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# RCRA CORRECTIVE ACTION PROGRAM

# INTERIM MEASURES ALTERNATIVES REVIEW REPORT
# EAST PLANT AREA

## VOLUME I OF II – TEXT, FIGURES, AND TABLES

## GENERAL MOTORS POWERTRAIN BEDFORD FACILITY
## BEDFORD, INDIANA
## U.S. EPA ID NO. IND 006036099

**Prepared For:**
**General Motors Corporation**

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**Prepared by:**
**Conestoga-Rovers & Associates**

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: (519) 884-0510
Fax: (519) 884-0525

web: http:\\www.CRAworld.com

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(500 mg/kg ≤ PCBs <1,500 mg/kg)

TABLE 6.9A DETAILED COST ESTIMATE
ALTERNATIVE 9A: SOIL SOURCE REMOVAL (50 mg/kg ≤ PCBs
<1500 mg/kg) TO ON-FACILITY LANDFILL VAULT AND (PCBs
≥1500 mg/kg) TO OFF-FACILITY DISPOSAL

TABLE 6.9B DETAILED COST ESTIMATE
ALTERNATIVE 9B: SOIL SOURCE REMOVAL (500 mg/kg ≤ PCBs
<1500 mg/kg) TO ON-FACILITY LANDFILL VAULT AND
(PCBs ≥1500 mg/kg) TO OFF-FACILITY DISPOSAL

TABLE 6.10 SUMMARY OF ALTERNATIVES

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# LIST OF ACRONYMS

| | | |
|---|---|---|
| Addendum No. 1 | - | RFI Work Plan Addendum No. 1 |
| Addendum No. 2 | - | RFI Work Plan Addendum No. 2 |
| Addendum No. 3 | - | RFI Work Plan Addendum No. 3 |
| Addendum No. 4 | - | RFI Work Plan Addendum No. 4 |
| Addendum No. 5 | - | RFI Work Plan Addendum No. 5 |
| Addendum No. 6 | - | RFI Work Plan Addendum No. 6 |
| Addendum No. 7 | - | RFI Work Plan Addendum No. 7 |
| Addendum No. 8 | - | RFI Work Plan Addendum No. 8 |
| Addendum No. 9 | - | RFI Work Plan Addendum No. 9 |
| Agreement | - | Performance Based Corrective Action Agreement |
| amsl | - | above mean sea level |
| AOC | - | Administrative Order on Consent |
| AOI 10 | - | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | - | Aboveground Storage Tanks |
| AOI 14 | - | McBride Cows Disposal Area |
| AOI 15 | - | Former Equipment Storage Area |
| AOI 16 | - | Former East Electrical Substation |
| AOI 23 | - | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |
| AOI 3 | - | PCB Storage Area |
| AOI 4 | - | Former North Disposal Area |
| AOI 5 | - | Former East Sand Disposal Area |
| AOI 6 | - | Former Sludge Disposal and Fire Training Area |
| AOI 7 | - | Former North Lagoons and Outfall 001 |
| AOI 8 | - | Former South Lagoons and Outfall 002 |
| AOI | - | Area of Interest |
| AST | - | Aboveground Storage Tank |
| BCA | - | Bias-corrected and accelerated method |
| bgs | - | below ground surface |
| BRA | - | Baseline Risk Assessment |
| BW | - | Bentonite-Water |
| CA | - | Corrective Action |
| CB | - | Cement-Bentonite |
| CCR | - | Current Conditions Report |

# LIST OF ACRONYMS

| | | |
|---|---|---|
| CERCLA | - | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFD | - | Central Foundry Division |
| CFR | - | Code of Federal Regulations |
| cfs | - | cubic feet per second |
| CKD | - | Cement Kiln Dust |
| CM | - | Corrective Measures |
| cm/s | - | centimeters per second |
| CPE | - | Chlorinated Polyethylene |
| CPT | - | Cone Penetration Tests |
| CRA | - | Conestoga-Rovers & Associates, Inc. |
| cy | - | cubic yards |
| DNAPL | - | Dense Non-Aqueous Phase Liquid |
| EI | - | Environmental Indicator |
| Fabricast | - | Fabricast Division |
| Facility | - | GM Powertrain Bedford Facility |
| FC | - | Fraction Contacted |
| FML | - | Flexible Membrane Liner |
| FS | - | Factor of Safety |
| ft | - | feet |
| GCL | - | Geosynthetic Clay Liner |
| Geonet | - | Geocomposite Drainage Net |
| GM | - | General Motors Corporation |
| GMS | - | Groundwater Monitoring System |
| gpd | - | gallons per day |
| HASP | - | Health and Safety Plan |
| HDPE | - | High Density Polyethylene |
| HELP | - | Hydrologic Evaluation of Landfill Performance |
| HI | - | Hazard Index |
| Hypalon | - | Chlorosulfonated Polyethylene |
| IDEM | - | Indiana Department of Environmental Management |
| IM | - | Interim Measures |
| IMI | - | Interim Measures Implementation |

# LIST OF ACRONYMS

| | | |
|---|---|---|
| IWI | - | Index of Watershed Indicators |
| LDPE | - | Low Density Polyethylene |
| LNAPL | - | Light Non-Aqueous Phase Liquid |
| mg/kg | - | milligrams per kilogram |
| MPC | - | Minerals Processing Corporation |
| MSW | - | Municipal Solid Waste |
| NAPL | - | Non-Aqueous Phase Liquid |
| NHTSA | - | National Highway Traffic Safety Administration |
| NPDES | - | National Pollutant Discharge Elimination System |
| O&M | - | Operation and Management |
| OMB | - | Office of Management and Budget |
| OMM | - | Operation, Maintenance, and Monitoring |
| PCBs | - | Polychlorinated Biphenyls |
| PRG | - | Preliminary Remediation Goal |
| PVC | - | Polyvinyl Chloride |
| RA | - | Removal Action |
| RCRA | - | Resource Conservation and Recovery Act |
| RFI | - | RCRA Facility Investigation |
| RISC | - | Risk Integrated System of Closure |
| RME | - | Reasonable Maximum Exposure |
| RME | - | Reasonable Maximum Exposure |
| SA | - | Soil- Attapulgite |
| SB | - | Soil-Bentonite |
| SHHRA | - | Streamlined Human Health Risk Assessment |
| Soil TM | - | Technical Memorandum, RCRA Facility Investigation (RFI), Soil, Sediment Surface Water, Wipe Sampling |
| SSC | - | Site Source Control |
| Stream TM | - | Technical Memorandum Phase II Stream Investigation |
| SWMM | - | Stormwater Management Model |
| TM | - | Technical Memorandum |
| TSCA | - | Toxic Substances Control Act |
| U.S. DOT | - | U.S. Department of Transportation |
| U.S. EPA | - | United States Environmental Protection Agency |
| UCL | - | Upper Confidence Limit |

# LIST OF ACRONYMS

| | | |
|---|---|---|
| USFWS | - | United States Fish and Wildlife Service |
| USGS | - | United States Geological Survey |
| VOCs | - | Volatile Organic Compounds |
| WWTP | - | Wastewater Treatment Plant |

# 1.0 INTRODUCTION

This Interim Measures (IM) Alternatives Review Report for the East Plant Area at the General Motors Corporation (GM) Powertrain Bedford Facility (Facility) located in Bedford, Indiana has been prepared by Conestoga-Rovers & Associates Inc. (CRA), on behalf of GM, as part of the Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) activities being conducted under the Performance-Based CA Agreement (Agreement) (effective March 20, 2001, and amended on October 1, 2002) between United States Environmental Protection Agency (U.S. EPA) and GM for the Facility. The Indiana Department of Environmental Management (IDEM) has also been involved in all aspects of the CA and the floodplain soil and sediment Removal Action (RA) activities for this Facility.

The Facility location and Facility plan are presented on Figures 1.1 and 1.2, respectively. The East Plant Area, and associated Areas of Interest (AOI) locations, are presented on Figure 1.3.

## 1.1 GENERAL

The Facility is located at 105 GM Drive in Bedford, Lawrence County, Indiana, 47421. The Facility produces aluminum casting products, such as transmission cases, pistons, and engine blocks. Major aluminum production processes include die casting and permanent molding. The Facility has been operating as an aluminum foundry since 1942, with major facility modifications completed in 1950, 1953, 1966, 1971, 1974, 1979, and 1980.

## 1.2 PERFORMANCE-BASED CORRECTIVE ACTION AGREEMENT

The Agreement (effective March 20, 2001, amended October 1, 2002) governs the RCRA CA for the Facility and specifies the schedule for meeting the Environmental Indicators (EIs) and the final CM for the Facility. The IM approach recommended in this IM Alternatives Review Report is designed to assist in meeting the objectives of the Agreement.

## 1.3 PURPOSE

The purpose of this IM Alternatives Review Report is to develop and evaluate potential IM alternatives to mitigate releases or potential releases of hazardous substances that have been identified in the East Plant Area and to support a final CM. The IM selection is supported by a Streamlined Human Health Risk Assessment (SHHRA) (presented in Section 4.0) that establishes the need for IM, the potential exposures to be addressed by IM, and the risk reduction that would be achieved by the different IM alternatives evaluated for the East Plant Area.

## 1.4 IM ALTERNATIVES REVIEW REPORT ORGANIZATION

This IM Alternatives Review Report is organized as follows:

**Section 2.0 – Description of Current Conditions**
A geographical and historical description of the Facility and East Plant Area is presented in this section along with a description and the characterization of AOIs within the East Plant Area. The nature and extent of Polychlorinated Biphenyls (PCBs) in the East Plant Area is also presented in this section.

**Section 3.0 – Corrective Action Objectives**
This section presents the objectives of the CA.

**Section 4.0 – Streamlined Human Health Risk Assessment**
This section presents the SHHRA which was prepared to establish the need for IM and to support the evaluation of IM alternatives for the East Plant Area.

**Section 5.0 – Screening of Interim Measures Technologies**
This section presents the evaluation of potential IM cleanup approaches and associated technologies.

**Section 6.0 – Identification of Interim Measures Alternatives**
This section develops IM alternatives based on the CA objectives and technology review that are further evaluated in this IM Alternatives Review Report.

**Section 7.0 – Evaluation of Interim Measures Alternatives**

IM alternatives are evaluated against U.S. EPA criteria for selecting CM under RCRA CA (61 FR 19432, May 1, 1996). This evaluation forms the basis for recommendation of a preferred IM alternative for the East Plant Area.

**Section 8.0 – Recommended Interim Measures Alternative**

The recommended IM alternative for the East Plant Area is presented in this section.

**Section 9.0 – Community Participation**

Methods to ensure community participation and consideration of community input in the decision making process for IM selection are described in this section.

**Section 10.0 - References**

This section presents references cited in this IM Alternatives Review Report.

# 2.0 DESCRIPTION OF CURRENT CONDITIONS

## 2.1 FACILITY LOCATION, HISTORY, LAND USE, SECURITY, AND WATER SUPPLY

This section presents the Facility location, history, land use, security, and water supply.

### 2.1.1 FACILITY LOCATION

The Bedford Plant operations consist of approximately 915,000 square feet of operating floor space located at 105 GM Drive in the City of Bedford, Shawswick Township, Lawrence County, Indiana. The Bedford Facility lies on approximately 152.5 acres of land on either side of GM Drive and extends north along Bailey Scales Road. The East Plant Area represents a portion of the Facility and is located to the east of GM Drive and west of Bailey Scales Road (see Figure 1.3).

### 2.1.2 FACILITY HISTORY

From the 1890's until the early 1940's, Stone City Construction Company owned the Bedford Facility property and operated limestone mills. In the early 1940's, the U.S. Government acquired the property for military production to assist with the war effort. In 1942, GM leased the former limestone mills from the U.S. Government for aluminum foundry production.

In 1946, GM purchased the Bedford Facility from the U.S. government, at which time the Bedford Facility became known as the Allison Bedford Foundry. In 1950, the Fabricast Division (Fabricast) of GM was formed and control of the property was transferred to Fabricast. In 1959, Fabricast consolidated with GM's existing Central Foundry Division (CFD). GM's CFD, later merged into GM Powertrain, with GM Powertrain operating the Bedford Facility since 1991.

Additional information regarding the Facility history is presented in the Current Conditions Report (CCR) (CRA, May 2001).

### 2.1.3 FACILITY LAND USE

Currently, the Bedford Facility is bordered by residential and undeveloped areas to the north; to the south by the Canadian and Pacific Railway, and IMCO (a Kaiser aluminum recycling facility), to the east by residential and undeveloped areas; and to the west by the railway, industrial and residential properties and a cemetery. The Bedford Facility property boundaries, buildings, and support facilities are presented on Figures 1.1, 1.2, and 1.3.

The Facility is currently zoned and utilized for industrial purposes. The reasonably foreseeable future land use is industrial (see Figure 2.1).

### 2.1.4 FACILITY SECURITY

The industrial land use at the Facility is controlled by GM Security which includes security fences, security cameras, and patrols by security guards. The security system and guards are maintained at the Facility on a 24 hour a day, 7 days a week basis.

### 2.1.5 WATER SUPPLY

The Facility receives municipal water from the City of Bedford. Public water supply lines are along all major roads throughout Lawrence County. These lines are owned by the Bedford City Utilities, East Lawrence Water Corporation, or North Lawrence Water Corporation. The surface water intake for the City of Bedford water supply is located on the East Fork White River. East Lawrence Water Corporation purchases all of their water from the City of Bedford. The North Lawrence Water Corporation purchases water from the City of Bedford for all of their customers located east of Salt Creek. For their customers west of Salt Creek, the North Lawrence Water Corporation supplies water from water supply wells screened in the bedrock (IDEM, 2001).

## 2.2 RCRA FACILITY INVESTIGATION STATUS

The following sections outline the RCRA Facility Investigation (RFI) activities that have been completed for the Facility including the East Plant Area.

### 2.2.1 CURRENT CONDITIONS REPORT

The CCR (CRA, May 2001) was compiled and finalized on May 21, 2001, based on a review of information contained in GM files, U.S. EPA files, U.S. Fish and Wildlife Service (USFWS) files, and IDEM files. In addition, other resources, including United States Geological Survey (USGS) data, were used to obtain information regarding local land-use, climate, geology, hydrogeology, surface water hydrology, and ecology. The CCR (CRA, May 2001) served as the basis for the design of the RFI Work Plan (CRA, October 2001).

### 2.2.2 RFI WORK PLAN

The RFI Work Plan (CRA, October 2001) was completed on October 29, 2001. The overall goal of the RFI was to characterize the nature and extent of any releases of hazardous waste and/or hazardous waste constituents at or from the Facility that may pose an unacceptable risk to human health and/or the environment.

The results of the RFI will be used to support the selection of final IM and CM necessary to protect human health and/or the environment from all current and potential future unacceptable risks, if any, due to releases of hazardous waste and/or hazardous waste constituents at or from the Facility. RFI investigations at the Facility are currently ongoing.

### 2.2.3 RFI REPORTING

A number of RFI activities have been completed for the Facility including the East Plant Area and the results are presented in the Technical Memorandum (TM), RCRA Facility Investigation (RFI) – Soil; Sediment; Surface Water; Wipe Sampling (Soil TM) (CRA, April 2004), and the Technical Memorandum, Phase II Stream Investigation (Stream TM) (CRA, February 2003). Based on the results of the initial RFI activities, additional investigations were identified, as necessary, to further characterize the Facility, including the East Plant Area. The scope of these activities was presented in various addenda to the RFI Work Plan (CRA, October 2001). Completed RFI Addenda include:

- RFI Work Plan Addendum No. 1 (Addendum No. 1) (CRA, November 18, 2002);
- RFI Work Plan Addendum No. 2 (Addendum No. 2) (CRA, May 22, 2003);

- RFI Work Plan Addendum No. 3 (Addendum No. 3) (CRA, March 2004); and
- RFI Work Plan Addendum No. 6 (Addendum No. 6) (CRA, September 27, 2004).

#### 2.2.3.1 TECHNICAL MEMORANDUM FOR SOIL, SEDIMENT, SURFACE WATER, AND WIPE SAMPLING (SOIL TM)

The Soil TM (CRA, April 2004) describes the RFI activities and results from the first three phases of investigation at the Facility. The Soil TM (CRA, April 2004) includes data for soil, sediment, surface water, and wipe samples collected from the Facility during the RFI activities completed prior to 2004.

#### 2.2.3.2 TECHNICAL MEMORANDA FOR STREAM INVESTIGATION (STREAM TM)

The Bedford RFI Technical Memorandum 1, 2001 Stream Investigation Data Summary (Exponent, March 2002) describes the RFI activities and results from the first phase of investigation at the Facility as defined in the Stream Investigation Work Plan (Exponent, June 2001). Specifically, this TM includes data for the initial creek sediment, surface water, soil, and biota samples collected during the RFI. This TM recommended that additional sampling include bank and floodplain soil sampling to further characterize potential impacts to the stream and flood plain.

The activities detailed in the Stream TM (CRA, February 2003) include stream investigation sampling and other follow-up activities to the October 2001 sampling event as presented in the Bedford RFI Technical Memorandum 1, Stream Investigation Data Summary (Exponent, March 2002). These follow-up activities included floodplain, bank soil, sediment, and surface water sampling on Bailey's Branch from Outfall 002 to Pleasant Run Creek, Pleasant Run Creek (Stream 6), Salt Creek, upstream tributaries 1, 2, 3, 4, and 5 to Bailey's Branch, and the Unnamed Western Tributary. In addition to the floodplain sampling activities, soil samples were collected at various other parcels upon receipt and evaluation of resident's requests for sampling on their property. The Stream TM (CRA, February 2003) presents a summary of the results of the Phase II Stream Investigation.

#### 2.2.3.3 ADDENDUM NO. 1

Addendum No. 1 (CRA, November 2002) investigated additional on and off-Facility areas based on previously completed RFI activities. The purpose of the additional investigative activities was to further define the extent of constituents in soil at the Facility, characterize non-aqueous phase liquid (NAPL) observed at or near the Facility and its transport pathways, and to obtain additional information on the groundwater-surface water system at or near the Facility. The activities outlined in Addendum No. 1 (CRA, November 2002) were completed in November 2002, and the results are also presented in the Soil TM (CRA, April 2004).

#### 2.2.3.4 ADDENDUM NO. 2

Addendum No. 2 (CRA, May 2003) investigated additional areas at the Former North Disposal Area (AOI 4) through completion of soil boring and monitoring well installations as well as surface water and sediment sampling. The activities outlined in Addendum No. 2 (CRA, May 2003) were completed in May 2003. The results are presented in the Soil TM (CRA, April 2004).

#### 2.2.3.5 ADDENDUM NO. 3 – HOURLY PARKING LOT

The purpose of Addendum No. 3 (CRA, March 2004) was to perform additional investigative activities at the GM hourly parking lot and in the vicinity of Breckenridge Road and GM Drive.

Soil sampling as part of the Addendum No. 3 (CRA, March 2004) was completed on May 10, 2004. These data are presented in Addendum No. 7 (CRA, August 2004) (which proposes additional delineation).

#### 2.2.3.6 ADDENDUM NO. 6 – SWALLET INVESTIGATION

The purpose of Addendum No. 6 (CRA, June 2004), was to present the investigative activities necessary to evaluate swallets identified on Parcel 15 and on Parcel 216. Implementation of Addendum No. 6 (CRA, September 2004) is complete, and final data were submitted to U.S. EPA on September 27, 2004.

### 2.2.3.7 PLANNED/ONGOING ADDITIONAL RFI INVESTIGATIONS

Currently, there are five Addenda to the RFI Work Plan (CRA, October 2001) that are in various stages of implementation. These include:

- RFI Work Plan Addendum No. 4 (Addendum No. 4) (CRA, May 3, 2004);
- RFI Work Plan Addendum No. 5 (Addendum No. 5) (CRA, July 26, 2004);
- RFI Work Plan Addendum No. 7 (Addendum No. 7) (CRA, September 2004);
- RFI Work Plan Addendum No. 8 (Addendum No. 8) (CRA, March 14, 2005); and
- RFI Work Plan Addendum No. 9 (Addendum No. 9) (CRA, Revision 1 Draft, March 4, 2005).

A brief description of these Addenda and the planned investigations presented in each Addenda are presented in the following subsections.

#### 2.2.3.7.1 ADDENDUM NO. 4 –TEST PIT EXCAVATION WORK PLAN

The purpose of proposed test-pitting activities outlined in RFI Work Plan Addendum No. 4 (CRA, May 2004) was to further investigate various anomalies that were identified in a geophysical investigation that was completed at the Facility. Although a majority of the test pit locations have been completed, there are a few under current remediation structures that will be completed once those structures are removed.

Final validated data of completed test pit locations in Addendum No. 4 (CRA, May 2004) were submitted to U.S. EPA on October 20, 2004.

#### 2.2.3.7.2 ADDENDUM NO. 5 – THERMAL IMAGING/ DYE TRACE TESTING/OFFSITE GROUNDWATER WELL INSTALLATIONS

The purpose of Addendum No. 5 (CRA, July 2004) was to conduct additional groundwater investigation activities related to assessing groundwater migration off of the Facility.

Field studies for thermal imaging, dye trace testing activities, and groundwater monitoring well installation have been completed and results were submitted to U.S. EPA on November 24, 2004. Implementation of the field studies for the sewer investigation at the Parcel 400 manhole structure is ongoing.

#### 2.2.3.7.3 ADDENDUM NO. 7 - HOURLY PARKING LOT

The purpose of Addendum No. 7 (CRA, September 2004) is to conduct additional delineation sampling at the hourly parking lot. Field activities associated with Addendum No. 7 were initiated in October 2004. Three of four proposed areas have been investigated and delineated. Some preliminary results for these areas were submitted to U.S. EPA on November 24, 2004. Field activities are on-going to further investigate and delineate the fourth area, the area of fill material in front of the Plant.

#### 2.2.3.7.4 DRAFT ADDENDUM NO. 8 – EAST PLANT AREA DYE TRACE TESTING

The purpose of draft Addendum No. 8 (CRA, March 14, 2005) will be to conduct two additional dye trace tests in the northeast and east portion of the East Plant Area. These activities will help to further define hydrogeologic conditions and potential groundwater migration pathways in this portion of the Facility.

#### 2.2.3.7.5 ADDENDUM NO. 9 – EAST PLANT AREA

The purpose of Addendum No. 9 (CRA, Revision 1 Draft, March 4, 2005) will be to conduct an additional pre-design investigation in the fill, overburden, and bedrock of the East Plant Area portion of the Facility. These activities will include a geophysical survey, PCB soil sampling, and investigative boreholes around the down gradient portion of the perimeter of the East Plant Area. These activities will support the IM Implementation (IMI).

## 2.3 REGIONAL ENVIRONMENTAL SETTING

The following descriptions of the regional environmental setting are based upon both published data and data obtained from various phases of the RFI at the Facility. The original descriptions presented in the CCR (CRA, May 2001) have been updated, as

appropriate, based on additional information obtained subsequent to the completion of the CCR.

### 2.3.1 REGIONAL PHYSIOGRAPHY AND TOPOGRAPHY

The State of Indiana covers an area of approximately 36,300-square miles. The state's topography ranges from 324 to 1,257 feet (ft) above mean sea level (amsl). The lowest point of elevation is in the southwest corner of Indiana, where the Wabash River flows into the Ohio River. The highest point is in Wayne County in east central Indiana.

### 2.3.2 REGIONAL LAND USE

Regional land use in this area is mixed, consisting of industrial, commercial, residential and agricultural. The primary crops are corn, soybeans, feed grains, and hay. Raising livestock is common throughout the area. Industrial and commercial uses are also important, especially near urban areas. Oil and gas (in the east central section) was discovered in 1889, however, this resource was depleted by 1912. There are several oil and natural gas fields located in the southwestern portion of Indiana.

### 2.3.3 REGIONAL GEOLOGY

The Bedford Facility lies within an area of Indiana that was not glaciated (driftless area) during the last glacial period on the North American continent. The maximum progression of the Illinoian Glacial advance (the furthest advance of the Laurentide Ice Sheet) lies to the west, north, and east of the immediate region surrounding the Bedford Facility (Figure 2.2). Consequently, the surficial geology of the area generally consists of a relatively thin layer of unconsolidated deposits of sand, clay, and fragments of chert produced by the weathering of limestone bedrock and wind-deposited silty material, known as loess. Thicker deposits of proglacial outwash, lake sediment, and recent colluvium occurs along the major stream valleys (Figure 2.3). The surficial deposits range in thickness from zero ft along bedrock outcrops to approximately 100 ft thick along Salt Creek and the East Fork of the White River (Gray, 1974).

The bedrock within the region is near the eastern margin of a structure known as the Illinois Basin. The bedrock formations in this area generally dip to the west at

approximately 20 to 25 ft per mile. The Cincinnati Arch lies to the east of the Illinois Basin and covers much of Indiana (Figure 2.3) (Indiana Geological Survey, 2001).

Two regional structures are within the vicinity of the Bedford Facility, the Leesward Anticline and the Mt. Carmel fault (Figure 2.3). The Leesward Anticline is located to the north and east of Bedford and plunges to the south-southeast. The Mt. Carmel fault is a normal fault with the downthrown side located to the west of the fault. This fault is located to the north and east of the Bedford Facility and truncates the Leesward Anticline on its western side. The Mt. Carmel fault generally acts as a hinge line, with gentler dips to the west of the fault and slightly steeper dips to the east (Melhorn and Smith, 1959).

Bedrock within the immediate vicinity of the Bedford Facility (Figure 2.4) consists of the lower beds of the Middle Mississippian St. Louis Limestone (the oldest formation within the Blue River Group) and is only approximately 25 ft thick in the immediate vicinity of the Bedford Facility (Melhorn and Smith, 1959). Immediately underlying the St. Louis Limestone, and outcropping to the east of the Bedford Facility, are the Salem Limestone and the Harrodsburg Limestone formations, respectively. These two Mississippian formations make up most of the Sanders Group. The Salem Limestone is approximately 70 to 80 ft thick, where fully preserved, and the Harrodsburg Limestone is approximately 80 to 90 ft thick in the area (Melhorn and Smith, 1959). Figure 2.5 presents a generalized stratigraphic column for Paleozoic formations in Indiana.

The Borden Group, which underlies the Sanders Group and outcrops further to the east, consists of approximately 500 to 800 ft of siltstone and shale, interbedded with some sandstone and minor limestone. The New Providence Shale formation makes up the bottom of the Borden Group, and is approximately 200 ft thick.

The Sanders and Blue River Groups have been described to consist mostly of carbonates, with minor amounts of chert, shale, siltstone, anhydrite, gypsum, and calcareous sandstone. A thin bed of brown dolomitic limestone commonly marks the bottom of the St. Louis Limestone. The Salem Limestone, which is more massively bedded limestone, is also known as the Indiana Limestone, the Bedford Limestone, or the Oolitic Limestone and is quarried as fine building stone. However, some horizons may contain geodes, joints and solution fractures, which render the formation less suitable for quarrying (Fenelon and Greeman, 1994).

Numerous joints and fractures are present in these formations with master sets trending east-west within the St. Louis Limestone, with minor sets 90 degrees to the master sets

(Powell, 1976 and 2001). Karst topography is present near the top of the St. Louis limestone. Numerous sinkholes can be observed on the USGS topographic quadrangles approximately 5 to 10 miles to the west of the Bedford Facility. Several caverns have been mapped in Lawrence County, including one of the largest mapped caverns in the United States, the Blue Springs Cavern, located approximately five miles southwest of the City of Bedford. Other mapped caverns in the area include the Shiloh Cave, the No Sweat Cave, the Dog Hill Cave, the Donnehue Cave, and the Salt Creek Cave. Other unmapped caverns within close proximity to the Bedford Facility include: Mouse Hole Cave, located one mile east-northeast; Eighteenth Street Cave, located one and one-half miles to the south-southeast; and Armstrong Caves I and II, located one and one-half miles to the west-southwest (Etzel, 1982).

The near surface regional geology is characterized by karst topography. Several geomorphic features, such as sinkholes, characterize the land surface near Bedford. This is especially prominent along the western portion of Lawrence County, with much less surface expression through the mid and eastern portions of the county. The City of Bedford lies within the physiographic province known as the Mitchell Plain, or Plateau (karst plain). The Mitchell Plain extends from near Bloomington south to the Ohio River within the State of Indiana.

### 2.3.4 REGIONAL HYDROGEOLOGY

Groundwater resources are found in Lawrence County along the valleys of the major rivers or streams and within the thick Mississippian carbonate aquifer system (within the western portion of Lawrence County) and the Silurian-Devonian carbonate bedrock aquifer (within the eastern portion of Lawrence County).

There are two basic types of aquifers: unconfined and confined. Unconfined aquifers in Lawrence County generally occur along the Salt Creek and the East Fork of the White River within the proglacial outwash deposits, glaciolacustrine deposits, and recent alluvium. The tops of unconsolidated aquifers are often exposed to the surface or have a very thin covering of non-aquifer material, generally comprised of silt and clay (Fenelon and Bobay, 1994).

Groundwater flow within the confined (carbonate) aquifers takes place along the joints, fractures, and bedding planes that eventually may become enlarged by solution to cave passages or karst features. Recharge to a karst system occurs through surface openings that vary in scale from narrow, solutionally widened joints to large sinkholes. Discharge

typically occurs through springs, which are solutionally widened joints or bedding planes, but may be enlarged, to sizable cave openings. Most groundwater within this aquifer system discharges to surficial water bodies, to underground water bodies, and to springs (Etzel, 1982).

### 2.3.5 REGIONAL HYDROLOGY

Most of the rivers in the East Fork White River Basin drain to the southwest. According to USGS Water Resources Division, the current stream flow recorded at the East Fork White River gauging station, located 7.8 miles southeast of Bedford in Lawrence County, is 4,210 cubic ft per second (cfs).

Major tributaries to the East Fork White River include the Muscatatuck River, Salt Creek, Driftwood River, Flatrock River, and the Big Blue River. Drainages in the East Fork White River Basin include the Lost River, Sugar Creek, Graham Creek, Clifty Creek, Big Creek, Indian Creek, White Creek, Brandywine Creek, and the Little Blur River.

Rivers in the eastern half of the East Fork White River Basin have a subparallel drainage. Those rivers include the Sugar Creek, Big Blue River, Little Blur River, Flatrock River, Clifty Creek, Sand Creek, Vernon Forth, Graham Creek, and the East Fork White River from Medora to Jonesville (see Figure 2.6 for the Lower East Fork White River Drainage Map).

Drainage of the Mitchell Plain in central Lawrence County (west of the Facility), northeast Orange County, and Monroe County is different from the rest of the East Fork White River Basin. In the streams that flow across the Mitchell Plain, surface water may be intercepted by swallow holes and diverted underground into the groundwater system or subterranean channels.

## 2.4 EAST PLANT AREA ENVIRONMENTAL SETTING

The East Plant Area is located on the portion of the Facility to the east of GM Drive and west of Bailey Scales Road. It is bordered to the west by GM Drive and the main plant operations, to the north and west by residential properties Parcels 401 through 406, to the east by residential properties Parcels 203, 204, 3, 207, 412, 413, 414, 415, 416, 214, and 15, to the northeast by Bailey Scales Road, and to the north by Parcels 217 and 21.

### 2.4.1 EAST PLANT AREA GEOLOGY

The natural soil in the immediate vicinity of the Bedford Facility is known as Crider. Crider soil is a fine-grained, silt loam to silty clay loam. Crider soil develops on 20 inches to 45 inches of silty loess over clayey material derived from limestone (USDA, 1985).

The overburden materials at the East Plant Area consist of fill materials, clay, and silt. The thickness of the overburden materials varies considerably across the East Plant Area. Overburden in the East Plant Area is generally thickest in AOIs 4, 5, 6, and 7, where foundry sand and other filling activities are known to have occurred historically.

The overburden within the East Plant Area is underlain by the St. Louis and Salem Limestone Formations. The St. Louis Limestone Formation has been identified to be highly weathered and fractured near surface. Fracture density appears to decrease with depth. The highly weathered and fractured St. Louis Limestone is underlain by the Salem Limestone (also known as the Indiana, Bedford, or Oolitic Limestone) which is the limestone formation utilized by local quarries for fine building stone. The Salem Limestone is also weathered and fractured at the erosional rock surface but is generally more massive and less weathered and fractured than the St. Louis Limestone. The Salem Limestone becomes more massive with depth.

Additional information on the East Plant Area geology is presented in the Soil TM (CRA, April 2004) and RFI Work Plan (CRA, October 2001).

### 2.4.2 EAST PLANT AREA HYDROGEOLOGY

The Conceptual Site Model for fill/overburden and shallow bedrock groundwater flow is presented on Figure 2.7. This Conceptual Site Model describes the shallow groundwater flow (i.e., unconfined water table) through the unconsolidated overburden and upper fractured/weathered bedrock at the Facility. Recharge to the aquifer occurs through the overburden materials and directly into bedrock, where exposed. Discharge of the shallow bedrock groundwater occurs through springs and seeps in topographically low areas (e.g., creeks and ditches). The results of groundwater sampling across the Facility and the results of the dye trace testing completed in September 2004 support the Conceptual Site Model of the shallow groundwater flow at the Facility. Available bedrock topographic information is presented on Figure 2.8. The

location of St. Louis and Salem Limestone outcropping into the ravines (or contacts) surrounding the East Plant Area are presented on Figure 2.9. Water table contours are presented on Figure 2.10. The water table generally occurs at depths of 5 to 15 ft below ground surface (bgs) depending upon location.

### 2.4.3 EAST PLANT AREA HYDROLOGY

The Bedford Facility is situated on a topographic ridge, such that the Facility is drained by surface runoff primarily to the east and northeast in small valleys which are tributaries of Bailey's Branch of Pleasant Run Creek. According to Facility personnel, surface water runoff from the Facility to the west of the Facility is minimal. The ridge top is approximately 150 ft to 185 ft higher than the valley bottom, located approximately one-half mile northeast of the Bedford Facility.

Stormwater from the manufacturing portions (e.g., improved surfaces) of the Bedford Facility is currently collected in the Stormwater Lagoon (which is part of the Facility's recycled water system). Stormwater from non-operational portions of the Facility (i.e., property located north and east of the Stormwater Lagoon) drains directly to several unnamed ditches and eventually to Bailey's Branch of Pleasant Run Creek.

## 2.5 EAST PLANT AREA CHARACTERIZATION

During the RFI implementation, GM investigated a wide variety of parameters in the surface and/or subsurface soils within the AOIs. Details regarding the RFI are included in the RFI Work Plan (CRA, October 2001) and the results are presented in the Soil TM (CRA, April 2004) (see Section 2.2). RFI investigation and reporting for the East Plant Area is ongoing. AOIs located within the East Plant Area are described below.

### 2.5.1 AOI DESCRIPTIONS

*AOI 3 – PCB Storage Area*

A PCB Storage Area for the Facility was located in the Wastewater Treatment Plant (WWTP) Filter Building and has been designated as AOI 3.

*AOI 4 – Former North Disposal Area*

Beginning in the late 1950s, the Facility began disposing of waste materials northeast of the former North Lagoon. AOI 4 has been referred to as the Sand Fill Area, Sand Landfill, Foundry Sand Storage Area, Landfill Storage Area, North Landfill, and Landfill (herein referred to as the Former North Disposal Area). One area to the northeast of the main landfill had historically been quarried and then backfilled. This AOI is currently covered with approximately 2 to 3 ft of clay soil cover.

*Area North of AOI 4*

The area north of AOI 4 is defined as the area to the west of Parcel 216, south of Parcel 217, and east of Parcels 401, 402, 403, 404, 405, and 406. Portions of this area are currently being addressed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) RA.

*AOI 5 – Former East Sand Disposal Area*

In 1985, GM began using foundry sand as fill east of the salary parking lot to expand the previously existing salary parking lot "footprint". This area was identified as AOI 5.

*AOI 6 – Former Sludge Disposal Area*

The former Sludge Disposal Area (AOI 6) was identified from historical aerial photographs and from interviews with Facility personnel. This disposal area is located within the AOI 5 East Sand Disposal Area on Facility property under and to the east and south of the salary parking lot. This area was used to put excavated sludges from the maintenance of the former process ponds. These sludges would be put in a hole dug into the sand fill and then covered after drying occurred.

*AOI 7 – Former North Lagoon and OutFall 001*

The CCR indicated that the Stone City Construction Company originally constructed the Former North Lagoon (also referred to as the North Pond, Old Lagoon, and North Stormwater Lagoon) sometime between 1938 and 1942. Subsequent review of additional historical photographs put the construction of this lagoon between 1946 and 1954. GM continued the use of the Former North Lagoon for stormwater collection and utilized a portion of the stormwater in the Facility's manufacturing processes on an as-needed basis until 1981. In 1981, the lagoon was excavated to bedrock, a sump collection system was installed on the rock, the area was backfilled with clean fill, and collected groundwater was pumped to a central sump that is periodically pumped to the Facility's current WWTP.

*AOI 8 – Former South Lagoons and Outfall 002*

GM utilized five lagoons (South Lagoons No. 1 through No. 5) at the Facility for the purpose of treating process wastewater and stormwater prior to discharge to Outfall 002, pursuant to a National Pollutant Discharge Elimination System (NPDES) permit (IN 0003573), originally issued in 1974. GM constructed the former South Lagoons in approximately 1959 (the first three lagoons can be seen in the 1954 historical photograph). The Former South Lagoons operated as a cascading-type system. The process wastewater primarily originated from the existing service tunnels beneath the die cast machine areas of the plant. The five South Lagoons were closed once the current WWTP was installed. The existing Facility WWTP occupies the location of Former South Lagoons No. 1, No. 2, No. 3, and No. 5. Although there have been no documented releases from Former South Lagoons No. 1, No. 2, No. 3, and No. 5, there was a potential that subsurface conditions may have been impacted due to the nature of the operations of the lagoons. Former South Lagoon No. 4 was excavated to bedrock in 1983, and due to the presence of springs and oil within the final excavation, a perimeter drain system was installed to collect groundwater to a central sump that is periodically pumped to the Facility's current WWTP. On February 26, 2004, GM received a new NPDES permit (IN0003573) effective April 1, 2004 through March 31, 2009.

*AOI 10 – Existing Stormwater Lagoon and Outfall 003*

The Existing Stormwater Lagoon is located northeast of the salary parking lot. The Facility stormwater management system is designed to allow collected stormwater to be recycled and reused prior to ultimate treatment in the Facility WWTP with final discharge to Outfall 002. The Existing Stormwater Lagoon can discharge to Outfall 003 (pursuant to permit IN0003573) during overflow conditions (a 15-year, 24-hour storm event).

*AOI 11 – Aboveground Storage Tanks*

The Facility has historically utilized several aboveground storage tanks (ASTs) for storage of various materials including vehicle fuel and PCB-containing fluids (hydraulic fluids or oils). The WWTP concrete surge basin currently covers one of the former bermed areas; the second former bermed AST area is covered with gravel west of the WWTP concrete aeration tank; and the third former bermed AST area is located within the bermed containment for the one-million gallon AST. The one million-gallon AST remains active and is used as a storage tank for the WWTP and for waters collected during the RA.

*AOI 15 – Former Equipment Storage Area*

A review of historical photographs, aerials, drawings and interviews with Facility personnel identified a former Equipment Storage Area located on the east side of GM Drive. The former Equipment Storage Area is located north of the former North Lagoon and is believed to overlie a portion of AOI 4. This area is currently being utilized as a parking lot for a tractor-trailer operator and is referred to as AOI 15.

*AOI 23 – Area Affected by the 1996 Wastewater Treatment Filter Cake Release*

In October 1996, a release of filter cake waste liquid occurred on a gravel surface outside of the Sludge Building. This area is referred to as AOI 23.

## 2.5.2 NATURE AND EXTENT OF PCBS IN EAST PLANT AREA

### 2.5.2.1 SUMMARY OF ANALYTICAL RESULTS

Although most of the sampling in the East Plant Area is completed, some soil and sediment sampling continues. The available analytical results for the East Plant Area are summarized in Tables 2.1 through 2.8.

Additional data will be collected during the implementation of ongoing RFI activities, the pre-design activities, or during the IMI.

### 2.5.2.2 SUMMARY OF EXCEEDANCES

Figures 2.11, 2.12, and 2.13 present the PCB and non-PCB exceedances of screening levels for sampling results for soil and sediment within the East Plant Area. Figures 2.14 and 2.15 present the PCB and non-PCB screening level exceedances in sampling results for surface water and groundwater within the East Plant Area. To prepare the data presented on Figures 2.11 to 2.15, and used in the SHHRA, the total concentration of PCBs is conservatively estimated by summing all detected Aroclor concentrations and one-half the sample quantitation limits of non-detected Aroclors that are found in RFI samples. Table 2.9 provides a summary of the East Plant Area AOIs and the location of concentrations over 1.8 mg/kg, 5.3 mg/kg, 7.4 mg/kg, 25 mg/kg, 50 mg/kg, 100 mg/kg, 500 mg/kg, and 1,500 mg/kg of PCBs.

Appendix A presents a detailed evaluation and presentation of the distribution and volumes of PCB impacted materials in the East Plant Area. The presentation includes a

visualization of the PCB distribution at various elevations across the East Plant Area. A 3-D view of the East Plant Area PCB distribution is presented on Figures 2.16 and 2.17. A 3-D Visualization of the PCB distribution is provided on the CD presented in Appendix A.

#### 2.5.2.3 ASSESSMENT OF VOLUMES OF PCB-IMPACTED MEDIA - EAST PLANT AREA

As indicated above, an assessment of the distribution and volumes of PCB impacted materials in the East Plant Area is presented in Appendix A. A summary of fill/overburden volumes over a variety of PCB concentrations is presented in Table 2.10 (based on Appendix A).

### 2.5.3 PREVIOUS FILL/OVERBURDEN STRENGTH EVALUATIONS

Appendix B presents a geotechnical strength evaluation performed for AOI 4 prepared in response to earlier discussions with U.S. EPA/IDEM regarding the existing strength of fill/overburden in AOI 4. In addition, the memorandum presented in Appendix B evaluates the slope stability of the AOI 4 area.

Cone penetration tests (CPTs) were performed at eleven locations (CPT-1 to CPT-11) by Conetech Inc. under the direction of the CRA on March 11, 2003. In general, CPT data correlate well with the subsurface information obtained through the previously installed RFI boreholes. Based on the CPT data, the surficial stratigraphy of the landfill in AOI 4 consists of a clay cover that is several ft thick. This clay cover is underlain by sandy silt/silty sand fill (foundry sand). The foundry sand fill is generally underlain by a thin native clay layer (up to 5 ft thick at the CPT locations). Refusal of the CPT probe occurred at depths of between 6.5 ft and 33.5 ft bgs.

Two angled boreholes were drilled in March 2003 (B-X177Y252D and B-X223Y247D) at AOI 4. The logs for the angled boreholes are also included in Appendix B. One groundwater dissipation test was also performed at CPT-8 (close to the location of monitoring well TMW-X193Y251) to determine the approximate static groundwater table depth. Based on the dissipation test, the groundwater level in CPT-8 was at 27 ft bgs; corresponding to elevation 658.6 ft amsl, which is consistent with groundwater level measurements in a nearby monitoring well.

CRA performed an assessment of the existing slope stability. Slope stability modeling was performed using Slope/W (Version 5.13) limit equilibrium software, using the Bishop Method of slices.

Based on the geotechnical data collected, and the slope stability analysis performed, the existing slopes at AOI 4 are currently stable, with a Factor of Safety (FS) of about 2.8 for the 3H:1V side slopes. A factor of safety of 1.3 to 1.5 is generally considered appropriate for existing slopes.

# 3.0 CORRECTIVE ACTION OBJECTIVES

## 3.1 OVERVIEW

U.S. EPA Region IX has developed generic risk-based Preliminary Remediation Goals (PRGs) for PCBs in soil (U.S. EPA, 2002) using conservative assumptions about worker exposures to soil. For a lifetime incremental cancer risk of $1x10^{-5}$, the generic PRG for PCBs is 7.4 mg/kg for routine workers exposed to soil every work day for the entire day. This PRG is being used as a conservative screening criterion for the ongoing RCRA CA project because it incorporates the level of conservatism to address virtually any type of worker exposure scenario without any land use restrictions or active remediation.

The Toxic Substances Control Act (TSCA) considers a level of 25 mg/kg for PCBs to be protective in low occupancy areas pursuant to the 40 CFR 761.61a self-implementing TSCA rules. TSCA defines "low occupancy" as any area where PCB remediation waste has been disposed of on-site and where occupancy and exposure within that area for any individual not wearing dermal and respiratory protection for a calendar year is less than 840 hours (an average of 16.8 hours per week) for non-porous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk PCB remediation waste. Examples could include an electrical substation or a location in an industrial facility where a worker spends small amounts of time per week (such as an unoccupied area outside a building, an electrical equipment vault, or in the non-office space in a warehouse where occupancy is transitory), (U.S. EPA, 2003). Within TSCA these cleanup criteria are considered protective for low occupancy exposure scenarios without further institutional controls or any remediation. TSCA also allows PCB remediation wastes of 50 mg/kg or less to remain at a cleanup site if the site is secured by a security fence and marked with warning signs, and levels of 100 mg/kg or less to remain at a cleanup site if the site is covered with a cap that meets the requirements specified in the 40 CFR 761.61a self-implementing TSCA rules.

IDEM has also developed generic cleanup criteria in the State Risk Integrated System of Closure (RISC) Guidance (IDEM, February 2001). In this guidance, a PCB level of 5.3 mg/kg is considered to be protective of worker exposures without any land use restrictions or active remediation. The IDEM RISC cleanup level of 5.3 mg/kg is also based on an acceptable level of risk of $1 \times 10^{-5}$ for individual chemicals. This generic PCB cleanup level differs somewhat from the U.S. EPA PRG because it was derived based on older U.S. EPA risk assessment guidance.

Finally, U.S. EPA and IDEM both allow the use of site-specific risk assessment rather than generic criteria, in the development and evaluation of IM alternatives that are protective of human health and the environment at a particular site. Section 4.0 presents a SHHRA that was prepared to support the evaluation of IM components and assembled alternatives for the East Plant Area. It should be noted, however, that some elements of the IM alternatives evaluated in Section 5.0/6.0 are not directly related to the SHHRA results because both U.S. EPA and IDEM remedies often focus on containment as a presumptive strategy for conditions similar to those encountered within the East Plant Area (e.g., NAPL in fractured bedrock and historically landfilled areas).

The continued use of the East Plant Area for industrial purposes is expected in the foreseeable future as GM owns this property, has no plans to sell this Facility, and this property contains important GM Plant support systems. The East Plant Area has always been used by GM to support the manufacturing activities on the west side of GM Drive. Currently, these uses include utilities conveyance, power substations, water storage and treatment, stormwater management, logistical support and employees parking. These systems are expected to be needed into the foreseeable future. Any substantial construction in the East Plant Area is not anticipated to occur in the foreseeable future.

Based on the foregoing, and the Facility-specific conditions present within the East Plant Area, this IM Alternatives Review Report will review and recommend an IM on a Facility-specific basis. In addition, the development of general and East Plant Area-specific CA objectives and IM alternatives is based on the continued use of the East Plant Area for industrial purposes only.

## 3.2 GENERAL CORRECTIVE ACTION OBJECTIVES

### 3.2.1 PROTECTION OF PUBLIC HEALTH

The primary objective of the IM alternatives is to protect public health by preventing human exposures that are estimated to have site-related cumulative cancer risk and noncancer hazard index that exceed $1 \times 10^{-4}$ or 1, respectively, under current and reasonably expected future land use. Protection of public health includes consideration of potential exposures and hazards during implementation and maintenance of the IM and CA.

The primary potential exposures to be addressed by the IM include:

- direct contact with impacted soil or groundwater;
- ingestion of impacted soil or groundwater; and
- inhalation of vapors or dust from impacted soil and groundwater.

### 3.2.2 PROTECTION OF THE ENVIRONMENT

There are limited habitat and ecological receptors in the East Plant Area because the East Plant Area is part of an active manufacturing facility and its future land use is expected to remain the same. The general objectives established for the protection of public health are considered to be appropriate for the protection of the environment in the East Plant Area.

### 3.2.3 SCOPING DECISIONS

Continued use of the East Plant Area for industrial purposes is reasonably expected. Therefore, allowing continued use of the land and buildings after implementation of the IM and minimizing disruption to the Facility during cleanup are general objectives for the IM and CA.

The local area surrounding the Facility is the subject of an ongoing RA in the Pleasant Run Creek watershed. This activity will continue for several years and create a large amount of truck traffic throughout the area surrounding the Facility. Trucking activities during the RA have raised concerns related to the safety and potential road damage from trucking large volumes (>600,000 tons) of materials to distant commercial landfills. In addition, the construction activities have resulted in a variety of other issues including dust generation, noise, and interference with local traffic. Minimizing disruption to the local community will also be a general objective for the IM and CA.

## 3.3 EAST PLANT AREA IM AND CA OBJECTIVES

The IM and CA objectives for the East Plant Area are summarized as follows:

1) eliminate the potential for significant human exposures to PCBs via ingestion of and dermal contact with soil or groundwater, or inhalation of unacceptable

levels of dust or vapor from these media during long-term use of the East Plant Area in the future;

2) minimize the potential for routine/construction worker and public exposure at the East Plant Area during implementation of the CA;

3) eliminate the potential for NAPL or impacted groundwater migration beyond the horizontal limits of the East Plant Area through effective perimeter hydraulic or physical containment;

4) control hydraulic gradients and leaching of PCBs into the groundwater below the East Plant Area through the use of an appropriate cover system;

5) minimize disruption to the Facility and surrounding community during implementation of the CA;

6) allow continued use of the East Plant Area for industrial purposes;

7) reduce the toxicity, mobility, or volume of PCBs to the extent practical through collection/treatment/ disposal and/or containment of NAPL and PCB-impacted soil and groundwater;

8) reduce long-term operation, maintenance, and monitoring requirements;

9) initiate and complete IM construction activities within a reasonable period of time; and

10) be cost effective.

# 4.0 STREAMLINED HUMAN HEALTH RISK ASSESSMENT

A SHHRA was performed to support a determination of whether IM are warranted for soil, groundwater, sediment, surface water, and spring water within the East Plant Area. Where IM were determined to be warranted, additional risk calculations were performed to estimate the risk reduction that would be achieved by the IM alternatives identified in Section 6.0.

The determination of whether environmental media at the East Plant Area warrant IM is discussed in Section 4.1. The additional risk calculations performed to estimate risk reduction associated with specific IM alternatives are discussed in Section 4.2.

## 4.1 BASELINE RISK ASSESSMENT

A streamlined Baseline Risk Assessment (BRA) was conducted to evaluate the significance of reasonable maximum exposure (RME) to environmental media at the East Plant Area under current and reasonably expected future land use. Estimates of Facility-related cumulative cancer and noncancer risks for these reasonable maximum exposures were developed using exposure scenarios that are consistent with current and reasonably expected future land use at the East Plant Area along with conservative assumptions and methodologies based on U.S. EPA risk assessment guidance. The estimates of Facility-related cumulative cancer risk and noncancer hazard indices (HI) were then compared with U.S. EPA-established levels for triggering IM or CM under RCRA, which are $10^{-4}$ and 1, respectively (U.S. EPA 1991; U.S. EPA 1996).

### 4.1.1 BASELINE EXPOSURE SCENARIOS

Based on the discussion of land use at and around the East Plant Area in Section 3.0, and also in the Soil TM (CRA, April 2004) and the Stream TM (CRA, February 2003), the potentially exposed populations at the East Plant Area under current and reasonably expected future land uses include routine workers, construction workers, maintenance workers, and trespassers.

Potential exposure of these receptor populations to environmental media under current conditions at AOIs within the East Plant Area was evaluated as part of the RCRA CA EIs determination of whether current human exposures are under control (CA725). The evaluation and its results are presented in the RCRA EIs CA725 Report (ENVIRON,

January 2005). As discussed in the CA725 Report, certain locations within the East Plant Area were identified as having media with concentrations of hazardous constituents that should be further considered for IM or CM, even though they do not currently pose significant risk. GM has restricted access in these areas to ensure that no significant exposures would occur at these locations while it plans the IM for the East Plant Area.

In light of the access controls currently at the East Plan Area, the streamlined BRA focused primarily on the evaluation of hypothetical exposures of receptor populations under reasonably expected future conditions in the absence of access controls and IM. With this focus on future exposures, the streamlined BRA evaluated the entire East Plant Area as an exposure unit, rather than as the individual AOIs that have been identified within the East Plant Area on the basis of past and current activities (as was done in the CA725 Report). The hypothetical exposures for the receptor populations evaluated in the baseline risk assessment are discussed below.

**Routine Workers**

The reasonably expected future land use at the East Plant Area is industrial, as discussed in Section 2.0. Under this land use, the largest receptor population at the East Plant Area would be expected to consist of workers who are engaged in routine industrial activities that generally take place indoors. During limited time outdoors, some workers could contact surface soil. Potential routes of exposure to surface soil would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates.

Exposure of routine workers via groundwater use was not evaluated because groundwater is not used as a potable or non-potable water supply at the East Plant Area or in the vicinity, and future potable or non-potable use is not reasonably expected.

**Construction Workers**

A small fraction of the workers at the East Plant Area are expected to conduct occasional subsurface construction or maintenance activities, which could put them in contact with surface and subsurface soil in the East Plant Area. Under GM operations, these subsurface activities are expected to be of limited size and duration (e.g., installation or repair of underground utilities, or removal or repair of pavement). However, larger-scale subsurface activities (e.g., associated with building construction) are possible under generic industrial land use. Potential routes of exposure to surface and subsurface soil under these scenarios would include incidental ingestion, dermal contact, and inhalation of soil vapor, and inhalation of airborne particulates.

During subsurface construction activities, workers could also contact shallow groundwater (within 10 ft bgs) and spring water. Potential routes of exposure would include incidental ingestion, dermal contact, and inhalation of vapor. In the streamlined BRA, potential worker exposure to spring water were evaluated indirectly using exposure estimates for maintenance workers (see below). This approach simplifies the evaluation and is conservative because potential construction worker exposures are expected to be lower than potential maintenance worker exposures (presented in Appendix C).

**Maintenance Workers**

A small fraction of the workers at the East Plant Area might conduct occasional sampling or maintenance of the outfalls and Stormwater Lagoon, which could put them in contact with surface water and sediment. Potential routes of exposure would include incidental ingestion, dermal contact, and inhalation of vapor (from surface water only).

Other maintenance activities in the East Plant Area might include road maintenance and lawn mowing, which could put workers in contact with surface soil. In the streamlined BRA, potential maintenance worker exposures to soil were evaluated indirectly using exposure estimates for routine workers. This approach simplifies the evaluation and is conservative because potential maintenance worker exposures are expected to be lower than potential routine worker exposures.

**Trespassers**

Trespassers in the East Plant Area could come into contact with any exposed soil. Potential routes of exposure would include incidental ingestion, dermal contact, and inhalation of soil vapor, and inhalation of airborne particulates. Potential exposure of trespassers is also possible in surface water bodies and seeps/springs. Potential routes of exposure in this case would include incidental ingestion and dermal contact with sediment and surface water, and inhalation of vapor emitted from surface water.

In the streamlined BRA, potential trespasser exposures to soil and sediment were evaluated indirectly using exposure estimates for routine workers. This approach simplifies the evaluation and is conservative because potential trespasser exposures are expected to be lower than potential routine worker exposures. For similar reasons, potential trespasser exposure to surface water and seeps/springs was evaluated using exposure estimates for maintenance workers as their chemical intakes are comparable.

### 4.1.2 BASELINE RISK ESTIMATES

The significance of potential exposures of the receptors discussed above were evaluated by estimating the cumulative cancer and noncancer risks under each exposure scenario using conservative exposure assumptions from U.S. EPA risk assessment guidance or similarly conservative assumptions based on professional judgment where guidance is not available. The risk calculations and associated methods and assumptions are discussed in Appendix C. The risk estimates from these calculations are summarized in Table 4.1 and discussed below for each receptor.

**Routine Workers**

Potential exposure of routine workers to surface soil was evaluated using U.S. EPA-recommended standard default exposure factors for estimating RME risks under generic commercial/industrial settings, as discussed in Appendix C. Under these conservative exposure assumptions and using 95% upper confidence limits (UCL) for key constituents, the estimated Facility-related cumulative cancer risk is $2 \times 10^{-4}$ and the estimated noncancer HI is 10. These estimates exceed the U.S. EPA-established limits of $10^{-4}$ and 1, respectively, which means that surface soil at the East Plant Area warrant IM. The predominant constituent contributing to these risk estimates is PCBs, and the most significant routes of exposure are ingestion and dermal contact.

**Construction Workers**

Potential exposure of construction workers to surface and subsurface soil was evaluated under both a small-scale and a large-scale construction scenario, as discussed above. U.S. EPA-recommended exposure factors for estimating RME risks were used for contact rates in both scenarios, as discussed in Appendix C. For the small-scale scenario, exposure was assumed to occur on average of 5 days/year for 10 years. For the large-scale scenario, exposure was assumed to occur for 125 days over 1 year. For both cases, the expected maximum depth of excavation is 10 ft. It should be noted that the number of days of exposure in both cases represent the number of days that workers have intensive contact with soil (e.g., during excavation work) rather than the number of days of construction work which typically includes days without intensive soil contact.

Under the assumptions used for the small-scale scenario and using 95% UCLs for key constituents, the estimated Facility-related cumulative cancer risk is $9 \times 10^{-6}$ and the estimated noncancer HI is 1. For the large-scale scenario, the estimated Facility-related cumulative cancer risk is $3 \times 10^{-5}$ and the estimated noncancer HI is 10. The HI for the large-scale scenario exceeds the U.S. EPA-established limit of 1, which means that surface and subsurface soil at the East Plant Area warrant IM. The predominant

constituent contributing to these risk estimates is PCBs, and the most significant routes of exposure are ingestion and dermal contact.

Potential exposure of construction workers to groundwater in the East Plant Area during excavations that extend into the water table was evaluated using the U.S. EPA-recommended contact rates for estimating RME risks, and exposure was assumed to occur on average of 5 days/year for 10 years, as discussed in Appendix C. The large-scale scenario used for evaluating potential exposure of construction workers to soil was not used for groundwater because it is not reasonable to expect excavations for general construction work to extend into the water table and remain open for such a long period. The estimates of cumulative cancer risk and HI, using the highest detected constituent concentrations in groundwater in the East Plant Area exceed the U.S. EPA-established limits of $10^{-4}$ and 1, respectively.

The high estimates of cumulative risk and HI are primarily attributable to PCBs in a sample (SU-X208Y096) collected from a sump that is located in AOI 8. The concentration of PCBs in this sample is 5.81 mg/L, which is much higher than the solubility of PCBs and is believed to be attributed to the presence of a NAPL in the sample. GM removed NAPL that was encountered during sampling of the sump in early 2004. However, IM are still being considered for the groundwater in the vicinity of this sump. No other concentrations in shallow groundwater resulted in estimates of cumulative cancer risk and HI that exceed the U.S. EPA limits.

**Maintenance Workers**

Potential exposure of maintenance workers to sediment, surface water, and spring water in the East Plant Area was evaluated using exposure assumptions that are specific to workers performing occasional maintenance activities, as discussed in Appendix C. As shown in Table 4.1, the only estimates of cumulative cancer risks or HIs, based on the highest concentrations found in the East Plant Area, exceeding the U.S. EPA-established limits of $10^{-4}$ and 1, respectively, is the HI of 2 for spring water. This HI is primarily attributable to PCBs in unfiltered samples collected from the SW-X216Y274 and SW-X256Y260 locations in 2002 (no PCBs were detected in the filtered samples at these locations). GM has implemented Site Source Control (SSC) systems at these locations to treat impacted spring water as part of the RA. Therefore, sediment, surface water, and spring water at the East Plant Area do not warrant additional IM.

**Trespassers**

As discussed in Section 4.1.1, risk estimates for trespassers were not calculated in the streamlined risk assessment because trespassers' exposures are expected to be no higher than those estimated for the receptors evaluated in the risk assessment.

## 4.2 POST-IM RISK ASSESSMENT

The BRA demonstrated that soil and groundwater at certain locations in the East Plant Area warrant IM, as discussed in Section 4.1. IM alternatives for addressing these media are discussed in later sections of this IM Alternatives Review Report. To support an evaluation of the IM alternatives for addressing surface and subsurface soil, additional risk calculations were performed to estimate risk reduction associated with certain alternatives discussed in Section 6.0.

### 4.2.1 POST-IM EXPOSURE SCENARIOS

Risk calculations based on the construction scenarios from the BRA were performed to estimate the risk reduction that would be associated with removal of soil with PCBs at concentrations higher than certain limits in the IM alternatives that involve installation of a soil cover. As discussed in Section 6.0, the concentration limits considered for the soil removal component of selective alternatives are 1,500 mg/kg, 500 mg/kg, and 50 mg/kg. Risk calculations were performed for each of these limits, and also for the case where no soil is removed before soil cover installation.

The post-IM risk calculations were based on the conservative assumption that institutional controls to prevent excavations through the soil cover are absent or have failed, and the workers do not wear personal protective equipment. Other exposure scenario such as the routine workers or trespassers were not evaluated as post-IM scenarios, because receptors in these scenarios are not expected to have a reasonable potential to penetrate the soil cover to reach native soil even in the absence of institutional controls. As discussed in later sections, the soil cover would consist of approximately 2.5 ft of clean soil and other materials.

To estimate exposure concentrations for a particular set of post-IM risk calculations, data for all constituents in soil samples with PCBs at concentrations higher than the particular PCBs concentration limit were excluded from the risk calculations and replaced with the

following estimates of constituent concentrations in the soil to be used to backfill the excavated areas:

- PCBs were conservatively assigned a concentration of 6.8 mg/kg in the backfill soil, which is the estimated average concentration in soil that has been proposed to be brought from the off-Facility RA as a possible source for subgrade backfill (see Section 5.0);
- Metals were assigned site-specific background levels (ENVIRON, January 2005); and
- Other constituents were assigned a concentration of zero, because no significant concentration of these constituents is expected in the backfill soil from any source.

Like the BRA, the additional risk calculations included both the small-scale and large-scale construction scenarios, and used a maximum expected excavation depth of 10 ft bgs. However, in these calculations the ground surface is the top of the soil cover that would be installed as part of IM. As noted above, the soil cover would consist of approximately 2.5 ft of clean soil and other materials. This means a 10-ft deep excavation would encounter 2.5 ft of clean soil before encountering any native or subgrade backfill soil.

To account for the soil cover, exposure concentrations were calculated using the highest concentrations within the top 7.5 ft of soil that would remain after soil removal. These concentrations were used to calculate 95% UCLs for the East Plant Area, just like in the BRA. Then a fraction contacted (FC) term of 0.75 (i.e., 2.5/10) was incorporated into the exposure calculations. In reality, a lower FC term may be justified because additional grading material is likely to be required in many parts of the East Plant Area to support cover construction (i.e., average thickness for the grading layer is 3 ft), as discussed in later sections. But the risk calculations conservatively ignored the potential presence of this additional material.

The sensitivity of the risk calculations to the excavation depth and cover thickness were tested by performing additional calculations that assumed an excavation depth of 15 ft (instead of 10 ft), and a cover thickness of zero (to simulate a very thin soil cover). The results of these two sets of sensitivity analysis calculations are also discussed in the following section.

### 4.2.2 RISK REDUCTION ESTIMATES

The results of the post-IM risk calculations are summarized in Table 4.2. For the case in which no soil would be removed prior to soil cover installation, the only estimate of cumulative cancer risk or noncancer HI that exceeds the U.S. EPA limits of $10^{-4}$ and 1, respectively, is the HI of 6 for the large-scale excavation scenario. If soil with PCBs at concentrations higher than 1,500 mg/kg were to be removed within 10 ft of the surface prior to cover installation, no cumulative cancer or noncancer risk estimates would exceed the U.S. EPA limits. Soil removal to the lower concentration limits of 500 mg/kg and 50 mg/kg would not provide any beneficial risk reduction from the baseline risk estimates. Figure 4.1 graphically shows the amount of beneficial risk reduction as a function of the PCBs concentration limit for soil removal.

The sensitivity of these results to the assumption of a maximum excavation depth of 10 ft for the constructions scenarios was tested by performing calculations that used an assumed maximum excavation depth of 15 ft. The results of these calculations are summarized in Table 4.3. The risk estimates in this table show that the risk estimates increase somewhat from those in Table 4.2. However, these results still show that the greatest beneficial risk reduction is associated with soil removal to the 1,500 mg/kg limit.

Table 4.4 summarizes the sensitivity of the results in Table 4.2 to the cover thickness used in the calculation. The risk estimates in this table show that even with an extreme assumption of a 0-ft cover thickness, the risk estimates increase only slightly from those in Table 4.2, and are very similar to those in Table 4.3. Again, the greatest beneficial risk reduction is associated with soil removal to the 1,500 mg/kg limit.

# 5.0 SCREENING OF INTERIM MEASURES TECHNOLOGIES

Prior to the development of a list of potential IM alternatives, available and potentially applicable cleanup approaches and technologies, which could be implemented to fulfill the East Plant Area CA objectives, are identified and prescreened.

Technologies are engineering or procedural components that may be grouped together or used individually to form an IM alternative. For example, the technologies of soil removal and disposal, and groundwater containment, extraction and treatment, when grouped together, form an IM alternative.

Table 5.1 presents a listing of the potentially applicable IM approaches/technologies.

Table 5.2 presents an initial screening of potential approaches/technologies considered applicable to the East Plant Area. Each of the alternatives and options listed is evaluated as to its general technical applicability for implementation within the East Plant Area. Some of the technologies clearly drop out quickly upon cursory review in the table itself. Those, which warrant further consideration, are discussed in the following sections.

The following sections provide a description and technical feasibility evaluation of the IM technologies considered potentially applicable for the East Plant Area:

5.1 No Action/Institutional Controls
5.2 Soil Technologies
5.3 NAPL/Groundwater Technologies

## 5.1 NO ACTION/INSTITUTIONAL CONTROLS

### 5.1.1 NO ACTION/INSTITUTIONAL CONTROLS ALTERNATIVES

#### 5.1.1.1 NO ACTION

The No Action alternative serves as the baseline for comparison to other alternatives. For the purpose of this IM Alternatives Review Report, operation and maintenance (O&M) of the recently installed RA SSC System, a Groundwater Monitoring System (GMS), and a spring/seep monitoring system are included as a part of the baseline No Action alternative.

#### 5.1.1.2 INSTITUTIONAL CONTROLS

Institutional controls (e.g., security fence, work area restrictions, deed restrictions, etc.) will be considered as a component of all IM alternatives other than the No Action baseline alternative. As the East Plant Area is part of the active Facility, ensuring implementation, monitoring, and maintenance of any institutional controls is not anticipated to be a concern. An Operation, Maintenance, and Monitoring (OMM) Plan would be prepared with the IMI Construction Certification Report to identify all OMM activities required to support the IM.

Institutional controls may involve the placement of a restriction within the deed (or other actions such as zoning changes) to the property ensuring that the property owner to not conduct specific unacceptable activities (e.g., excavation, residential use, etc.), and to provide information to prospective future purchasers concerning the condition of the property. Deed restrictions can be made enforceable and permanent through various legal mechanisms. The use of a deed restriction does not imply that other IM components are unnecessary.

### 5.1.2 NO ACTION/INSTITUTIONAL CONTROLS ASSESSMENT

The No Action Alternative will not change the existing conditions in the East Plant Area. Soil and groundwater with concentrations exceeding potential cleanup goals will remain in the East Plant Area and may migrate over time to other properties.

Institutional controls will minimize potential future contact with impacted NAPL, soil, and groundwater in the East Plant Area.

### 5.1.3 NO ACTION/INSTITUTIONAL CONTROLS RECOMMENDATION

It is recommended that access restrictions and institutional controls be considered as a component of all IM alternatives (except for the No Action Alternative).

## 5.2 SOIL TECHNOLOGIES

Soil technologies are presented in the following subsections:

5.2.1 Physical Containment
5.2.2 Solidification/Stabilization
5.2.3 Removal/Disposal

### 5.2.1 PHYSICAL CONTAINMENT

The containment option involves the use of physical barriers to contain or otherwise restrict the mobility and migration of Facility-related constituents. Potential containment options applicable to the East Plant Area include one or a combination of the following:

1. cover system; and
2. groundwater cutoff wall.

#### 5.2.1.1 COVER SYSTEMS

Cover systems would involve the construction of a low permeability cover over the impacted area of the East Plant Area (see Figure 2.16). The purpose of the cover system is to prevent direct contact and reduce infiltration of precipitation through the soil and subsequent percolation of potentially impacted infiltration into the groundwater. In addition, cover systems provide long-term protection against erosion and subsequent transport of contaminants.

In general, the cover system technology provides very good isolation of the contaminated soil but may extend the length of time that other possible remedy components, such as monitoring, are required because they do not reduce the mass of contaminants within the zone of impact.

Materials which may be used in the construction of low permeability cover systems may include:

1) Normal Portland Cement Concrete Cover;
2) Asphaltic Concrete Cover;
3) Clay; and
4) Multi-Layer Covers.

A brief description and Facility-specific screening of each cover system technology is presented below.

Normal Portland Cement Concrete Cover

This technology would involve the placement of a concrete slab over a compacted granular base, which would overlie the contaminated soil. The thickness of the concrete cap and granular base are dependent on the amount of anticipated settlement and the local weather conditions.

The concrete slab would provide a durable surface, which would permit selective future surface use of the East Plant Area for storage or parking. The concrete slab has excellent weathering characteristics and low permeability.

Due to the reduced infiltration rate, increased precipitation runoff would occur. This could result in the need for improved stormwater management controls at the Facility in the East Plant Area.

Concrete can be susceptible to cracking from settlement, shrinkage and frost heave, but proper design of expansion joints and reinforcing, would control cracking and minimize future maintenance.

Although the concrete cover would provide an effective means of reducing infiltration and eliminating direct contact and erosion, a vegetative soil/synthetic cover also achieves these same performance criteria at a lower capital and maintenance cost, and therefore, is also a desired characteristic of the cover system. Therefore, the Normal Portland Cement Concrete Cover will only be considered for select areas of the East Plant Area (as needed to support ongoing manufacturing activities).

Asphaltic Concrete Cover

This technology would involve the construction of an asphaltic concrete surface over a compacted granular base. The granular base would overlie the foundation layer. The required thicknesses of the asphaltic concrete cover and granular drainage base are functions of the degree of anticipated settlement and local climatic conditions.

Asphaltic concrete mixes designed to reduce infiltration are similar to highway paving asphaltic concretes except that the percentages of mineral filler and asphalt cement are increased. These increased percentages serve to increase water repellency and decrease the photo-sensitive weathering characteristics as compared to normal asphaltic pavements.

Asphaltic concrete is designed to retain enough flexibility to mold to slight deformations of the subgrade, and is more resistant to surface cracking than normal Portland Cement concrete.

The increased precipitation runoff resulting from the reduced infiltration capacity of the asphaltic concrete pavement could result in the need to improve stormwater management controls at the Facility in the East Plant Area.

Although the asphaltic concrete cover would provide an effective means of reducing infiltration, a vegetative soil/synthetic cover is a desired characteristic of the cover system due to comparatively better cost and maintenance issues, as well as better ability to handle surface water runoff. Therefore, the asphaltic concrete cover will only be considered for select areas of the East Plant Area (as needed to support ongoing manufacturing activities).

Clay Cover

This technology would require; the installation/preparation of a grading layer to provide two to four percent minimum slopes; placement of compacted low permeability clay; placement, compaction, and grading of a sand drainage layer, and placement, compaction, and grading of compacted fill. The clay soil should be placed and compacted to achieve a hydraulic conductivity on the order of $10^{-7}$ cm/sec. The finished surface would be covered with topsoil and would be seeded to provide a vegetative cover. Vegetation would help manage or control surface water runoff, by slowing down runoff and capturing some water within the vegetative layer.

The drainage layer provides protection against surface water infiltration. Infiltrated water would drain along the surface of the sloped clay layer surface and would be discharged into ditches located adjacent to the cover. Frost protection of the clay layer by the cover materials prevents degradation of the clay liner due to freeze-thaw cycles.

The vegetative cover, topsoil, and low permeability clay will help to reduce infiltration into the impacted soil. The clay cover option would require importation of a significant volume of soil materials compared to other similarly performing, suitable materials that are evaluated in the IM Alternatives Review Report. Since this relatively higher amount of importation, in combination with other ongoing transportation related to the cleanup, may result in disruptions to the local community. The clay cover is eliminated from further review at this time. Soil covers may be evaluated for select portions of the East Plant Area.

Multi-Layer Cover

In general, this technology would involve installation of the following layers:

- topsoil;
- common fill;
- geotextile fabric;
- sand drainage layer or geonet;
- synthetic membrane liner;
- sand layer; and
- grading layer.

The topsoil layer would be seeded to promote vegetative growth.

There are a variety of types of synthetic liners available including: High Density Polyethylene (HDPE), Chlorosulfonated Polyethylene (Hypalon), Chlorinated Polyethylene (CPE), Low Density Polyethylene (LDPE), butyl rubber, and Polyvinyl Chloride (PVC). The thickness of the synthetic liner is determined based upon the projected physical and climatic stresses anticipated during installation and the projected service life of the cover system.

Synthetic membranes may provide hydraulic conductivities on the order of as low as $10^{-13}$ cm/sec.

In addition, the low hydraulic conductivity layer could be provided through the utilization of a geosynthetic clay layer (GCL). GCL layers are comprised of a bentonite mat composite which is capable of providing low hydraulic conductivity and a general resistance to freeze-thaw deterioration/settlement issues.

#### 5.2.1.1.1 COVER SYSTEM ALTERNATIVES

Alternative cover systems are discussed in the following subsections.

##### 5.2.1.1.1.1 INDIANA HERITAGE COVER

During the operational life of AOI 4, landfills in Indiana were regulated by the Indiana Stream Pollution Control Board. Cover requirements called for 24 inches of compacted soil (referred to herein as the Indiana Heritage Cover). There were no specifications for the type of soil or final compacted hydraulic conductivity. A 6-inch vegetative layer was typically placed over the compacted soil. While AOI 4 was previously capped in a manner consistent with the Indiana Heritage Cover, other areas of the East Plant Area do not appear to be covered. For purposes of this evaluation, the entire East Plant Area will be addressed by a new Cover System. Figure 5.1 presents a typical cross-section for this approach.

##### 5.2.1.1.1.2 INDIANA MUNICIPAL SOLID WASTE LANDFILL COVER

The current regulations for municipal solid waste landfill covers in Indiana are contained in 329 IAC 10-22-6 and 7. 329 IAC 10-22-6 covers the requirements for landfills with a composite bottom liner and leachate collection system. 329 IAC 10-22-7 covers the requirements for landfills without a composite bottom liner or leachate collection system. The cap components under 329 IAC 10-22-6 consist of the following from top to bottom:

- a vegetative layer with a minimum thickness of 6 inches;
- a protective soil layer with a minimum thickness of 18 inches;
- a drainage layer consisting of 12 inches of material with a hydraulic conductivity of $1x10^{-3}$ cm/sec or more. A geosynthetic drainage material may be substituted for the 12 inch layer provided that it has a transmissivity equal to the specified 12 inch layer;

- a minimum 30-mil geomembrane liner placed in direct contact with the soil barrier layer. If the geomembrane is HDPE the thickness must be a minimum of 60 mil;
- a soil barrier layer consisting of a lower component of 12 inches of structural fill and an upper component of 12 inches of compacted soil with a hydraulic conductivity of $1x10^{-6}$ cm/sec or less. The upper component must consist of soil of Unified Soil Classification ML, CL, MH, CH, or OH; and
- a methane gas venting layer installed directly over the waste consisting of a minimum 12 inches of drainage layer material with a hydraulic conductivity of $1x10^{-3}$ cm/s or more. The methane venting layer requirement may be waived, considering the inorganic nature of the material deposited into AOI 4.

The requirements under 329 IAC 10-22-7 are similar to the above standards. For slopes of less that 15 percent the above listed components must be installed. For slopes of greater than 15 percent the cap requirements consist of 24 inches of compacted soil of Unified Soil Classification ML, CL, MH, CH, or OH. The soil must be compacted to a hydraulic conductivity of $1x10^{-6}$ cm/sec or less. A vegetative layer with a minimum thickness of 6 inches must be placed on top of the compacted soil layer.

Figures 5.2 and 5.3 present typical cross-sections for the Indiana Solid Waste Landfill Cover designs.

#### 5.2.1.1.1.3 TSCA SELF-IMPLEMENTING COVER

Title 40 of the Code of Federal Regulations (CFR) addresses the "Protection of Environment", with Parts 700-799 presenting the regulations governing TSCA requirements. More specifically, Part 761.61 addresses the Storage and Disposal of PCB Remediation Waste, with paragraph (a), sub-paragraph (7), outlining the cap requirements under the Self-Implementing option. While this IM Alternatives Review Report is not a self-implementing option, the requirements are relevant for evaluation purposes. This regulation states that bulk PCB remediation waste in low occupancy areas may remain at a cleanup site at concentrations $\leq$100 mg/kg, if the site is covered with a cap over the area where remediation waste was left in place. The purpose of this cap is to prevent or minimize human exposure, limit infiltration of water, and to control erosion. Specifically, 40 CFR 761.61 (a)(7) requires compacted soil (hydraulic conductivity $\leq 1x10^{-7}$ cm/sec) with a minimum thickness of 10 inches. Although not specifically stated, it is assumed that this barrier layer would need to be covered with a vegetated topsoil cover to control erosion, if not covered with a durable surface.

A typical TCSA Self-Implementing Soil Cover cross-section is presented on Figure 5.4.

#### 5.2.1.1.1.4 RCRA SUBTITLE C COVER

A RCRA Subtitle C cover is a multi-layer landfill cover designed for use in RCRA hazardous waste applications. These landfill covers generally consist of the following components:

- 24–inch thick upper vegetative layer (6-inches topsoil with 18 inches of common fill);
- 12-inch thick sand drainage layer with hydraulic conductivity greater than $1x10^{-3}$ cm/sec;
- synthetic membrane of greater than 20-mil thickness;
- 24-inch thick barrier layer of clay with hydraulic conductivity no greater than $1x10^{-7}$ cm/sec; and
- 12-inch thick grading layer to act as a foundation for the cap, if required, based on the site-specific conditions.

A typical RCRA Subtitle C cover cross-section is presented on Figure 5.5.

In certain circumstances, the 12-inch thick drainage layer of sand can be substituted with a Geocomposite Drainage Net (Geonet) with hydraulic conductivity greater than $1x10^{-3}$ cm/sec. A RCRA Subtitle C Alternate cover cross-section is presented on Figure 5.6.

#### 5.2.1.1.1.5 RCRA SUBTITLE D COVER

RCRA Subtitle D cover requirements are for non-hazardous waste landfills. A RCRA Subtitle D compliant landfill cover would consist of a 6-inch thick vegetative and protective soil layer overlying an 18-inch-thick cap of earthen material with a hydraulic conductivity of approximately $1x10^{-5}$ cm/sec. A typical RCRA Subtitle D cover cross-section is presented on Figure 5.7.

#### 5.2.1.1.1.6 GCL COVER

The GCL cover is a modified version of the RCRA Subtitle C cover designed to use geosynthetic materials instead of soil materials in order to reduce the trucking in of soil materials. The cover would consist of the following layers:

- 6-inch topsoil layer/vegetation;
- 12-inch common fill layer;
- Geonet (in lieu of 12-inch drainage layer);
- GCL (in lieu of 12 to 24 inches of clay);
- 12-inch clay layer; and
- grading fill (as required).

The GCL serves as an additional barrier layer to minimize infiltration. The effective hydraulic conductivity of this alternative will be on the order of $1 \times 10^{-7}$ cm/s or less. A cross-section of the GCL cover alternative is presented on Figure 5.8.

#### 5.2.1.1.1.7 HARD SURFACE COVER ALTERNATIVES

Asphalt/concrete covers are alternatives to multi-layer soil covers and can provide equivalent performance to a TSCA Self-Implementing or a RCRA Subtitle C or D cover. Hard surface covers are typically used only when required to limit vertical relief or provide a paved surface for traffic or parking. Hard surface covers work by maintaining a high-strength, low-hydraulic conductivity cover over the waste to stabilize surface soils and reduce infiltration of surface water.

The TSCA Self-Implementing cover requirements require 6 inches of concrete or asphalt. A typical cross-section of an asphalt cover is presented on Figure 5.9.

### 5.2.1.1.2 COVER SYSTEM ASSESSMENT

#### A. GRADING LAYER CONSIDERATIONS

Two grading layer configurations were considered for the East Plant Area. The two cover configurations include constructing a cover at existing grades (with the minimum importation of grading layer soils), or secondly, the placement of additional grading fill

to achieve optimized design slopes (to provide more effective stormwater management and to minimize infiltration and long-term O&M). The first configuration is to cover the East Plant Area as is, with an appropriate Cover System, with minimal re-grading of existing material or importation of fill. Grades under the alternative range from approximately 2% to 4:1. The second configuration involves the use of low level (≤50 mg/kg) PCB soils excavated during the RA as grading fill to provide optimized design grades (i.e., min/max grades) over the East Plant Area, resulting in better stormwater management, less infiltration, less O&M, and a more stable cover system.

The following grading fill quantities are expected to be required to make grades:

| *Cover Grading Alternative* | *Minimum Grading Fill Required (Cubic Yards) (cy)* | *Grading Layer Description* |
|---|---|---|
| 1 | 17,600 cy | Minimized |
| 2 | 160,000 cy | Optimized |

Several hundred thousand cubic yards of <50 mg/kg soil materials are expected to be available to be used as backfill and grading fill from the RA. This optimized subgrade would equate to an average grading layer thickness of at approximately 3 feet across the East Plant Area. Due to the size of the East Plant Area, the actual volume for the optimized grading layer has a significant degree of flexibility to accept greater than the approximate 160,000 cy described above, which should be viewed as a minimum volume. The actual volume will be determined during the final design based on the actual amount of <50 mg/kg RA soil materials that are available, if selected.

The grading layer will be designed to optimize the functionality of the Cover System. An optimized grading layer design would provide minimum and maximum grades which would optimize the effectiveness of the Cover System. Benefits of the optimized grading layer include:

- reduced infiltration resulting in lower groundwater recharge in the East Plant Area and ultimately less shallow groundwater collection;
- more effective stormwater management resulting in less erosion and reduced O&M; and
- minimized impacts of differential settlement resulting in less O&M.

Overall, the optimized grading layer approach provides for a more stable Cover System which results in less infiltration and reduced O&M.

Consistent with the RA Administrative Order on Consent (AOC), GM is proposing to use <50 mg/kg PCB soil/sediment material being removed during the RA to construct the optimized grading layer. The advantages of using this material are summarized as follows:

- The use of the <50 mg/kg PCB-impacted RA soil material as backfill or grading fill below the East Plant Area cover system is protective;
- The prescribed soil removal will result in the excavation and on-site containment of approximately 145,000 tons of PCB-impacted soil material with an average concentration of 1,048 mg/kg of PCBs. This area will be backfilled by the <50 mg/kg PCB-impacted RA soil material and then a minimum of approximately 275,000 cy of the RA soil material will be re-used as the grading layer for the low permeability cover system;
- The beneficial re-use of this soil material allows the cover system design to be optimized to:
  - Reduce infiltration through the use of appropriate grades, and
  - Reduce long-term maintenance due to less erosion;
- This optimized design for the grading layer would be more effective than the alternative of covering the East Plant Areas as is, with minimal grading and less preferred/steeper slopes;
- The use of the low-level PCB-impacted RA soil material for the remedy in the East Plant Area will significantly reduce the need for trucking the soil to commercial landfills in distant communities. As of February 2005, approximately 46,600 tons of <50 mg/kg PCB-impacted soil material have been transported to the Republic Inc. - Sycamore Ridge Landfill 80 miles away and approximately 87,400 tons of ≥ 50 mg/kg PCB-impacted soil material have been transported to the Heritage Environmental Services landfill 85 miles away. The roads in and around the work area are narrow, hilly, and winding, and there is a significant risk of severe accidents. The total current estimate of soil material to be excavated during the RA is 717,300 tons of soil. This represents 591,730 tons of soil with <50 mg/kg PCBs and 125,570 tons of soil with ≥ 50 mg/kg PCBs. Therefore, roughly 19 percent (134,000 tons to date of 717,300 tons total) of the anticipated soil disposal for the RA has been completed. Re-use of a significant portion of the soil material as backfill or grading fill would also reduce the amount of trucking of clean soil for use as backfill and grading fill for the remedy in the East Plant Area.

- U.S. Department of Transportation (U.S. DOT) statistics estimate 12.27 injury accidents and 0.02 fatalities due to the trucking associated with the disposal of PCB-impacted soil material and the importation of clean backfill (see Attachment A) during the project.
- The National Highway Traffic Safety Administration (NHTSA) statistics estimate 2.61 injury accidents and 0.14 fatalities associated with the project (see Attachment A) during the project.

Use of the low-level PCB-impacted RA soil material as backfill and grading fill during the East Plant Area remedy will result in a reduction of trucking risks in excess of 50 percent.

It should be noted that GM has directed CRA and its contractors to be cautious of road conditions, weather conditions, and residential areas, and to use cautious judgement in driving practices and speed. In addition, CRA independently monitors truck traffic, speed, driving habits, and has considered school bus routes and schedules in establishing disposal truck transportation routes. Even with these major precautions, significant transportation risks are present, which can be further reduced by limiting the number of trucking miles associated with the project;

- The local roads were not designed and constructed to support the size of trucks used in the cleanup effort. A significant amount of road damage and disruption to the community has already occurred. It is anticipated that the RA will continue for at least an additional year. Therefore, significant damage continues to degrade the local public infrastructure. While GM has committed to repairing visible road damage to haul roads proximate to the cleanup areas, reducing the truck traffic will further reduce such damage;
- The use of this material will preserve a minimum of approximately 389,000 cy of landfill capacity at the referenced commercial landfills. In addition, it will conserve an equal volume of clean soil resources (e.g., imported clean soil from local suppliers) that would otherwise be used to backfill the prescribed soil removal areas and to construct the grading layer in the East Plant Area;
- The use of this material will reduce the use of a significant volume of diesel fuel (1,383,800 gallons are required to truck all material to off-Facility commercial landfills during the project) thereby reducing greenhouse gases and local air pollution (in excess of 6,200,000 project miles driven divided by 4.5 miles per gallon);
- The Revised Proposal is consistent with U.S. EPA's preference for "on-Site" remedies.
  - The East Plant Area is considered part of the "Site" contemplated by the AOC (see AOC, Paragraph 1), and
  - The Revised Proposal is an "on-Site" solution to the disposal of the subject soils;

- An on-Site approach for a portion of the RA is consistent with U.S. EPA's guidance for the volume of soil anticipated to be addressed during the RA (i.e., >100,000 cubic yards);
- The RA was initiated by GM in a dynamic manner in response to the off-Facility issues that were identified early in the project for soil volumes originally estimated at 200,000 tons. The clean-up criteria utilized for soil and sediment are considered protective and conservative, and are based upon sound risk assessment, U.S. EPA practice, and state issued criteria. As the project has proceeded, and new information has been developed, the estimated volume of soil materials to be addressed during the RA, has increased to 717,300 tons. This new volume estimate requires a strategic review of the off-Facility transportation and disposal approach contemplated in the AOC; and
- The proposed use of the RA soil material is more cost effective than off-Facility disposal and importing clean backfill and grading fill soils to the Facility.

## B. STORMWATER MANAGEMENT SYSTEM CONSIDERATIONS

Stormwater management will be required for the cover system. Stormwater Management System components will consist of drainage swales and sedimentation ponds, if required. Under the current grading plans, drainage swales will run around the perimeter of the cover, and along key internal topographic contours, directing runoff into drainage swales and stormwater detention ponds for sediment control, if required.

The stormwater swales and detention ponds (if required) will be designed using a Stormwater Management Model (SWMM). Swale dimensions can be varied within the SWMM such that the most efficient dimensions and locations are achieved. Proposed ponds, if required, and their dimensions may also be entered in the model, with the pond dimensions being varied until the required residence time and sediment control is achieved.

The final cover design will greatly affect the stormwater design. The better the cover is at reducing infiltration, the larger the runoff component of precipitation. This will require larger swales and ponds, if required, to handle the stormwater. Based on the current surface water divide immediately north of the treatment facility, the cover will require stormwater management both to the north and south, necessitating two separate drainage pathways (similar to the natural drainage of the East Plant Area).

## C. INFILTRATION CONSIDERATIONS

The previous section presented seven alternatives for a soil, composite, or hard surface cover. Alternative cover design options include:

- Indiana Heritage Cover;
- Indiana Municipal Cover;
- TSCA Self-Implementing Soil Cover;
- RCRA Subtitle C Cover;
- RCRA Subtitle D Cover;
- GCL Lined Cover; and
- Hard Surface Cover.

Each of the above covers include a barrier layer, although the individual specifications for hydraulic conductivity vary. As a result, it is expected that the seven alternative covers would provide varying degrees of protection against infiltration.

Selection of the proposed Cover System design will consider performance objectives, availability of materials, methods to reduce trucking, and the other components of East Plant Area IM.

The only areas of the East Plant Area that would not receive a soil cover would be the building footprints, ZIPP and salary parking lots, Stormwater Lagoon, and the roadways around the WWTP facility. In these areas, a hard surface cap, as required, either asphalt or concrete, will be designed to fit the expected functional needs of these areas. No cover will be required for the building footprints or Stormwater Lagoon. Asphalt pavement will be placed in most normal traffic areas, with asphaltic concrete considered where heavier loads and high traffic use is expected (as required).

A preliminary review of the infiltration characteristics of selected cover system alternatives was conducted using the Hydrologic Evaluation of Landfill Performance (HELP) model to estimate infiltration. A cross-section of the proposed cover systems and the HELP model predicted infiltration rates are presented below (HELP model output is presented in Appendix D):

| *Alternative* | *Average Infiltration (gpd)* |
|---|---|
| Existing Conditions (Baseline) | 30,735 |
| TSCA Self Implementing Cover | 3,669 |
| GCL Cover Approach | 205 |
| FML Cover Approach | 0.5 |

This assessment demonstrates that the TSCA Self Implementing and GCL/Flexible Membrane Liner (FML) cover system alternatives result in a 90 to 99 reduction in infiltration rates.

#### 5.2.1.1.3 COVER SYSTEM RECOMMENDATION

Consistent with the review presented in the previous section an optimized grading layer design is recommended. The optimized grading layer approach will provide for an overall more effective Cover System. In addition, an approach to minimize infiltration is also required.

The recommended general Cover System cross-section is as follows (bottom to top):

- grading layer (depth varies, as necessary);
- barrier layer - clay (12 inches);
- GCL;
- Geonet drainage layer;
- common fill (12 inches); and
- vegetative cover (6 inches).

This Cover System cross-section is recommended because it provides excellent reduction in infiltration and utilizes composite materials (i.e., GCL and Geonet) which will significantly reduce the trucking necessary to import additional clay barrier or sand drainage soil materials. The use of the GCL and Geonet will further reduce the importation of between 58,500 cy and 117,000 cy of clay (2,500 to 5,000 truck loads) and 58,500 cy of drainage sand (2,500 truck loads). This is a necessary benefit to the community. In addition, the GCL approach is generally easier to construct and is less susceptible to differential settlement issues. It is also more forgiving of freeze/thaw damage than a straight clay layer.

The optimized grading layer will be constructed with soil materials excavated during the RA with PCB concentrations of <50 mg/kg. A minimum of 160,000 cy of this material is available with an average concentration of 6.8 mg/kg (it is expected that the final average concentration of this material will be <5 mg/kg PCBs due to such factors as the typical removal techniques requiring some over-excavating into cleaner material).

It should be noted that hard surface covers would be utilized in selected portions of the East Plant Area in areas where parking areas currently exist.

#### 5.2.1.2 GROUNDWATER CUTOFF WALL

Groundwater cutoff wall technology involves containment of groundwater through construction of a physical barrier wall which isolates the waste from the surrounding groundwater flow field. Construction of a groundwater cutoff wall reduces the potential for the migration of potentially contaminated groundwater.

In order to effectively control contaminant migration, the barrier cutoff wall should be keyed into a confining layer of relatively lower permeability at its base and extend upwards to an elevation above the groundwater level. A dewatering system consisting of either a gravity drainage trench connected to a sump, or an extraction well system, would be required to control groundwater flow.

Materials, which could be utilized for the construction of a groundwater cutoff wall within the East Plant Area, are listed below:

1) slurry walls;
2) grout curtains; and
3) steel sheet piles.

A general description of each of these alternative cutoff wall materials is presented in the following sections.

#### 5.2.1.2.1 GROUNDWATER CUTOFF WALL ALTERNATIVES

##### 5.2.1.2.1.1 SLURRY CUTOFF WALLS

Slurry walls are the most common form of groundwater cutoff wall implemented at hazardous waste sites. The term slurry wall is applied to a variety of cutoff walls, constructed in a vertical trench excavated under a slurry. The bentonite-water (BW) slurry acts to shore the trench, preventing collapse, and also forms a filter cake on the trench walls, which acts to prevent fluid losses. The filter cake also reduces the native soils effective hydraulic conductivity, as the filter cake hydraulic conductivity is generally on the order of $10^{-7}$ to $10^{-9}$ cm/sec.

In brief, the trench is excavated, immediately filled with BW slurry and subsequently backfilled with a soil-bentonite (SB) backfill, soil-attapulgite (SA) backfill, or some other suitable backfill. In some instances the trench is excavated under a slurry of cement, bentonite, and water. In this case, the cement-bentonite (CB) mixture is left in the trench to set.

Each of the following types of slurry walls are discussed below:

- SB;
- CB; and
- SA.

SB Cutoff Walls

SB slurry walls are the most common form of groundwater cutoff walls constructed for contaminated groundwater containment. SB slurry walls offer advantages over other slurry wall materials, which include low costs, low permeability, and a wide range of chemical compatibilities.

CB Cutoff Walls

The principal difference between SB and CB walls is that of the backfill. CB walls are generally excavated using slurries composed of cement, bentonite, and water. The difference is that the slurry is left to setup to form the completed cutoff wall. CB walls are generally more expensive than SB walls and are not capable of providing hydraulic conductivities as low as SB cutoffs. In general, the hydraulic conductivity of CB walls is

in the range of $10^{-6}$ cm/sec. CB walls are also more susceptible to degradation by contaminants in the groundwater. As with cementious materials in general, CB cutoff walls are susceptible to attack by sulphates, strong acids and bases (pH <4, pH >7), and other chemical substances. They are also not as plastic as SB walls, and thus form cracks much more readily.

As CB walls are more expensive than SB walls they are generally not used at hazardous waste sites unless one or more of the following conditions applies:

- there is no room to mix SB;
- increased physical strength is required; or
- extreme topography makes it impracticable to grade the area for a SB cutoff wall installation.

SA Cutoff Walls

A relatively new method of backfilling a slurry wall to provide low hydraulic conductivity involves the placement of SA backfill. SA backfill may be chosen as an appropriate backfill when traditional bentonite backfills are found to be adversely affected by site contamination.

Attapulgite clay consists of "needle-like" silicate clay minerals as opposed to the "plate-like" mineral structure of bentonite. This physical characteristic gives attapulgite clay a lower ion exchange capacity and thus it is more resistant to chemical degradation. However, attapulgite does not have the swelling characteristics of bentonite and thus larger percentages of attapulgite are required in the backfill to provide hydraulic conductivity equivalent to bentonite based backfills.

#### 5.2.1.2.1.2 GROUT CURTAINS

Grout curtains are formed by injection of grout into unconsolidated overburden under pressure. Several different grout mixtures are used depending on the purpose of the grout. In general, grout mixtures are typically formulated from cement (most common), clay alkali silicates, organic polymers, and various mixtures of these compounds. The grout mixture is introduced to the subsurface through high pressure injection boreholes.

#### 5.2.1.2.1.3 STEEL SHEET PILE CUTOFFS

Sheet pile cutoffs can also be used to produce a physical groundwater barrier (typically used in overburden only).

The "Waterloo Wall" is a low permeability sheet pile containment wall constructed from metal sheet piles with sealable joints. The Waterloo Wall is a readily available design, which consists of conventional metal sheet piles with the addition of sealable wall joints to reduce the leakage of groundwater. A variety of sealant materials may be used including bentonite, vermiculitic grout, cementicious grout, and organic polymers. Sealant mixtures are selected to optimize chemical resistance and provide the lowest attainable hydraulic permeability with respect to Facility-specific conditions.

### 5.2.1.2.2 GROUNDWATER CUTOFF WALL ASSESSMENT

Existing RFI data indicates that potentially impacted groundwater generally migrates horizontally to springs or seeps with discharge to surface water features toward the northeast and east of the East Plant Area (i.e., there is limited vertical migration beyond the springs/seeps). In addition, shallow groundwater within the East Plant area is generally present in limited thicknesses in bedrock valleys and is relatively unimpacted except in selected areas (e.g., northeast corner and Outfall 002 area) (significant constituents other than PCBs have not been detected). This shallow groundwater is currently being controlled and collected by the SSC systems being installed during the RA to eliminate the potential for re-contamination of surface water features being remediated during the RA.

Based on the fact that groundwater flow is truncated by the SSC systems, and additional perimeter shallow groundwater collection will be evaluated in this IM Alternatives Review Report, the use of a Groundwater Cutoff Wall as a physical groundwater barrier should be reserved as a contingency component for selected IM alternatives.

### 5.2.1.2.3 GROUNDWATER CUTOFF WALL RECOMMENDATION

Based on the discussion presented in the previous section, the use of a Groundwater Cutoff Wall is going to be reserved as a contingency component for selected IM alternatives. A Groundwater Cutoff Wall could be installed through a slurry wall or grout injection approach.

### 5.2.2 SOLIDIFICATION/STABILIZATION

In situ solidification/stabilization primarily, but not exclusively, obtains results through the production of a monolithic block of waste with high structural integrity and low hydraulic conductivity ($10^{-6}$ cm/sec to $10^{-8}$ cm/sec). Solidification/stabilization can be used on unconsolidated overburden soil and to fill in the voids of solution enhanced fractures. Contaminants (both organics and inorganics) are mechanically locked within the solidified matrix. Contaminant loss (through leachability) and mobility are minimized through reduction of surface area in contact with the groundwater. Additionally, utilization of cement as a solidifying agent can also serve to increase the pH of infiltrating water to a level at which metals would not significantly soluble in water at sites where metals contamination is significant. Solidification/stabilization is an effective method of reducing the mobility of contaminants that may otherwise be mobile in the applicable media. PCBs, the constituent generally present at the Site, which presents an exposure risk, is not readily mobile in soil except at very high concentrations. Therefore, use of this treatment may not be necessary for most soils managed as part of the alternatives considered.

#### 5.2.2.1 SOLIDIFICATION/STABILIZATION ALTERNATIVES

Solidification/stabilization of the soil is a viable treatment technology, which may be effectively utilized to reduce the mobility of Facility-related constituents. It should be noted however, that PCBs would not be expected to be mobile in soils, even without solidification, except at very high concentrations. The technology may be implemented utilizing a variety of solidification/stabilization agents and materials.

Three types of solidification/stabilization reagents, discussed below, may be applicable to the solidification of contaminated soil or solution-enhanced fractures in the East Plant Area.

Portland Cement

The introduction of Portland Cement into a contaminated media is accomplished with the addition of water, unless sufficient water is already present in the media, to ensure that proper hydration is achieved for the successful bonding of the matrix. During this process the hazardous constituents are physically trapped and some of the inorganics

may also be chemically stabilized as hydroxides of metals may be formed. The basic properties of the cement also serve to increase the pH environment rendering the inorganics less soluble in the presence of leaching agents. Depending on the characteristics of the media, quantities of fly ash, sodium silicate, bentonite, or other additives may be added in conjunction with the cement. The resultant physical state of this process ranges from granular material to a monolithic structure of high strength and integrity.

Portland Cement reagents have been used extensively in solidification projects. Portland Cement has been applied to media containing metals such as cadmium, chromium, lead and zinc as well as media containing organic constituents such as PCBs, oils, and oil sludges.

Cement Kiln Dust

Cement Kiln Dust (CKD), a pozzolan, is a by-product of cement manufacturing which is high in siliceous and aluminosilicate minerals. Pozzolans tend not to have bonding properties unless they are mixed in appropriate quantities with water and lime or cement. Pozzolanic reactions are generally much slower than cement reactions. The result of this process can range from a granular material to a monolithic structure.

ASTM Class F Fly Ash

Fly ash is a by-product of coal burning and is a pozzolan like CKD and therefore lacks self-hydrating properties. Fly ash must be combined with water and lime or cement to create a matrix, which will set properly.

There are two construction processes available for the in-situ solidification/stabilization of soil materials. They include:

- mass mixing; and
- column mixing.

#### 5.2.2.1.1 MASS MIXING

Mass mixing is accomplished using either a hydraulic backhoe bucket or an injection rake mounted to the stick of a backhoe. Where a backhoe with a standard bucket is

used, reagents are placed on top of the waste and then thoroughly mixed into the material by the backhoe. Injection raking introduces the reagents through the tip of the rake fingers as the material is being mixed. These methods may be effective where the depth of treatment required is small.

#### 5.2.2.1.2 COLUMN MIXING

Column mixing employs a crane-mounted auger mixing head that is advanced into the waste matrix through a bottom-open cylinder. The reagents are introduced into the waste as the blades rotate and travel through the entire depth of the cylinder. Chemical reagents are added pneumatically. The column mixing process allows containment and collection of vapors and dust emanating from the subsurface.

### 5.2.2.2 SOLIDIFICATION/STABILIZATION ASSESSMENT

Solidification/stabilization is an effective technology to reduce the mobility of contaminants and the resultant hydraulic conductivity of the solidified soil mass. Solidification/stabilization is considered to be an effective potential technology for application to further immobilize PCBs, where present at very high concentrations, within the East Plant Area.

### 5.2.2.3 SOLIDIFICATION/STABILIZATION RECOMMENDATION

Solidification/stabilization will be retained for use in selected IM alternatives based upon the other components retained within individual IM alternatives.

## 5.2.3 REMOVAL/DISPOSAL

Excavation and on-Facility or off-Facility disposal consists of the excavation of PCB-impacted soil, transport, and disposal on-Facility or off-Facility. Off-Facility disposal would occur at a permitted TSCA or municipal solid waste (MSW) disposal facility, as appropriate, based on the PCB concentrations. On-Facility disposal would occur in an appropriately designed landfill vault (e.g., liner and cover system).

Excavation and on-Facility or off-Facility disposal provides an immediate reduction in risk to human health and the environment as the contaminant is physically removed. Once the excavated soils have been disposed, PCB concentrations and/or mass in the environment at the Facility will be reduced. Therefore, excavation provides "source control" and mitigation of potential future releases. Removal and on-Facility or off-Facility disposal eliminates the future ingestion, dermal contact, and inhalation exposure pathways to that specific soil.

#### 5.2.3.1 REMOVAL/DISPOSAL ALTERNATIVES

##### 5.2.3.1.1 OFF-FACILITY DISPOSAL

Off-Facility disposal would occur at U.S. EPA or IDEM permitted off-Facility commercial landfills. Off-Facility disposal is technically effective but may result in significant disruption of the community through increased truck traffic depending on the volume of material to be disposed.

##### 5.2.3.1.2 ON-FACILITY DISPOSAL

On-Facility disposal could occur through the construction of a Subtitle C/D, TSCA, or equivalent liner/cover landfill system (or vault) designed consistent with Facility-specific geology and hydrogeology.

#### 5.2.3.2 REMOVAL/DISPOSAL ASSESSMENT

Off-Facility and on-Facility disposal are both viable alternatives for soil materials requiring disposal. It should be noted that the use of the <50 mg/kg RA soil as backfill for excavations will have the similar benefits as described in Section 5.2.1.1.2.

#### 5.2.3.3 REMOVAL/DISPOSAL RECOMMENDATION

Both off and on-Facility disposal will be retained for incorporation into selected IM alternatives.

## 5.3 NAPL/GROUNDWATER TECHNOLOGIES

### 5.3.1 NAPL/GROUNDWATER CONTAINMENT/ ASSESSMENT/RECOMMENDATION

NAPL/groundwater physical containment technologies were reviewed in Sections 5.2.1 and 5.2.2.

### 5.3.2 NAPL/GROUNDWATER EXTRACTION/TREATMENT

There are two practical alternatives for the collection of shallow groundwater in these areas. These include the installation of collection trenches, similar to those designed for the springs on Parcel 3/205 (Outfall 002 area) during the SSC, or the installation of an extraction well network. The following two subsections detail these options.

#### 5.3.2.1 NAPL/GROUNDWATER EXTRACTION/ TREATMENT ALTERNATIVES

##### 5.3.2.1.1 SHALLOW BEDROCK COLLECTION TRENCH

Shallow bedrock collection trenches would provide effective horizontal control of groundwater transport. This alternative involves constructing a trench through the more weathered and fractured upper portion of the bedrock. The trench locations and alignments will be optimized with respect to bedrock topography and groundwater flow directions as additional RFI data collected is evaluated. Groundwater collected in the trenches would then be pumped via a forcemain to a pretreatment system (as required) and then to the Facility WWTP. Any collected NAPL would be transported off-Facility for proper treatment and/or disposal.

The exact alignment for the perimeter shallow groundwater collection system will be based on the following considerations:

- the nature and extent of impacted groundwater and preferential flow pathways based upon the RFI;
- the location of the perimeter of the landfill Cover System;

- the number and location of RA SSC collection systems which have been installed; and
- the hydraulic properties of the media.

The following list identifies the commonly used construction options for open excavations:

- excavate without support;
- excavate with trench boxes;
- excavate within sheet piling;
- use of biopolymer slurry to maintain trench walls;
- mechanical removal of bedrock;
- blast fracturing (where bedrock is encountered); and
- horizontal drilling.

Typical cross-sections for these construction installation techniques are presented on Figure 5.11.

In addition to the hydraulic barrier affected by the installation of the collection trench, a physical barrier could be incorporated into the final design to protect against continued migration beyond the downgradient side of the collection system (or to limit backflow from the downgradient side of the trench). One way to construct this physical barrier is to install a HDPE liner along the outside wall of the collection trench before backfilling.

#### 5.3.2.1.2 EXTRACTION WELL NETWORK

An extraction well network would involve pumping several extraction wells to create overlapping cones of influence. An extraction well network would require significant long-term operation and maintenance. Given the fractured nature of the bedrock, and that the fact groundwater flow is along secondary permeability fractures, the effectiveness of an extraction well network cannot be reliably estimated for the broad area of the Facility where groundwater extraction would be needed.

#### 5.3.2.2 NAPL/GROUNDWATER EXTRACTION ASSESSMENT

Section 5.2.1 discusses the alternative methods of groundwater collection (collection trenches versus extraction wells). Considering the IM alternatives for the entire East Plant Area, it is apparent that hydraulic containment and collection of groundwater is an essential component of the final IM for the East Plant Area.

Extraction wells may be more effective in targeting limited areas and would minimize overall ground surface disturbance. However, a more continuous and effective hydraulic barrier will be provided by a continuous overburden/shallow bedrock collection trench. This is consistent with project experience to date associated with the RA SSC.

#### 5.3.2.3 NAPL/GROUNDWATER EXTRACTION RECOMMENDATION

Considering the bedrock valleys and groundwater flow gradients that exist within the East Plant Area, the installation of shallow bedrock collection trenches is recommended to be included in the IM alternatives.

## 5.4 SUMMARY OF RETAINED INTERIM MEASURE TECHNOLOGIES

The following provides a summary of the retained IM technologies and approaches:

| | *Description* | *Retained* | *Comment* |
|---|---|---|---|
| 1. | No Action with SSC O&M, GMS, and Spring/Seep Monitoring System | yes | - baseline for comparison<br>- SSC O&M, GMS, and Spring/Seep Monitoring System to be included in all alternatives |
| 2. | Institutional Controls | yes | - used to reduce potential for exposures<br>- will be included in all alternatives |
| 3. | Physical Containment | | |

| | *Description* | *Retained* | *Comment* |
|---|---|---|---|
| | a) Cover System | yes | - used to eliminate direct contact exposures and reduce infiltration of precipitation |
| | b) Groundwater Cutoff Wall | yes | - reserved as a contingency IM component |
| 4. | Solidification/Stabilization | yes | - retained for hybrid IM alternatives |
| 5. | Removal/Off-Facility Disposal | yes | - used to eliminate source from environment |
| 6. | Removal/On-Facility Disposal | yes | - used to isolate sources from environment |
| 7. | NAPL/Groundwater Extraction/Treatment | | |
| | a) Collection Trench | yes | - used to control horizontal groundwater flow |
| | b) Extraction Wells | no | - effectiveness unknown for Facility conditions given large area needed |
| | c) WWTP | yes | - used to treat aqueous phase liquids |
| | d) Incineration (or approved alternative disposal method) | yes | - used to destroy or dispose of NAPL |

## 6.0 IDENTIFICATION OF INTERIM MEASURES ALTERNATIVES

CA objectives were developed in Section 3.0 and are summarized as follows:

1) eliminate the potential for significant human exposures to PCBs via ingestion of and dermal contact with soil or groundwater or inhalation of unacceptable levels of dust or vapor from these media during long-term use of the East Plant Area in the future;
2) minimize the potential for routine/construction worker and public exposure at the East Plant Area during implementation of the CA;
3) eliminate the potential for NAPL or impacted groundwater migration beyond the horizontal limits of the East Plant Area through effective perimeter hydraulic or physical containment;
4) control hydraulic gradients and leaching of PCBs into the groundwater below the East Plant Area through the use of an appropriate cover system;
5) minimize disruption to the Facility and surrounding community during implementation of the CA;
6) allow continued use of the East Plant Area for industrial purposes;
7) reduce the toxicity, mobility, or volume of PCBs through collection/treatment/ disposal and/or containment of NAPL and PCB-impacted soil and groundwater;
8) reduce long-term operation, maintenance, and monitoring requirements;
9) initiate and complete IM construction activities within a reasonable period of time; and
10) be cost effective.

The CA objectives are utilized collectively with the SHHRA presented in Section 4.0 and the screening of IM technologies presented in Section 5.0 to assemble appropriate IM alternatives for the East Plant Area.

Technologies that were not appropriate for the East Plant Area, or those that were expected to prove very difficult to implement, require unreasonable time periods to implement, or rely on insufficiently developed approaches, were eliminated from further evaluation. It should also be noted that for all IM alternatives that include technical components beyond those of institutional controls, the IM alternatives have containment technologies such as cover systems and groundwater collection trenches. These technologies are required because NAPL has been identified to exist within the

upper fractured bedrock at the Facility, and it is currently technically impracticable to remove a sufficient amount of this material to ensure protection of human health and the environment. In addition, selected IM alternatives include impacted media excavation/disposal and/or treatment.

The IM alternatives presented in this section were developed to identify a range of potentially viable IM alternatives for the East Plant Area. It should be noted that some variations to the assembled alternatives may also be viable in attaining CA objectives.

The final listing of IM alternatives that will be retained for detailed evaluation in Section 7.0 of this IM Alternatives Review Report is as follows:

| ***Alternative #*** | ***Description*** | ***Figure Reference #*** |
|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B |

| *Alternative #* | *Description* | *Figure Reference #* |
|---|---|---|
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F |

| *Alternative #* | *Description* | *Figure Reference #* |
|---|---|---|
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B |

| *Alternative #* | *Description* | *Figure Reference #* |
|---|---|---|
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤PCBs <500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤PCBs <1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤PCBs <500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A |

| *Alternative #* | *Description* | *Figure Reference #* |
|---|---|---|
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- -includes Alternative 5C components with on-Facility disposal of soil with ≥1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤PCBs <1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B |
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs <1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs <1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B |

All excavation remedies assume that soils will be removed to the concentrations specified in the remedy, based on the existing data available from the RFI and that additional sampling following excavation will not be conducted. The volumes associated with removing various concentrations of PCBs were determined for four different depth scenarios (any depth in overburden, 0 to 2 ft, 0 to 10 ft, and 0 to 15 ft) as

presented in Appendix A. For simplicity of review, most of the assembled IM alternatives in Section 6.0 are based on addressing PCBs at any depth in the overburden. However, in addition (consistent with the SHHRA) three of the assembled alternatives presented in Section 6.0 include a PCB soil excavation approach with excavation occurring in the 0 to 10 ft depth interval for Alternative 4. These alternatives are presented as Alternatives 4D, 4E, and 4F. This limited depth excavation scenario presents an example alternative to excavation of PCBs at any depth in the overburden in order to provide a comparison of alternate approaches. Section 7.0 presents additional comparative analysis of IM alternatives, including an assessment of addressing PCB impacted media at variable depths (any depth in overburden, 0 to 2 ft, 0 to 10 ft, and 0 to 15 ft).

For each alternative, present worth costs have been calculated using a discount rate of 2.5 percent over a 30-year period. This discount rate was selected to allow a realistic estimate of the IM alternatives present worth costs. The methodology used to calculate present worth is presented below.

The present worth calculations include the capital costs associated with potential alternative IM as well as the present worth of annual O&M costs. The calculations were completed within Microsoft Excel Spreadsheets to determine the present worth of each alternative. The first part of the calculation involves computing the Present Worth Factors that are then inputted into the total formula for Present Worth as presented below.

**PRESENT WORTH FACTORS**

1. Uniform Series Factor

$$(P/A,i,N) = \frac{[(1+i)^{N}-1]}{[i(1+i)^{N}]}$$

2. Single Payment Factor

$$(P/F,i,N) = \frac{1}{(1+i)^{N}}$$

where:
P = Present Worth
A = Annual Payment Cost

F = Single Payment Cost
i = interest rate (2.5%)
N = Time Period (years)

**FORMULA FOR PRESENT WORTH**

$P = \text{Capital Cost} + (O\&M_u)(P/A,i,N) + O\&M_s\ (P/F, i, N)$

where:

$O\&M_u$ = Operation & Maintenance costs incurred every year for N years
O&Ms = Operation & Maintenance costs incurred as a single payment at N years

A 30-year time horizon was evaluated for all alternatives. It should be noted that the O&M of potential alternatives may extend beyond 30 years and will need to be considered in the final design phase of the selected IM. A 30-year horizon was chosen as a reasonable time horizon for the present worth calculations.

A detailed description of the alternatives is provided in the following sections. The costs presented for alternatives have been rounded off to the nearest $1,000.

## 6.1 ALTERNATIVE 1

Alternative 1 is the No Action Alternative. This alternative does not include any active IM other than groundwater monitoring, O&M of the RA SSC, and spring/seep monitoring following the completion of the IM Alternatives Review Report. The SSC O&M and spring/seep monitoring will be based upon the O&M Plan to be prepared pursuant to the RA. The GMS would consist of the proposed monitoring well network presented on Figure 6.1. There are 31 existing monitoring wells and 10 proposed new monitoring wells in the proposed monitoring well network. The GMS would include the installation of the proposed wells, and the collection and analysis of groundwater samples from all 41 wells. For the purposes of the IM Alternatives Review Report, the proposed Facility specific parameter list for the groundwater samples would consist of Volatile Organic Compounds (VOCs), metals, and PCBs. Monitoring would be conducted on a semi-annual basis for the first 5 years, and on an annual basis thereafter. Alternative 1 includes a 5-year review of the effectiveness of the IM alternative (to allow an assessment of the need to modify the IM in years 5 and 10).

A detailed cost breakdown for Alternative 1 is presented in Table 6.1. The total capital cost is estimated to be $159,000 and the estimated annual operation and maintenance cost is estimated to be $758,000. The total present worth of this alternative is estimated to be $11,913,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.2 ALTERNATIVE 2

Alternative 2 includes O&M of the RA SSC, and the groundwater and spring/seep monitoring described for Alternative 1. In addition, Alternative 2 includes the implementation of institutional controls. The components of Alternative 2 are presented on Figure 6.2. The institutional controls would consist of deed restrictions as well as physical controls to eliminate the future potential for on-Facility exposures. Institutional controls would be utilized to effectively mitigate the potential for exposure to impacted media, and therefore, reduce risks associated with such exposures.

Institutional controls may involve the placement of a restriction within the deed (or other actions such as zoning changes) to the property ensuring that the property owner does not conduct specific unacceptable activities (e.g., excavation, residential use, etc.). Deed restrictions also may involve placing a notation on the property deed, which makes the current and any prospective property owner aware of the property's history and restricted land use of the property. Deed restrictions can be made enforceable and permanent through various legal mechanisms.

Additional institutional controls would include physical controls such as a security perimeter fence.

A detailed cost breakdown for Alternative 2 is presented in Table 6.2. The total capital cost is estimated to be $452,000 and the estimated annual operation and maintenance cost is estimated to be $761,000. The total present worth of this alternative is estimated to be $12,809,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.3 ALTERNATIVE 3

Alternative 3 includes the IM components described in Section 6.2 for Alternative 2 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring. In addition, Alternative 3 includes active IM components

consisting of a Cover System and Perimeter Groundwater Collection System. The components of Alternative 3 are presented on Figure 6.3.

The purpose of the Cover System is to prevent direct contact with soil and reduce infiltration of precipitation through the soil and subsequent percolation of potentially contaminated infiltration into the groundwater. As discussed in Section 5.2.1.1.3, the recommended general Cover System would consist of the following components (bottom to top):

- grading layer using RA soil materials (<50 mg/kg PCBs)(depth varies, as necessary);
- barrier layer - clay (12 inches);
- GCL;
- Geonet drainage layer;
- common fill (12 inches); and
- vegetative cover (6 inches).

As discussed in Section 5.2.1.1.2, the optimized grading layer approach will provide for an overall more effective Cover System. The optimized grading layer would be constructed with soil materials excavated during the RA with PCB concentrations of <50 mg/kg.

The Cover System would be constructed in all areas of the East Plant Area with the exception of the building footprints, ZIPP and salary parking lots, Stormwater Lagoon, and the roadways around the treatment facility. For roadways and parking areas, a hard surface cover would be designed to fit the expected necessary functional needs of these areas.

A Perimeter Groundwater Collection System would also be constructed for Alternative 3. A variety of shallow groundwater collection systems have previously been installed as part of the ongoing SSC in the area of the AOI 4 and to the east of the East Plant Area on Parcel 003/205. As discussed in Section 5.3, additional perimeter shallow bedrock collection trenches would provide effective and full horizontal control of groundwater transport to ensure that any contamination reaching the groundwater with the Cover System in place, would be collected, thereby mitigating the potential for downgradient migration. This alternative involves constructing a vertical collection trench into the more weathered and fractured upper portion of the shallow bedrock around the northern, eastern, and a portion of the southern perimeter of the East Plant

Area. The trench locations and alignments would be optimized with respect to bedrock topography and groundwater flow directions during the design phase by the collection of additional RFI data. The existing SSC trenches will be incorporated into the Perimeter Groundwater Collection System, as practical. Groundwater collected in the trenches would then be pumped via a forcemain to a pretreatment system (as required) and then to the Facility WWTP. Any collected NAPL would be transported off-Facility for proper disposal.

A detailed cost breakdown for Alternative 3 is presented in Table 6.3. The total capital cost is estimated to be $16,150,000 and the estimated annual operation and maintenance cost is estimated to be $816,000. The total present worth of this alternative is estimated to be $29,110,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.4 ALTERNATIVE 4

Alternative 4 includes the IM components described in Section 6.3 for Alternative 3 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring, a Cover System, and a Perimeter Groundwater Collection System. In addition, Alternative 4 includes a Groundwater Source Removal System and Soil Source Removal (with two options; any depth in overburden or the 0-10 ft depth interval).

The Groundwater Source Removal System would consist of the installation of shallow bedrock collection trenches within AOI 8. Within AOI 8, PCB concentrations in groundwater are relatively higher than other AOIs as discussed in Section 4.2.2 and contribute to human health risk levels associated with the exposure of a construction worker to groundwater in this area. There is also the potential for NAPL to be present within AOI 8. The trench locations and alignments would be optimized with respect to bedrock topography and groundwater flow directions within AOI 8 to maximize NAPL/groundwater containment and collection. Collected groundwater would then be pumped via a forcemain to a pretreatment system (as required) and then to the Facility WWTP. Any NAPL that is collected would be disposed off-Facility via an approved approach such as incineration.

Soil Source Removal would be implemented, as pre-defined by existing RFI soil analysis, in specific areas of the East Plant Area under Alternative 4 to provide a reduction in mass of PCBs consistent with the CA objectives. This Soil Source Removal component would consist of the excavation of PCB-impacted soil above a certain concentration,

transport, and disposal off-Facility at an approved TSCA or RCRA Subtitle C facility, as appropriate, based on the PCB concentrations. Select areas of soil contamination are impractical to remove based on its proximity to the existing stormwater basin or buried utilities (e.g.,AOI-8). The PCB concentrations to be used to define the volume and limits of material to be excavated and disposed are as follows:

- Alternative 4A – PCB concentrations in soil above 50 mg/kg at any depth in the overburden, where practical;
- Alternative 4B – PCB concentrations in soil above 500 mg/kg at any depth in the overburden, where practical;
- Alternative 4C – PCB concentrations in soil above 1,500 mg/kg at any depth in the overburden, where practical;
- Alternative 4D – PCB concentrations in soil above 50 mg/kg within the 0 to 10 ft depth interval, where practical;
- Alternative 4E – PCB concentrations in soil above 500 mg/kg within the 0 to 10 ft depth interval, where practical; and
- Alternative 4F – PCB concentrations in soil above 1,500 mg/kg within the 0 to 10 ft depth interval, where practical.

The volume of soil to be excavated under each of the six scenarios has been determined based on the assessment of PCB-impacted media presented in Appendix A. The removal area and depth has been prescribed based on existing data for Alternatives 4B/4E and 4C/4F. Additional delineation will augment the existing data to define the areas and depths to be excavated under Alternative 4A/4D. No soil verification testing will be required because the removal area and depth will be specified beforehand using conservatively bounded areas and depths. Utilizing a prescribed soil removal approach will provide for a more timely completion of the excavation work and limit dust generation. A prescribed approach is also more practical to implement for this alternative because the significant depth of the fill and location of contamination may make it extremely difficult to perform verification sampling and, if an exceedance is identified, to remove additional material without removing significant amounts of clean fill above or adjacent to it. The prescribed removal approach is easily implemented given the amount of sampling in the East Plant Area and knowledge of the historical waste management activities. It should also be noted that in selected areas (in the vicinity of structures, utilities, and the Stormwater Lagoon) it may be technically impracticable to implement a soil excavation alternative.

In addition to the excavation of soil above the specified concentrations, additional 'clean' soil will also require excavation and handling to support the excavation of PCB-impacted soil.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 4A, 4B, 4C, 4D, 4E, and 4F are further discussed in Sections 6.4.1 to 6.4.6.

### 6.4.1 ALTERNATIVE 4A

Alternative 4A includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 50 mg/kg at any depth in the overburden, where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 130,000 cy (182,000 tons). The components of Alternative 4A, including the prescribed limits of excavation are presented on Figure 6.4A.

A detailed cost breakdown for Alternative 4A is presented in Table 6.4A. The total capital cost is estimated to be $65,221,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $78,783,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.4.2 ALTERNATIVE 4B

Alternative 4B includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 500 mg/kg at any depth in the overburden, where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 37,500 cy (52,500 tons). The components of Alternative 4B, including the prescribed limits of excavation, are presented on Figure 6.4B.

A detailed cost breakdown for Alternative 4B is presented in Table 6.4B. The total capital cost is estimated to be $31,102,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $44,665,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.4.3 ALTERNATIVE 4C

Alternative 4C includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 1,500 mg/kg, where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 10,000 cy (14,000 tons). The components of Alternative 4C, including the prescribed limits of excavation, are presented on Figure 6.4C.

A detailed cost breakdown for Alternative 4C is presented in Table 6.4C. The total capital cost is estimated to be $20,545,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $34,108,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.4.4 ALTERNATIVE 4D

Alternative 4D includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 50 mg/kg (0 to 10 ft depth), where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 47,000 cy (65,800 tons). The components of Alternative 4A, including the prescribed limits of excavation are presented on Figure 6.4D.

A detailed cost breakdown for Alternative 4D is presented in Table 6.4D. The total capital cost is estimated to be $34,247,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $47,810,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.4.5 ALTERNATIVE 4E

Alternative 4E includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 500 mg/kg (0 to 10 ft depth), where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 14,500 cy (20,300 tons). The components of

Alternative 4E, including the prescribed limits of excavation, are presented on Figure 6.4E.

A detailed cost breakdown for Alternative 4E is presented in Table 6.4E. The total capital cost is estimated to be $21,888,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $35,451,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.4.6 ALTERNATIVE 4F

Alternative 4F includes all the components presented in Section 6.4 with the excavation and disposal of soil containing PCB concentrations above 1,500 mg/kg (0 to 10 ft depth), where practical. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 5,000 cy (7,000 tons). The components of Alternative 4F, including the prescribed limits of excavation, are presented on Figure 6.4F.

A detailed cost breakdown for Alternative 4F is presented in Table 6.4F. The total capital cost is estimated to be $18,344,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $31,897,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.5 ALTERNATIVE 5

Alternative 5 includes the IM components described in Section 6.4 for Alternative 4 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring, a Cover System, a Perimeter Groundwater Collection System, a Groundwater Source Removal System, and Soil Source Removal. However, Alternative 5 includes the disposal of the excavated soil in a landfill vault constructed on-Facility instead of off-Facility disposal as used for Alternative 4.

The on-Facility landfill vault would be constructed using a RCRA Subtitle C consistent cover and liner system as described in Section 5.2.1.1.1.4 and presented in cross-section on Figures 5.5 and 5.6. Other cover systems such as those described in Section 5.2.1.1.1

that provide a similar level of performance may also be suitable for the landfill vault. The RCRA Subtitle C cover consists of the following components:

- 24–inch thick upper vegetative layer (6-inches topsoil with 18 inches of common fill);
- 12-inch thick sand drainage layer with hydraulic conductivity greater than $1x10^{-3}$ cm/sec (or a 12-inch thick drainage layer of sand with a Geonet with hydraulic conductivity greater than $1x10^{-3}$ cm/sec);
- synthetic membrane of greater than 20-mil thickness;
- 24-inch thick barrier layer of clay with hydraulic conductivity no greater than $1x10^{-7}$ cm/sec; and
- 12-inch thick grading layer to act as a foundation for the cap, if required, based on the site-specific conditions.

The PCB concentration alternatives to be used to define the volume and limits of material to be excavated and disposed in the on-Facility landfill vault are as follows:

- Alternative 5A – PCB concentrations in soil above 50 mg/kg at any depth in the overburden, where practical;
- Alternative 5B – PCB concentrations in soil above 500 mg/kg at any depth in the overburden, where practical; and
- Alternative 5C – PCB concentrations in soil above 1,500 mg/kg at any depth in the overburden, where practical.

It should be noted that Alternative 5 could also be implemented for excavation scenarios at a variety of depths similar to Alternatives 4D, 4E, and 4F. A comparative analysis is presented in Section 7.0.

Soil containing PCBs above the specified concentrations would be excavated and placed in the area designated for the landfill vault in the East Plant Area. The removal areas and depths would be prescribed in advance as previously described in Section 6.4 and are subject to technical impracticable constraints in select portions of this Facility. The design of the vault would be dependent upon the volume of material under each of the three scenarios. A suitable grading plan would be developed to ensure slope stability and proper surface water drainage controls specific to the volumes of material to be excavated under Alternatives 5A, 5B, and 5C. The Cover System presented in Section 6.3 would be constructed within the East Plant Area in the areas outside the footprint of the landfill vault, as appropriate.

The volume of soil to be excavated under each of the three scenarios has been determined based on the assessment of PCB-impacted media presented in Appendix A.

In addition to the excavation of soil above the specified concentrations, additional 'clean' soil will also require excavation and handling to support the excavation of impacted soil.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 5A, 5B, and 5C are further discussed in Sections 6.5.1 to 6.5.3. Alternatives 5A and 5B were identified by the U.S. EPA.

### 6.5.1 ALTERNATIVE 5A

Alternative 5A includes the components described in Section 6.5 with the excavation of soil containing PCB concentrations above 50 mg/kg, where practical, and disposal in an on-Facility landfill vault. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 130,000 cy (182,000 tons). The components of Alternative 5A, including the prescribed limits of excavation and the on-Facility landfill vault are presented on Figure 6.5A.

A detailed cost breakdown for Alternative 5A is presented in Table 6.5A. The total capital cost is estimated to be $27,184,000 and the estimated annual operation and maintenance cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $40,797,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.5.2 ALTERNATIVE 5B

Alternative 5B includes the components described in Section 6.5 with the excavation of soil containing PCB concentrations above 500 mg/kg, where practical, and disposal in an on-Facility landfill vault. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 37,500 cy (52,500 tons). The components of Alternative 5B, including the prescribed limits of excavation, and the on-Facility landfill vault are presented on Figure 6.5B.

A detailed cost breakdown for Alternative 5B is presented in Table 6.5B. The total capital cost is estimated to be $20,442,000 and the estimated annual operation and maintenance cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $34,055,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.5.3 ALTERNATIVE 5C

Alternative 5C includes the components described in Section 6.5 with the excavation of soil containing PCB concentrations above 1,500 mg/kg, where practical, and disposal in an on-Facility landfill vault. The total volume of soil to be excavated and disposed under this alternative is estimated to be approximately 14,000 tons (10,000 cy). The components of Alternative 5C, including the prescribed limits of excavation, and the on-Facility landfill vault are presented on Figure 6.5C.

A detailed cost breakdown for Alternative 5C is presented in Table 6.5C. The total capital cost is estimated to be $17,871,000 and the estimated annual operation and maintenance cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $31,484,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.6 ALTERNATIVE 6

Alternative 6 includes the IM components described in Section 6.4 for Alternative 4 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring, a Cover System, a Perimeter Groundwater Collection System, and a Groundwater Source Removal System. However, Alternative 6 includes the in situ solidification/stabilization of PCB-impacted media instead of the excavation and disposal of soil used for Alternative 4.

In situ solidification/stabilization primarily, but not exclusively, obtains results through the production of a monolithic block of waste with high structural integrity and low hydraulic conductivity ($10^{-6}$ cm/sec to $10^{-8}$ cm/sec). Contaminants (both organics and inorganics) are mechanically locked within the solidified matrix. Contaminant loss (through leachability) and mobility are minimized through reduction of surface area in contact with the environment. Solidification/stabilization is an effective method of reducing the mobility of contaminants but may not reduce the toxicity or volume. It

should be noted that PCBs do not readily leach even from soils that are not solidified and are not generally mobile, except at very high concentrations.

As presented in Section 5.2.2.1, solidification/stabilization of the soil is a viable treatment technology, which may be effectively utilized to reduce the mobility of Facility-related constituents such as PCBs if they are present at very high concentrations. The technology may be implemented utilizing a variety of solidification/stabilization agents and materials such as portland cement, CKD, or ASTM Class F Fly Ash. The solidification/stabilization agent would be introduced to the PCB-impacted area by using the column mixing method. Due to the method of mixing the solidification/stabilization ingredients into the soil matrix, there are technical impracticability limitations horizontally and vertically in application of this approach in select portions of the Facility.

The PCB concentrations to be used to define the area limits of material to be solidified for alternative evaluation are as follows:

- Alternative 6A – PCB concentrations in soil above 50 mg/kg at any depth in the overburden, where practical;
- Alternative 6B – PCB concentrations in soil above 500 mg/kg at any depth in the overburden, where practical; and
- Alternative 6C – PCB concentrations in soil above 1,500 mg/kg at any depth in the overburden, where practical.

It should be noted that Alternative 6 could also be implemented for scenarios at a variety of depths. A comparative analysis is presented in Section 7.0.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 6A, 6B, and 6C are further discussed in Sections 6.6.1 to 6.6.3.

### 6.6.1 ALTERNATIVE 6A

Alternative 6A includes the components described in Section 6.6 with the in situ solidification of soil containing PCB concentrations above 50 mg/kg, where practical. The total volume of soil to be solidified under this alternative is estimated to be

approximately 130,000 cy (182,000 tons). The components of Alternative 6A, including the prescribed limits of soil solidification are presented on Figure 6.6A.

A detailed cost breakdown for Alternative 6A is presented in Table 6.6A. The total capital cost is estimated to be $25,399,000 and the estimated annual O&M cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $38,962,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.6.2 ALTERNATIVE 6B

Alternative 6B includes the components described in Section 6.6 with the in situ solidification of soil containing PCB concentrations above 500 mg/kg, where practical. The total volume of soil to be solidified under this alternative is estimated to be approximately 37,500 cy (52,500 tons). The components of Alternative 6B, including the prescribed limits of soil solidification, are presented on Figure 6.6B.

A detailed cost breakdown for Alternative 6B is presented in Table 6.6B. The total capital cost is estimated to be $18,974,000 and the estimated annual O&M cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $32,537,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.6.3 ALTERNATIVE 6C

Alternative 6C includes the components described in Section 6.6 with the in situ solidification of soil containing PCB concentrations above 1,500 mg/kg, where practical. The total volume of soil to be solidified under this alternative is estimated to be approximately 10,000 cy (14,000 tons). The components of Alternative 6C, including the prescribed limits of soil solidification, are presented on Figure 6.6C.

A detailed cost breakdown for Alternative 6C is presented in Table 6.6C. The total capital cost is estimated to be $17,058,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $30,620,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.7 ALTERNATIVE 7

Alternative 7 includes the IM components described in Section 6.4 for Alternative 4 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring, a Cover System, a Perimeter Groundwater Collection System, Soil Source Removal, and a Groundwater Source Removal System. However, Alternative 7 also includes the in situ solidification of a portion of the remaining PCB-impacted soil that is not excavated and disposed off-Facility. However, as described previously, there are select areas of the Facility where removal and/or solidification/stabilization may be technically impracticable due to structures, utilities, or the Stormwater Lagoon.

The PCB concentrations to be used to define the volume and limits of material to be excavated and disposed and solidified in situ for alternative evaluation are as follows:

- Alternative 7A – prescribed excavation and disposal of soil with PCB concentrations above 500 mg/kg and in situ solidification of remaining soil with PCB concentrations between 50 mg/kg and 500 mg/kg, where practical; and
- Alternative 7B – prescribed excavation and disposal of soil with PCB concentrations above 1,500 mg/kg; and in situ solidification of remaining soil with PCB concentrations between 500 mg/kg and 1,500 mg/kg, where practical.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 7A and 7B are further discussed in Sections 6.7.1 and 6.7.2.

### 6.7.1 ALTERNATIVE 7A

Alternative 7A includes the components described in Section 6.7 with the excavation and off-Facility disposal of soil containing PCB concentrations above 500 mg/kg and the in situ solidification of the remaining soil with PCB concentrations between 50 mg/kg and 500 mg/kg, where practical. The total volumes of soil to be excavated for off-Facility disposal and solidified under this alternative are estimated to be approximately 37,500 cy (52,500 tons) and 92,5 cy (129,500 tons), respectively. The components of Alternative 7A, including the prescribed limits of soil solidification are presented on Figure 6.7A.

A detailed cost breakdown for Alternative 7A is presented in Table 6.7A. The total capital cost is estimated to be $35,691,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $49,254,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.7.2 ALTERNATIVE 7B

Alternative 7B includes the components described in Section 6.7 with the excavation and off-Facility disposal of soil containing PCB concentrations above 1,500 mg/kg and the in situ solidification of the remaining soil with PCB concentrations between 500 mg/kg and 1,500 mg/kg, where practical. The total volumes of soil to be excavated for off-Facility disposal and solidified under this alternative are estimated to be approximately 10,000 cy (14,000 tons) and 27,500 cy (38,500 tons), respectively. The components of Alternative 7B, including the prescribed limits of soil solidification, are presented on Figure 6.7B.

A detailed cost breakdown for Alternative 7B is presented in Table 6.7B. The total capital cost is estimated to be $20,785,000 and the estimated annual operation and maintenance cost is estimated to be $845,000. The total present worth of this alternative is estimated to be $34,348,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.8 ALTERNATIVE 8

Alternative 8 includes the IM components described in Section 6.5 for Alternative 5 consisting of institutional controls, O&M of the RA SSC, and groundwater and spring/seep monitoring, a Cover System, a Perimeter Groundwater Collection System, Soil Source Removal, an on Facility Landfill Vault, and a Groundwater Source Removal System. However, Alternative 8 also includes the in situ solidification of a portion of the remaining PCB-impacted soil that is not excavated and disposed in the on-Facility landfill vault.

The PCB concentrations to be used to define the volume and limits of material to be excavated and disposed in the on-Facility landfill vault and solidified in situ for alternative evaluation are as follows:

- Alternative 8A – prescribed excavation and on-Facility disposal of soil with PCB concentrations above 500 mg/kg and in situ solidification of remaining soil with PCB concentrations between 50 mg/kg and 500 mg/kg, where practical; and
- Alternative 8B – prescribed excavation and on-Facility disposal of soil with PCB concentrations above 1,500 mg/kg; and in situ solidification of remaining soil with PCB concentrations between 500 mg/kg and 1,500 mg/kg, where practical.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 8A and 8B are further discussed in Sections 6.8.1 and 6.8.2.

### 6.8.1 ALTERNATIVE 8A

Alternative 8A includes the components described in Section 6.8 with the excavation and on-Facility disposal of soil containing PCB concentrations above 500 mg/kg and the in situ solidification of the remaining soil with PCB concentrations between 50 mg/kg and 500 mg/kg, where practical. The total volumes of soil to be excavated for on-Facility disposal and solidified under this alternative are estimated to be approximately 37,500 cy (52,500 tons) and 92,500 cy (129,500 tons), respectively. The components of Alternative 8A, including the prescribed limits of soil solidification are presented on Figure 6.8A.

A detailed cost breakdown for Alternative 8A is presented in Table 6.8A. The total capital cost is estimated to be $26,435,000 and the estimated annual operation and maintenance cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $40,048,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.8.2 ALTERNATIVE 8B

Alternative 8B includes the components described in Section 6.8 with the excavation and on-Facility disposal of soil containing PCB concentrations above 1,500 mg/kg and the in situ solidification of the remaining soil with PCB concentrations between 500 mg/kg and 1,500 mg/kg, where practical. The total volumes of soil to be excavated for on-Facility disposal and solidified under this alternative are estimated to be approximately 10,000 cy (14,000 tons) and 27,500 cy (38,500 tons), respectively. The

components of Alternative 8B, including the prescribed limits of soil solidification, are presented on Figure 6.8B.

A detailed cost breakdown for Alternative 8B is presented in Table 6.8B. The total capital cost is estimated to be $19,537,000 and the estimated annual O&M cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $33,150,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.9 ALTERNATIVE 9

Alternative 9 includes the IM components described in Section 6.5 for Alternative 5 consisting of institutional controls , O&M of the RA SCC, groundwater and spring/seep monitoring, a Cover System, a Perimeter Groundwater Collection System, a Groundwater Source Removal System, Soil Source Removal, and an on-Facility Landfill Vault. However, Alternative 9 includes the disposal of the excavated soil with PCB concentrations below 1,500 mg/kg in the constructed on-Facility landfill vault and off-Facility disposal for soil containing PCB concentrations greater than 1,500 mg/kg.

The PCB concentrations to be used to define the volume and limits of material to be excavated and disposed in the on-Facility landfill vault and off-Facility disposal are as follows:

- Alternative 9A - prescribed excavation of soil with PCB concentrations of 50 mg/kg and above, on-Facility disposal of soil with PCB concentrations between 50 mg/kg and 1,500 mg/kg, and off-Facility disposal of soil with PCB concentrations above 1,500 mg/kg; and
- Alternative 9B - prescribed excavation of soil with PCB concentrations of 500 mg/kg and above, on-Facility disposal of soil with PCB concentrations between 500 mg/kg and 1,500 mg/kg, and off-Facility disposal of soil with PCB concentrations above 1,500 mg/kg.

Areas excavated may be restored using <50 mg/kg PCB soil from the RA.

Alternatives 9A and 9B are further discussed in Sections 6.9.1 and 6.9.2.

### 6.9.1 ALTERNATIVE 9A

Alternative 9A includes the components described in Section 6.9 with the excavation and on-Facility disposal of soil containing PCB concentrations between 50 mg/kg and 1,500 mg/kg, and the excavation and off-Facility disposal of soil containing PCB concentrations above 1,500 mg/kg. The total volumes of soil to be excavated for on-Facility and off-Facility disposal under this alternative are estimated to be approximately 120,000 cy (168,000 tons) and 10,000 cy (14,000 tons), respectively. The components of Alternative 9A, including the prescribed limits of excavation are presented on Figure 6.9A.

A detailed cost breakdown for Alternative 9A is presented in Table 6.9A. The total capital cost is estimated to be $29,587,000 and the estimated annual O&M cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $43,200,000 based upon a 2.5 percent discount rate over a 30-year period.

### 6.9.2 ALTERNATIVE 9B

Alternative 9B includes the components described in Section 6.9 with the excavation and on-Facility disposal of soil containing PCB concentrations between 500 mg/kg and 1,500 mg/kg and the excavation and off-Facility disposal of soil containing PCB concentrations above 1,500 mg/kg. The total volumes of soil to be excavated for on-Facility and off-Facility disposal under this alternative are estimated to be approximately 27,500 cy (38,500 tons) and 10,000 cy (14,000 tons), respectively. The components of Alternative 9B, including the prescribed limits of excavation are presented on Figure 6.9.B.

A detailed cost breakdown for Alternative 9B is presented in Table 6.9B. The total capital cost is estimated to be $22,581,000 and the estimated annual O&M cost is estimated to be $847,000. The total present worth of this alternative is estimated to be $36,194,000 based upon a 2.5 percent discount rate over a 30-year period.

## 6.10 SUMMARY OF IM ALTERNATIVES

A summary of IM alternatives and associated costs are presented in Table 6.10.

# 7.0 EVALUATION OF CORRECTIVE MEASURES ALTERNATIVES

## 7.1 PERFORMANCE STANDARDS AND BALANCING/ EVALUATION CRITERIA

The evaluation of IM alternatives will be completed in accordance with U.S. EPA guidance as summarized in "Fact Sheet #3, Final Remedy Selection for Results – Based RCRA Corrective Action" (U.S. EPA, March 2000). This guidance presents three Performance Standards and seven Balancing/Evaluation Criteria, which are utilized to evaluate the assembled IM alternatives. The Performance Standards and Balancing/Evaluation Criteria are presented in the following subsections.

### 7.1.1 PERFORMANCE STANDARDS

*"U.S. EPA believes that final remedies selected for RCRA Corrective Action facilities should achieve the following* ***three performance standards:***

1. ***Protect human health and the environment*** *based on reasonably anticipated land use(s), both now and in the future.*

   *Protecting human health and the environment is the general mandate from the RCRA statue; therefore, it is appropriate to include this goal as the first performance standard for final RCRA CA remedies. This standard also serves to ensure remedies include protective activities (e.g., providing an alternative drinking water supply) that would not necessarily be needed to achieve the other two standards.*

2. ***Achieve media cleanup objectives*** *appropriate to the assumptions regarding current and reasonably anticipated land use(s) and current and potential beneficial uses of water resources. The cleanup objectives should address* ***media cleanup levels*** *(chemical concentrations),* ***points of compliance*** *(where cleanup levels should be achieved), and* ***remediation time frames*** *(time to implement the remedy and achieve cleanup levels at the point of compliance).*

   *Note that for human health, U.S. EPA's goal remains to reduce the threat from carcinogenic contaminants such that, for any medium, the excess risk of cancer to an individual exposed over a lifetime generally falls within a range from one in ten thousand to one in one million (i.e., $1x10^{-4}$ to $1x10^{-6}$). Note also that U.S. EPA prefers cleanup levels at the more protective end of this risk range; however, cleanup levels determined on a site-specific basis that represent anywhere within the range could be acceptable. For toxicants associated with adverse effects other than cancer, groundwater cleanup levels*

*should be established at concentrations to which human populations, including sensitive subgroups, could be exposed on a daily basis without appreciable risk of negative effect during a lifetime. Such levels are generally interpreted as equal to or below a HI of one.*

3. ***Remediate the sources of releases*** *so as to eliminate or reduce further releasers of hazardous waste or hazardous constituents that may pose a threat to human health and the environment, and using treatment to address principal threat wastes[1] unless alternative approaches are approved by the overseeing regulator. In this context, "sources" includes both the location of the original release as well as locations where significant mass of contaminants may have migrated. Note that while U.S. EPA expects facilities to use treatment technologies to address principal threats, we also expect that containment technologies as well as institutional controls can be used to address wastes that pose relatively low long-term threats.*

   [1] *U.S. EPA expects to use treatment to address the principal threats posed by a site whenever practical and cost-effective. Contamination that represents principal threats for which treatment is most likely to be appropriate include contamination that is highly toxic, highly mobile or cannot be reliably contained, and that would present a significant risk to human health and the environment should exposure occur."* (U.S. EPA, March 2000)

### 7.1.2 BALANCING/EVALUATION CRITERIA

"1. ***Long-Term Effectiveness:*** *Decision-makers should evaluate remedies based on the long-term reliability and effectiveness they afford, along with the degree of certainty that they will remain protective of human health and the environment. Additional considerations include: the magnitude of risks that will remain at a site from untreated hazardous wastes, and hazardous wastes and hazardous constituents, and treatment residuals; and the reliability of any containment systems and institutional controls. A remedial option should include a description of the approaches that facilities will use to assess long-term performance and effectiveness.*

2. ***Toxicity, Mobility, and Volume Reduction:*** *Decision-makers should evaluate remedies based on the degree to which they employ treatment, including treatment of principal threats, that reduces the toxicity, mobility or volume of hazardous wastes and hazardous constituents, considering, as appropriate: the treatment processes to be used and the amount of hazardous waste and hazardous constituents that will be treated; the degree to which treatment is irreversible; and the types of treatment residuals that will be produced.*

3. ***Short-Term Effectiveness:*** *Decision-makers should evaluate remedies based on the short-term effectiveness and short-term risks that remedies pose, along with the amount of time it will take for remedy design, construction, and implementation.*

4. ***Implementability:*** *Decision-makers should evaluate remedies based on the ease or difficulty of remedy implementation, considering as appropriate: the technical feasibility of constructing, operating, and monitoring the remedy; the administrative feasibility of coordinating with and obtaining necessary approvals and permits from other agencies; and the availability of services and materials, including capacity and location of needed treatment, storage, and disposal services.*

5. ***Cost:*** *Decision-makers should evaluate remedies based on capital and operation and maintenance costs, and the net present value of the capital and operation and maintenance costs.*

6. ***Community Acceptance:*** *Decision-makers should evaluate remedies based on the degree to which they are acceptable to the interested community.*

7. ***State Acceptance:*** *Decision-makers should evaluate remedies based on the degree to which whey are acceptable to the State in which the subject facility is located. This is particularly important where U.S. EPA, not the State, selects the remedy*" (U.S. EPA, March 2000).

## 7.2 IM ALTERNATIVES EVALUATION APPROACH

In order to compare the suitability of the different approaches, each IM alternative will be evaluated and assigned a numerical score for each performance standard and balancing/evaluation criteria. It should be noted that there is some degree of subjectivity introduced into this evaluation process and the scoring between the different criteria may not be perfectly harmonized. Therefore, selection of the most appropriate IM should be based on a general relative ranking and evaluation of the alternatives, not by merely summing the individual scores to determine the highest total score. The numerical score is indicative of how well the individual IM alternative satisfies the particular criteria. Numerical values have been assigned as follows to provide a general relative ranking of IM alternatives:

| *Factor* | *Score* |
|---|---|
| Excellent | 5 |
| Good | 4 |
| Average | 3 |
| Fair | 2 |
| Poor | 1 |

## 7.3 EVALUATION OF IM ALTERNATIVES WITH THE PERFORMANCE STANDARDS

### 7.3.1 PROTECT HUMAN HEALTH AND THE ENVIRONMENT

To support the evaluation of how well an IM alternative addresses the significant soil exposures identified in the BRA, post-IM risk estimates were developed for several key IM alternatives. As discussed in Section 4.2, the post-IM exposure scenarios evaluated the effectiveness of a 2.5-ft soil cover and soil excavation to three alternate PCB concentration limits before installation of the Cover System. Post-IM risk estimates for these scenarios were calculated under the conservative and highly unlikely assumption that exposure to soil under the Cover System occurs because institutional controls are absent or have failed and that no subgrade has been added to the Cover System.

The baseline (i.e., Alternative 1 - No Action) and post-IM risk estimates are summarized in Table 4.2 and are presented graphically on Figures 7.1 and 7.2. For purposes of this analysis, the No Action alternative is considered separate from the three post-IM scenarios which include some amount of PCB impacted soil removal. As presented on Figure 7.1 and discussed in Section 4.2.2, the post-IM cumulative cancer risk estimates are well within or below the U.S. EPA acceptable risk range of $10^{-6}$ to $10^{-4}$ for all post-IM exposure scenarios. The highest post-IM cumulative cancer risk estimate is approximately $1 \times 10^{-5}$, which is based on excavation through the Cover System in the large-scale construction scenario without any soil excavation prior to Cover System installation (and assuming no institutional controls).

The only post-IM hazard index estimate that exceeds the U.S. EPA limit of 1 is the HI of 6 for excavation through the Cover System in the large-scale construction scenario if no soil is excavated prior to Cover System installation as presented on Figure 7.2. As discussed in Section 4.2.1, this scenario assumed that construction workers could excavate to a depth of 10 ft from the surface of the Cover System, and conservatively assumed that no subgrade backfill is present to support the Cover System construction

and workers would be exposed for 125 days. If soil with PCBs at concentrations higher than 1,500 mg/kg were to be removed prior to cover installation, the HI estimate for this scenario would not exceed the limit of 1.

These post-IM risk calculations show that any of the IM alternatives that includes excavation of soil with PCBs at concentrations higher than 1,500 mg/kg and installation of a Cover System would be sufficient to provide full human health protection against direct soil exposures, even if post-IM institutional controls fail. The only post-IM risk estimate that exceeds an U. S. EPA risk limit is the HI of 6 for the large-scale construction scenario, and this estimate is less than one order of magnitude higher than the limit of 1. Figures 7.1 and 7.2 also demonstrate that the IM alternatives that involve excavation of PCBs in soil from areas with concentrations lower than 1,500 mg/kg (e.g., 500 mg/kg and 50 mg/kg) do not provide any meaningful or necessary incremental risk reduction (based on these exposure scenarios evaluated).

As discussed in Section 6.0, the other IM components such as institutional controls can be utilized to effectively eliminate the exposures that exceed the U.S. EPA risk limits. As a result, Alternatives 3 through 9 are all capable of protection of human health and the environment for the routine worker and construction worker exposure scenarios. Alternative 2 provides less protection than Alternatives 3 through 9 and Alternative 1 provides the least protection.

An evaluation of the ability of each alternative to meet this performance standard is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - provides limited protection through SSC O&M<br>- least protective alternative | 1 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - provides limited protection through SSC O&M<br>- additional protection relies on institutional controls | 1 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - fully protective<br>- consistent with future industrial land use | 2 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - fully protective<br>- consistent with future industrial land use | 5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - fully protective<br>- consistent with future industrial land use | 5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - fully protective<br>- consistent with future industrial land use | 5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - fully protective<br>- consistent with future industrial land use | 5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - fully protective<br>- consistent with future industrial landfill use | 5 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - fully protective<br>- consistent with future industrial landfill use | 5 |

### 7.3.2 ACHIEVE MEDIA CLEANUP OBJECTIVES

The CA objectives presented in Section 3.0 and the SHHRA presented in Section 4.0 are based on the expectation that the current and reasonably foreseeable future land use for this East Plant Area will remain industrial. Based upon the nature and extent of PCB-impacts in the East Plant Area, including the potential presence of NAPL in fractured bedrock, the overall CA approach will need to rely on the effective physical and hydraulic containment of the East Plant Area to maintain the cleanup objectives. As a result, effective containment becomes the primary media cleanup objective for the East Plant Area. Selected alternatives also include excavation and/or treatment of soils to various PCB concentrations (i.e., 50 mg/kg, 500 mg/kg, and 1,500 mg/kg). In these circumstances, the ability to achieve media cleanup objectives is alternative-specific and is based on the expected degree of difficulty to effectively contain and excavate and/or treat the soil to the specified concentration and/or depth. It should be noted that areas downgradient of the East Plant Area are being cleaned up pursuant to the ongoing RA (which includes a SSC System and soil/sediment removal) or will be further addressed

by future off-Facility CA activities as additional RFI activities in the downgradient area are completed.

This performance standard is met primarily through the implementation of an effective physical and hydraulic containment approach (e.g., Cover System and Perimeter Collection System), although several of the alternatives include a combination of containment and soil excavation and/or treatment. Source removal and/or treatment is incorporated with selected alternatives in varying degrees as summarized in Table 6.9. Soil removal would be included to provide PCB mass reduction in the East Plant Area. However, it is technically impracticable to remove a sufficient amount of the highest concentrations of PCBs, which exist in the fractured bedrock and thus protect human health and the environment without containment. In addition, it may not be feasible to remove impacted media in areas where existing industrial infrastructure necessary to support plant operations (e.g., utilities, stormwater lagoon, wastewater treatment, foundations, etc) must be maintained.

An evaluation of the ability of each alternative to meet this performance standard is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - No media objectives to attain in this alternative | 5 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - No media objectives to attain in this alternative | 5 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - provides effective containment | 5 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - provides effective containment<br>- greatest level of PCB removal although difficult to achieve<br>- may not be technically practical to remove all soil due to plant infrastructure | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - provides effective containment<br>- less PCB removal than Alternative 4A although still somewhat difficult to achieve<br>- may not be technically practical to remove all soil due to plant infrastructure | 3.5 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - provides effective containment<br>- less PCB removal than Alternative 4B<br>- may not be technically practical to remove all soil due to plant infrastructure | 4 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - provides effective containment<br>- less PCB removal than Alternative 4A<br>- may not be technically practical to remove all targeted soil due to plant infrastructure | 3.5 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - provides effective containment<br>- less PCB removal than Alternative 4B<br>- may not be technically practical to remove all targeted soil due to plant infrastructure | 4 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - provides effective containment<br>- less PCB removal than Alternative 4C<br>- may not be technically practical to remove all targeted soil due to plant infrastructure | 4.5 |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - provides effective containment<br>- on-Facility equivalent to Alternative 4A (mass remains on-Facility) | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - provides effective containment<br>- on-Facility equivalent to Alternative 4B (mass remains on-Facility) | 3.5 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with $\geq$ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - provides effective containment<br>- on-Facility equivalent to Alternative 4C (mass remains on-Facility)<br>- may not be technically practical to remove all soil due to plant infrastructure | 4 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - provides effective containment<br>- utilizes treatment in lieu of disposal<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to solidify all soil due to plant infrastructure | 2.5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with $\geq$ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - provides effective containment<br>- utilizes treatment in lieu of disposal<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to solidify all soil due to plant infrastructure | 3 |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with $\geq$ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - provides effective containment<br>- utilizes treatment in lieu of disposal<br>- may not be technically practical to solidify all soil due to plant infrastructure | 3.25 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - provides effective containment<br>- utilizes disposal and treatment<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to remove all soil due to plant infrastructure | 2.5 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - provides effective containment<br>- utilizes disposal and treatment<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to remove all soil due to plant infrastructure | 3 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - provides effective containment<br>- utilizes disposal and treatment<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to remove all soil due to plant infrastructure | 2.5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - provides effective containment<br>- utilizes disposal and treatment<br>- treatment may not be necessary to reduce mobility<br>- may not be technically practical to remove all soil due to plant infrastructure | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - provides effective containment<br>- on-Facility equivalent to Alternative 4A (most mass remains on-Facility<br>- may not be technically practical | 3 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - provides effective containment<br>- on-Facility equivalent to Alternative 4B (most mass remains on-Facility<br>- may not be technically practical | 3.5 |

### 7.3.3 REMEDIATE THE SOURCES OF RELEASES

As indicated in Section 7.3.2, the IM approach for the East Plant Area will need to rely on effective physical and hydraulic containment. In essence, the IM approach addresses the entire East Plant Area as a potential source which will be physically isolated and hydraulically contained by the selected IM.

All alternatives include a Cover System and Perimeter Collection System. In addition, selected alternatives include varying approaches related to PCB removal, disposal, or solidification) stabilization (see Table 6.9).

The U.S. EPA objective in this performance standard is to use treatment technologies to address principal threat wastes, where practical. U.S. EPA considers principal threat wastes to be "*source materials with toxicity and mobility characteristics that combine to pose a potential risk* ***several orders of magnitude*** *greater than the risk level that is acceptable for the current or reasonably anticipated future land use, given realistic exposure scenarios*" (U.S. EPA, August 1997). Therefore, the objective in this performance standard is to treat source

materials that pose a potential cumulative cancer risk higher than approximately $10^{-2}$ or a HI higher than approximately 100 (U.S. EPA, August 1997).

As discussed in Section 4.2, all post-IM risk estimates for potential exposures to soil in the East Plant Area are below U.S. EPA's threshold for treatment of source materials. The highest cumulative cancer risk estimate for post-IM exposures to soil is $1 \times 10^{-5}$ and the highest HI is 6. These cancer and noncancer risk estimates are both well below the principal threat thresholds of approximately $10^{-2}$ and 100, respectively. Therefore, containment is an appropriate IM approach for addressing the overburden soil in the East Plant Area.

The only potential principal threat material in the East Plant Area is PCBs-containing NAPL that has been found in a sump at AOI 8 and in fractured bedrock underlying the overburden soil in the East Plant Area. A Groundwater Source Removal System is included as a component of most of the IM alternatives to remove groundwater and NAPL at AOI 8. However, removal of NAPL from the fractured bedrock to the extent necessary to protect human health and the environment is believed to be technically impracticable. Therefore, the recommended IM alternative will require effective physical and hydraulic containment (i.e., institutional controls, Cover System, Perimeter Collection System) to provide long-term control of potential NAPL migration from the fractured bedrock in the East Plant Area (consistent with the current state-of-the-art for addressing the presence of NAPL in fractured bedrock).

An evaluation of the ability of each alternative to meet this performance standard is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - ineffective | 1 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - ineffective | 1 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - partially effective<br>- Alternative 3 represents the minimum requirements for effective containment<br>- does not include groundwater source removal at AOI 8 | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - fully effective<br>- includes soil removal to 50 mg/kg | 5 |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - fully effective<br>- less PCB removal than Alternative 4A | 4 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - fully effective<br>- less PCB removal than Alternative 4B | 3 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - fully effective<br>- less PCB removal than Alternative 4A | 4 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - fully effective<br>- less PCB removal than Alternative 4B | 4 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - fully effective<br>- less PCB removal than Alternative 4C | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - fully effective<br>- similar to Alternative 4A | 5 |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - fully effective<br>- similar to Alternative 4B | 4 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - fully effective<br>- similar to Alternative 4C | 3 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - fully effective<br>- similar to Alternative 4A but uses treatment | 5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - fully effective<br>- similar to Alternative 4B but uses treatment | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - fully effective<br>- similar to Alternative 4C but uses treatment | 3 |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - fully effective<br>- combination of removal and treatment | 5 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - fully effective<br>- combination of removal and treatment | 4 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - fully effective<br>- combination of removal and treatment | 5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - fully effective<br>- combination of removal and treatment | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - fully effective<br>- similar to Alternative 4A | 5 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - fully effective<br>- similar to Alternative 4B | 4 |

## 7.4 EVALUATION OF IM ALTERNATIVES WITH THE BALANCING/EVALUATION CRITERIA

### 7.4.1 LONG-TERM EFFECTIVENESS

Long-term effectiveness relates the ability of the IM alternatives to remain protective over time. The IM components included in the various IM alternatives involve technologies that have been demonstrated to be effective in a wide range of other projects (e.g., Cover Systems, soil excavation, on/off-Facility disposal, solidification/stabilization, and NAPL/groundwater collection/treatment).

Alternatives 1 through 9 all include ongoing O&M of the Site Source Control System, and groundwater and spring/seep monitoring. These alternatives include a 5-year review of the CA effectiveness (at 5 and 10 years) to determine if any modifications to the approach are required to ensure continued long-term effectiveness.

Alternatives 3 through 9 all include a Cover System and Perimeter Collection System as the principal components of the East Plant Area physical and hydraulic containment approach. The components require long-term operation and maintenance to remain effective.

Alternatives 4 through 9 all include various on/off-Facility approaches to treat or dispose soil materials with PCBs exceeding 50 mg/kg, 500 mg/kg, or 1,500 mg/kg. Alternatives including off-Facility disposal are considered to have a slight advantage to on-Facility alternatives for long-term effectiveness (see Table 6.9) even though the off-Facility commercial landfill will also need long-term operation and maintenance to remain effective.

An evaluation of the ability of each alternative to meet this performance standard is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - does not address CA objectives | 1 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - relies on deed restrictions | 2 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - provides the basic containment components necessary for long-term effectiveness | 3 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - same as Alternative 3 but has a significant off-Facility disposal component | 5 |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - same as Alternative 4A with less off-Facility disposal | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - same as Alternative 4B with less off-Facility disposal | 4 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - same as Alternative 4A with less off-Facility disposal | 4 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - same as Alternative 4D with less off-Facility disposal | 4 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - same as Alternative 4E with less off-Facility disposal | 3.5 |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - similar to Alternative 4A | 5 |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - similar to Alternative 4B | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - similar to Alternative 4C | 4 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - similar to Alternative 4A/5A | 5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - similar to Alternative 4B/5B | 4 |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - similar to Alternative 4C/5C | 4 |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - similar long-term effectiveness to Alternative 4B/6A | 5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - similar long-term effectiveness to Alternative 4C/6B | 4 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - similar to Alternative 7A | 5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - similar to Alternative 7B | 4 |
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - similar to Alternative 4A/5A | 5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - similar to Alternative 4B/5B | 4 |

### 7.4.2 TOXICITY, MOBILITY, AND VOLUME REDUCTION

Reduction in toxicity, mobility, and volume through treatment is accomplished in the various IM alternatives to varying degrees dependant upon the individual IM components.

Alternatives 3 through 9 all include a Cover System and Perimeter Collection System which will be utilized to reduce mobility of the East Plant Area contamination. Toxicity and volume decreases will occur with the Perimeter Collection System through NAPL/groundwater collection and treatment. Treatment of NAPL will occur through incineration or an approved disposal alternative.

Alternatives 6 through 9 involve varying degrees of in situ soil treatment via solidification/stabilization. Solidification/stabilization can add an incremental reduction in the mobility of PCBs, if present at very high concentrations, but it also increases the volume of all the soil that is treated.

The balancing/evaluation criteria is biased to IM components, which result in the reduction in toxicity, mobility, or volume based upon treatment. The IM alternatives provide varying degrees of further reductions in toxicity, mobility but may increase the volume (due to the fact that treatment is only utilized in selective alternatives).

An evaluation of each alternatives ability to meet this balancing/evaluation criteria is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - ineffective | 1 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - ineffective | 1 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - partially effective | 3 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - partially effective<br>- minimal treatment of NAPL | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - partially effective<br>- minimal treatment of NAPL | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 4.5 |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - effective<br>- soil and NAPL treatment | 4 |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 4 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 3.25 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 4 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - effective<br>- soil and NAPL treatment<br>- soil treatment may not be necessary to reduce mobility | 3.5 |
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - partially effective<br>- minimal treatment of NAPL | 3 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - partially effective<br>- minimal treatment of NAPL | 3 |

### 7.4.3 SHORT-TERM EFFECTIVENESS

Short-term effectiveness relates to the implementation of the IM alternatives and the effect of those alternatives on the Facility and local community. The major issues associated with short-term effectiveness include:

1. proximity to plant infrastructure and depth of excavation
   - construction safety
   - potential impacts to plant operations
2. duration of construction
   - construction safety
3. Off-Facility trucking issues
   - track out
   - dust
   - traffic safety
   - road repair
4. air emissions
   - dust
   - vapors

An evaluation of each alternatives ability to meet this balancing/evaluation criteria is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - few short-term issues | 4 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - similar to Alternative 1<br>- exposures addressed through institutional controls | 4 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - effective | 4 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - excavation issues<br>- significant trucking issues | 2 |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - excavation issues<br>- significant trucking issues | 2.5 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - excavation issues<br>- significant trucking issues | 3.5 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4A | - excavation issues<br>- significant trucking issues | 2.5 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4B | - excavation issues<br>- significant trucking issues | 3.5 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4C | - excavation issues reduced due to predefined volumes<br>- significant trucking issues | 3.75 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - excavation issues reduced due to predefined volumes<br>- materials to construct landfill cell must be brought on-Facility | 3 |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - excavation issues reduced due to predefined volumes<br>- materials to construct landfill cell must be brought on-Facility | 3.5 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - excavation issues reduced due to predefined volumes<br>- materials to construct landfill cell must be brought on-Facility | 3.75 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - effective<br>- solidification process may generate dust | 3.5 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - effective<br>- solidification process may generate dust | 3.5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - effective<br>- solidification process may generate dust | 3.5 |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - excavation issues reduced due to predefined volumes<br>- significant trucking issues<br>- solidification process may generate dust | 2.25 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - excavation issues reduced due to predefined volumes<br>- significant trucking issues<br>- solidification process may generate dust | 2.75 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - excavation issues reduced due to predefined volumes<br>- materials to construct landfill cell must be brought on-Facility<br>- solidification process may generate dust | 2.5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - excavation issues reduced due to predefined volumes<br>- materials to construct landfill cell must be brought on-Facility<br>- solidification process may generate dust | 3.25 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - excavation issues reduced due to predefined volumes<br>- significant trucking issues<br>- materials to construct landfill cell must be brought on-Facility | 2 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - excavation issues reduced due to predefined volumes<br>- significant trucking issues<br>- materials to construct landfill cell must be brought on-Facility | 2.5 |

### 7.4.4 IMPLEMENTABILITY

Implementability addresses the ability to implement the IM utilizing standard construction approaches. Implementability issues include:

- ability to have a complete cleanup with PCB-impacted NAPL in the shallow bedrock due to technical impracticability;
- ability to remove impacted soils at depth due to the necessity to excavate/stockpile clean overburden to get to impacted materials; and
- ability to effectively remove impacted materials in the vicinity of Facility infrastructure including utilities (overhead power, water, WWTP, telephone, Stormwater Lagoon, etc.) without impacting manufacturing operations.

These issues are discussed further in the following sections.

#### 7.4.4.1 DISCUSSION OF CLEANUP OF PCB-IMPACTED NAPL IN SHALLOW BEDROCK

On May 10, 2004, U.S. EPA issued a discussion paper entitled "Cleanup Goals Appropriate for DNAPL Source Zones". The purpose of the discussion paper was "*to promote dialogue*" on the establishment of cleanup objectives for sites with DNAPL-impacted zones. The paper identified that "*DNAPLs include chemical compounds and mixtures with a wide range of chemical properties, including chlorinated solvents, creosote, coal tar, and polychlorinated biphenyls (PCBs)*". The paper further identifies that "*DNAPLs migrate into the subsurface resulting in disconnected blobs of liquid referred to a "residual DNAPL", and continuous distributions of DNAPL sometimes referred to a "pools*". The paper generally discussed the issues identified with effectively remediating DNAPL source areas based upon existing technologies and past experience. The paper further identifies the need to develop alternate cleanup goals (e.g., physical/hydraulic containment and alternate point of compliance) based upon project-specific information. In general, a technology has not been developed to effectively address NAPL in fractured bedrock.

#### 7.4.4.2 DISCUSSION OF EXCAVATION AND/OR SOLIDIFICATION/STABILIZATION OF PCB-IMPACTED MEDIA AT DEPTH

To assess the implementability of completing the excavation and/or solidification/stabilization of PCB-impacted media at depth, calculations were performed to assess the actual volume of excavation required to remove the PCB-impacted media based on the PCB Volume Assessment (presented in Appendix A).

Appendix E presents the calculations completed to determine the actual volume of soil that requires excavation and the associated volumes of un-impacted or low-level PCB-impacted material ("Clean Fill") that have to be excavated, stockpiled, re-placed, compacted, and regraded following removal of material exceeding the specified PCB cleanup concentration.

In most cases, the volume of clean material that has to be excavated and handled to complete the excavation and/or solidification/stabilization is approximately equal to the volume of PCB-impacted media. This presents a significant additional cost to the alternatives.

The following presents a summary of the PCB-impacted and "clean" overburden to be removed for the four volume scenarios.

| | *PCB-Impacted Soil* (1) | *Excavation Required* (2) | *Clean Soil* (3) |
|---|---|---|---|
| **Scenario 1 (any depth within overburden)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 181,181 | 320,074 | 138,873 |
| 500 mg/kg | 52,184 | 122,255 | 70,071 |
| 1,500 mg/kg | 13,681 | 49,042 | 35,361 |
| **Scenario 2 (0 to 2 ft depth)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 11,285 | 12,548 | 1,263 |
| 500 mg/kg | 3,283 | 3,742 | 459 |
| 1,500 mg/kg | 865 | 1,063 | 197 |
| **Scenario 3 (0 to 10 ft depth)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 65,549 | 124,734 | 59,185 |
| 500 mg/kg | 20,130 | 40,270 | 20,140 |
| 1,500 mg/kg | 6,936 | 17,172 | 10,235 |
| **Scenario 4 (0 to 15 ft depth)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 81,335 | 182,685 | 101,350 |
| 500 mg/kg | 24,231 | 62,685 | 38,454 |
| 1,500 mg/kg | 7,090 | 21,698 | 14,608 |

Notes:

(1) Based on calculations presented in the PCB Volume Assessment (Appendix A).

(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and relocation to remove PCB-impacted soils.

The above identified volumes of material to be removed to support the individual IM alternatives are assessed in the cost estimates to implement the IM alternatives.

### 7.4.4.3 DISCUSSION OF EXCAVATION AND/OR SOLIDIFICATION/STABILIZATION OF PCB-IMPACTED MEDIA AT DEPTH IN THE VICINITY OF EAST PLANT AREA UTILITIES

The approximate locations of plant infrastructure including utilities within the East Plant Area are schematically presented on Figures 7.3 through 7.6. There may be significant implementability issues in areas with structures, utilities, or in the vicinity of the Stormwater Lagoon. Appendix F presents example calculations for the removal action to ≥ 50 mg/kg PCBs. These engineering calculations were developed to determine the removal action areas that are impractical to remove due to utilities, slope stability, etc.

### 7.4.4.4 IMPLEMENTABILITY SCORING

An evaluation of each alternatives ability to meet this balancing/evaluation criteria is summarized below.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - easily implemented | 5 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - easily implemented | 5 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - easily implemented<br>- common construction techniques<br>- available for major IM components | 4 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3.25 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3.25 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3.25 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3.5 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes | 3.5 |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes<br>- vault uses common construction techniques<br>- | 3.5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes<br>- vault uses common construction techniques<br>- | 3.75 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes<br>- vault uses common construction techniques<br>- | 3.75 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - implementability concerns associated with solidification of impacted material<br>- cover uses common construction techniques | 2 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - implementability concerns associated with solidification of impacted material<br>- cover uses common construction techniques | 2.5 |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - implementability concerns associated with solidification of impacted material<br>- cover uses common construction techniques | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes<br>- implementability concerns associated with solidification of impacted material | 2.25 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - implementability concerns associated with excavation and utilities<br>- issues associated with off-Facility disposal<br>- predefined excavation volumes<br>- implementability concerns associated with solidification of impacted material | 2.5 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - implementability similar to Alternative 5B/6A | 2.5 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - implementability similar to Alternative 5C/6B | 2.5 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - implementability similar to Alternative 4A/5A | 3.5 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - implementability similar to Alternative 4B/5B | 3.75 |

### 7.4.5 COST

The costs for the IM alternatives were developed and presented in Section 6.0, and are discussed below. The costs for key IM alternatives are also presented graphically on Figures 7.7 and 7.8, which present these costs in relation to their corresponding post-IM risk estimates. Figures 7.7 and 7.8 are the same as Figures 7.1 and 7.2, except they also include the total cost associated with select IM alternatives. Figures 7.7 and 7.8 present the post-IM risk versus costs for three groups of alternatives ((1, 3, 4A, 4B, 4C), (1, 3, 4D, 4E, 4F), and (1, 3, 5A, 5B, 5C)).

As presented on Figure 7.7 and discussed in Section 7.3.1, any IM alternative that includes installation of a Cover System is sufficient to be protective of post-IM direct exposures to soil, even if institutional controls are absent or have failed, based on the cumulative cancer risk estimates derived in Section 4.2. The cost associated with installation of the Cover System is approximately $29,110,000 (Alternative 3).

Figure 7.8 shows that any alternative that includes removal of PCBs with soil concentrations higher than 1,500 mg/kg and installation of a Cover System is sufficient to be protective of post-IM direct exposures to soil, even if institutional controls are absent or have failed, based on the HI estimates derived in Section 4.2. The cost associated with installation of the Cover System and removal of PCBs in soil to a concentration limit of 1,500 mg/kg is approximately $31,900,000 (Alternative 4F).

As discussed in Section 7.3.1 and shown in these figures, the IM alternatives that involve removal of PCBs in soil to concentration limits lower than 1,500 mg/kg do not provide further risk reduction that would be meaningful and would entail increasingly higher costs that extend up to approximately $78,783,000 (Alternative 4A).

An evaluation of each alternatives ability to meet this balancing/evaluation criteria is summarized below. The scores have been assigned as follows:

| *Range* | *Score* |
|---|---|
| $10.0 to $20.0 million | 5 |
| $20.1 million to $28.0 million | 4 |
| $28.1 million to $36.0 million | 3 |
| $36.1 million to $44.0 million | 2 |
| >$44.0 million | 1 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - $11,913,000<br>- lower cost approach | 5 |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - $12,809,000<br>- lower cost approach | 5 |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - $29,110,000<br>- more costly than Alternatives 1 and 2 | 3 |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - $78,783,000<br>- not cost effective<br>- off-Facility disposal costs less certain | 1 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - $44,665,000<br>- not cost effective<br>- off-Facility disposal costs less certain | 1 |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - 34,108,000<br>- less costly than Alternatives 4A and 4B<br>- off-Facility disposal costs less certain | 3 |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - $47,810,000<br>- not cost effective<br>- off-Facility disposal costs less certain | 1 |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - $35,451,000<br>- not cost effective<br>- off-Facility disposal costs less certain | 3 |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - $31,897,000<br>- less costly than Alternatives 4D and 4E<br>- average cost effectiveness<br>- off-Facility disposal costs less certain | 3 |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - $40,797,000<br>- | 2 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - $34,055,000<br>- | 3 |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - $31,484,000<br>- | 3 |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - $38,962,000<br>- costs more certain than Alternatives 4A and 5A | 2 |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - $32,537,000<br>- costs more certain than Alternatives 4B and 5B | 3 |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - $30,620,000<br>- costs more certain than Alternatives 4C and 5C | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - $49,254,000<br>- off-Facility disposal costs less certain | 1 |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - $34,348,000<br>- off-Facility disposal costs less certain | 3 |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - $40,048,000<br>- | 2 |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - $33,150,000<br>- | 3 |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - $43,200,000<br>- off-Facility disposal costs less certain | 2 |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - $36,194,000<br>- off-Facility disposal costs less certain | 2 |

The resultant costs for the various alternatives for the 4 excavation scenarios are summarized as follows (to provide a sensitivity analysis to depth of soil addressed by alternative):

| *Alternative No.* | *Scenario 1 (RA and/or S/S at specified PCB concentration any depth in overburden)* | *Scenario 2 (RA and/or S/S at specified PCB concentration 0-2 ft depth bgs)* | *Scenario 3 (RA and/or S/S at specified PCB concentration 0-10 ft depth bgs)* | *Scenario 4 (RA and/or S/S at specified PCB concentration (0-15 ft depth bgs)* |
|---|---|---|---|---|
| 4A | $78,783,000 | $33,131,000 | -- | $53,277,000 |
| 4B | $44,665,000 | $30,892,000 | -- | $36,967,000 |
| 4C | $34,108,000 | $30,214,000 | -- | $31,961,000 |
| 4D | -- | -- | $47,809,000 | -- |
| 4E | -- | -- | $35,451,000 | -- |
| 4F | -- | -- | $31,897,000 | -- |
| 5A | $40,797,000 | $32,896,000 | $35,534,000 | $37,137,000 |
| 5B | $34,055,000 | $31,143,000 | $32,019,000 | $32,600,000 |
| 5C | $31,484,000 | $30,462,000 | $30,834,000 | $30,899,000 |
| 6A | $38,962,000 | $30,551,000 | $33,199,000 | $34,102,000 |
| 6B | $32,537,000 | $30,112,000 | $30,934,000 | $31,144,000 |
| 6C | $30,620,000 | $29,990,000 | $30,272,000 | $30,272,000 |
| 7A | $49,254,000 | $29,927,000 | $36,205,000 | $38,514,000 |
| 7B | $34,348,000 | $28,946,000 | $31,104,000 | $31,420,000 |
| 8A | $40,048,000 | $31,579,000 | $34,154,000 | $35,563,000 |
| 8B | $33,150,000 | $30,593,000 | $31,431,000 | $31,769,000 |
| 9A | $43,200,000 | $31,010,000 | $35,825,000 | $37,504,000 |
| 9B | $36,194,000 | $30,569,000 | $32,953,000 | $33,564,000 |

The cost estimates for Scenario 2, 3, and 4 presented above are presented in Appendix G.

### 7.4.6 COMMUNITY ACCEPTANCE

This balancing/evaluation criteria will be evaluated through a proactive public consultation process which is presented in Section 9.0.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal ≥ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - the community involvement will be ensured through a proactive public consultation process. See Section 9.0 | TBD |

### 7.4.7 STATE ACCEPTANCE

This balancing/evaluation criteria will be evaluated by involving IDEM on an ongoing basis during the development and finalization of this IM Alternatives Review Report.

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 1 | No Action<br>- includes RA SSC, O&M, GMS, and Spring/Seep Monitoring System | Figure 6.1 | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 2 | Institutional Controls<br>- includes security fences, deed restriction, and Alternative 1 components | Figure 6.2 | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 3 | Cover System and Perimeter Collection System<br>- includes Cover System, Perimeter Collection System, and Alternative 2 components | Figure 6.3 | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 4A | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 4B | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 4C | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) with off-Facility disposal | Figure 6.4C | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 4D | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4D | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 4E | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4E | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 4F | Soil Source Removal and Groundwater Source Removal System<br>- includes soil and groundwater source removal and Alternative 3 components<br>- soil removal $\geq$ 1,500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (0 to 10 ft depth) with off-Facility disposal | Figure 6.4F | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 5A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with $\geq$ 50 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 5B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with $\geq$ 500 mg/kg PCBs, , as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 5C | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4C components with excavation of soil with $\geq$ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) and disposal in a constructed on-Facility landfill vault | Figure 6.5C | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 6A | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4A components with in situ solidification of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 6B | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4B components with in situ solidification of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 6C | In Situ Soil Solidification, Cover System, and Groundwater Source Removal System<br>- includes Alternative 4C components with in situ solidification of soil with ≥ 1,500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical, (any depth in overburden) (no on/off-Facility disposal) | Figure 6.6C | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 7A | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4B components with off-Facility soil removal and disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 7B | Soil Source Removal, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 4C components with off-Facility soil removal and disposal of soil with ≥ 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.7B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |

| *Alternative #* | *Description* | *Figure Reference #* | *Discussion* | *Numerical Score* |
|---|---|---|---|---|
| Alternative 8A | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5B components with on-Facility disposal of soil with ≥ 500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 50 mg/kg ≤ PCBs < 500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 8B | Soil Source Removal, On-Facility Landfill Vault, In Situ Solidification, and Groundwater Source Removal System<br>- includes Alternative 5C components with on-Facility disposal of soil with > 1,500 mg/kg PCBs (any depth in overburden) and in situ solidification of soil with 500 mg/kg ≤ PCBs < 1,500 mg/kg, as pre-defined by existing RFI soil analysis, as practical | Figure 6.8B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 9A | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4A components with excavation of soil with ≥ 50 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 50 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9A | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |
| Alternative 9B | Soil Source Removal, On-Facility Landfill Vault, and Groundwater Source Removal System<br>- includes Alternative 4B components with excavation of soil with ≥ 500 mg/kg PCBs, as pre-defined by existing RFI soil analysis, where practical (any depth in overburden)<br>- disposal of soil with 500 mg/kg ≤ PCBs < 1500 mg/kg in a constructed on-Facility Landfill Vault<br>- off-Facility disposal of soil with ≥ 1500 mg/kg PCBs | Figure 6.9B | - IDEM will be kept fully involved in the development of this IM Alternatives Review Report/selection of IM alternative | TBD |

## 7.5 IM ALTERNATIVES EVALUATION SUMMARY

The first component of the evaluation of alternatives was to evaluate the three performance standards as presented in "Fact Sheet #3, Final Remedy Selection for Results – Based RCRA Corrective Action" (U.S. EPA, March 2000):

1. Protect Human Health and the Environment;
2. Achieve Media Cleanup Objectives; and
3. Remediate the Sources of Releases

All alternatives were evaluated for their effectiveness in achieving the performance standard, and assigned an appropriate relative score.

The second component of the evaluation is to assess the remaining alternatives capable of achieving the three performance standards compared to the seven following Balancing/Evaluation Criteria:

1. Long Term Effectiveness;
2. Toxicity, Mobility, and Volume Reduction;
3. Short Term Effectiveness;
4. Implementability;
5. Cost;
6. Community Acceptance; and
7. State Acceptance.

All alternatives were evaluated for their effectiveness in achieving the balancing/evaluation criteria and assigned an appropriate relative score. A discussion of the scoring of alternatives compared the Performance Standards and the Balancing/Evaluation Criteria are presented in Sections 7.5.1 and 7.5.2 respectively.

### 7.5.1 EVALUATION OF PERFORMANCE STANDARDS

A summary of the IM alternatives performance standard evaluation is presented in Table 7.1. Alternatives that do not adequately satisfy all three of the U.S. EPA performance standards - Protect Human Health and the Environment, Achieve Media Cleanup Objectives, and Remediate the Sources of Releases as presented in "Fact Sheet

#3, Final Remedy Selection for Results – Based RCRA Corrective Action" (U.S. EPA, March 2000) are not considered good options. Alternatives 1 and 2 score poorly (1) in both standards Protect Human Health and the Environment, and Remediate the Sources of Releases. All other alternatives sufficiently address the three performance standards and are further evaluated in section 7.5.2.

### 7.5.2 EVALUATION OF BALANCING/EVALUATION CRITERIA

Each of the Balancing/Evaluation Criteria (Long Term Effectiveness; Toxicity, Mobility, and Volume Reduction; Short Term Effectiveness; Implementability; Cost; Community Acceptance; and State Acceptance) were evaluated separately in Sections 7.4.1 through 7.4.7. This section presents an evaluation of each of the alternatives relative to each other.

*Long Term Effectiveness*

The long term effectiveness of alternatives was evaluated relative to how effective the alternative would be at addressing PCB-impacted media within the East Plant Area over time. Most alternatives scored "good (4)". The alternatives that involved a removal action or solidification of all PCB-impacted media greater than or equal to 50 mg/kg from all depths of overburden score excellent as those areas remove/immobilize the material, substantially reduce infiltration, and provide perimeter collection of leachate from within the East Plant Area.

*Toxicity, Mobility, and Volume Reduction*

Most alternatives scored average for addressing toxicity, mobility and volume reduction. The alternatives that had a solidification component scored high as solidification of PCB-impacted soils effectively stops mobility, and consequently results in an effective volume reduction. Alternatives the employed a removal action and a cover system provide an adequate level in these criteria.

*Short-Term Effectiveness*

Alternatives 1, 2 and 3 scored high in short-term effectiveness as they could be implemented in less than one year. The remaining other alternatives vary from one to two years of construction time, and vary in complexity. The options that are more complex to execute due to moving large volumes of materials within the work area

several times decrease the short term effectiveness in addition to the straight implementation time. The cleanup level also affects the implementation time, the lower the cleanup levels the larger the volume of soil removed.

*Implementability*

Alternatives 1, 2, and 3 are relatively easy to implement as they require limited and basic construction techniques and score excellent (5) to good (4). The other alternatives vary in scoring from fair to average. Alternatives with more volume to remove/solidify, and to greater depths require more complex construction methods and are more difficult to implement. The services and materials are readily available for each of the alternatives.

*Costs*

The costs of alternatives were evaluated relative to the cost ranges presented in Section 7.4.5. Alternatives 1 and 2 are the lowest cost relative the other options. Options 3 through 9B vary in cost significantly and extend up to approximately $78,783,000 for Alternative 4A. Generally the higher the cleanup level the costlier that alternative is to implement. Option 5A

*Community Acceptance*

Scores for Community Acceptance are not defined and need to be determined.

*State Acceptance*

Scores for State Acceptance are not defined and need to be determined.

## 8.0 RECOMMENDED IM ALTERNATIVE

The IM alternatives were evaluated on a relative basis compared to the Performance Standards and the Balancing/ Evaluation Criteria in Section 7.0 from the most favorable (ranked "5") to the least favorable (ranked "1").

A summary of the relative ranking is presented on Table 7.1.

The recommended IM alternative is Alternative 5A.

## 9.0 COMMUNITY PARTICIPATION

Community participation in review and selection of an IM alternative may include:

- scheduling of a Public Meeting to present the recommended IM; and
- public comment period.

Community relation activities in this regard may include:

- project fact sheets specific to the East Plant Area IM activities;
- project web site;
- GM organized community meetings; and
- Community Liaison Panel (CLP) involvement.

## 10.0 REFERENCES

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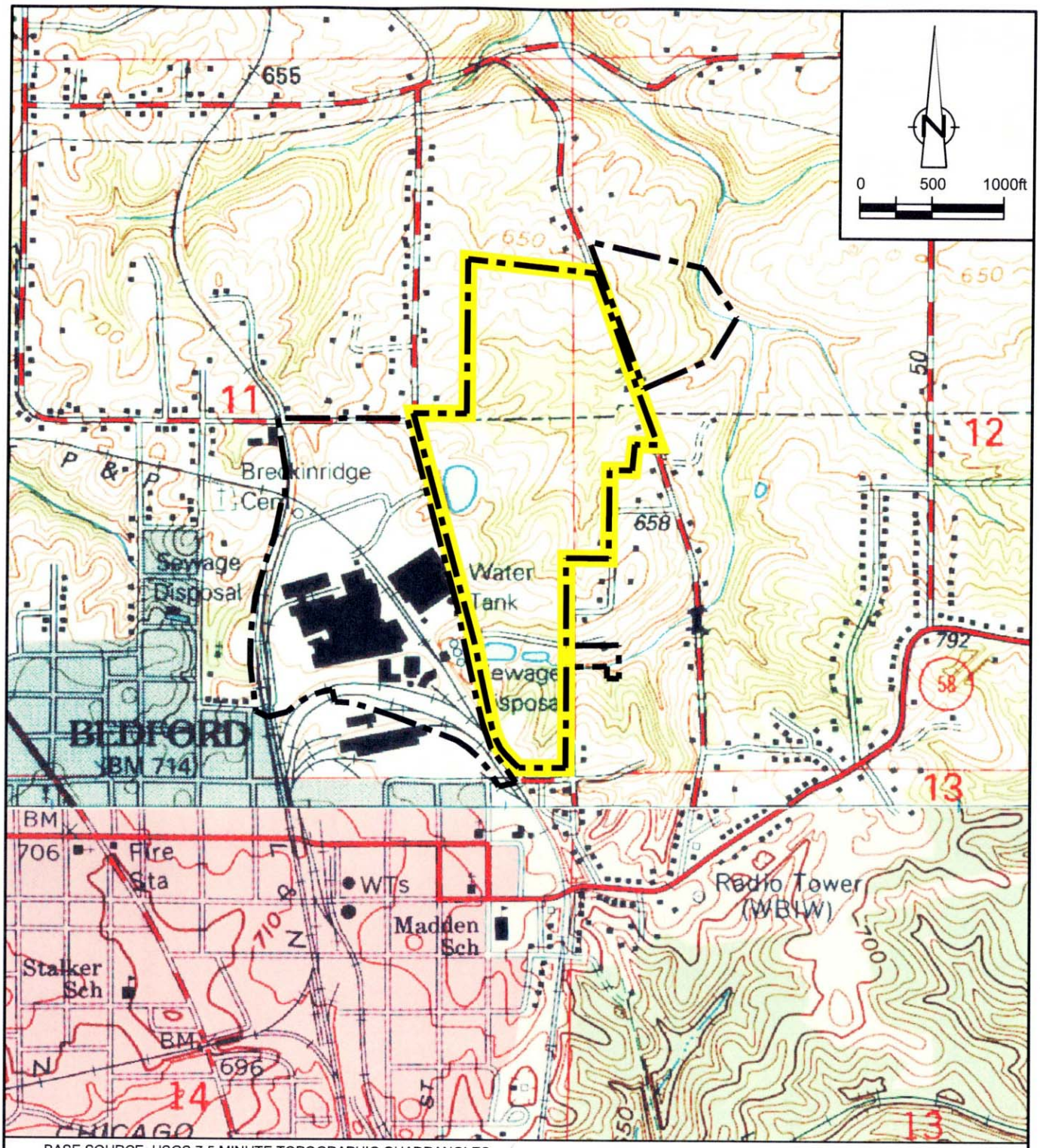


BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES;
BARTLETTSVILLE, INDIANA 1994
BEDFORD EAST, INDIANA 1978
BEDFORD WEST, INDIANA 1993
OOLITIC, INDIANA 1987

LEGEND

FACILITY BOUNDARY

EAST PLANT AREA

figure 1.1

# FACILITY LOCATION
# IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
# GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

13968-00(151)GN-WA001 APR 06/2005

| No | Revision | Date | Initial |
|---|---|---|---|
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| | | | |

N

0 100 200ft

LEGEND

- 600 — EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE GM PROPERTY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

# GM POWERTRAIN BEDFORD FACILITY BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

## FACILITY PLAN

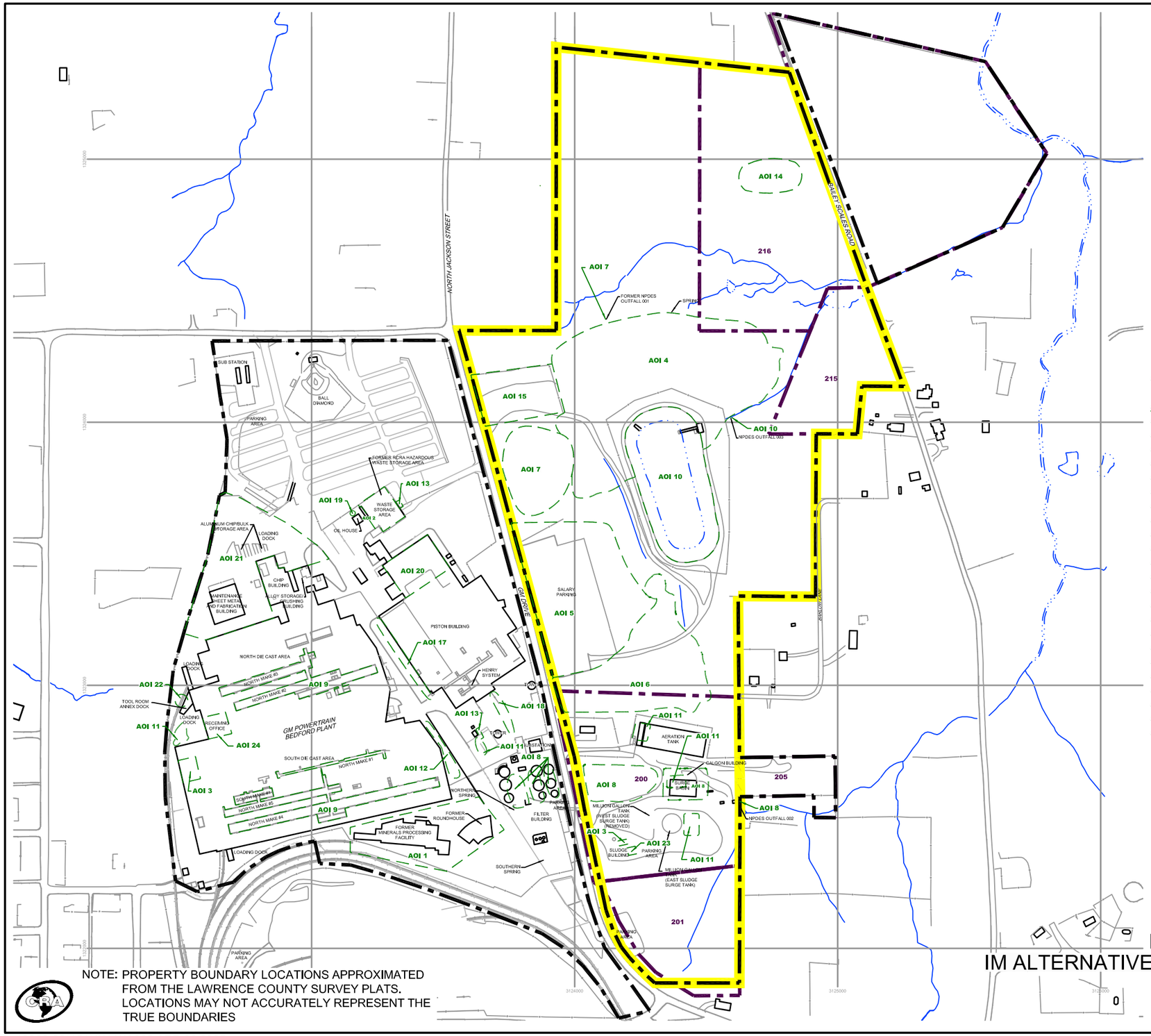
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No: 13968-00 | Report No: 151 | Drawing No: figure 1.2 |

13968-00(151)GN-WA002 APR 06/2005




## AOI SUMMARY

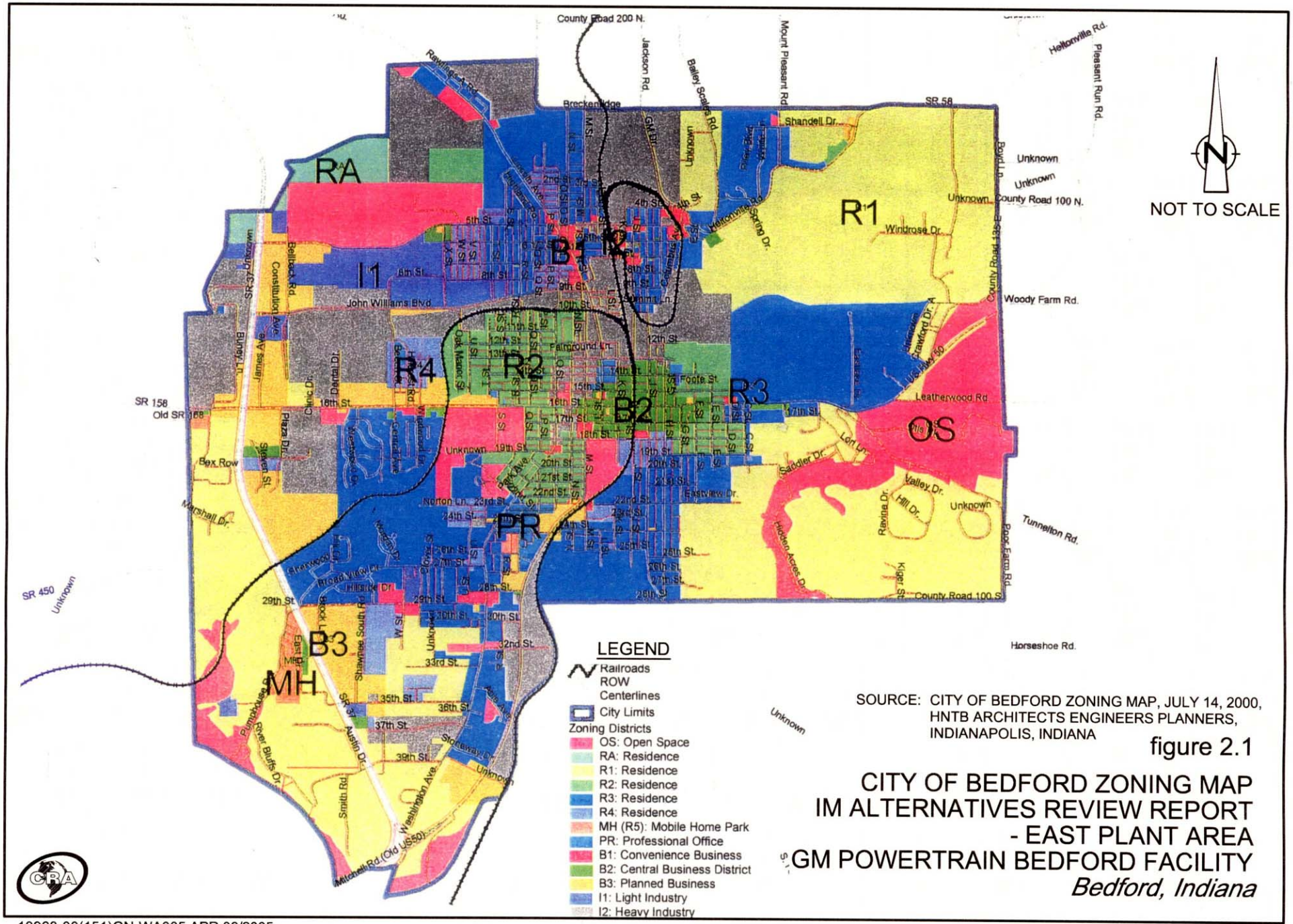
| AOI ID | Description |
|---|---|
| AOI 1 | Former Railroad Operations and Minerals Processing Facility |
| AOI 2 | Waste Storage Area |
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 9 | Service Tunnels |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 12 | Area Affected by the Reclaimed Hydraulic Fluid Release |
| AOI 13 | Underground Storage Tanks |
| AOI 14 | McBride Cows Disposal Area |
| AOI 15 | Former Equipment Storage Area |
| AOI 17 | Piston Building Oil Accumulations |
| AOI 18 | Area Affected by the Henry System Discharge |
| AOI 19 | Area Affected by Paint and Thinner Spill |
| AOI 20 | Northern Portion of the Piston Building |
| AOI 21 | Filled Ravine North of Die Cast Building |
| AOI 22 | Tool Room Annex Dock Release |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |
| AOI 24 | Area Affected by the June 2000 Die Lube 5150 Release |

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

figure 1.3

# EAST PLANT AREA AND AOI LOCATIONS
# IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
# GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

13968-00(151)GN-WA003 APR 06/2005




SOURCE: CITY OF BEDFORD ZONING MAP, JULY 14, 2000, HNTB ARCHITECTS ENGINEERS PLANNERS, INDIANAPOLIS, INDIANA

figure 2.1

# CITY OF BEDFORD ZONING MAP
# IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA - GM POWERTRAIN BEDFORD FACILITY

*Bedford, Indiana*

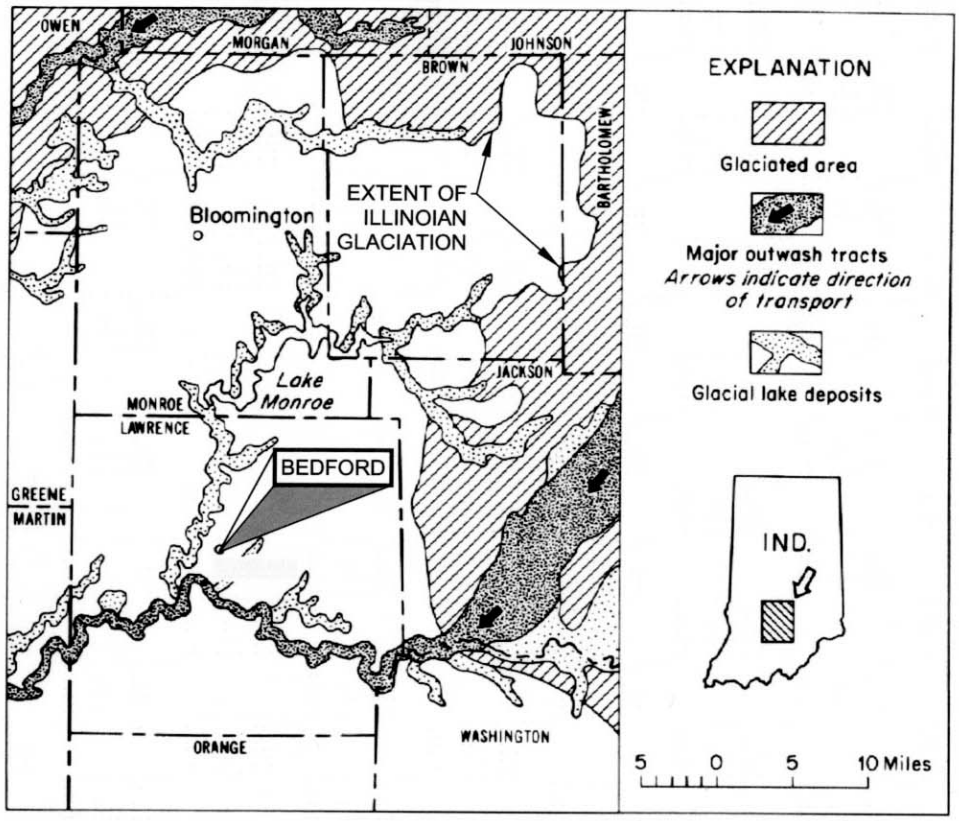



figure 2.2

GLACIAL FEATURES OF SOUTH-CENTRAL INDIANA
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

SOURCE: GRAY, 1974

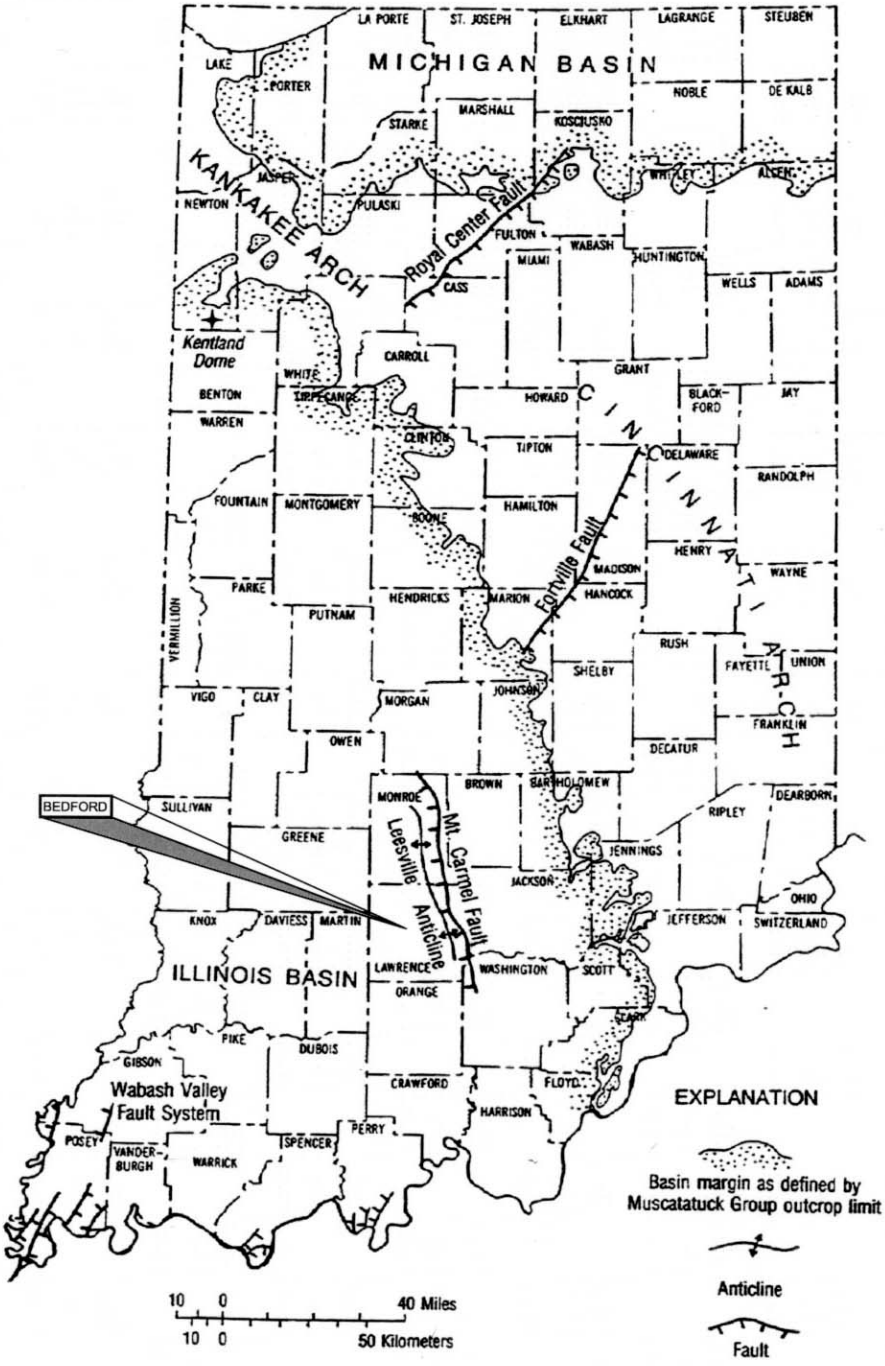



figure 2.3

BEDROCK STRUCTURAL FEATURES OF INDIANA
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

SOURCE: RUPP, 1991

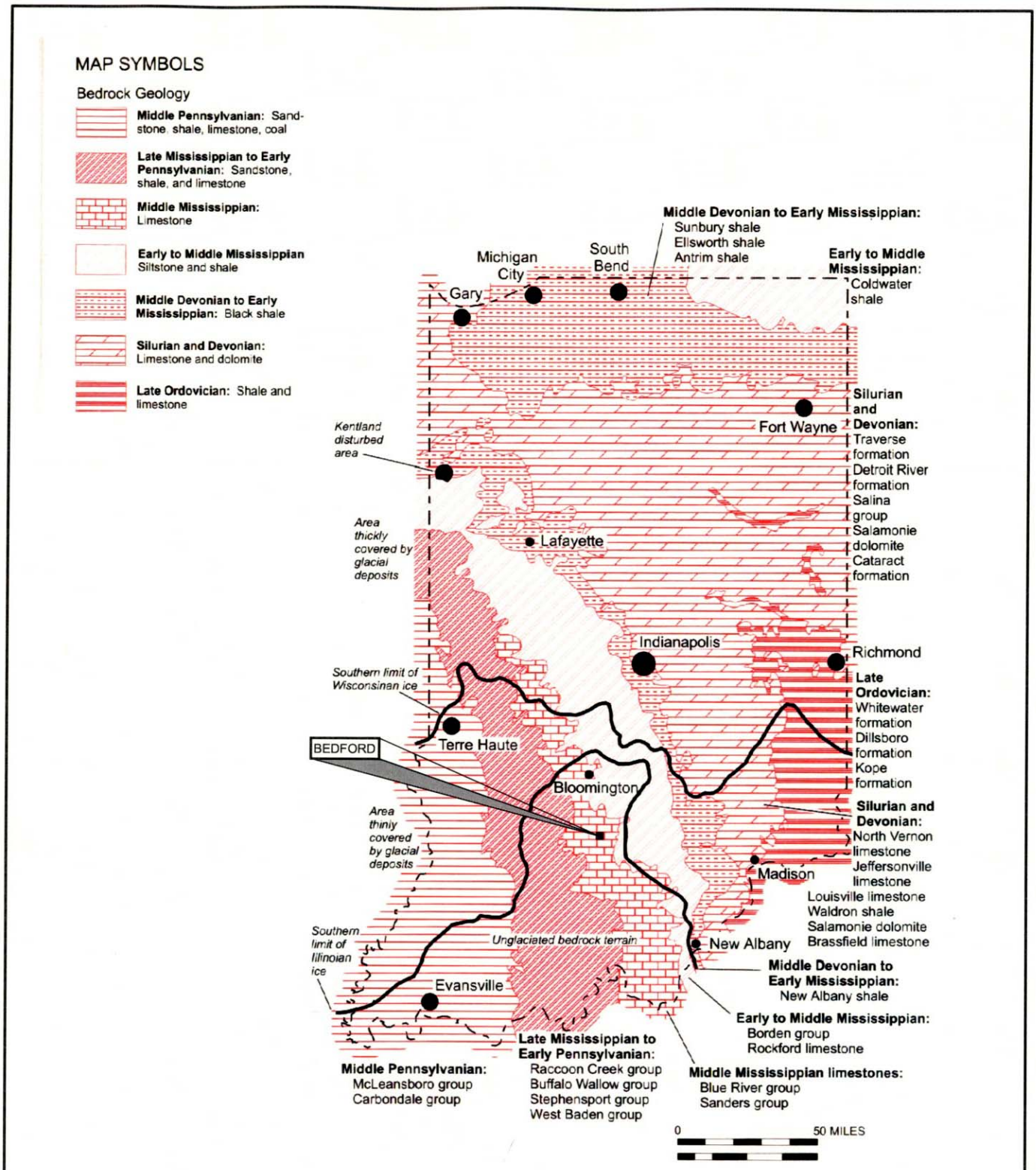
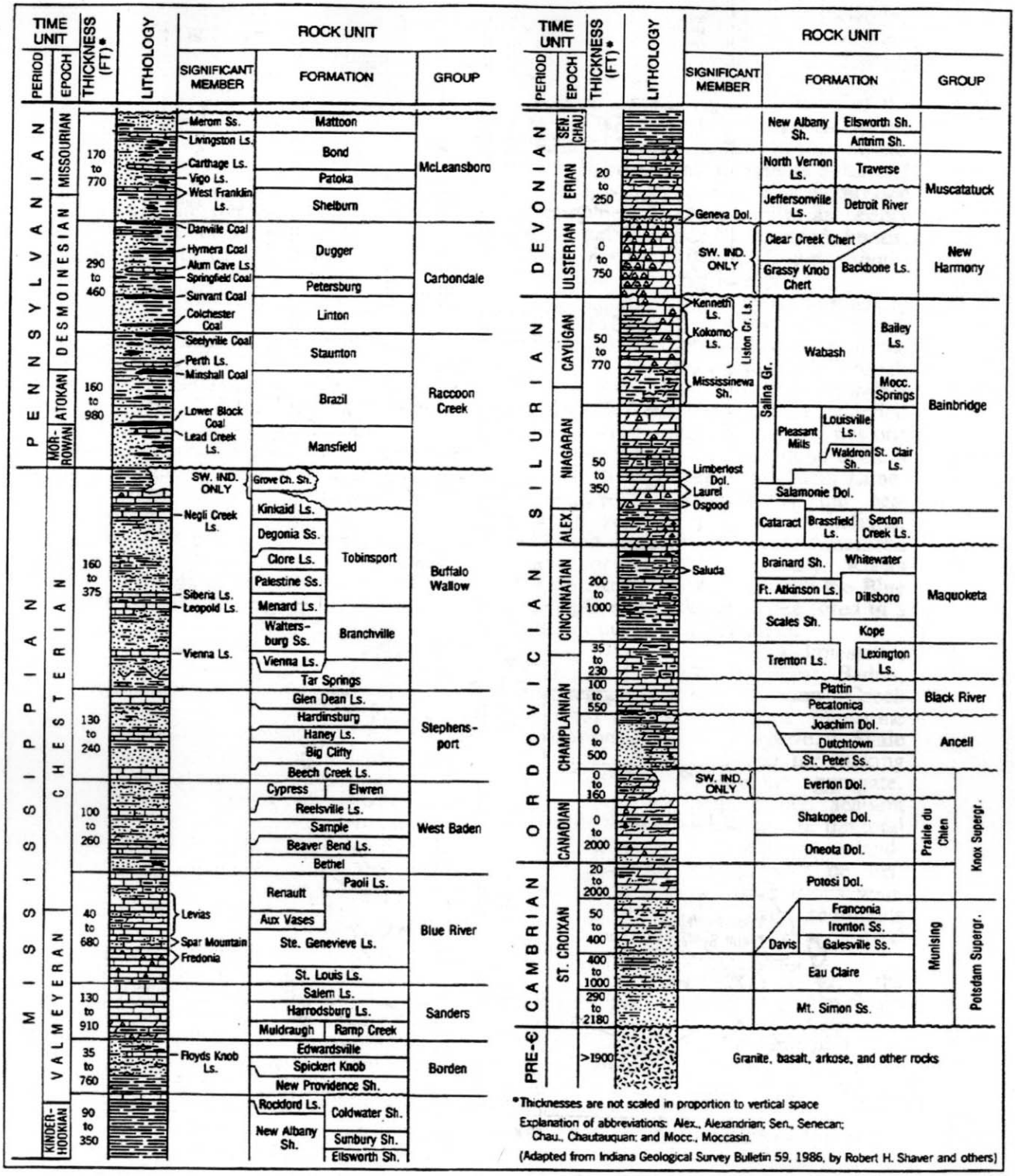



figure 2.4

BEDROCK GEOLOGY OF INDIANA
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

SOURCE: CAMP AND RICHARDSON, 1999




*Thicknesses are not scaled in proportion to vertical space

Explanation of abbreviations: Alex., Alexandrian; Sen., Senecan; Chau., Chautauquan; and Mocc., Moccasin.

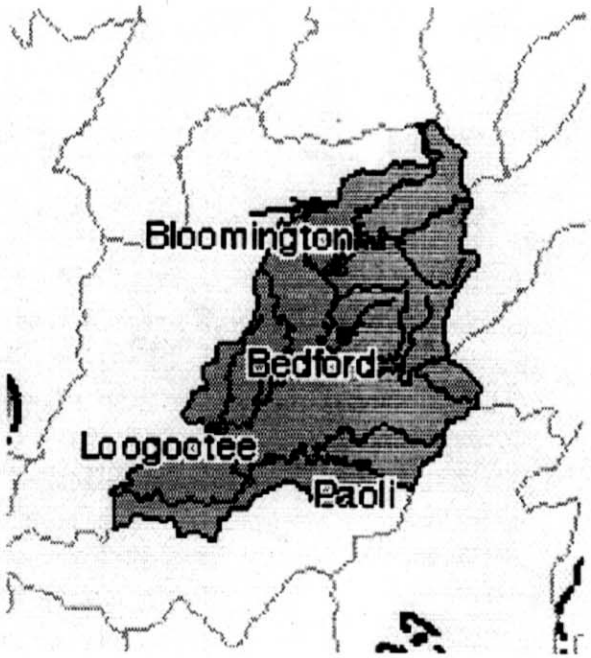
(Adapted from Indiana Geological Survey Bulletin 59, 1986, by Robert H. Shaver and others)

figure 2.5

# GENERALIZED STRATIGRAPHIC COLUMN FOR PALEOZOIC ROCKS IN INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

SOURCE: HILL, UNDATED




SOURCE: U.S. EPA, UNDATED

NOT TO SCALE

figure 2.6

LOWER EAST FORK WHITE RIVER
DRAINAGE BASIN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

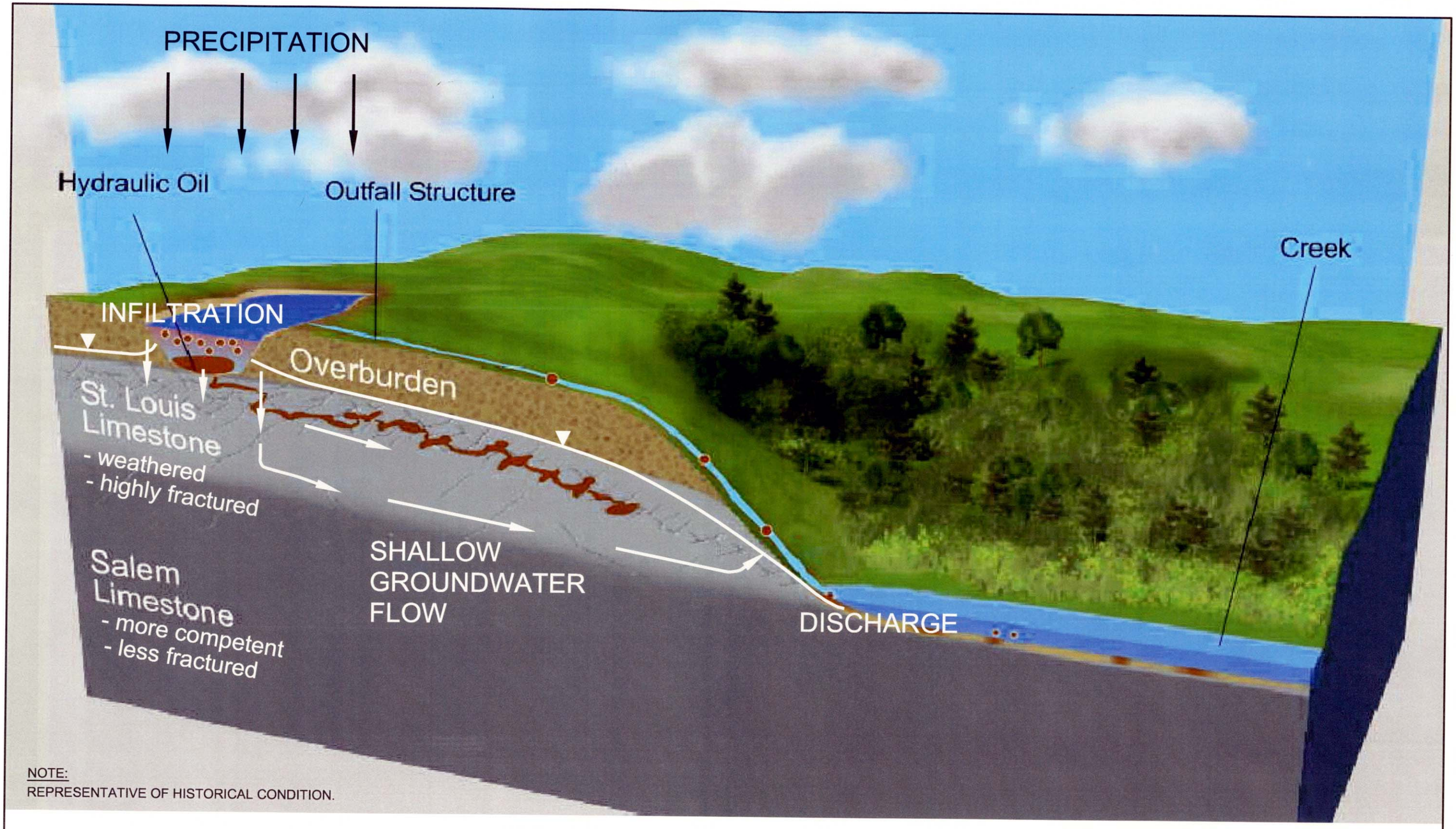
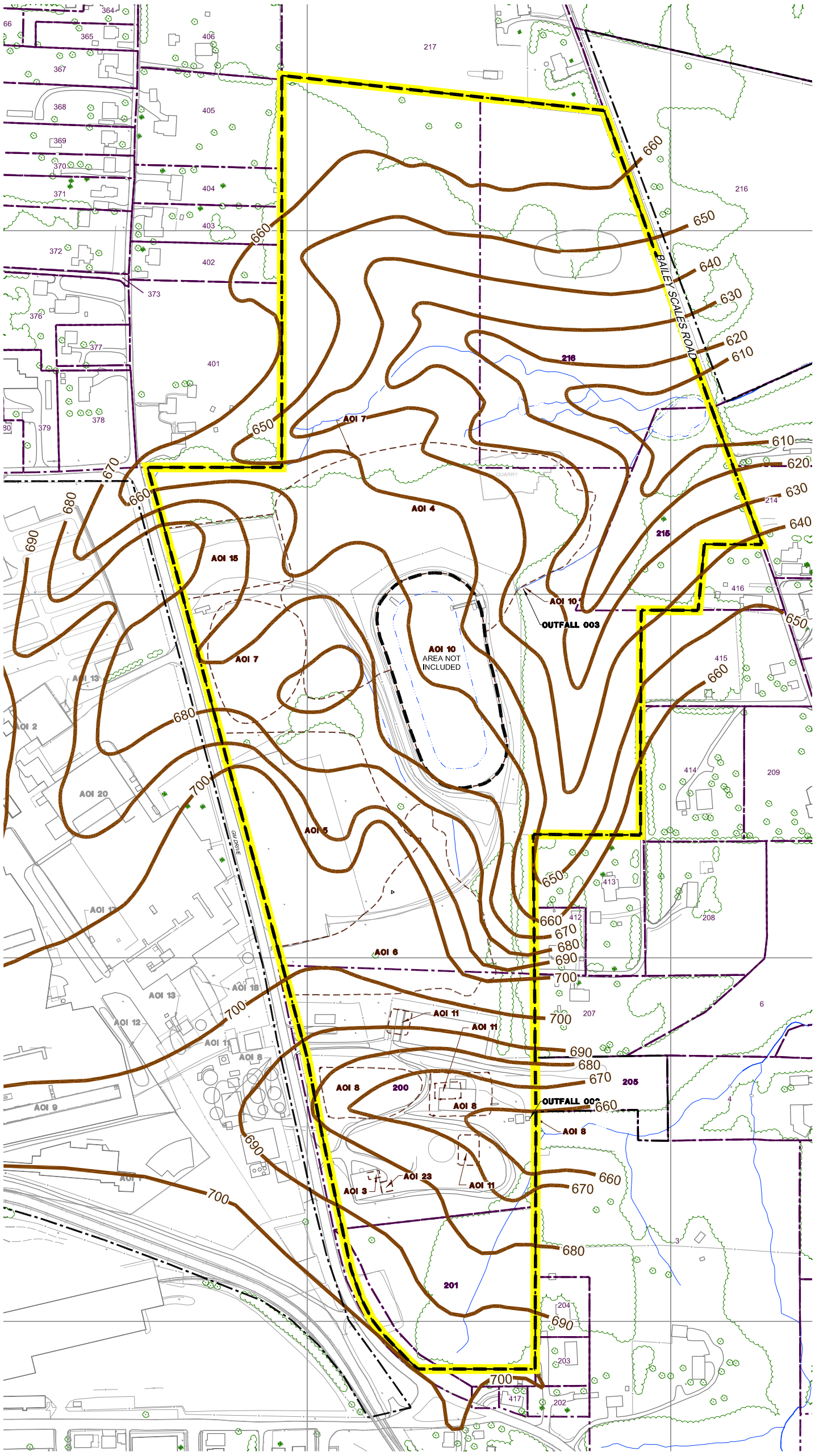



figure 2.7

OVERBURDEN AND SHALLOW BEDROCK CONCEPTUAL SITE MODEL FOR HISTORIC MIGRATION OF OIL AND SHALLOW GROUNDWATER FLOW
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*




| № | Revision | Date | Initial |
|---|---|---|---|
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SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

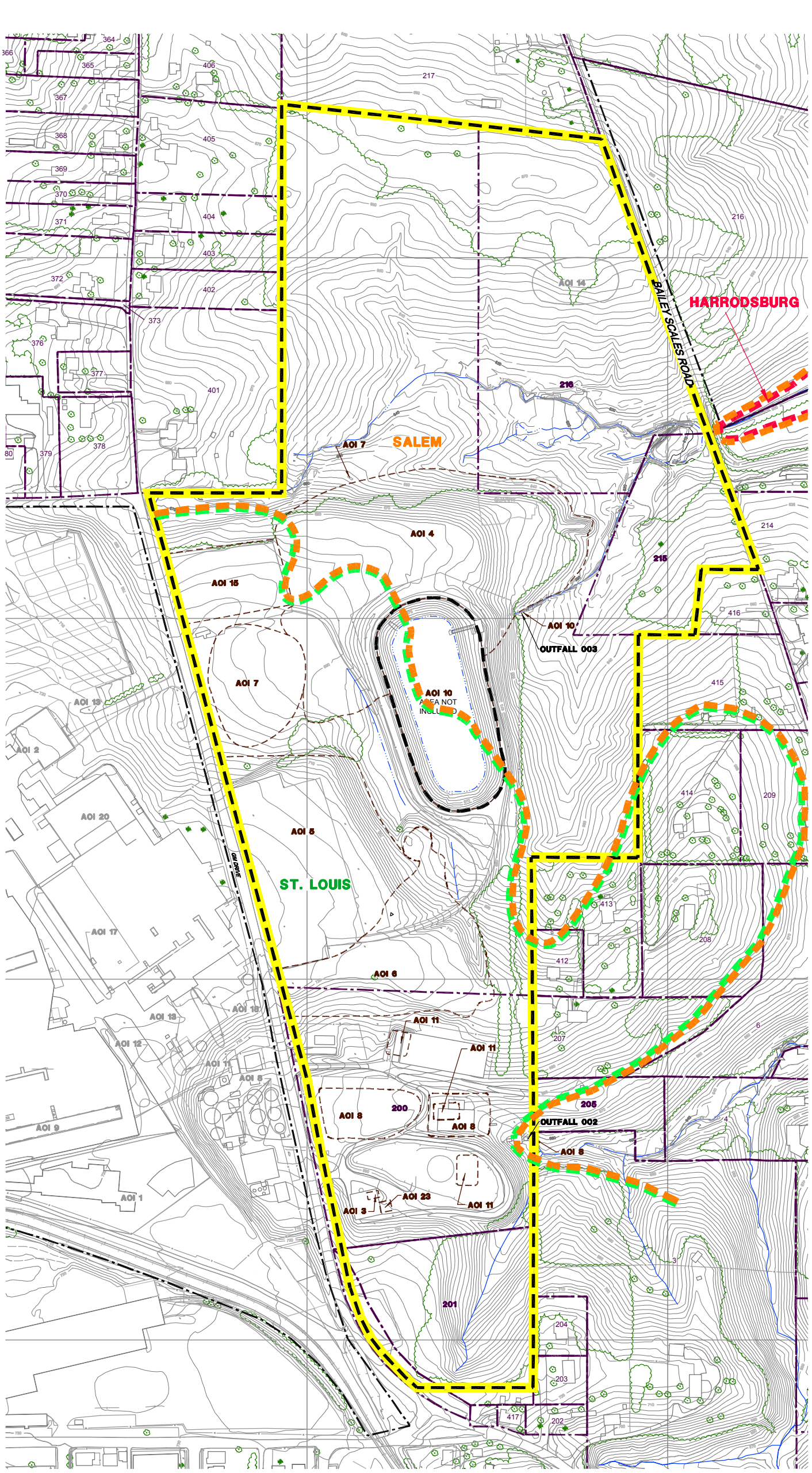
## BEDROCK TOPOGRAPHY

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure 2.8 |

13968-00(151)GN-WA012 APR 06/2005




N

0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- APPROXIMATE BEDROCK FORMATION CONTACT GREEN INDICATES ST. LOUIS FORMATIOM
- ORANGE INDICATES SALEM FORMATION
- RED INDICATES HARROSBURG FORMATION

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

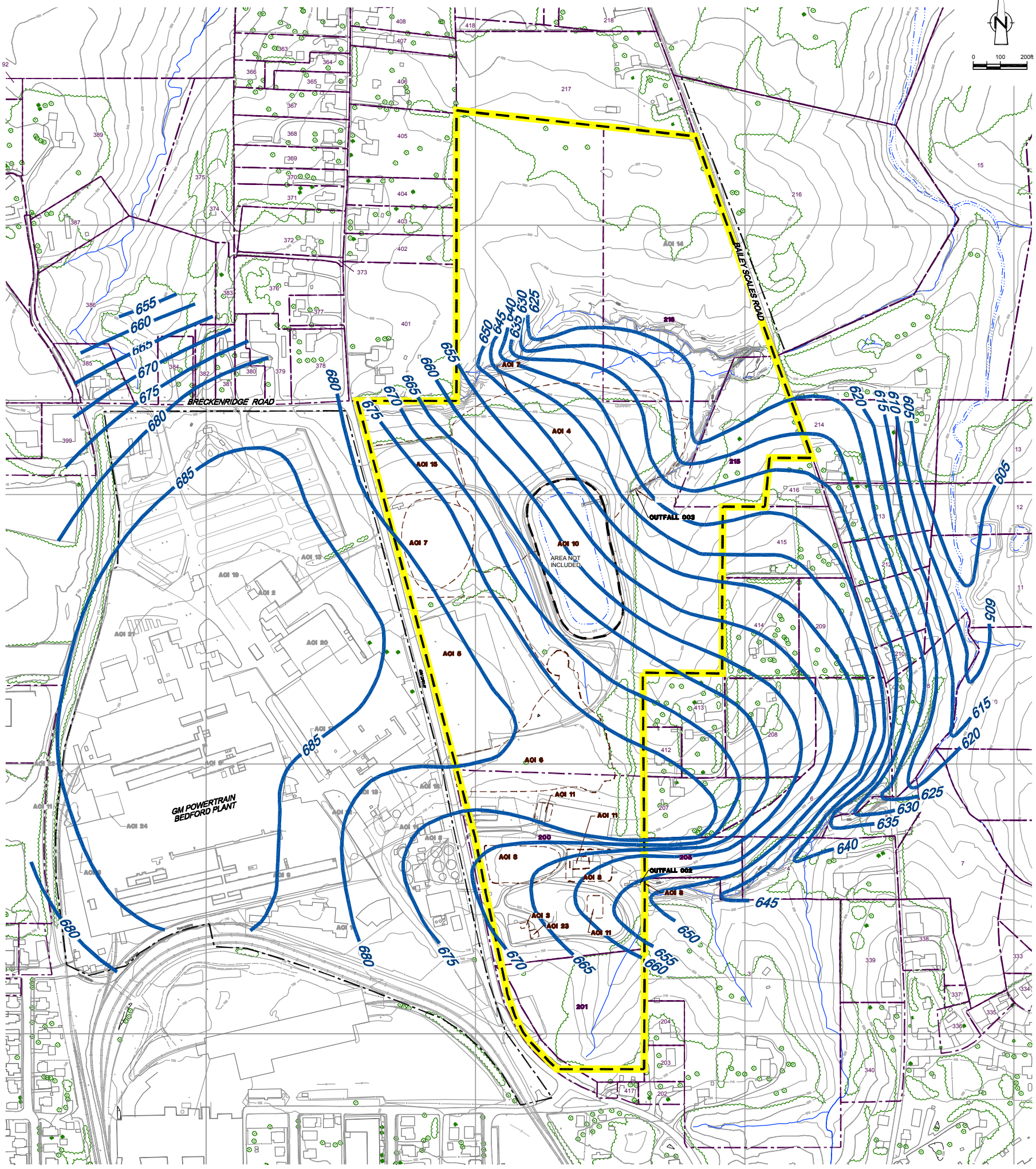
# APPROXIMATE BEDROCK FORMATION CONTACT LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 2.9 |

13968-00(151)GN-WA013 APR 06/2005


N
0 100 200ft
BRECKENRIDGE ROAD
BAILEY SCALES ROAD
GM POWERTRAIN
BEDFORD PLANT
OUTFALL 003
OUTFALL 002
AREA NOT
INCLUDED
AOI 2
AOI 3
AOI 4
AOI 5
AOI 6
AOI 7
AOI 8
AOI 10
AOI 11
AOI 13
AOI 14
AOI 15
AOI 20
AOI 21
AOI 23
AOI 24
655
660
665
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680
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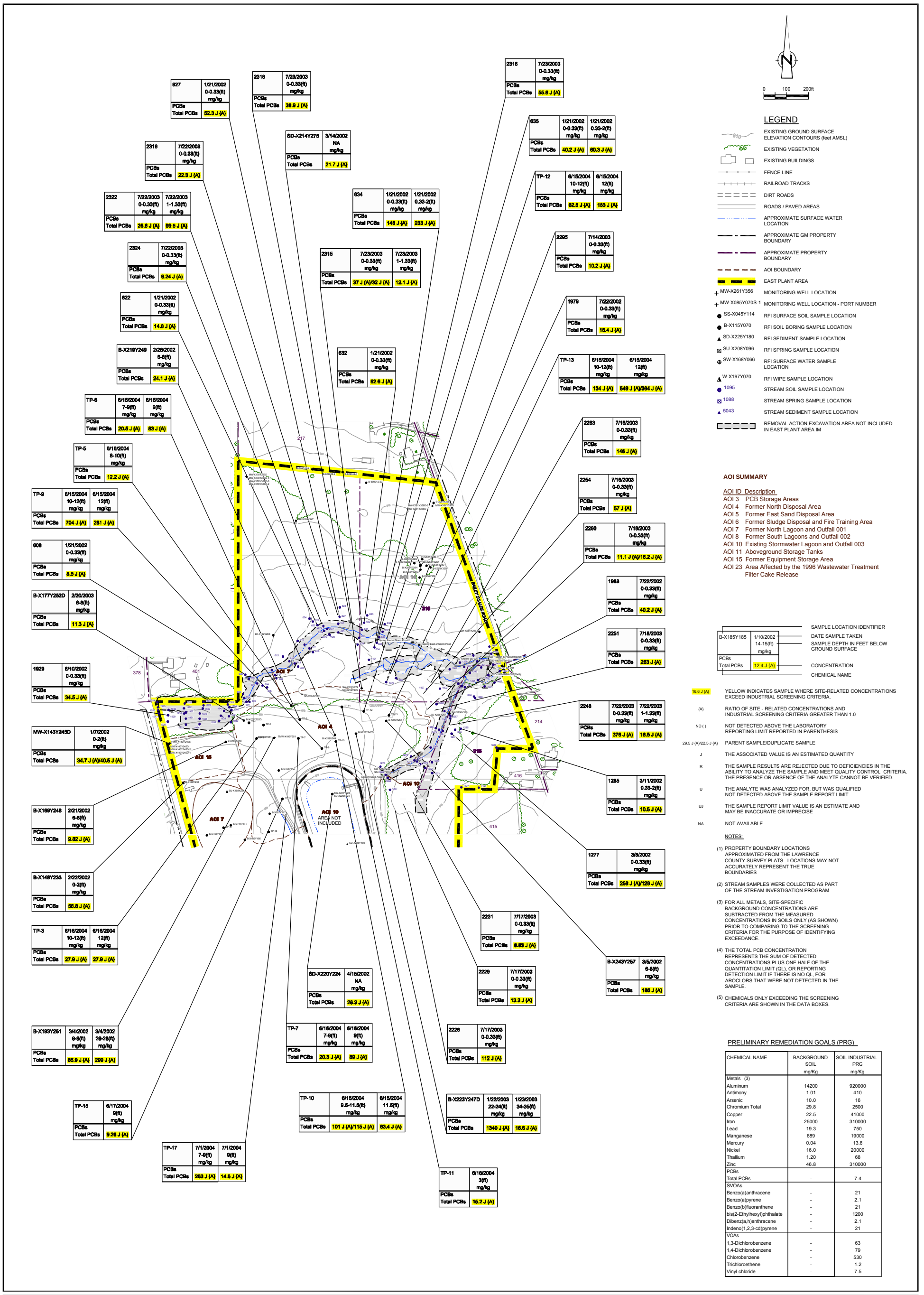
850




PRELIMINARY REMEDIATION GOALS (PRG)

| CHEMICAL NAME | BACKGROUND SOIL mg/Kg | SOIL INDUSTRIAL PRG mg/Kg |
|---|---|---|
| Metals (3) | | |
| Aluminum | 14200 | 920000 |
| Antimony | 1.01 | 410 |
| Arsenic | 10.0 | 16 |
| Chromium Total | 29.8 | 2500 |
| Copper | 22.5 | 41000 |
| Iron | 25000 | 310000 |
| Lead | 19.3 | 750 |
| Manganese | 689 | 19000 |
| Mercury | 0.04 | 13.6 |
| Nickel | 16.0 | 20000 |
| Thallium | 1.20 | 68 |
| Zinc | 46.8 | 310000 |
| PCBs | | |
| Total PCBs | - | 7.4 |
| SVOAs | | |
| Benzo(a)anthracene | - | 21 |
| Benzo(a)pyrene | - | 2.1 |
| Benzo(b)fluoranthene | - | 21 |
| bis(2-Ethylhexyl)phthalate | - | 1200 |
| Dibenz(a,h)anthracene | - | 2.1 |
| Indeno(1,2,3-cd)pyrene | - | 21 |
| VOAs | | |
| 1,3-Dichlorobenzene | - | 63 |
| 1,4-Dichlorobenzene | - | 79 |
| Chlorobenzene | - | 530 |
| Trichloroethene | - | 1.2 |
| Vinyl chloride | - | 7.5 |

KEY MAP - EAST PLANT AREA - NORTH

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

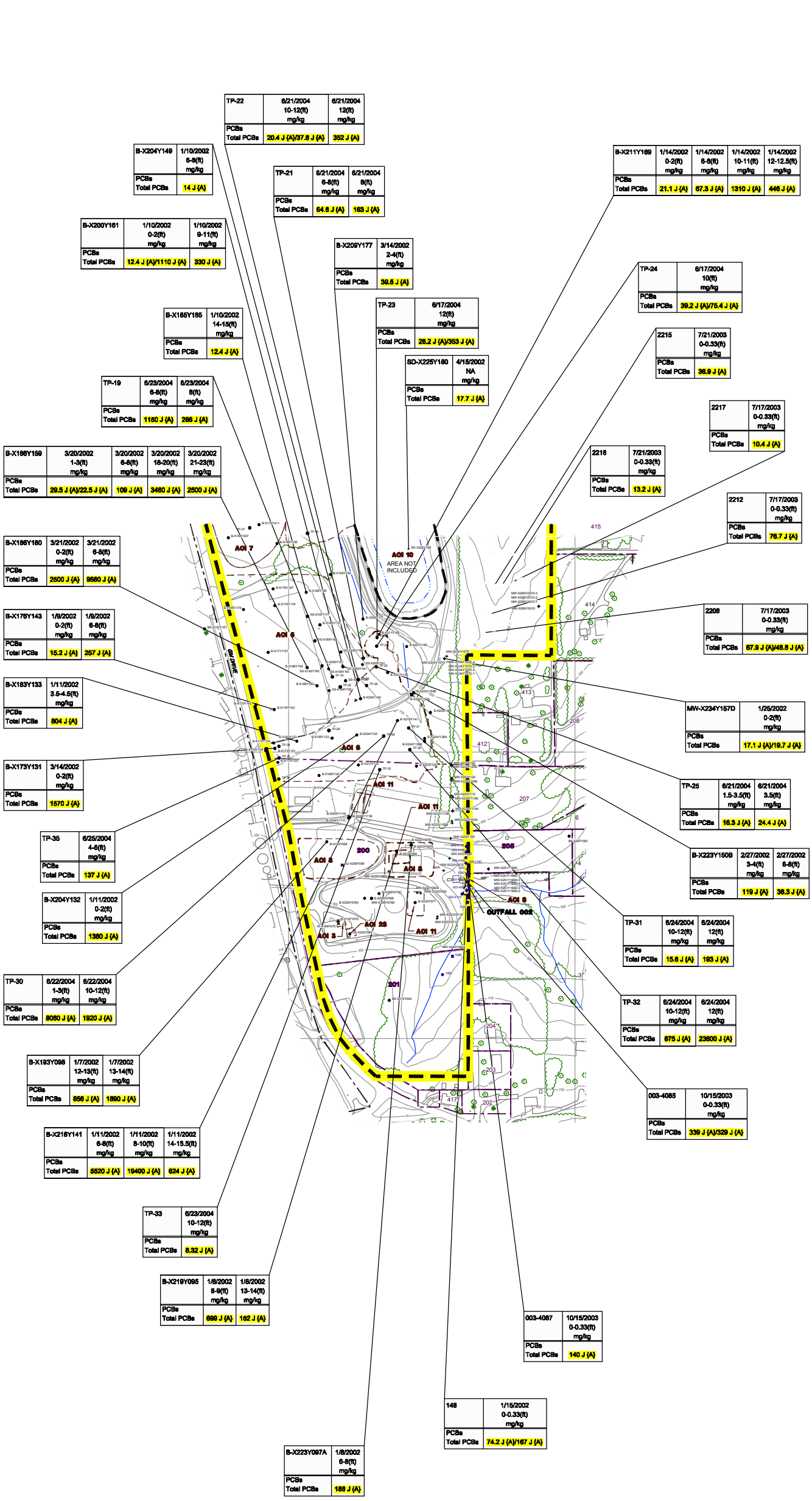
RFI AND STREAM SAMPLE PCB EXCEEDANCE LOCATIONS RESULTS - SOILS / SEDIMENT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 2.11 |

13968-00(151)GN-WA015 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- MW-X261Y356 — MONITORING WELL LOCATION
- MW-X085Y070S-1 — MONITORING WELL LOCATION - PORT NUMBER
- SS-X045Y114 — RFI SURFACE SOIL SAMPLE LOCATION
- B-X115Y070 — RFI SOIL BORING SAMPLE LOCATION
- SD-X225Y180 — RFI SEDIMENT SAMPLE LOCATION
- SU-X208Y096 — RFI SPRING SAMPLE LOCATION
- SW-X168Y066 — RFI SURFACE WATER SAMPLE LOCATION
- W-X197Y070 — RFI WIPE SAMPLE LOCATION
- 1095 — STREAM SOIL SAMPLE LOCATION
- 1088 — STREAM SPRING SAMPLE LOCATION
- 5043 — STREAM SEDIMENT SAMPLE LOCATION
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM

### AOI SUMMARY

AOI ID Description
- AOI 3 PCB Storage Areas
- AOI 4 Former North Disposal Area
- AOI 5 Former East Sand Disposal Area
- AOI 6 Former Sludge Disposal and Fire Training Area
- AOI 7 Former North Lagoon and Outfall 001
- AOI 8 Former South Lagoons and Outfall 002
- AOI 10 Existing Stormwater Lagoon and Outfall 003
- AOI 11 Aboveground Storage Tanks
- AOI 15 Former Equipment Storage Area
- AOI 23 Area Affected by the 1996 Wastewater Treatment Filter Cake Release

| B-X185Y185 | 1/10/2002 14-15(ft) mg/kg |
|---|---|
| PCBs Total PCBs | 12.4 J (A) |

- SAMPLE LOCATION IDENTIFIER
- DATE SAMPLE TAKEN
- SAMPLE DEPTH IN FEET BELOW GROUND SURFACE
- CONCENTRATION
- CHEMICAL NAME

16.6 J (A) — YELLOW INDICATES SAMPLE WHERE SITE-RELATED CONCENTRATIONS EXCEED INDUSTRIAL SCREENING CRITERIA.

(A) — RATIO OF SITE - RELATED CONCENTRATIONS AND INDUSTRIAL SCREENING CRITERIA GREATER THAN 1.0

ND ( ) — NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT REPORTED IN PARENTHESIS

29.5 J (A)/22.5 J (A) — PARENT SAMPLE/DUPLICATE SAMPLE

J — THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY

R — THE SAMPLE RESULTS ARE REJECTED DUE TO DEFICIENCIES IN THE ABILITY TO ANALYZE THE SAMPLE AND MEET QUALITY CONTROL CRITERIA. THE PRESENCE OR ABSENCE OF THE ANALYTE CANNOT BE VERIFIED.

U — THE ANALYTE WAS ANALYZED FOR, BUT WAS QUALIFIED NOT DETECTED ABOVE THE SAMPLE REPORT LIMIT

UJ — THE SAMPLE REPORT LIMIT VALUE IS AN ESTIMATE AND MAY BE INACCURATE OR IMPRECISE

NA — NOT AVAILABLE

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

(2) STREAM SAMPLES WERE COLLECTED AS PART OF THE STREAM INVESTIGATION PROGRAM

(3) FOR ALL METALS, SITE-SPECIFIC BACKGROUND CONCENTRATIONS ARE SUBTRACTED FROM THE MEASURED CONCENTRATIONS IN SOILS ONLY (AS SHOWN) PRIOR TO COMPARING TO THE SCREENING CRITERIA FOR THE PURPOSE OF IDENTIFYING EXCEEDANCE.

(4) THE TOTAL PCB CONCENTRATION REPRESENTS THE SUM OF DETECTED CONCENTRATIONS PLUS ONE HALF OF THE QUANTITATION LIMIT (QL), OR REPORTING DETECTION LIMIT IF THERE IS NO QL, FOR AROCLORS THAT WERE NOT DETECTED IN THE SAMPLE.

(5) CHEMICALS ONLY EXCEEDING THE SCREENING CRITERIA ARE SHOWN IN THE DATA BOXES.

PRELIMINARY REMEDIATION GOALS (PRG)

| CHEMICAL NAME | BACKGROUND SOIL mg/Kg | SOIL INDUSTRIAL PRG mg/Kg |
|---|---|---|
| Metals (3) | | |
| Aluminum | 14200 | 920000 |
| Antimony | 1.01 | 410 |
| Arsenic | 10.0 | 16 |
| Chromium Total | 29.8 | 2500 |
| Copper | 22.5 | 41000 |
| Iron | 25000 | 310000 |
| Lead | 19.3 | 750 |
| Manganese | 689 | 19000 |
| Mercury | 0.04 | 13.6 |
| Nickel | 16.0 | 20000 |
| Thallium | 1.20 | 68 |
| Zinc | 46.8 | 310000 |
| PCBs | | |
| Total PCBs | - | 7.4 |
| SVOAs | | |
| Benzo(a)anthracene | - | 21 |
| Benzo(a)pyrene | - | 2.1 |
| Benzo(b)fluoranthene | - | 21 |
| bis(2-Ethylhexyl)phthalate | - | 1200 |
| Dibenz(a,h)anthracene | - | 2.1 |
| Indeno(1,2,3-cd)pyrene | - | 21 |
| VOAs | | |
| 1,3-Dichlorobenzene | - | 63 |
| 1,4-Dichlorobenzene | - | 79 |
| Chlorobenzene | - | 530 |
| Trichloroethene | - | 1.2 |
| Vinyl chloride | - | 7.5 |

KEY MAP - EAST PLANT AREA - SOUTH

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

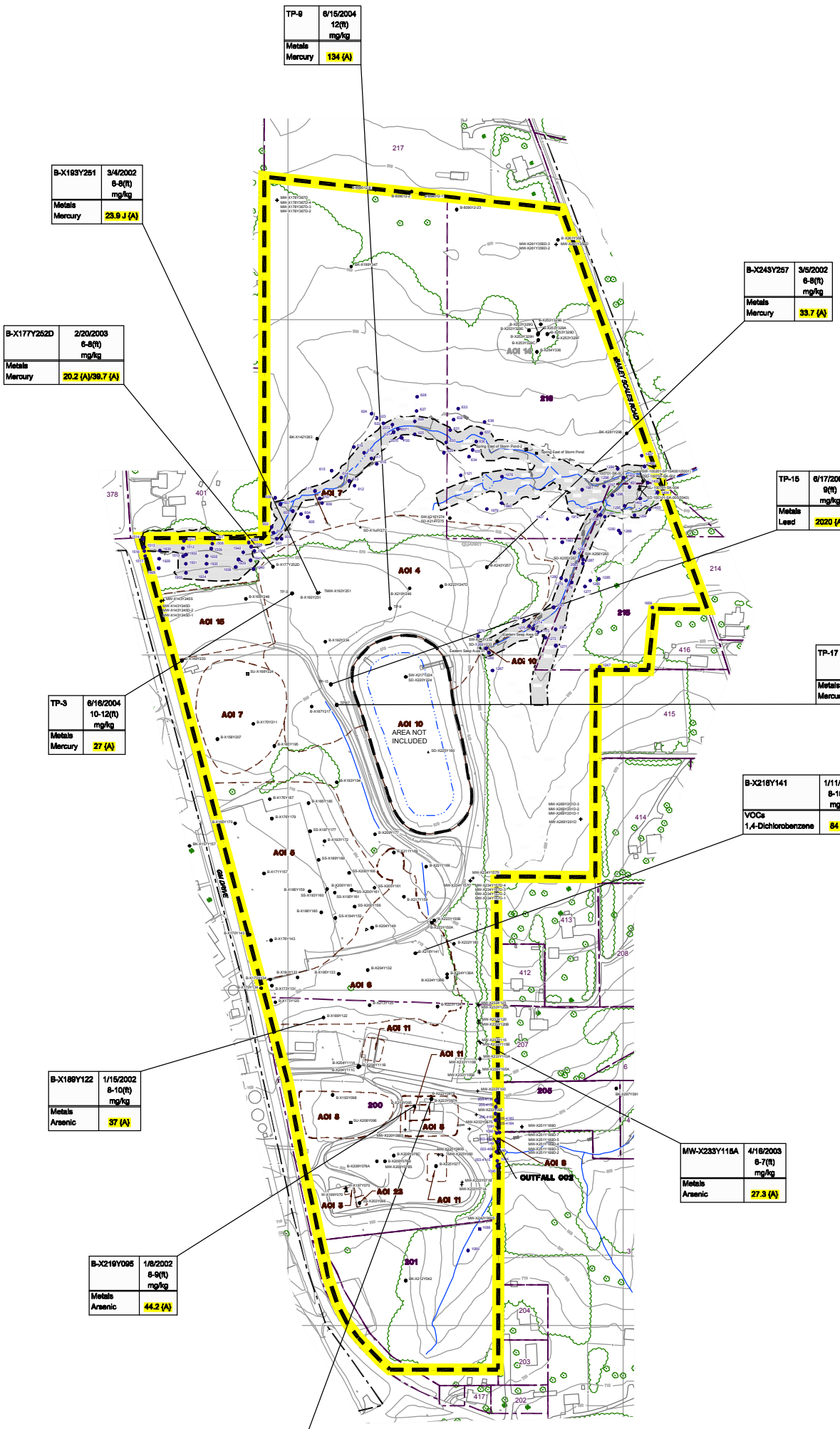
RFI AND STREAM SAMPLE PCB EXCEEDANCE LOCATIONS RESULTS - SOILS / SEDIMENT

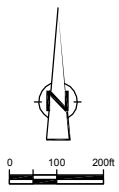
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 2.12 |

13968-00(151)GN-WA016 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- MW-X261Y356 — MONITORING WELL LOCATION
- MW-X085Y070S-1 — MONITORING WELL LOCATION - PORT NUMBER
- SS-X045Y114 — RFI SURFACE SOIL SAMPLE LOCATION
- B-X115Y070 — RFI SOIL BORING SAMPLE LOCATION
- SD-X225Y180 — RFI SEDIMENT SAMPLE LOCATION
- SU-X208Y096 — RFI SPRING SAMPLE LOCATION
- SW-X168Y066 — RFI SURFACE WATER SAMPLE LOCATION
- W-X197Y070 — RFI WIPE SAMPLE LOCATION
- 1095 — STREAM SOIL SAMPLE LOCATION
- 1088 — STREAM SPRING SAMPLE LOCATION
- 5043 — STREAM SEDIMENT SAMPLE LOCATION
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM

### AOI SUMMARY

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| B-X189Y122 | 1/15/2002 8-10(ft) mg/kg |
|---|---|
| Metals Arsenic | 37 (A) |

- SAMPLE LOCATION IDENTIFIER
- DATE SAMPLE TAKEN
- SAMPLE DEPTH IN FEET BELOW GROUND SURFACE
- CONCENTRATION
- CHEMICAL NAME

- 84 (A) — YELLOW INDICATES SAMPLE WHERE SITE-RELATED CONCENTRATIONS EXCEED INDUSTRIAL SCREENING CRITERIA.
- {A} — RATIO OF SITE - RELATED CONCENTRATIONS AND INDUSTRIAL SCREENING CRITERIA GREATER THAN 1.0
- ND ( ) — NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT REPORTED IN PARENTHESIS
- 20.2 (A)/39.7 (A) — PARENT SAMPLE/DUPLICATE SAMPLE
- J — THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY
- R — THE SAMPLE RESULTS ARE REJECTED DUE TO DEFICIENCIES IN THE ABILITY TO ANALYZE THE SAMPLE AND MEET QUALITY CONTROL CRITERIA. THE PRESENCE OR ABSENCE OF THE ANALYTE CANNOT BE VERIFIED.
- U — THE ANALYTE WAS ANALYZED FOR, BUT WAS QUALIFIED NOT DETECTED ABOVE THE SAMPLE REPORT LIMIT
- UJ — THE SAMPLE REPORT LIMIT VALUE IS AN ESTIMATE AND MAY BE INACCURATE OR IMPRECISE

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

(2) STREAM SAMPLES WERE COLLECTED AS PART OF THE STREAM INVESTIGATION PROGRAM

(3) FOR ALL METALS, SITE-SPECIFIC BACKGROUND CONCENTRATIONS ARE SUBTRACTED FROM THE MEASURED CONCENTRATIONS IN SOILS ONLY (AS SHOWN) PRIOR TO COMPARING TO THE SCREENING CRITERIA FOR THE PURPOSE OF IDENTIFYING EXCEEDANCE.

(4) THE TOTAL PCB CONCENTRATION REPRESENTS THE SUM OF DETECTED CONCENTRATIONS PLUS ONE HALF OF THE QUANTITATION LIMIT (QL), OR REPORTING DETECTION LIMIT IF THERE IS NO QL, FOR AROCLORS THAT WERE NOT DETECTED IN THE SAMPLE.

(5) CHEMICALS ONLY EXCEEDING THE SCREENING CRITERIA ARE SHOWN IN THE DATA BOXES.

PRELIMINARY REMEDIATION GOALS (PRG)

| CHEMICAL NAME | BACKGROUND SOIL mg/Kg | SOIL INDUSTRIAL PRG mg/Kg |
|---|---|---|
| Metals (3) | | |
| Aluminum | 14200 | 920000 |
| Antimony | 1.01 | 410 |
| Arsenic | 10.0 | 16 |
| Chromium Total | 29.8 | 2500 |
| Copper | 22.5 | 41000 |
| Iron | 25000 | 310000 |
| Lead | 19.3 | 750 |
| Manganese | 689 | 19000 |
| Mercury | 0.04 | 13.6 |
| Nickel | 16.0 | 20000 |
| Thallium | 1.20 | 68 |
| Zinc | 46.8 | 310000 |
| PCBs | | |
| Total PCBs | - | 7.4 |
| SVOAs | | |
| Benzo(a)anthracene | - | 21 |
| Benzo(a)pyrene | - | 2.1 |
| Benzo(b)fluoranthene | - | 21 |
| bis(2-Ethylhexyl)phthalate | - | 1200 |
| Dibenz(a,h)anthracene | - | 2.1 |
| Indeno(1,2,3-cd)pyrene | - | 21 |
| VOAs | | |
| 1,3-Dichlorobenzene | - | 63 |
| 1,4-Dichlorobenzene | - | 79 |
| Chlorobenzene | - | 530 |
| Trichloroethene | - | 1.2 |
| Vinyl chloride | - | 7.5 |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

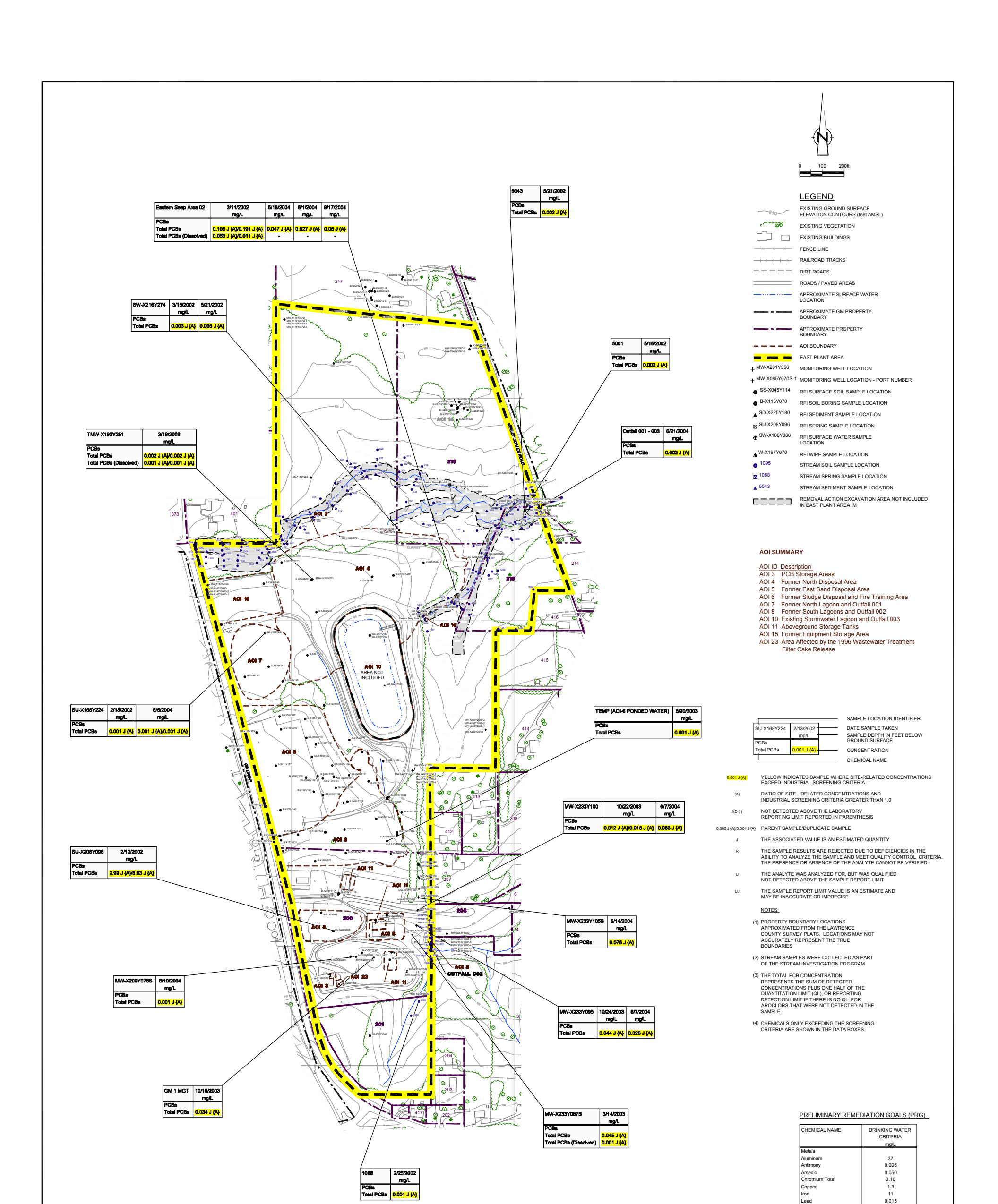
RFI AND STREAM SAMPLE NON-PCB EXCEEDANCE LOCATIONS RESULTS - SOILS / SEDIMENT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 2.13 |

13968-00(151)GN-WA017 APR 06/2005




PRELIMINARY REMEDIATION GOALS (PRG)

| CHEMICAL NAME | DRINKING WATER CRITERIA mg/L |
|---|---|
| Metals | |
| Aluminum | 37 |
| Antimony | 0.006 |
| Arsenic | 0.050 |
| Chromium Total | 0.10 |
| Copper | 1.3 |
| Iron | 11 |
| Lead | 0.015 |
| Manganese | 0.88 |
| Mercury | 0.002 |
| Nickel | 0.73 |
| Thallium | 0.002 |
| Zinc | 11 |
| PCBs | |
| Total PCBs | 0.0005 |
| SVOAs | |
| Benzo(a)anthracene | 0.00092 |
| Benzo(a)pyrene | 0.00020 |
| Benzo(b)fluoranthene | 0.00092 |
| bis(2-Ethylhexyl)phthalate | 0.006 |
| Dibenz(a,h)anthracene | 0.00009 |
| Indeno(1,2,3-cd)pyrene | 0.00092 |
| VOAs | |
| 1,3-Dichlorobenzene | 0.033 |
| 1,4-Dichlorobenzene | 0.075 |
| Chlorobenzene | |
| Trichloroethene | 0.005 |
| Vinyl chloride | 0.002 |

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

RFI AND STREAM SAMPLE PCB EXCEEDANCE LOCATIONS RESULTS - SURFACE / GROUNDWATER

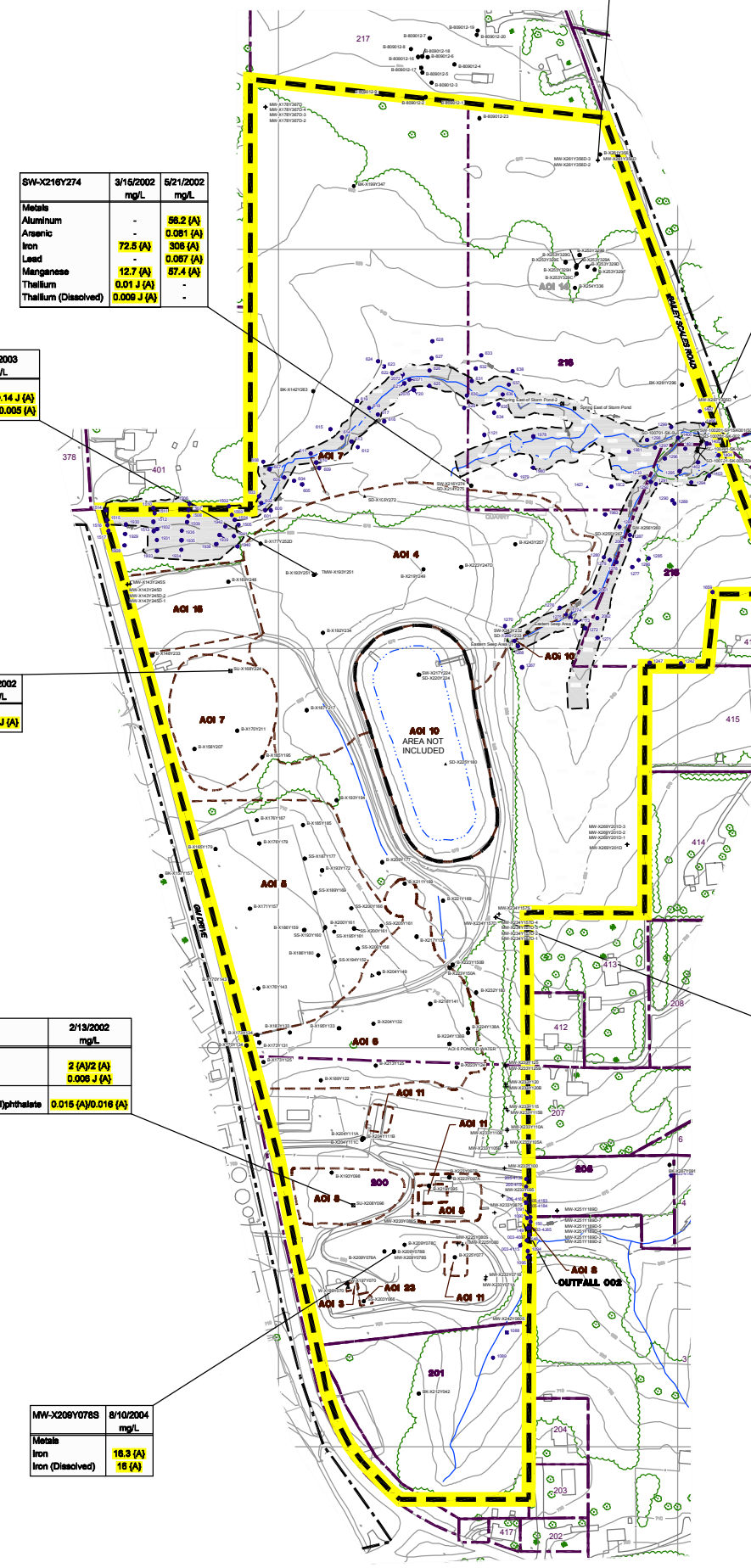
SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 2.14 |

13968-00(151)GN-WA018 APR 06/2005




0 100 200ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- MW-X261Y356 — MONITORING WELL LOCATION
- MW-X085Y070S-1 — MONITORING WELL LOCATION - PORT NUMBER
- SS-X045Y114 — RFI SURFACE SOIL SAMPLE LOCATION
- B-X115Y070 — RFI SOIL BORING SAMPLE LOCATION
- SD-X225Y180 — RFI SEDIMENT SAMPLE LOCATION
- SU-X208Y096 — RFI SPRING SAMPLE LOCATION
- SW-X168Y066 — RFI SURFACE WATER SAMPLE LOCATION
- W-X197Y070 — RFI WIPE SAMPLE LOCATION
- 1095 — STREAM SOIL SAMPLE LOCATION
- 1088 — STREAM SPRING SAMPLE LOCATION
- 5043 — STREAM SEDIMENT SAMPLE LOCATION
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM

| SU-X168Y224 | 2/13/2002 mg/L |
|---|---|
| Metals | |
| Thallium (Dissolved) | 0.006 J {A} |

- SAMPLE LOCATION IDENTIFIER
- DATE SAMPLE TAKEN
- SAMPLE DEPTH IN FEET BELOW GROUND SURFACE
- CONCENTRATION
- CHEMICAL NAME

- 0.28 {A} — YELLOW INDICATES SAMPLE WHERE SITE-RELATED CONCENTRATIONS EXCEED INDUSTRIAL SCREENING CRITERIA.
- {A} — RATIO OF SITE - RELATED CONCENTRATIONS AND INDUSTRIAL SCREENING CRITERIA GREATER THAN 1.0
- ND ( ) — NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT REPORTED IN PARENTHESIS
- 2 {A}/2 {A} — PARENT SAMPLE/DUPLICATE SAMPLE
- J — THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY
- R — THE SAMPLE RESULTS ARE REJECTED DUE TO DEFICIENCIES IN THE ABILITY TO ANALYZE THE SAMPLE AND MEET QUALITY CONTROL CRITERIA. THE PRESENCE OR ABSENCE OF THE ANALYTE CANNOT BE VERIFIED.
- U — THE ANALYTE WAS ANALYZED FOR, BUT WAS QUALIFIED NOT DETECTED ABOVE THE SAMPLE REPORT LIMIT
- UJ — THE SAMPLE REPORT LIMIT VALUE IS AN ESTIMATE AND MAY BE INACCURATE OR IMPRECISE

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

(2) STREAM SAMPLES WERE COLLECTED AS PART OF THE STREAM INVESTIGATION PROGRAM

(3) THE TOTAL PCB CONCENTRATION REPRESENTS THE SUM OF DETECTED CONCENTRATIONS PLUS ONE HALF OF THE QUANTITATION LIMIT (QL), OR REPORTING DETECTION LIMIT IF THERE IS NO QL, FOR AROCLORS THAT WERE NOT DETECTED IN THE SAMPLE.

(4) CHEMICALS ONLY EXCEEDING THE SCREENING CRITERIA ARE SHOWN IN THE DATA BOXES.

PRELIMINARY REMEDIATION GOALS (PRG)

| CHEMICAL NAME | DRINKING WATER CRITERIA mg/L |
|---|---|
| Metals | |
| Aluminum | 37 |
| Antimony | 0.006 |
| Arsenic | 0.050 |
| Chromium Total | 0.10 |
| Copper | 1.3 |
| Iron | 11 |
| Lead | 0.015 |
| Manganese | 0.88 |
| Mercury | 0.002 |
| Nickel | 0.73 |
| Thallium | 0.002 |
| Zinc | 11 |
| PCBs | |
| Total PCBs | 0.0005 |
| SVOAs | |
| Benzo(a)anthracene | 0.00092 |
| Benzo(a)pyrene | 0.00020 |
| Benzo(b)fluoranthene | 0.00092 |
| bis(2-Ethylhexyl)phthalate | 0.006 |
| Dibenz(a,h)anthracene | 0.00009 |
| Indeno(1,2,3-cd)pyrene | 0.00092 |
| VOAs | |
| 1,3-Dichlorobenzene | 0.033 |
| 1,4-Dichlorobenzene | 0.075 |
| Chlorobenzene | |
| Trichloroethene | 0.005 |
| Vinyl chloride | 0.002 |

**AOI SUMMARY**

AOI ID Description
AOI 3 PCB Storage Areas
AOI 4 Former North Disposal Area
AOI 5 Former East Sand Disposal Area
AOI 6 Former Sludge Disposal and Fire Training Area
AOI 7 Former North Lagoon and Outfall 001
AOI 8 Former South Lagoons and Outfall 002
AOI 10 Existing Stormwater Lagoon and Outfall 003
AOI 11 Aboveground Storage Tanks
AOI 15 Former Equipment Storage Area
AOI 23 Area Affected by the 1996 Wastewater Treatment Filter Cake Release

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

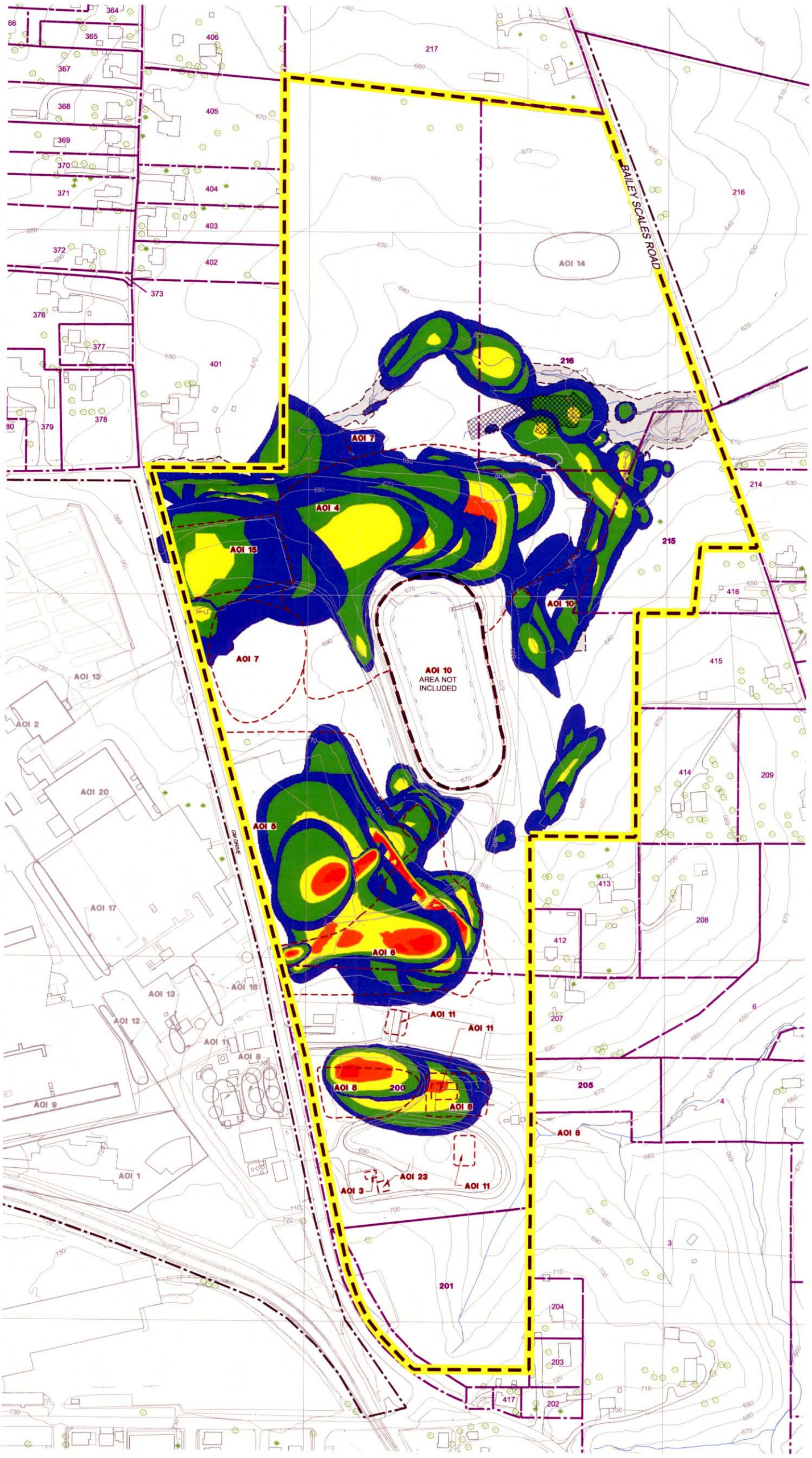
RFI AND STREAM SAMPLE NON-PCB EXCEEDANCE LOCATIONS
RESULTS - SURFACE / GROUNDWATER

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 2.15 |

13968-00(151)GN-WA019 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTE:

PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

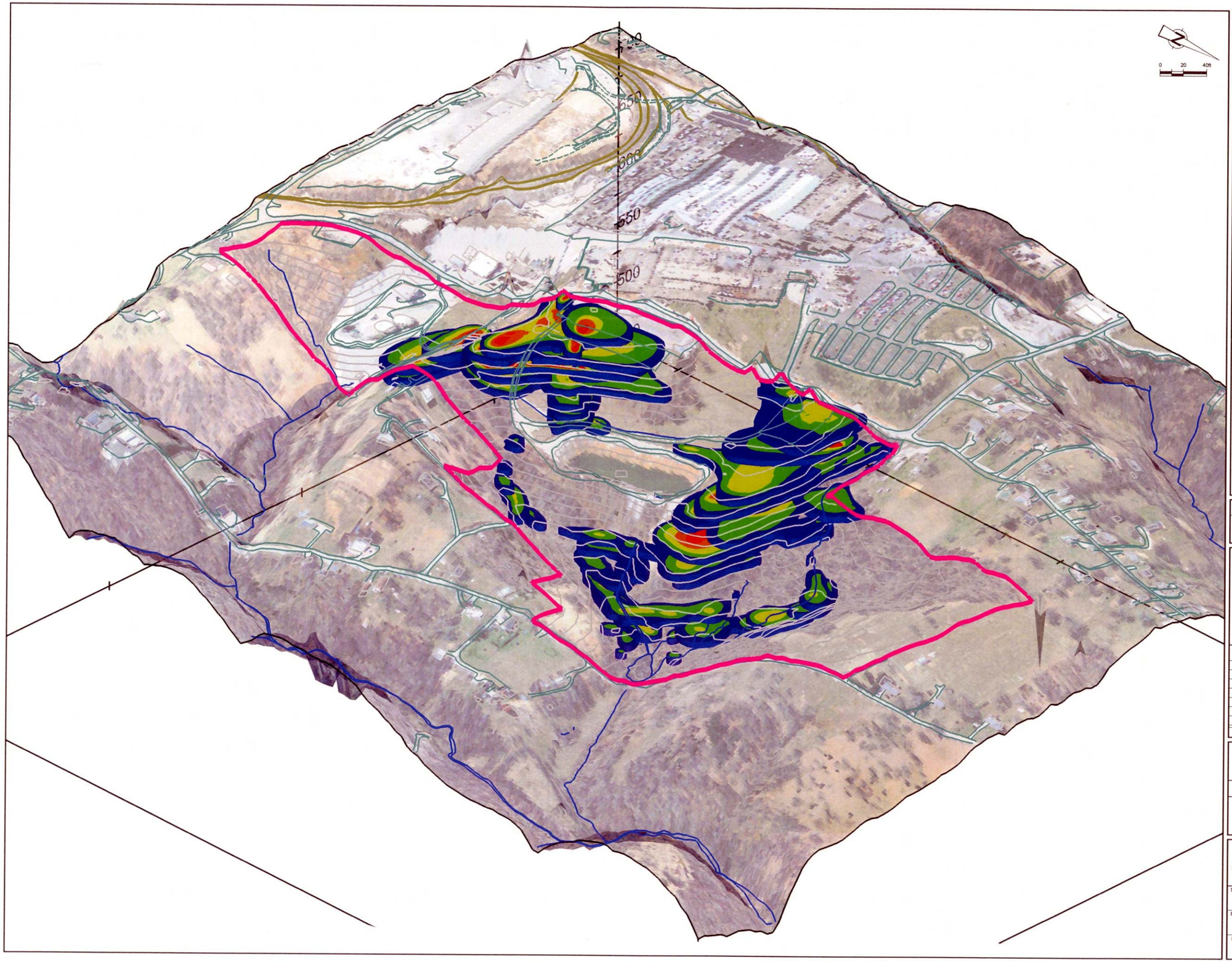
3-D PCB DISTRIBUTION
IN EAST PLANT AREA
PLAN VIEW

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: | Project Nº: | Report Nº: | Drawing Nº: |
| AS SHOWN | 13968-00 | 151 | figure 2.16 |

13968-00(151)GN-WA020 APR 06/2005




| N° | Revision | Date | Initial |
|---|---|---|---|
| | | | |

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTE:

PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

GM POWERTRAIN BEDOFRD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

3-D PCB DISTRIBUTION
IN EAST PLANT AREA
OBLIQUE VIEW

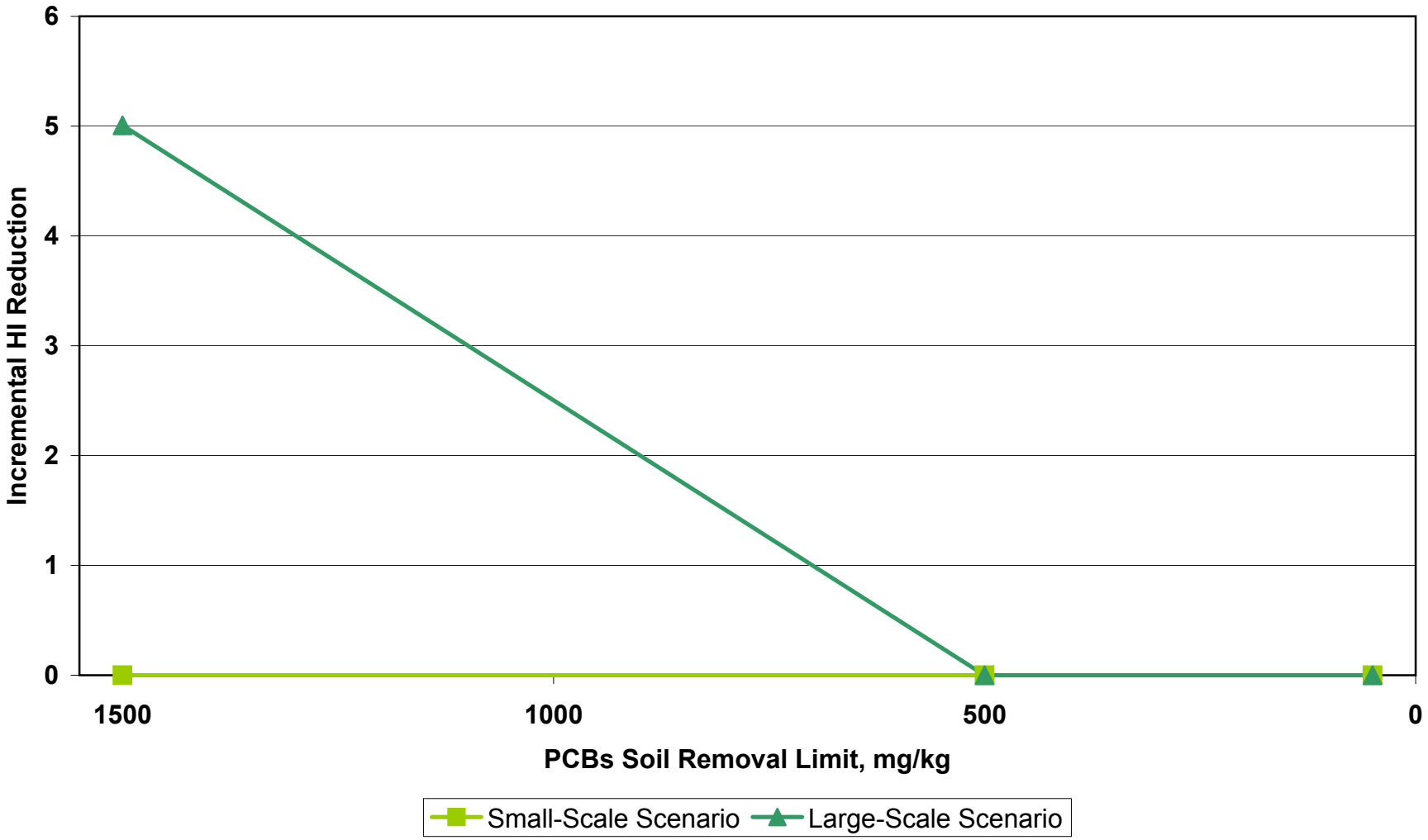
CONESTOGA-ROVERS & ASSOCIATES

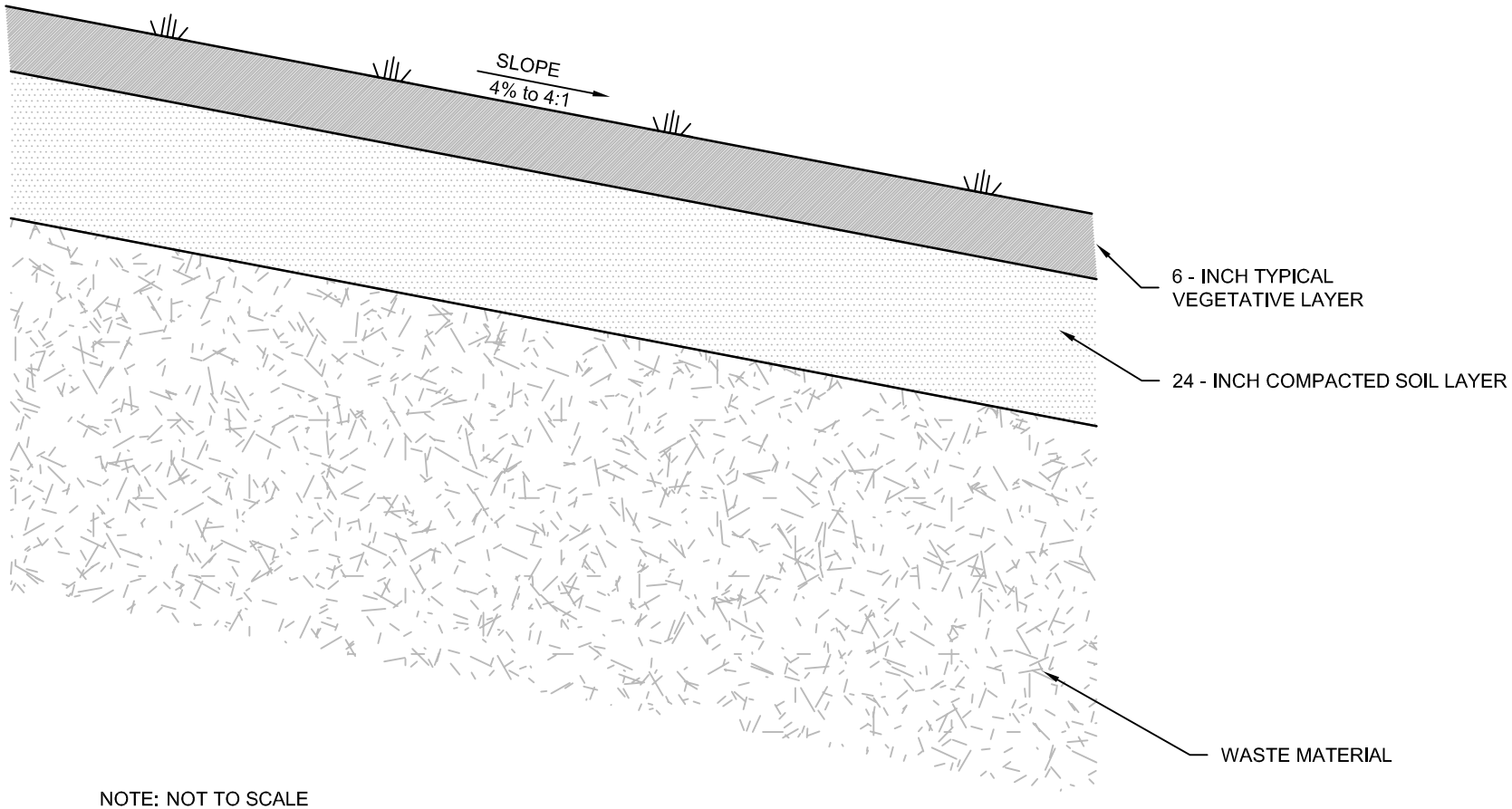
Source Reference:

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure 2.17 |

13968-00(151)GN-WA021 APR 06/2005

**Figure 4.1 Beneficial Hazard Index Reduction vs. PCBs Soil Removal Limits**
**10-ft Construction Scenarios with Soil Cover**
**GM Powertrain Bedford Facility, Bedford, Indiana**

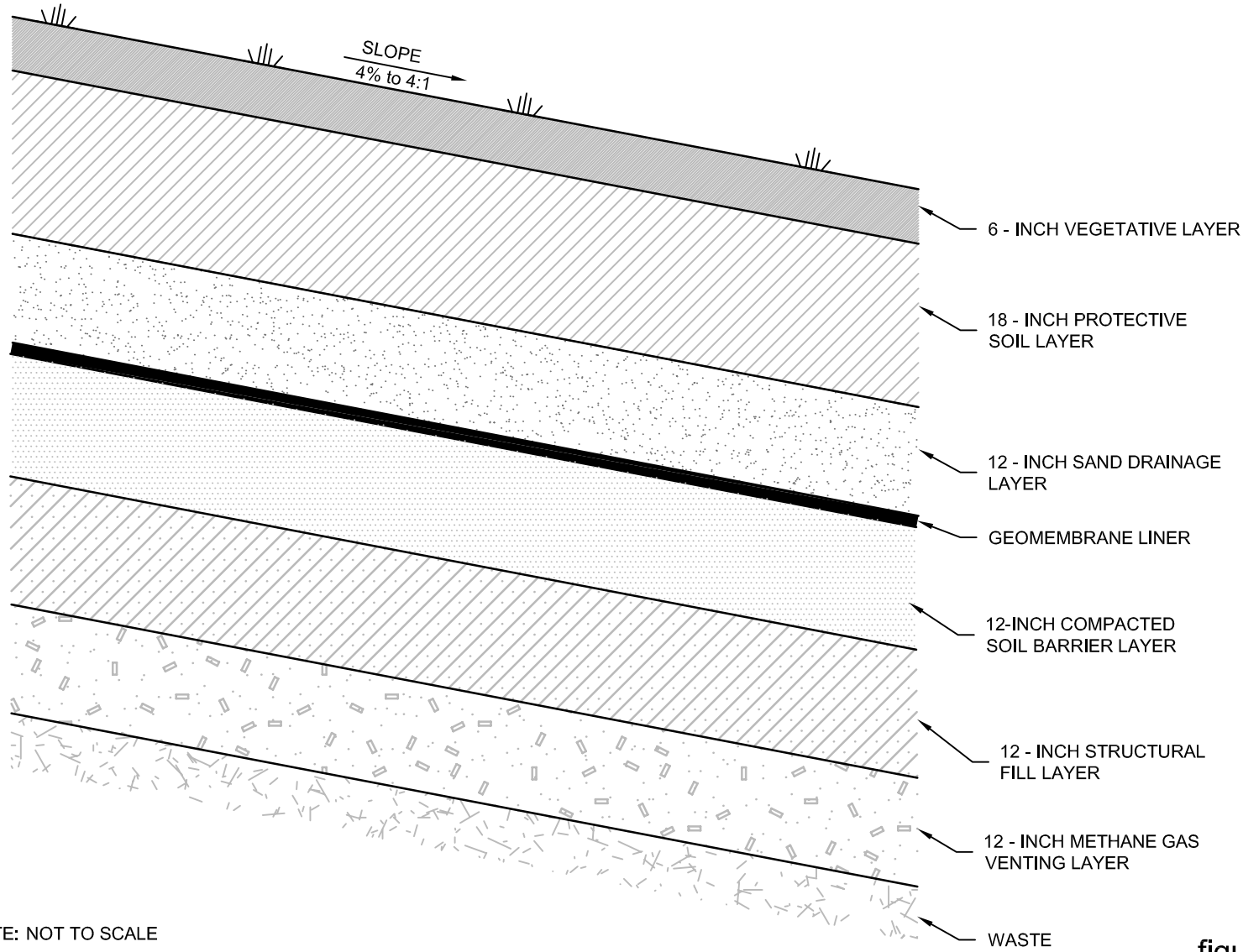





NOTE: NOT TO SCALE

figure 5.1

TYPICAL INDIANA HERITAGE COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*




NOTE: NOT TO SCALE

figure 5.2

TYPICAL INDIANA MUNICIPAL SOLID WASTE LANDFILL COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

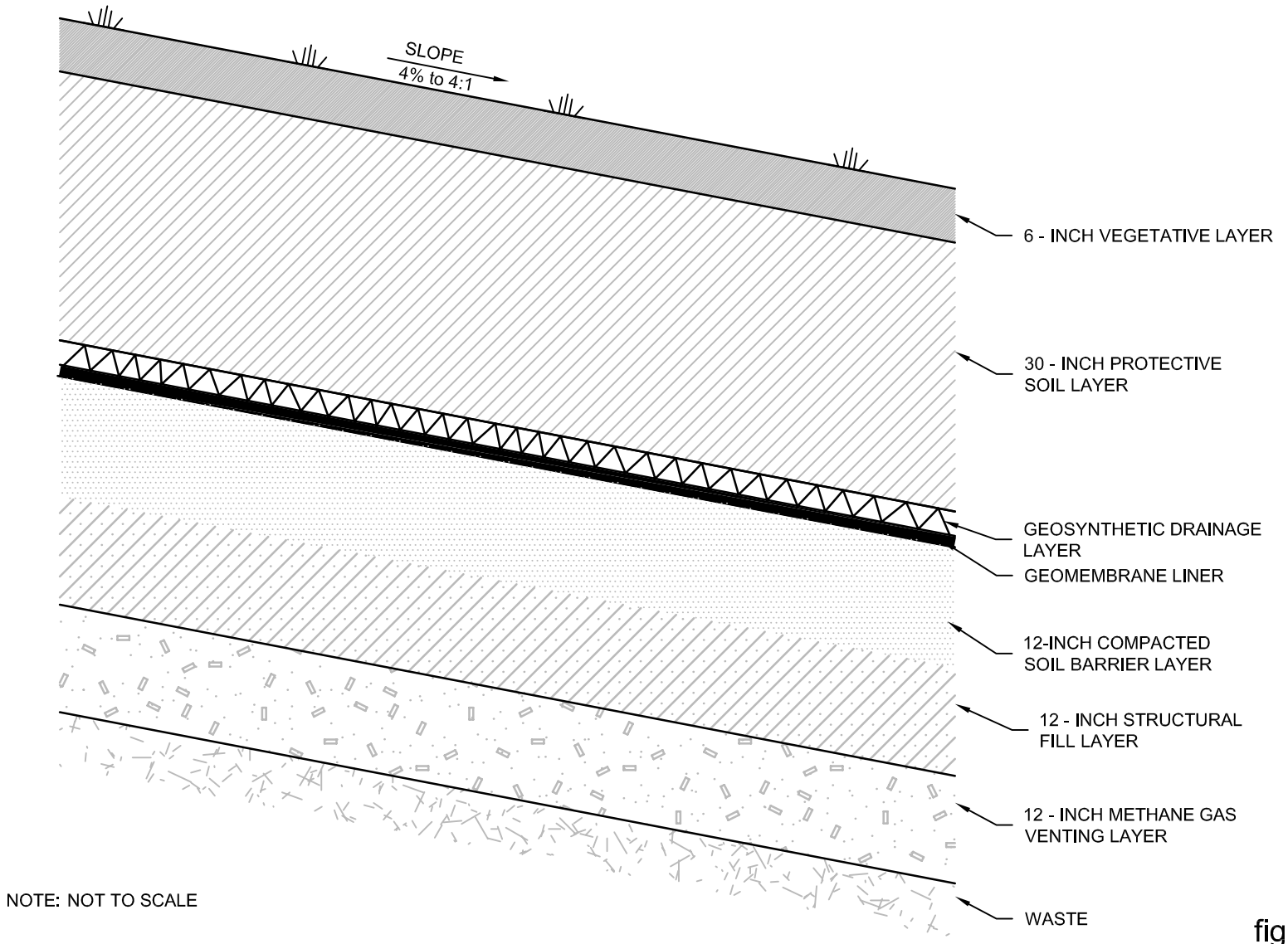
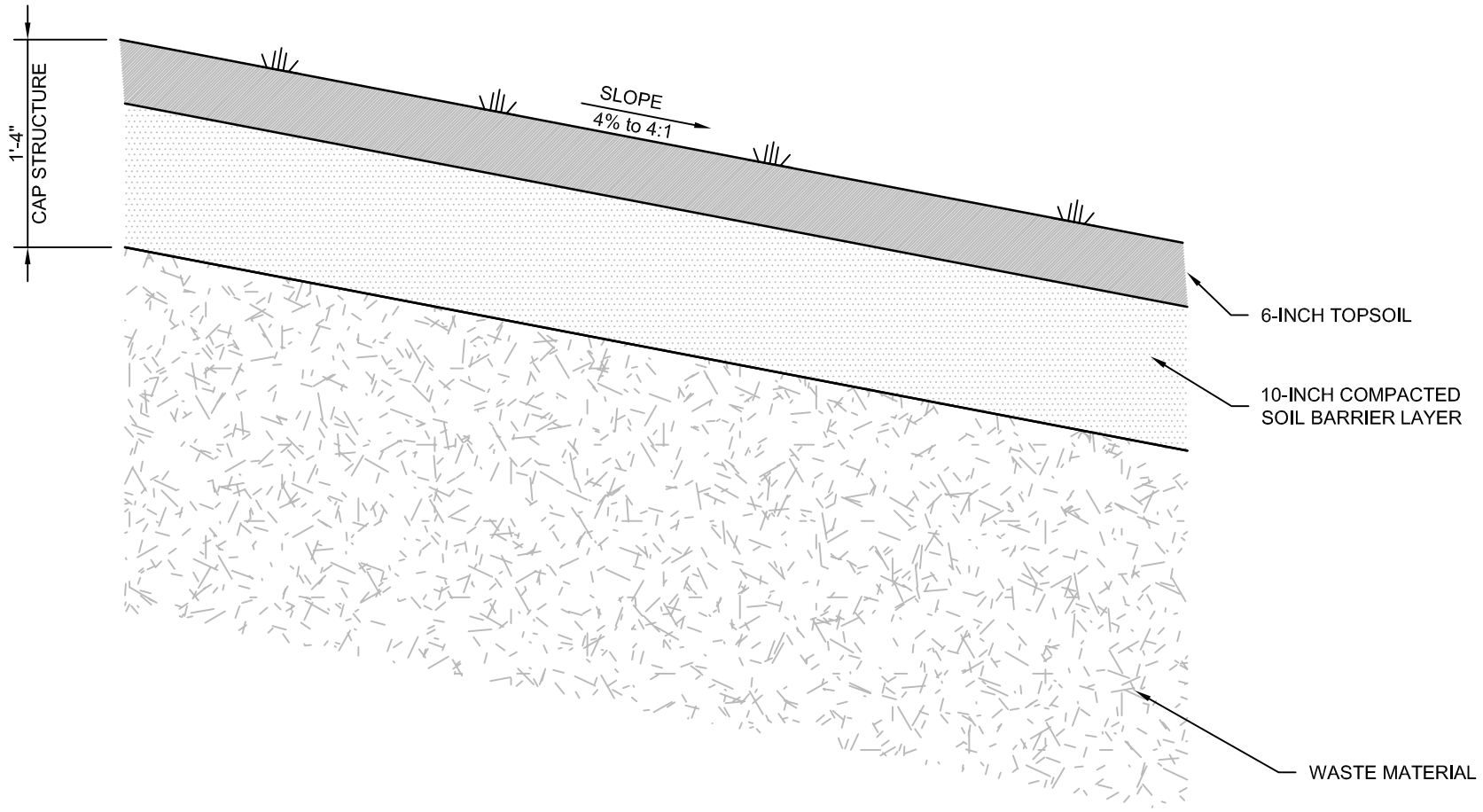



figure 5.3

ALTERNATE INDIANA MUNICIPAL SOLID WASTE LANDFILL COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*




NOTE: NOT TO SCALE

figure 5.4

TYPICAL TSCA SELF-IMPLEMENTING COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

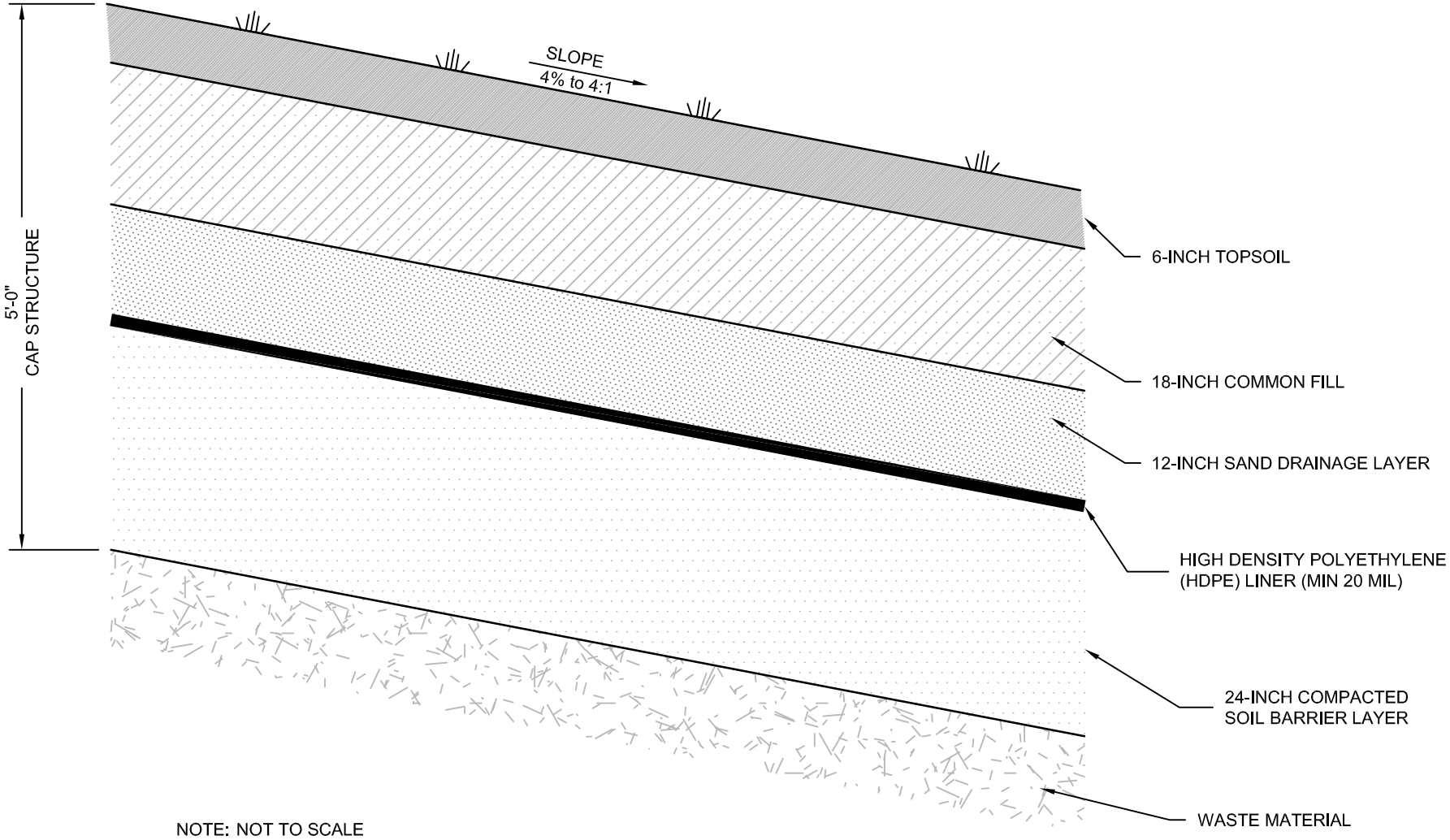



figure 5.5

TYPICAL RCRA SUBTITLE C COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

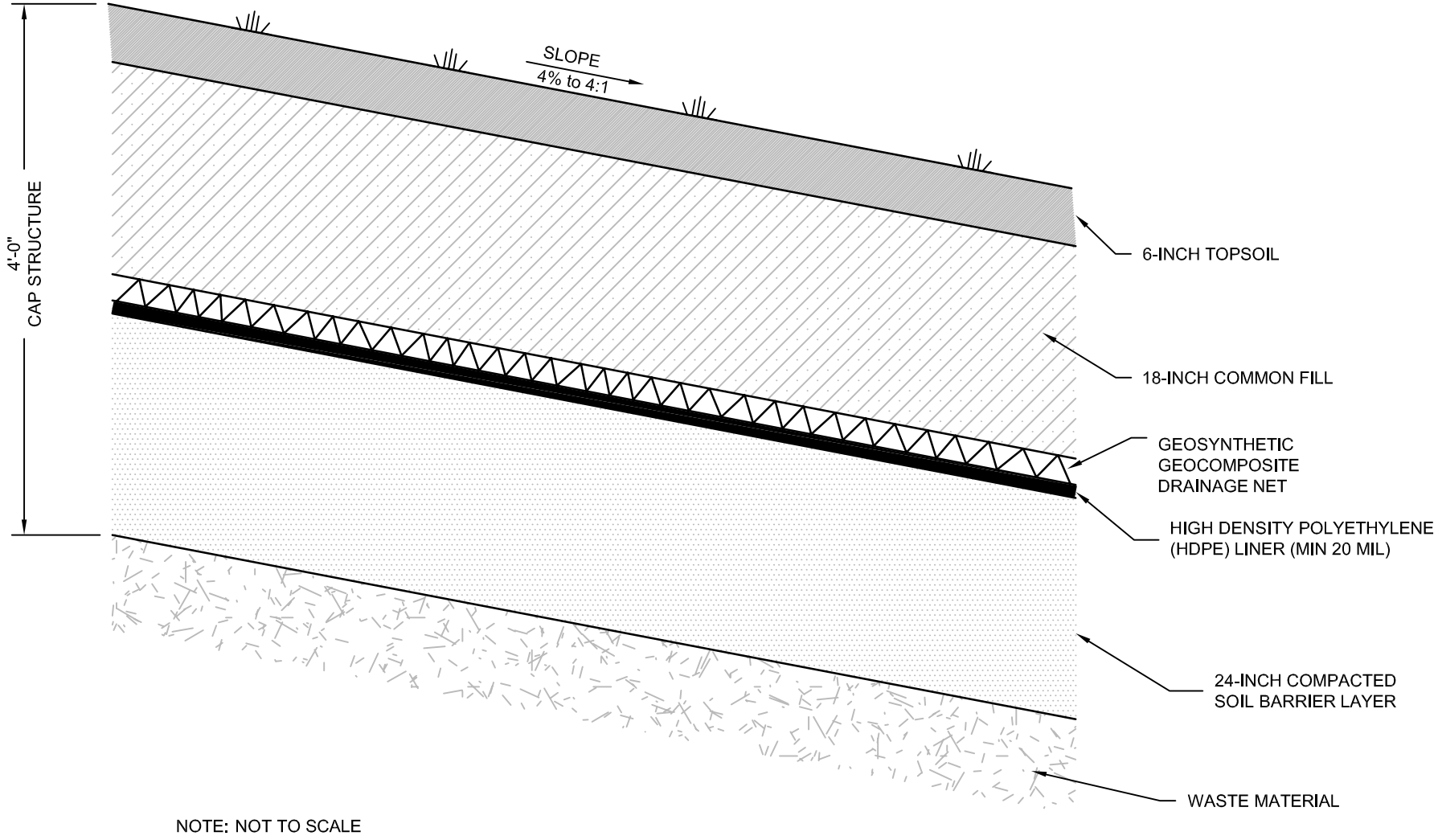
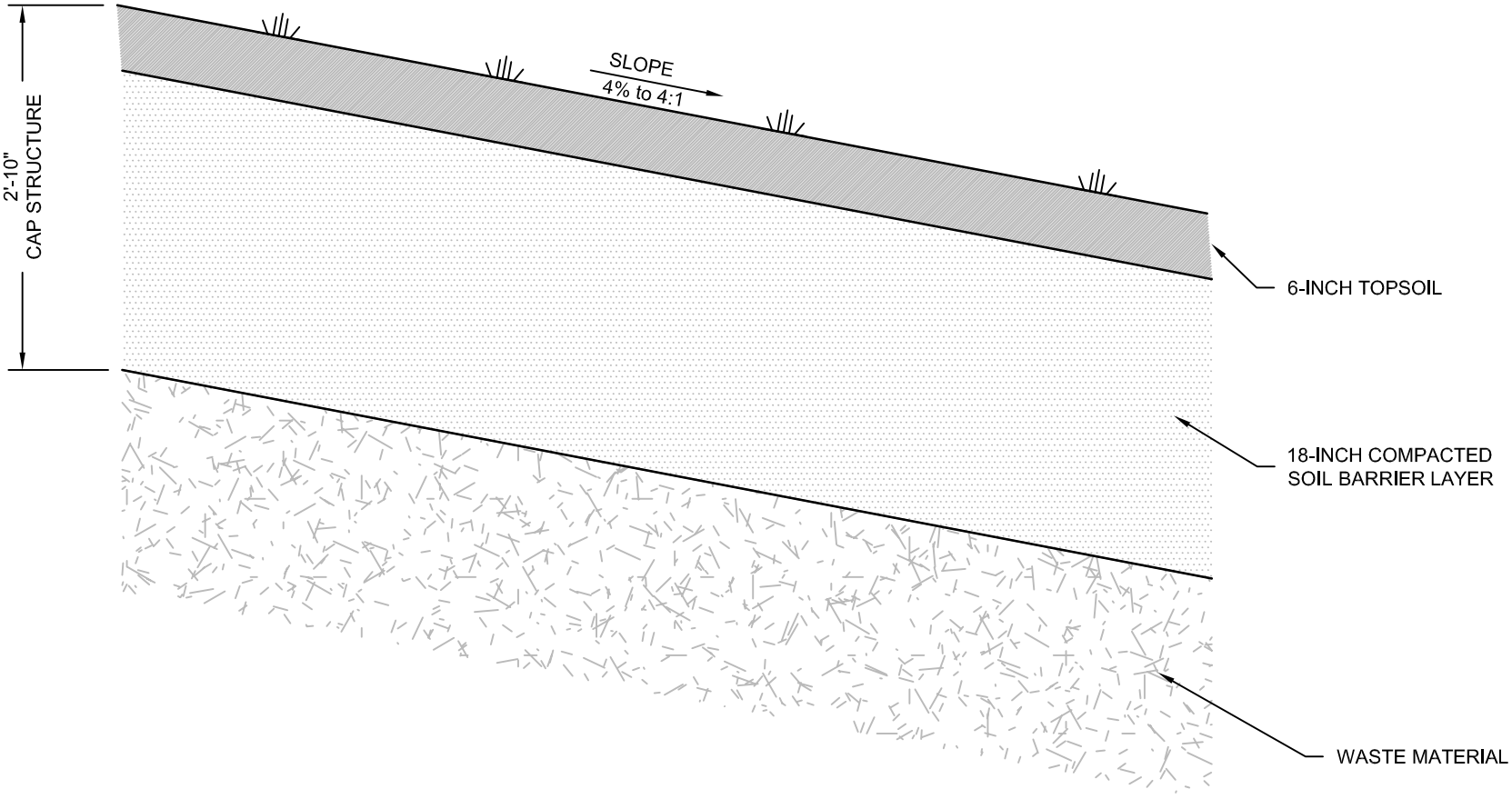



figure 5.6

TYPICAL RCRA SUBTITLE C ALTERNATE COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*




NOTE: NOT TO SCALE

figure 5.7

TYPICAL RCRA SUBTITLE D COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

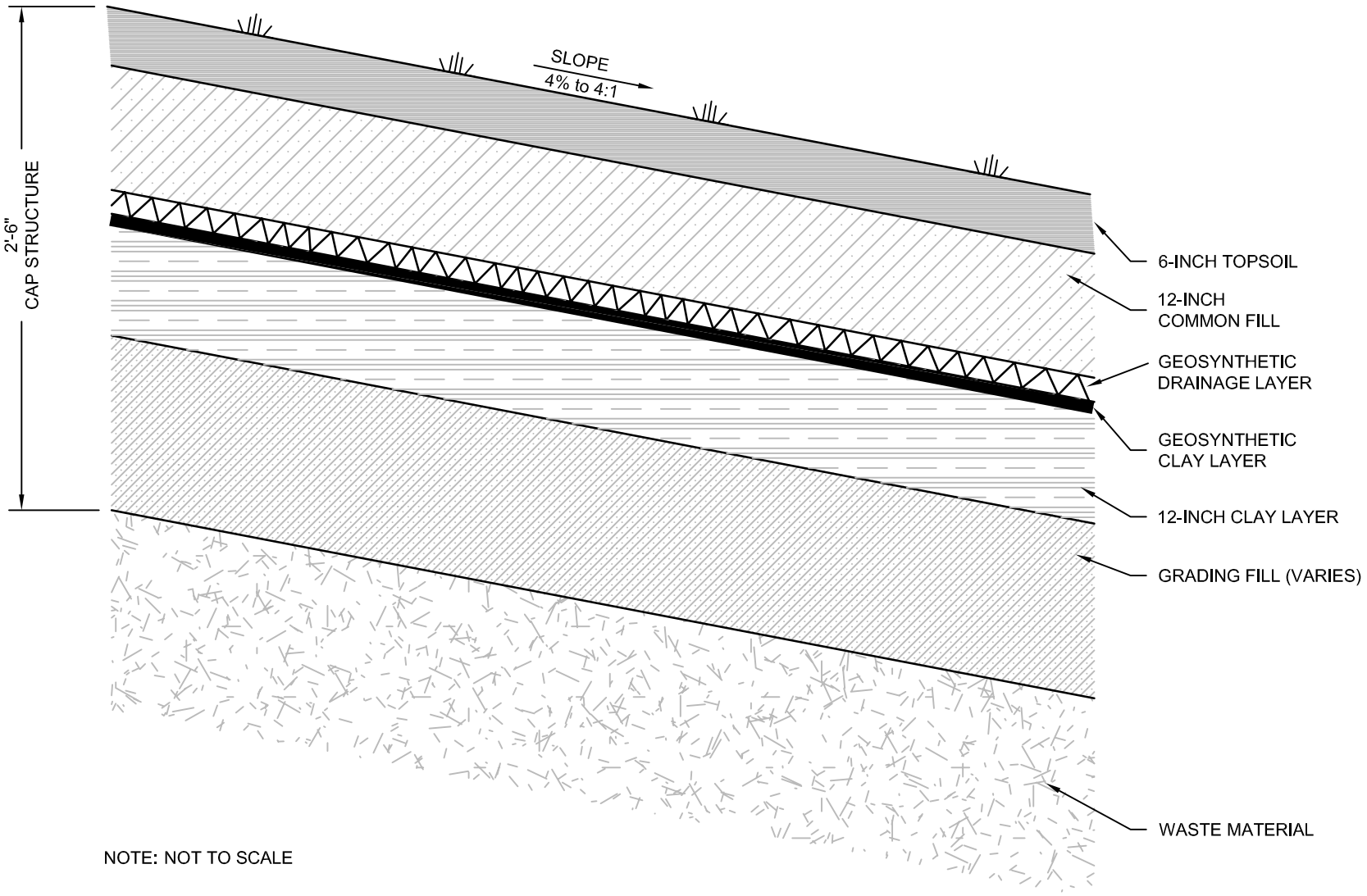
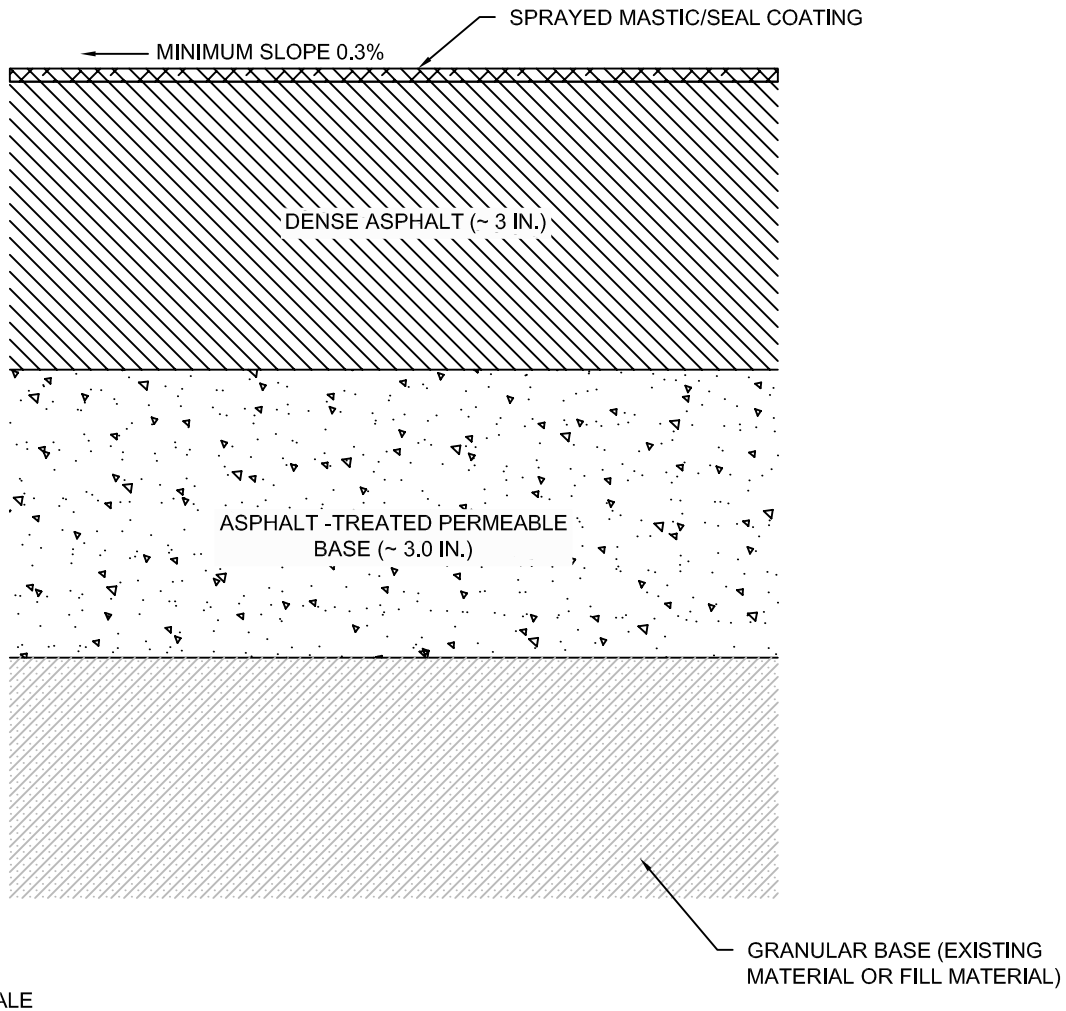



figure 5.8

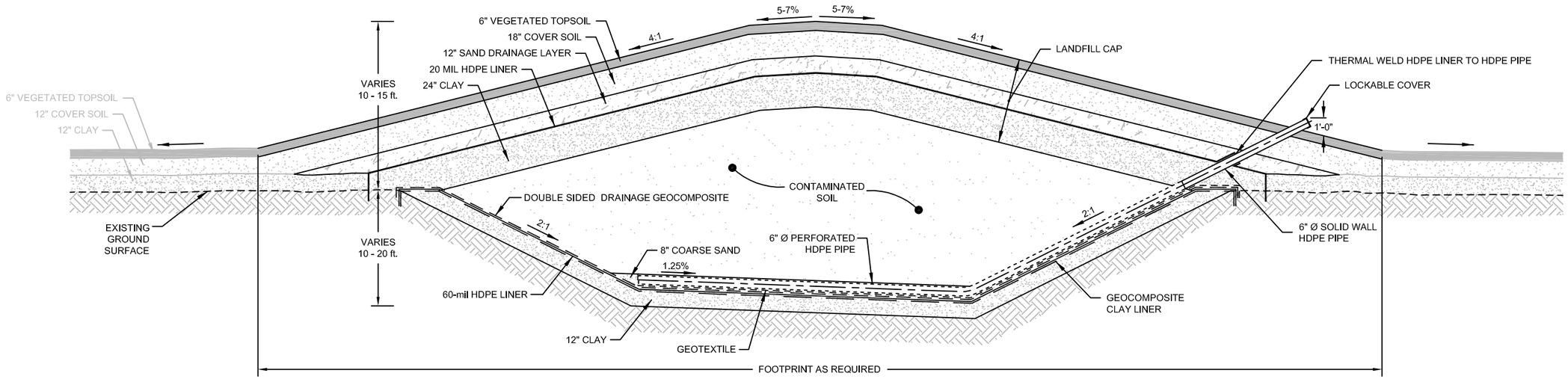
TYPICAL GCL COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*



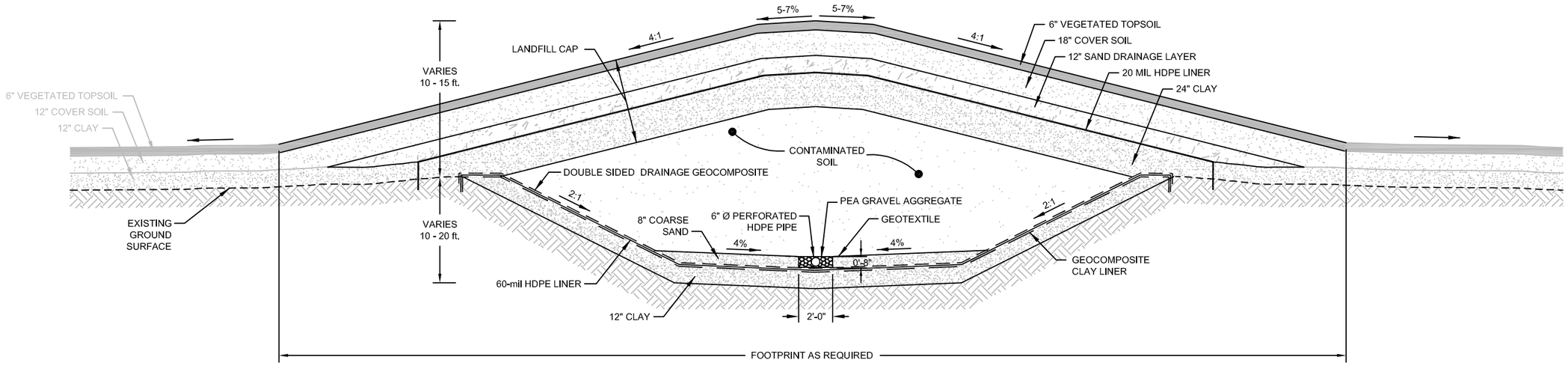

NOTE: NOT TO SCALE

figure 5.9

TYPICAL ASPHALT COVER DESIGN
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*




CONTAINMENT VAULT - SECTION A-A'



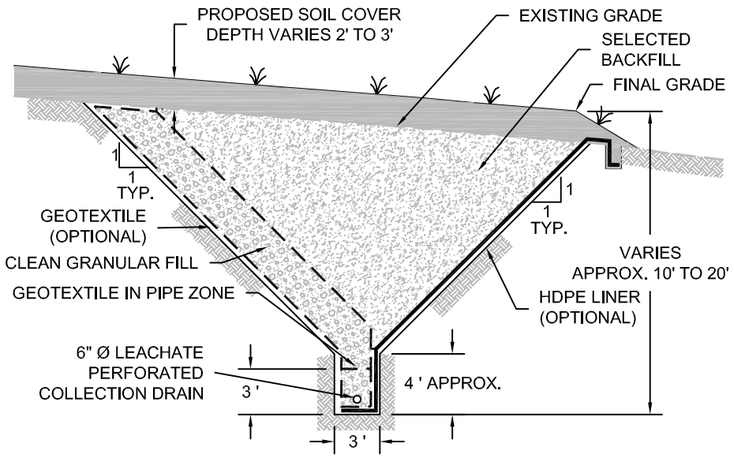

CONTAINMENT VAULT - SECTION B-B'

NOTES: NOT TO SCALE

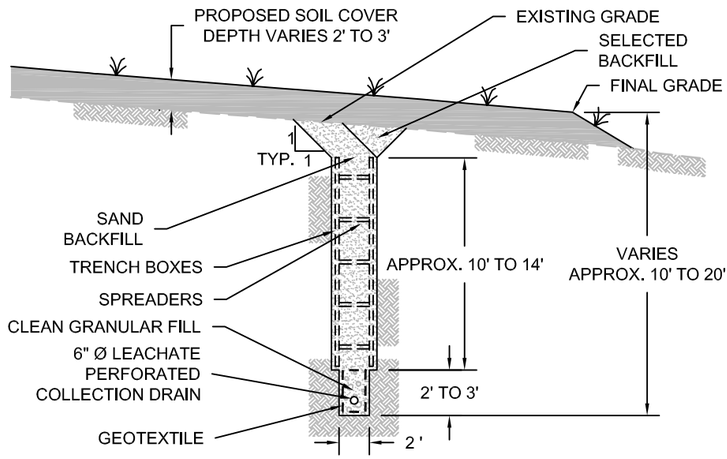
HDPE - HIGH DENSITY POLYETHYLENE

figure 5.10

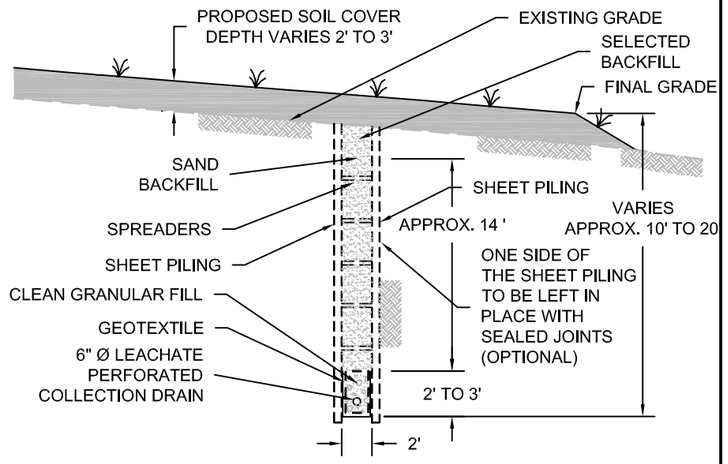
TYPICAL CONTAINMENT VAULT CROSS-SECTIONS
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*



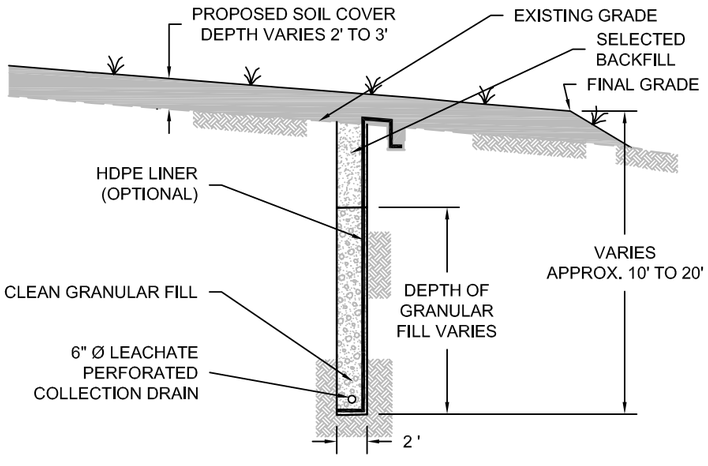

DETAIL 1 EXCAVATION WITHOUT SUPPORT



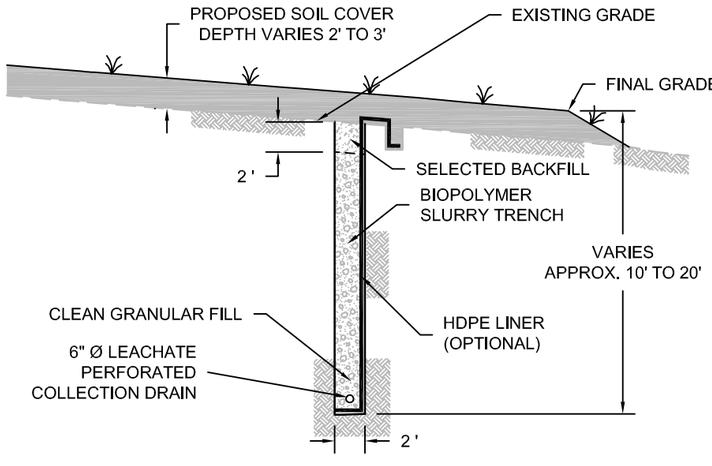

DETAIL 2 EXCAVATION WITH TRENCH BOXES



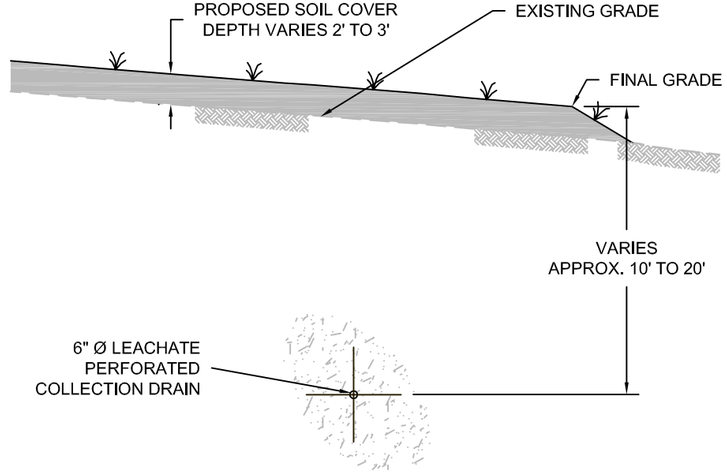

DETAIL 3 EXCAVATION WITHIN SHEET PILING




DETAIL 4 CONTINUOUS TRENCHING SINGLE PASS METHOD




DETAIL 5 BIOPOLYMER SLURRY TRENCHING



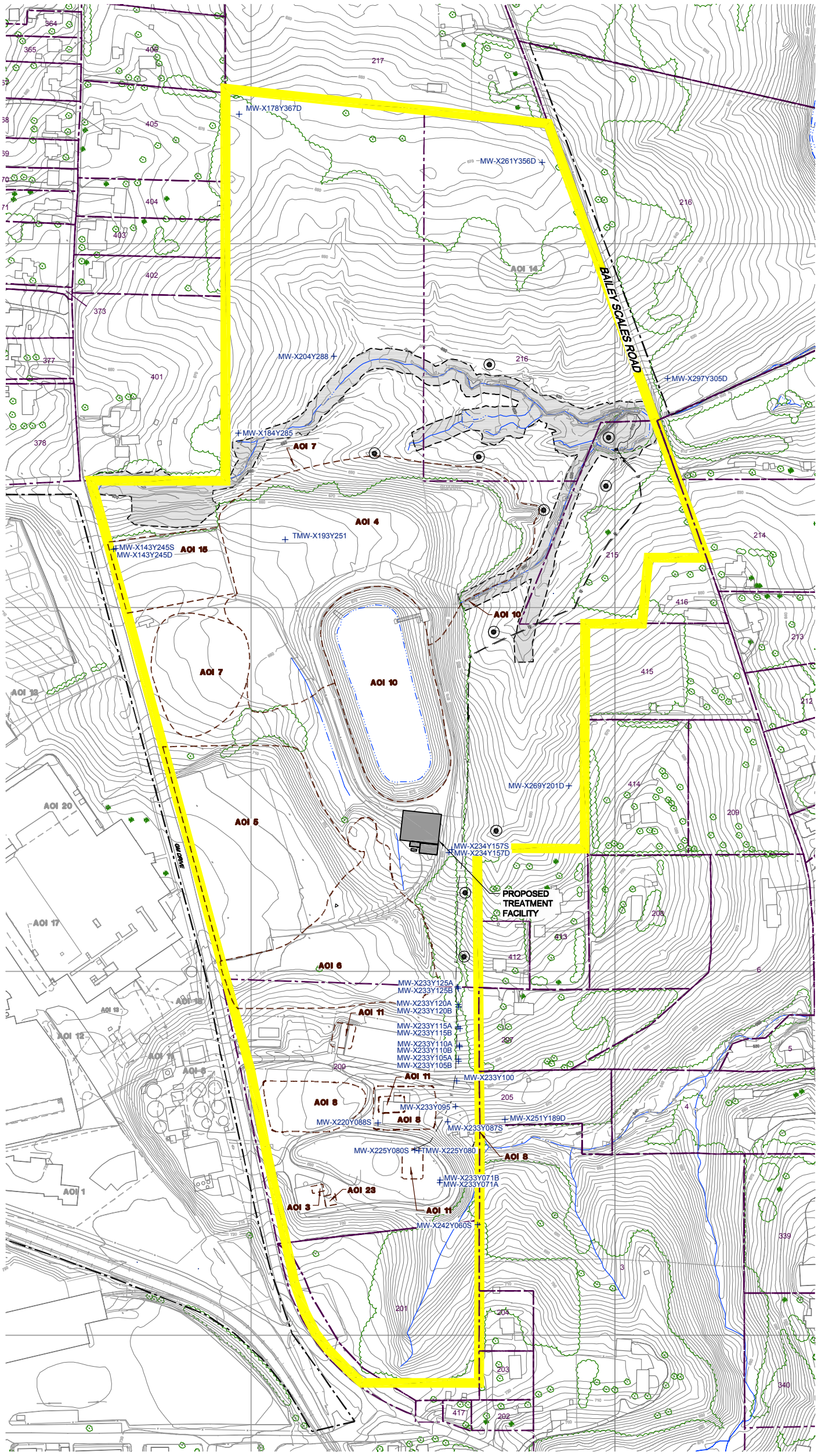

DETAIL 6 HORIZONTAL DRILLING

figure 5.11

SHALLOW GROUNDWATER COLLECTION TRENCHING OPTIONS
IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

NOTES: 1.) NOT TO SCALE

2.) HDPE - HIGH DENSITY POLYETHYLENE




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- MW-X269Y201D EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- E ELECTRICAL POWER LINE
- F EXISTING FORCEMAIN TO TREATMENT FACILITY

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

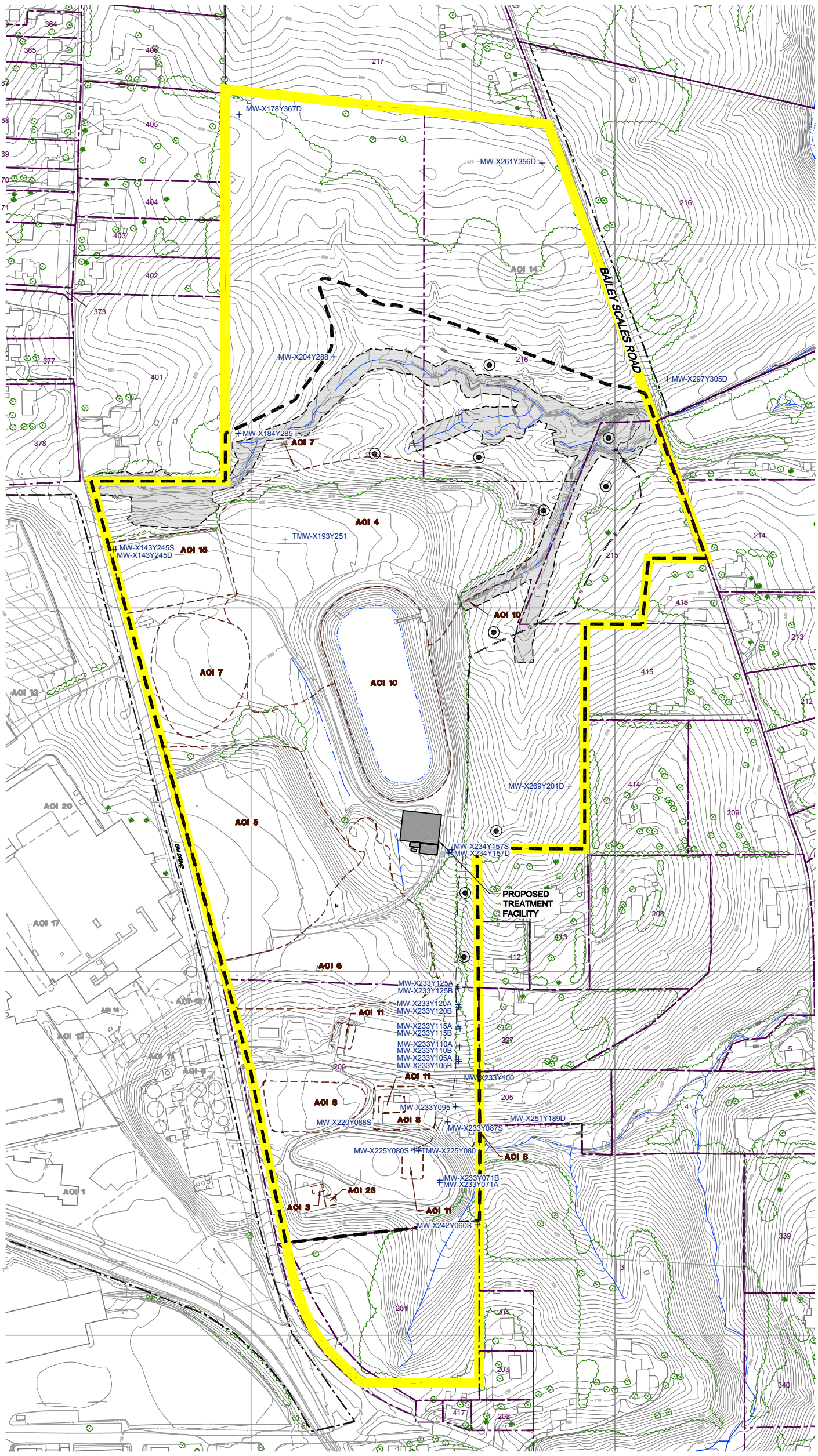
ALTERNATIVE 1: NO ACTION
GROUNDWATER MONITORING SYSTEM (GMS)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 6.1 |

13968-00(151)GN-WA033 APR 08/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- PROPOSED PERIMETER FENCE
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- MW-X269Y201D EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

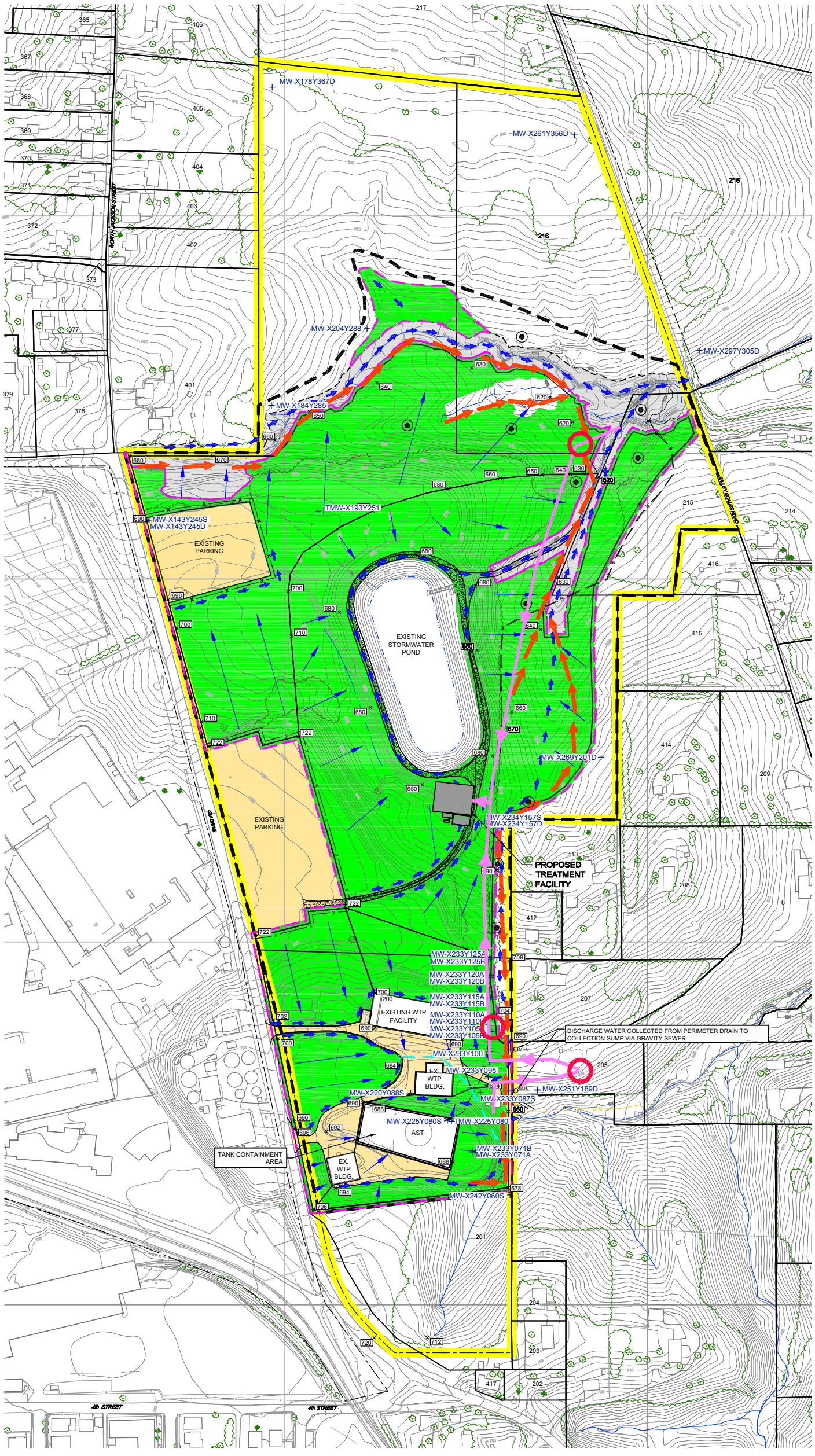
ALTERNATIVE 2:
INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure 6.2 |

13968-00(151)GN-WA034 APR 08/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

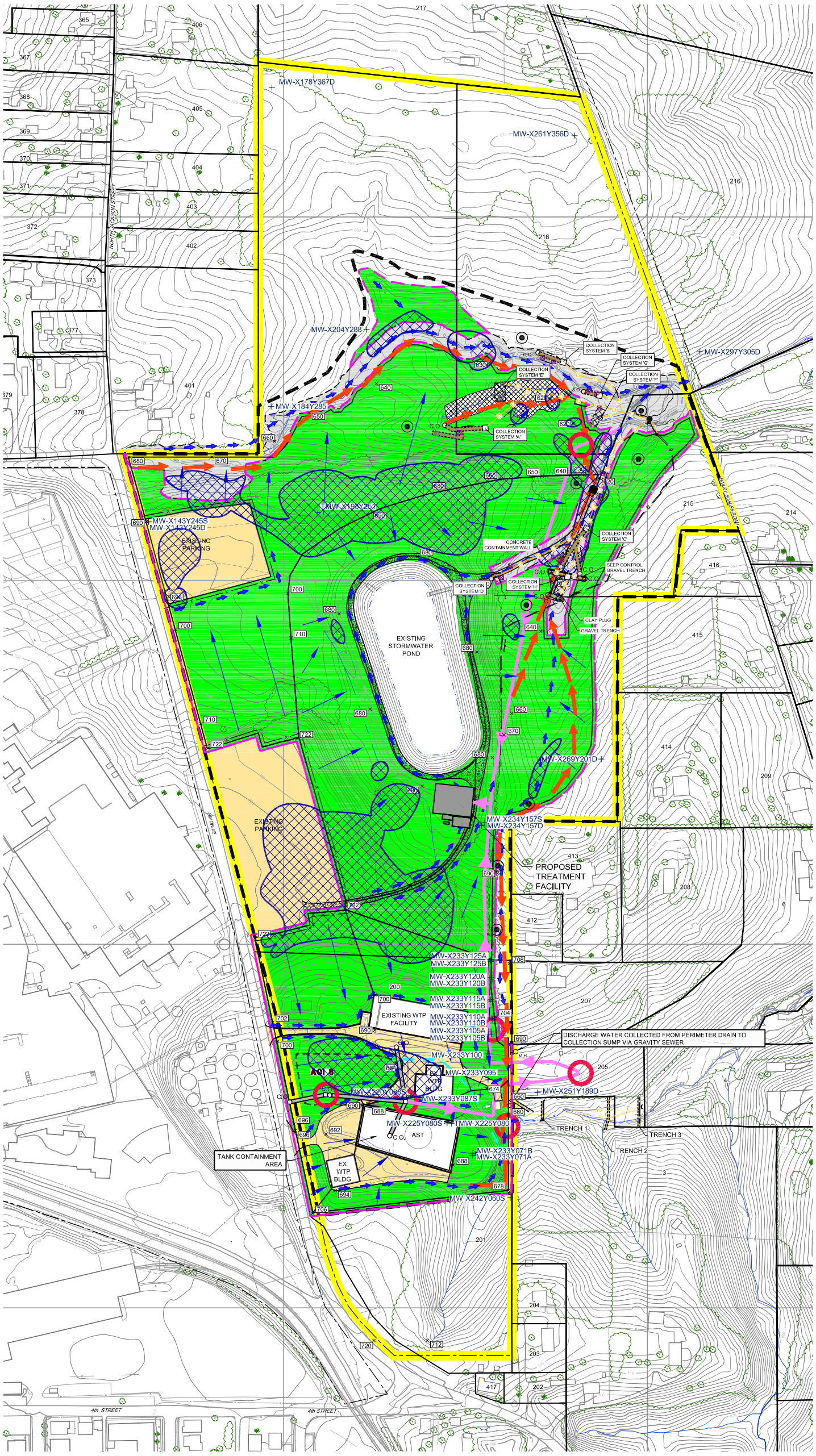
ALTERNATIVE 3: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure 6.3 |

13968-00(151)GN-WA035 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

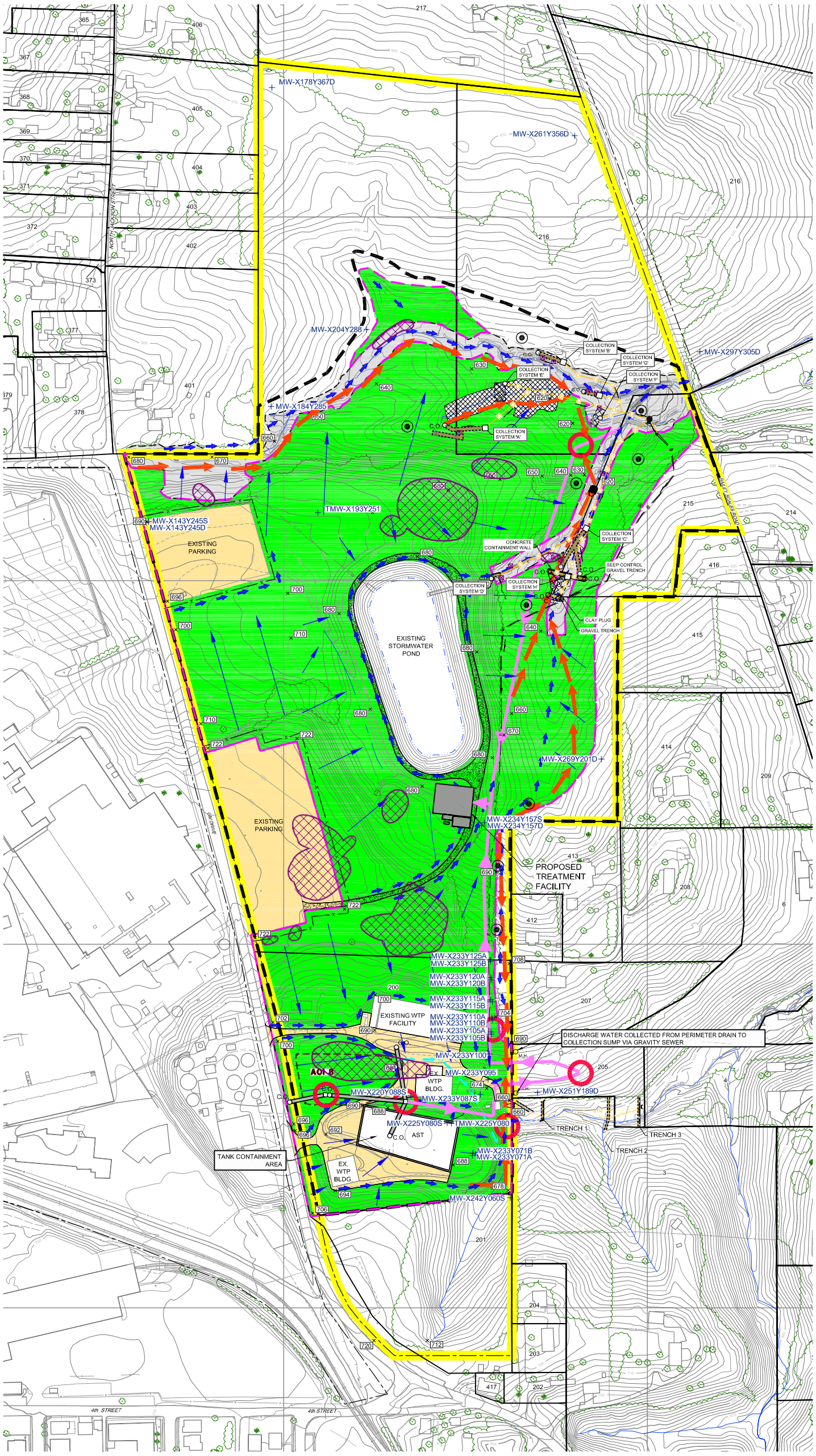
ALTERNATIVE 4A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥50 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4A |

13968-00(151)GN-WA036 APR 12/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

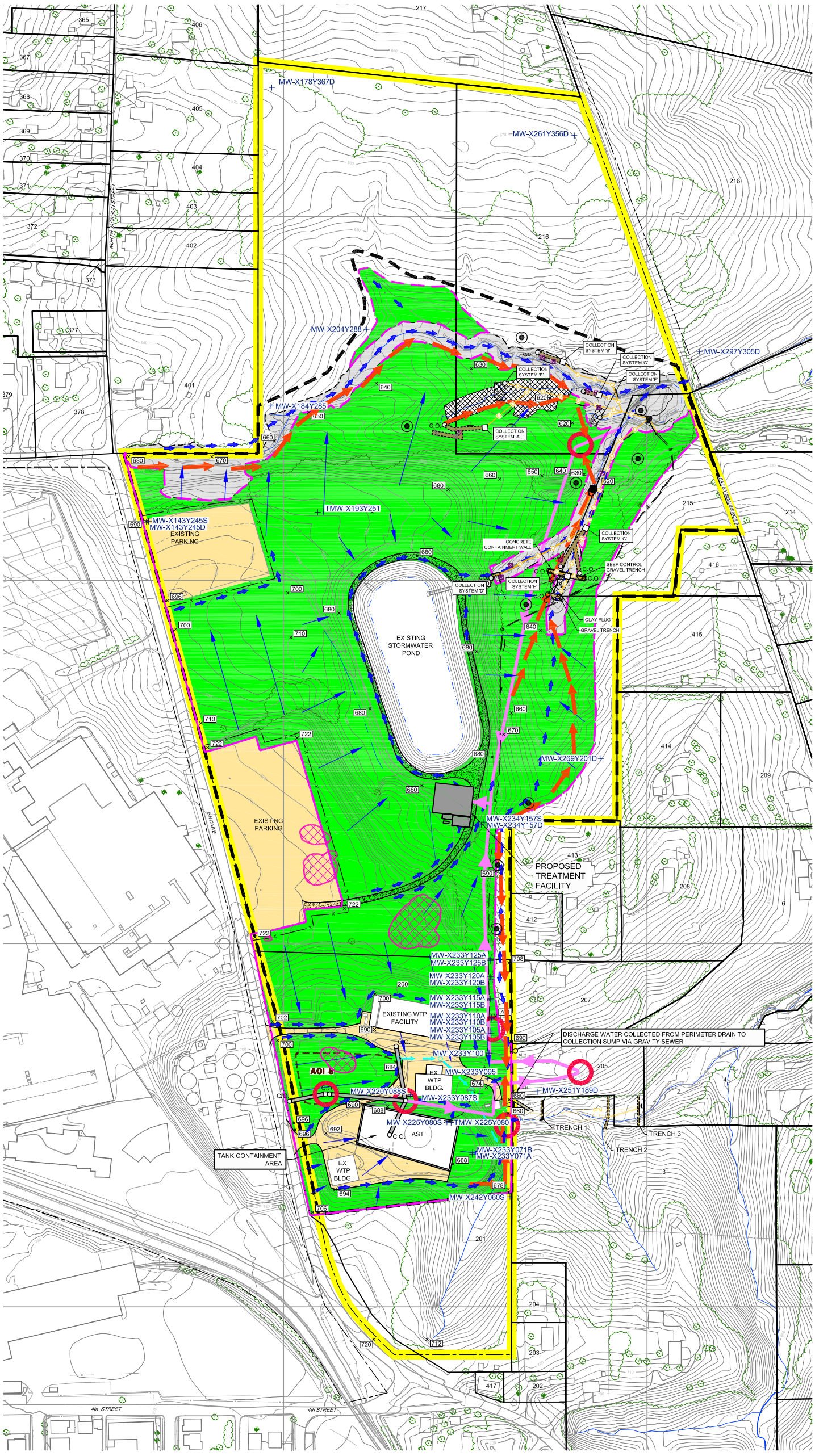
ALTERNATIVE 4B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥500 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4B |

13968-00(151)GN-WA037 APR 12/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

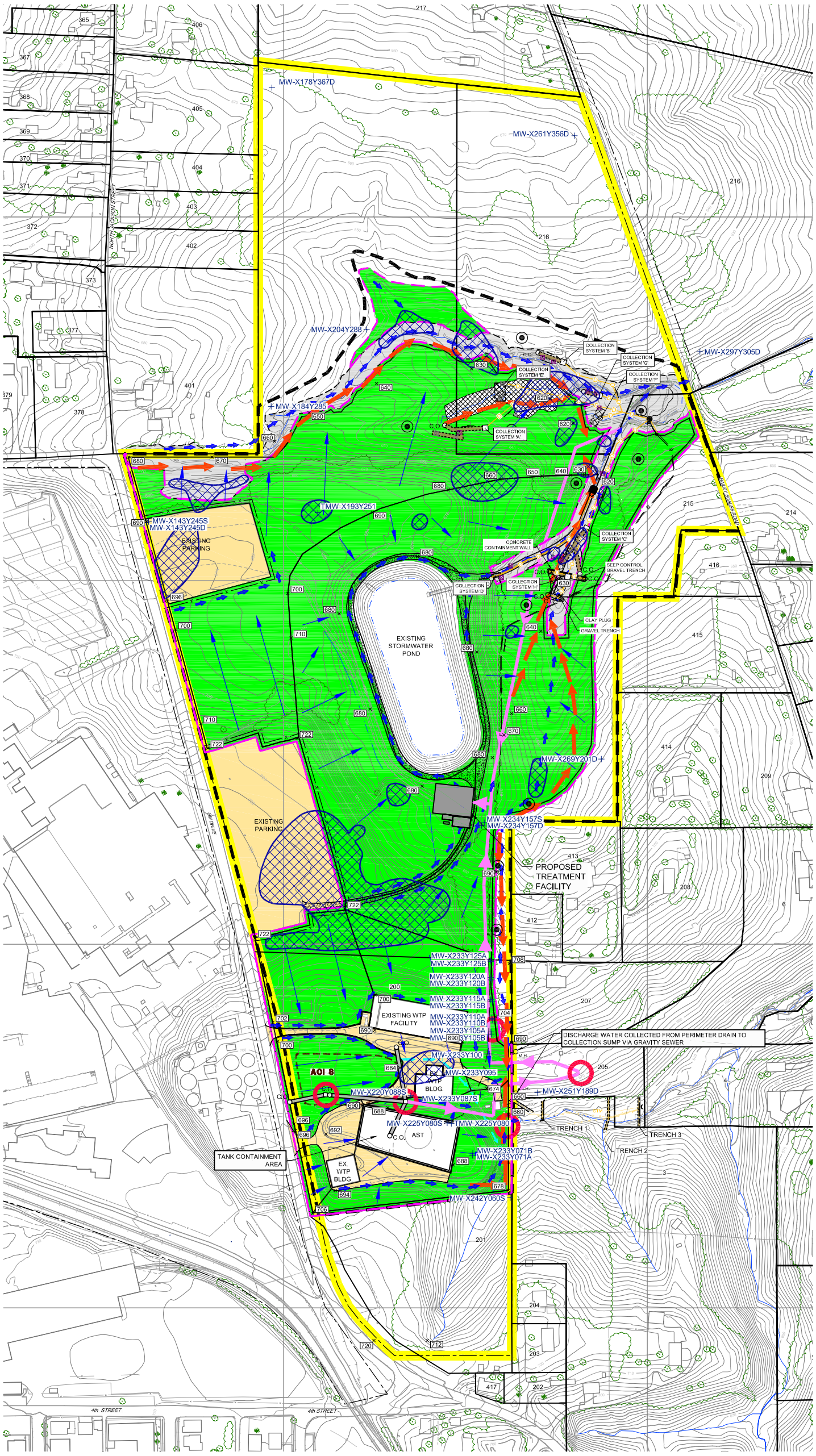
ALTERNATIVE 4C: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥1500 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4C |

13968-00(151)GN-WA038 APR 12/2005




LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- PROPOSED PERIMETER FENCE
- GENERAL SURFACE WATER RUNOFF DIRECTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- SUBCATCHMENT BOUNDARY
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL EXCAVATION (PCBs ≥50 mg/kg AT 0-10 FT BGS)
- MW-X269Y201D — EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. — CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

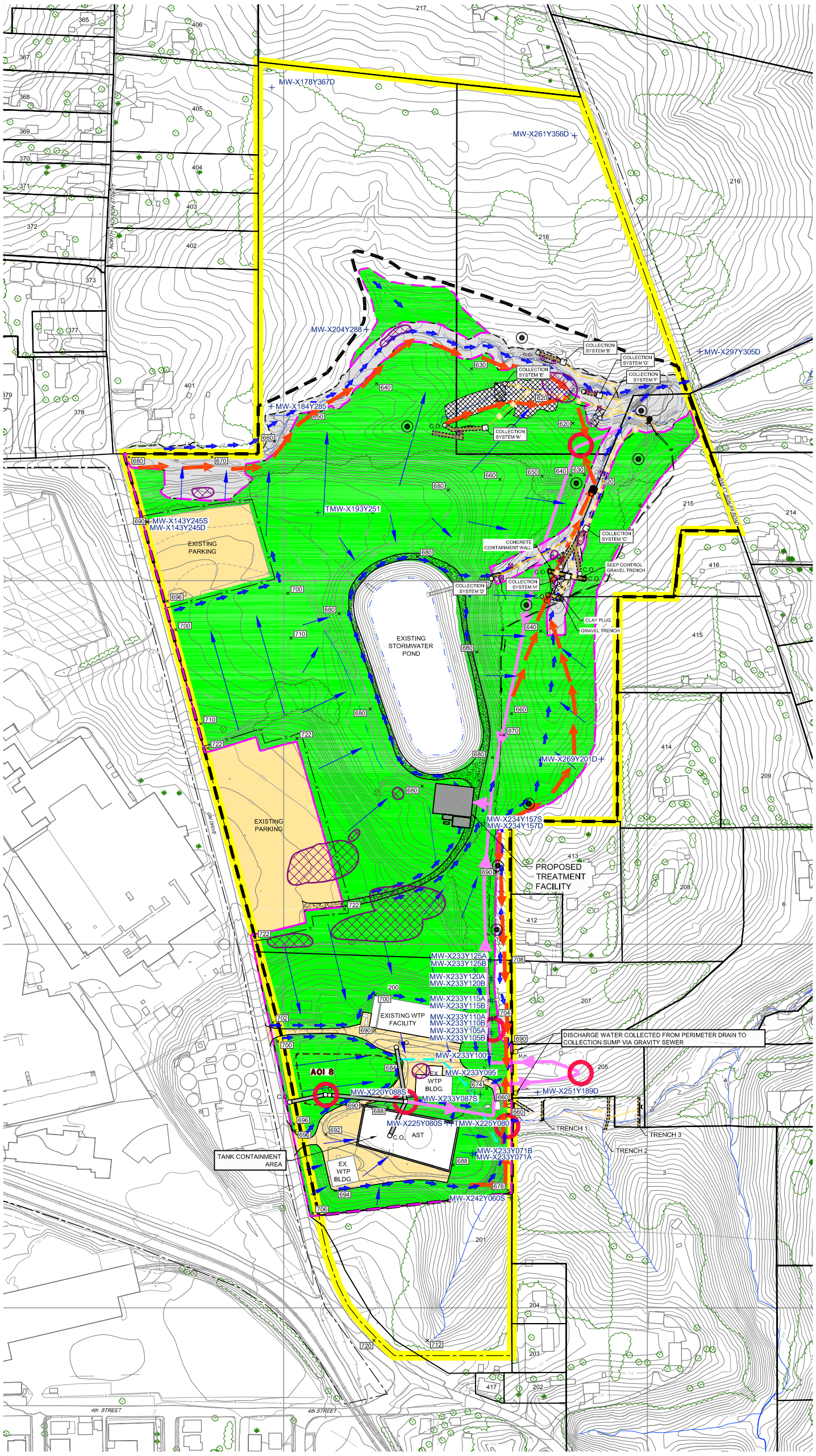
ALTERNATIVE 4D: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥50 mg/kg AT 0-10 FT BGS)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4D |

13968-00(151)GN-WA039 APR 12/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

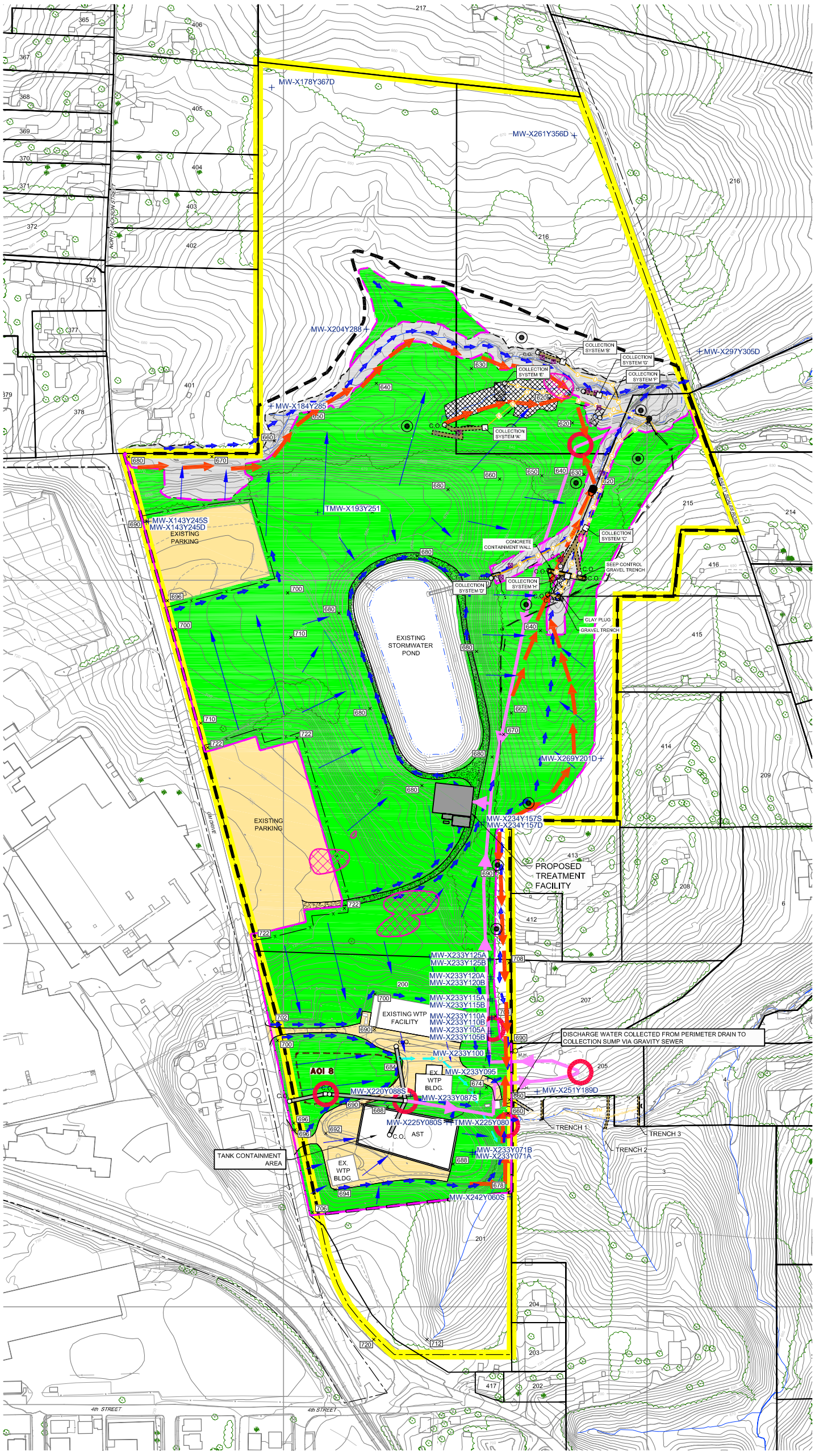
ALTERNATIVE 4E: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥500 mg/kg AT 0-10 FT BGS)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4E |

13968-00(151)GN-WA040 APR 12/2005




LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- PROPOSED PERIMETER FENCE
- GENERAL SURFACE WATER RUNOFF DIRECTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL EXCAVATION (PCBs ≥1500 mg/kg AT 0-10 FT BGS)
- MW-X269Y201D — EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

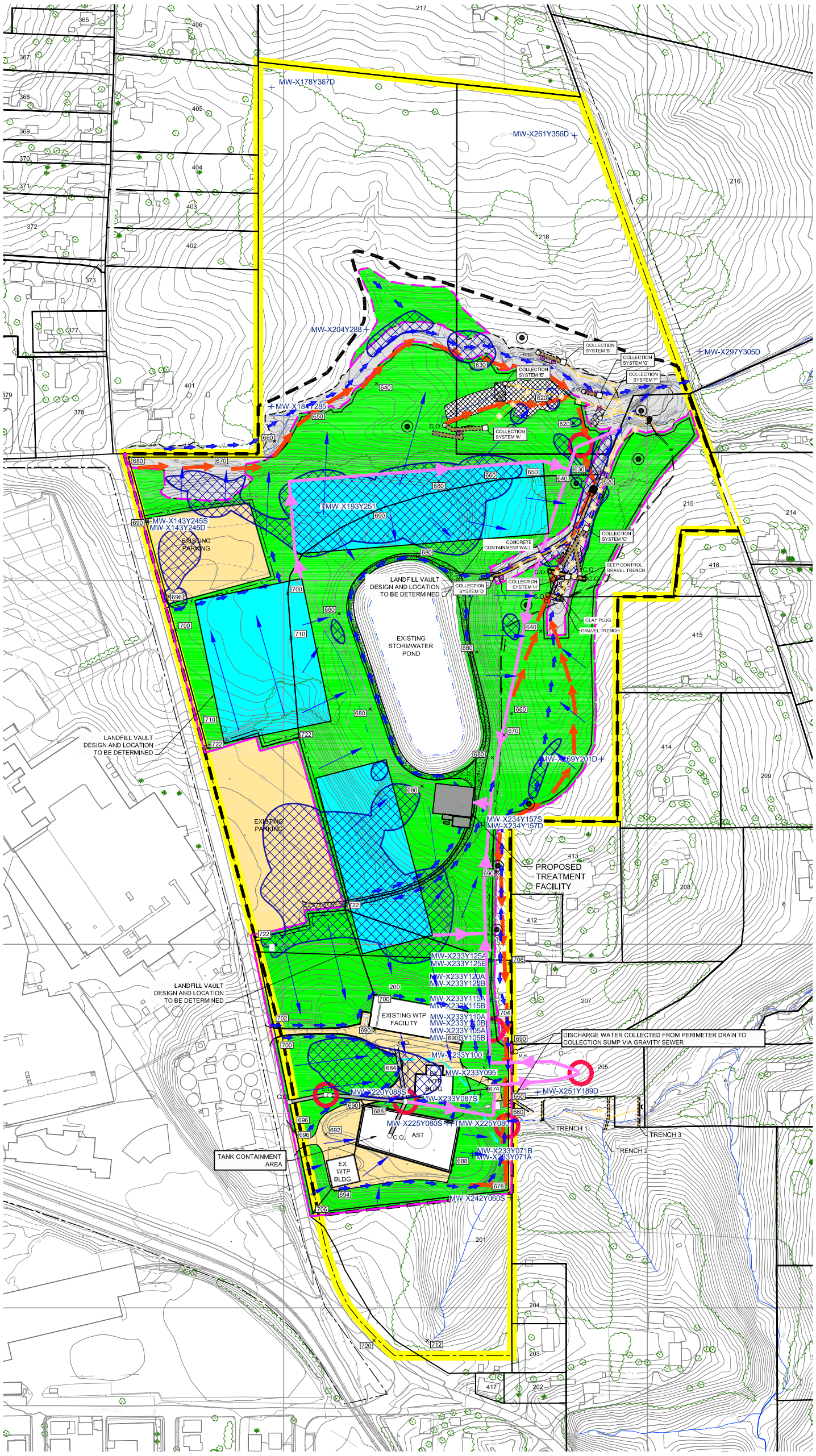
ALTERNATIVE 4F: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥1500 mg/kg AT 0-10 FT BGS)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.4F |

13968-00(151)GN-WA041 APR 12/2005




LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- PROPOSED PERIMETER FENCE
- GENERAL SURFACE WATER RUNOFF DIRECTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- SUBCATCHMENT BOUNDARY
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL EXCAVATION (≥50 PPM OF PCBs)
- LANDFILL VAULT
- MW-X269Y201D — EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. — CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >50 mg/kg = 258,830 cu yd.

(4) VOLUME CAPACITY OF VAULT IS APPROXIMATELY 260,000 cu yd.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

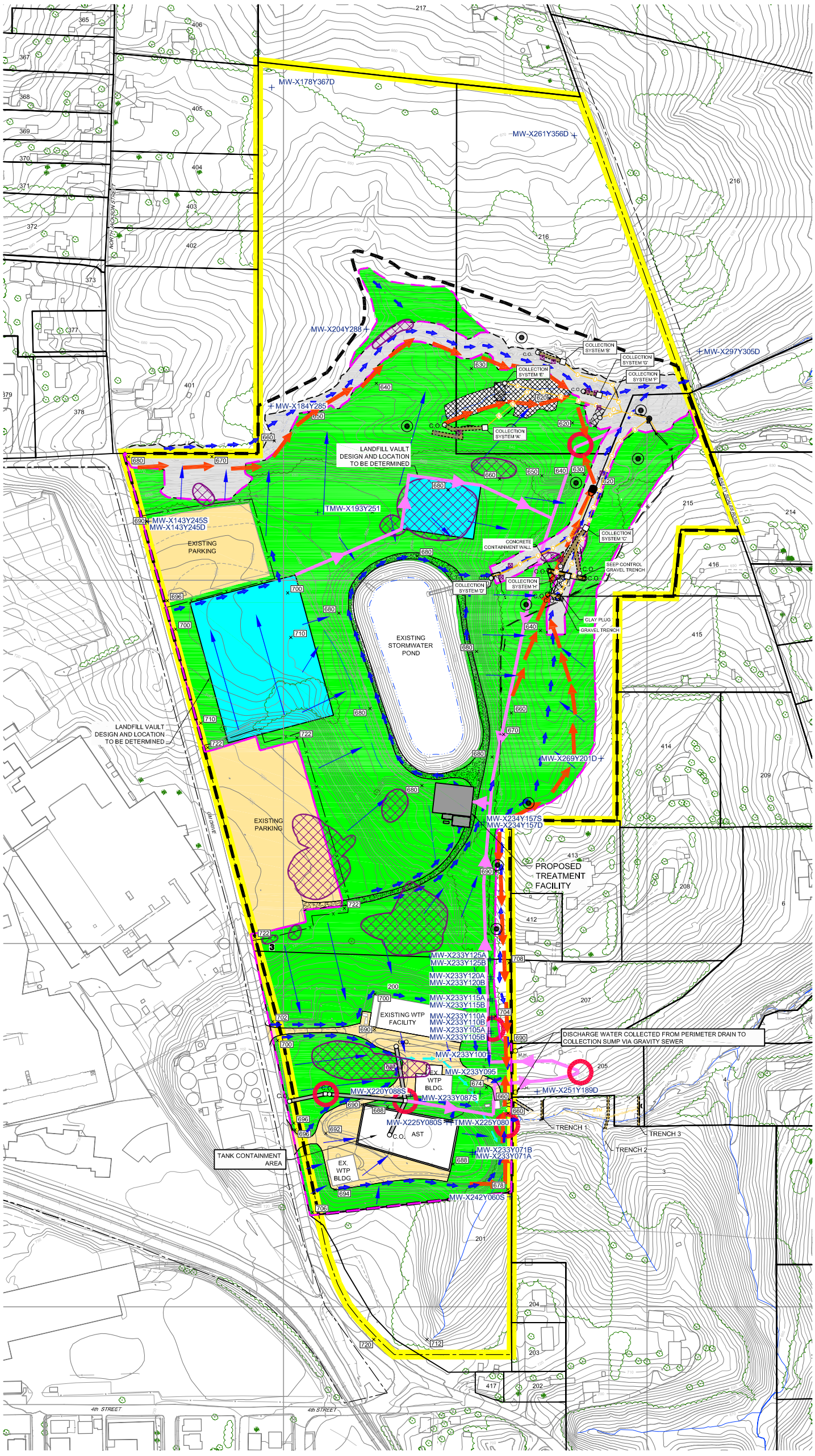
ALTERNATIVE 5A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥50 mg/kg); ON-FACILITY LANDFILL VAULT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.5A |

13968-00(151)GN-WA042 APR 12/2005




LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA
- PROPOSED PERIMETER FENCE
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL EXCAVATION (≥500 PPM OF PCBs)
- LANDFILL VAULT
- MW-X269Y201D — EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. — CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >500 mg/kg = 74,548 cu yd.

(4) VOLUME CAPACITY OF VAULT IS APPROXIMATELY 75,000 cu yd.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

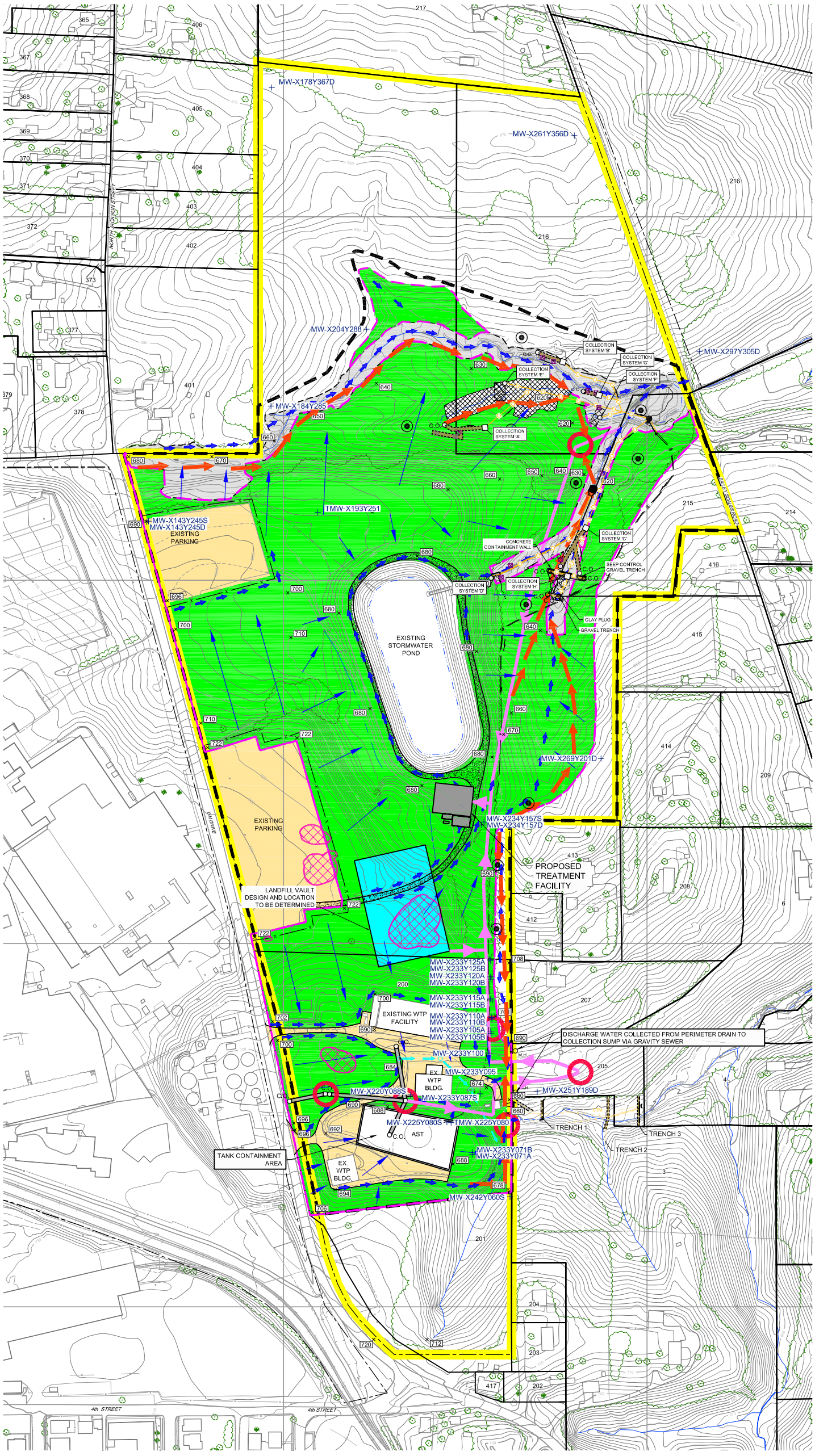
ALTERNATIVE 5B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥500 mg/kg); ON-FACILITY LANDFILL VAULT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.5B |

13968-00(151)GN-WA043 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

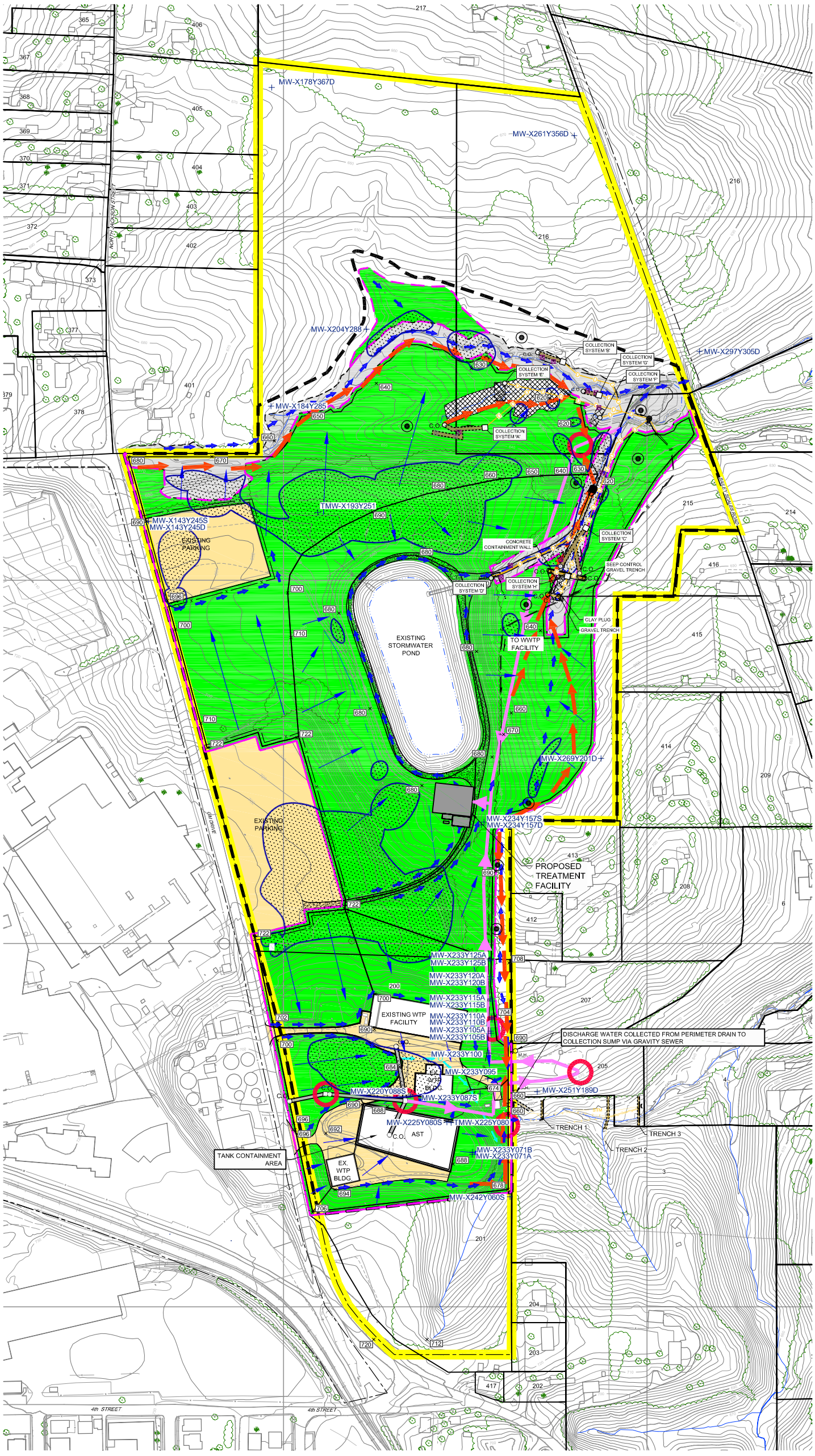
ALTERNATIVE 5C: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥1500 mg/kg); ON-FACILITY LANDFILL VAULT

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.5C |

13968-00(151)GN-WA044 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

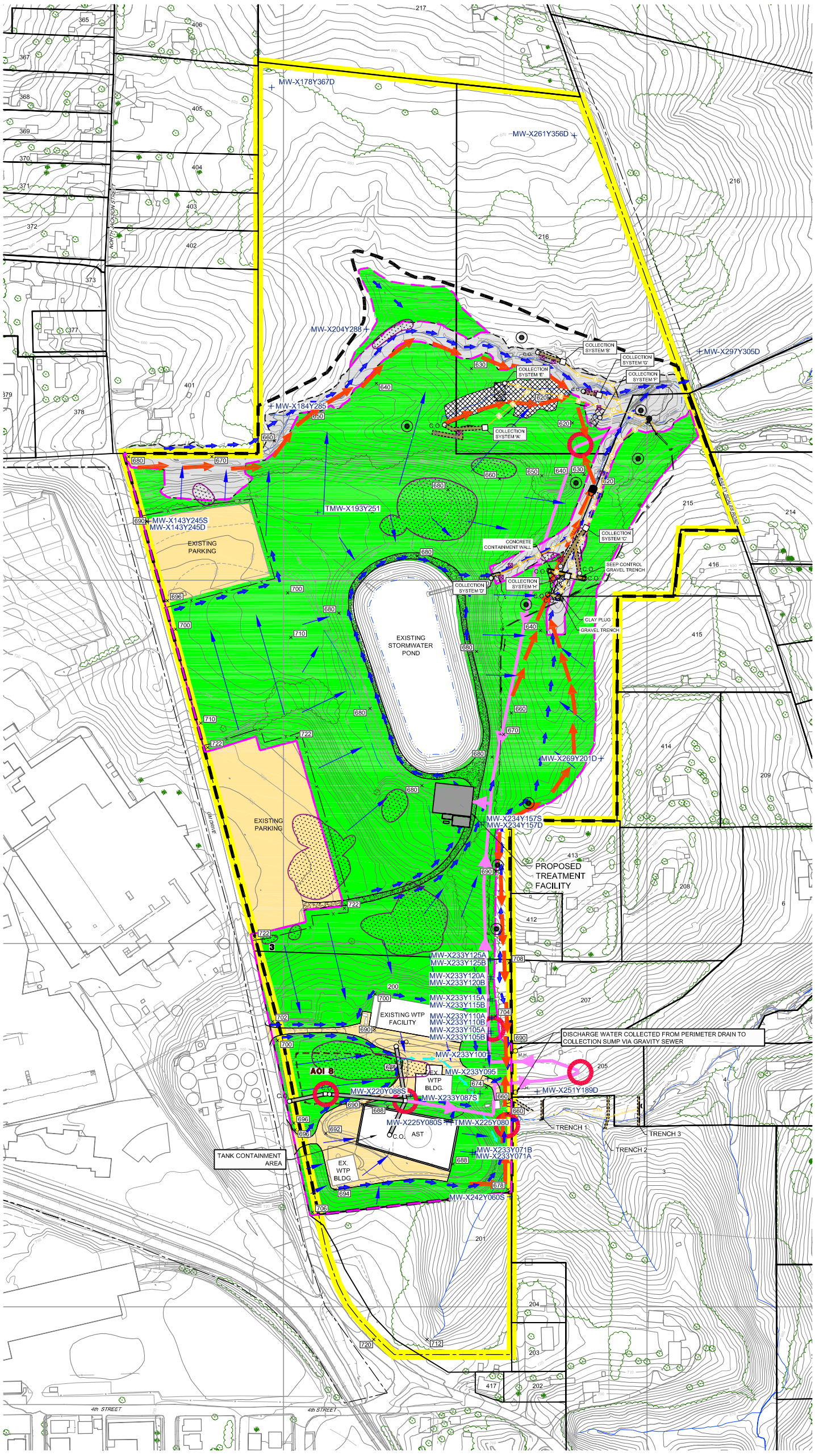
ALTERNATIVE 6A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
IN SITU SOLIDIFICATION OF SOIL (PCBs ≥50 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | r.m. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.6A |

13968-00(151)GN-WA045 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

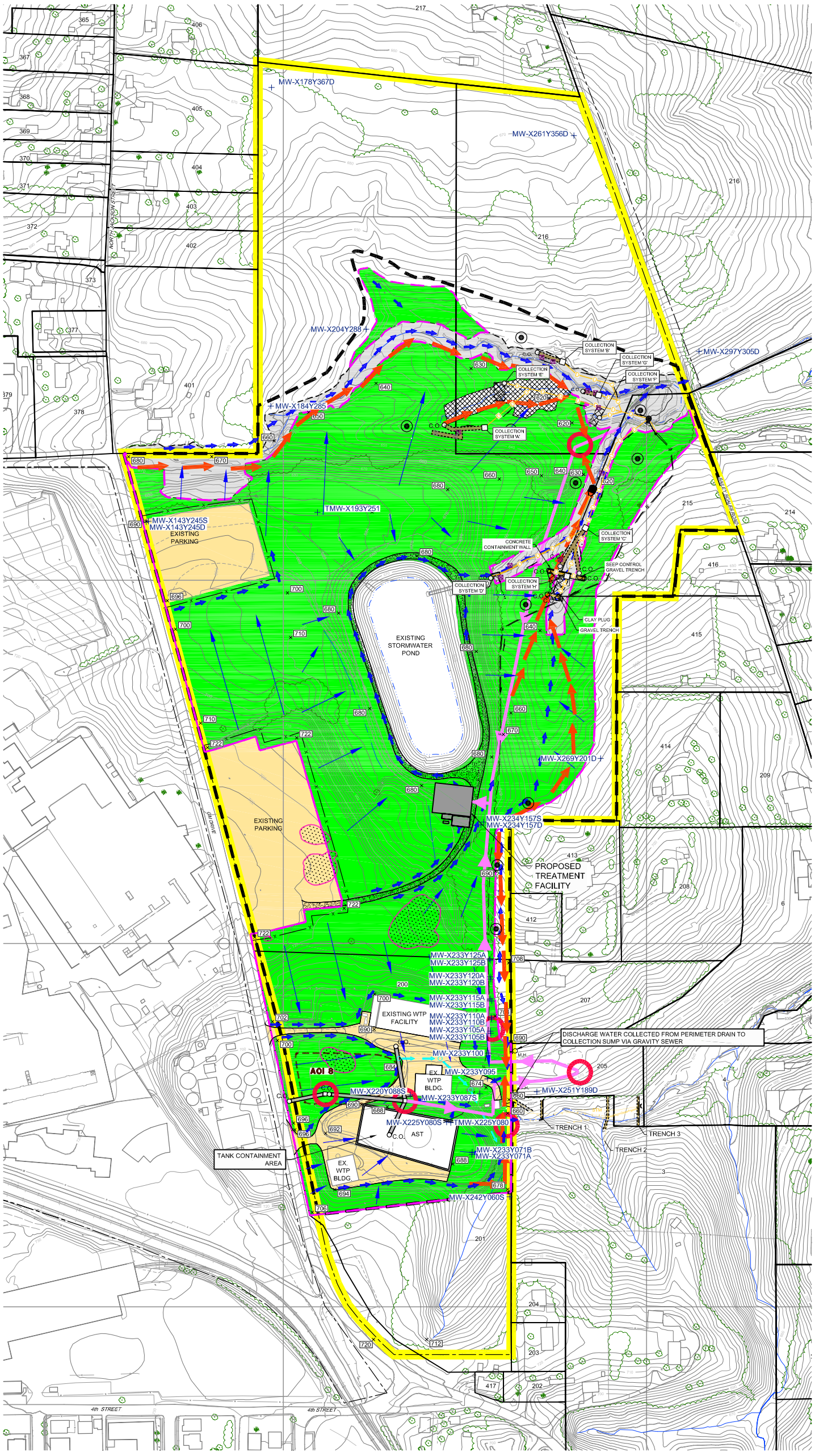
ALTERNATIVE 6B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
IN SITU SOLIDIFICATION OF SOIL (PCBs ≥500 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.6B |

13968-00(151)GN-WA046 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

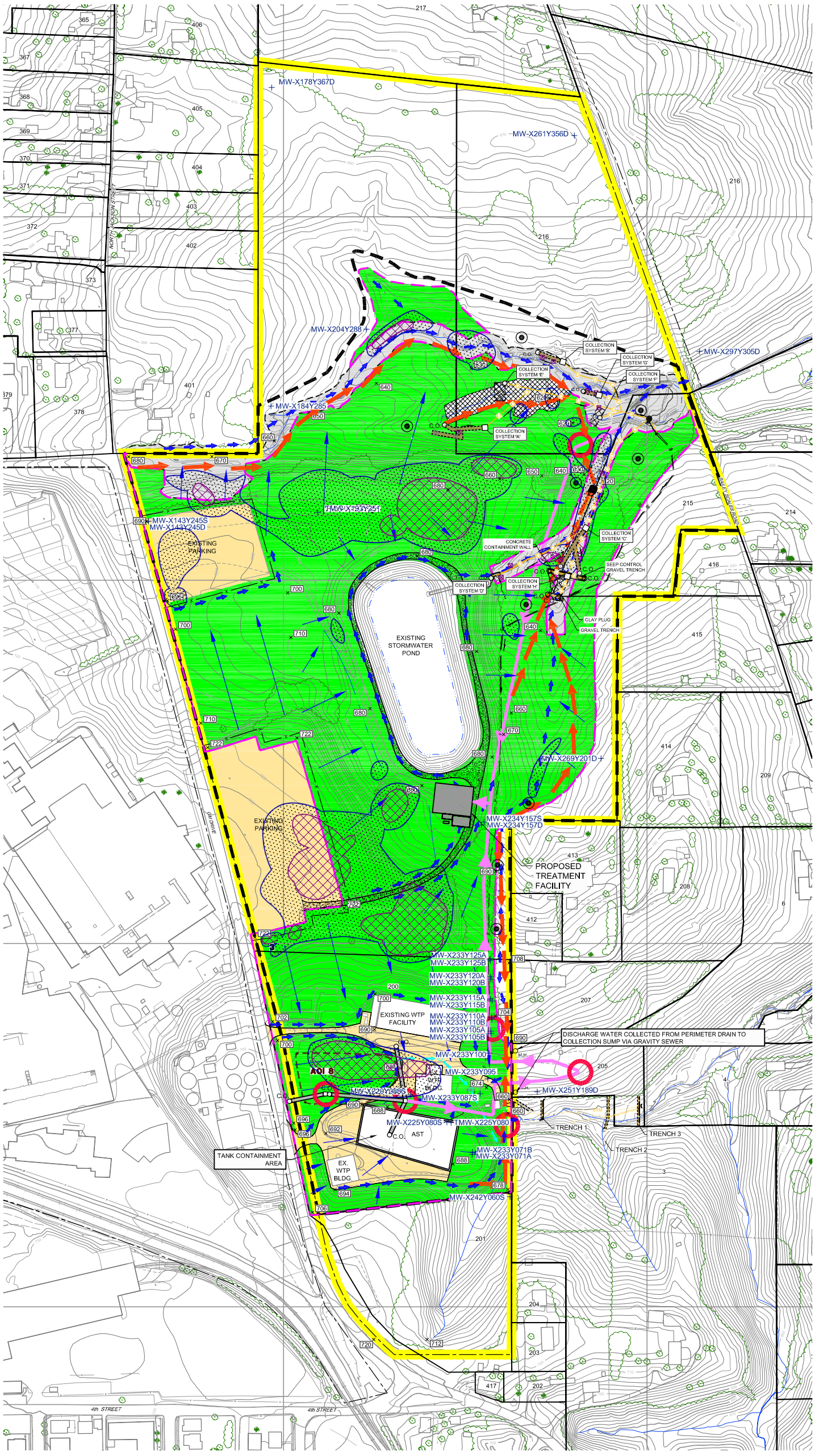
ALTERNATIVE 6C: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
IN SITU SOLIDIFICATION OF SOIL (PCBs ≥1500 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.6C |

13968-00(151)GN-WA047 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

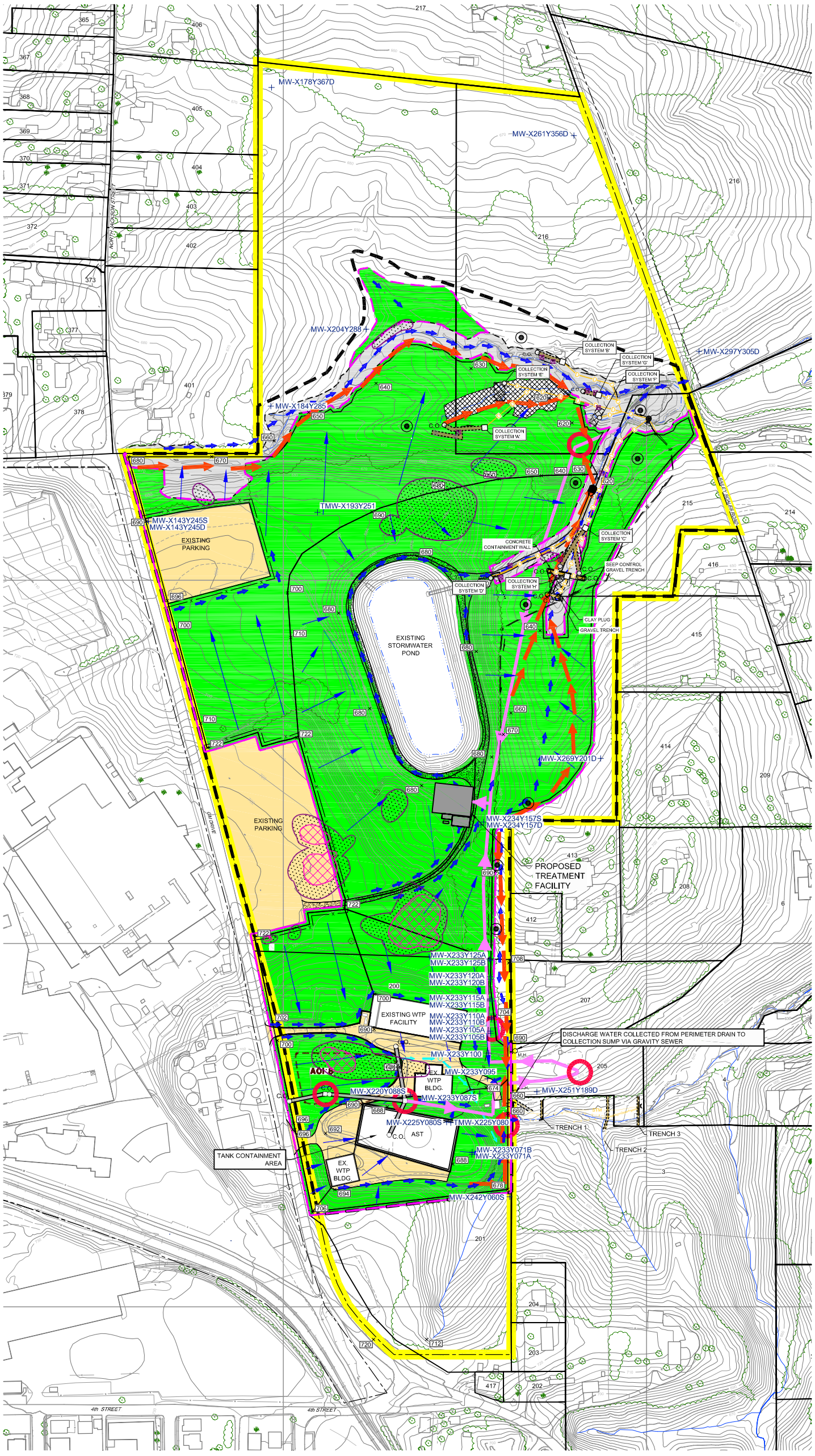
ALTERNATIVE 7A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)
IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.7A |

13968-00(151)GN-WA048 APR 12/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >1500 mg/kg = 19,545 cu yd.

(4) IN SITU SOLIDIFICATION WILL TAKE PLACE UNDER EXCAVATED AREAS IF PCBs EXCEED 500 mg/kg.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

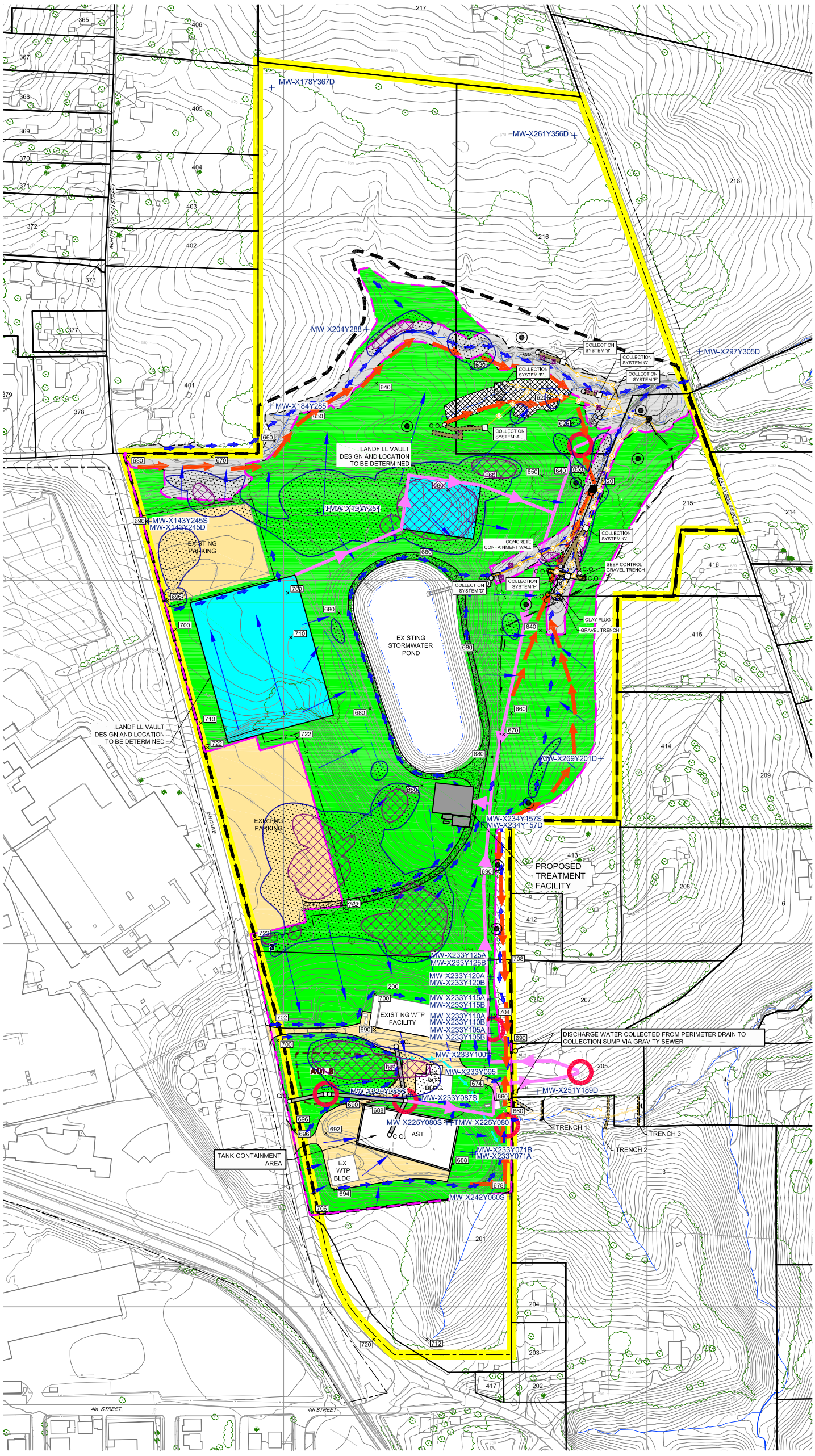
ALTERNATIVE 7B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥ 1500 mg/kg)
IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1500 mg/kg)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.7B |

13968-00(151)GN-WA049 APR 12/2005




NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >500 mg/kg = 74,548 cu yd.

(4) VOLUME OF VAULT IS APPROXIMATELY 75,000 cu yd.

(5) IN SITU SOLIDIFICATION WILL TAKE PLACE UNDER EXCAVATED AREAS IF PCBs EXCEED 50 mg/kg.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

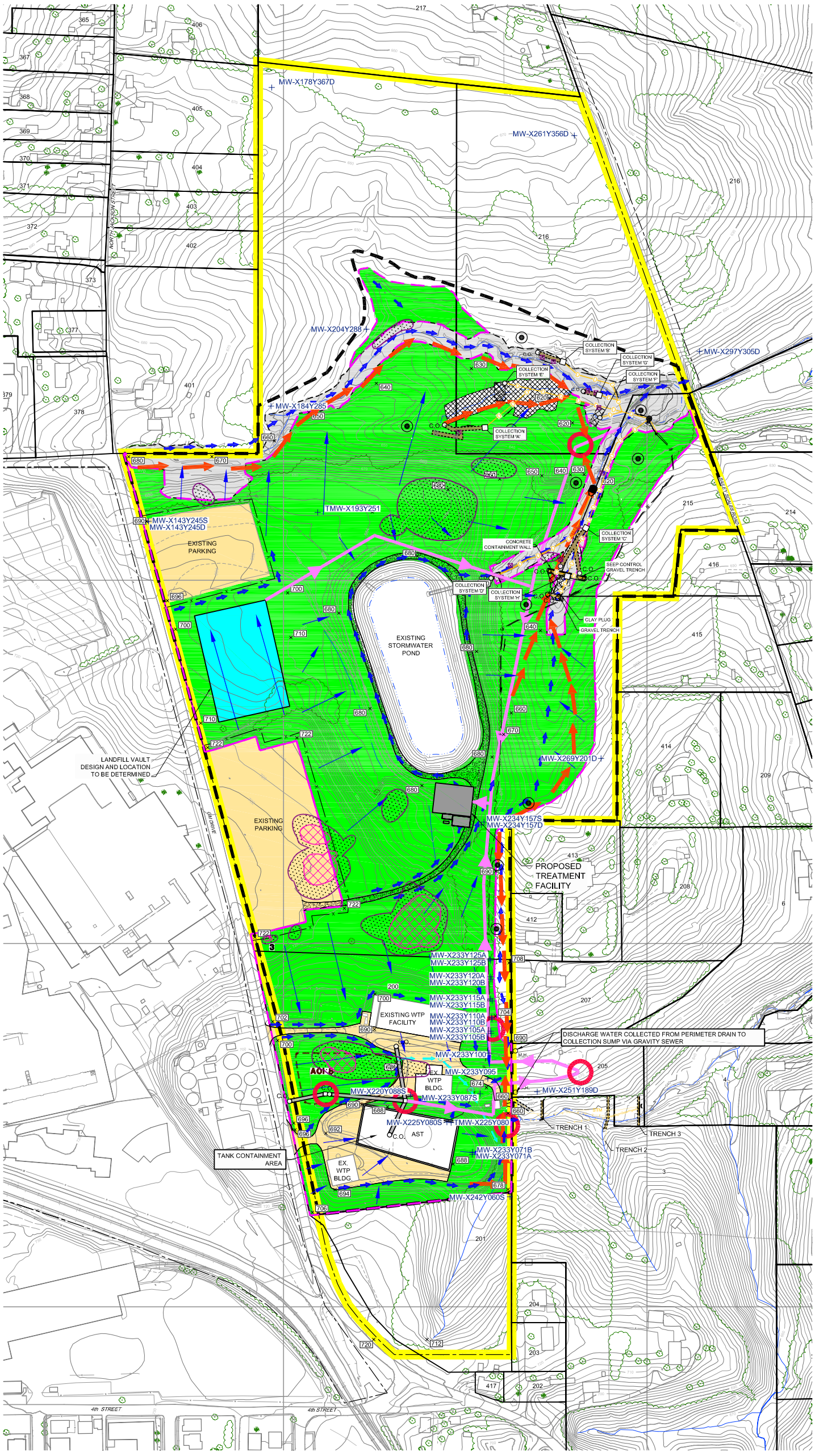
ALTERNATIVE 8A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg); ON-FACILITY LANDFILL VAULT
IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.8A |

13968-00(151)GN-WA050 APR 12/2005




0 60 150ft

LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA
- PROPOSED PERIMETER FENCE
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA CMS
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL SOLIDIFICATION AREA (≥ 1500 mg/kg OF PCBs)
- IN SITU SOIL SOLIDIFICATION AREA (500 mg/kg ≤ PCBs < 1500 mg/kg)
- LANDFILL VAULT
- EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >1500 mg/kg = 19,545 cu yd.

(4) VOLUME OF VAULT IS APPROXIMATELY 20,000 cu yd.

(5) IN SITU SOLIDIFICATION WILL TAKE PLACE UNDER EXCAVATED AREAS IF PCBs EXCEED 500 mg/kg.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

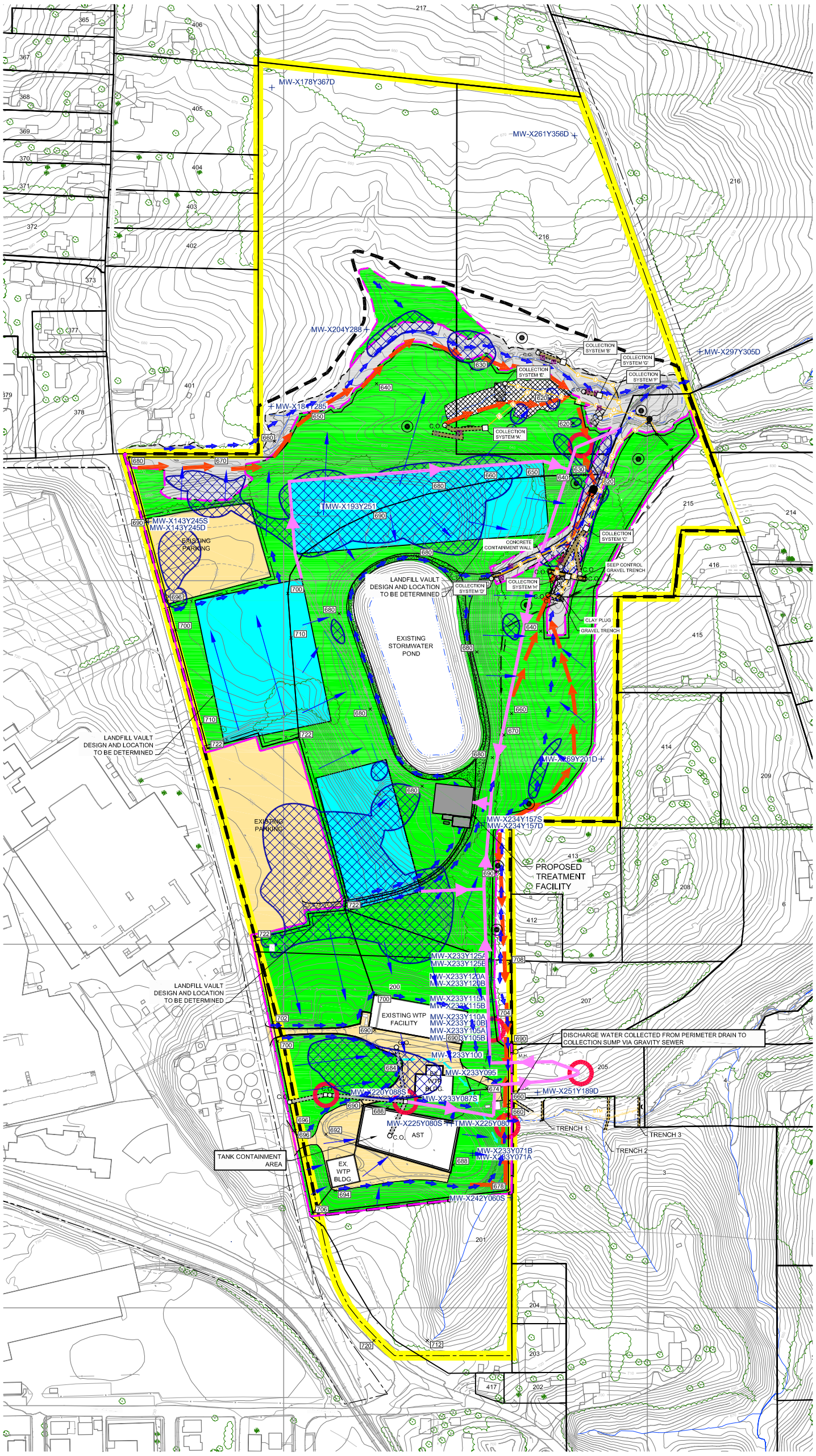
ALTERNATIVE 8B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (PCBs ≥ 1500 mg/kg); ON-FACILITY LANDFILL VAULT
IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1500 mg/kg)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.8B |

13968-00(151)GN-WA004 APR 12/2005




LEGEND

- EXISTING BUILDINGS
- EXISTING CONTOURS
- EXISTING ROADS / PAVED AREAS
- EXISTING VEGETATION
- EXISTING FENCE
- SURFACE WATER LOCATION
- GM PROPERTY BOUNDARY
- PROPOSED COVER LIMIT
- EAST PLANT AREA / AREA OF DEED RESTRICTION
- PROPOSED PERIMETER FENCE
- GENERAL SURFACE WATER RUNOFF DIRECTION
- SURFACE WATER DRAINAGE PATH / PROPOSED SWALE
- STORM SEWER
- SPOT ELEVATION (ft AMSL)
- MANHOLE
- SUBCATCHMENT BOUNDARY
- PROPOSED FENCE
- EXISTING GRAVEL ACCESS ROAD
- MAXIMUM EXPECTED EXTENT OF POTENTIAL SOIL COVER AREA
- MAXIMUM EXPECTED EXTENT OF POTENTIAL ASPHALT COVER AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- PRESCRIPTIVE SOIL EXCAVATION (≥ 50 PPM OF PCBs)
- LANDFILL VAULT
- EXISTING MONITORING WELL
- PROPOSED GMS MONITORING WELL
- COLLECTION SUMP
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- SSC OVERBURDEN EXTRACTION TRENCH
- SSC BEDROCK EXTRACTION TRENCH
- SPRING CONTAINING DNAPL SUMP STRUCTURE
- APPROXIMATE LOCATION OF GRAVE BLANKET
- C.O. CLEANOUT
- WET WELL
- DIRECTION OF FLOW
- PROPOSED PERIMETER COLLECTION TRENCH (2)
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY

NOTES:

(1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES.

(2) ACTUAL PLACEMENT AND DESIGN OF PROPOSED COLLECTION TRENCH TO BE DETERMINED DURING FIELD INVESTIGATION AND PRELIMINARY DESIGN PHASE.

(3) ESTIMATED VOLUME FOR REMOVAL OF PCB-IMPACTED SOIL >50 mg/kg = 130,000 cu yd.

(4) VOLUME CAPACITY OF VAULT IS APPROXIMATELY 240,000 cu yd.

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

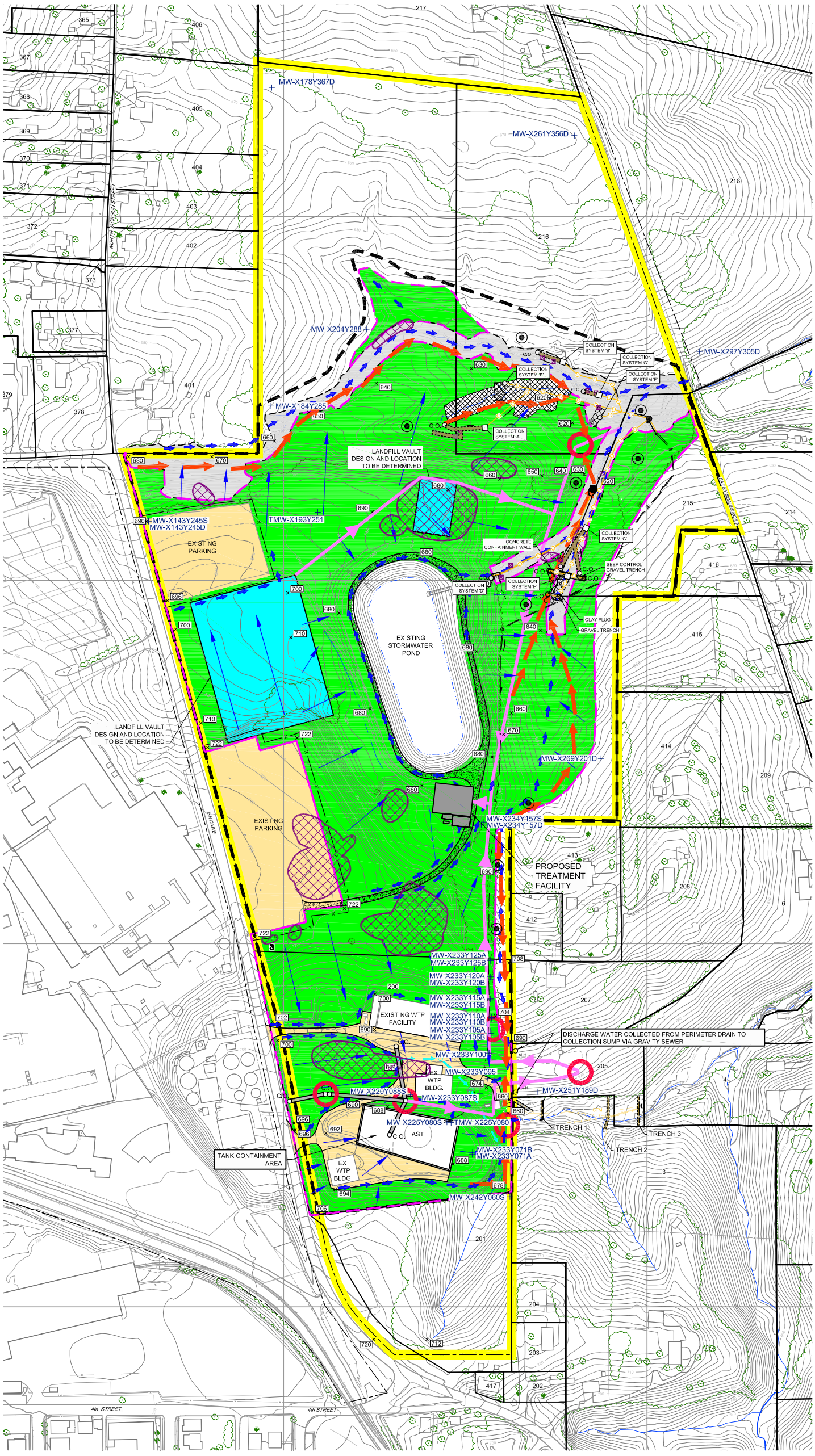
ALTERNATIVE 9A: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (50 mg/kg ≤ PCBs < 1500 mg/kg) TO ON-FACILITY LANDFILL VAULT
AND (PCBs ≥ 1500 mg/kg) TO OFF-FACILITY DISPOSAL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.9A |

13968-00(151)GN-WA055 APR 12/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

ALTERNATIVE 9B: INSTITUTIONAL CONTROLS SYSTEM
GROUNDWATER MONITORING SYSTEM (GMS)
COVER SYSTEM
PERIMETER COLLECTION SYSTEM
GROUNDWATER SOURCE REMOVAL SYSTEM
SOIL SOURCE REMOVAL (500 mg/kg ≤ PCBs < 1500 mg/kg) TO ON-FACILITY LANDFILL VAULT
AND (PCBs ≥ 1500 mg/kg) TO OFF-FACILITY DISPOSAL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | R.M. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 6.9B |

13968-00(151)GN-WA056 APR 12/2005

**Figure 7.1 Cancer Risk Estimates for Interim Measure Alternatives**
**Routine Worker & 10-ft Construction Scenarios**
**GM Powertrain Bedford Facility, Bedford, Indiana**

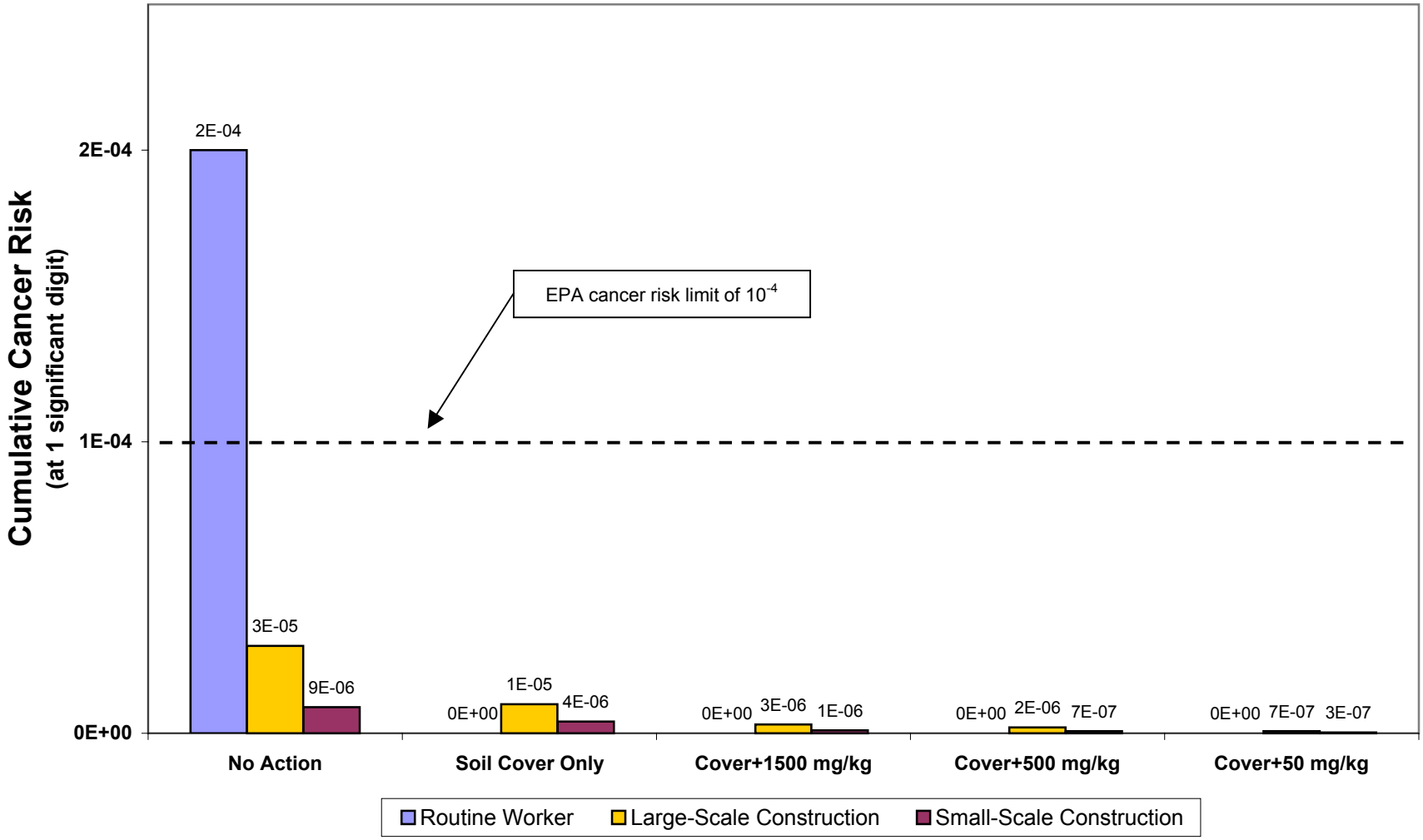
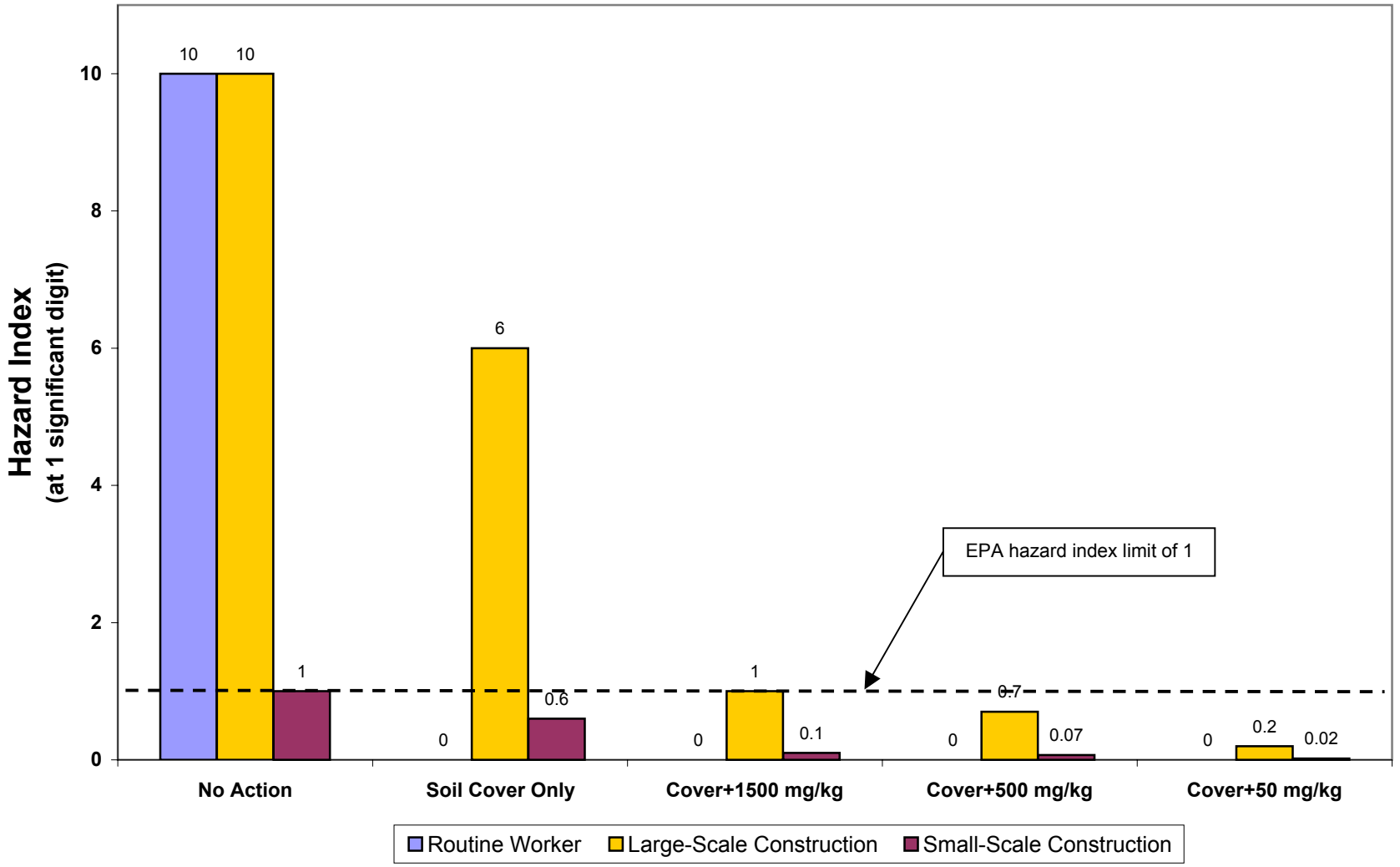
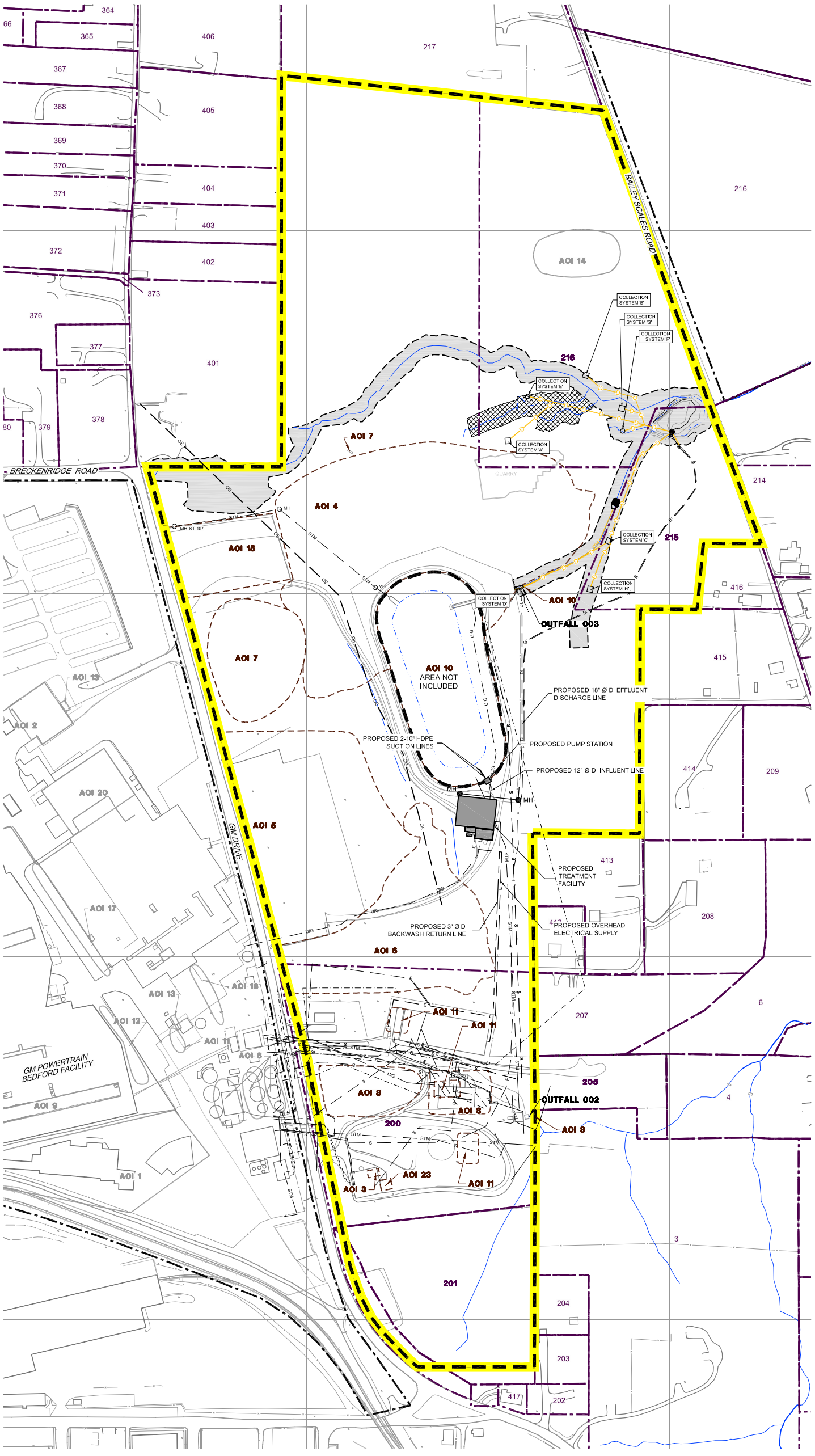


**Figure 7.2 Noncancer Hazard Index for Interim Measure Alternatives**
**Routine Worker & 10-ft Construction Scenarios**
**GM Powertrain Bedford Facility, Bedford, Indiana**






## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- MANHOLE
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- OVERHEAD POWER LINE
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- STORM PIPE LOCATION

APPROXIMATE LOCATIONS OF KNOWN UTILITIES (SEE FIGURE 7.2)

- UNDERGROUND FIRE LINE
- UNDERGROUND ARGON LINE
- PROCESS SEWER LINE
- UNDERGROUND PROCESS SEWER LINE
- STORM SEWER LINE
- UNDERGROUND LINE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) UTILITY LOCATIONS APPROXIMATED FROM DRAWINGS RECEIVED FROM GENERAL MOTORS ON JANUARY 17, 2005

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge DIsposal and FIre TraInIng Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment FIlter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

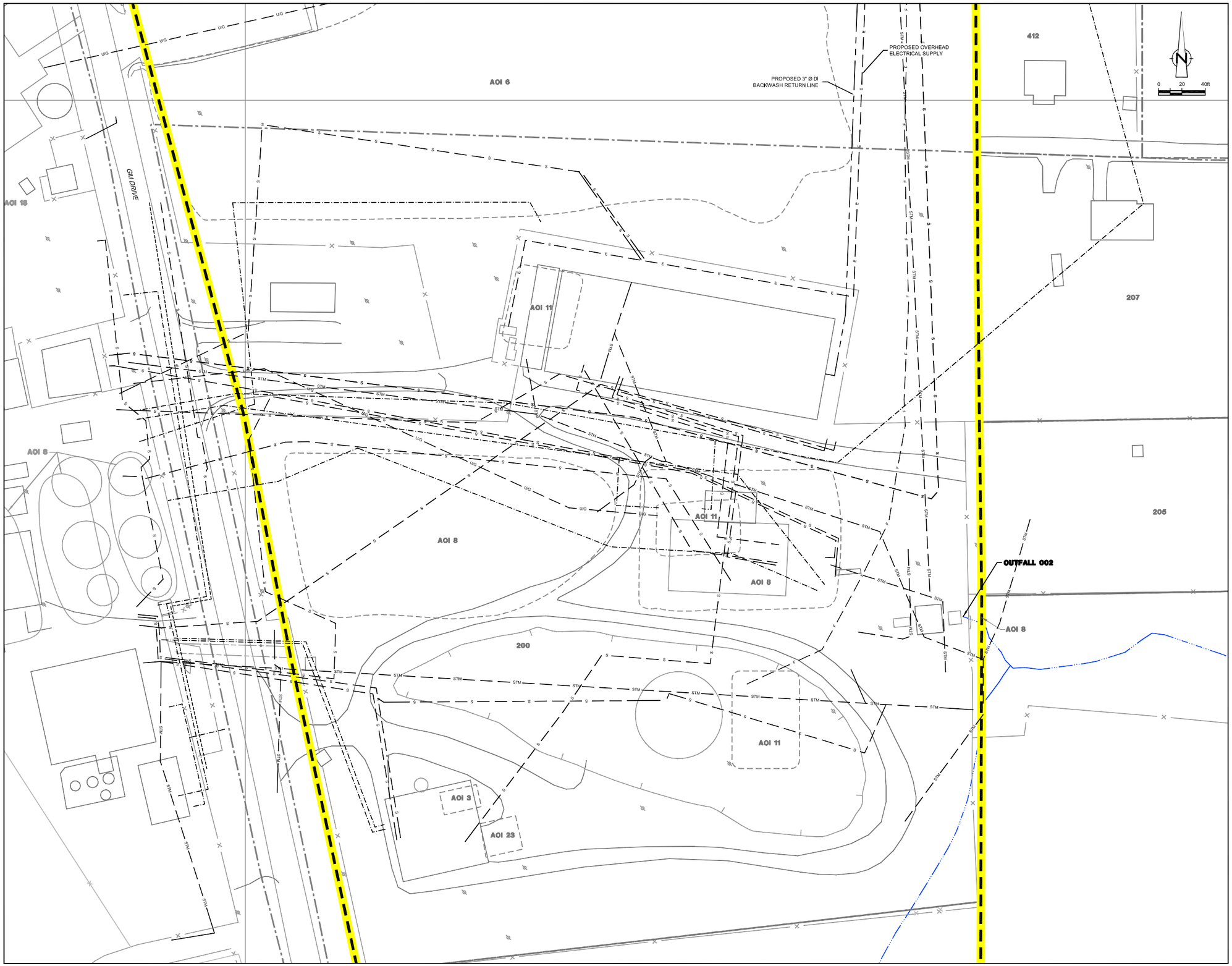
APPROXIMATE LOCATION OF UTILITIES

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure 7.3 |

13968-00(151)GN-WA051 APR 08/2005




| NO | Revision | Date | Initial |
|---|---|---|---|
| | | | |

## LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- F — EXISTING FORCEMAIN TO TREATMENT FACILITY

APPROXIMATE LOCATIONS OF KNOWN UTILITIES

- UNDERGROUND FIRE LINE
- UNDERGROUND ARGON LINE
- S — PROCESS SEWER LINE
- UNDERGROUND PROCESS SEWER LINE
- STM — STORM SEWER LINE
- U/G — UNDERGROUND LINE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) UTILITY LOCATIONS APPROXIMATED FROM DRAWINGS RECEIVED FROM GENERAL MOTORS ON JANUARY 17, 2005

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

# GM POWERTRAIN BEDFORD FACILITY BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

## APPROXIMATE LOCATION OF UTILITIES WITHIN PARCEL 200

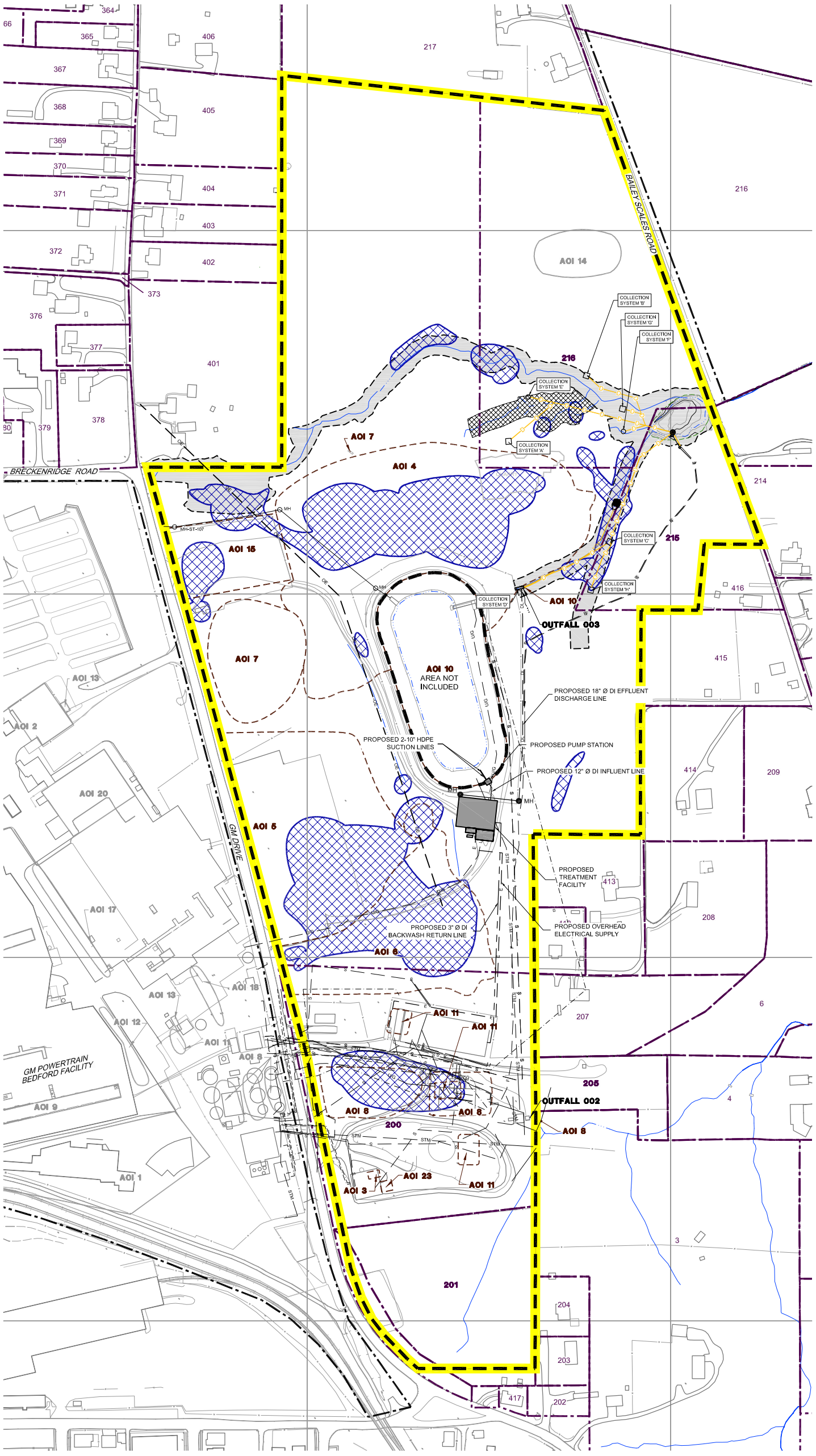
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure 7.4 |

13968-00(151)GN-WA052 APR 08/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- MANHOLE
- ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- OVERHEAD POWER LINE
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- PRESCRIPTIVE SOIL EXCAVATION ( > 50 PPM OF PCBs)
- STORM PIPE LOCATION

APPROXIMATE LOCATIONS OF KNOWN UTILITIES (SEE FIGURE 7.4)

- UNDERGROUND FIRE LINE
- UNDERGROUND ARGON LINE
- PROCESS SEWER LINE
- UNDERGROUND PROCESS SEWER LINE
- STORM SEWER LINE
- UNDERGROUND LINE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) UTILITY LOCATIONS APPROXIMATED FROM DRAWINGS RECEIVED FROM GENERAL MOTORS ON JANUARY 17, 2005

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge DIsposal and FIre TraInIng Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment FIlter Cake Release |

| № | Revision | Date | InItIal |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

REMOVAL ACTION / SOLIDIFICATION
INTERFERENCE WITH UTILITIES

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure 7.5 |

13968-00(151)GN-WA053 APR 08/2005

| NO | Revision | Date | Initial |
|---|---|---|---|
| | | | |

## LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- PRESCRIPTIVE SOIL EXCAVATION ( > 50 PPM OF PCBs)

APPROXIMATE LOCATIONS OF KNOWN UTILITIES

- UNDERGROUND FIRE LINE
- UNDERGROUND ARGON LINE
- PROCESS SEWER LINE
- UNDERGROUND PROCESS SEWER LINE
- STORM SEWER LINE
- UNDERGROUND LINE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) UTILITY LOCATIONS APPROXIMATED FROM DRAWINGS RECEIVED FROM GENERAL MOTORS ON JANUARY 17, 2005

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

# GM POWERTRAIN BEDFORD FACILITY BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

REMOVAL ACTION / SOLIDIFICATION INTERFERENCE WITH UTILITIES WITHIN PARCEL 200

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure 7.6 |

13968-00(151)GN-WA054 APR 08/2005

**Figure 7.7 Cancer Risk Estimates and Costs for Interim Measure Alternatives**
**Routine Worker & 10-ft Construction Scenarios**
**GM Powertrain Bedford Facility, Bedford, Indiana**

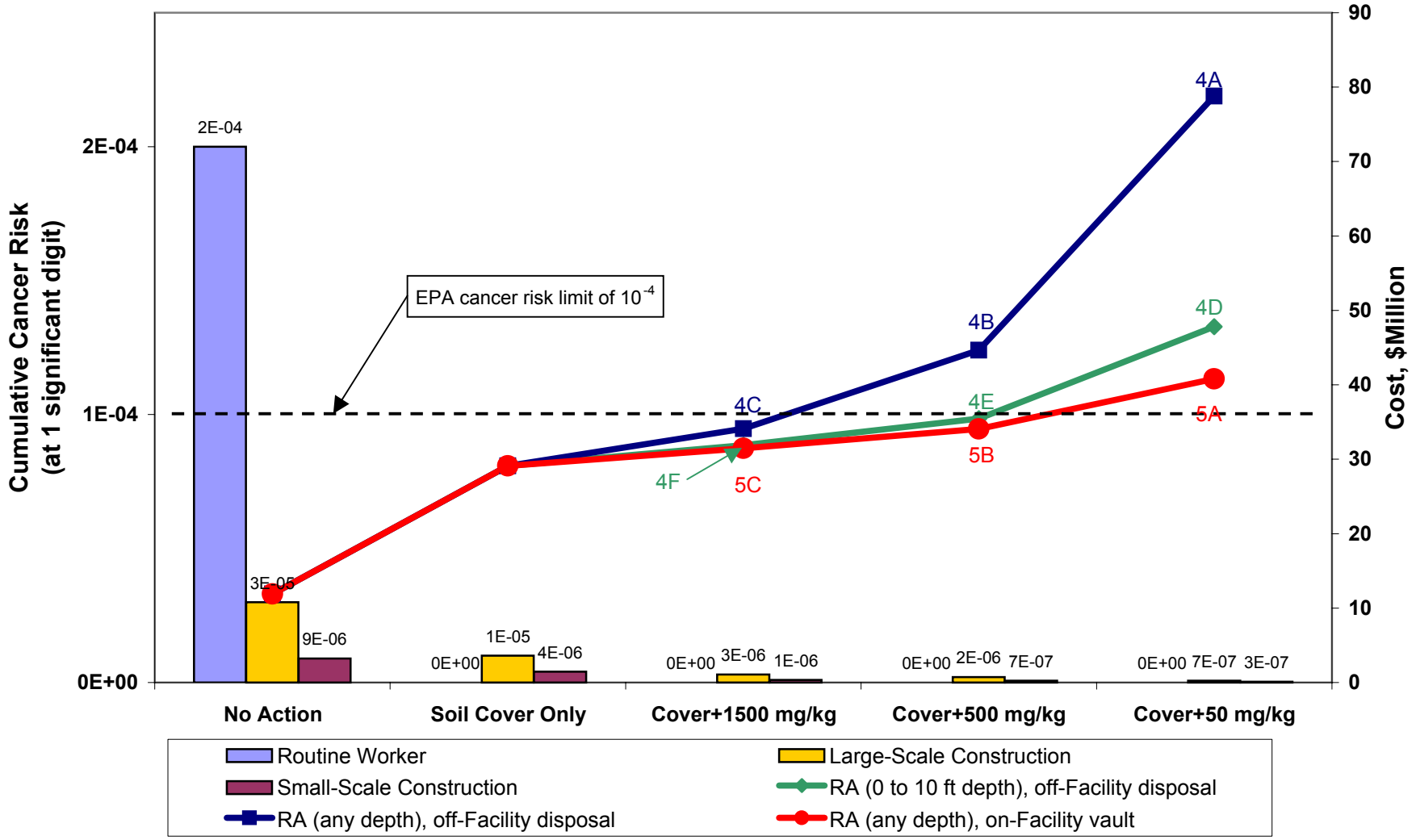


**Figure 7.8 Noncancer Hazard Index and Costs for Interim Measure Alternatives**
**Routine Worker & 10-ft Construction Scenarios**
**GM Powertrain Bedford Facility, Bedford, Indiana**

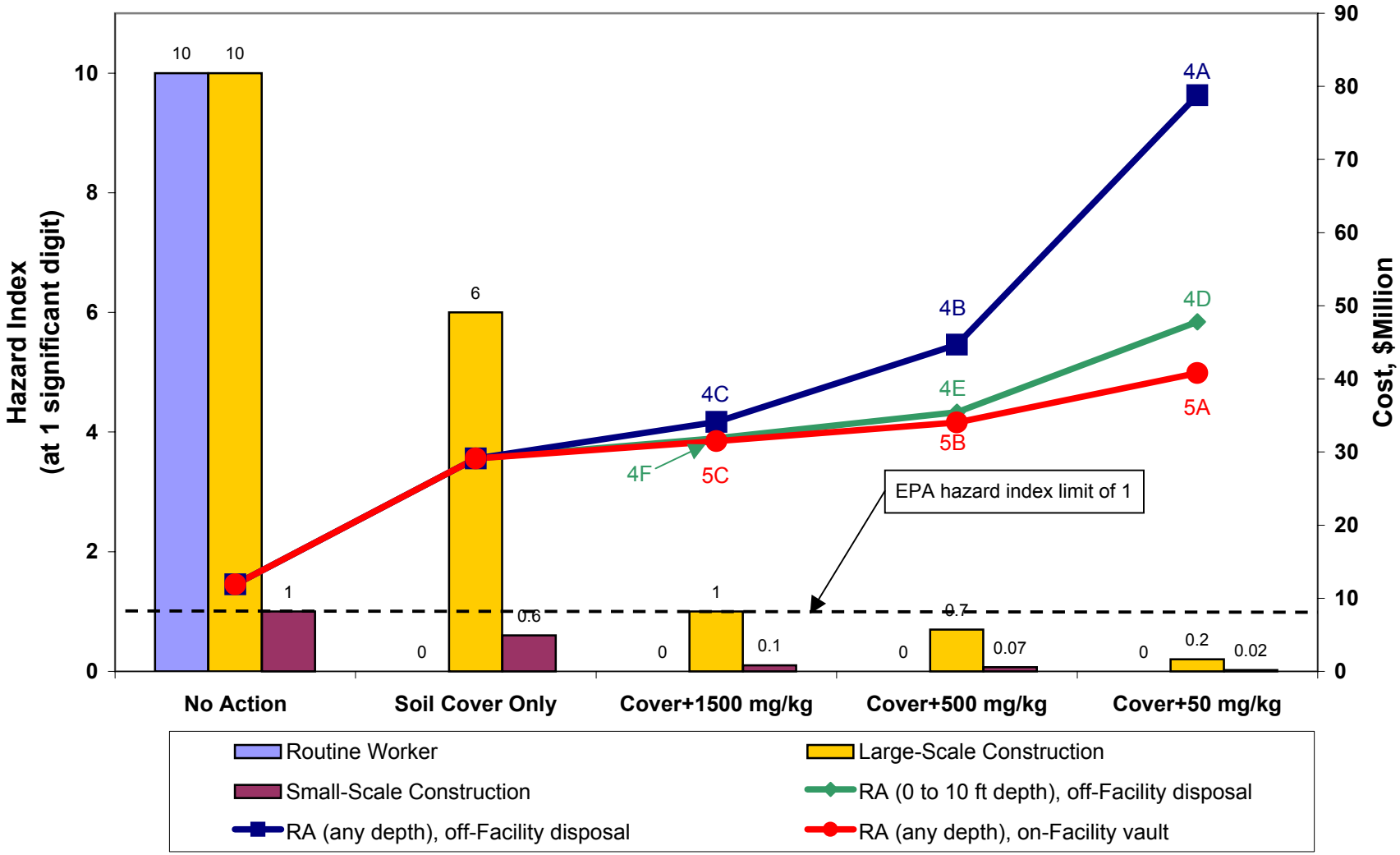


**TABLE 2.1**

**RFI BEDROCK SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X178Y367D* | *MW-X178Y367D* | *MW-X178Y367D* | *MW-X269Y201D* | *MW-X269Y201D* | *MW-X269Y201D* | *MW-X269Y201D* |
| *Sample ID:* | | *RC-121802-KMV-555* | *RC-121802-KMV-560* | *RC-121802-KMV-565* | *RC-121802-KMV-550* | *RC-121802-KMV-554* | *RC-121802-KMV-559* | *RC-121802-KMV-564* |
| *Sample Date:* | | *12/18/2002* | *12/18/2002* | *12/18/2002* | *12/18/2002* | *12/18/2002* | *12/18/2002* | *12/18/2002* |
| *Sample Depth:* | | *(12.83-13)* | *(64.58-64.75)* | *(124.5-124.67)* | *(12.33-12.58)* | *(38-38.25)* | *(85.33-85.5)* | *(164.58-164.75)* |
| ***Parameters*** | ***Units*** | | | | | | | |
| ***Misc*** | | | | | | | | |
| Bulk Density | $g/cm^3$ | 2.516 | 2.593 | 2.255 | 2.405 | 2.391 | 2.571 | 2.218 |
| Grain Density | $g/cm^3$ | 2.695 | 2.685 | 2.834 | 2.739 | 2.701 | 2.689 | 2.821 |
| Porosity | % | 7.56 | 4.10 | 21.28 | 13.33 | 12.03 | 5.50 | 22.12 |

Notes:
g/cm3 - grams per cubic centimeter

**TABLE 2.2**

**RFI SEDIMENT SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *P215 GMPT* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SD-X214Y275* | *SD-X255Y267* | *SD-100701-SK-002* | *SD-100701-SK-002* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample ID:* | | *SD-031402-JW-1428* | *SD-031402-JW-1427* | *SD-100701-SK-002* | *SD-100701-SK-003* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample Date:* | | *3/14/2002* | *3/14/2002* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* |
| *Sample Depth:* | | | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | |
| *Parameters* | *Units* | | | | | | | |
| *Volatiles* | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,1,2-Trichloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,1-Dichloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,1-Dichloroethene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (39) | ND (15) | ND (16) | ND (16) | ND (16) | ND (57) | ND (15) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,2-Dichlorobenzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,2-Dichloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,2-Dichloropropane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| 1,3-Dichlorobenzene | µg/kg | 3.1 J | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | 28 J | ND (7.4) |
| 1,4-Dichlorobenzene | µg/kg | 5.5 J | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | 54 | ND (7.4) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (77) | ND (30) | ND (31) | ND (33) | ND (32) | 19 J | ND (30) |
| 2-Hexanone | µg/kg | ND (77) | ND (30) | ND (31) UJ | ND (33) | ND (32) | ND (110) | ND (30) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (77) | ND (30) | ND (31) | ND (33) | ND (32) | ND (110) | ND (30) |
| Acetone | µg/kg | ND (77) | ND (30) | 5.6 J | 21 J | 5.1 J | 100 J | 17 J |
| Benzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Bromodichloromethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Bromoform | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Carbon disulfide | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Carbon tetrachloride | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Chlorobenzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | 8.7 J | ND (7.4) |
| Chloroethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Chloroform (Trichloromethane) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| cis-1,2-Dichloroethene | µg/kg | ND (9.6) | ND (3.8) | ND (3.9) | ND (4.1) | ND (4) | ND (14) | ND (3.7) |
| cis-1,3-Dichloropropene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Cyclohexane | µg/kg | ND (39) | ND (15) | ND (16) | ND (16) | ND (16) | ND (57) | ND (15) |
| Dibromochloromethane | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Ethylbenzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Isopropylbenzene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Methyl acetate | µg/kg | 41 | 5.8 J | 10 J | 12 J | 16 | 52 J | 12 J |
| Methyl cyclohexane | µg/kg | ND (39) | ND (15) | ND (16) | ND (16) | ND (16) | ND (57) | ND (15) |
| Methyl Tert Butyl Ether | µg/kg | ND (77) | ND (30) | ND (31) | ND (33) | ND (32) | ND (110) | ND (30) |
| Methylene chloride | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Styrene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Tetrachloroethene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Toluene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| trans-1,2-Dichloroethene | µg/kg | ND (9.6) | ND (3.8) | ND (3.9) | ND (4.1) | ND (4) | ND (14) | ND (3.7) |
| trans-1,3-Dichloropropene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Trichloroethene | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Vinyl chloride | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |
| Xylene (total) | µg/kg | ND (19) | ND (7.6) | ND (7.9) | ND (8.1) | ND (8) | ND (29) | ND (7.4) |

**TABLE 2.2**

**RFI SEDIMENT SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *P215 GMPT* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SD-X214Y275* | *SD-X255Y267* | *SD-100701-SK-002* | *SD-100701-SK-002* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample ID:* | | *SD-031402-JW-1428* | *SD-031402-JW-1427* | *SD-100701-SK-002* | *SD-100701-SK-003* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample Date:* | | *3/14/2002* | *3/14/2002* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* |
| *Sample Depth:* | | | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | |
| *Parameters* | *Units* | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,4,5-Trichlorophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,4,6-Trichlorophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,4-Dichlorophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,4-Dimethylphenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,4-Dinitrophenol | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 2,4-Dinitrotoluene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2,6-Dinitrotoluene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2-Chloronaphthalene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2-Chlorophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2-Methylnaphthalene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2-Methylphenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 2-Nitroaniline | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 2-Nitrophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 3-Nitroaniline | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 4-Chloro-3-methylphenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 4-Chloroaniline | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 4-Methylphenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| 4-Nitroaniline | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| 4-Nitrophenol | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| Acenaphthene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Acenaphthylene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Acetophenone | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Anthracene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Atrazine | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzaldehyde | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzo(a)anthracene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzo(a)pyrene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzo(b)fluoranthene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzo(g,h,i)perylene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Benzo(k)fluoranthene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Biphenyl | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| bis(2-Chloroethyl)ether | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Butyl benzylphthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Caprolactam | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |

**TABLE 2.2**

**RFI SEDIMENT SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *P215 GMPT* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SD-X214Y275* | *SD-X255Y267* | *SD-100701-SK-002* | *SD-100701-SK-002* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample ID:* | | *SD-031402-JW-1428* | *SD-031402-JW-1427* | *SD-100701-SK-002* | *SD-100701-SK-003* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample Date:* | | *3/14/2002* | *3/14/2002* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* |
| *Sample Depth:* | | | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| Carbazole | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Chrysene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Dibenz(a,h)anthracene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Dibenzofuran | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Diethyl phthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Dimethyl phthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Di-n-butylphthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Di-n-octyl phthalate | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Fluoranthene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Fluorene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Hexachlorobenzene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Hexachlorobutadiene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Hexachlorocyclopentadiene | µg/kg | ND (4600) | ND (2400) | ND (2500) | ND (2600) | ND (2600) | ND (9100) | ND (2400) |
| Hexachloroethane | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Isophorone | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Naphthalene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Nitrobenzene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| N-Nitrosodiphenylamine | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Pentachlorophenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Phenanthrene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Phenol | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| Pyrene | µg/kg | ND (940) | ND (500) | ND (520) | ND (540) | ND (530) | ND (1900) | ND (490) |
| ***Metals*** | | | | | | | | |
| Aluminum | mg/kg | 4970 | 747 | 8730 | 7060 | 7570 | 4490 | 10200 |
| Antimony | mg/kg | ND (17.1) | ND (9.1) | ND (9.4) UJ | ND (9.8) UJ | ND (9.6) UJ | ND (171) UJ | ND (8.9) UJ |
| Arsenic | mg/kg | 11.6 | 1.7 | 7.5 | 7.4 | 7.9 | 120 | 6.2 |
| Barium | mg/kg | 112 | 8.3 J | 72.2 | 66.8 | 61.2 | 493 | 46.5 |
| Beryllium | mg/kg | ND (1.4) U | ND (0.76) U | 0.59 J | 0.45 J | 0.45 J | 0.48 J | 0.33 J |
| Cadmium | mg/kg | ND (1.4) | 1.5 | 0.57 J | 0.79 J | 1 | 1.7 J | 0.84 |
| Chromium Total | mg/kg | 15.7 | 3.4 | 14.7 | 14.1 | 16.6 | 5.5 J | 21.9 |
| Cobalt | mg/kg | 26.6 | 1.4 J | 10 | 10.8 | 11.6 | 29.7 | 11.2 |
| Copper | mg/kg | 93.1 | 6.3 | 18.2 | 20.7 | 38.2 | 136 | 83.1 |
| Cyanide (amenable) | mg/kg | ND (1.4) | ND (0.76) | ND (0.79) | ND (0.81) | ND (0.8) | ND (2.9) | ND (0.74) |
| Cyanide (total) | mg/kg | ND (1.4) | ND (0.76) | ND (0.79) | ND (0.81) | ND (0.8) | 1.1 J | ND (0.74) |
| Iron | mg/kg | 39600 | 4760 | 16500 | 16500 | 16000 | 364000 | 14300 |
| Lead | mg/kg | 16.3 | 21.4 | 17.8 | 18.3 | 21.3 | 22 | 21.1 |
| Manganese | mg/kg | 6840 | 167 | 898 | 1170 | 2060 | 16200 | 893 |
| Mercury | mg/kg | ND (0.29) U | ND (0.15) U | 0.14 J | 0.16 | 0.11 J | 0.2 J | 0.89 |
| Nickel | mg/kg | 30.8 | 3.8 J | 12.4 | 11.7 | 18.2 | 19 J | 27.9 |
| Selenium | mg/kg | ND (1.4) | ND (0.76) | 0.52 J | ND (0.81) | ND (0.8) | 8.7 | ND (0.74) |
| Silver | mg/kg | 1.0 J | 0.41 J | ND (1.6) | ND (1.6) | 1.2 J | 1.5 J | 1.1 J |
| Thallium | mg/kg | ND (2.9) | ND (1.5) | 0.89 J | ND (1.6) | ND (1.6) | 12.5 J | ND (1.5) |
| Vanadium | mg/kg | 9.0 J | 2.6 J | 24.3 | 21.2 | 20.6 | 8.3 J | 14.7 |
| Zinc | mg/kg | 68.0 | 151 | 76.8 | 86.8 | 155 | 121 | 125 |

**TABLE 2.2**

**RFI SEDIMENT SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *P215 GMPT* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P215(GM) P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SD-X214Y275* | *SD-X255Y267* | *SD-100701-SK-002* | *SD-100701-SK-002* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample ID:* | | *SD-031402-JW-1428* | *SD-031402-JW-1427* | *SD-100701-SK-002* | *SD-100701-SK-003* | *SD-100701-SK-004* | *SD-100701-SK-005* | *SD-100701-SK-006* |
| *Sample Date:* | | *3/14/2002* | *3/14/2002* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* | *10/7/2001* |
| *Sample Depth:* | | | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| ***PCBs*** | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (1900) | ND (250) | ND (260) | ND (540) | ND (1100) | ND (940) | ND (980) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (1900) | ND (250) | ND (260) | ND (540) | ND (1100) | ND (940) | ND (980) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (1900) | ND (250) | ND (260) | ND (540) | ND (1100) | ND (940) | ND (980) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (1900) | ND (250) | ND (260) | ND (540) | ND (1100) | 2600 | ND (980) |
| Aroclor-1248 (PCB-1248) | µg/kg | 18000 | 2300 | 1300 | 2500 | 14000 | ND (940) | 8000 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (1900) | ND (250) | ND (260) | ND (540) | ND (1100) | ND (940) | ND (980) |
| Aroclor-1260 (PCB-1260) | µg/kg | 1800 J | 280 | 240 J | 440 J | 3100 | ND (940) | ND (980) |
| ***General Chemistry*** | | | | | | | | |
| Total Organic Carbon (TOC) | mg/kg | 49000 | 6500 | 13000 | 12000 | 10000 | 49000 | 12000 |
| Total Solids | % | 35.0 | 65.9 | 63.6 | 61.5 | 62.4 | 17.5 | 67.4 |

Notes:
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
ND - Non Detect
PCB - Polychlorinated Biphenyl
J - Estimated
R - Rejected
U - Non-detect at associated value
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limit is an estimated quantity.

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X187Y217*** | ***B-X187Y217*** | ***B-X192Y234*** | ***B-X192Y234*** | ***B-X192Y234*** | ***B-X193Y251*** |
| ***Sample ID:*** | | ***S-022003-MG-240*** | ***S-022003-MG-241*** | ***S-022003-MG-242*** | ***S-022003-MG-243*** | ***S-022003-MG-244*** | ***S-030602-MG-156*** | ***S-030602-MG-157*** | ***S-030502-MG-153*** | ***S-030502-MG-154*** | ***S-030502-MG-155*** | ***S-030402-MG-146*** |
| ***Sample Date:*** | | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***3/6/2002*** | ***3/6/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/4/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(6-8)*** | ***(6-8)*** | ***(18-20)*** | ***(24-25)*** | ***(0-2)*** | ***(6-8)*** | ***(0-2)*** | ***(6-8)*** | ***(20-22)*** | ***(0-2)*** |
| | | | | ***Duplicate*** | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,1,2-Trichloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,1-Dichloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,1-Dichloroethene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) U | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) | ND (15) | ND (12) | ND (13) | ND (12) | ND (12) | ND (18) | ND (15) | ND (17) | ND (11) | ND (12) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,2-Dichlorobenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,2-Dichloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,2-Dichloropropane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,3-Dichlorobenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 1,4-Dichlorobenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | 1.3 J | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (25) | ND (30) | ND (24) | 5.5 J | ND (24) | ND (24) | ND (36) | ND (29) | 7.3 J | 5.7 J | ND (24) |
| 2-Hexanone | µg/kg | ND (25) | ND (30) | ND (24) | ND (26) | ND (24) | ND (24) | ND (36) | ND (29) | ND (33) | ND (23) | ND (24) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (25) | ND (30) | ND (24) | ND (26) | ND (24) | ND (24) | ND (36) | ND (29) | ND (33) | ND (23) | ND (24) |
| Acetone | µg/kg | ND (25) | ND (30) | ND (24) | ND (26) U | ND (24) U | ND (24) UJ | ND (36) UJ | ND (29) UJ | 40 J | 28 J | ND (24) UJ |
| Benzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Bromodichloromethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Bromoform | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) UJ | ND (9.1) UJ | ND (7.3) UJ | ND (8.3) UJ | ND (5.6) UJ | ND (5.9) UJ |
| Bromomethane (Methyl Bromide) | µg/kg | R | R | R | ND (6.5) | R | ND (6) | ND (9.1) | ND (7.3) UJ | ND (8.3) UJ | ND (5.6) UJ | ND (5.9) UJ |
| Carbon disulfide | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | 7.9 | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | 5.3 J | ND (5.6) | ND (5.9) |
| Carbon tetrachloride | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Chlorobenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Chloroethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Chloroform (Trichloromethane) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (3.7) | ND (3.0) | ND (3.2) | ND (3.0) | ND (3) | ND (4.5) | ND (3.6) | ND (4.2) | ND (2.8) | ND (3) |
| cis-1,3-Dichloropropene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Cyclohexane | µg/kg | ND (12) | ND (15) | ND (12) | ND (13) | ND (12) | ND (12) | ND (18) | ND (15) | ND (17) | ND (11) | ND (12) |
| Dibromochloromethane | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6.2) UJ | ND (7.4) UJ | ND (6.0) UJ | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Ethylbenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Isopropylbenzene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Methyl acetate | µg/kg | 5.6 J | 1.7 J | 2.3 J | 2.7 J | ND (12) | ND (12) | ND (18) | ND (15) | ND (17) | ND (11) | ND (12) |
| Methyl cyclohexane | µg/kg | ND (12) | ND (15) | ND (12) | ND (13) | ND (12) | ND (12) | ND (18) | ND (15) | ND (17) | ND (11) | ND (12) |
| Methyl Tert Butyl Ether | µg/kg | ND (25) | ND (30) | ND (24) | ND (26) | ND (24) | ND (24) | ND (36) | ND (29) | ND (33) | ND (23) | ND (24) |
| Methylene chloride | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | 3.0 J | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Styrene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Tetrachloroethene | µg/kg | ND (6.2) | 8.2 | 2.5 J | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Toluene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (3.7) | ND (3.0) | ND (3.2) | ND (3.0) | ND (3) | ND (4.5) | ND (3.6) | ND (4.2) | ND (2.8) | ND (3) |
| trans-1,3-Dichloropropene | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Trichloroethene | µg/kg | ND (6.2) | 2.4 J | ND (6.0) | 0.98 J | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Vinyl chloride | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |
| Xylene (total) | µg/kg | ND (6.2) | ND (7.4) | ND (6.0) | ND (6.5) | ND (6.1) | ND (6) | ND (9.1) | ND (7.3) | ND (8.3) | ND (5.6) | ND (5.9) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X177Y252D* | *B-X177Y252D* | *B-X177Y252D* | *B-X177Y252D* | *B-X177Y252D* | *B-X187Y217* | *B-X187Y217* | *B-X192Y234* | *B-X192Y234* | *B-X192Y234* | *B-X193Y251* |
| *Sample ID:* | | *S-022003-MG-240* | *S-022003-MG-241* | *S-022003-MG-242* | *S-022003-MG-243* | *S-022003-MG-244* | *S-030602-MG-156* | *S-030602-MG-157* | *S-030502-MG-153* | *S-030502-MG-154* | *S-030502-MG-155* | *S-030402-MG-146* |
| *Sample Date:* | | *2/20/2003* | *2/20/2003* | *2/20/2003* | *2/20/2003* | *2/20/2003* | *3/6/2002* | *3/6/2002* | *3/5/2002* | *3/5/2002* | *3/5/2002* | *3/4/2002* |
| *Sample Depth:* | | *(0-2)* | *(6-8)* | *(6-8)* | *(18-20)* | *(24-25)* | *(0-2)* | *(6-8)* | *(0-2)* | *(6-8)* | *(20-22)* | *(0-2)* |
| | | | | *Duplicate* | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,4,5-Trichlorophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,4,6-Trichlorophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,4-Dichlorophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,4-Dimethylphenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 2,4-Dinitrotoluene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2,6-Dinitrotoluene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2-Chloronaphthalene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2-Chlorophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2-Methylnaphthalene | µg/kg | ND (430) | 73 J | 51 J | 92 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2-Methylphenol | µg/kg | ND (430) | 24 J | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 2-Nitrophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 4-Chloro-3-methylphenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 4-Chloroaniline | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 4-Methylphenol | µg/kg | ND (430) | ND (360) | ND (370) | 32 J# | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| Acenaphthene | µg/kg | ND (430) | ND (360) | 34 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Acenaphthylene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Acetophenone | µg/kg | ND (430) | ND (360) | ND (370) | 66 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Anthracene | µg/kg | ND (430) | ND (360) | 110 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Atrazine | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Benzaldehyde | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Benzo(a)anthracene | µg/kg | ND (430) | 58 J | 350 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Benzo(a)pyrene | µg/kg | ND (430) | 71 J | 390 | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Benzo(b)fluoranthene | µg/kg | ND (430) | 80 J | 510 | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | 74 J | ND (380) | ND (430) |
| Benzo(g,h,i)perylene | µg/kg | ND (430) | 46 J | 180 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Benzo(k)fluoranthene | µg/kg | ND (430) | 48 J | 230 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Biphenyl | µg/kg | ND (430) | ND (360) | ND (370) | 57 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| bis(2-Chloroethyl)ether | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| bis(2-Ethylhexyl)phthalate | µg/kg | 150 J | 77 J | 100 J | 97 J | 20 J | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Butyl benzylphthalate | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Caprolactam | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Carbazole | µg/kg | ND (430) | ND (360) | 140 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Chrysene | µg/kg | ND (430) | 67 J | 350 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | 59 J | ND (380) | ND (430) |
| Dibenz(a,h)anthracene | µg/kg | ND (430) | ND (360) UJ | 57 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Dibenzofuran | µg/kg | ND (430) | ND (360) | 22 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Diethyl phthalate | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Dimethyl phthalate | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Di-n-butylphthalate | µg/kg | ND (430) | 530 | 500 | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Di-n-octyl phthalate | µg/kg | ND (430) | ND (360) UJ | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Fluoranthene | µg/kg | ND (430) | 91 J | 680 | 21 J | ND (420) | ND (410) | ND (430) | ND (440) | 80 J | ND (380) | ND (430) |
| Fluorene | µg/kg | ND (430) | ND (360) | 34 J | 18 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A004*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X177Y252D*** | ***B-X187Y217*** | ***B-X187Y217*** | ***B-X192Y234*** | ***B-X192Y234*** | ***B-X192Y234*** | ***B-X193Y251*** |
| ***Sample ID:*** | | ***S-022003-MG-240*** | ***S-022003-MG-241*** | ***S-022003-MG-242*** | ***S-022003-MG-243*** | ***S-022003-MG-244*** | ***S-030602-MG-156*** | ***S-030602-MG-157*** | ***S-030502-MG-153*** | ***S-030502-MG-154*** | ***S-030502-MG-155*** | ***S-030402-MG-146*** |
| ***Sample Date:*** | | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***2/20/2003*** | ***3/6/2002*** | ***3/6/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/4/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(6-8)*** | ***(6-8)*** | ***(18-20)*** | ***(24-25)*** | ***(0-2)*** | ***(6-8)*** | ***(0-2)*** | ***(6-8)*** | ***(20-22)*** | ***(0-2)*** |
| | | | | ***Duplicate*** | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (430) | 90 J | 48 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Hexachlorobutadiene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (1800) | ND (1800) | ND (1800) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1800) | ND (2100) |
| Hexachloroethane | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (430) | 39 J | 180 J | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Isophorone | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Naphthalene | µg/kg | ND (430) | 29 J | 29 J | 93 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Nitrobenzene | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| N-Nitrosodiphenylamine | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Pentachlorophenol | µg/kg | ND (430) | ND (360) | ND (370) | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Phenanthrene | µg/kg | ND (430) | 80 J | 460 | ND (370) | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Phenol | µg/kg | ND (430) | 400 | 230 J | 190 J | ND (420) | ND (410) | ND (430) | ND (440) | ND (370) | ND (380) | ND (430) |
| Pyrene | µg/kg | ND (430) | 91 J | 650 | 27 J | ND (420) | ND (410) | ND (430) | ND (440) | 71 J | ND (380) | ND (430) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 13200 | 5220 | 3910 | 3720 | 19200 | 13200 | 15200 | 12200 | 4710 | 22500 | 16800 |
| Antimony | mg/kg | R | R | R | R | R | ND (7.5) UJ | ND (7.8) UJ | ND (7.9) UJ | ND (6.7) UJ | ND (6.9) UJ | R |
| Arsenic | mg/kg | 8.1 | 1.1 | 1.3 | 1.3 | 22.8 | 10.2 | 12.8 | 8.3 | 2.5 | 3.9 | 10.3 |
| Barium | mg/kg | 85.6 | 26.4 | 23.7 | 51.8 | 103 | 50.3 | 192 | 49.4 | 25.5 | 93.3 | 137 |
| Beryllium | mg/kg | 1.1 | ND (0.55) | ND (0.55) | ND (0.56) | 0.82 | ND (0.62) U | 1.6 | 1.4 | ND (0.56) U | ND (0.58) U | 0.95 |
| Cadmium | mg/kg | ND (0.65) | 0.31 J | 0.42 J | ND (0.56) | 0.16 J | ND (0.62) | 0.081 J | ND (0.66) | 0.11 J | ND (0.58) | ND (0.64) |
| Chromium Total | mg/kg | 22.6 | 78.2 | 74.6 | 15.2 | 33.1 | 23.6 J | 21.2 J | 31.0 | 19.7 | 15.3 | 22.9 |
| Cobalt | mg/kg | 10.9 | 88.5 | 67.1 | 13.5 | 8.2 | 4.3 J | 8.3 J | 20.8 | 15.2 | 7.8 | 12.9 |
| Copper | mg/kg | 15.3 | 141 | 72.5 | 42.8 | 17.4 | 15.1 J | 21.2 J | 23.3 | 52.7 | 256 | 30.7 J |
| Cyanide (amenable) | mg/kg | ND (0.65) | ND (0.55) | ND (0.55) | ND (0.56) | ND (0.63) | ND (0.62) | ND (0.65) | ND (0.66) | ND (0.56) | ND (0.58) | ND (0.64) |
| Cyanide (total) | mg/kg | ND (0.65) | ND (0.55) | ND (0.55) | ND (0.56) | ND (0.63) | ND (0.62) | ND (0.65) | ND (0.66) | ND (0.56) | 0.27 J | ND (0.64) |
| Iron | mg/kg | 26900 | 4440 | 4770 | 8290 | 36000 | 26000 J | 30400 J | 28700 | 6660 | 9540 | 29000 |
| Lead | mg/kg | 20.1 J | 36.0 J | 27.9 J | 19.6 J | 15.5 J | 17.8 J | 29.5 J | 19.6 | 19.0 | 26.4 | 15.2 |
| Manganese | mg/kg | 323 | 42.4 | 47.5 | 51.4 | 254 | 145 J | 402 J | 190 | 138 | 330 | 573 |
| Mercury | mg/kg | 0.025 J | 39.7 | 20.2 | 6.9 | ND (0.13) | 0.20 | 0.14 | 0.47 | 0.15 | 0.089 J | 0.071 J |
| Nickel | mg/kg | 15.1 | 167 | 174 | 36.2 | 19.3 | 13.2 J | 51.7 J | 31.0 | 24.3 | 82.4 | 35.8 |
| Selenium | mg/kg | 0.81 | 0.58 | ND (0.55) | ND (0.56) | 1.2 | ND (0.62) | ND (0.65) | ND (0.66) | ND (0.56) | ND (0.58) | ND (0.64) |
| Silver | mg/kg | ND (1.3) | ND (1.1) | ND (1.1) | ND (1.1) | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.1) | ND (1.2) | ND (1.3) |
| Thallium | mg/kg | ND (1.3) | 0.69 J | ND (1.1) | ND (1.1) | ND (1.3) | 0.64 J | 1.1 J | ND (1.3) | ND (1.1) | ND (1.2) | 0.78 J |
| Vanadium | mg/kg | 38.3 | 4.2 J | 5.1 J | 2.8 J | 60.7 | 38.0 J | 31.4 J | 43.3 | 8.8 | 16.1 | 32.6 |
| Zinc | mg/kg | 43.6 | 51.9 | 39.1 | 29.2 | 76.1 | 45.5 J | 72.9 J | 66.0 | 57.3 | 32.9 | 77.3 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (720) | ND (1800) | ND (740) | ND (42) | ND (41) | ND (43) | ND (44) | ND (180) | ND (38) | ND (43) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (720) | ND (1800) | ND (740) | ND (42) | ND (41) | ND (43) | ND (44) | ND (180) | ND (38) | ND (43) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (720) | ND (1800) | ND (740) | ND (42) | ND (41) | ND (43) | ND (44) | ND (180) | ND (38) | ND (43) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (720) | ND (1800) | ND (740) | ND (42) | ND (41) | ND (43) | ND (44) | ND (180) | ND (38) | ND (43) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (43) | 4100 | 7700 | 3100 | 150 | 170 | 25 J | 11 J | 1600 | ND (38) | ND (43) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (720) | ND (1800) | ND (740) | ND (42) | ND (41) | ND (43) | ND (44) | ND (180) | 190 | ND (43) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | 580 J | 2100 | 720 J | 36 J | 27 J | ND (43) | ND (44) | 100 J | ND (38) | ND (43) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | 1500 | 3300 | 3600 | 4900 | 920 | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 77.0 | 91.3 | 90.2 | 89.5 | 78.9 | 80.2 | 76.7 | 75.8 | 90.0 | 86.7 | 77.6 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X193Y251* | *B-X193Y251* | *B-X193Y251* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* |
| *Sample ID:* | | *S-030402-MG-147* | *S-030402-MG-148* | *S-030402-MG-149* | *S-022502-KMV-536* | *S-022502-KMV-537* | *S-022602-KMV-538* | *S-022602-KMV-539* | *S-012203-MG-236* | *S-012203-MG-237* | *S-012203-MG-238* | *S-012303-MG-239* |
| *Sample Date:* | | *3/4/2002* | *3/4/2002* | *3/4/2002* | *2/25/2002* | *2/25/2002* | *2/26/2002* | *2/26/2002* | *1/22/2003* | *1/22/2003* | *1/22/2003* | *1/23/2003* |
| *Sample Depth:* | | *(0-2)* | *(6-8)* | *(26-28)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-23)* | *(0-2)* | *(8-10)* | *(22-24)* | *(34-35)* |
| | | *Duplicate* | | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,1,2-Trichloroethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,1-Dichloroethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,1-Dichloroethene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) U | ND (6.7) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) | ND (12) | ND (680) | ND (9.8) | ND (9.7) | ND (13) | ND (11) | ND (14) UJ | ND (10) UJ | ND (18) UJ | ND (13) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,2-Dichlorobenzene | µg/kg | ND (6) | ND (6.2) | 550 | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,2-Dichloroethane | µg/kg | ND (6) | ND (6.2) | 16 J | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,2-Dichloropropane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| 1,3-Dichlorobenzene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | 7.2 J | 2.2 J |
| 1,4-Dichlorobenzene | µg/kg | ND (6) | ND (6.2) | ND (340) U | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | 1.4 J | 5.5 J |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (24) | 3.4 J | ND (1400) | ND (20) | ND (19) | 8.5 J | ND (23) | ND (29) | ND (20) | 30 J | ND (27) UJ |
| 2-Hexanone | µg/kg | ND (24) | ND (25) | ND (1400) | ND (20) | ND (19) | ND (26) | ND (23) | ND (29) | ND (20) | ND (37) | ND (27) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (24) | ND (25) | ND (1400) | ND (20) | ND (19) | ND (26) | ND (23) | ND (29) | ND (20) | ND (37) | ND (27) |
| Acetone | µg/kg | ND (24) UJ | 18 J | ND (1400) | ND (20) UJ | ND (19) UJ | ND (26) UJ | ND (23) UJ | ND (29) | ND (20) U | 190 | 23 J |
| Benzene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | 1.4 J | ND (6.7) |
| Bromodichloromethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Bromoform | µg/kg | ND (6) UJ | ND (6.2) UJ | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6) UJ | ND (6.2) UJ | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) UJ |
| Carbon disulfide | µg/kg | ND (6) | ND (6.2) | 340 | ND (4.9) | ND (4.8) | 1.8 J | ND (5.7) | ND (7.2) | ND (5.1) | 6.4 J | ND (6.7) |
| Carbon tetrachloride | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) UJ |
| Chlorobenzene | µg/kg | ND (6) | 0.93 J | 3500 | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | 1.3 J |
| Chloroethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Chloroform (Trichloromethane) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| cis-1,2-Dichloroethene | µg/kg | ND (3) | ND (3.1) | ND (170) | ND (2.5) | ND (2.4) | 1.3 J | ND (2.9) | ND (3.6) | ND (2.5) | ND (4.6) | ND (3.3) |
| cis-1,3-Dichloropropene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Cyclohexane | µg/kg | ND (12) | ND (12) | ND (680) | ND (9.8) | ND (9.7) | 2 J | ND (11) | ND (14) | ND (10) | 2.6 J | ND (13) |
| Dibromochloromethane | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) UJ | ND (5.1) UJ | ND (9.2) UJ | ND (6.7) |
| Ethylbenzene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | 0.88 J | ND (5.7) | ND (7.2) | ND (5.1) | 1.8 J | ND (6.7) |
| Isopropylbenzene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | 2.1 J | ND (6.7) |
| Methyl acetate | µg/kg | ND (12) | ND (12) | 74 J | ND (9.8) | ND (9.7) | ND (13) | ND (11) | 4.4 J | 1.4 J | 7.6 J | ND (13) |
| Methyl cyclohexane | µg/kg | ND (12) | ND (12) | 28 J | ND (9.8) | ND (9.7) | 3.8 J | ND (11) | ND (14) | ND (10) | 3.6 J | ND (13) |
| Methyl Tert Butyl Ether | µg/kg | ND (24) | ND (25) | ND (1400) | ND (20) | ND (19) | ND (26) | ND (23) | ND (29) | ND (20) | ND (37) | ND (27) |
| Methylene chloride | µg/kg | ND (6) | ND (6.2) | ND (340) | 4 J | 4.8 | ND (6.4) | 8.6 | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Styrene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Tetrachloroethene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Toluene | µg/kg | ND (6) | ND (6.2) | 14 J | ND (4.9) | ND (4.8) | 1.5 J | ND (5.7) | ND (7.2) | ND (5.1) | 5.6 J | ND (6.7) |
| trans-1,2-Dichloroethene | µg/kg | ND (3) | ND (3.1) | ND (170) | ND (2.5) | ND (2.4) | ND (3.2) | ND (2.9) | ND (3.6) | ND (2.5) | ND (4.6) | ND (3.3) |
| trans-1,3-Dichloropropene | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Trichloroethene | µg/kg | ND (6) | ND (6.2) | 26 J | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) UJ |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Vinyl chloride | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | ND (6.4) | ND (5.7) | ND (7.2) | ND (5.1) | ND (9.2) | ND (6.7) |
| Xylene (total) | µg/kg | ND (6) | ND (6.2) | ND (340) | ND (4.9) | ND (4.8) | 3.1 J | ND (5.7) | ND (7.2) | ND (5.1) | 7.4 J | ND (6.7) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X193Y251* | *B-X193Y251* | *B-X193Y251* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* |
| *Sample ID:* | | *S-030402-MG-147* | *S-030402-MG-148* | *S-030402-MG-149* | *S-022502-KMV-536* | *S-022502-KMV-537* | *S-022602-KMV-538* | *S-022602-KMV-539* | *S-012203-MG-236* | *S-012203-MG-237* | *S-012203-MG-238* | *S-012303-MG-239* |
| *Sample Date:* | | *3/4/2002* | *3/4/2002* | *3/4/2002* | *2/25/2002* | *2/25/2002* | *2/26/2002* | *2/26/2002* | *1/22/2003* | *1/22/2003* | *1/22/2003* | *1/23/2003* |
| *Sample Depth:* | | *(0-2)* | *(6-8)* | *(26-28)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-23)* | *(0-2)* | *(8-10)* | *(22-24)* | *(34-35)* |
| | | *Duplicate* | | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | 6100 | ND (1500) | ND (410) | ND (390) | 320 J | ND (390) | ND (410) | ND (380) | 1100 J | ND (450) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2-Methylnaphthalene | µg/kg | ND (420) | 270 J | ND (1500) | ND (410) | ND (390) | 260 J | ND (390) | ND (410) | 56 J | ND (8500) | ND (450) |
| 2-Methylphenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 4-Methylphenol | µg/kg | ND (420) | 270 J | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| Acenaphthene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 150 J | ND (390) | ND (410) | ND (380) | 430 J | ND (450) |
| Acenaphthylene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Acetophenone | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Anthracene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 98 J | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Atrazine | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Benzaldehyde | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 320 J | 79 J | ND (410) | ND (380) | ND (8500) | ND (450) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 360 J | 74 J | ND (410) | ND (380) | 940 J | ND (450) |
| Benzo(b)fluoranthene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 410 | 88 J | ND (410) | ND (380) | 1400 J | ND (450) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 240 J | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 220 J | ND (390) | ND (410) | ND (380) | 480 J | ND (450) |
| Biphenyl | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (420) | 570 | ND (1500) | ND (410) | 120 J | ND (370) | 64 J | ND (410) | 52 J | 18000 | 53 J |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Caprolactam | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Carbazole | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 110 J | ND (390) | ND (410) | 430 | ND (8500) | ND (450) |
| Chrysene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 390 | 88 J | ND (410) | ND (380) | ND (8500) | ND (450) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 69 J | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Dibenzofuran | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 130 J | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Diethyl phthalate | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Di-n-butylphthalate | µg/kg | ND (420) | 2900 | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | 29000 | ND (450) |
| Fluoranthene | µg/kg | ND (420) | 73 J | ND (1500) | ND (410) | ND (390) | 630 | 200 J | ND (410) | ND (380) | 1800 J | ND (450) |
| Fluorene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 150 J | ND (390) | ND (410) | ND (380) | 1800 J | ND (450) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* | *A004* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X193Y251* | *B-X193Y251* | *B-X193Y251* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X219Y249* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* | *B-X223Y247D* |
| *Sample ID:* | | *S-030402-MG-147* | *S-030402-MG-148* | *S-030402-MG-149* | *S-022502-KMV-536* | *S-022502-KMV-537* | *S-022602-KMV-538* | *S-022602-KMV-539* | *S-012203-MG-236* | *S-012203-MG-237* | *S-012203-MG-238* | *S-012303-MG-239* |
| *Sample Date:* | | *3/4/2002* | *3/4/2002* | *3/4/2002* | *2/25/2002* | *2/25/2002* | *2/26/2002* | *2/26/2002* | *1/22/2003* | *1/22/2003* | *1/22/2003* | *1/23/2003* |
| *Sample Depth:* | | *(0-2)* | *(6-8)* | *(26-28)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-23)* | *(0-2)* | *(8-10)* | *(22-24)* | *(34-35)* |
| | | *Duplicate* | | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (1700) | ND (7200) | ND (2000) UJ | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (1800) | ND (41000) | ND (2200) |
| Hexachloroethane | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 210 J | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Isophorone | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Naphthalene | µg/kg | ND (420) | 160 J | ND (1500) | ND (410) | ND (390) | 290 J | ND (390) | ND (410) | ND (380) | 440 J | ND (450) |
| Nitrobenzene | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Pentachlorophenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | ND (370) | ND (390) | ND (410) | ND (380) | ND (8500) | ND (450) |
| Phenanthrene | µg/kg | ND (420) | 190 J | ND (1500) | ND (410) | ND (390) | 440 | 180 J | ND (410) | ND (380) | 1800 J | ND (450) |
| Phenol | µg/kg | ND (420) | ND (350) | ND (1500) | ND (410) | ND (390) | 340 J | ND (390) | ND (410) | 250 J | ND (8500) | ND (450) |
| Pyrene | µg/kg | ND (420) | 86 J | ND (1500) | ND (410) | ND (390) | 530 | 160 J | ND (410) | ND (380) | 1600 J | ND (450) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 13500 | 2020 | 4650 | 11400 | 11800 | 7190 | 8990 | 11300 | 4940 | 14900 | 16300 |
| Antimony | mg/kg | R | R | R | ND (7.5) UJ | ND (7.2) UJ | ND (6.8) UJ | ND (7.1) UJ | ND (7.4) | ND (6.9) | 0.63 J | 0.33 J |
| Arsenic | mg/kg | 10.5 | 0.87 J | 1.1 | 7.7 | 7.2 | 1.8 | 5 | 8.1 | 6.8 | 3.2 | 15.3 |
| Barium | mg/kg | 86.1 | 20.8 J | 11.2 J | 67.6 | 66.8 | 379 J | 68.3 J | 81.1 | 43.9 | 95.8 | 133 |
| Beryllium | mg/kg | 1.1 | ND (0.54) | ND (0.56) U | 0.52 J | 0.25 J | ND (0.57) U | ND (0.59) U | 0.53 J | 0.34 J | ND (0.65) U | 1.1 |
| Cadmium | mg/kg | ND (0.64) | ND (0.54) | 0.51 J | ND (0.62) | ND (0.60) | 0.37 J | 0.29 J | ND (0.62) | 0.30 J | 0.49 J | 0.80 |
| Chromium Total | mg/kg | 31 | 441 | 97.1 | 22.8 | 16.7 | 97.4 | 22 | 19.2 | 10.8 | 226 | 32.0 |
| Cobalt | mg/kg | 12.3 | 718 | 104 | 7 | 6.7 | 103 J | 34.4 J | 9.1 | 4.3 J | 417 | 13.0 |
| Copper | mg/kg | 23.2 J | 38.6 J | 98.2 J | 14.3 | 16.5 | 115 | 83.7 | 12.5 | 30.2 | 485 | 23.9 |
| Cyanide (amenable) | mg/kg | ND (0.64) | ND (0.54) | ND (0.56) | ND (0.62) | ND (0.60) | ND (0.57) | ND (0.59) | ND (0.62) | ND (0.58) | ND (0.65) | ND (0.68) |
| Cyanide (total) | mg/kg | ND (0.64) | ND (0.54) | ND (0.56) | ND (0.62) | ND (0.60) | ND (0.57) | ND (0.59) | ND (0.62) | ND (0.58) | 0.15 J | ND (0.68) |
| Iron | mg/kg | 33700 | 12000 | 6060 | 24700 | 20300 | 12100 | 11300 | 22200 | 13500 | 13400 | 31900 |
| Lead | mg/kg | 16.5 | 47.5 | 18.4 | 11.4 | 12.4 | 66.6 J | 32.2 J | 14.5 | 10 | 72.6 | 15.0 |
| Manganese | mg/kg | 358 | 140 | 56.5 | 215 | 357 | 125 J | 757 J | 544 | 293 | 225 | 231 |
| Mercury | mg/kg | 0.038 J | 23.9 J | 1.7 J | 0.032 J | 0.035 J | 8.2 | 0.87 | 0.038 J | 0.036 J | 4.8 | 0.13 J |
| Nickel | mg/kg | 25.6 | 984 | 184 | 14.2 | 11.9 | 267 | 33.5 | 13.8 | 16.1 | 456 | 49.4 |
| Selenium | mg/kg | ND (0.64) | 0.69 | 0.43 J | ND (0.62) | ND (0.60) | 0.59 | ND (0.59) | ND (0.62) | ND (0.58) | ND (0.65) | ND (0.68) |
| Silver | mg/kg | ND (1.3) | 0.25 J | ND (1.1) | ND (1.2) | ND (1.2) | 0.23 J | ND (1.2) | ND (1.2) | ND (1.2) | 2.4 | ND (1.4) |
| Thallium | mg/kg | 0.8 J | 2.6 | 0.69 J | ND (1.2) | 0.81 J | ND (1.1) U | ND (1.2) | ND (1.2) | 1.1 J | 2.1 | 0.96 J |
| Vanadium | mg/kg | 43.5 | 2.2 J | 2.9 J | 34.5 | 28.1 | 6.1 | 16.2 | 30.1 | 10.7 | 11.4 | 43.9 |
| Zinc | mg/kg | 62.7 | 47.4 | 44.8 | 36.4 | 35.6 | 63.3 | 71.7 | 43.3 | 54.5 | 232 | 102 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (3500) | ND (19000) | ND (41) | ND (39) | ND (1900) | ND (390) | ND (41) | ND (760) | ND (210000) | ND (2200) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (3500) | ND (19000) | ND (41) | ND (39) | ND (1900) | ND (390) | ND (41) | ND (760) | ND (210000) | ND (2200) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (3500) | ND (19000) | ND (41) | ND (39) | ND (1900) | ND (390) | ND (41) | ND (760) | ND (210000) | ND (2200) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (3500) | ND (19000) | ND (41) | ND (39) | ND (1900) | ND (390) | ND (41) | ND (760) | 1100000 | 14000 |
| Aroclor-1248 (PCB-1248) | µg/kg | 8.1 J | 69000 | ND (19000) | ND (41) | ND (39) | 19000 | 3100 | ND (41) | 3700 | ND (210000) | ND (2200) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (3500) | 280000 | ND (41) | ND (39) | ND (1900) | ND (390) | ND (41) | ND (760) | ND (210000) | ND (2200) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | 13000 | ND (19000) | ND (41) | ND (39) | 3000 | 290 J | ND (41) | ND (760) | ND (210000) | ND (2200) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | 2300 J | 9800 J | 9800 J | 1600 J |
| Total Solids | % | 78 | 93.4 | 89 | 80.3 | 83.8 | 88.4 | 84.9 | 80.7 | 86.7 | 77.5 | 73.4 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X243Y257*** | ***B-X243Y257*** | ***B-X243Y257*** | ***SD-X196Y272*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X171Y157*** |
| ***Sample ID:*** | | ***S-030502-MG-150*** | ***S-030502-MG-151*** | ***S-030502-MG-152*** | ***S-031402-JW-1429*** | ***S-010902-MG-021*** | ***S-010902-MG-022*** | ***S-010902-MG-023*** | ***S-032102-MG-203*** | ***S-032102-MG-204*** | ***S-032102-MG-205*** | ***S-032202-MG-206*** |
| ***Sample Date:*** | | ***3/5/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/14/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/22/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(6-8)*** | ***(14-16)*** | ***(0-0.33)*** | ***(0-2)*** | ***(6-8)*** | ***(16-18)*** | ***(0-2)*** | ***(6-8)*** | ***(19.5-21.5)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,1,2-Trichloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,1-Dichloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,1-Dichloroethene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) UJ | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (13) | ND (14) | ND (16) | ND (12) | ND (11) UJ | ND (12) UJ | ND (12) UJ | ND (12) UJ | ND (11) | ND (16) | ND (13) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,2-Dichlorobenzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) UJ | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,2-Dichloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,2-Dichloropropane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,3-Dichlorobenzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) UJ | ND (5.7) | ND (7.9) | ND (6.6) |
| 1,4-Dichlorobenzene | µg/kg | ND (6.4) | 0.93 J | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) UJ | ND (5.7) | ND (7.9) | ND (6.6) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (26) | 36 | ND (32) | ND (25) | 3.6 J | ND (24) | ND (24) | ND (24) | ND (23) | ND (31) | ND (27) |
| 2-Hexanone | µg/kg | ND (26) | ND (28) | ND (32) | ND (25) | ND (23) | ND (24) | ND (24) | ND (24) | ND (23) | ND (31) | ND (27) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (26) | ND (28) | ND (32) | ND (25) | ND (23) | ND (24) | ND (24) | ND (24) | ND (23) | ND (31) | ND (27) |
| Acetone | µg/kg | 56 J | 170 J | 23 J | ND (25) U | ND (24) U | ND (24) U | ND (24) U | ND (24) | ND (23) | ND (31) | ND (27) U |
| Benzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Bromodichloromethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Bromoform | µg/kg | ND (6.4) UJ | ND (6.9) UJ | ND (8) UJ | ND (6.2) UJ | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6.4) UJ | ND (6.9) UJ | ND (8) UJ | ND (6.2) UJ | ND (5.6) UJ | ND (5.9) UJ | ND (6) UJ | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) UJ |
| Carbon disulfide | µg/kg | ND (6.4) | 8.2 | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Carbon tetrachloride | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Chlorobenzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Chloroethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Chloroform (Trichloromethane) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.2) | ND (3.4) | ND (4) | ND (3.1) | ND (2.8) | ND (3) | 1.6 J | ND (3) | ND (2.9) | ND (3.9) | ND (3.3) |
| cis-1,3-Dichloropropene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Cyclohexane | µg/kg | ND (13) | 1.9 J | ND (16) | ND (12) | ND (11) | ND (12) | ND (12) | ND (12) | ND (11) | ND (16) | ND (13) |
| Dibromochloromethane | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) U | ND (5.9) U | ND (6) U | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Ethylbenzene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Isopropylbenzene | µg/kg | ND (6.4) | 3.4 J | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Methyl acetate | µg/kg | ND (13) | ND (14) | ND (16) | ND (12) | ND (11) | ND (12) | ND (12) | ND (12) | ND (11) | ND (16) | ND (13) |
| Methyl cyclohexane | µg/kg | ND (13) | 1.6 J | ND (16) | ND (12) | ND (11) | ND (12) | ND (12) | ND (12) | 1.5 J | ND (16) | ND (13) |
| Methyl Tert Butyl Ether | µg/kg | ND (26) | ND (28) | ND (32) | ND (25) | ND (23) | ND (24) | ND (24) | ND (24) | ND (23) | ND (31) | ND (27) |
| Methylene chloride | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) U | ND (5.9) U | ND (6) U | ND (6) | ND (5.7) U | ND (7.9) | ND (6.6) |
| Styrene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Tetrachloroethene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | 12 | 8.1 | ND (7.9) | ND (6.6) |
| Toluene | µg/kg | ND (6.4) | 3.2 J | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.2) | ND (3.4) | ND (4) | ND (3.1) | ND (2.8) | ND (3) | ND (3) | ND (3) | ND (2.9) | ND (3.9) | ND (3.3) |
| trans-1,3-Dichloropropene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Trichloroethene | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Vinyl chloride | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |
| Xylene (total) | µg/kg | ND (6.4) | ND (6.9) | ND (8) | ND (6.2) | ND (5.6) | ND (5.9) | ND (6) | ND (6) | ND (5.7) | ND (7.9) | ND (6.6) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X243Y257*** | ***B-X243Y257*** | ***B-X243Y257*** | ***SD-X196Y272*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X171Y157*** |
| ***Sample ID:*** | | ***S-030502-MG-150*** | ***S-030502-MG-151*** | ***S-030502-MG-152*** | ***S-031402-JW-1429*** | ***S-010902-MG-021*** | ***S-010902-MG-022*** | ***S-010902-MG-023*** | ***S-032102-MG-203*** | ***S-032102-MG-204*** | ***S-032102-MG-205*** | ***S-032202-MG-206*** |
| ***Sample Date:*** | | ***3/5/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/14/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/22/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(6-8)*** | ***(14-16)*** | ***(0-0.33)*** | ***(0-2)*** | ***(6-8)*** | ***(16-18)*** | ***(0-2)*** | ***(6-8)*** | ***(19.5-21.5)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,4,5-Trichlorophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,4,6-Trichlorophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,4-Dichlorophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,4-Dimethylphenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 2,4-Dinitrotoluene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2,6-Dinitrotoluene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2-Chloronaphthalene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2-Chlorophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2-Methylnaphthalene | µg/kg | ND (430) | 58 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2-Methylphenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 2-Nitrophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 4-Chloro-3-methylphenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 4-Chloroaniline | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 4-Methylphenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) UJ | ND (2100) UJ | ND (2100) UJ | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| Acenaphthene | µg/kg | ND (430) | 520 | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Acenaphthylene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Acetophenone | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Anthracene | µg/kg | ND (430) | 57 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Atrazine | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzaldehyde | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzo(a)anthracene | µg/kg | ND (430) | 120 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzo(a)pyrene | µg/kg | ND (430) | 120 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzo(b)fluoranthene | µg/kg | ND (430) | 150 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzo(g,h,i)perylene | µg/kg | ND (430) | 83 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Benzo(k)fluoranthene | µg/kg | ND (430) | 78 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Biphenyl | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| bis(2-Chloroethyl)ether | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (430) | 200 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Butyl benzylphthalate | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Caprolactam | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Carbazole | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Chrysene | µg/kg | ND (430) | 170 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Dibenz(a,h)anthracene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Dibenzofuran | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Diethyl phthalate | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Dimethyl phthalate | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Di-n-butylphthalate | µg/kg | ND (430) | ND (380) | ND (410) | 530 | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Di-n-octyl phthalate | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Fluoranthene | µg/kg | ND (430) | 230 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Fluorene | µg/kg | ND (430) | 82 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A004*** | ***A004*** | ***A004*** | ***A004*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A005*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X243Y257*** | ***B-X243Y257*** | ***B-X243Y257*** | ***SD-X196Y272*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X165Y179*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X170Y143*** | ***B-X171Y157*** |
| ***Sample ID:*** | | ***S-030502-MG-150*** | ***S-030502-MG-151*** | ***S-030502-MG-152*** | ***S-031402-JW-1429*** | ***S-010902-MG-021*** | ***S-010902-MG-022*** | ***S-010902-MG-023*** | ***S-032102-MG-203*** | ***S-032102-MG-204*** | ***S-032102-MG-205*** | ***S-032202-MG-206*** |
| ***Sample Date:*** | | ***3/5/2002*** | ***3/5/2002*** | ***3/5/2002*** | ***3/14/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/21/2002*** | ***3/22/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(6-8)*** | ***(14-16)*** | ***(0-0.33)*** | ***(0-2)*** | ***(6-8)*** | ***(16-18)*** | ***(0-2)*** | ***(6-8)*** | ***(19.5-21.5)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Hexachlorobutadiene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (1800) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2100) | ND (1800) | ND (1900) | ND (2100) | ND (2100) |
| Hexachloroethane | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Isophorone | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Naphthalene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Nitrobenzene | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| N-Nitrosodiphenylamine | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Pentachlorophenol | µg/kg | ND (430) | ND (380) | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Phenanthrene | µg/kg | ND (430) | 410 | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Phenol | µg/kg | ND (430) | ND (380) | ND (410) | 220 J | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| Pyrene | µg/kg | ND (430) | 240 J | ND (410) | ND (420) | ND (420) | ND (440) | ND (440) | ND (360) | ND (390) | ND (440) | ND (430) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 15100 | 11100 | 16900 | 31800 | 14800 | 12500 | 3410 | 1570 | 1200 | 10900 | 14400 |
| Antimony | mg/kg | ND (7.9) UJ | ND (6.9) UJ | ND (7.5) UJ | ND (7.7) | ND (7.6) UJ | ND (8.0) UJ | ND (8.0) UJ | ND (6.6) | ND (7.0) | ND (39.6) | 0.79 J |
| Arsenic | mg/kg | 10.7 | 2.0 | 20.2 | 7.3 | 8.5 | 7.4 | 9.6 | 1.5 | 1.1 J | 12.9 | 8.2 |
| Barium | mg/kg | 65.6 | 64.5 | 65.5 | 69.8 | 76.5 | 25.1 J | 15.3 J | 12.2 J | 8.9 J | 87.9 J | 38.9 |
| Beryllium | mg/kg | ND (0.88) U | ND (0.58) U | ND (0.83) U | ND (0.68) U | 0.26 J | 0.58 J | 0.48 J | ND (0.55) | ND (0.58) | 2.4 J | 0.21 J |
| Cadmium | mg/kg | ND (0.66) | 0.60 | ND (0.62) | ND (0.64) | 0.16 J | 0.25 J | 1.5 | 0.28 J | 0.24 J | 0.41 J | ND (0.66) UJ |
| Chromium Total | mg/kg | 32.3 | 176 | 26.0 | 39.1 | 23.0 J | 37.8 J | 6.9 J | 7.7 | 4.5 | 26.6 | 44.9 J |
| Cobalt | mg/kg | 5.4 J | 218 | 15.3 | 31.9 | 5.1 J | 3.2 J | 4.5 J | 1.1 J | 0.84 J | 6.9 J | 1.9 J |
| Copper | mg/kg | 16.1 | 400 | 15.7 | 184 | 16.2 J | 15.0 J | 8.8 J | 16.7 | 12.9 | 18.1 | 11.3 |
| Cyanide (amenable) | mg/kg | ND (0.66) | ND (0.58) | ND (0.62) | ND (0.64) | ND (0.63) | ND (0.67) | ND (0.67) | ND (0.55) | ND (0.58) | ND (0.66) | ND (0.66) |
| Cyanide (total) | mg/kg | ND (0.66) | 0.27 J | ND (0.62) | ND (0.64) | ND (0.63) | ND (0.67) | ND (0.67) | ND (0.55) | ND (0.58) | ND (0.66) | ND (0.66) |
| Iron | mg/kg | 34100 | 9190 | 33500 | 20900 | 24200 J | 39700 J | 17000 J | 3330 | 2550 | 19800 | 31100 |
| Lead | mg/kg | 15.9 | 63.2 | 20.0 | 26.9 | 13.4 J | 15.5 J | 8.5 J | 56.5 | 30.1 | 16.3 | 14.0 |
| Manganese | mg/kg | 211 | 159 | 590 | 523 | 181 J | 27.1 J | 308 J | 39.9 | 30.3 | 215 | 65.1 |
| Mercury | mg/kg | 0.13 | 33.7 | 0.089 J | ND (0.13) U | 0.17 J | 0.030 J | 0.013 J | 0.030 J | 0.023 J | 0.086 J | 0.12 J |
| Nickel | mg/kg | 12.9 | 476 | 17.5 | 86.8 | 12.9 J | 12.9 J | 20.6 J | 11.5 | 7.2 | 103 | 9.5 |
| Selenium | mg/kg | ND (0.66) | ND (0.58) | ND (0.62) | ND (0.64) | ND (0.63) | ND (0.67) | ND (0.67) | ND (0.55) | ND (0.58) | 0.52 J | 0.81 |
| Silver | mg/kg | ND (1.3) | 2.9 | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | 0.17 J | ND (1.2) | ND (6.6) | ND (1.3) |
| Thallium | mg/kg | ND (1.3) | 0.59 J | ND (1.2) | 1.0 J | ND (1.3) | ND (1.3) | ND (1.3) U | 0.57 J | ND (1.2) | 3.3 J | ND (1.3) |
| Vanadium | mg/kg | 53.3 | 5.6 J | 55.3 | 26.7 | 34.0 | 57.1 | 6.6 J | 3.1 J | 2.1 J | 23.4 J | 77.5 |
| Zinc | mg/kg | 37.8 | 122 | 68.6 | 122 | 45.6 J | 42.6 J | 22.3 J | 40.3 | 38.3 | 110 | 31.8 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (15000) | ND (41) | ND (42) | ND (42) | ND (44) | ND (44) | ND (180) | ND (77) | ND (44) | ND (43) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (15000) | ND (41) | ND (42) | ND (42) | ND (44) | ND (44) | ND (180) | ND (77) | ND (44) | ND (43) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (15000) | ND (41) | ND (42) | ND (42) | ND (44) | ND (44) | ND (180) | ND (77) | ND (44) | ND (43) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | 170000 | 24 J | ND (42) | ND (42) | ND (44) | ND (44) | ND (180) | ND (77) | 93 | ND (43) |
| Aroclor-1248 (PCB-1248) | µg/kg | 62 | ND (15000) | ND (41) | 490 | 10 J | ND (44) | 6.4 J | ND (180) | ND (77) | ND (44) | ND (43) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (15000) | ND (41) | ND (42) | ND (42) | ND (44) | ND (44) | 910 | 550 | ND (44) | ND (43) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | ND (15000) | ND (41) | 84 | ND (42) | ND (44) | ND (44) | ND (180) | ND (77) | ND (44) | ND (43) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 76.1 | 86.5 | 80.2 | 77.7 | 79.1 | 75.2 | 74.6 | 90.6 | 85.7 | 75.8 | 76.0 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X171Y157* | *B-X171Y157* | *B-X171Y157* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y179* | *B-X176Y179* | *B-X176Y179* | *B-X176Y187* |
| *Sample ID:* | | *S-032202-MG-207* | *S-032202-MG-208* | *S-032202-MG-209* | *S-010902-MG-017* | *S-010902-MG-018* | *S-010902-MG-019* | *S-010902-MG-020* | *S-022202-MG-128* | *S-022202-MG-129* | *S-022202-MG-130* | *S-022102-MG-122* |
| *Sample Date:* | | *3/22/2002* | *3/22/2002* | *3/22/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *2/22/2002* | *2/22/2002* | *2/22/2002* | *2/21/2002* |
| *Sample Depth:* | | *(6-8)* | *(18-20)* | *(18-20)* | *(0-2)* | *(6-8)* | *(21-23)* | *(21-23)* | *(3.5-5)* | *(6-8)* | *(24-26)* | *(0-2)* |
| | | | | *Duplicate* | | | | *Duplicate* | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| 1,1,2-Trichloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,1-Dichloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,1-Dichloroethene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) | ND (14) | ND (13) | ND (10) UJ | ND (11) UJ | ND (11) UJ | ND (13) UJ | ND (13) UJ | ND (13) UJ | ND (14) | ND (14) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,2-Dichlorobenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| 1,2-Dichloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,2-Dichloropropane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| 1,3-Dichlorobenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| 1,4-Dichlorobenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (25) | ND (27) | ND (27) | ND (20) | ND (22) | ND (23) | ND (26) | 25 J | ND (27) U | ND (29) | ND (28) |
| 2-Hexanone | µg/kg | ND (25) | ND (27) | ND (27) | ND (20) | ND (22) | ND (23) | ND (26) | ND (26) | ND (27) | ND (29) | ND (28) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (25) | ND (27) | ND (27) | ND (20) | ND (22) | ND (23) | ND (26) | ND (26) | ND (27) | ND (29) | ND (28) |
| Acetone | µg/kg | ND (25) U | ND (27) | ND (27) | ND (20) U | ND (22) U | ND (23) U | ND (26) U | 130 J | ND (27) UJ | ND (29) UJ | ND (28) UJ |
| Benzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Bromodichloromethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Bromoform | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) UJ | ND (7.2) | ND (7.1) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6.1) UJ | ND (6.8) UJ | ND (6.7) UJ | ND (5.1) UJ | ND (5.4) UJ | ND (5.7) UJ | ND (6.6) UJ | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Carbon disulfide | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Carbon tetrachloride | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Chlorobenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Chloroethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Chloroform (Trichloromethane) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) UJ | ND (6.7) | ND (7.2) UJ | ND (7.1) UJ |
| cis-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (3.4) | ND (3.3) | ND (2.5) | ND (2.7) | ND (2.8) | ND (3.3) | ND (3.2) | ND (3.4) | 1.6 J | ND (3.5) |
| cis-1,3-Dichloropropene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Cyclohexane | µg/kg | ND (12) | ND (14) | ND (13) | ND (10) | ND (11) | ND (11) | ND (13) | ND (13) UJ | ND (13) UJ | ND (14) | ND (14) |
| Dibromochloromethane | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) U | ND (5.4) U | ND (5.7) U | ND (6.6) U | ND (6.4) UJ | ND (6.7) | ND (7.2) UJ | ND (7.1) UJ |
| Ethylbenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Isopropylbenzene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Methyl acetate | µg/kg | ND (12) | ND (14) | ND (13) | ND (10) | ND (11) | ND (11) | ND (13) | ND (13) UJ | ND (13) UJ | ND (14) | ND (14) |
| Methyl cyclohexane | µg/kg | ND (12) | ND (14) | ND (13) | ND (10) | ND (11) | ND (11) | ND (13) | ND (13) UJ | ND (13) UJ | ND (14) | ND (14) |
| Methyl Tert Butyl Ether | µg/kg | ND (25) | ND (27) | ND (27) | ND (20) | ND (22) | ND (23) | ND (26) | ND (26) | ND (27) | ND (29) | ND (28) |
| Methylene chloride | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) U | ND (5.4) | ND (5.7) U | ND (6.6) U | 16 | 12 | 10 | 14 |
| Styrene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Tetrachloroethene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Toluene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | 1.1 J | ND (6.7) | ND (7.2) | ND (7.1) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (3.4) | ND (3.3) | ND (2.5) | ND (2.7) | ND (2.8) | ND (3.3) | ND (3.2) | ND (3.4) | ND (3.6) | ND (3.5) |
| trans-1,3-Dichloropropene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Trichloroethene | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Vinyl chloride | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |
| Xylene (total) | µg/kg | ND (6.1) | ND (6.8) | ND (6.7) | ND (5.1) | ND (5.4) | ND (5.7) | ND (6.6) | ND (6.4) | ND (6.7) | ND (7.2) | ND (7.1) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X171Y157* | *B-X171Y157* | *B-X171Y157* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y179* | *B-X176Y179* | *B-X176Y179* | *B-X176Y187* |
| *Sample ID:* | | *S-032202-MG-207* | *S-032202-MG-208* | *S-032202-MG-209* | *S-010902-MG-017* | *S-010902-MG-018* | *S-010902-MG-019* | *S-010902-MG-020* | *S-022202-MG-128* | *S-022202-MG-129* | *S-022202-MG-130* | *S-022102-MG-122* |
| *Sample Date:* | | *3/22/2002* | *3/22/2002* | *3/22/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *2/22/2002* | *2/22/2002* | *2/22/2002* | *2/21/2002* |
| *Sample Depth:* | | *(6-8)* | *(18-20)* | *(18-20)* | *(0-2)* | *(6-8)* | *(21-23)* | *(21-23)* | *(3.5-5)* | *(6-8)* | *(24-26)* | *(0-2)* |
| | | | | *Duplicate* | | | | *Duplicate* | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,4,5-Trichlorophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,4,6-Trichlorophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,4-Dichlorophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,4-Dimethylphenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 2,4-Dinitrotoluene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2,6-Dinitrotoluene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2-Chloronaphthalene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2-Chlorophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2-Methylnaphthalene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2-Methylphenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 2-Nitrophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 4-Chloro-3-methylphenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 4-Chloroaniline | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 4-Methylphenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) UJ | ND (1900) UJ | ND (2000) UJ | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| Acenaphthene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Acenaphthylene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Acetophenone | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Anthracene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Atrazine | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzaldehyde | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzo(a)anthracene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzo(a)pyrene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzo(b)fluoranthene | µg/kg | ND (410) | ND (410) | ND (400) | 66 J | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzo(g,h,i)perylene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Benzo(k)fluoranthene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Biphenyl | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| bis(2-Chloroethyl)ether | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) U | ND (390) U | ND (440) U | ND (410) |
| Butyl benzylphthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Caprolactam | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Carbazole | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Chrysene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Dibenz(a,h)anthracene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Dibenzofuran | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Diethyl phthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Dimethyl phthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Di-n-butylphthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Di-n-octyl phthalate | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Fluoranthene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Fluorene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X171Y157* | *B-X171Y157* | *B-X171Y157* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y143* | *B-X176Y179* | *B-X176Y179* | *B-X176Y179* | *B-X176Y187* |
| *Sample ID:* | | *S-032202-MG-207* | *S-032202-MG-208* | *S-032202-MG-209* | *S-010902-MG-017* | *S-010902-MG-018* | *S-010902-MG-019* | *S-010902-MG-020* | *S-022202-MG-128* | *S-022202-MG-129* | *S-022202-MG-130* | *S-022102-MG-122* |
| *Sample Date:* | | *3/22/2002* | *3/22/2002* | *3/22/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *1/9/2002* | *2/22/2002* | *2/22/2002* | *2/22/2002* | *2/21/2002* |
| *Sample Depth:* | | *(6-8)* | *(18-20)* | *(18-20)* | *(0-2)* | *(6-8)* | *(21-23)* | *(21-23)* | *(3.5-5)* | *(6-8)* | *(24-26)* | *(0-2)* |
| | | | | *Duplicate* | | | | *Duplicate* | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Hexachlorobutadiene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (2000) | ND (1900) | ND (1800) | ND (19000) | ND (1900) | ND (2000) | ND (1900) | ND (1900) | ND (2100) | ND (2000) |
| Hexachloroethane | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Isophorone | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Naphthalene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Nitrobenzene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| N-Nitrosodiphenylamine | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Pentachlorophenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Phenanthrene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Phenol | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | ND (390) | ND (390) | ND (440) | ND (410) |
| Pyrene | µg/kg | ND (410) | ND (410) | ND (400) | ND (370) | ND (3900) | ND (400) | ND (420) | 61 J | ND (390) | ND (440) | ND (410) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 4650 | 8200 | 6400 | 2170 | 5240 | 7170 | 12000 | 2330 | 6190 | 14600 | 12600 |
| Antimony | mg/kg | R | R | R | ND (6.8) UJ | 2.5 J | ND (7.3) UJ | ND (7.6) UJ | ND (7.0) | 0.91 J | ND (15.9) | ND (7.5) |
| Arsenic | mg/kg | 3.1 | 5.1 | 5.6 | 1.3 | 3.9 | 5.9 | 5.4 | 2.3 | 1.5 | 9.7 | 7.1 |
| Barium | mg/kg | 13.6 J | 17.1 J | 37.5 J | 9.2 J | 26.0 | 68.8 | 55.9 | 13 J | 23.6 | 91.7 | 103 |
| Beryllium | mg/kg | 0.19 J | 2.3 | 1.6 | ND (0.57) U | ND (0.59) U | 0.82 | 0.38 J | ND (0.59) U | ND (0.59) | 1.5 | 0.61 J |
| Cadmium | mg/kg | ND (0.62) UJ | 1.2 J | 2.0 J | 0.58 | 0.54 J | 0.16 J | 0.075 J | 0.68 | 0.89 | 0.53 J | ND (0.63) U |
| Chromium Total | mg/kg | 15.8 J | 32.7 J | 11.1 J | 6.3 J | 12.9 J | 15.6 J | 28.3 J | 8.3 | 92.1 | 27.1 | 13.2 |
| Cobalt | mg/kg | 1.4 J | 10.1 | 10.6 J | 2.7 J | 3.9 J | 8.2 J | 3.4 J | 4 J | 37.3 | 18.8 | 11.2 |
| Copper | mg/kg | 4.9 | 22.4 | 20.3 | 18.2 J | 107 J | 11.9 J | 6.1 J | 34.2 | 228 | 18.1 | 12.5 |
| Cyanide (amenable) | mg/kg | ND (0.62) | ND (0.63) | ND (0.61) | ND (0.57) | ND (0.59) | ND (0.60) | ND (0.63) | ND (0.59) | ND (0.59) | ND (0.66) | ND (0.63) |
| Cyanide (total) | mg/kg | ND (0.62) | ND (0.63) | ND (0.61) | ND (0.57) | ND (0.59) | ND (0.60) | ND (0.63) | ND (0.59) | ND (0.59) | ND (0.66) | ND (0.63) |
| Iron | mg/kg | 13900 | 25200 | 16600 | 3030 J | 10600 J | 19100 J | 12100 J | 6500 | 4650 | 31100 | 16600 |
| Lead | mg/kg | 8.7 | 29.2 | 44.8 | 5.8 J | 71.0 J | 10.6 J | 15.4 J | 79.6 | 125 | 25.8 | 13.2 |
| Manganese | mg/kg | 48.3 | 403 | 562 | 70.0 J | 117 J | 162 J | 89.2 J | 154 | 135 | 320 | 947 |
| Mercury | mg/kg | ND (0.12) | 0.036 J | 0.041 J | 0.048 J | 0.11 J | 0.062 J | 0.064 J | 0.1 J | 0.065 J | 0.087 J | 0.068 J |
| Nickel | mg/kg | 6.0 | 42.0 | 37.2 | 9.1 J | 19.3 J | 17.6 J | 6.6 J | 360 | 18 | 38.6 | 12.8 |
| Selenium | mg/kg | 0.73 | 0.55 J | 0.90 J | ND (0.57) | ND (0.59) | ND (0.60) | ND (0.63) | ND (0.59) | ND (0.59) | ND (1.3) | ND (0.63) |
| Silver | mg/kg | ND (1.2) | ND (1.3) | ND (2.4) | ND (1.1) | ND (1.2) | ND (1.2) | ND (1.3) | ND (1.2) | ND (1.2) | ND (2.6) | ND (1.3) |
| Thallium | mg/kg | ND (1.2) | 1.1 J | 0.98 J | ND (1.1) U | ND (1.2) U | ND (1.2) U | ND (1.3) | ND (1.2) | ND (1.2) | ND (2.6) | ND (1.3) |
| Vanadium | mg/kg | 27.1 | 28.2 | 17.7 | 5.8 | 9.6 | 16.9 | 30.8 | 6.3 | 3.5 J | 37.2 | 26.8 |
| Zinc | mg/kg | 19.7 | 151 | 113 | 37.9 J | 86.0 J | 25.9 J | 17.8 J | 85.9 | 132 | 92 | 39.9 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (41) | ND (41) | ND (40) | ND (1900) | ND (19000) | ND (40) | ND (42) | ND (77) | ND (190) | ND (44) | ND (83) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (41) | ND (41) | ND (40) | ND (1900) | ND (19000) | ND (40) | ND (42) | ND (77) | ND (190) | ND (44) | ND (83) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (41) | ND (41) | ND (40) | ND (1900) | ND (19000) | ND (40) | ND (42) | ND (77) | ND (190) | ND (44) | ND (83) |
| Aroclor-1242 (PCB-1242) | µg/kg | 130 | ND (41) | ND (40) | ND (1900) | 210000 | ND (40) | ND (42) | ND (77) | ND (190) | ND (44) | ND (83) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (41) | ND (41) | ND (40) | 7200 | ND (19000) | 5.8 J | ND (42) | 900 | ND (190) | ND (44) | 730 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (41) | ND (41) | ND (40) | ND (1900) | ND (19000) | ND (40) | ND (42) | ND (77) | 1400 | ND (44) | ND (83) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (41) | ND (41) | ND (40) | 5900 | 29000 | ND (40) | ND (42) | 430 | ND (190) | ND (44) UJ | 66 J |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 80.8 | 79.9 | 82.3 | 88.1 | 84.8 | 82.7 | 78.9 | 85.4 | 84.7 | 75.7 | 79.9 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X176Y187* | *B-X176Y187* | *B-X176Y187* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* |
| *Sample ID:* | | *S-022102-MG-123* | *S-022102-MG-124* | *S-022102-MG-125* | *S-011002-MG-024* | *S-011002-MG-025* | *S-011002-MG-026* | *S-011002-MG-027* | *S-032002-MG-195* | *S-032002-MG-196* | *S-032002-MG-197* | *S-032002-MG-198* |
| *Sample Date:* | | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* |
| *Sample Depth:* | | *(0-2)* | *(8-10)* | *(36-38)* | *(0-2)* | *(6-8)* | *(14-15)* | *(33.5-35.5)* | *(1-3)* | *(1-3)* | *(6-8)* | *(18-20)* |
| | | *Duplicate* | | | | | | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6) | R | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,1,2-Trichloroethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,1-Dichloroethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,1-Dichloroethene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6) | R | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | 210 J |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) | R | ND (13) | ND (13) | ND (11) | ND (10) | ND (11) | ND (11) | ND (11) | ND (11) | ND (4500) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,2-Dichlorobenzene | µg/kg | ND (6) | R | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | 1200 J |
| 1,2-Dichloroethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,2-Dichloropropane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| 1,3-Dichlorobenzene | µg/kg | ND (6) | R | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | 20000 |
| 1,4-Dichlorobenzene | µg/kg | ND (6) | R | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | 0.95 J | ND (5.6) | ND (5.6) | 54000 |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (24) | ND (25) | ND (25) | ND (26) | ND (21) | ND (20) | ND (23) U | ND (22) | ND (22) | 3.2 J | ND (8900) |
| 2-Hexanone | µg/kg | ND (24) | ND (25) | ND (25) | ND (26) | ND (21) | ND (20) | ND (23) | ND (22) | ND (22) | ND (23) | ND (8900) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (24) | ND (25) | ND (25) | ND (26) UJ | ND (21) UJ | ND (20) UJ | ND (23) UJ | ND (22) | ND (22) | ND (23) | ND (8900) |
| Acetone | µg/kg | ND (24) UJ | ND (25) UJ | ND (25) UJ | ND (26) | ND (21) U | ND (20) U | ND (23) U | 4.7 J | 6.9 J | 8.5 J | ND (8900) |
| Benzene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Bromodichloromethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Bromoform | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) UJ | ND (5.4) UJ | ND (5) UJ | ND (5.7) UJ | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Carbon disulfide | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | 1 J | ND (2200) |
| Carbon tetrachloride | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Chlorobenzene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | 2000 J |
| Chloroethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Chloroform (Trichloromethane) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6) UJ | ND (6.4) UJ | ND (6.4) UJ | ND (6.6) UJ | ND (5.4) UJ | ND (5) UJ | ND (5.7) UJ | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| cis-1,2-Dichloroethene | µg/kg | ND (3) | ND (3.2) | ND (3.2) | ND (3.3) | ND (2.7) | ND (2.5) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.8) | ND (1100) |
| cis-1,3-Dichloropropene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Cyclohexane | µg/kg | ND (12) | R | ND (13) | ND (13) | ND (11) | ND (10) | ND (11) | ND (11) | ND (11) | ND (11) | ND (4500) |
| Dibromochloromethane | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6) UJ | ND (6.4) UJ | ND (6.4) UJ | ND (6.6) UJ | ND (5.4) UJ | ND (5) UJ | ND (5.7) UJ | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Ethylbenzene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | 4.4 J | ND (2200) |
| Isopropylbenzene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | 2.9 J | ND (5.7) | ND (5.5) | ND (5.6) | 7.8 | ND (2200) |
| Methyl acetate | µg/kg | ND (12) | R | ND (13) | ND (13) UJ | ND (11) UJ | ND (10) UJ | ND (11) UJ | ND (11) | ND (11) | ND (11) | ND (4500) |
| Methyl cyclohexane | µg/kg | ND (12) | R | ND (13) | ND (13) | ND (11) | ND (10) | ND (11) | ND (11) | ND (11) | 29 | ND (4500) |
| Methyl Tert Butyl Ether | µg/kg | ND (24) | ND (25) | ND (25) | ND (26) | ND (21) | ND (20) | ND (23) | ND (22) | ND (22) | ND (23) | ND (8900) |
| Methylene chloride | µg/kg | 23 | 4.1 J | 3.7 J | ND (6.6) | ND (5.4) U | ND (5) U | ND (5.7) U | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Styrene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Tetrachloroethene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Toluene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | 140 J |
| trans-1,2-Dichloroethene | µg/kg | ND (3) | ND (3.2) | ND (3.2) | ND (3.3) | ND (2.7) | ND (2.5) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.8) | ND (1100) |
| trans-1,3-Dichloropropene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Trichloroethene | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) UJ | ND (5.4) UJ | ND (5) UJ | ND (5.7) UJ | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) UJ | ND (5.4) UJ | ND (5) UJ | ND (5.7) UJ | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Vinyl chloride | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | ND (5.6) | ND (2200) |
| Xylene (total) | µg/kg | ND (6) | ND (6.4) | ND (6.4) | ND (6.6) | ND (5.4) | ND (5) | ND (5.7) | ND (5.5) | ND (5.6) | 3 J | 170 J |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X176Y187* | *B-X176Y187* | *B-X176Y187* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* |
| *Sample ID:* | | *S-022102-MG-123* | *S-022102-MG-124* | *S-022102-MG-125* | *S-011002-MG-024* | *S-011002-MG-025* | *S-011002-MG-026* | *S-011002-MG-027* | *S-032002-MG-195* | *S-032002-MG-196* | *S-032002-MG-197* | *S-032002-MG-198* |
| *Sample Date:* | | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* |
| *Sample Depth:* | | *(0-2)* | *(8-10)* | *(36-38)* | *(0-2)* | *(6-8)* | *(14-15)* | *(33.5-35.5)* | *(1-3)* | *(1-3)* | *(6-8)* | *(18-20)* |
| | | *Duplicate* | | | | | | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | 4900 | ND (21000) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) UJ |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2-Methylnaphthalene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 2-Methylphenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | 61 J | ND (21000) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| 4-Methylphenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | 110 J | ND (21000) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| Acenaphthene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Acenaphthylene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Acetophenone | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Anthracene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Atrazine | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Benzaldehyde | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Benzo(b)fluoranthene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) UJ | ND (400) UJ | ND (400) UJ | ND (21000) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Biphenyl | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | 9900 J |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Caprolactam | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Carbazole | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Chrysene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Dibenzofuran | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Diethyl phthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Di-n-butylphthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | 67 J | ND (410) | ND (390) | 81 J | ND (400) | 9500 J |
| Fluoranthene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Fluorene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X176Y187* | *B-X176Y187* | *B-X176Y187* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X185Y185* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* | *B-X186Y159* |
| *Sample ID:* | | *S-022102-MG-123* | *S-022102-MG-124* | *S-022102-MG-125* | *S-011002-MG-024* | *S-011002-MG-025* | *S-011002-MG-026* | *S-011002-MG-027* | *S-032002-MG-195* | *S-032002-MG-196* | *S-032002-MG-197* | *S-032002-MG-198* |
| *Sample Date:* | | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* | *3/20/2002* |
| *Sample Depth:* | | *(0-2)* | *(8-10)* | *(36-38)* | *(0-2)* | *(6-8)* | *(14-15)* | *(33.5-35.5)* | *(1-3)* | *(1-3)* | *(6-8)* | *(18-20)* |
| | | *Duplicate* | | | | | | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (1900) | ND (2100) | ND (2100) | ND (1900) | ND (1900) | ND (2000) | ND (1900) | ND (2000) | ND (1900) | ND (100000) |
| Hexachloroethane | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Isophorone | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Naphthalene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Nitrobenzene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Pentachlorophenol | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Phenanthrene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Phenol | µg/kg | ND (420) | 150 J | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| Pyrene | µg/kg | ND (420) | ND (400) | ND (440) | ND (440) | ND (380) | ND (400) | ND (410) | ND (390) | ND (400) | ND (400) | ND (21000) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 4090 | 2600 | 2090 | 11800 | 6770 | 8860 | 9960 | 10000 | 8510 | 6280 | 10700 |
| Antimony | mg/kg | ND (7.6) | 0.81 J | ND (7.9) | ND (8.0) | ND (7.0) | ND (7.2) | ND (7.5) | 0.59 J | 0.71 J | 2.8 J | 0.78 J |
| Arsenic | mg/kg | 5.6 | 2.3 | 2.1 | 9.4 | 5.0 | 6.5 | 4.2 | 7.0 | 6.1 | 3.6 | 9.9 |
| Barium | mg/kg | 105 | 21.5 J | 52.1 | 130 | 47.8 | 50.3 | 97.6 | 46.0 | 49.0 | 40.6 | 81.9 |
| Beryllium | mg/kg | 0.67 | ND (0.60) U | 0.42 J | 1.1 | ND (0.58) U | 0.37 J | 0.91 | 0.44 J | 0.36 J | 0.37 J | 0.68 |
| Cadmium | mg/kg | ND (0.63) U | 0.91 | 0.39 J | ND (0.67) | ND (0.58) U | ND (0.60) | ND (0.62) U | 0.34 J | 0.33 J | 0.53 J | 0.81 |
| Chromium Total | mg/kg | 6.6 | 11.7 | 3.8 | 22.9 | 14.4 | 18.7 | 12.4 | 25.4 | 18.7 | 12.1 | 30.1 |
| Cobalt | mg/kg | 15 | 3.2 J | 7.7 | 17.9 | 3.5 J | 4.1 J | 10.2 | 10.2 | 8.7 | 5.6 J | 22.2 |
| Copper | mg/kg | 8.4 | 65.4 | 6.6 | 23.5 | 12.7 | 13.8 | 10.1 | 44.8 | 27.5 | 78.8 | 77.3 |
| Cyanide (amenable) | mg/kg | ND (0.63) | ND (0.60) | ND (0.66) | ND (0.67) | ND (0.58) | ND (0.60) | ND (0.62) | ND (0.60) | ND (0.61) | ND (0.61) | ND (0.63) |
| Cyanide (total) | mg/kg | ND (0.63) | ND (0.60) | ND (0.66) | ND (0.67) | ND (0.58) | ND (0.60) | ND (0.62) | ND (0.60) | ND (0.61) | ND (0.61) | ND (0.63) |
| Iron | mg/kg | 8360 | 6700 | 6530 | 20700 | 15000 | 19300 | 17900 | 19000 J | 20400 J | 11400 J | 20400 J |
| Lead | mg/kg | 15.5 | 108 | 4.6 | 20.1 | 15.5 | 13.7 | 15.4 | 36.7 | 24.9 | 80.8 | 60.0 |
| Manganese | mg/kg | 1490 | 111 | 186 | 1640 J | 202 J | 219 J | 273 J | 179 | 230 | 885 | 212 |
| Mercury | mg/kg | 0.065 J | 0.073 J | 0.016 J | 0.075 J | 0.019 J | 0.035 J | 0.024 J | 0.014 J | 0.081 J | 0.28 | 0.072 J |
| Nickel | mg/kg | 4.7 J | 31.8 | 11.7 | 16.3 | 6.7 | 6.8 | 22.9 | 39.1 | 17.8 | 12.6 | 39.4 |
| Selenium | mg/kg | ND (0.63) | ND (0.60) | ND (0.66) | ND (0.67) U | ND (0.58) U | ND (0.60) U | ND (0.62) U | ND (0.60) | ND (0.61) | ND (0.61) | ND (0.63) |
| Silver | mg/kg | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.3) |
| Thallium | mg/kg | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.2) | 0.81 J | ND (1.2) | 0.62 J | ND (1.2) | 0.84 J |
| Vanadium | mg/kg | 16 | 4.3 J | 5.4 J | 32.4 | 24.5 | 33.1 | 12.0 | 28.4 | 27.4 | 15.8 | 31.1 |
| Zinc | mg/kg | 14.5 | 98 | 14.1 | 46.0 J | 32.4 J | 27.5 J | 42.3 J | 72.8 | 70.5 | 105 | 154 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (83) | ND (40) | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | ND (2000) | ND (2000) | ND (8000) | ND (210000) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (83) | ND (40) | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | ND (2000) | ND (2000) | ND (8000) | ND (210000) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (83) | ND (40) | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | ND (2000) | ND (2000) | ND (8000) | ND (210000) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (83) | ND (40) | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | ND (2000) | ND (2000) | 82000 | 3200000 |
| Aroclor-1248 (PCB-1248) | µg/kg | 580 | ND (40) | ND (44) | 690 | 2400 | 10000 | ND (41) | 26000 | 19000 | ND (8000) | ND (210000) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (83) | 500 | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | ND (2000) | ND (2000) | ND (8000) | ND (210000) |
| Aroclor-1260 (PCB-1260) | µg/kg | 32 J | ND (40) | ND (44) | ND (44) | ND (380) | ND (2000) | ND (41) | 1300 J | 1300 J | 20000 | 73000 J |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 79.4 | 83.4 | 75.5 | 75.1 | 85.9 | 82.9 | 80.1 | 83.9 | 81.9 | 82.6 | 78.9 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X186Y159* | *B-X186Y180* | *B-X186Y180* | *B-X186Y180* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y194* | *B-X193Y194* | *SS-X195Y161* |
| *Sample ID:* | | *S-032002-MG-199* | *S-032102-MG-200* | *S-032102-MG-201* | *S-032102-MG-202* | *S-031802-MG-191* | *S-031802-MG-192* | *S-031802-MG-193* | *S-031802-MG-194* | *S-022102-MG-126* | *S-022102-MG-127* | *S-060302-MG-222* |
| *Sample Date:* | | *3/20/2002* | *3/21/2002* | *3/21/2002* | *3/21/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *2/21/2002* | *2/21/2002* | *6/3/2002* |
| *Sample Depth:* | | *(21-23)* | *(0-2)* | *(6-8)* | *(20-22)* | *(0-2)* | *(6-8)* | *(25-27)* | *(31-33)* | *(0-2)* | *(5-7)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,1,2-Trichloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,1-Dichloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,1-Dichloroethene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,2,4-Trichlorobenzene | µg/kg | 60 J | 17 J | 300 J | ND (6.5) | ND (6.8) | ND (7.2) U | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (740) | ND (10) UJ | ND (680) | ND (13) | ND (14) | ND (14) | ND (15) | ND (15) | ND (14) | ND (13) | -- |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,2-Dichlorobenzene | µg/kg | 58 J | 1.2 J | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,2-Dichloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,2-Dichloropropane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,3-Dichlorobenzene | µg/kg | 590 | 7.1 J | 79 J | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 1,4-Dichlorobenzene | µg/kg | 2100 | 2.8 J | 51 J | ND (6.5) | ND (6.8) | 1.4 J | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (1500) | 13 J | ND (1400) | ND (26) | ND (27) | 15 J | 16 J | 6.4 J | ND (29) | ND (25) | -- |
| 2-Hexanone | µg/kg | ND (1500) | ND (20) | ND (1400) | ND (26) | ND (27) | ND (29) | ND (29) | ND (30) | ND (29) | ND (25) | -- |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (1500) | ND (20) | ND (1400) | ND (26) | ND (27) | ND (29) | ND (29) | ND (30) | ND (29) | ND (25) | -- |
| Acetone | µg/kg | ND (1500) UJ | 36 | ND (1400) | 12 J | ND (27) | 190 | 54 | ND (30) U | ND (29) UJ | ND (25) UJ | -- |
| Benzene | µg/kg | ND (370) | 1.3 J | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | 1.2 J | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Bromodichloromethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Bromoform | µg/kg | ND (370) UJ | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) UJ | ND (7.2) UJ | ND (7.3) UJ | ND (7.4) UJ | ND (7.2) | ND (6.3) | -- |
| Bromomethane (Methyl Bromide) | µg/kg | ND (370) UJ | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) UJ | ND (7.2) UJ | ND (7.3) UJ | ND (7.4) UJ | ND (7.2) | ND (6.3) | -- |
| Carbon disulfide | µg/kg | ND (370) | 1.5 J | ND (340) | ND (6.5) | ND (6.8) | 2.5 J | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Carbon tetrachloride | µg/kg | ND (370) UJ | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Chlorobenzene | µg/kg | 180 J | 0.78 J | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Chloroethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Chloroform (Trichloromethane) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Chloromethane (Methyl Chloride) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) UJ | ND (6.3) UJ | -- |
| cis-1,2-Dichloroethene | µg/kg | ND (180) | ND (2.5) | ND (170) | ND (3.2) | ND (3.4) | ND (3.6) | ND (3.7) | ND (3.7) | ND (3.6) | ND (3.1) | -- |
| cis-1,3-Dichloropropene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Cyclohexane | µg/kg | ND (740) | ND (10) | ND (680) | ND (13) | ND (14) | ND (14) | ND (15) | ND (15) | ND (14) | ND (13) | -- |
| Dibromochloromethane | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) UJ | ND (6.3) UJ | -- |
| Ethylbenzene | µg/kg | ND (370) | 0.64 J | 43 J | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Isopropylbenzene | µg/kg | ND (370) | ND (5.1) | 14 J | ND (6.5) | ND (6.8) | ND (7.2) | 3.5 J | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Methyl acetate | µg/kg | ND (740) | 1.7 J | 200 J | ND (13) | ND (14) | ND (14) | ND (15) | ND (15) | ND (14) | ND (13) | -- |
| Methyl cyclohexane | µg/kg | ND (740) | ND (10) | ND (680) | ND (13) | ND (14) | 1.2 J | ND (15) | ND (15) | ND (14) | ND (13) | -- |
| Methyl Tert Butyl Ether | µg/kg | ND (1500) | ND (20) | ND (1400) | ND (26) | ND (27) | ND (29) | ND (29) | ND (30) | ND (29) | ND (25) | -- |
| Methylene chloride | µg/kg | ND (370) | ND (5.1) U | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | 17 | 2.5 J | -- |
| Styrene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Tetrachloroethene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Toluene | µg/kg | ND (370) | 1.6 J | 61 J | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| trans-1,2-Dichloroethene | µg/kg | ND (180) | ND (2.5) | ND (170) | ND (3.2) | ND (3.4) | ND (3.6) | ND (3.7) | ND (3.7) | ND (3.6) | ND (3.1) | -- |
| trans-1,3-Dichloropropene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Trichloroethene | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Vinyl chloride | µg/kg | ND (370) | ND (5.1) | ND (340) | ND (6.5) | ND (6.8) | ND (7.2) | ND (7.3) | ND (7.4) | ND (7.2) | ND (6.3) | -- |
| Xylene (total) | µg/kg | ND (370) | 2.1 J | 190 J | ND (6.5) | ND (6.8) | ND (7.2) | 3.1 J | ND (7.4) | ND (7.2) | ND (6.3) | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X186Y159* | *B-X186Y180* | *B-X186Y180* | *B-X186Y180* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y194* | *B-X193Y194* | *SS-X195Y161* |
| *Sample ID:* | | *S-032002-MG-199* | *S-032102-MG-200* | *S-032102-MG-201* | *S-032102-MG-202* | *S-031802-MG-191* | *S-031802-MG-192* | *S-031802-MG-193* | *S-031802-MG-194* | *S-022102-MG-126* | *S-022102-MG-127* | *S-060302-MG-222* |
| *Sample Date:* | | *3/20/2002* | *3/21/2002* | *3/21/2002* | *3/21/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *2/21/2002* | *2/21/2002* | *6/3/2002* |
| *Sample Depth:* | | *(21-23)* | *(0-2)* | *(6-8)* | *(20-22)* | *(0-2)* | *(6-8)* | *(25-27)* | *(31-33)* | *(0-2)* | *(5-7)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,4,5-Trichlorophenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,4,6-Trichlorophenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,4-Dichlorophenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,4-Dimethylphenol | µg/kg | ND (450) | ND (3800) | 150000 | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,4-Dinitrophenol | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 2,4-Dinitrotoluene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2,6-Dinitrotoluene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2-Chloronaphthalene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2-Chlorophenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2-Methylnaphthalene | µg/kg | ND (450) | ND (3800) | 620 J | ND (410) | ND (440) | 640 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2-Methylphenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 130 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 2-Nitroaniline | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 2-Nitrophenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 3-Nitroaniline | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2200) | ND (18000) UJ | ND (21000) UJ | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 4-Bromophenyl phenyl ether | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 4-Chloro-3-methylphenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 4-Chloroaniline | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 4-Methylphenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 140 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| 4-Nitroaniline | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| 4-Nitrophenol | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| Acenaphthene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Acenaphthylene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Acetophenone | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Anthracene | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Atrazine | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzaldehyde | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzo(a)anthracene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 64 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzo(a)pyrene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzo(b)fluoranthene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzo(g,h,i)perylene | µg/kg | ND (450) UJ | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Benzo(k)fluoranthene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Biphenyl | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| bis(2-Chloroethoxy)methane | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| bis(2-Chloroethyl)ether | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| bis(2-Ethylhexyl)phthalate | µg/kg | 1700 | ND (3800) | ND (4300) | ND (410) | ND (440) | 200 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Butyl benzylphthalate | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Caprolactam | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Carbazole | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Chrysene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 82 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Dibenz(a,h)anthracene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Dibenzofuran | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Diethyl phthalate | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Dimethyl phthalate | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Di-n-butylphthalate | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Di-n-octyl phthalate | µg/kg | 1900 | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Fluoranthene | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | 140 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Fluorene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X186Y159* | *B-X186Y180* | *B-X186Y180* | *B-X186Y180* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y172* | *B-X193Y194* | *B-X193Y194* | *SS-X195Y161* |
| *Sample ID:* | | *S-032002-MG-199* | *S-032102-MG-200* | *S-032102-MG-201* | *S-032102-MG-202* | *S-031802-MG-191* | *S-031802-MG-192* | *S-031802-MG-193* | *S-031802-MG-194* | *S-022102-MG-126* | *S-022102-MG-127* | *S-060302-MG-222* |
| *Sample Date:* | | *3/20/2002* | *3/21/2002* | *3/21/2002* | *3/21/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *3/18/2002* | *2/21/2002* | *2/21/2002* | *6/3/2002* |
| *Sample Depth:* | | *(21-23)* | *(0-2)* | *(6-8)* | *(20-22)* | *(0-2)* | *(6-8)* | *(25-27)* | *(31-33)* | *(0-2)* | *(5-7)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Hexachlorobutadiene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Hexachlorocyclopentadiene | µg/kg | ND (2200) | ND (18000) | ND (21000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) | ND (2300) | ND (2100) | ND (2200) | -- |
| Hexachloroethane | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Isophorone | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Naphthalene | µg/kg | ND (450) | ND (3800) | 760 J | ND (410) | ND (440) | 93 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Nitrobenzene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| N-Nitrosodi-n-propylamine | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| N-Nitrosodiphenylamine | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Pentachlorophenol | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | ND (370) | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Phenanthrene | µg/kg | ND (450) | ND (3800) UJ | ND (4300) UJ | ND (410) | ND (440) | 99 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Phenol | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 7500 | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| Pyrene | µg/kg | ND (450) | ND (3800) | ND (4300) | ND (410) | ND (440) | 160 J | ND (410) | ND (480) | ND (430) | ND (450) | -- |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 8980 | 4040 | 5630 | 11100 | 13000 | 4680 | 15800 | 6560 | 11600 | 6540 | -- |
| Antimony | mg/kg | 0.68 J | ND (6.9) | ND (7.7) | ND (15.0) | ND (8.0) UJ | ND (6.8) UJ | ND (7.5) UJ | ND (8.7) UJ | ND (7.7) | ND (8.2) | -- |
| Arsenic | mg/kg | 6.8 | 3.1 | 4.2 | 7.5 | 5.7 | 0.56 J | 7.2 | 5.3 | 6.3 | 7.5 | -- |
| Barium | mg/kg | 79.1 | 31.6 | 44.5 | 106 | 104 | 8.3 J | 61.2 | 52.1 | 76.4 | 70.5 | -- |
| Beryllium | mg/kg | 0.37 J | 0.25 J | 0.18 J | 3.4 | ND (0.91) U | ND (0.57) U | ND (0.62) U | ND (0.81) U | 0.56 J | 0.51 J | -- |
| Cadmium | mg/kg | 0.31 J | 0.41 J | 0.63 J | 0.23 J | ND (0.66) U | ND (0.57) U | ND (0.62) | 0.36 J | ND (0.65) U | ND (0.68) U | -- |
| Chromium Total | mg/kg | 18.7 | 11.5 | 29.0 | 13.5 | 15.2 | 14.1 | 14.2 | 10 | 11.7 | 13.4 | -- |
| Cobalt | mg/kg | 6.1 J | 4.1 J | 6.6 | 26.1 | 13.8 | 0.98 J | 11.4 | 4.5 J | 26.5 | 1.6 J | -- |
| Copper | mg/kg | 24.4 | 25.9 | 69.2 | 25.4 | 98.6 | 189 | 13.7 | 18.1 | 11.4 | 6.4 | -- |
| Cyanide (amenable) | mg/kg | ND (0.68) | ND (0.58) | ND (0.64) | ND (0.62) | ND (0.66) | ND (0.57) | ND (0.62) | ND (0.72) | ND (0.65) | ND (0.68) | -- |
| Cyanide (total) | mg/kg | ND (0.68) | ND (0.58) | ND (0.64) | ND (0.62) | 0.25 J | ND (0.57) | ND (0.62) | ND (0.72) | ND (0.65) | ND (0.68) | -- |
| Iron | mg/kg | 23100 J | 7710 | 11900 | 22700 | 12600 | 2520 | 18800 | 15000 | 15700 | 12900 | -- |
| Lead | mg/kg | 26.8 | 35.5 | 81.2 | 17.1 | 25.4 | 41.7 | 13.2 | 21.0 | 13.3 | 12.7 | -- |
| Manganese | mg/kg | 762 | 224 | 107 | 210 | 909 | 47.0 | 242 | 247 | 1010 | 75 | -- |
| Mercury | mg/kg | 0.068 J | 0.15 | 0.36 | ND (0.12) | 0.11 J | ND (0.11) U | ND (0.12) U | 0.16 | 0.039 J | 0.086 J | -- |
| Nickel | mg/kg | 15.9 | 8.7 | 64.2 | 40.8 | 16.1 | 6.2 | 11.7 | 29.1 | 10.3 | 2.2 J | -- |
| Selenium | mg/kg | ND (0.68) | ND (0.58) | 0.48 J | 0.71 J | ND (0.66) | ND (0.57) | ND (0.62) U | ND (0.72) | ND (0.65) | ND (0.68) | -- |
| Silver | mg/kg | ND (1.4) | ND (1.2) | 1.8 | ND (2.5) | ND (1.3) | ND (1.1) | ND (1.2) | ND (1.4) | ND (1.3) | ND (1.4) | -- |
| Thallium | mg/kg | 0.72 J | 0.66 J | ND (1.3) | 0.79 J | ND (1.3) | ND (1.1) | ND (1.2) | ND (1.4) | ND (1.3) | ND (1.4) | -- |
| Vanadium | mg/kg | 30.0 | 10.7 | 14.7 | 16.8 | 22.0 | 2.4 J | 29.3 | 12.2 | 24.1 | 32.1 | -- |
| Zinc | mg/kg | 55.1 | 106 | 134 | 47.3 | 85.7 | 60.7 | 42.0 | 83.2 | 33.6 | 8.8 | -- |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (180000) | ND (190000) | ND (1100000) | ND (41) | ND (44) | ND (370) | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (180000) | ND (190000) | ND (1100000) | ND (41) | ND (44) | ND (370) | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg/kg | 2300000 | ND (190000) | ND (1100000) | ND (41) | ND (44) | ND (370) | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (180000) | 2300000 | 8600000 | 29 J | ND (44) | 2400 | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (180000) | ND (190000) | ND (1100000) | ND (41) | 140 | ND (370) | 93 | ND (48) | 15 J | ND (45) | 60 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (180000) | ND (190000) | ND (1100000) | ND (41) | ND (44) | ND (370) | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (180000) | ND (190000) | ND (1100000) | ND (41) | ND (44) | ND (370) | ND (41) | ND (48) | ND (43) | ND (45) | ND (42) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 73.7 | 86.7 | 77.5 | 80.1 | 75.2 | 88.1 | 80.0 | 69.1 | 77.4 | 73.2 | 79.0 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SS-X200Y156* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *SS-X200Y166* | *SS-X205Y161* | *B-X209Y177* | *B-X209Y177* | *SS-X187Y177* | *SS-X189Y169* |
| *Sample ID:* | | *S-060302-MG-221* | *S-011002-MG-028* | *S-011002-MG-029* | *S-011002-MG-030* | *S-011002-MG-031* | *S-060302-MG-223* | *S-060302-MG-224* | *S-031402-MG-184* | *S-031402-MG-185* | *S-071802-CLM-001* | *S-071802-CLM-002* |
| *Sample Date:* | | *6/3/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *6/3/2002* | *6/3/2002* | *3/14/2002* | *3/14/2002* | *7/18/2002* | *7/18/2002* |
| *Sample Depth:* | | *(0-2)* | *(0-2)* | *(0-2)* | *(6-8)* | *(9-11)* | *(0-2)* | *(0-2)* | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* |
| | | | | *Duplicate* | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,1,2,2-Tetrachloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,1,2-Trichloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,1-Dichloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,1-Dichloroethene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,2,4-Trichlorobenzene | µg/kg | -- | ND (4.9) | ND (4.8) U | ND (6.1) | 68 J | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | -- | ND (9.8) | ND (9.6) | ND (12) | ND (540) UJ | -- | -- | ND (13) | ND (14) | -- | -- |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,2-Dichlorobenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | 42 J | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,2-Dichloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | 13 J | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,2-Dichloropropane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,3-Dichlorobenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | 670 | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 1,4-Dichlorobenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | 870 | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | -- | ND (20) | ND (19) | ND (24) | ND (1100) | -- | -- | ND (26) | ND (28) | -- | -- |
| 2-Hexanone | µg/kg | -- | ND (20) | ND (19) | ND (24) | ND (1100) | -- | -- | ND (26) | ND (28) | -- | -- |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | -- | ND (20) UJ | ND (19) UJ | ND (24) UJ | ND (1100) | -- | -- | ND (26) | ND (28) | -- | -- |
| Acetone | µg/kg | -- | ND (20) | ND (19) U | ND (24) | ND (1100) U | -- | -- | ND (26) | ND (28) | -- | -- |
| Benzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Bromodichloromethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Bromoform | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Bromomethane (Methyl Bromide) | µg/kg | -- | ND (4.9) UJ | ND (4.8) UJ | ND (6.1) UJ | ND (270) UJ | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Carbon disulfide | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Carbon tetrachloride | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Chlorobenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | 40 J | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Chloroethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Chloroform (Trichloromethane) | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Chloromethane (Methyl Chloride) | µg/kg | -- | ND (4.9) UJ | ND (4.8) UJ | ND (6.1) UJ | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| cis-1,2-Dichloroethene | µg/kg | -- | ND (2.5) | ND (2.4) | ND (3) | ND (130) | -- | -- | ND (3.2) | ND (3.4) | -- | -- |
| cis-1,3-Dichloropropene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Cyclohexane | µg/kg | -- | ND (9.8) | ND (9.6) | ND (12) | ND (540) | -- | -- | ND (13) | ND (14) | -- | -- |
| Dibromochloromethane | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Dichlorodifluoromethane (CFC-12) | µg/kg | -- | ND (4.9) UJ | ND (4.8) UJ | ND (6.1) UJ | 58 J | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Ethylbenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Isopropylbenzene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Methyl acetate | µg/kg | -- | ND (9.8) UJ | ND (9.6) UJ | ND (12) UJ | 66 J | -- | -- | ND (13) | 1.9 J | -- | -- |
| Methyl cyclohexane | µg/kg | -- | ND (9.8) | ND (9.6) | ND (12) | ND (540) | -- | -- | ND (13) | ND (14) | -- | -- |
| Methyl Tert Butyl Ether | µg/kg | -- | ND (20) | ND (19) | ND (24) | ND (1100) | -- | -- | ND (26) | ND (28) | -- | -- |
| Methylene chloride | µg/kg | -- | ND (4.9) U | ND (4.8) U | ND (6.1) U | ND (270) U | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Styrene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Tetrachloroethene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Toluene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) U | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| trans-1,2-Dichloroethene | µg/kg | -- | ND (2.5) | ND (2.4) | ND (3) | ND (130) | -- | -- | ND (3.2) | ND (3.4) | -- | -- |
| trans-1,3-Dichloropropene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Trichloroethene | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Trichlorofluoromethane (CFC-11) | µg/kg | -- | ND (4.9) UJ | ND (4.8) UJ | ND (6.1) UJ | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Trifluorotrichloroethane (Freon 113) | µg/kg | -- | ND (4.9) UJ | ND (4.8) UJ | ND (6.1) UJ | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Vinyl chloride | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) | -- | -- | ND (6.4) | ND (6.9) | -- | -- |
| Xylene (total) | µg/kg | -- | ND (4.9) | ND (4.8) | ND (6.1) | ND (270) U | -- | -- | ND (6.4) | ND (6.9) | -- | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SS-X200Y156* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *SS-X200Y166* | *SS-X205Y161* | *B-X209Y177* | *B-X209Y177* | *SS-X187Y177* | *SS-X189Y169* |
| *Sample ID:* | | *S-060302-MG-221* | *S-011002-MG-028* | *S-011002-MG-029* | *S-011002-MG-030* | *S-011002-MG-031* | *S-060302-MG-223* | *S-060302-MG-224* | *S-031402-MG-184* | *S-031402-MG-185* | *S-071802-CLM-001* | *S-071802-CLM-002* |
| *Sample Date:* | | *6/3/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *6/3/2002* | *6/3/2002* | *3/14/2002* | *3/14/2002* | *7/18/2002* | *7/18/2002* |
| *Sample Depth:* | | *(0-2)* | *(0-2)* | *(0-2)* | *(6-8)* | *(9-11)* | *(0-2)* | *(0-2)* | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* |
| | | | | *Duplicate* | | | | | | | | |
| *Parameters* | *Units* | | | | | | | | | | | |
| *Semi-Volatiles* | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,4,5-Trichlorophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,4,6-Trichlorophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,4-Dichlorophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,4-Dimethylphenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | 730 J | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,4-Dinitrophenol | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 2,4-Dinitrotoluene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2,6-Dinitrotoluene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2-Chloronaphthalene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2-Chlorophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2-Methylnaphthalene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2-Methylphenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 2-Nitroaniline | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 2-Nitrophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 3,3'-Dichlorobenzidine | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 3-Nitroaniline | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 4,6-Dinitro-2-methylphenol | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 4-Bromophenyl phenyl ether | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 4-Chloro-3-methylphenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 4-Chloroaniline | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 4-Chlorophenyl phenyl ether | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 4-Methylphenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| 4-Nitroaniline | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| 4-Nitrophenol | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| Acenaphthene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Acenaphthylene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Acetophenone | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Anthracene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Atrazine | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Benzaldehyde | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Benzo(a)anthracene | µg/kg | -- | ND (390) | ND (390) | ND (350) | 790 J | -- | -- | ND (430) | 78 J | -- | -- |
| Benzo(a)pyrene | µg/kg | -- | ND (390) | ND (390) | ND (350) | 740 J | -- | -- | ND (430) | ND (440) | -- | -- |
| Benzo(b)fluoranthene | µg/kg | -- | ND (390) | 71 J | ND (350) | 780 J | -- | -- | ND (430) | 99 J | -- | -- |
| Benzo(g,h,i)perylene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Benzo(k)fluoranthene | µg/kg | -- | ND (390) | ND (390) | ND (350) | 430 J | -- | -- | ND (430) | ND (440) | -- | -- |
| Biphenyl | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| bis(2-Chloroethoxy)methane | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| bis(2-Chloroethyl)ether | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| bis(2-Ethylhexyl)phthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | 2000 J | -- | -- | ND (430) | ND (440) | -- | -- |
| Butyl benzylphthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Caprolactam | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Carbazole | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Chrysene | µg/kg | -- | ND (390) | 72 J | ND (350) | 1000 J | -- | -- | ND (430) | 120 J | -- | -- |
| Dibenz(a,h)anthracene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Dibenzofuran | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Diethyl phthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Dimethyl phthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Di-n-butylphthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Di-n-octyl phthalate | µg/kg | -- | ND (390) | ND (390) | ND (350) | 2900 | -- | -- | ND (430) | ND (440) | -- | -- |
| Fluoranthene | µg/kg | -- | ND (390) | 120 J | ND (350) | 1200 J | -- | -- | ND (430) | 170 J | -- | -- |
| Fluorene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* | *A005* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *SS-X200Y156* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *B-X200Y161* | *SS-X200Y166* | *SS-X205Y161* | *B-X209Y177* | *B-X209Y177* | *SS-X187Y177* | *SS-X189Y169* |
| *Sample ID:* | | *S-060302-MG-221* | *S-011002-MG-028* | *S-011002-MG-029* | *S-011002-MG-030* | *S-011002-MG-031* | *S-060302-MG-223* | *S-060302-MG-224* | *S-031402-MG-184* | *S-031402-MG-185* | *S-071802-CLM-001* | *S-071802-CLM-002* |
| *Sample Date:* | | *6/3/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *6/3/2002* | *6/3/2002* | *3/14/2002* | *3/14/2002* | *7/18/2002* | *7/18/2002* |
| *Sample Depth:* | | *(0-2)* | *(0-2)* | *(0-2)* *Duplicate* | *(6-8)* | *(9-11)* | *(0-2)* | *(0-2)* | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Hexachlorobutadiene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Hexachlorocyclopentadiene | µg/kg | -- | ND (1900) | ND (1900) | ND (1700) | ND (13000) | -- | -- | ND (2100) | ND (2100) | -- | -- |
| Hexachloroethane | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Indeno(1,2,3-cd)pyrene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Isophorone | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Naphthalene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Nitrobenzene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| N-Nitrosodi-n-propylamine | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| N-Nitrosodiphenylamine | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Pentachlorophenol | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Phenanthrene | µg/kg | -- | ND (390) | ND (390) | ND (350) | ND (2600) | -- | -- | ND (430) | 210 J | -- | -- |
| Phenol | µg/kg | -- | ND (390) | ND (390) | 1000 | ND (2600) | -- | -- | ND (430) | ND (440) | -- | -- |
| Pyrene | µg/kg | -- | ND (390) | 100 J | ND (350) | 1200 J | -- | -- | ND (430) | 210 J | -- | -- |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | -- | 9550 | 8150 | 2700 | 17700 | -- | -- | 16400 | 10600 | -- | -- |
| Antimony | mg/kg | -- | ND (7.1) | ND (7.1) | ND (6.4) | ND (7.2) U | -- | -- | ND (7.7) | ND (7.9) | -- | -- |
| Arsenic | mg/kg | -- | 6.0 | 5.5 | 0.47 J | 5.5 | -- | -- | 9.2 | 9.6 | -- | -- |
| Barium | mg/kg | -- | 45.6 | 55.2 | 1.1 J | 53.9 | -- | -- | 71.5 | 69.7 | -- | -- |
| Beryllium | mg/kg | -- | 1.0 | 0.95 | ND (0.53) | 0.59 J | -- | -- | ND (0.71) U | ND (0.88) U | -- | -- |
| Cadmium | mg/kg | -- | ND (0.59) U | 0.20 J | ND (0.53) U | 0.82 | -- | -- | ND (0.64) | ND (0.66) U | -- | -- |
| Chromium Total | mg/kg | -- | 21.3 | 18.4 | 35.7 | 25.3 | -- | -- | 25.2 | 16.9 | -- | -- |
| Cobalt | mg/kg | -- | 9.9 | 7.2 | 24.0 | 14.5 | -- | -- | 7.8 | 12.8 | -- | -- |
| Copper | mg/kg | -- | 17.4 | 22.6 | 65.9 | 406 | -- | -- | 16.2 | 20.9 | -- | -- |
| Cyanide (amenable) | mg/kg | -- | ND (0.59) | ND (0.59) | ND (0.53) | ND (0.60) | -- | -- | ND (0.64) | ND (0.66) | -- | -- |
| Cyanide (total) | mg/kg | -- | ND (0.59) | ND (0.59) | ND (0.53) | ND (0.60) | -- | -- | ND (0.64) | ND (0.66) | -- | -- |
| Iron | mg/kg | -- | 24300 | 22600 | 3490 | 17000 | -- | -- | 24100 | 21300 | -- | -- |
| Lead | mg/kg | -- | 12.8 | 14.0 | 5.3 | 68.2 | -- | -- | 13.2 | 20.1 | -- | -- |
| Manganese | mg/kg | -- | 120 J | 159 J | 44.3 J | 465 J | -- | -- | 402 | 521 | -- | -- |
| Mercury | mg/kg | -- | 0.021 J | 0.046 J | 0.026 J | 0.79 | -- | -- | ND (0.13) U | ND (0.13) U | -- | -- |
| Nickel | mg/kg | -- | 22.2 | 22.0 | 19.2 | 48.4 | -- | -- | 18.3 | 22.5 | -- | -- |
| Selenium | mg/kg | -- | ND (0.59) U | ND (0.59) U | ND (0.53) U | 0.49 J | -- | -- | ND (0.64) | ND (0.66) | -- | -- |
| Silver | mg/kg | -- | ND (1.2) | ND (1.2) | ND (1.1) | 0.20 J | -- | -- | ND (1.3) | ND (1.3) | -- | -- |
| Thallium | mg/kg | -- | ND (1.2) | ND (1.2) | ND (1.1) | ND (1.2) | -- | -- | ND (1.3) | ND (1.3) | -- | -- |
| Vanadium | mg/kg | -- | 32.1 | 30.4 | 3.0 J | 25.6 | -- | -- | 40.9 | 27.4 | -- | -- |
| Zinc | mg/kg | -- | 54.1 J | 55.5 J | 27.5 J | 133 J | -- | -- | 56.4 | 52.5 | -- | -- |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (41) | ND (78000) | ND (2000) | ND (70) | ND (20000) | ND (40) | ND (41) | ND (43) | ND (4400) | ND (41) | ND (41) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (41) | ND (78000) | ND (2000) | ND (70) | ND (20000) | ND (40) | ND (41) | ND (43) | ND (4400) | ND (41) | ND (41) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (41) | ND (78000) | ND (2000) | ND (70) | ND (20000) | ND (40) | ND (41) | ND (43) | ND (4400) | ND (41) | ND (41) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (41) | ND (78000) | ND (2000) | ND (70) | ND (20000) | ND (40) | ND (41) | ND (43) | ND (4400) | ND (41) | ND (41) |
| Aroclor-1248 (PCB-1248) | µg/kg | 380 | 1000000 | 10000 | 880 | 300000 | ND (40) | 120 | 57 | 32000 | 42 | 39 J |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (41) | ND (78000) | ND (2000) | ND (70) | ND (20000) | ND (40) | ND (41) | ND (43) | ND (4400) | ND (41) | ND (41) |
| Aroclor-1260 (PCB-1260) | µg/kg | 16 J | 25000 J | ND (2000) | ND (70) | 8000 J | ND (40) | ND (41) | ND (43) | 2600 J | ND (41) | ND (41) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 79.7 | 84.3 | 84.5 | 94.3 | 83.1 | 82.2 | 81.2 | 77.6 | 75.6 | 79.6 | 80.4 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***SS-X189Y169*** | ***SS-X193Y160*** | ***SS-X194Y152*** | ***SS-X200Y161*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y134*** |
| ***Sample ID:*** | | ***S-071802-CLM-005*** | ***S-071802-CLM-003*** | ***S-071802-CLM-004*** | ***S-082702-JW-006*** | ***S-060302-MG-216*** | ***S-060302-MG-217*** | ***S-060302-MG-218*** | ***S-031402-MG-181*** | ***S-031402-MG-182*** | ***S-031402-MG-183*** | ***S-060302-MG-214*** |
| ***Sample Date:*** | | ***7/18/2002*** | ***7/18/2002*** | ***7/18/2002*** | ***8/27/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***6/3/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(4-6)*** | ***(4-6)*** | ***(0-2)*** | ***(6-8)*** | ***(18-20)*** | ***(2-4)*** |
| | | ***Duplicate*** | | | | | | ***Duplicate*** | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,1,2,2-Tetrachloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,1,2-Trichloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,1-Dichloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,1-Dichloroethene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,2,4-Trichlorobenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (12) | ND (14) | ND (12) | -- |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,2-Dichlorobenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,2-Dichloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,2-Dichloropropane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,3-Dichlorobenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 1,4-Dichlorobenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| 2-Butanone (Methyl Ethyl Ketone) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (24) | ND (28) | ND (24) | -- |
| 2-Hexanone | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (24) | ND (28) | ND (24) | -- |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (24) | ND (28) | ND (24) | -- |
| Acetone | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (24) | ND (28) | ND (24) | -- |
| Benzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Bromodichloromethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Bromoform | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Bromomethane (Methyl Bromide) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Carbon disulfide | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Carbon tetrachloride | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Chlorobenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Chloroethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Chloroform (Trichloromethane) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Chloromethane (Methyl Chloride) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| cis-1,2-Dichloroethene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (3) | ND (3.5) | ND (3) | -- |
| cis-1,3-Dichloropropene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Cyclohexane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (12) | ND (14) | ND (12) | -- |
| Dibromochloromethane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Dichlorodifluoromethane (CFC-12) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Ethylbenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Isopropylbenzene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Methyl acetate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (12) | ND (14) | ND (12) | -- |
| Methyl cyclohexane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (12) | ND (14) | ND (12) | -- |
| Methyl Tert Butyl Ether | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (24) | ND (28) | ND (24) | -- |
| Methylene chloride | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Styrene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Tetrachloroethene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Toluene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| trans-1,2-Dichloroethene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (3) | ND (3.5) | ND (3) | -- |
| trans-1,3-Dichloropropene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Trichloroethene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Trichlorofluoromethane (CFC-11) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Trifluorotrichloroethane (Freon 113) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Vinyl chloride | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |
| Xylene (total) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (5.9) | ND (7) | ND (5.9) | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***SS-X189Y169*** | ***SS-X193Y160*** | ***SS-X194Y152*** | ***SS-X200Y161*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y134*** |
| ***Sample ID:*** | | ***S-071802-CLM-005*** | ***S-071802-CLM-003*** | ***S-071802-CLM-004*** | ***S-082702-JW-006*** | ***S-060302-MG-216*** | ***S-060302-MG-217*** | ***S-060302-MG-218*** | ***S-031402-MG-181*** | ***S-031402-MG-182*** | ***S-031402-MG-183*** | ***S-060302-MG-214*** |
| ***Sample Date:*** | | ***7/18/2002*** | ***7/18/2002*** | ***7/18/2002*** | ***8/27/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***6/3/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(4-6)*** | ***(4-6)*** | ***(0-2)*** | ***(6-8)*** | ***(18-20)*** | ***(2-4)*** |
| | | ***Duplicate*** | | | | | | ***Duplicate*** | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,4,5-Trichlorophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,4,6-Trichlorophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,4-Dichlorophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,4-Dimethylphenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,4-Dinitrophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 2,4-Dinitrotoluene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2,6-Dinitrotoluene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2-Chloronaphthalene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2-Chlorophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2-Methylnaphthalene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2-Methylphenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 2-Nitroaniline | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 2-Nitrophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 3,3'-Dichlorobenzidine | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 3-Nitroaniline | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 4,6-Dinitro-2-methylphenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 4-Bromophenyl phenyl ether | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 4-Chloro-3-methylphenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 4-Chloroaniline | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 4-Chlorophenyl phenyl ether | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 4-Methylphenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| 4-Nitroaniline | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| 4-Nitrophenol | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| Acenaphthene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Acenaphthylene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Acetophenone | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Anthracene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Atrazine | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzaldehyde | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzo(a)anthracene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzo(a)pyrene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzo(b)fluoranthene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzo(g,h,i)perylene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Benzo(k)fluoranthene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Biphenyl | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| bis(2-Chloroethoxy)methane | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| bis(2-Chloroethyl)ether | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| bis(2-Ethylhexyl)phthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Butyl benzylphthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Caprolactam | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Carbazole | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Chrysene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Dibenz(a,h)anthracene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Dibenzofuran | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Diethyl phthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Dimethyl phthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Di-n-butylphthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Di-n-octyl phthalate | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Fluoranthene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Fluorene | µg / kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A005*** | ***A005*** | ***A005*** | ***A005*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***SS-X189Y169*** | ***SS-X193Y160*** | ***SS-X194Y152*** | ***SS-X200Y161*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X170Y134*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y131*** | ***B-X173Y134*** |
| ***Sample ID:*** | | ***S-071802-CLM-005*** | ***S-071802-CLM-003*** | ***S-071802-CLM-004*** | ***S-082702-JW-006*** | ***S-060302-MG-216*** | ***S-060302-MG-217*** | ***S-060302-MG-218*** | ***S-031402-MG-181*** | ***S-031402-MG-182*** | ***S-031402-MG-183*** | ***S-060302-MG-214*** |
| ***Sample Date:*** | | ***7/18/2002*** | ***7/18/2002*** | ***7/18/2002*** | ***8/27/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***3/14/2002*** | ***6/3/2002*** |
| ***Sample Depth:*** | | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(4-6)*** | ***(4-6)*** | ***(0-2)*** | ***(6-8)*** | ***(18-20)*** | ***(2-4)*** |
| | | ***Duplicate*** | | | | | | ***Duplicate*** | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Hexachlorobutadiene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Hexachlorocyclopentadiene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (1800) | ND (2000) | ND (2100) | -- |
| Hexachloroethane | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Indeno(1,2,3-cd)pyrene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Isophorone | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Naphthalene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Nitrobenzene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| N-Nitrosodi-n-propylamine | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| N-Nitrosodiphenylamine | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Pentachlorophenol | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Phenanthrene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Phenol | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| Pyrene | µg/kg | -- | -- | -- | -- | -- | -- | -- | ND (380) | ND (410) | ND (430) | -- |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | -- | -- | -- | -- | -- | -- | -- | 8600 | 13500 | 8050 | -- |
| Antimony | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (6.8) U | ND (7.4) U | ND (15.6) | -- |
| Arsenic | mg/kg | -- | -- | -- | -- | -- | -- | -- | 8.7 | 10.2 | 11.0 | -- |
| Barium | mg/kg | -- | -- | -- | -- | -- | -- | -- | 39.6 | 9.6 J | 17.6 J | -- |
| Beryllium | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.57) U | ND (0.62) U | 1.5 | -- |
| Cadmium | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.57) | ND (0.62) | 3.6 | -- |
| Chromium Total | mg/kg | -- | -- | -- | -- | -- | -- | -- | 12.1 | 35.2 | 21.2 | -- |
| Cobalt | mg/kg | -- | -- | -- | -- | -- | -- | -- | 4.6 J | 1.9 J | 10.9 J | -- |
| Copper | mg/kg | -- | -- | -- | -- | -- | -- | -- | 16.4 | 8.8 | 21.2 | -- |
| Cyanide (amenable) | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.57) | ND (0.62) | ND (0.65) | -- |
| Cyanide (total) | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.57) | ND (0.62) | ND (0.65) | -- |
| Iron | mg/kg | -- | -- | -- | -- | -- | -- | -- | 18100 | 39800 | 39300 | -- |
| Lead | mg/kg | -- | -- | -- | -- | -- | -- | -- | 22.5 | 12.1 | 36.4 | -- |
| Manganese | mg/kg | -- | -- | -- | -- | -- | -- | -- | 170 | 18.3 | 180 | -- |
| Mercury | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.11) U | ND (0.12) | ND (0.13) U | -- |
| Nickel | mg/kg | -- | -- | -- | -- | -- | -- | -- | 8.7 | 4.1 J | 60.3 | -- |
| Selenium | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (0.57) | ND (0.62) | ND (1.3) | -- |
| Silver | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (1.1) | ND (1.2) | ND (2.6) | -- |
| Thallium | mg/kg | -- | -- | -- | -- | -- | -- | -- | ND (1.1) | 0.96 J | 1.2 J | -- |
| Vanadium | mg/kg | -- | -- | -- | -- | -- | -- | -- | 22.5 | 68.8 | 26.9 | -- |
| Zinc | mg/kg | -- | -- | -- | -- | -- | -- | -- | 36.7 | 11.2 | 135 | -- |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (39) | ND (81) | ND (370) | ND (38) | ND (200) | ND (43) | ND (48) | ND (190000) | ND (41) | ND (43) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (39) | ND (81) | ND (370) | ND (38) | ND (200) | ND (43) | ND (48) | ND (190000) | ND (41) | ND (43) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (39) | ND (81) | ND (370) | ND (38) | ND (200) | ND (43) | ND (48) | ND (190000) | ND (41) | ND (43) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (39) | ND (81) | ND (370) | ND (38) | ND (200) | ND (43) | ND (48) | ND (190000) | ND (41) | ND (43) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg/kg | 210 | 390 | 4000 | 180 | 1300 | ND (43) | ND (48) | 1100000 | 24 J | 39 J | 590 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (39) | ND (81) | ND (370) | ND (38) | ND (200) | ND (43) | ND (48) | ND (190000) | ND (41) | ND (43) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (39) | ND (81) | ND (370) | 27 J | 170 J | ND (43) | ND (48) | 260000 | ND (41) | ND (43) | 66 |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 85.5 | 81.8 | 88.8 | 86.5 | 80.6 | 76.0 | 69.3 | 87.8 | 81.3 | 77.0 | 78.8 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X173Y134* | *B-X183Y133* | *B-X183Y133* | *B-X183Y133* | *B-X183Y133* | *B-X183Y133* | *B-X195Y133* | *B-X195Y133* | *B-X195Y133* | *B-X204Y132* | *B-X204Y132* |
| *Sample ID:* | | *S-060302-MG-215* | *S-011102-MG-039* | *S-011102-MG-040* | *S-011102-MG-041* | *S-011102-MG-042* | *S-011102-MG-043* | *S-031102-MG-175* | *S-031102-MG-176* | *S-031102-MG-177* | *S-011102-MG-044* | *S-011102-MG-045* |
| *Sample Date:* | | *6/3/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *1/11/2002* | *1/11/2002* |
| *Sample Depth:* | | *(4-6)* | *(0-2)* | *(3.5-4.5)* | *(6-8)* | *(6-8)* *Duplicate* | *(18-19)* | *(0-2)* | *(6-8)* | *(15-17)* | *(0-2)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,1,2,2-Tetrachloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,1,2-Trichloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,1-Dichloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,1-Dichloroethene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,2,4-Trichlorobenzene | µg/kg | -- | ND (5.9) | 220 J | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | 700 | ND (6.6) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | -- | ND (12) | ND (840) UJ | ND (13) | ND (14) | ND (13) | ND (13) | ND (13) | ND (12) | ND (570) UJ | ND (13) UJ |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,2-Dichlorobenzene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | 35 J | ND (6.6) |
| 1,2-Dichloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | 17 J | ND (6.6) |
| 1,2-Dichloropropane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| 1,3-Dichlorobenzene | µg/kg | -- | ND (5.9) | 50 J | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | 450 | 1.1 J |
| 1,4-Dichlorobenzene | µg/kg | -- | ND (5.9) | 49 J | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | 490 | 1.8 J |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | -- | ND (24) | 170 J | ND (25) U | ND (27) U | ND (26) U | ND (27) | ND (26) | ND (24) | ND (1100) | ND (26) |
| 2-Hexanone | µg/kg | -- | ND (24) | ND (1700) | ND (25) | ND (27) | ND (26) | ND (27) | ND (26) | ND (24) | ND (1100) | ND (26) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | -- | ND (24) UJ | ND (1700) | ND (25) UJ | ND (27) UJ | ND (26) UJ | ND (27) | ND (26) | ND (24) | ND (1100) | ND (26) |
| Acetone | µg/kg | -- | ND (24) | ND (1700) U | ND (30) U | ND (27) U | ND (26) U | ND (27) | ND (26) | ND (24) | ND (1100) U | ND (26) U |
| Benzene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Bromodichloromethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Bromoform | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) UJ | ND (6.5) UJ | ND (6.1) UJ | ND (280) | ND (6.6) |
| Bromomethane (Methyl Bromide) | µg/kg | -- | ND (5.9) UJ | ND (420) UJ | ND (6.4) UJ | ND (6.8) UJ | ND (6.5) UJ | ND (6.6) UJ | ND (6.5) UJ | ND (6.1) UJ | ND (280) UJ | ND (6.6) UJ |
| Carbon disulfide | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Carbon tetrachloride | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Chlorobenzene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Chloroethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Chloroform (Trichloromethane) | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Chloromethane (Methyl Chloride) | µg/kg | -- | ND (5.9) UJ | ND (420) | ND (6.4) UJ | ND (6.8) UJ | ND (6.5) UJ | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| cis-1,2-Dichloroethene | µg/kg | -- | ND (3) | ND (210) | ND (3.2) | ND (3.4) | ND (3.3) | ND (3.3) | ND (3.2) | ND (3) | ND (140) | ND (3.3) |
| cis-1,3-Dichloropropene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Cyclohexane | µg/kg | -- | ND (12) | ND (840) | ND (13) | ND (14) | ND (13) | ND (13) | ND (13) | ND (12) | ND (570) | ND (13) |
| Dibromochloromethane | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | -- | ND (5.9) UJ | ND (420) U | ND (6.4) UJ | ND (6.8) UJ | ND (6.5) UJ | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) U |
| Ethylbenzene | µg/kg | -- | ND (5.9) | 62 J | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Isopropylbenzene | µg/kg | -- | ND (5.9) | 14 J | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Methyl acetate | µg/kg | -- | ND (12) UJ | 200 J | ND (13) UJ | ND (14) UJ | ND (13) UJ | ND (13) | ND (13) | ND (12) | ND (570) | ND (13) |
| Methyl cyclohexane | µg/kg | -- | ND (12) | ND (840) | ND (13) | ND (14) | ND (13) | ND (13) | ND (13) | ND (12) | ND (570) | ND (13) |
| Methyl Tert Butyl Ether | µg/kg | -- | ND (24) | ND (1700) | ND (25) | ND (27) | ND (26) | ND (27) | ND (26) | ND (24) | ND (1100) | ND (26) |
| Methylene chloride | µg/kg | -- | ND (5.9) U | ND (420) U | ND (6.4) U | ND (6.8) | ND (6.5) U | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) U | ND (6.6) |
| Styrene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Tetrachloroethene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Toluene | µg/kg | -- | ND (5.9) | ND (420) U | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) U | ND (6.6) |
| trans-1,2-Dichloroethene | µg/kg | -- | ND (3) | ND (210) | ND (3.2) | ND (3.4) | ND (3.3) | ND (3.3) | ND (3.2) | ND (3) | ND (140) | ND (3.3) |
| trans-1,3-Dichloropropene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Trichloroethene | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Trichlorofluoromethane (CFC-11) | µg/kg | -- | ND (5.9) UJ | ND (420) | ND (6.4) UJ | ND (6.8) UJ | ND (6.5) UJ | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | -- | ND (5.9) UJ | ND (420) | ND (6.4) UJ | ND (6.8) UJ | ND (6.5) UJ | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Vinyl chloride | µg/kg | -- | ND (5.9) | ND (420) | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) | ND (6.6) |
| Xylene (total) | µg/kg | -- | ND (5.9) | ND (420) U | ND (6.4) | ND (6.8) | ND (6.5) | ND (6.6) | ND (6.5) | ND (6.1) | ND (280) U | ND (6.6) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X173Y134*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X195Y133*** | ***B-X195Y133*** | ***B-X195Y133*** | ***B-X204Y132*** | ***B-X204Y132*** |
| ***Sample ID:*** | | ***S-060302-MG-215*** | ***S-011102-MG-039*** | ***S-011102-MG-040*** | ***S-011102-MG-041*** | ***S-011102-MG-042*** | ***S-011102-MG-043*** | ***S-031102-MG-175*** | ***S-031102-MG-176*** | ***S-031102-MG-177*** | ***S-011102-MG-044*** | ***S-011102-MG-045*** |
| ***Sample Date:*** | | ***6/3/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***3/11/2002*** | ***3/11/2002*** | ***3/11/2002*** | ***1/11/2002*** | ***1/11/2002*** |
| ***Sample Depth:*** | | ***(4-6)*** | ***(0-2)*** | ***(3.5-4.5)*** | ***(6-8)*** | ***(6-8)*** ***Duplicate*** | ***(18-19)*** | ***(0-2)*** | ***(6-8)*** | ***(15-17)*** | ***(0-2)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,4,5-Trichlorophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,4,6-Trichlorophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,4-Dichlorophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,4-Dimethylphenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,4-Dinitrophenol | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 2,4-Dinitrotoluene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2,6-Dinitrotoluene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2-Chloronaphthalene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2-Chlorophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2-Methylnaphthalene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2-Methylphenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 2-Nitroaniline | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 2-Nitrophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 3,3'-Dichlorobenzidine | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 3-Nitroaniline | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 4-Bromophenyl phenyl ether | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 4-Chloro-3-methylphenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 4-Chloroaniline | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 4-Chlorophenyl phenyl ether | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 4-Methylphenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| 4-Nitroaniline | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| 4-Nitrophenol | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) UJ | ND (2000) UJ | ND (2100) UJ | ND (39000) | ND (2000) |
| Acenaphthene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Acenaphthylene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Acetophenone | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Anthracene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Atrazine | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzaldehyde | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzo(a)anthracene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzo(a)pyrene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzo(b)fluoranthene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzo(g,h,i)perylene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Benzo(k)fluoranthene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Biphenyl | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| bis(2-Chloroethoxy)methane | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| bis(2-Chloroethyl)ether | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| bis(2-Ethylhexyl)phthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | 2000 J | ND (410) |
| Butyl benzylphthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Caprolactam | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Carbazole | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Chrysene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Dibenz(a,h)anthracene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Dibenzofuran | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Diethyl phthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Dimethyl phthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Di-n-butylphthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Di-n-octyl phthalate | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | 3400 J | ND (410) |
| Fluoranthene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Fluorene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X173Y134*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X183Y133*** | ***B-X195Y133*** | ***B-X195Y133*** | ***B-X195Y133*** | ***B-X204Y132*** | ***B-X204Y132*** |
| ***Sample ID:*** | | ***S-060302-MG-215*** | ***S-011102-MG-039*** | ***S-011102-MG-040*** | ***S-011102-MG-041*** | ***S-011102-MG-042*** | ***S-011102-MG-043*** | ***S-031102-MG-175*** | ***S-031102-MG-176*** | ***S-031102-MG-177*** | ***S-011102-MG-044*** | ***S-011102-MG-045*** |
| ***Sample Date:*** | | ***6/3/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***3/11/2002*** | ***3/11/2002*** | ***3/11/2002*** | ***1/11/2002*** | ***1/11/2002*** |
| ***Sample Depth:*** | | ***(4-6)*** | ***(0-2)*** | ***(3.5-4.5)*** | ***(6-8)*** | ***(6-8) Duplicate*** | ***(18-19)*** | ***(0-2)*** | ***(6-8)*** | ***(15-17)*** | ***(0-2)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Hexachlorobutadiene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Hexachlorocyclopentadiene | µg/kg | -- | ND (1900) | ND (100000) | ND (2100) | ND (2000) | ND (2100) | ND (1900) | ND (2000) | ND (2100) | ND (39000) | ND (2000) |
| Hexachloroethane | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Indeno(1,2,3-cd)pyrene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Isophorone | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Naphthalene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Nitrobenzene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| N-Nitrosodi-n-propylamine | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| N-Nitrosodiphenylamine | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Pentachlorophenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Phenanthrene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Phenol | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| Pyrene | µg/kg | -- | ND (390) | ND (21000) | ND (420) | ND (420) | ND (430) | ND (400) | ND (410) | ND (430) | ND (8100) | ND (410) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | -- | 12400 | 2800 | 18300 | 10400 | 8470 | 15300 | 9760 | 6050 | 8600 | 8800 |
| Antimony | mg/kg | -- | R | R | R | R | R | ND (7.2) UJ | ND (7.5) UJ | ND (38.9) UJ | R | R |
| Arsenic | mg/kg | -- | 7.9 | 3.6 | 6.9 | 7.0 | 7.0 | 9.6 | 6.7 | 4.5 J | 6.8 | 5.9 |
| Barium | mg/kg | -- | 56.4 | 17.9 J | 52.4 | 62.6 | 34.2 | 46.3 | 46.3 | 43.0 J | 95.8 | 13.1 J |
| Beryllium | mg/kg | -- | ND (0.60) U | 0.17 J | 0.37 J | 0.58 J | 1.2 | ND (0.60) U | ND (0.62) U | 1.2 J | 0.63 | 0.99 |
| Cadmium | mg/kg | -- | 0.35 J | 0.51 J | ND (0.64) | ND (0.64) | 2.1 | 0.27 J | 0.39 J | 0.91 J | ND (0.62) | ND (0.62) |
| Chromium Total | mg/kg | -- | 20.6 | 15.9 | 21.1 | 12.8 | 12.7 | 23.0 | 19.9 | 8.6 | 41.3 | 20.3 |
| Cobalt | mg/kg | -- | 7.4 | 7.2 | 5.3 J | 12.1 | 11.4 | 4.4 J | 5.8 J | 7.0 J | 3.4 J | 5.7 J |
| Copper | mg/kg | -- | 42.6 | 38.6 | 19.5 | 10.5 | 11.9 | 15.9 | 10.2 | 14.4 J | 16.9 | 18.2 |
| Cyanide (amenable) | mg/kg | -- | ND (0.60) | ND (0.65) | ND (0.64) | ND (0.64) | ND (0.65) | ND (0.60) | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.62) |
| Cyanide (total) | mg/kg | -- | ND (0.60) | ND (0.65) | ND (0.64) | ND (0.64) | ND (0.65) | ND (0.60) | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.62) |
| Iron | mg/kg | -- | 19900 | 7600 | 23900 | 14900 | 21600 | 25100 | 24900 | 17500 | 36600 | 28400 |
| Lead | mg/kg | -- | 20.4 | 35.5 | 10.5 | 20.9 | 27.7 | 12.9 J | 53.2 | 9.4 | 24.6 | 16.9 |
| Manganese | mg/kg | -- | 182 | 51.8 | 267 | 138 | 246 | 102 J | 529 J | 385 J | 114 | 123 |
| Mercury | mg/kg | -- | 0.12 | 0.076 J | 0.18 | 0.10 J | 0.052 J | 0.086 J | 0.028 J | 0.051 J | 0.021 J | 0.020 J |
| Nickel | mg/kg | -- | 24.8 | 24.8 | 11.2 | 9.7 | 42.2 | 10.7 | 21.4 | 55.2 | 13.2 | 22.3 |
| Selenium | mg/kg | -- | ND (0.60) | 0.63 J | 1.3 | 1.6 | 0.80 | ND (0.60) | ND (0.62) | ND (3.2) | 0.87 | 1.1 |
| Silver | mg/kg | -- | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.2) | ND (6.5) | ND (1.2) | ND (1.2) |
| Thallium | mg/kg | -- | ND (1.2) | ND (1.3) | ND (1.3) | 0.64 J | ND (1.3) | ND (1.2) | ND (1.2) | ND (6.5) | ND (1.2) | 0.70 J |
| Vanadium | mg/kg | -- | 28.9 | 10.1 | 28.8 | 24.6 | 15.8 | 32.7 | 39.8 | 9.7 J | 60.1 | 37.3 |
| Zinc | mg/kg | -- | 51.6 | 68.5 | 48.3 | 38.5 | 94.6 | 38.4 | 46.4 | 85.4 | 51.7 | 73.4 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (39000) | ND (43000) | ND (42) | ND (42) | ND (43) | ND (40) | ND (41) | ND (43) | ND (81000) | ND (82) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (39000) | ND (43000) | ND (42) | ND (42) | ND (43) | ND (40) | ND (41) | ND (43) | ND (81000) | ND (82) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (39000) | ND (43000) | ND (42) | ND (42) | ND (43) | ND (40) | ND (41) | ND (43) | ND (81000) | ND (82) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (39000) | 670000 | ND (42) | ND (42) | 26 J | ND (40) | ND (41) | ND (43) | 1300000 | 490 |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (39000) | ND (43000) | 230 | ND (42) | ND (43) | 34 J | ND (41) | ND (43) | ND (81000) | ND (82) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (39000) | ND (43000) | ND (42) | ND (42) | ND (43) | ND (40) | ND (41) | ND (43) | ND (81000) | ND (82) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | ND (39000) | 95000 | 33 J | ND (42) | ND (43) | ND (40) | ND (41) | ND (43) | ND (81000) | ND (82) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 78.1 | 83.7 | 76.8 | 77.7 | 78.2 | 77.2 | 82.9 | 80.3 | 77.1 | 81.0 | 80.5 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X204Y132* | *B-X204Y149* | *B-X204Y149* | *B-X204Y149* | *B-X211Y169* | *B-X211Y169* | *B-X211Y169* | *B-X211Y169* | *B-X217Y159* | *B-X217Y159* | *B-X218Y141* |
| *Sample ID:* | | *S-011102-MG-046* | *S-011002-MG-032* | *S-011002-MG-033* | *S-011002-MG-034* | *S-011402-MG-050* | *S-011402-MG-051* | *S-011402-MG-052* | *S-011402-MG-053* | *S-022702-MG-141* | *S-022702-MG-142* | *S-011102-MG-035* |
| *Sample Date:* | | *1/11/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/14/2002* | *1/14/2002* | *1/14/2002* | *1/14/2002* | *2/27/2002* | *2/27/2002* | *1/11/2002* |
| *Sample Depth:* | | *(14-15.5)* | *(0-2)* | *(6-8)* | *(15-16)* | *(0-2)* | *(6-8)* | *(10-11)* | *(12-12.5)* | *(0-2)* | *(6-7)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,1,2-Trichloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,1-Dichloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,1-Dichloroethene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (5.9) | 7.3 | 98 J | ND (6.2) U | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) U | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) UJ | ND (10) | ND (12) UJ | ND (12) | ND (11) | ND (11) | ND (1200) UJ | ND (780) | ND (11) | ND (16) | ND (12) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,2-Dichlorobenzene | µg/kg | ND (5.9) | ND (5.2) | 14 J | ND (6.2) | ND (5.5) | ND (5.5) | 140 J | 38 J | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,2-Dichloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) U | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,2-Dichloropropane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,3-Dichlorobenzene | µg/kg | ND (5.9) | ND (5.2) | 8.2 J | ND (6.2) | ND (5.5) | ND (5.5) | 220 J | 45 J | ND (5.7) | ND (7.9) | ND (5.9) |
| 1,4-Dichlorobenzene | µg/kg | 1.1 J | ND (5.2) | 12 J | ND (6.2) | ND (5.5) | ND (5.5) | 450 J | 100 J | ND (5.7) | ND (7.9) | ND (5.9) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (24) | ND (21) | ND (23) U | ND (25) U | ND (22) | ND (22) | 250 J | ND (1600) | ND (23) | ND (32) | ND (23) |
| 2-Hexanone | µg/kg | ND (24) | ND (21) | ND (23) | ND (25) | ND (22) | ND (22) | ND (2500) UJ | ND (1600) | ND (23) | ND (32) | ND (23) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (24) | ND (21) UJ | ND (23) UJ | ND (25) UJ | ND (22) | ND (22) | ND (2500) UJ | ND (1600) | ND (23) | ND (32) | ND (23) UJ |
| Acetone | µg/kg | ND (24) U | ND (21) | ND (25) U | ND (25) U | ND (22) UJ | ND (22) UJ | ND (2500) UJ | ND (1600) UJ | ND (23) | ND (32) | ND (23) |
| Benzene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Bromodichloromethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Bromoform | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) UJ | ND (5.5) UJ | ND (620) UJ | ND (390) UJ | ND (5.7) | ND (7.9) | ND (5.9) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (5.9) UJ | ND (5.2) UJ | ND (5.8) UJ | ND (6.2) UJ | ND (5.5) UJ | ND (5.5) UJ | ND (620) UJ | ND (390) UJ | ND (5.7) | ND (7.9) | ND (5.9) UJ |
| Carbon disulfide | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Carbon tetrachloride | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Chlorobenzene | µg/kg | ND (5.9) | ND (5.2) | 27 | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Chloroethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Chloroform (Trichloromethane) | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (5.9) | ND (5.2) UJ | ND (5.8) UJ | ND (6.2) UJ | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) UJ |
| cis-1,2-Dichloroethene | µg/kg | ND (2.9) | ND (2.6) | ND (2.9) | ND (3.1) | ND (2.7) | ND (2.8) | ND (310) UJ | ND (200) | ND (2.8) | ND (4) | ND (2.9) |
| cis-1,3-Dichloropropene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Cyclohexane | µg/kg | ND (12) | ND (10) | ND (12) | ND (12) | ND (11) | ND (11) | ND (1200) UJ | ND (780) | ND (11) | ND (16) | ND (12) |
| Dibromochloromethane | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (5.9) U | ND (5.2) UJ | ND (5.8) UJ | ND (6.2) UJ | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) UJ |
| Ethylbenzene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | 40 J | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Isopropylbenzene | µg/kg | ND (5.9) | ND (5.2) | 1.3 J | ND (6.2) | ND (5.5) | ND (5.5) | 780 J | 200 J | ND (5.7) | ND (7.9) | ND (5.9) |
| Methyl acetate | µg/kg | ND (12) | ND (10) UJ | ND (12) UJ | ND (12) UJ | 1.3 J | 1.4 J | 180 J | 110 J | ND (11) | ND (16) | ND (12) UJ |
| Methyl cyclohexane | µg/kg | ND (12) | ND (10) | ND (12) | ND (12) | ND (11) | ND (11) | 120 J | ND (780) | ND (11) | ND (16) | ND (12) |
| Methyl Tert Butyl Ether | µg/kg | ND (24) | ND (21) | ND (23) | ND (25) | ND (22) | ND (22) | ND (2500) UJ | ND (1600) | ND (23) | ND (32) | ND (23) |
| Methylene chloride | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) U | ND (6.2) U | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) U |
| Styrene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Tetrachloroethene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Toluene | µg/kg | ND (5.9) | ND (5.2) | 2.8 J | ND (6.2) | ND (5.5) | ND (5.5) | 340 J | 110 J | ND (5.7) | ND (7.9) | ND (5.9) |
| trans-1,2-Dichloroethene | µg/kg | ND (2.9) | ND (2.6) | ND (2.9) | ND (3.1) | ND (2.7) | ND (2.8) | ND (310) UJ | ND (200) | ND (2.8) | ND (4) | ND (2.9) |
| trans-1,3-Dichloropropene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Trichloroethene | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (5.9) | ND (5.2) UJ | ND (5.8) UJ | ND (6.2) UJ | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) UJ |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (5.9) | ND (5.2) UJ | ND (5.8) UJ | ND (6.2) UJ | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) UJ |
| Vinyl chloride | µg/kg | ND (5.9) | ND (5.2) | ND (5.8) | ND (6.2) | ND (5.5) | ND (5.5) | ND (620) UJ | ND (390) | ND (5.7) | ND (7.9) | ND (5.9) |
| Xylene (total) | µg/kg | ND (5.9) | ND (5.2) | 2.7 J | ND (6.2) | ND (5.5) | ND (5.5) | 260 J | 90 J | ND (5.7) | ND (7.9) | ND (5.9) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X204Y132* | *B-X204Y149* | *B-X204Y149* | *B-X204Y149* | *B-X211Y169* | *B-X211Y169* | *B-X211Y169* | *B-X211Y169* | *B-X217Y159* | *B-X217Y159* | *B-X218Y141* |
| *Sample ID:* | | *S-011102-MG-046* | *S-011002-MG-032* | *S-011002-MG-033* | *S-011002-MG-034* | *S-011402-MG-050* | *S-011402-MG-051* | *S-011402-MG-052* | *S-011402-MG-053* | *S-022702-MG-141* | *S-022702-MG-142* | *S-011102-MG-035* |
| *Sample Date:* | | *1/11/2002* | *1/10/2002* | *1/10/2002* | *1/10/2002* | *1/14/2002* | *1/14/2002* | *1/14/2002* | *1/14/2002* | *2/27/2002* | *2/27/2002* | *1/11/2002* |
| *Sample Depth:* | | *(14-15.5)* | *(0-2)* | *(6-8)* | *(15-16)* | *(0-2)* | *(6-8)* | *(10-11)* | *(12-12.5)* | *(0-2)* | *(6-7)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,4,5-Trichlorophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,4,6-Trichlorophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,4-Dichlorophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,4-Dimethylphenol | µg/kg | ND (410) | 100 J | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 2,4-Dinitrotoluene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2,6-Dinitrotoluene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2-Chloronaphthalene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2-Chlorophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2-Methylnaphthalene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2-Methylphenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 2-Nitrophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 4-Chloro-3-methylphenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 4-Chloroaniline | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 4-Methylphenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| Acenaphthene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Acenaphthylene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Acetophenone | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Anthracene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Atrazine | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzaldehyde | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzo(a)anthracene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzo(a)pyrene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzo(b)fluoranthene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzo(g,h,i)perylene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Benzo(k)fluoranthene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Biphenyl | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| bis(2-Chloroethyl)ether | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (410) | 1400 | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) U | ND (9000) U | ND (400) | ND (440) | ND (400) |
| Butyl benzylphthalate | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Caprolactam | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) UJ | ND (54000) UJ | ND (9000) UJ | ND (400) | ND (440) | ND (400) |
| Carbazole | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Chrysene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Dibenz(a,h)anthracene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Dibenzofuran | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Diethyl phthalate | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Dimethyl phthalate | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Di-n-butylphthalate | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Di-n-octyl phthalate | µg/kg | ND (410) | 3900 | ND (420) | ND (410) | ND (360) | 68 J | 18000 J | 2900 J | ND (400) | ND (440) | ND (400) |
| Fluoranthene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Fluorene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X204Y132*** | ***B-X204Y149*** | ***B-X204Y149*** | ***B-X204Y149*** | ***B-X211Y169*** | ***B-X211Y169*** | ***B-X211Y169*** | ***B-X211Y169*** | ***B-X217Y159*** | ***B-X217Y159*** | ***B-X218Y141*** |
| ***Sample ID:*** | | ***S-011102-MG-046*** | ***S-011002-MG-032*** | ***S-011002-MG-033*** | ***S-011002-MG-034*** | ***S-011402-MG-050*** | ***S-011402-MG-051*** | ***S-011402-MG-052*** | ***S-011402-MG-053*** | ***S-022702-MG-141*** | ***S-022702-MG-142*** | ***S-011102-MG-035*** |
| ***Sample Date:*** | | ***1/11/2002*** | ***1/10/2002*** | ***1/10/2002*** | ***1/10/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***2/27/2002*** | ***2/27/2002*** | ***1/11/2002*** |
| ***Sample Depth:*** | | ***(14-15.5)*** | ***(0-2)*** | ***(6-8)*** | ***(15-16)*** | ***(0-2)*** | ***(6-8)*** | ***(10-11)*** | ***(12-12.5)*** | ***(0-2)*** | ***(6-7)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Hexachlorobenzene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Hexachlorobutadiene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (1700) | ND (1800) | ND (260000) | ND (44000) | ND (1900) | ND (2100) | ND (1900) |
| Hexachloroethane | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Isophorone | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Naphthalene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Nitrobenzene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| N-Nitrosodiphenylamine | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Pentachlorophenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Phenanthrene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Phenol | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| Pyrene | µg/kg | ND (410) | ND (400) | ND (420) | ND (410) | ND (360) | ND (380) | ND (54000) | ND (9000) | ND (400) | ND (440) | ND (400) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 6470 | 10800 | 13400 | 7200 | 6430 | 7910 | 13300 | 13400 | 12200 | 15600 | 15600 |
| Antimony | mg/kg | R | ND (7.2) | ND (7.6) | ND (7.5) | ND (6.6) | ND (6.9) | ND (9.8) | ND (8.2) | ND (7.3) UJ | ND (8.0) UJ | R |
| Arsenic | mg/kg | 7.5 | 7.4 | 10.4 | 6.9 | 4.7 | 4.1 | 5.2 | 15.5 | 9.4 | 13.8 | 9.2 |
| Barium | mg/kg | 49.4 J | 60.5 | 63.0 | 75.6 | 39.7 | 41.0 | 65.1 | 55.4 | 66.9 | 123 | 77.3 |
| Beryllium | mg/kg | 5.1 | 0.58 J | 0.50 J | 1.4 | 0.29 J | 0.23 J | 0.41 J | 0.92 | 0.36 J | 1.6 | ND (0.60) U |
| Cadmium | mg/kg | 0.72 J | 0.55 J | ND (0.63) | 0.39 J | 0.32 J | 0.38 J | 2.1 | 0.72 | 0.24 J | 1.2 | 0.46 J |
| Chromium Total | mg/kg | 65.2 | 31.0 | 15.6 | 11.2 | 11.9 | 11.0 | 26.5 | 33.0 | 33.5 | 27.2 | 16.9 |
| Cobalt | mg/kg | 11.5 J | 12.4 | 7.5 | 4.0 J | 5.7 | 5.1 J | 8.4 | 9.2 | 6.1 | 9.9 | 14.2 |
| Copper | mg/kg | 14.9 | 77.1 | 13.5 | 15.0 | 27.3 | 26.4 | 107 | 26.6 | 12.3 | 24.8 | 19.5 |
| Cyanide (amenable) | mg/kg | ND (0.63) | ND (0.60) | ND (0.63) | ND (0.63) | ND (0.55) | ND (0.58) | ND (0.82) | ND (0.68) | ND (0.61) | ND (0.67) | ND (0.60) |
| Cyanide (total) | mg/kg | ND (0.63) | ND (0.60) | ND (0.63) | 0.24 J | ND (0.55) | ND (0.58) | 0.30 J | ND (0.68) | ND (0.61) | ND (0.67) | ND (0.60) |
| Iron | mg/kg | 27200 | 20200 | 21800 | 13600 | 11900 | 10800 | 10900 | 26100 | 23500 | 34300 | 24100 |
| Lead | mg/kg | 13.6 | 38.0 | 14.5 | 9.2 | 14.6 | 14.1 | 39.8 | 37.3 | 17.2 | 17.6 | 14.7 |
| Manganese | mg/kg | 288 | 237 J | 164 J | 145 J | 275 | 273 | 180 | 349 | 338 J | 344 J | 547 |
| Mercury | mg/kg | 0.055 J | 0.22 | 0.053 J | 0.036 J | 0.026 J | 0.033 J | 0.12 J | 0.022 J | 0.046 J | 0.12 J | 0.059 J |
| Nickel | mg/kg | 43.7 | 38.6 | 11.9 | 36.8 | 27.7 | 16.4 | 19.0 | 27.2 | 11.1 | 44.2 | 16.5 |
| Selenium | mg/kg | 0.63 J | 0.80 | 1.2 | 0.41 J | ND (0.55) | ND (0.58) | ND (0.82) | ND (0.68) | ND (0.61) | ND (0.67) | ND (0.60) |
| Silver | mg/kg | ND (2.5) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.1) | ND (1.2) | ND (1.6) | ND (1.4) | ND (1.2) | ND (1.3) | ND (1.2) |
| Thallium | mg/kg | ND (2.5) | 0.72 J | ND (1.3) | 0.92 J | ND (1.1) U | ND (1.2) U | ND (1.6) | ND (1.4) | ND (1.2) | ND (1.3) | ND (1.2) |
| Vanadium | mg/kg | 36.6 | 29.4 | 30.4 | 12.2 | 13.6 | 15.5 | 18.3 | 40.2 | 33.8 | 31.0 | 30.2 |
| Zinc | mg/kg | 102 | 123 J | 42.8 J | 22.2 J | 43.4 | 47.4 | 643 | 94.7 | 42.4 J | 141 J | 48.1 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (41) | ND (400) | ND (830) | ND (41) | ND (1800) | ND (7600) | ND (110000) | ND (45000) | ND (40) | ND (44) | ND (400) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (41) | ND (400) | ND (830) | ND (41) | ND (1800) | ND (7600) | ND (110000) | ND (45000) | ND (40) | ND (44) | ND (400) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (41) | ND (400) | ND (830) | ND (41) | ND (1800) | ND (7600) | ND (110000) | ND (45000) | ND (40) | ND (44) | ND (400) |
| Aroclor-1242 (PCB-1242) | µg/kg | 24 J | ND (400) | ND (830) | ND (41) | ND (1800) | ND (7600) | 1200000 | 400000 | ND (40) | ND (44) | ND (400) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (41) | 4300 | 13000 | 120 | 18000 | 56000 | ND (110000) | ND (45000) | ND (40) | ND (44) | 2000 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (41) | ND (400) | ND (830) | ND (41) | ND (1800) | ND (7600) | ND (110000) | ND (45000) | ND (40) | ND (44) | ND (400) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (41) | 460 | ND (830) | ND (41) | 1100 J | 2900 J | ND (110000) | ND (45000) | ND (40) | ND (44) | ND (400) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 79.9 | 83.4 | 79.4 | 79.6 | 91.6 | 86.9 | 61.1 | 73.3 | 82.2 | 75.0 | 82.8 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X218Y141* | *B-X218Y141* | *B-X218Y141* | *B-X221Y169* | *B-X221Y169* | *B-X223Y150B* | *B-X223Y150B* | *B-X223Y150B* | *B-X224Y138A* | *B-X224Y138B* | *B-X224Y138B* |
| *Sample ID:* | | *S-011102-MG-036* | *S-011102-MG-037* | *S-011102-MG-038* | *S-022702-MG-139* | *S-022702-MG-140* | *S-022702-MG-143* | *S-022702-MG-144* | *S-022702-MG-145* | *S-022502-MG-135* | *S-022502-MG-136* | *S-022502-MG-137* |
| *Sample Date:* | | *1/11/2002* | *1/11/2002* | *1/11/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/25/2002* | *2/25/2002* | *2/25/2002* |
| *Sample Depth:* | | *(6-8)* | *(8-10)* | *(14-15.5)* | *(0-2)* | *(4-5)* | *(3-4)* | *(6-8)* | *(10-12)* | *(0-2)* | *(0-2)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,1,2-Trichloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,1-Dichloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,1-Dichloroethene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,2,4-Trichlorobenzene | µg/kg | 780 | 460 J | 92 J | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (820) UJ | ND (4900) UJ | ND (640) UJ | ND (14) | ND (16) | ND (710) | ND (14) | ND (14) | ND (14) | ND (13) | ND (11) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,2-Dichlorobenzene | µg/kg | 320 J | 2200 J | 110 J | ND (7) | ND (8.1) | 180 J | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,2-Dichloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,2-Dichloropropane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,3-Dichlorobenzene | µg/kg | 5000 | 32000 | 1100 | ND (7) | ND (8.1) | 1700 | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 1,4-Dichlorobenzene | µg/kg | 13000 | 84000 | 2600 | ND (7) | ND (8.1) | 5000 | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | 140 J | ND (9800) | ND (1300) | ND (28) | ND (32) | ND (1400) | 13 J | ND (28) | ND (27) | ND (25) | ND (21) |
| 2-Hexanone | µg/kg | ND (1600) | ND (9800) | ND (1300) | ND (28) | ND (32) | ND (1400) | ND (28) | ND (28) | ND (27) | ND (25) | ND (21) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (1600) | ND (9800) | ND (1300) | ND (28) | ND (32) | ND (1400) | ND (28) | ND (28) | ND (27) | ND (25) | ND (21) |
| Acetone | µg/kg | ND (1600) U | ND (9800) U | ND (1300) U | ND (28) | ND (32) | ND (1400) | ND (28) U | ND (28) | ND (27) UJ | ND (25) UJ | ND (21) UJ |
| Benzene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Bromodichloromethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Bromoform | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (410) UJ | 500 J | ND (320) UJ | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Carbon disulfide | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Carbon tetrachloride | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Chlorobenzene | µg/kg | 300 J | 1800 J | 27 J | ND (7) | ND (8.1) | 250 J | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Chloroethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Chloroform (Trichloromethane) | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| cis-1,2-Dichloroethene | µg/kg | ND (210) | ND (1200) | ND (160) | ND (3.5) | ND (4) | ND (180) | ND (3.5) | ND (3.5) | ND (3.4) | ND (3.1) | ND (2.6) |
| cis-1,3-Dichloropropene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Cyclohexane | µg/kg | ND (820) | ND (4900) | ND (640) | ND (14) | ND (16) | ND (710) | ND (14) | ND (14) | ND (14) | ND (13) | ND (11) |
| Dibromochloromethane | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (410) | ND (2500) | ND (320) U | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Ethylbenzene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Isopropylbenzene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Methyl acetate | µg/kg | ND (820) | ND (4900) | ND (640) | 1.7 J | ND (16) | 96 J | 3.3 J | ND (14) | ND (14) | ND (13) | ND (11) |
| Methyl cyclohexane | µg/kg | ND (820) | ND (4900) | ND (640) | ND (14) | ND (16) | ND (710) | ND (14) | ND (14) | ND (14) | ND (13) | ND (11) |
| Methyl Tert Butyl Ether | µg/kg | ND (1600) | ND (9800) | ND (1300) | ND (28) | ND (32) | ND (1400) | ND (28) | ND (28) | ND (27) | ND (25) | ND (21) |
| Methylene chloride | µg/kg | ND (410) U | ND (2500) U | ND (320) U | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | 5.9 J | 7.4 | 6 |
| Styrene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Tetrachloroethene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Toluene | µg/kg | 77 J | 730 J | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| trans-1,2-Dichloroethene | µg/kg | ND (210) | ND (1200) | ND (160) | ND (3.5) | ND (4) | ND (180) | ND (3.5) | ND (3.5) | ND (3.4) | ND (3.1) | ND (2.6) |
| trans-1,3-Dichloropropene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Trichloroethene | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Vinyl chloride | µg/kg | ND (410) | ND (2500) | ND (320) | ND (7) | ND (8.1) | ND (350) | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |
| Xylene (total) | µg/kg | ND (410) U | 300 J | ND (320) | ND (7) | ND (8.1) | ND (350) U | ND (6.9) | ND (7) | ND (6.8) | ND (6.3) | ND (5.3) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** | ***A006*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X218Y141*** | ***B-X218Y141*** | ***B-X218Y141*** | ***B-X221Y169*** | ***B-X221Y169*** | ***B-X223Y150B*** | ***B-X223Y150B*** | ***B-X223Y150B*** | ***B-X224Y138A*** | ***B-X224Y138B*** | ***B-X224Y138B*** |
| ***Sample ID:*** | | ***S-011102-MG-036*** | ***S-011102-MG-037*** | ***S-011102-MG-038*** | ***S-022702-MG-139*** | ***S-022702-MG-140*** | ***S-022702-MG-143*** | ***S-022702-MG-144*** | ***S-022702-MG-145*** | ***S-022502-MG-135*** | ***S-022502-MG-136*** | ***S-022502-MG-137*** |
| ***Sample Date:*** | | ***1/11/2002*** | ***1/11/2002*** | ***1/11/2002*** | ***2/27/2002*** | ***2/27/2002*** | ***2/27/2002*** | ***2/27/2002*** | ***2/27/2002*** | ***2/25/2002*** | ***2/25/2002*** | ***2/25/2002*** |
| ***Sample Depth:*** | | ***(6-8)*** | ***(8-10)*** | ***(14-15.5)*** | ***(0-2)*** | ***(4-5)*** | ***(3-4)*** | ***(6-8)*** | ***(10-12)*** | ***(0-2)*** | ***(0-2)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,4,5-Trichlorophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,4,6-Trichlorophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,4-Dichlorophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,4-Dimethylphenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | 5900 | 13000 | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,4-Dinitrophenol | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 2,4-Dinitrotoluene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2,6-Dinitrotoluene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2-Chloronaphthalene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2-Chlorophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2-Methylnaphthalene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2-Methylphenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 2-Nitroaniline | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 2-Nitrophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 3-Nitroaniline | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 4-Chloro-3-methylphenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 4-Chloroaniline | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 4-Methylphenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| 4-Nitroaniline | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| 4-Nitrophenol | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| Acenaphthene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | 360 J | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Acenaphthylene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Acetophenone | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Anthracene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Atrazine | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzaldehyde | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzo(a)anthracene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzo(a)pyrene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzo(b)fluoranthene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzo(g,h,i)perylene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Benzo(k)fluoranthene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Biphenyl | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| bis(2-Chloroethyl)ether | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| bis(2-Ethylhexyl)phthalate | µg/kg | 4500 J | 42000 | 1200 | ND (440) | ND (440) | 1500 | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Butyl benzylphthalate | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Caprolactam | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Carbazole | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Chrysene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Dibenz(a,h)anthracene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Dibenzofuran | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Diethyl phthalate | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Dimethyl phthalate | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Di-n-butylphthalate | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Di-n-octyl phthalate | µg/kg | 5700 J | 63000 | 2300 | ND (440) | ND (440) | 1900 | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Fluoranthene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* | *A006* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X218Y141* | *B-X218Y141* | *B-X218Y141* | *B-X221Y169* | *B-X221Y169* | *B-X223Y150B* | *B-X223Y150B* | *B-X223Y150B* | *B-X224Y138A* | *B-X224Y138B* | *B-X224Y138B* |
| *Sample ID:* | | *S-011102-MG-036* | *S-011102-MG-037* | *S-011102-MG-038* | *S-022702-MG-139* | *S-022702-MG-140* | *S-022702-MG-143* | *S-022702-MG-144* | *S-022702-MG-145* | *S-022502-MG-135* | *S-022502-MG-136* | *S-022502-MG-137* |
| *Sample Date:* | | *1/11/2002* | *1/11/2002* | *1/11/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/27/2002* | *2/25/2002* | *2/25/2002* | *2/25/2002* |
| *Sample Depth:* | | *(6-8)* | *(8-10)* | *(14-15.5)* | *(0-2)* | *(4-5)* | *(3-4)* | *(6-8)* | *(10-12)* | *(0-2)* | *(0-2)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Hexachlorobenzene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Hexachlorobutadiene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Hexachlorocyclopentadiene | µg/kg | ND (98000) | ND (99000) | ND (2100) | ND (2100) | ND (2100) | ND (2000) | ND (8100) | ND (2200) | ND (2100) | ND (2000) | ND (1900) |
| Hexachloroethane | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Isophorone | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Naphthalene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Nitrobenzene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| N-Nitrosodiphenylamine | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Pentachlorophenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Phenanthrene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Phenol | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| Pyrene | µg/kg | ND (20000) | ND (20000) | ND (430) | ND (440) | ND (440) | ND (420) | ND (1700) | ND (450) | ND (430) | ND (420) | ND (400) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 19300 | 20000 | 11600 | 8740 | 15800 | 10800 | 9620 | 12800 | 4130 | 14300 | 7700 |
| Antimony | mg/kg | R | R | R | ND (7.9) UJ | ND (7.9) UJ | ND (7.6) UJ | ND (7.6) UJ | ND (16.5) UJ | ND (7.8) UJ | ND (7.7) UJ | ND (7.2) UJ |
| Arsenic | mg/kg | 9.9 | 3.9 | 13.6 | 7.1 | 12.8 | 9.7 | 5.5 | 13.6 | 11.2 | 11.2 | 6 |
| Barium | mg/kg | 62.3 | 54.0 | 118 | 57.3 | 89.8 | 92.5 | 90.2 | 174 | 67.2 | 43.4 | 235 |
| Beryllium | mg/kg | ND (0.62) U | ND (0.62) U | 3.9 | 0.63 J | 1.3 | 1.8 | 0.50 J | 2.4 | 0.72 | ND (0.64) | 1.1 |
| Cadmium | mg/kg | 0.28 J | 1.7 | 0.72 J | 0.35 J | 0.56 J | 0.82 | 0.26 J | 1.5 | 3.3 | ND (0.64) | 0.14 J |
| Chromium Total | mg/kg | 19.3 | 43.9 | 19.9 | 11.1 | 24.1 | 17.4 | 13.6 | 24.6 | 5.8 | 20 | 29.8 |
| Cobalt | mg/kg | 6.2 | 33.9 | 11.1 J | 8.0 | 8.4 | 10.6 | 14.3 | 13.9 | 7.2 | 5 J | 46 |
| Copper | mg/kg | 19.1 | 633 | 17.6 | 15.3 | 17.1 | 21.0 | 11.9 | 19.0 | 6 | 16.6 | 16.4 |
| Cyanide (amenable) | mg/kg | ND (0.62) | ND (0.62) | ND (0.65) | ND (0.66) | ND (0.66) | ND (0.63) | ND (0.64) | ND (0.69) | ND (0.65) | ND (0.64) | ND (0.60) |
| Cyanide (total) | mg/kg | ND (0.62) | 0.38 J | ND (0.65) | ND (0.66) | ND (0.66) | ND (0.63) | ND (0.64) | ND (0.69) | ND (0.65) | ND (0.64) | ND (0.60) |
| Iron | mg/kg | 24000 | 11800 | 30900 | 29100 | 33000 | 24500 | 14000 | 29400 | 19200 | 27600 | 28200 |
| Lead | mg/kg | 15.0 | 107 | 23.9 | 11.8 | 19.2 | 18.5 | 17.8 | 22.1 | 12.7 | 13.2 | 58.1 |
| Manganese | mg/kg | 201 | 144 | 280 | 180 J | 349 J | 285 J | 946 J | 336 J | 1000 | 172 | 1880 |
| Mercury | mg/kg | 0.090 J | 0.24 | 0.13 | 0.052 J | 0.090 J | 0.088 J | 0.042 J | 0.16 | 0.026 J | 0.13 | 0.016 J |
| Nickel | mg/kg | 14.2 | 68.7 | 81.8 | 32.6 | 37.4 | 30.5 | 12.5 | 55.7 | 187 | 12 | 48 |
| Selenium | mg/kg | ND (0.62) | ND (0.62) | 1.2 J | ND (0.66) | ND (0.66) | ND (0.63) | ND (0.64) | ND (1.4) | 1.6 | 0.8 | ND (0.60) |
| Silver | mg/kg | ND (1.2) | 0.43 J | ND (2.6) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (2.8) | ND (1.3) | ND (1.3) | ND (1.2) |
| Thallium | mg/kg | ND (1.2) | ND (1.2) | 2.1 J | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (2.8) | 1.3 | ND (1.3) | 0.94 J |
| Vanadium | mg/kg | 35.3 | 13.2 | 24.9 | 11.7 | 35.0 | 26.6 | 23.0 | 34.0 | 7 | 32.6 | 47.3 |
| Zinc | mg/kg | 52.2 | 650 | 84.6 | 44.8 J | 106 J | 82.9 J | 39.3 J | 122 J | 67.4 | 45.6 | 81 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (410000) | 6900000 | ND (43000) | ND (44) | ND (44) | ND (8300) | ND (4200) | ND (45) | ND (43) | ND (42) | ND (40) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (410000) | ND (4100000) | ND (43000) | ND (44) | ND (44) | ND (8300) | ND (4200) | ND (45) | ND (43) | ND (42) | ND (40) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (410000) | ND (4100000) | ND (43000) | ND (44) | ND (44) | ND (8300) | ND (4200) | ND (45) | ND (43) | ND (42) | ND (40) |
| Aroclor-1242 (PCB-1242) | µg/kg | 5100000 | 8600000 | 580000 | ND (44) | ND (44) | 110000 | 32000 | 320 | ND (43) | ND (42) | ND (40) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (410000) | ND (4100000) | ND (43000) | 32 J | ND (44) | ND (8300) | ND (4200) | ND (45) | 19 J | 240 | ND (40) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (410000) | ND (4100000) | ND (43000) | ND (44) | ND (44) | ND (8300) | ND (4200) | ND (45) | ND (43) | ND (42) | ND (40) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (410000) | ND (4100000) | ND (43000) | ND (44) | ND (44) | ND (8300) | ND (4200) | ND (45) | ND (43) | ND (42) | ND (40) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 81.3 | 80.7 | 76.5 | 75.8 | 75.8 | 79.1 | 78.5 | 72.7 | 76.6 | 78.1 | 83.2 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X224Y138B*** | ***B-X232Y180*** | ***B-X232Y180*** | ***B-X173Y125*** | ***B-X173Y125*** | ***B-X189Y122*** | ***B-X189Y122*** | ***B-X189Y122*** | ***B-X213Y125*** | ***B-X213Y125*** | ***B-X213Y125*** |
| ***Sample ID:*** | | ***S-022502-MG-138*** | ***S-031802-MG-189*** | ***S-031802-MG-190*** | ***S-060302-MG-219*** | ***S-060302-MG-220*** | ***S-011502-MG-054*** | ***S-011502-MG-055*** | ***S-011502-MG-056*** | ***S-022502-MG-131*** | ***S-022502-MG-134*** | ***S-022502-MG-132*** |
| ***Sample Date:*** | | ***2/25/2002*** | ***3/18/2002*** | ***3/18/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***1/15/2002*** | ***1/15/2002*** | ***1/15/2002*** | ***2/25/2002*** | ***2/25/2002*** | ***2/25/2002*** |
| ***Sample Depth:*** | | ***(14-16)*** | ***(0-2)*** | ***(4.5-6.5)*** | ***(0-2)*** | ***(4-6)*** | ***(0-2)*** | ***(6-8)*** | ***(8-10)*** | ***(0-2)*** | ***(5-6)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,1,2-Trichloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,1-Dichloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,1-Dichloroethene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (12) | ND (18) | ND (12) | -- | -- | ND (12) | ND (12) | ND (14) | ND (12) | ND (12) | ND (11) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,2-Dichlorobenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,2-Dichloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,2-Dichloropropane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,3-Dichlorobenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 1,4-Dichlorobenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (25) | ND (37) | ND (25) | -- | -- | ND (24) | ND (25) | ND (28) | ND (24) | ND (24) | ND (23) |
| 2-Hexanone | µg/kg | ND (25) | ND (37) | ND (25) | -- | -- | ND (24) | ND (25) | ND (28) | ND (24) | ND (24) | ND (23) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (25) | ND (37) | ND (25) | -- | -- | ND (24) | ND (25) | ND (28) | ND (24) | ND (24) | ND (23) |
| Acetone | µg/kg | ND (25) UJ | ND (37) U | ND (25) U | -- | -- | ND (24) UJ | ND (25) UJ | ND (28) UJ | ND (24) UJ | ND (24) UJ | ND (23) UJ |
| Benzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Bromodichloromethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Bromoform | µg/kg | ND (6.2) | ND (9.2) UJ | ND (6.1) UJ | -- | -- | ND (6) UJ | ND (6.2) UJ | ND (6.9) UJ | ND (5.9) | ND (5.9) | ND (5.7) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6.2) | ND (9.2) UJ | ND (6.1) UJ | -- | -- | ND (6) UJ | ND (6.2) UJ | ND (6.9) UJ | ND (5.9) | ND (5.9) | ND (5.7) |
| Carbon disulfide | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Carbon tetrachloride | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Chlorobenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Chloroethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Chloroform (Trichloromethane) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (4.6) | ND (3.1) | -- | -- | ND (3) | ND (3.1) | ND (3.4) | ND (2.9) | ND (2.9) | ND (2.9) |
| cis-1,3-Dichloropropene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Cyclohexane | µg/kg | ND (12) | ND (18) | ND (12) | -- | -- | ND (12) | ND (12) | ND (14) | ND (12) | ND (12) | ND (11) |
| Dibromochloromethane | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Ethylbenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Isopropylbenzene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Methyl acetate | µg/kg | ND (12) | ND (18) | ND (12) | -- | -- | 2.4 J | ND (12) | ND (14) | ND (12) | ND (12) | ND (11) |
| Methyl cyclohexane | µg/kg | ND (12) | ND (18) | ND (12) | -- | -- | ND (12) | ND (12) | ND (14) | ND (12) | ND (12) | ND (11) |
| Methyl Tert Butyl Ether | µg/kg | ND (25) | ND (37) | ND (25) | -- | -- | ND (24) | ND (25) | ND (28) | ND (24) | ND (24) | ND (23) |
| Methylene chloride | µg/kg | 9 | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | 12 | 11 | 14 |
| Styrene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Tetrachloroethene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Toluene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.1) | ND (4.6) | ND (3.1) | -- | -- | ND (3) | ND (3.1) | ND (3.4) | ND (2.9) | ND (2.9) | ND (2.9) |
| trans-1,3-Dichloropropene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Trichloroethene | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Vinyl chloride | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |
| Xylene (total) | µg/kg | ND (6.2) | ND (9.2) | ND (6.1) | -- | -- | ND (6) | ND (6.2) | ND (6.9) | ND (5.9) | ND (5.9) | ND (5.7) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *A006* | *A006* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* | *A006 P200(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X224Y138B* | *B-X232Y180* | *B-X232Y180* | *B-X173Y125* | *B-X173Y125* | *B-X189Y122* | *B-X189Y122* | *B-X189Y122* | *B-X213Y125* | *B-X213Y125* | *B-X213Y125* |
| *Sample ID:* | | *S-022502-MG-138* | *S-031802-MG-189* | *S-031802-MG-190* | *S-060302-MG-219* | *S-060302-MG-220* | *S-011502-MG-054* | *S-011502-MG-055* | *S-011502-MG-056* | *S-022502-MG-131* | *S-022502-MG-134* | *S-022502-MG-132* |
| *Sample Date:* | | *2/25/2002* | *3/18/2002* | *3/18/2002* | *6/3/2002* | *6/3/2002* | *1/15/2002* | *1/15/2002* | *1/15/2002* | *2/25/2002* | *2/25/2002* | *2/25/2002* |
| *Sample Depth:* | | *(14-16)* | *(0-2)* | *(4.5-6.5)* | *(0-2)* | *(4-6)* | *(0-2)* | *(6-8)* | *(8-10)* | *(0-2)* | *(5-6)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,4,5-Trichlorophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,4,6-Trichlorophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,4-Dichlorophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,4-Dimethylphenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,4-Dinitrophenol | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 2,4-Dinitrotoluene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2,6-Dinitrotoluene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2-Chloronaphthalene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2-Chlorophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2-Methylnaphthalene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2-Methylphenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 2-Nitroaniline | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 2-Nitrophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 3-Nitroaniline | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 4-Chloro-3-methylphenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 4-Chloroaniline | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 4-Methylphenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| 4-Nitroaniline | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| 4-Nitrophenol | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| Acenaphthene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Acenaphthylene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Acetophenone | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Anthracene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Atrazine | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzaldehyde | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzo(a)anthracene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzo(a)pyrene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzo(b)fluoranthene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzo(g,h,i)perylene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Benzo(k)fluoranthene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Biphenyl | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| bis(2-Chloroethyl)ether | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Butyl benzylphthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Caprolactam | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Carbazole | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Chrysene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Dibenz(a,h)anthracene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Dibenzofuran | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Diethyl phthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Dimethyl phthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Di-n-butylphthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Di-n-octyl phthalate | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Fluoranthene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | 89 J | ND (440) | ND (400) | ND (400) | ND (410) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006*** | ***A006*** | ***A006*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X224Y138B*** | ***B-X232Y180*** | ***B-X232Y180*** | ***B-X173Y125*** | ***B-X173Y125*** | ***B-X189Y122*** | ***B-X189Y122*** | ***B-X189Y122*** | ***B-X213Y125*** | ***B-X213Y125*** | ***B-X213Y125*** |
| ***Sample ID:*** | | ***S-022502-MG-138*** | ***S-031802-MG-189*** | ***S-031802-MG-190*** | ***S-060302-MG-219*** | ***S-060302-MG-220*** | ***S-011502-MG-054*** | ***S-011502-MG-055*** | ***S-011502-MG-056*** | ***S-022502-MG-131*** | ***S-022502-MG-134*** | ***S-022502-MG-132*** |
| ***Sample Date:*** | | ***2/25/2002*** | ***3/18/2002*** | ***3/18/2002*** | ***6/3/2002*** | ***6/3/2002*** | ***1/15/2002*** | ***1/15/2002*** | ***1/15/2002*** | ***2/25/2002*** | ***2/25/2002*** | ***2/25/2002*** |
| ***Sample Depth:*** | | ***(14-16)*** | ***(0-2)*** | ***(4.5-6.5)*** | ***(0-2)*** | ***(4-6)*** | ***(0-2)*** | ***(6-8)*** | ***(8-10)*** | ***(0-2)*** | ***(5-6)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Hexachlorobenzene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Hexachlorobutadiene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Hexachlorocyclopentadiene | µg/kg | ND (2300) | ND (2000) | ND (2000) | -- | -- | ND (2000) | ND (2100) | ND (2200) | ND (2000) | ND (2000) | ND (2000) |
| Hexachloroethane | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Isophorone | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Naphthalene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Nitrobenzene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| N-Nitrosodiphenylamine | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Pentachlorophenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Phenanthrene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Phenol | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| Pyrene | µg/kg | ND (470) | ND (410) | ND (410) | -- | -- | ND (410) | ND (430) | ND (440) | ND (400) | ND (400) | ND (410) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 10700 | 11000 | 13600 | -- | -- | 9080 | 11900 | 6770 | 11300 | 8200 | 8680 |
| Antimony | mg/kg | ND (8.5) UJ | ND (7.5) UJ | ND (7.5) UJ | -- | -- | ND (7.4) | ND (7.8) | ND (16.2) | ND (7.3) UJ | ND (14.7) | ND (15.0) |
| Arsenic | mg/kg | 7.5 | 4.9 | 6.7 | -- | -- | 8.3 | 7.3 | 37.0 | 7.3 | 5.7 | 8.8 |
| Barium | mg/kg | 45.5 | 54.2 | 66.7 | -- | -- | 42.5 | 68.0 | 216 | 25.5 | 230 | 374 |
| Beryllium | mg/kg | 2.5 | ND (0.63) U | ND (0.63) U | -- | -- | 0.67 | 1.1 | ND (1.3) U | ND (0.61) U | 3.7 | 7.8 |
| Cadmium | mg/kg | 0.68 J | ND (0.63) | ND (0.63) | -- | -- | 0.34 J | ND (0.65) | 1.6 | ND (0.61) | 0.68 J | 1.5 |
| Chromium Total | mg/kg | 22 | 11.2 | 19.9 | -- | -- | 23.4 | 25.5 | 8.4 | 23.4 | 16.7 | 14.6 |
| Cobalt | mg/kg | 12.1 | 11.8 | 3.3 J | -- | -- | 8.0 | 13.9 | 6.8 J | 3.2 J | 307 | 14.5 |
| Copper | mg/kg | 19.1 | 9.2 | 10.9 | -- | -- | 15.5 | 27.7 | 29.1 | 12.2 | 9.8 | 11.7 |
| Cyanide (amenable) | mg/kg | ND (0.70) | ND (0.63) | ND (0.63) | -- | -- | ND (0.61) | ND (0.65) | ND (0.67) | ND (0.61) | ND (0.61) | ND (0.62) |
| Cyanide (total) | mg/kg | ND (0.70) | ND (0.63) | ND (0.63) | -- | -- | ND (0.61) | ND (0.65) | ND (0.67) | ND (0.61) | ND (0.61) | ND (0.62) |
| Iron | mg/kg | 24000 | 14200 | 17000 | -- | -- | 25200 | 21100 | 31800 | 26800 | 12600 | 25400 |
| Lead | mg/kg | 13.2 | 13.2 | 9.2 | -- | -- | 22.7 | 24.0 | 50.2 | 12.5 | 9.6 | 17.8 |
| Manganese | mg/kg | 148 | 848 | 99.3 | -- | -- | 219 | 279 | 137 | 67.5 | 1790 | 1320 |
| Mercury | mg/kg | 0.04 J | ND (0.13) U | 0.069 J | -- | -- | 0.16 | 0.12 J | 0.14 | 0.029 J | 0.096 J | 0.025 J |
| Nickel | mg/kg | 33.8 | 8.8 J | 9.6 | -- | -- | 21.0 | 66.2 | 52.5 | 8 | 76.5 | 63.4 |
| Selenium | mg/kg | ND (0.70) | ND (0.63) | ND (0.63) U | -- | -- | 1.2 | ND (0.65) | ND (1.3) | 0.5 J | ND (1.2) | ND (1.2) |
| Silver | mg/kg | ND (1.4) | ND (1.3) | ND (1.3) | -- | -- | ND (1.2) | ND (1.3) | ND (2.7) | ND (1.2) | ND (2.4) | ND (2.5) |
| Thallium | mg/kg | 0.73 J | ND (1.3) | ND (1.3) | -- | -- | 0.72 J | ND (1.3) | 3.7 | ND (1.2) | 3.6 | 1.7 J |
| Vanadium | mg/kg | 28.7 | 22.7 | 34.6 | -- | -- | 35.2 | 25.0 | 7.4 J | 35.7 | 15.8 | 21.2 |
| Zinc | mg/kg | 40.5 | 33.8 | 30.1 | -- | -- | 47.6 | 43.8 | 375 | 26.7 | 120 | 121 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (47) | ND (41) | ND (41) | ND (38) | ND (42) | ND (81) | ND (430) | ND (220) | ND (40) | ND (40) | ND (41) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (47) | ND (41) | ND (41) | ND (38) | ND (42) | ND (81) | ND (430) | ND (220) | ND (40) | ND (40) | ND (41) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (47) | ND (41) | ND (41) | ND (38) | ND (42) | ND (81) | ND (430) | ND (220) | ND (40) | ND (40) | ND (41) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (47) | ND (41) | ND (41) | ND (38) | ND (42) | ND (81) | ND (430) | 530 | ND (40) | ND (40) | ND (41) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (47) | 8 J | ND (41) | 220 | 120 | 1400 | 2700 | ND (220) | ND (40) | ND (40) | ND (41) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (47) | ND (41) | ND (41) | ND (38) | ND (42) | ND (81) | ND (430) | ND (220) | ND (40) | ND (40) | ND (41) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (47) | ND (41) | ND (41) | 45 | 24 J | 120 | ND (430) | ND (220) | ND (40) UJ | ND (40) | ND (41) UJ |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 71 | 79.7 | 79.7 | 86.4 | 78.4 | 81.4 | 76.9 | 74.2 | 81.7 | 81.7 | 80 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X213Y125*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X185Y195*** |
| ***Sample ID:*** | | ***S-022502-MG-133*** | ***S-011402-MG-047*** | ***S-011402-MG-048*** | ***S-011402-MG-049*** | ***S-030602-MG-161*** | ***S-030602-MG-162*** | ***S-030602-MG-163*** | ***S-030602-MG-158*** | ***S-030602-MG-159*** | ***S-030602-MG-160*** | ***S-031502-MG-186*** |
| ***Sample Date:*** | | ***2/25/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/15/2002*** |
| ***Sample Depth:*** | | ***(10-11.5)*** | ***(0-2)*** | ***(6-8)*** | ***(14-15)*** | ***(0-2)*** | ***(6-8)*** | ***(22-24)*** | ***(0-2)*** | ***(6-8)*** | ***(26-28)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,1,2-Trichloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,1-Dichloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,1-Dichloroethene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (15) | ND (11) | ND (12) | ND (12) | ND (13) | ND (13) | ND (11) | ND (10) | ND (16) | ND (15) | ND (11) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,2-Dichlorobenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,2-Dichloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,2-Dichloropropane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,3-Dichlorobenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | 4 J | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| 1,4-Dichlorobenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | 13 | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | 1 J | ND (5.7) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (30) | ND (22) | ND (25) | ND (23) | ND (27) | 5.8 J | ND (23) | ND (20) | ND (31) | ND (31) | ND (23) |
| 2-Hexanone | µg/kg | ND (30) | ND (22) | ND (25) | ND (23) | ND (27) | ND (27) | ND (23) | ND (20) | ND (31) | ND (31) | ND (23) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (30) | ND (22) | ND (25) | ND (23) | ND (27) | ND (27) | ND (23) | ND (20) | ND (31) | ND (31) | ND (23) |
| Acetone | µg/kg | ND (30) UJ | ND (22) UJ | ND (25) UJ | ND (23) UJ | ND (27) UJ | 26 J | ND (23) UJ | ND (20) UJ | ND (31) UJ | ND (31) UJ | ND (23) |
| Benzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Bromodichloromethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Bromoform | µg/kg | ND (7.4) | ND (5.6) UJ | ND (6.2) UJ | ND (5.8) UJ | ND (6.7) UJ | ND (6.7) UJ | ND (5.7) UJ | ND (5.1) UJ | ND (7.8) UJ | ND (7.7) UJ | ND (5.7) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (7.4) | ND (5.6) UJ | ND (6.2) UJ | ND (5.8) UJ | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Carbon disulfide | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Carbon tetrachloride | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Chlorobenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | 2.2 J | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Chloroethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Chloroform (Trichloromethane) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.7) | ND (2.8) | ND (3.1) | ND (2.9) | ND (3.3) | ND (3.3) | 1.7 J | ND (2.5) | ND (3.9) | ND (3.9) | ND (2.8) |
| cis-1,3-Dichloropropene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Cyclohexane | µg/kg | ND (15) | ND (11) | ND (12) | ND (12) | ND (13) | ND (13) | ND (11) | ND (10) | ND (16) | ND (15) | ND (11) |
| Dibromochloromethane | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Ethylbenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Isopropylbenzene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Methyl acetate | µg/kg | ND (15) | ND (11) | ND (12) | ND (12) | ND (13) | ND (13) | ND (11) | ND (10) | ND (16) | ND (15) | ND (11) |
| Methyl cyclohexane | µg/kg | ND (15) | ND (11) | ND (12) | ND (12) | ND (13) | ND (13) | ND (11) | ND (10) | ND (16) | ND (15) | ND (11) |
| Methyl Tert Butyl Ether | µg/kg | ND (30) | ND (22) | ND (25) | ND (23) | ND (27) | ND (27) | ND (23) | ND (20) | ND (31) | ND (31) | ND (23) |
| Methylene chloride | µg/kg | 7.5 | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Styrene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Tetrachloroethene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Toluene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.7) | ND (2.8) | ND (3.1) | ND (2.9) | ND (3.3) | ND (3.3) | ND (2.8) | ND (2.5) | ND (3.9) | ND (3.9) | ND (2.8) |
| trans-1,3-Dichloropropene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Trichloroethene | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Vinyl chloride | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |
| Xylene (total) | µg/kg | ND (7.4) | ND (5.6) | ND (6.2) | ND (5.8) | ND (6.7) | ND (6.7) | ND (5.7) | ND (5.1) | ND (7.8) | ND (7.7) | ND (5.7) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X213Y125*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X185Y195*** |
| ***Sample ID:*** | | ***S-022502-MG-133*** | ***S-011402-MG-047*** | ***S-011402-MG-048*** | ***S-011402-MG-049*** | ***S-030602-MG-161*** | ***S-030602-MG-162*** | ***S-030602-MG-163*** | ***S-030602-MG-158*** | ***S-030602-MG-159*** | ***S-030602-MG-160*** | ***S-031502-MG-186*** |
| ***Sample Date:*** | | ***2/25/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/15/2002*** |
| ***Sample Depth:*** | | ***(10-11.5)*** | ***(0-2)*** | ***(6-8)*** | ***(14-15)*** | ***(0-2)*** | ***(6-8)*** | ***(22-24)*** | ***(0-2)*** | ***(6-8)*** | ***(26-28)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,4,5-Trichlorophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,4,6-Trichlorophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,4-Dichlorophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,4-Dimethylphenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 2,4-Dinitrotoluene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2,6-Dinitrotoluene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2-Chloronaphthalene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2-Chlorophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2-Methylnaphthalene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2-Methylphenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 2-Nitrophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 4-Chloro-3-methylphenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 4-Chloroaniline | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 4-Methylphenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| Acenaphthene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Acenaphthylene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Acetophenone | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Anthracene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Atrazine | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzaldehyde | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzo(a)anthracene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzo(a)pyrene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzo(b)fluoranthene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzo(g,h,i)perylene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Benzo(k)fluoranthene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Biphenyl | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| bis(2-Chloroethyl)ether | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Butyl benzylphthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Caprolactam | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) UJ |
| Carbazole | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Chrysene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Dibenz(a,h)anthracene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Dibenzofuran | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Diethyl phthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Dimethyl phthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Di-n-butylphthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Di-n-octyl phthalate | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Fluoranthene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A006 P200(GM)*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** | ***A007*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X213Y125*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X223Y124*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X158Y207*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X170Y211*** | ***B-X185Y195*** |
| ***Sample ID:*** | | ***S-022502-MG-133*** | ***S-011402-MG-047*** | ***S-011402-MG-048*** | ***S-011402-MG-049*** | ***S-030602-MG-161*** | ***S-030602-MG-162*** | ***S-030602-MG-163*** | ***S-030602-MG-158*** | ***S-030602-MG-159*** | ***S-030602-MG-160*** | ***S-031502-MG-186*** |
| ***Sample Date:*** | | ***2/25/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***1/14/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/6/2002*** | ***3/15/2002*** |
| ***Sample Depth:*** | | ***(10-11.5)*** | ***(0-2)*** | ***(6-8)*** | ***(14-15)*** | ***(0-2)*** | ***(6-8)*** | ***(22-24)*** | ***(0-2)*** | ***(6-8)*** | ***(26-28)*** | ***(0-2)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Hexachlorobenzene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Hexachlorobutadiene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (1900) | ND (2100) | ND (2000) | ND (2000) |
| Hexachloroethane | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Isophorone | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Naphthalene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Nitrobenzene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| N-Nitrosodiphenylamine | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Pentachlorophenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Phenanthrene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Phenol | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| Pyrene | µg/kg | ND (430) | ND (410) | ND (420) | ND (430) | ND (410) | ND (430) | ND (410) | ND (390) | ND (430) | ND (420) | ND (420) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 7260 | 12300 | 9660 | 10800 | 11100 | 11800 | 12600 | 11400 | 13400 | 12700 | 13000 J |
| Antimony | mg/kg | ND (39.0) | ND (7.5) | ND (38.1) | ND (7.9) | ND (7.5) UJ | ND (7.7) UJ | ND (7.5) UJ | ND (7.2) UJ | ND (7.7) UJ | ND (7.6) UJ | ND (7.7) UJ |
| Arsenic | mg/kg | 10.3 | 9.1 | 8.9 | 9.3 | 8.4 | 7.6 | 10.2 | 9.9 | 7.9 | 7.5 | 10.2 |
| Barium | mg/kg | 533 | 56.7 | 67.7 J | 29.5 | 52.1 | 87.7 | 65.1 | 45.9 | 57.2 | 66.3 | 58.1 J |
| Beryllium | mg/kg | 2.5 J | ND (0.62) U | 7.0 | 1.4 | 1.1 | 1.1 | 1.7 | ND (0.68) U | ND (0.85) U | 2.4 | ND (0.67) UJ |
| Cadmium | mg/kg | 15.4 | 0.12 J | 5.1 | 0.70 | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.60) | ND (0.64) | ND (0.63) | ND (0.64) |
| Chromium Total | mg/kg | 13.4 | 17.9 | 14.3 | 22.7 | 36.2 J | 17.3 J | 34.7 J | 23.3 J | 19.7 J | 18.4 J | 22.5 J |
| Cobalt | mg/kg | 22.3 J | 6.2 | 10.8 J | 7.8 | 11.0 J | 8.6 J | 29.8 J | 8.4 J | 10.0 J | 12.1 J | 5.8 J |
| Copper | mg/kg | 40.6 | 17.1 | 33.6 | 12.0 | 14.9 J | 15.4 J | 15.8 J | 13.0 J | 13.2 J | 17.0 J | 13.7 J |
| Cyanide (amenable) | mg/kg | ND (0.65) | ND (0.62) | ND (0.64) | ND (0.66) | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.60) | ND (0.64) | ND (0.63) | ND (0.64) |
| Cyanide (total) | mg/kg | ND (0.65) | ND (0.62) | ND (0.64) | ND (0.66) | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.60) | ND (0.64) | ND (0.63) | ND (0.64) |
| Iron | mg/kg | 31200 | 23800 | 22100 | 21900 | 25300 J | 19200 J | 27900 J | 27400 J | 21700 J | 24700 J | 27100 J |
| Lead | mg/kg | 76.9 | 15.5 | 14.0 | 14.8 | 20.1 J | 20.0 J | 27.5 J | 16.7 J | 14.8 J | 15.2 J | 18.1 J |
| Manganese | mg/kg | 3390 | 219 | 1170 | 221 | 178 J | 120 J | 328 J | 202 J | 148 J | 425 J | 204 J |
| Mercury | mg/kg | 0.093 J | 0.019 J | 0.13 | 0.072 J | ND (0.12) U | 0.095 J | ND (0.12) U | ND (0.12) U | ND (0.13) U | 0.064 J | ND (0.13) U |
| Nickel | mg/kg | 111 | 12.2 | 149 | 19.6 | 20.3 J | 22.8 J | 30.7 J | 16.5 J | 14.3 J | 38.9 J | 12.1 J |
| Selenium | mg/kg | ND (3.3) | ND (0.62) | 0.86 J | ND (0.66) | ND (0.62) | ND (0.65) | ND (0.62) | ND (0.60) | ND (0.64) | ND (0.63) | ND (0.64) |
| Silver | mg/kg | ND (6.5) | ND (1.2) | ND (6.4) | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.2) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) |
| Thallium | mg/kg | 4 J | ND (1.2) U | ND (6.4) | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.2) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) U |
| Vanadium | mg/kg | 37.5 | 29.6 | 15.5 J | 27.4 | 34.5 J | 29.4 J | 37.0 J | 35.7 J | 32.9 J | 23.6 J | 38.4 J |
| Zinc | mg/kg | 154 | 51.1 | 179 | 34.6 | 41.2 J | 41.3 J | 51.2 J | 42.7 J | 35.7 J | 42.9 J | 36.1 J |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (43) | 23 J | ND (42) | ND (43) | 88 | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) | ND (41) | ND (39) | ND (43) | ND (42) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | ND (41) | ND (42) | ND (43) | ND (41) | ND (43) UJ | ND (41) UJ | ND (39) | ND (43) | ND (42) | ND (42) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 76.9 | 80.1 | 78.7 | 76.1 | 80.1 | 77.4 | 80.5 | 83.7 | 77.6 | 79.0 | 78.1 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A007* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X185Y195* | *B-X185Y195* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y115* | *MW-X233Y115* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y125* |
| *Sample ID:* | | *S-031502-MG-187* | *S-031502-MG-188* | *S-042403-JM-1008* | *S-042403-JM-1007* | *S-041603-KMV-571* | *S-041603-KMV-572* | *S-042203-JM-1000* | *S-042203-JM-1001* | *S-042203-JM-1002* | *S-042203-JM-1003* | *S-042203-JM-1004* |
| *Sample Date:* | | *3/15/2002* | *3/15/2002* | *4/24/2003* | *4/24/2003* | *4/16/2003* | *4/16/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* |
| *Sample Depth:* | | *(6-8)* | *(11-12.5)* | *(2.6-4)* | *(5-6)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* Duplicate | *(6-8)* | *(8-10)* | *(0-2)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,1,2-Trichloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,1-Dichloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,1-Dichloroethene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (16) | ND (14) | ND (11) | ND (9.7) | ND (9.5) | ND (11) | ND (11) | ND (12) | ND (10) | ND (12) | ND (10) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,2-Dichlorobenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,2-Dichloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,2-Dichloropropane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,3-Dichlorobenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 1,4-Dichlorobenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (32) | ND (29) | ND (21) UJ | ND (19) UJ | ND (19) UJ | ND (22) UJ | ND (21) UJ | ND (23) UJ | ND (20) UJ | ND (24) UJ | ND (21) UJ |
| 2-Hexanone | µg/kg | ND (32) | ND (29) | ND (21) UJ | ND (19) UJ | ND (19) UJ | ND (22) UJ | ND (21) UJ | ND (23) | ND (20) | ND (24) | ND (21) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (32) | ND (29) | ND (21) | ND (19) | ND (19) | ND (22) | ND (21) | ND (23) | ND (20) | ND (24) | ND (21) |
| Acetone | µg/kg | ND (32) | 3.3 J | ND (21) UJ | ND (19) UJ | ND (19) UJ | ND (22) UJ | ND (21) UJ | ND (23) UJ | ND (20) UJ | ND (24) UJ | ND (21) UJ |
| Benzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Bromodichloromethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Bromoform | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Carbon disulfide | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Carbon tetrachloride | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) UJ | ND (4.8) UJ | ND (4.7) | ND (5.6) | ND (5.3) UJ | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Chlorobenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Chloroethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Chloroform (Trichloromethane) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| cis-1,2-Dichloroethene | µg/kg | ND (4.1) | ND (3.6) | ND (2.7) | ND (2.4) | ND (2.4) | ND (2.8) | ND (2.6) | ND (2.9) | ND (2.5) | ND (3.0) | ND (2.6) |
| cis-1,3-Dichloropropene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Cyclohexane | µg/kg | ND (16) | ND (14) | ND (11) | ND (9.7) | ND (9.5) | ND (11) | ND (11) | ND (12) | ND (10) | ND (12) | ND (10) |
| Dibromochloromethane | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Ethylbenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Isopropylbenzene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Methyl acetate | µg/kg | ND (16) | ND (14) | ND (11) | ND (9.7) | ND (9.5) | ND (11) | ND (11) | ND (12) | ND (10) | ND (12) | ND (10) |
| Methyl cyclohexane | µg/kg | ND (16) | ND (14) | ND (11) | ND (9.7) | ND (9.5) | ND (11) | ND (11) | ND (12) | ND (10) | ND (12) | ND (10) |
| Methyl Tert Butyl Ether | µg/kg | ND (32) | ND (29) | ND (21) | ND (19) | ND (19) | ND (22) | ND (21) | ND (23) | ND (20) | ND (24) | ND (21) |
| Methylene chloride | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Styrene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Tetrachloroethene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Toluene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| trans-1,2-Dichloroethene | µg/kg | ND (4.1) | ND (3.6) | ND (2.7) | ND (2.4) | ND (2.4) | ND (2.8) | ND (2.6) | ND (2.9) | ND (2.5) | ND (3.0) | ND (2.6) |
| trans-1,3-Dichloropropene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Trichloroethene | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) UJ | ND (4.8) UJ | ND (4.7) UJ | ND (5.6) UJ | ND (5.3) UJ | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Vinyl chloride | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |
| Xylene (total) | µg/kg | ND (8.1) | ND (7.1) | ND (5.4) | ND (4.8) | ND (4.7) | ND (5.6) | ND (5.3) | ND (5.8) | ND (5.1) | ND (5.9) | ND (5.1) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A007* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X185Y195* | *B-X185Y195* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y115* | *MW-X233Y115* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y125* |
| *Sample ID:* | | *S-031502-MG-187* | *S-031502-MG-188* | *S-042403-JM-1008* | *S-042403-JM-1007* | *S-041603-KMV-571* | *S-041603-KMV-572* | *S-042203-JM-1000* | *S-042203-JM-1001* | *S-042203-JM-1002* | *S-042203-JM-1003* | *S-042203-JM-1004* |
| *Sample Date:* | | *3/15/2002* | *3/15/2002* | *4/24/2003* | *4/24/2003* | *4/16/2003* | *4/16/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* |
| *Sample Depth:* | | *(6-8)* | *(11-12.5)* | *(2.6-4)* | *(5-6)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* | *(6-8)* | *(8-10)* | *(0-2)* |
| | | | | | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2-Methylnaphthalene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2-Methylphenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 4-Methylphenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| Acenaphthene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Acenaphthylene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Acetophenone | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Anthracene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Atrazine | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzaldehyde | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzo(b)fluoranthene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Biphenyl | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| bis(2-Ethylhexyl)phthalate | µg/kg | 200 J | ND (480) | 47 J | 40 J | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Caprolactam | µg/kg | ND (420) UJ | ND (480) UJ | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Carbazole | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Chrysene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Dibenzofuran | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Diethyl phthalate | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Di-n-butylphthalate | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Fluoranthene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A007* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X185Y195* | *B-X185Y195* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y115* | *MW-X233Y115* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y120* | *MW-X233Y125* |
| *Sample ID:* | | *S-031502-MG-187* | *S-031502-MG-188* | *S-042403-JM-1008* | *S-042403-JM-1007* | *S-041603-KMV-571* | *S-041603-KMV-572* | *S-042203-JM-1000* | *S-042203-JM-1001* | *S-042203-JM-1002* | *S-042203-JM-1003* | *S-042203-JM-1004* |
| *Sample Date:* | | *3/15/2002* | *3/15/2002* | *4/24/2003* | *4/24/2003* | *4/16/2003* | *4/16/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* | *4/22/2003* |
| *Sample Depth:* | | *(6-8)* | *(11-12.5)* | *(2.6-4)* | *(5-6)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* | *(6-8)* | *(8-10)* | *(0-2)* |
| | | | | | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Hexachlorobenzene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (2300) | ND (1900) | ND (1800) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (1800) | ND (2000) |
| Hexachloroethane | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Isophorone | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Naphthalene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Nitrobenzene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Pentachlorophenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Phenanthrene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Phenol | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| Pyrene | µg/kg | ND (420) | ND (480) | ND (400) | ND (380) | ND (400) | ND (420) | ND (410) | ND (420) | ND (430) | ND (370) | ND (410) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 9050 J | 19800 J | 9050 | 4920 | 12500 | 10500 | 15600 | 16300 | 9200 | 5450 | 14700 |
| Antimony | mg/kg | ND (38.0) UJ | ND (17.5) UJ | ND (7.3) | ND (6.8) | ND (7.3) | ND (30.6) | 0.76 J | 0.65 J | ND (38.7) UJ | ND (67.2) UJ | 0.56 J |
| Arsenic | mg/kg | 9.0 | 15.7 | 4.0 | 4.5 | 8.1 | 27.3 | 11.3 | 9.6 | 6.4 | 5.8 J | 6.6 |
| Barium | mg/kg | 47.2 J | 79.8 J | 90.3 | 50.6 | 51.9 | 78.8 J | 48.2 J | 50.0 J | 85.7 J | 49.6 J | 28.6 J |
| Beryllium | mg/kg | 1.4 J | 1.9 J | 0.56 J | ND (0.57) U | 0.58 J | 2.3 J | 0.26 J | 0.29 J | 6.7 | 1.5 J | 0.55 J |
| Cadmium | mg/kg | ND (3.2) | ND (1.5) | 0.85 | 0.36 J | 0.29 J | 0.61 J | 0.24 J | 0.23 J | 1.6 J | 1.4 J | 0.37 J |
| Chromium Total | mg/kg | 9.8 J | 32.9 J | 11.4 | 6.9 | 16.1 | 18.1 | 21.8 | 18.0 | 14.5 | 7.2 J | 30.9 |
| Cobalt | mg/kg | 17.8 J | 18.5 J | 2.2 J | 4.6 J | 5.7 J | 15.2 J | 5.6 J | 6.3 J | 14.9 J | 10 J | 5.8 J |
| Copper | mg/kg | 9.1 J | 24.0 J | 6.6 | 8.4 | 14.8 | 35.6 | 18.7 | 16.2 | 15.4 J | ND (28.0) U | 17.4 |
| Cyanide (amenable) | mg/kg | ND (0.63) | ND (0.73) | ND (0.61) | ND (0.57) | ND (0.61) | ND (0.64) | ND (0.62) | ND (0.63) | ND (0.64) | ND (0.56) | ND (0.63) |
| Cyanide (total) | mg/kg | ND (0.63) | ND (0.73) | ND (0.61) | ND (0.57) | ND (0.61) | ND (0.64) | ND (0.62) | ND (0.63) | ND (0.64) | ND (0.56) | ND (0.63) |
| Iron | mg/kg | 28600 J | 34400 J | 10700 | 11700 | 19900 | 36300 | 28600 | 24000 | 19500 | 19000 | 32800 |
| Lead | mg/kg | 14.9 J | 41.2 J | 7.2 | 5.4 | 15.0 | 50.1 | 12.7 J | 14.3 J | 13.5 J | 20.9 J | 15.7 J |
| Manganese | mg/kg | 250 J | 387 J | 118 | 201 | 146 | 313 | 114 | 163 | 643 | 261 | 57.9 |
| Mercury | mg/kg | ND (0.13) U | ND (0.16) U | 0.069 J | ND (0.11) | 0.036 J | 0.088 J | 0.12 | 0.064 J | 0.069 J | 0.045 J | ND (0.13) |
| Nickel | mg/kg | 47.7 J | 48.1 J | 11.3 | 14.7 | 17.3 | 59.2 | 12.4 J | 13.4 J | 128 J | 46.1 J | 11.9 J |
| Selenium | mg/kg | ND (3.2) | ND (1.5) | ND (0.61) | 0.82 | ND (0.61) | ND (2.5) | 1.0 | 1.3 | ND (3.2) | ND (5.6) | 0.94 |
| Silver | mg/kg | ND (6.3) | ND (2.9) | ND (1.2) | ND (1.1) | ND (1.2) | ND (5.1) | ND (1.2) | ND (1.3) | ND (6.4) | ND (11.2) | ND (1.3) |
| Thallium | mg/kg | ND (6.3) | ND (2.9) U | ND (1.2) | ND (1.1) | ND (1.2) | ND (5.1) | ND (1.2) | ND (1.3) | ND (6.4) | ND (11.2) | ND (1.3) |
| Vanadium | mg/kg | 10.3 J | 49.5 J | 16.4 | 8.8 | 26.7 | 25.7 | 34.9 | 33.6 | 18.8 J | 10.6 J | 39.7 |
| Zinc | mg/kg | 47.1 J | 62.6 J | 36.6 | 21.9 | 42.1 | 69.8 | 47.0 J | 48.4 J | 119 J | 62.5 J | 40.3 J |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (48) | 19 J | 25 J | 1200 | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | 540 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | ND (48) | ND (40) | ND (38) | ND (200) | ND (42) | ND (41) | ND (42) | ND (43) | ND (37) | ND (83) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 78.9 | 68.7 | 82.2 | 87.8 | 82.2 | 78.5 | 80.7 | 78.8 | 77.6 | 89.3 | 79.8 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***A008*** | ***A008*** | ***A008 P200(GM)*** | ***A008 P200(GM)*** | ***A008 P200(GM)*** | ***A008 P200(GM)*** | ***A011 P200(GM)*** | ***A011 P200(GM)*** | ***A011 P200(GM)*** | ***A011 P200(GM)*** | ***A011 P200(GM)*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***MW-X233Y125*** | ***MW-X233Y125*** | ***B-X193Y098*** | ***B-X193Y098*** | ***B-X193Y098*** | ***B-X193Y098*** | ***B-X204Y111C*** | ***B-X219Y095*** | ***B-X219Y095*** | ***B-X219Y095*** | ***B-X219Y095*** |
| ***Sample ID:*** | | ***S-042203-JM-1005*** | ***S-042203-JM-1006*** | ***S-010702-MG-004*** | ***S-010702-MG-005*** | ***S-010702-MG-006*** | ***S-010702-MG-007*** | ***S-010802-MG-016*** | ***S-010802-MG-008*** | ***S-010802-MG-009*** | ***S-010802-MG-010*** | ***S-010802-MG-011*** |
| ***Sample Date:*** | | ***4/22/2003*** | ***4/22/2003*** | ***1/7/2002*** | ***1/7/2002*** | ***1/7/2002*** | ***1/7/2002*** | ***1/8/2002*** | ***1/8/2002*** | ***1/8/2002*** | ***1/8/2002*** | ***1/8/2002*** |
| ***Sample Depth:*** | | ***(6-8)*** | ***(12-14)*** | ***(0-2)*** | ***(6-8)*** | ***(12-13)*** | ***(13-14)*** | ***(6.5-7.5)*** | ***(0-2)*** | ***(0-2) Duplicate*** | ***(6-8)*** | ***(8-9)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,1,2-Trichloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,1-Dichloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,1-Dichloroethene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (4.9) | ND (5.0) U | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (9.8) | ND (10) | ND (12) | ND (13) | ND (2400) | ND (12) UJ | ND (11) UJ | ND (11) UJ | ND (11) UJ | ND (11) UJ | ND (11) UJ |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,2-Dichlorobenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | 790 J | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,2-Dichloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,2-Dichloropropane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| 1,3-Dichlorobenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | 6500 | 14 | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | 2.5 J |
| 1,4-Dichlorobenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | 34000 | 23 | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | 4.2 J |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (20) UJ | ND (20) UJ | ND (23) | ND (27) | ND (4800) U | 4.1 J | ND (22) | 3.3 J | 3.9 J | ND (23) | 4.6 J |
| 2-Hexanone | µg/kg | ND (20) | ND (20) | ND (23) | ND (27) | ND (4800) | ND (24) | ND (22) | ND (23) | ND (23) | ND (23) | ND (23) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (20) | ND (20) | ND (23) | ND (27) | ND (4800) | ND (24) | ND (22) | ND (23) | ND (23) | ND (23) | ND (23) |
| Acetone | µg/kg | ND (20) UJ | ND (20) UJ | ND (23) | ND (27) | ND (4800) U | ND (24) U | ND (22) U | ND (23) U | ND (23) U | ND (23) U | ND (23) U |
| Benzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Bromodichloromethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Bromoform | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Carbon disulfide | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Carbon tetrachloride | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Chlorobenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | 9000 | 130 | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | 11 |
| Chloroethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Chloroform (Trichloromethane) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| cis-1,2-Dichloroethene | µg/kg | ND (2.4) | ND (2.5) | ND (2.9) | ND (3.4) | ND (600) | ND (3) | ND (2.8) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.8) |
| cis-1,3-Dichloropropene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Cyclohexane | µg/kg | ND (9.8) | ND (10) | ND (12) | ND (13) | ND (2400) | ND (12) | ND (11) | ND (11) | ND (11) | ND (11) | ND (11) |
| Dibromochloromethane | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) U | ND (5.6) | ND (5.7) U | ND (5.7) U | ND (5.7) U | ND (5.6) |
| Ethylbenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Isopropylbenzene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Methyl acetate | µg/kg | ND (9.8) | ND (10) | ND (12) | ND (13) | ND (2400) | ND (12) | ND (11) | ND (11) | ND (11) | ND (11) | ND (11) |
| Methyl cyclohexane | µg/kg | ND (9.8) | ND (10) | ND (12) | ND (13) | ND (2400) | ND (12) | ND (11) | ND (11) | ND (11) | ND (11) | ND (11) |
| Methyl Tert Butyl Ether | µg/kg | ND (20) | ND (20) | ND (23) | ND (27) | ND (4800) | ND (24) | ND (22) | ND (23) | ND (23) | ND (23) | ND (23) |
| Methylene chloride | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Styrene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Tetrachloroethene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Toluene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | 0.78 J | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| trans-1,2-Dichloroethene | µg/kg | ND (2.4) | ND (2.5) | ND (2.9) | ND (3.4) | ND (600) | ND (3) | ND (2.8) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.8) |
| trans-1,3-Dichloropropene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Trichloroethene | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) UJ | ND (5.6) UJ | ND (5.7) UJ | ND (5.7) UJ | ND (5.7) UJ | ND (5.6) UJ |
| Vinyl chloride | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |
| Xylene (total) | µg/kg | ND (4.9) | ND (5.0) | ND (5.9) | ND (6.7) | ND (1200) | ND (5.9) | ND (5.6) | ND (5.7) | ND (5.7) | ND (5.7) | ND (5.6) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y125* | *MW-X233Y125* | *B-X193Y098* | *B-X193Y098* | *B-X193Y098* | *B-X193Y098* | *B-X204Y111C* | *B-X219Y095* | *B-X219Y095* | *B-X219Y095* | *B-X219Y095* |
| *Sample ID:* | | *S-042203-JM-1005* | *S-042203-JM-1006* | *S-010702-MG-004* | *S-010702-MG-005* | *S-010702-MG-006* | *S-010702-MG-007* | *S-010802-MG-016* | *S-010802-MG-008* | *S-010802-MG-009* | *S-010802-MG-010* | *S-010802-MG-011* |
| *Sample Date:* | | *4/22/2003* | *4/22/2003* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* |
| *Sample Depth:* | | *(6-8)* | *(12-14)* | *(0-2)* | *(6-8)* | *(12-13)* | *(13-14)* | *(6.5-7.5)* | *(0-2)* | *(0-2)* *Duplicate* | *(6-8)* | *(8-9)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,4,5-Trichlorophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,4,6-Trichlorophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,4-Dichlorophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,4-Dimethylphenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,4-Dinitrophenol | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 2,4-Dinitrotoluene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2,6-Dinitrotoluene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2-Chloronaphthalene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2-Chlorophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2-Methylnaphthalene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2-Methylphenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 2-Nitroaniline | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 2-Nitrophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 3-Nitroaniline | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 4-Chloro-3-methylphenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 4-Chloroaniline | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 4-Methylphenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| 4-Nitroaniline | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| 4-Nitrophenol | µg/kg | ND (1900) UJ | ND (2000) | ND (2000) UJ | ND (2300) UJ | ND (2100) UJ | ND (2000) UJ | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) UJ |
| Acenaphthene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Acenaphthylene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Acetophenone | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Anthracene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Atrazine | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Benzaldehyde | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Benzo(a)anthracene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Benzo(a)pyrene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Benzo(b)fluoranthene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Benzo(g,h,i)perylene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Benzo(k)fluoranthene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Biphenyl | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| bis(2-Chloroethyl)ether | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | 4300 | 4500 J | ND (380) | ND (410) | ND (410) | ND (420) | 5100 |
| Butyl benzylphthalate | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Caprolactam | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Carbazole | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Chrysene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Dibenz(a,h)anthracene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Dibenzofuran | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Diethyl phthalate | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | 180 J | ND (410) | ND (410) | ND (420) | ND (1600) |
| Dimethyl phthalate | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Di-n-butylphthalate | µg/kg | ND (400) | ND (400) | ND (410) UJ | ND (470) UJ | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Di-n-octyl phthalate | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | 3600 J | 3600 J | ND (380) | ND (410) | ND (410) | ND (420) | 6000 J |
| Fluoranthene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y125* | *MW-X233Y125* | *B-X193Y098* | *B-X193Y098* | *B-X193Y098* | *B-X193Y098* | *B-X204Y111C* | *B-X219Y095* | *B-X219Y095* | *B-X219Y095* | *B-X219Y095* |
| *Sample ID:* | | *S-042203-JM-1005* | *S-042203-JM-1006* | *S-010702-MG-004* | *S-010702-MG-005* | *S-010702-MG-006* | *S-010702-MG-007* | *S-010802-MG-016* | *S-010802-MG-008* | *S-010802-MG-009* | *S-010802-MG-010* | *S-010802-MG-011* |
| *Sample Date:* | | *4/22/2003* | *4/22/2003* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* |
| *Sample Depth:* | | *(6-8)* | *(12-14)* | *(0-2)* | *(6-8)* | *(12-13)* | *(13-14)* | *(6.5-7.5)* | *(0-2)* | *(0-2)* *Duplicate* | *(6-8)* | *(8-9)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Hexachlorobenzene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Hexachlorobutadiene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Hexachlorocyclopentadiene | µg/kg | ND (1900) | ND (2000) | ND (2000) | ND (2300) | ND (2100) | ND (2000) | ND (1900) | ND (2000) | ND (2000) | ND (2000) | ND (7500) |
| Hexachloroethane | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) UJ |
| Isophorone | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Naphthalene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Nitrobenzene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| N-Nitrosodiphenylamine | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Pentachlorophenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Phenanthrene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| Phenol | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | 230 J |
| Pyrene | µg/kg | ND (400) | ND (400) | ND (410) | ND (470) | ND (430) | ND (420) | ND (380) | ND (410) | ND (410) | ND (420) | ND (1600) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 10700 | 4440 | 12000 | 14200 | 9510 | 9210 | 2640 | 11900 | 11000 | 15400 | 10100 |
| Antimony | mg/kg | ND (7.2) UJ | 0.33 J | ND (7.5) UJ | ND (8.6) UJ | ND (7.7) UJ | ND (7.6) UJ | ND (7.0) UJ | ND (7.5) UJ | ND (7.4) UJ | 10.8 J | 11.2 J |
| Arsenic | mg/kg | 5.4 | 16.1 | 7.6 | 7.9 | 6.9 | 8.2 | 3.2 | 8.4 | 7.7 | 13.9 | 44.2 |
| Barium | mg/kg | 300 J | 98.2 J | 85.4 J | 171 J | 142 J | 122 J | 23.0 J | 86.9 | 69.4 | 65.7 | 21.5 J |
| Beryllium | mg/kg | 0.63 | 0.33 J | 0.66 | 0.88 | 0.60 J | 0.70 | 0.16 J | 0.27 J | 0.30 J | 0.18 J | ND (0.59) |
| Cadmium | mg/kg | 2.2 | 1.1 | 0.53 J | 0.57 J | 0.65 | 0.72 | 0.77 | ND (0.62) | ND (0.62) | 0.20 J | ND (5.9) |
| Chromium Total | mg/kg | 26.0 | 8.4 | 17.5 | 18.0 | 12.0 | 15.1 | 6.2 J | 15.6 J | 15.6 J | 114 J | 1080 J |
| Cobalt | mg/kg | 85.6 J | 6.8 J | 6.8 | 10.5 | 10.8 | 12.2 | 2.0 J | 11.5 | 11.1 | 32.2 | 56.1 |
| Copper | mg/kg | 20.6 | 44.4 | 13.1 | 14.9 | 20.0 | 18.8 | 6.9 | 13.5 | 24.4 | 485 | 1960 |
| Cyanide (amenable) | mg/kg | ND (0.60) | ND (0.61) | ND (0.62) | ND (0.72) | ND (0.64) | ND (0.63) | ND (0.58) | ND (0.62) | ND (0.62) | ND (0.64) | ND (0.59) |
| Cyanide (total) | mg/kg | ND (0.60) | ND (0.61) | ND (0.62) | ND (0.72) | ND (0.64) | ND (0.63) | ND (0.58) | ND (0.62) | ND (0.62) | ND (0.64) | 0.25 J |
| Iron | mg/kg | 25200 | 22900 | 23800 | 25000 | 26600 | 32400 | 5390 | 20200 | 17700 | 87000 | 336000 |
| Lead | mg/kg | 35.0 J | 37.1 J | 13.4 | 14.0 | 17.3 | 19.6 | 6.6 | 15.0 | 16.6 | 191 | 173 |
| Manganese | mg/kg | 2900 | 64.6 | 742 | 665 | 197 | 219 | 111 | 1390 | 717 | 1580 | 2810 |
| Mercury | mg/kg | 0.034 J | 0.12 | ND (0.12) U | ND (0.14) U | ND (0.13) U | ND (0.13) U | 0.022 J | 0.051 J | 0.17 | 0.31 | 0.29 |
| Nickel | mg/kg | 52.0 J | 44.1 J | 14.9 | 23.4 | 25.8 | 34.5 | 5.7 | 13.7 | 24.2 | 495 | 1830 |
| Selenium | mg/kg | 0.62 | 1.1 | ND (0.62) | ND (0.72) | ND (0.64) | ND (0.63) | ND (0.58) | 0.54 J | 0.50 J | 1.5 | 3.7 J |
| Silver | mg/kg | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.4) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.3) | ND (1.2) |
| Thallium | mg/kg | ND (1.2) | 3.8 | ND (1.2) | 1.2 J | 0.66 J | 1.5 | 0.80 J | 0.70 J | 1.3 | ND (2.6) | ND (11.8) |
| Vanadium | mg/kg | 41.3 | 4.6 J | 29.5 | 29.4 | 14.3 | 17.8 | 6.6 | 28.9 | 26.3 | 25.6 | 44.3 J |
| Zinc | mg/kg | 73.2 J | 113 J | 32.7 | 43.6 | 41.6 | 38.0 | 48.2 | 39.5 | 39.2 | 126 | 445 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | ND (190) | ND (82) | ND (82) | ND (420) | ND (39000) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | ND (190) | ND (82) | ND (82) | 2400 | 380000 |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | 760000 | 1700000 | ND (190) | ND (82) | ND (82) | ND (420) | ND (39000) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | ND (190) | 1000 | 670 | ND (420) | 290000 |
| Aroclor-1248 (PCB-1248) | µg/kg | 37 J | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | 1100 | ND (82) | ND (82) | 620 | ND (39000) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | ND (190) | ND (82) | ND (82) | ND (420) | ND (39000) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (40) | ND (40) | ND (41) | ND (47) | ND (85000) | ND (170000) | ND (190) | ND (82) | ND (82) | ND (420) | ND (39000) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 82.8 | 81.8 | 80.2 | 69.7 | 77.6 | 79.1 | 86.2 | 80.1 | 80.8 | 78.4 | 85.0 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A014* | *A014* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X219Y095* | *B-X223Y097A* | *B-X223Y097A* | *B-X223Y097B* | *B-X225Y077* | *B-X225Y077* | *B-X225Y077* | *B-X253Y329H* | *B-X254Y336* | *B-X148Y233* | *B-X148Y233* |
| *Sample ID:* | | *S-010802-MG-012* | *S-010802-MG-013* | *S-010802-MG-014* | *S-010802-MG-015* | *S-010402-MG-001* | *S-010402-MG-002* | *S-010402-MG-003* | *S-012202-MG-063* | *S-012202-MG-064* | *S-022202-KMV-532* | *S-022202-KMV-533* |
| *Sample Date:* | | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/4/2002* | *1/4/2002* | *1/4/2002* | *1/22/2002* | *1/22/2002* | *2/22/2002* | *2/22/2002* |
| *Sample Depth:* | | *(13-14)* | *(0-2)* | *(6-8)* | *(5-6)* | *(0-2)* | *(6-8)* | *(13-15)* | *(10-11)* | *(3-3.5)* | *(0-2)* | *(0-2)* *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,1,2-Trichloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,1-Dichloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,1-Dichloroethene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (450) UJ | ND (12) UJ | ND (16) UJ | ND (16) UJ | ND (14) | ND (11) | ND (13) | -- | -- | ND (11) | ND (15) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,2-Dichlorobenzene | µg/kg | 83 J | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,2-Dichloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,2-Dichloropropane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,3-Dichlorobenzene | µg/kg | 890 | ND (5.8) | 7.2 J | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 1,4-Dichlorobenzene | µg/kg | 1700 | ND (5.8) | 19 | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (890) | 4.8 J | 6.3 J | ND (32) | ND (28) | ND (22) | ND (26) | -- | -- | ND (21) | ND (30) |
| 2-Hexanone | µg/kg | ND (890) | ND (23) | ND (32) | ND (32) | ND (28) | ND (22) | ND (26) | -- | -- | ND (21) | ND (30) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (890) | ND (23) | ND (32) | ND (32) | ND (28) | ND (22) | ND (26) | -- | -- | ND (21) | ND (30) |
| Acetone | µg/kg | ND (890) U | ND (32) U | ND (36) U | ND (32) U | ND (28) U | ND (22) U | ND (26) U | -- | -- | ND (21) UJ | ND (30) UJ |
| Benzene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Bromodichloromethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Bromoform | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Carbon disulfide | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Carbon tetrachloride | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Chlorobenzene | µg/kg | 2200 | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Chloroethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Chloroform (Trichloromethane) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) UJ | ND (7.6) UJ |
| cis-1,2-Dichloroethene | µg/kg | ND (110) | ND (2.9) | ND (3.9) | ND (4) | ND (3.4) | ND (2.8) | ND (3.2) | -- | -- | ND (2.7) | ND (3.8) |
| cis-1,3-Dichloropropene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Cyclohexane | µg/kg | ND (450) | ND (12) | ND (16) | ND (16) | ND (14) | ND (11) | ND (13) | -- | -- | ND (11) | ND (15) |
| Dibromochloromethane | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (220) U | ND (5.8) U | ND (7.9) U | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) UJ | ND (7.6) UJ |
| Ethylbenzene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Isopropylbenzene | µg/kg | 21 J | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Methyl acetate | µg/kg | ND (450) | ND (12) | 2.1 J | ND (16) | ND (14) | ND (11) | ND (13) | -- | -- | ND (11) | ND (15) |
| Methyl cyclohexane | µg/kg | ND (450) | ND (12) | ND (16) | ND (16) | ND (14) | ND (11) | ND (13) | -- | -- | ND (11) | ND (15) |
| Methyl Tert Butyl Ether | µg/kg | ND (890) | ND (23) | ND (32) | ND (32) | ND (28) | ND (22) | ND (26) | -- | -- | ND (21) | ND (30) |
| Methylene chloride | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | 10 | 7.5 J |
| Styrene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Tetrachloroethene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Toluene | µg/kg | ND (220) U | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| trans-1,2-Dichloroethene | µg/kg | ND (110) | ND (2.9) | ND (3.9) | ND (4) | ND (3.4) | ND (2.8) | ND (3.2) | -- | -- | ND (2.7) | ND (3.8) |
| trans-1,3-Dichloropropene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Trichloroethene | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (220) UJ | ND (5.8) UJ | ND (7.9) UJ | ND (8) UJ | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Vinyl chloride | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |
| Xylene (total) | µg/kg | ND (220) | ND (5.8) | ND (7.9) | ND (8) | ND (6.9) | ND (5.5) | ND (6.4) | -- | -- | ND (5.4) | ND (7.6) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A014* | *A014* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X219Y095* | *B-X223Y097A* | *B-X223Y097A* | *B-X223Y097B* | *B-X225Y077* | *B-X225Y077* | *B-X225Y077* | *B-X253Y329H* | *B-X254Y336* | *B-X148Y233* | *B-X148Y233* |
| *Sample ID:* | | *S-010802-MG-012* | *S-010802-MG-013* | *S-010802-MG-014* | *S-010802-MG-015* | *S-010402-MG-001* | *S-010402-MG-002* | *S-010402-MG-003* | *S-012202-MG-063* | *S-012202-MG-064* | *S-022202-KMV-532* | *S-022202-KMV-533* |
| *Sample Date:* | | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/4/2002* | *1/4/2002* | *1/4/2002* | *1/22/2002* | *1/22/2002* | *2/22/2002* | *2/22/2002* |
| *Sample Depth:* | | *(13-14)* | *(0-2)* | *(6-8)* | *(5-6)* | *(0-2)* | *(6-8)* | *(13-15)* | *(10-11)* | *(3-3.5)* | *(0-2)* | *(0-2) Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,4,5-Trichlorophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,4,6-Trichlorophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,4-Dichlorophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,4-Dimethylphenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,4-Dinitrophenol | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 2,4-Dinitrotoluene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2,6-Dinitrotoluene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2-Chloronaphthalene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2-Chlorophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2-Methylnaphthalene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2-Methylphenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 2-Nitroaniline | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 2-Nitrophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 3-Nitroaniline | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 4-Chloro-3-methylphenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 4-Chloroaniline | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 4-Methylphenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| 4-Nitroaniline | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| 4-Nitrophenol | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| Acenaphthene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 73 J | ND (360) |
| Acenaphthylene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Acetophenone | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Anthracene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 83 J | ND (360) |
| Atrazine | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Benzaldehyde | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Benzo(a)anthracene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 350 J | 61 J |
| Benzo(a)pyrene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 400 J | 74 J |
| Benzo(b)fluoranthene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 590 J | 99 J |
| Benzo(g,h,i)perylene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 280 J | ND (360) |
| Benzo(k)fluoranthene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 190 J | ND (360) |
| Biphenyl | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| bis(2-Chloroethyl)ether | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| bis(2-Ethylhexyl)phthalate | µg/kg | 620 | ND (410) | 510 | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) U | ND (360) U |
| Butyl benzylphthalate | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Caprolactam | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) UJ | ND (420) UJ | -- | -- | ND (370) | ND (360) |
| Carbazole | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 66 J | ND (360) |
| Chrysene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 440 J | 77 J |
| Dibenz(a,h)anthracene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 71 J | ND (360) |
| Dibenzofuran | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Diethyl phthalate | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Dimethyl phthalate | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Di-n-butylphthalate | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Di-n-octyl phthalate | µg/kg | 740 | ND (410) | 650 | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Fluoranthene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 940 J | 110 J |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A011 P200(GM)* | *A014* | *A014* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X219Y095* | *B-X223Y097A* | *B-X223Y097A* | *B-X223Y097B* | *B-X225Y077* | *B-X225Y077* | *B-X225Y077* | *B-X253Y329H* | *B-X254Y336* | *B-X148Y233* | *B-X148Y233* |
| *Sample ID:* | | *S-010802-MG-012* | *S-010802-MG-013* | *S-010802-MG-014* | *S-010802-MG-015* | *S-010402-MG-001* | *S-010402-MG-002* | *S-010402-MG-003* | *S-012202-MG-063* | *S-012202-MG-064* | *S-022202-KMV-532* | *S-022202-KMV-533* |
| *Sample Date:* | | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/8/2002* | *1/4/2002* | *1/4/2002* | *1/4/2002* | *1/22/2002* | *1/22/2002* | *2/22/2002* | *2/22/2002* |
| *Sample Depth:* | | *(13-14)* | *(0-2)* | *(6-8)* | *(5-6)* | *(0-2)* | *(6-8)* | *(13-15)* | *(10-11)* | *(3-3.5)* | *(0-2)* | *(0-2)* |
| | | | | | | | | | | | | *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Hexachlorobenzene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Hexachlorobutadiene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Hexachlorocyclopentadiene | µg/kg | ND (1800) | ND (2000) | ND (2400) | ND (2200) | ND (2100) | ND (1700) | ND (2000) | -- | -- | ND (1800) | ND (1700) |
| Hexachloroethane | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 270 J | ND (360) |
| Isophorone | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Naphthalene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 57 J | ND (360) |
| Nitrobenzene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| N-Nitrosodiphenylamine | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Pentachlorophenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | ND (360) |
| Phenanthrene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 510 J | 63 J |
| Phenol | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | ND (370) | 99 J |
| Pyrene | µg/kg | ND (360) | ND (410) | ND (500) | ND (460) | ND (430) | ND (340) | ND (420) | -- | -- | 740 J | 120 J |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 1760 | 5790 | 20700 | 9680 | 10700 | 1170 | 11700 | -- | -- | 2530 | 1720 |
| Antimony | mg/kg | ND (6.6) UJ | ND (7.4) UJ | ND (9.1) UJ | ND (8.4) UJ | ND (7.8) | ND (6.3) | ND (7.7) | -- | -- | ND (6.8) | ND (6.5) |
| Arsenic | mg/kg | 2.1 | 4.7 | 11.1 | 27.8 | 7.1 | 0.78 J | 9.9 | -- | -- | 0.36 J | 1.1 |
| Barium | mg/kg | 131 | 60.1 | 136 | 86.7 | 88.6 | 50.6 | 89.9 | -- | -- | 14.3 J | 15.1 J |
| Beryllium | mg/kg | 0.16 J | 0.36 J | 1.3 | 0.62 J | 0.43 J | ND (0.52) U | 1.2 | -- | -- | ND (0.56) | ND (0.55) U |
| Cadmium | mg/kg | 0.33 J | 0.67 | 0.53 J | 0.71 | 0.23 J | 0.35 J | ND (0.64) | -- | -- | ND (0.56) U | ND (0.55) U |
| Chromium Total | mg/kg | 8.9 J | 10.2 J | 24.4 J | 14.3 J | 25.0 | 4.2 | 15.6 | -- | -- | 25.7 | 15.9 |
| Cobalt | mg/kg | 3.6 J | 8.5 | 7.5 J | 10.4 | 4.4 J | 0.86 J | 11.4 | -- | -- | 37.2 | 16.5 |
| Copper | mg/kg | 13.6 | 11.6 | 19.9 | 34.1 | 10.1 | 2.9 | 16.3 | -- | -- | 54.4 | 42.1 |
| Cyanide (amenable) | mg/kg | ND (0.55) | ND (0.61) | ND (0.76) | ND (0.70) | -- | -- | -- | -- | -- | ND (0.56) | ND (0.55) |
| Cyanide (total) | mg/kg | ND (0.55) | ND (0.61) | ND (0.76) | ND (0.70) | ND (0.65) | ND (0.52) | ND (0.64) | -- | -- | ND (0.56) | ND (0.55) |
| Iron | mg/kg | 5640 | 11100 | 27300 | 27300 | 23400 | 2890 | 25400 | -- | -- | 1040 | 1710 |
| Lead | mg/kg | 3.4 | 34.9 | 20.3 | 51.8 | 12.4 | 1.4 | 15.0 | -- | -- | ND (0.34) U | 21 |
| Manganese | mg/kg | 147 | 540 | 118 | 681 | 364 | 136 | 242 | -- | -- | 55.3 | 51.8 |
| Mercury | mg/kg | 0.014 J | 0.075 J | 0.079 J | 0.041 J | ND (0.13) U | ND (0.10) U | 0.070 J | -- | -- | 0.31 J | 0.33 J |
| Nickel | mg/kg | 19.0 | 9.0 | 35.8 | 29.8 | 9.5 | 5.2 | 27.9 | -- | -- | 37.3 | 38.2 |
| Selenium | mg/kg | ND (0.55) | ND (0.61) | ND (0.76) | ND (0.70) | 0.48 J | ND (0.52) | 0.92 | -- | -- | ND (0.56) | ND (0.55) |
| Silver | mg/kg | ND (1.1) | ND (1.2) | ND (1.5) | ND (1.4) | ND (1.3) | ND (1.0) | ND (1.3) | -- | -- | 0.26 J | ND (1.1) |
| Thallium | mg/kg | ND (1.1) | 0.76 J | 0.77 J | 1.4 | ND (1.3) | ND (1.0) | ND (1.3) | -- | -- | ND (1.1) | ND (1.1) |
| Vanadium | mg/kg | 4.5 J | 14.9 | 36.2 | 28.5 | 37.0 | 2.6 J | 26.3 | -- | -- | 1.8 J | 2.7 J |
| Zinc | mg/kg | 33.4 | 282 | 76.7 | 69.1 | 33.3 | 27.9 | 46.6 | -- | -- | 17.6 | 16.3 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (7300) | ND (41) | ND (10000) | ND (230) | ND (43) | ND (34) | ND (42) | ND (45) | ND (44) | ND (3700) | ND (360) |
| Aroclor-1221 (PCB-1221) | µg/kg | 49000 | ND (41) | 61000 | 1200 | ND (43) | ND (34) | ND (42) | ND (45) | ND (44) | ND (3700) | ND (360) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (7300) | ND (41) | ND (10000) | ND (230) | ND (43) | ND (34) | ND (42) | ND (45) | ND (44) | ND (3700) | ND (360) |
| Aroclor-1242 (PCB-1242) | µg/kg | 98000 | ND (41) | 120000 | 1400 | ND (43) | ND (34) | ND (42) | ND (45) | ND (44) | ND (3700) | ND (360) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (7300) | 290 | ND (10000) | ND (230) | 95 | ND (34) | ND (42) | 84 | ND (44) | 48000 | 3300 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (7300) | ND (41) | ND (10000) | ND (230) | ND (43) | ND (34) | ND (42) | ND (45) | ND (44) | ND (3700) | ND (360) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (7300) | ND (41) | ND (10000) | ND (230) | 180 | ND (34) | ND (42) | ND (45) | ND (44) | 4700 | 310 J |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 90.6 | 81.4 | 65.8 | 71.2 | 76.9 | 95.8 | 78.2 | 72.6 | 75.2 | 88.8 | 91.7 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A023 P200(GM)* | *Background* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X148Y233* | *B-X148Y233* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *MW-X143Y245D* | *MW-X143Y245D* | *MW-X143Y245D* | *SS-X203Y066* | *BK-X142Y263* |
| *Sample ID:* | | *S-022202-KMV-534* | *S-022202-KMV-535* | *S-022102-KMV-528* | *S-022102-KMV-529* | *S-022102-KMV-530* | *S-022102-KMV-531* | *S-010702-KMV-501* | *S-010702-KMV-502* | *S-010702-KMV-503* | *SS-010902-MG-001* | *S-012402-MO-004* |
| *Sample Date:* | | *2/22/2002* | *2/22/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/9/2002* | *1/24/2002* |
| *Sample Depth:* | | *(6-8)* | *(12-14)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-24)* | *(0-2)* | *(0-2)* | *(6-8)* | *(2-4)* | *(0-2)* |
| | | | | | *Duplicate* | | | | *Duplicate* | | | |
| *Parameters* | *Units* | | | | | | | | | | | |
| *Volatiles* | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,1,2-Trichloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,1-Dichloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,1-Dichloroethene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (13) | ND (15) | ND (9.9) | ND (9.5) | ND (600) | ND (11) | ND (9.5) UJ | ND (9.3) | ND (11) | ND (11) UJ | ND (12) UJ |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,2-Dichlorobenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,2-Dichloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,2-Dichloropropane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,3-Dichlorobenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 1,4-Dichlorobenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 23 J | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (26) | ND (30) | ND (20) | ND (19) | ND (1200) U | 3 J | 4 J | 3.6 J | ND (22) | ND (22) | ND (25) |
| 2-Hexanone | µg/kg | ND (26) | ND (30) | ND (20) | ND (19) | ND (1200) | ND (22) | ND (19) | ND (19) | ND (22) | ND (22) | ND (25) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (26) | ND (30) | ND (20) | ND (19) | ND (1200) | ND (22) | ND (19) | ND (19) | ND (22) | ND (22) | ND (25) |
| Acetone | µg/kg | ND (26) UJ | ND (30) UJ | ND (20) UJ | ND (19) UJ | ND (1200) UJ | ND (22) UJ | ND (34) U | ND (21) U | ND (22) | ND (22) U | ND (25) U |
| Benzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 31 J | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Bromodichloromethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Bromoform | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) UJ | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) UJ | ND (6.2) UJ |
| Carbon disulfide | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Carbon tetrachloride | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) UJ |
| Chlorobenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Chloroethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Chloroform (Trichloromethane) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (6.5) UJ | ND (7.5) UJ | ND (4.9) UJ | ND (4.8) UJ | ND (300) | ND (5.5) UJ | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.3) | ND (3.8) | ND (2.5) | ND (2.4) | 900 | ND (2.8) | ND (2.4) | ND (2.3) | ND (2.7) | ND (2.7) | ND (3.1) |
| cis-1,3-Dichloropropene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Cyclohexane | µg/kg | ND (13) | ND (15) | ND (9.9) | ND (9.5) | ND (600) | ND (11) | ND (9.5) | ND (9.3) | ND (11) | ND (11) | ND (12) |
| Dibromochloromethane | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (6.5) UJ | ND (7.5) UJ | ND (4.9) UJ | ND (4.8) UJ | ND (300) | ND (5.5) UJ | ND (4.8) U | ND (4.7) | ND (5.4) | ND (5.4) U | ND (6.2) |
| Ethylbenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 19 J | ND (5.5) | ND (4.8) | 1 J | ND (5.4) | ND (5.4) | ND (6.2) |
| Isopropylbenzene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Methyl acetate | µg/kg | ND (13) | ND (15) | ND (9.9) | ND (9.5) | ND (600) | ND (11) | 2.3 J | ND (9.3) | ND (11) | ND (11) | 3.5 J |
| Methyl cyclohexane | µg/kg | ND (13) | ND (15) | ND (9.9) | ND (9.5) | ND (600) | ND (11) | ND (9.5) | ND (9.3) | ND (11) | ND (11) | ND (12) |
| Methyl Tert Butyl Ether | µg/kg | ND (26) | ND (30) | ND (20) | ND (19) | ND (1200) | ND (22) | ND (19) | ND (19) | ND (22) | ND (22) | ND (25) |
| Methylene chloride | µg/kg | 4.6 J | 21 | 4.6 J | 13 | ND (300) | 7 | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) U | 4 J |
| Styrene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Tetrachloroethene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 920 | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Toluene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 220 J | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.3) | ND (3.8) | ND (2.5) | ND (2.4) | 110 J | ND (2.8) | ND (2.4) | ND (2.3) | ND (2.7) | ND (2.7) | ND (3.1) |
| trans-1,3-Dichloropropene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Trichloroethene | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 280 J | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | ND (4.8) UJ | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Vinyl chloride | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | 320 | 6.9 | ND (4.8) | ND (4.7) | ND (5.4) | ND (5.4) | ND (6.2) |
| Xylene (total) | µg/kg | ND (6.5) | ND (7.5) | ND (4.9) | ND (4.8) | ND (300) | ND (5.5) | 3.3 J | 6.7 | ND (5.4) | ND (5.4) | ND (6.2) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A023 P200(GM)* | *Background* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X148Y233* | *B-X148Y233* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *MW-X143Y245D* | *MW-X143Y245D* | *MW-X143Y245D* | *SS-X203Y066* | *BK-X142Y263* |
| *Sample ID:* | | *S-022202-KMV-534* | *S-022202-KMV-535* | *S-022102-KMV-528* | *S-022102-KMV-529* | *S-022102-KMV-530* | *S-022102-KMV-531* | *S-010702-KMV-501* | *S-010702-KMV-502* | *S-010702-KMV-503* | *SS-010902-MG-001* | *S-012402-MO-004* |
| *Sample Date:* | | *2/22/2002* | *2/22/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/9/2002* | *1/24/2002* |
| *Sample Depth:* | | *(6-8)* | *(12-14)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-24)* | *(0-2)* | *(0-2)* | *(6-8)* | *(2-4)* | *(0-2)* |
| | | | | | *Duplicate* | | | | *Duplicate* | | | |
| *Parameters* | *Units* | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,4,5-Trichlorophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,4,6-Trichlorophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,4-Dichlorophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,4-Dimethylphenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 2,4-Dinitrotoluene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2,6-Dinitrotoluene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2-Chloronaphthalene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2-Chlorophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2-Methylnaphthalene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2-Methylphenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 2-Nitrophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 4-Chloro-3-methylphenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 4-Chloroaniline | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 4-Methylphenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) UJ | ND (1800) UJ | ND (2200) UJ | ND (2000) UJ | ND (2100) |
| Acenaphthene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Acenaphthylene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Acetophenone | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Anthracene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 100 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Atrazine | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Benzaldehyde | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Benzo(a)anthracene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 370 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Benzo(a)pyrene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 360 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Benzo(b)fluoranthene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 410 J | 71 J | ND (460) | ND (410) | ND (440) |
| Benzo(g,h,i)perylene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 220 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Benzo(k)fluoranthene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 210 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Biphenyl | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| bis(2-Chloroethyl)ether | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (430) U | ND (460) U | ND (350) | ND (350) | ND (370) | ND (400) | 69 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Butyl benzylphthalate | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Caprolactam | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Carbazole | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 72 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Chrysene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 440 | 52 J | ND (460) | ND (410) | ND (440) |
| Dibenz(a,h)anthracene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 62 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Dibenzofuran | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Diethyl phthalate | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Dimethyl phthalate | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Di-n-butylphthalate | µg/kg | ND (430) | ND (460) | 430 | 320 J | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Di-n-octyl phthalate | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Fluoranthene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | 160 J | ND (400) | 960 | 77 J | ND (460) | ND (410) | ND (440) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A015* | *A023 P200(GM)* | *Background* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X148Y233* | *B-X148Y233* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *B-X169Y248* | *MW-X143Y245D* | *MW-X143Y245D* | *MW-X143Y245D* | *SS-X203Y066* | *BK-X142Y263* |
| *Sample ID:* | | *S-022202-KMV-534* | *S-022202-KMV-535* | *S-022102-KMV-528* | *S-022102-KMV-529* | *S-022102-KMV-530* | *S-022102-KMV-531* | *S-010702-KMV-501* | *S-010702-KMV-502* | *S-010702-KMV-503* | *SS-010902-MG-001* | *S-012402-MO-004* |
| *Sample Date:* | | *2/22/2002* | *2/22/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *2/21/2002* | *1/7/2002* | *1/7/2002* | *1/7/2002* | *1/9/2002* | *1/24/2002* |
| *Sample Depth:* | | *(6-8)* | *(12-14)* | *(0-2)* | *(0-2)* | *(6-8)* | *(22-24)* | *(0-2)* | *(0-2)* | *(6-8)* | *(2-4)* | *(0-2)* |
| | | | | | *Duplicate* | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Hexachlorobenzene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Hexachlorobutadiene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (2200) | ND (1700) | ND (1700) | ND (1800) | ND (1900) | ND (1900) | ND (1800) | ND (2200) | ND (2000) | ND (2100) |
| Hexachloroethane | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | 210 J | ND (370) | ND (460) | ND (410) | ND (440) |
| Isophorone | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Naphthalene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Nitrobenzene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| N-Nitrosodiphenylamine | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Pentachlorophenol | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | ND (370) | ND (400) | ND (390) | ND (370) | ND (460) | ND (410) | ND (440) |
| Phenanthrene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | 150 J | ND (400) | 440 | ND (370) | ND (460) | ND (410) | ND (440) |
| Phenol | µg/kg | ND (430) | ND (460) | 180 J | 110 J | ND (370) | ND (400) | 70 J | 300 J | ND (460) | ND (410) | ND (440) |
| Pyrene | µg/kg | ND (430) | ND (460) | ND (350) | ND (350) | 140 J | ND (400) | 610 | ND (370) | ND (460) | ND (410) | ND (440) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 2280 | 2800 | 2660 | 1380 | 21400 | 17100 | 7420 | 6440 | 16800 | 11000 | 12600 |
| Antimony | mg/kg | ND (7.8) | ND (8.4) | ND (6.3) | ND (6.4) | 1.6 J | ND (7.3) | ND (7.1) UJ | ND (6.8) UJ | 1.4 J | ND (7.4) UJ | ND (7.9) UJ |
| Arsenic | mg/kg | 2.1 | 7.4 | 1.2 | 0.71 J | 3.2 | 11.8 | 1.8 | 1.6 | 17.5 | 9.9 | 8.5 |
| Barium | mg/kg | 37.1 | 42.8 | 69.6 | 33.1 | 19.7 J | 64 | 871 J | 232 J | 142 J | 72.2 | 118 |
| Beryllium | mg/kg | ND (0.65) U | 1.3 | ND (0.53) U | ND (0.53) U | ND (0.55) U | 0.7 | ND (0.59) U | ND (0.56) U | 6.7 | 0.74 | 0.47 J |
| Cadmium | mg/kg | ND (0.65) U | 0.29 J | 0.73 | 0.66 | 0.82 | 0.43 J | 0.88 | 0.46 J | ND (2.8) U | 0.49 J | 0.11 J |
| Chromium Total | mg/kg | 3.1 | 8.4 | 12.7 | 9.8 | 109 | 31.2 | 27.4 | 33.0 | 29.1 | 18.4 J | 28.3 J |
| Cobalt | mg/kg | 20.7 | 5.6 J | 7.6 | 5.9 | 14.8 | 10.2 | 28.2 | 34.6 | 15.3 J | 14.1 J | 12.2 |
| Copper | mg/kg | 5.7 | 7.3 | 61.6 | 41.3 | 541 | 17.6 | 194 | 161 | 17.7 | 14.5 J | 34.9 J |
| Cyanide (amenable) | mg/kg | ND (0.65) | ND (0.70) | ND (0.53) | ND (0.53) | ND (0.55) | ND (0.61) | ND (0.59) | ND (0.56) | ND (0.69) | ND (0.62) | ND (0.66) |
| Cyanide (total) | mg/kg | ND (0.65) | ND (0.70) | ND (0.53) | ND (0.53) | ND (0.55) | ND (0.61) | ND (0.59) | ND (0.56) | ND (0.69) | ND (0.62) | ND (0.66) |
| Iron | mg/kg | 6510 | 11700 | 7740 | 5760 | 11200 | 33900 | 6730 | 5590 | 36900 | 22800 J | 18300 |
| Lead | mg/kg | ND (0.39) U | ND (0.42) U | 12.8 | 9.1 | 160 | 17.8 | 23.6 | 17.1 | 25.7 | 21.4 J | 22.5 |
| Manganese | mg/kg | 1120 | 373 | 154 | 124 | 236 | 335 | 129 | 79.3 | 379 | 492 J | 1200 J |
| Mercury | mg/kg | 0.02 J | 0.11 J | 0.45 | 0.38 | 5 | 0.12 | 2.2 | 1.0 | 0.20 | 0.067 J | 0.039 J |
| Nickel | mg/kg | 10.5 | 19.3 | 22.4 | 22.2 | 1130 | 26.7 | 43.0 | 47.5 | 94.9 | 22.1 J | 20.8 |
| Selenium | mg/kg | ND (0.65) | ND (0.70) | ND (0.53) | ND (0.53) | ND (0.55) | ND (0.61) | ND (0.59) | ND (0.56) | 1.2 J | ND (0.62) | 0.65 J |
| Silver | mg/kg | ND (1.3) | ND (1.4) | ND (1.1) | ND (1.1) | 0.48 J | ND (1.2) | 0.23 J | 0.37 J | ND (5.5) | ND (1.2) | ND (1.3) |
| Thallium | mg/kg | ND (1.3) | ND (1.4) | ND (1.1) | ND (1.1) | ND (1.1) U | ND (1.2) U | ND (1.2) | 1.2 | 4.4 J | ND (1.2) U | 1.2 J |
| Vanadium | mg/kg | 9.5 | 25.8 | 4.4 J | 2.1 J | 8.3 | 53.9 | 5.7 J | 7.5 | 49.1 | 28.2 | 29.5 |
| Zinc | mg/kg | 10.3 | 25 | 48.1 | 32.7 | 160 | 42.1 | 131 | 61.4 | 83.8 | 53.6 J | 50.4 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (46) | ND (690) | ND (710) | ND (730) | ND (40) | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (46) | ND (690) | ND (710) | ND (730) | ND (40) | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (46) | ND (690) | ND (710) | ND (730) | ND (40) | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (46) | ND (690) | ND (710) | ND (730) | ND (40) | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| Aroclor-1248 (PCB-1248) | µg/kg | 7.1 J | ND (46) | 4900 | 5100 | ND (730) | ND (40) | 30000 | 36000 | 87 | 3300 | ND (44) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (46) | ND (690) | ND (710) | 9100 | 62 | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | ND (46) | 570 J | 650 J | ND (730) | ND (40) | ND (3900) | ND (3700) | ND (46) | ND (410) | ND (44) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | 5900 J | 2700 J | -- | -- | 18000 |
| Total Solids | % | 76.8 | 71.8 | 95 | 93.5 | 90.2 | 82.5 | 85.0 | 88.8 | 72.5 | 81.1 | 75.6 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *Background* | *Background* | *Background* | *Background* | *Background* | *Background P205(GM)* | *Background RFI Boundary* | *Background RFI Boundary* | *NA NP (05-27-03)* | *NA NP (05-27-03)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *BK-X199Y347* | *BK-X199Y347* | *BK-X212Y042* | *BK-X281Y296* | *BK-X281Y296* | *BK-X267Y091* | *MW-X261Y356D* | *MW-X261Y356D* | *MW-X233Y105A* | *MW-X233Y110A* |
| *Sample ID:* | | *S-060602-MG-225* | *S-060602-MG-226* | *S-010223-MO-002* | *S-010223-MO-001* | *S-010223-MO-005* | *S-010223-MO-003* | *S-012102-KMV-509* | *S-012102-KMV-510* | *S-041503-KMV-569* | *S-041503-KMV-570* |
| *Sample Date:* | | *6/6/2002* | *6/6/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/21/2002* | *1/21/2002* | *4/15/2003* | *4/15/2003* |
| *Sample Depth:* | | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* |
| | | | | | | *Duplicate* | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,1,2-Trichloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,1-Dichloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,1-Dichloroethene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) U | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (16) | ND (16) | ND (12) | ND (12) | ND (11) | ND (12) | ND (11) | ND (11) | ND (10) | ND (12) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,2-Dichlorobenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,2-Dichloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,2-Dichloropropane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,3-Dichlorobenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 1,4-Dichlorobenzene | µg/kg | ND (7.8) U | ND (8.0) U | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (31) | ND (32) | ND (24) | ND (24) | ND (23) | ND (24) | ND (21) | ND (22) | ND (20) | ND (23) |
| 2-Hexanone | µg/kg | ND (31) | ND (32) | ND (24) | ND (24) | ND (23) | ND (24) | ND (21) | ND (22) | ND (20) | ND (23) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (31) | ND (32) | ND (24) | ND (24) | ND (23) | ND (24) | ND (21) | ND (22) | ND (20) | ND (23) |
| Acetone | µg/kg | 34 J | ND (32) UJ | 4 J | 17 J | 13 J | 12 J | ND (21) U | ND (22) U | ND (20) UJ | ND (23) UJ |
| Benzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Bromodichloromethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Bromoform | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) UJ | ND (6) UJ | ND (5.7) UJ | ND (6.1) UJ | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Carbon disulfide | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Carbon tetrachloride | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Chlorobenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Chloroethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Chloroform (Trichloromethane) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.9) | ND (4.0) | ND (3) | ND (3) | ND (2.8) | ND (3) | ND (2.7) | ND (2.7) | ND (2.5) | ND (2.9) |
| cis-1,3-Dichloropropene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Cyclohexane | µg/kg | ND (16) | ND (16) | ND (12) | ND (12) | ND (11) | ND (12) | ND (11) | ND (11) | ND (10) | ND (12) |
| Dibromochloromethane | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Ethylbenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Isopropylbenzene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Methyl acetate | µg/kg | ND (16) | ND (16) | ND (12) | ND (12) | ND (11) | ND (12) | ND (11) | ND (11) | ND (10) | ND (12) |
| Methyl cyclohexane | µg/kg | ND (16) | ND (16) | ND (12) | ND (12) | ND (11) | ND (12) | ND (11) | ND (11) | ND (10) | ND (12) |
| Methyl Tert Butyl Ether | µg/kg | ND (31) | ND (32) | ND (24) | ND (24) | ND (23) | ND (24) | ND (21) | ND (22) | ND (20) | ND (23) |
| Methylene chloride | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Styrene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Tetrachloroethene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Toluene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.9) | ND (4.0) | ND (3) | ND (3) | ND (2.8) | ND (3) | ND (2.7) | ND (2.7) | ND (2.5) | ND (2.9) |
| trans-1,3-Dichloropropene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Trichloroethene | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Vinyl chloride | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |
| Xylene (total) | µg/kg | ND (7.8) | ND (8.0) | ND (6.1) | ND (6) | ND (5.7) | ND (6.1) | ND (5.3) | ND (5.4) | ND (5.0) | ND (5.8) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *Background* | *Background* | *Background* | *Background* | *Background* | *Background P205(GM)* | *Background RFI Boundary* | *Background RFI Boundary* | *NA NP (05-27-03)* | *NA NP (05-27-03)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *BK-X199Y347* | *BK-X199Y347* | *BK-X212Y042* | *BK-X281Y296* | *BK-X281Y296* | *BK-X267Y091* | *MW-X261Y356D* | *MW-X261Y356D* | *MW-X233Y105A* | *MW-X233Y110A* |
| *Sample ID:* | | *S-060602-MG-225* | *S-060602-MG-226* | *S-010223-MO-002* | *S-010223-MO-001* | *S-010223-MO-005* | *S-010223-MO-003* | *S-012102-KMV-509* | *S-012102-KMV-510* | *S-041503-KMV-569* | *S-041503-KMV-570* |
| *Sample Date:* | | *6/6/2002* | *6/6/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/21/2002* | *1/21/2002* | *4/15/2003* | *4/15/2003* |
| *Sample Depth:* | | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* |
| | | | | | | *Duplicate* | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,4-Dinitrophenol | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) UJ | ND (2200) UJ |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2-Methylnaphthalene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2-Methylphenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 2-Nitroaniline | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| 3-Nitroaniline | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 4-Methylphenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| 4-Nitroaniline | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| 4-Nitrophenol | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| Acenaphthene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Acenaphthylene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Acetophenone | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Anthracene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Atrazine | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzaldehyde | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzo(b)fluoranthene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Biphenyl | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Caprolactam | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Carbazole | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Chrysene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Dibenzofuran | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Diethyl phthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Di-n-butylphthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Fluoranthene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *Background* | *Background* | *Background* | *Background* | *Background* | *Background P205(GM)* | *Background RFI Boundary* | *Background RFI Boundary* | *NA NP (05-27-03)* | *NA NP (05-27-03)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *BK-X199Y347* | *BK-X199Y347* | *BK-X212Y042* | *BK-X281Y296* | *BK-X281Y296* | *BK-X267Y091* | *MW-X261Y356D* | *MW-X261Y356D* | *MW-X233Y105A* | *MW-X233Y110A* |
| *Sample ID:* | | *S-060602-MG-225* | *S-060602-MG-226* | *S-010223-MO-002* | *S-010223-MO-001* | *S-010223-MO-005* | *S-010223-MO-003* | *S-012102-KMV-509* | *S-012102-KMV-510* | *S-041503-KMV-569* | *S-041503-KMV-570* |
| *Sample Date:* | | *6/6/2002* | *6/6/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/23/2002* | *1/21/2002* | *1/21/2002* | *4/15/2003* | *4/15/2003* |
| *Sample Depth:* | | *(0-2)* | *(2-4)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* |
| | | | | | | *Duplicate* | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| Fluorene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Hexachlorobenzene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Hexachlorocyclopentadiene | µg/kg | ND (2100) | ND (2100) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) | ND (2100) | ND (2000) | ND (2200) |
| Hexachloroethane | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Isophorone | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Naphthalene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Nitrobenzene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Pentachlorophenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Phenanthrene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Phenol | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| Pyrene | µg/kg | ND (420) | ND (430) | ND (420) | ND (420) | ND (420) | ND (410) | ND (420) | ND (430) | ND (410) | ND (450) |
| ***Metals*** | | | | | | | | | | | |
| Aluminum | mg/kg | 17700 | 13700 | 10700 | 11400 | 13900 | 10200 | 18700 | 12600 | 8670 J | 14000 J |
| Antimony | mg/kg | ND (7.7) U | ND (7.8) U | ND (7.6) UJ | ND (7.7) UJ | ND (7.7) UJ | ND (7.5) UJ | 1.7 J | ND (7.8) | ND (7.5) UJ | ND (8.1) UJ |
| Arsenic | mg/kg | 11.5 | 15.2 | 5.9 | 10.4 | 12.5 | 6.8 | 11.9 | 9.1 | 9.0 | 10.2 |
| Barium | mg/kg | 67.7 | 43.4 | 43.2 | 64.0 | 67.3 | 45.5 | 101 | 81.7 | 75.7 J | 48.4 |
| Beryllium | mg/kg | 0.27 J | 0.34 J | 0.18 J | 0.33 J | 0.28 J | 0.24 J | 0.38 J | 0.36 J | 1.0 J | 0.87 |
| Cadmium | mg/kg | ND (0.64) | ND (0.65) | ND (0.63) | 0.11 J | ND (0.64) | 0.062 J | ND (0.64) | 0.075 J | 0.71 J | 0.20 J |
| Chromium Total | mg/kg | 19.8 | 33.8 | 14.7 | 18.0 | 22.0 | 16.0 | 21.6 | 17.2 | 15.7 J | 21.2 |
| Cobalt | mg/kg | 7.1 | 5.7 J | 8.7 | 10.2 | 10.2 | 7.3 | 8.6 | 11.5 | 10.6 J | 7.1 J |
| Copper | mg/kg | 14.8 | 9.6 | 12.3 | 14.0 | 12.9 | 15.3 | 18.3 | 23.4 | 21.9 | 20.0 |
| Cyanide (amenable) | mg/kg | ND (0.64) | ND (0.65) | ND (0.63) | ND (0.64) | ND (0.64) | ND (0.63) | ND (0.64) | ND (0.65) | ND (0.62) | ND (0.68) |
| Cyanide (total) | mg/kg | ND (0.64) | ND (0.65) | ND (0.63) | ND (0.64) | ND (0.64) | ND (0.63) | ND (0.64) | ND (0.65) | ND (0.62) | ND (0.68) |
| Iron | mg/kg | 24500 | 25000 | 17000 | 20200 | 25400 | 16200 | 27800 | 20000 | 18600 J | 25600 |
| Lead | mg/kg | 13.3 | 13.6 | 13.2 | 17.6 | 17.0 | 20.3 | 18.7 | 19.4 | 17.7 J | 16.0 J |
| Manganese | mg/kg | 246 | 167 | 271 J | 556 J | 477 J | 161 J | 422 | 599 | 205 J | 67.5 J |
| Mercury | mg/kg | 0.047 J | 0.070 J | ND (0.13) U | ND (0.13) U | ND (0.13) U | ND (0.13) U | 0.046 J | 0.045 J | 0.12 | 0.078 J |
| Nickel | mg/kg | 13.0 | 10.2 | 10.6 | 11.7 | 12.8 | 18.2 | 15.5 | 14.0 | 27.4 J | 24.5 |
| Selenium | mg/kg | ND (0.64) | ND (0.65) | ND (0.63) | ND (0.64) | 0.91 | 0.39 J | 0.60 J | 0.75 | 0.73 | ND (0.68) |
| Silver | mg/kg | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.4) |
| Thallium | mg/kg | ND (1.3) U | ND (1.3) U | ND (1.3) | ND (1.3) U | ND (1.3) U | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) UJ | ND (1.4) UJ |
| Vanadium | mg/kg | 38.8 | 48.7 | 27.1 | 34.8 | 43.4 | 23.0 | 38.2 | 29.9 | 21.9 J | 36.8 |
| Zinc | mg/kg | 45.7 | 38.0 | 30.2 J | 40.7 J | 45.6 J | 39.5 J | 55.3 | 43.7 | 58.5 J | 42.8 |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | 2400 | 51 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (43) | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) UJ | ND (43) UJ | ND (42) | ND (42) | ND (42) | ND (41) | ND (42) | ND (43) | ND (210) | ND (45) |
| ***General Chemistry*** | | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | 2700 | 1900 | 5300 | 5400 | 5800 | 11000 | 1400 J | 12000 J | -- | -- |
| Total Solids | % | 77.8 | 76.5 | 78.9 | 77.7 | 78.2 | 79.7 | 77.7 | 76.8 | 80.3 | 73.9 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078C* | *B-X209Y078C* |
| *Sample ID:* | | *S-071602-CLM-004* | *S-071602-CLM-005* | *S-071602-CLM-006* | *S-071602-CLM-007* | *S-071602-CLM-008* | *S-071602-CLM-001* | *S-071602-CLM-002* | *S-071602-CLM-013* | *S-071602-CLM-003* | *S-071602-CLM-009* | *S-071602-CLM-010* |
| *Sample Date:* | | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* |
| *Sample Depth:* | | *(2-4)* | *(6-8)* | *(10-12)* | *(11.5-13.5)* | *(2-4)* | *(6-8)* | *(10-12)* | *(10-12)* *Duplicate* | *(10.5-12.5)* | *(2-4)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,1,2-Trichloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,1-Dichloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,1-Dichloroethene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (10) | ND (9.3) | ND (12) | ND (13) | ND (11) | ND (8.8) | ND (11) | ND (10) | ND (14) | ND (11) | ND (8.7) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,2-Dichlorobenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,2-Dichloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,2-Dichloropropane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,3-Dichlorobenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 1,4-Dichlorobenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (21) UJ | 3.4 J | 3.5 J | 4.7 J | ND (21) UJ | ND (18) UJ | ND (23) UJ | ND (20) UJ | 4.9 J | ND (23) | ND (17) UJ |
| 2-Hexanone | µg/kg | ND (21) | ND (19) | ND (24) | ND (27) | ND (21) | ND (18) | ND (23) | ND (20) | ND (27) | ND (23) | ND (17) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (21) | ND (19) | ND (24) | ND (27) | ND (21) | ND (18) | ND (23) | ND (20) | ND (27) | ND (23) | ND (17) |
| Acetone | µg/kg | ND (26) UJ | ND (19) UJ | ND (24) UJ | ND (27) U | ND (21) UJ | ND (18) UJ | ND (23) UJ | ND (20) UJ | ND (27) UJ | ND (23) | ND (17) UJ |
| Benzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Bromodichloromethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Bromoform | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Carbon disulfide | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Carbon tetrachloride | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Chlorobenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Chloroethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Chloroform (Trichloromethane) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| cis-1,2-Dichloroethene | µg/kg | ND (2.6) | ND (2.3) | ND (3.0) | ND (3.4) | ND (2.7) | ND (2.2) | ND (2.9) | ND (2.5) | ND (3.4) | ND (2.9) | ND (2.2) |
| cis-1,3-Dichloropropene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Cyclohexane | µg/kg | ND (10) | ND (9.3) | ND (12) | ND (13) | ND (11) | ND (8.8) | ND (11) | ND (10) | ND (14) | ND (11) | ND (8.7) |
| Dibromochloromethane | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Ethylbenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Isopropylbenzene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Methyl acetate | µg/kg | ND (10) | ND (9.3) | ND (12) | ND (13) | ND (11) | ND (8.8) | ND (11) | ND (10) | ND (14) | ND (11) | ND (8.7) |
| Methyl cyclohexane | µg/kg | ND (10) | ND (9.3) | ND (12) | ND (13) | ND (11) | ND (8.8) | ND (11) | ND (10) | ND (14) | ND (11) | ND (8.7) |
| Methyl Tert Butyl Ether | µg/kg | ND (21) | ND (19) | ND (24) | ND (27) | ND (21) | ND (18) | ND (23) | ND (20) | ND (27) | ND (23) | ND (17) |
| Methylene chloride | µg/kg | 2.3 J | 1.6 J | ND (6.0) | ND (6.7) U | ND (5.3) | 1.1 J | ND (5.7) | 2.2 J | 2.9 J | ND (5.7) U | 1.3 J |
| Styrene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Tetrachloroethene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Toluene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| trans-1,2-Dichloroethene | µg/kg | ND (2.6) | ND (2.3) | ND (3.0) | ND (3.4) | ND (2.7) | ND (2.2) | ND (2.9) | ND (2.5) | ND (3.4) | ND (2.9) | ND (2.2) |
| trans-1,3-Dichloropropene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Trichloroethene | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (5.2) UJ | ND (4.6) UJ | ND (6.0) UJ | ND (6.7) | ND (5.3) UJ | ND (4.4) UJ | ND (5.7) UJ | ND (5.1) UJ | ND (6.9) UJ | ND (5.7) | ND (4.3) UJ |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Vinyl chloride | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |
| Xylene (total) | µg/kg | ND (5.2) | ND (4.6) | ND (6.0) | ND (6.7) | ND (5.3) | ND (4.4) | ND (5.7) | ND (5.1) | ND (6.9) | ND (5.7) | ND (4.3) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078C* | *B-X209Y078C* |
| *Sample ID:* | | *S-071602-CLM-004* | *S-071602-CLM-005* | *S-071602-CLM-006* | *S-071602-CLM-007* | *S-071602-CLM-008* | *S-071602-CLM-001* | *S-071602-CLM-002* | *S-071602-CLM-013* | *S-071602-CLM-003* | *S-071602-CLM-009* | *S-071602-CLM-010* |
| *Sample Date:* | | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* |
| *Sample Depth:* | | *(2-4)* | *(6-8)* | *(10-12)* | *(11.5-13.5)* | *(2-4)* | *(6-8)* | *(10-12)* | *(10-12)* *Duplicate* | *(10.5-12.5)* | *(2-4)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | ND (360) | 67 J | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2-Methylnaphthalene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2-Methylphenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 4-Methylphenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| Acenaphthene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Acenaphthylene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Acetophenone | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Anthracene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Atrazine | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzaldehyde | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzo(b)fluoranthene | µg/kg | 62 J | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Biphenyl | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Caprolactam | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Carbazole | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Chrysene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Dibenzofuran | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Diethyl phthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Di-n-butylphthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Fluoranthene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* | *P200 GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078A* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078B* | *B-X209Y078C* | *B-X209Y078C* |
| *Sample ID:* | | *S-071602-CLM-004* | *S-071602-CLM-005* | *S-071602-CLM-006* | *S-071602-CLM-007* | *S-071602-CLM-008* | *S-071602-CLM-001* | *S-071602-CLM-002* | *S-071602-CLM-013* | *S-071602-CLM-003* | *S-071602-CLM-009* | *S-071602-CLM-010* |
| *Sample Date:* | | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* | *7/16/2002* |
| *Sample Depth:* | | *(2-4)* | *(6-8)* | *(10-12)* | *(11.5-13.5)* | *(2-4)* | *(6-8)* | *(10-12)* | *(10-12)* *Duplicate* | *(10.5-12.5)* | *(2-4)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| Fluorene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Hexachlorobenzene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (1700) | ND (1900) | ND (2300) | ND (2000) | ND (1700) | ND (2100) | ND (2000) | ND (2200) | ND (2100) | ND (1700) |
| Hexachloroethane | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Isophorone | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Naphthalene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Nitrobenzene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Pentachlorophenol | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Phenanthrene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Phenol | µg/kg | 470 | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| Pyrene | µg/kg | ND (420) | ND (360) | ND (400) | ND (470) | ND (410) | ND (360) | ND (440) | ND (410) | ND (440) | ND (420) | ND (350) |
| ***Metals*** | | | | | | | | | | | | |
| Aluminum | mg/kg | 15400 | 1210 | 15500 | 16900 | 13100 | 1220 | 12200 | 12000 | 17700 | 15100 | 1290 |
| Antimony | mg/kg | ND (7.6) UJ | ND (6.5) UJ | ND (7.2) UJ | ND (8.6) UJ | ND (7.5) UJ | ND (6.5) UJ | ND (16.0) UJ | ND (7.5) UJ | ND (8.1) UJ | ND (7.7) UJ | ND (6.3) UJ |
| Arsenic | mg/kg | 9.5 | 1.4 | 7.2 | 8.0 | 9.1 | 0.61 J | 9.5 | 4.8 | 14.2 | 10.1 | 1.0 J |
| Barium | mg/kg | 65.5 | 75.6 | 72.9 | 151 | 49.8 | 69.5 | 181 | 112 | 50.1 | 81.2 | 61.0 |
| Beryllium | mg/kg | 0.69 | ND (0.54) U | 0.57 J | 1.1 | 0.63 | ND (0.54) U | 1.2 J | 1.7 | 0.78 | 0.66 | ND (0.53) U |
| Cadmium | mg/kg | ND (0.64) | 0.30 J | ND (0.60) | 0.19 J | ND (0.62) | 0.29 J | 0.52 J | ND (0.63) | ND (0.67) | ND (0.64) | 0.30 J |
| Chromium Total | mg/kg | 28.7 | 3.3 | 16.5 | 17.1 | 34.7 | 3.8 | 21.9 | 14.0 | 25.2 | 39.7 | 4.1 |
| Cobalt | mg/kg | 6.1 J | 0.86 J | 9.7 | 6.2 J | 4.3 J | 0.83 J | 9.9 J | 43.7 | 4.4 J | 4.3 J | 0.90 J |
| Copper | mg/kg | 15.6 | 4.3 | 13.8 | 15.7 | 13.7 | 1.6 J | 14.3 | 11.6 | 22.7 | 14.1 | 3.5 |
| Cyanide (amenable) | mg/kg | ND (0.64) | ND (0.54) | ND (0.60) | ND (0.72) | ND (0.62) | ND (0.54) | ND (0.67) | ND (0.63) | ND (0.67) | ND (0.64) | ND (0.53) |
| Cyanide (total) | mg/kg | ND (0.64) | 0.11 J | ND (0.60) | 0.15 J | ND (0.62) | ND (0.54) | ND (0.67) | ND (0.63) | ND (0.67) | ND (0.64) | ND (0.53) |
| Iron | mg/kg | 32600 | 3040 | 19600 | 21600 | 33900 | 2460 | 28600 | 24400 | 37900 | 34900 | 3110 |
| Lead | mg/kg | 16.0 | 1.8 | 13.6 | 13.3 | 19.2 | 1.5 | 14.4 | 27.8 | 17.8 | 17.0 | 2.0 |
| Manganese | mg/kg | 129 J | 234 J | 184 J | 1100 J | 116 J | 108 J | 471 J | 497 J | 84.5 J | 141 J | 161 J |
| Mercury | mg/kg | 0.038 J | ND (0.11) | 0.039 J | 0.080 J | 0.080 J | ND (0.11) | 0.058 J | ND (0.13) | 0.13 | 0.051 J | ND (0.11) |
| Nickel | mg/kg | 15.1 | 5.1 | 13.8 | 32.0 | 13.7 | 4.4 | 55.0 | 32.3 | 26.3 | 13.7 | 5.5 |
| Selenium | mg/kg | ND (0.64) | ND (0.54) | ND (0.60) | ND (0.72) | ND (0.62) | ND (0.54) | ND (1.3) | ND (0.63) | ND (0.67) | ND (0.64) | ND (0.53) |
| Silver | mg/kg | ND (1.3) | ND (1.1) | ND (1.2) | ND (1.4) | ND (1.2) | ND (1.1) | ND (2.7) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.1) |
| Thallium | mg/kg | ND (1.3) | ND (1.1) | ND (1.2) | 0.89 J | ND (1.2) | ND (1.1) | ND (2.7) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.1) |
| Vanadium | mg/kg | 43.7 | 2.5 J | 31.3 | 29.2 | 48.2 | 2.8 J | 26.2 | 14.7 | 33.5 | 53.2 | 2.8 J |
| Zinc | mg/kg | 45.3 | 21.9 | 43.5 | 62.6 | 40.6 | 27.4 | 61.2 | 41.2 | 66.3 | 40.2 | 27.5 |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1242 (PCB-1242) | µg/kg | 40 J | ND (36) | 860 | 750 | 37 J | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | ND (36) | ND (200) | ND (240) | ND (41) | ND (36) | ND (44) | ND (41) | ND (44) | ND (42) | ND (35) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Chloride | mg/kg | 10.6 J | 4.7 J | 16.0 | 20.2 | 14.9 | 4.1 J | 10.4 J | 9.7 J | 14.9 | 16.3 | 5.1 J |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 78.5 | 92.8 | 83.1 | 69.9 | 80.5 | 92.2 | 75.1 | 79.5 | 74.3 | 77.8 | 94.7 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P200 GMPT* | *P200 GMPT* | *P200(GM) GMPT* | *P200(GM) GMPT* | *P200(GM) GMPT* | *P217* | *P217* | *P217* | *P217* | *P217* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X209Y078C* | *B-X209Y078C* | *TMW-X225Y080* | *TMW-X225Y080* | *TMW-X225Y080* | *B-809012-1* | *B-809012-1* | *B-809012-1* | *B-809012-2* | *B-809012-2* |
| *Sample ID:* | | *S-071602-CLM-011* | *S-071602-CLM-012* | *S-080802-JN-001* | *S-080802-JN-002* | *S-080802-JN-003* | *S-809-040802-MG-001* | *S-809-040802-MG-002* | *S-809-040802-MG-003* | *S-809-040802-MG-004* | *S-809-040802-MG-005* |
| *Sample Date:* | | *7/16/2002* | *7/16/2002* | *8/8/2002* | *8/8/2002* | *8/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* |
| *Sample Depth:* | | *(10-12)* | *(10.5-12.5)* | *(0-2)* | *(6-8)* | *(12-14)* | *(0-2)* | *(6-8)* | *(16-17)* | *(0-2)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,1,2,2-Tetrachloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,1,2-Trichloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,1-Dichloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,1-Dichloroethene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,2,4-Trichlorobenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg / kg | ND (11) | ND (11) | ND (11) | ND (13) | ND (9.0) | ND (14) | ND (11) | ND (16) | ND (19) | ND (13) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,2-Dichlorobenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,2-Dichloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,2-Dichloropropane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,3-Dichlorobenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 1,4-Dichlorobenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| 2-Butanone (Methyl Ethyl Ketone) | µg / kg | 4.0 J | 5.3 J | ND (22) | ND (27) | ND (18) | ND (28) | ND (22) | ND (32) | ND (37) | ND (27) |
| 2-Hexanone | µg / kg | ND (22) | ND (21) | ND (22) | ND (27) | ND (18) | ND (28) | ND (22) | ND (32) | ND (37) | ND (27) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg / kg | ND (22) | ND (21) | ND (22) | ND (27) | ND (18) | ND (28) | ND (22) | ND (32) | ND (37) | ND (27) |
| Acetone | µg / kg | ND (22) UJ | ND (23) UJ | ND (22) | ND (27) | ND (18) | ND (28) UJ | ND (22) UJ | ND (32) UJ | ND (37) UJ | ND (27) UJ |
| Benzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Bromodichloromethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Bromoform | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) UJ | ND (5.5) UJ | ND (8) UJ | ND (9.3) UJ | ND (6.7) UJ |
| Bromomethane (Methyl Bromide) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) UJ | ND (5.5) UJ | ND (8) UJ | ND (9.3) UJ | ND (6.7) UJ |
| Carbon disulfide | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Carbon tetrachloride | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Chlorobenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Chloroethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Chloroform (Trichloromethane) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Chloromethane (Methyl Chloride) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| cis-1,2-Dichloroethene | µg / kg | ND (2.7) | ND (2.6) | ND (2.7) | ND (3.4) | ND (2.3) | ND (3.6) | ND (2.7) | ND (4) | ND (4.6) | ND (3.4) |
| cis-1,3-Dichloropropene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Cyclohexane | µg / kg | ND (11) | ND (11) | ND (11) | ND (13) | ND (9.0) | ND (14) | ND (11) | ND (16) | ND (19) | ND (13) |
| Dibromochloromethane | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) UJ | ND (5.5) UJ | ND (8) UJ | ND (9.3) UJ | ND (6.7) UJ |
| Dichlorodifluoromethane (CFC-12) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Ethylbenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Isopropylbenzene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Methyl acetate | µg / kg | ND (11) | ND (11) | ND (11) | ND (13) | ND (9.0) | ND (14) | ND (11) | ND (16) | ND (19) | ND (13) |
| Methyl cyclohexane | µg / kg | ND (11) | ND (11) | ND (11) | ND (13) | ND (9.0) | ND (14) | ND (11) | ND (16) | ND (19) | ND (13) |
| Methyl Tert Butyl Ether | µg / kg | ND (22) | ND (21) | ND (22) | ND (27) | ND (18) | ND (28) | ND (22) | ND (32) | ND (37) | ND (27) |
| Methylene chloride | µg / kg | 1.5 J | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Styrene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Tetrachloroethene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Toluene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| trans-1,2-Dichloroethene | µg / kg | ND (2.7) | ND (2.6) | ND (2.7) | ND (3.4) | ND (2.3) | ND (3.6) | ND (2.7) | ND (4) | ND (4.6) | ND (3.4) |
| trans-1,3-Dichloropropene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Trichloroethene | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Trichlorofluoromethane (CFC-11) | µg / kg | ND (5.5) UJ | ND (5.3) UJ | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Trifluorotrichloroethane (Freon 113) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Vinyl chloride | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |
| Xylene (total) | µg / kg | ND (5.5) | ND (5.3) | ND (5.4) | ND (6.7) | ND (4.5) | ND (7.1) | ND (5.5) | ND (8) | ND (9.3) | ND (6.7) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P200 GMPT* | *P200 GMPT* | *P200(GM) GMPT* | *P200(GM) GMPT* | *P200(GM) GMPT* | *P217* | *P217* | *P217* | *P217* | *P217* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X209Y078C* | *B-X209Y078C* | *TMW-X225Y080* | *TMW-X225Y080* | *TMW-X225Y080* | *B-809012-1* | *B-809012-1* | *B-809012-1* | *B-809012-2* | *B-809012-2* |
| *Sample ID:* | | *S-071602-CLM-011* | *S-071602-CLM-012* | *S-080802-JN-001* | *S-080802-JN-002* | *S-080802-JN-003* | *S-809-040802-MG-001* | *S-809-040802-MG-002* | *S-809-040802-MG-003* | *S-809-040802-MG-004* | *S-809-040802-MG-005* |
| *Sample Date:* | | *7/16/2002* | *7/16/2002* | *8/8/2002* | *8/8/2002* | *8/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* | *4/8/2002* |
| *Sample Depth:* | | *(10-12)* | *(10.5-12.5)* | *(0-2)* | *(6-8)* | *(12-14)* | *(0-2)* | *(6-8)* | *(16-17)* | *(0-2)* | *(6-8)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,4,5-Trichlorophenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,4,6-Trichlorophenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,4-Dichlorophenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,4-Dimethylphenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,4-Dinitrophenol | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 2,4-Dinitrotoluene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2,6-Dinitrotoluene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2-Chloronaphthalene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2-Chlorophenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2-Methylnaphthalene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2-Methylphenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 2-Nitroaniline | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 2-Nitrophenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 3,3'-Dichlorobenzidine | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 3-Nitroaniline | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 4,6-Dinitro-2-methylphenol | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 4-Bromophenyl phenyl ether | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 4-Chloro-3-methylphenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 4-Chloroaniline | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 4-Chlorophenyl phenyl ether | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 4-Methylphenol | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| 4-Nitroaniline | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| 4-Nitrophenol | µg / kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| Acenaphthene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Acenaphthylene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Acetophenone | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Anthracene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Atrazine | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzaldehyde | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzo(a)anthracene | µg / kg | ND (410) | ND (400) | 45 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzo(a)pyrene | µg / kg | ND (410) | ND (400) | 63 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzo(b)fluoranthene | µg / kg | ND (410) | ND (400) | 85 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzo(g,h,i)perylene | µg / kg | ND (410) | ND (400) | 44 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Benzo(k)fluoranthene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Biphenyl | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| bis(2-Chloroethoxy)methane | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| bis(2-Chloroethyl)ether | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| bis(2-Ethylhexyl)phthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Butyl benzylphthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Caprolactam | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Carbazole | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Chrysene | µg / kg | ND (410) | ND (400) | 62 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Dibenz(a,h)anthracene | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Dibenzofuran | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Diethyl phthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Dimethyl phthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Di-n-butylphthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Di-n-octyl phthalate | µg / kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Fluoranthene | µg / kg | ND (410) | ND (400) | 65 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***P200 GMPT*** | ***P200 GMPT*** | ***P200(GM) GMPT*** | ***P200(GM) GMPT*** | ***P200(GM) GMPT*** | ***P217*** | ***P217*** | ***P217*** | ***P217*** | ***P217*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X209Y078C*** | ***B-X209Y078C*** | ***TMW-X225Y080*** | ***TMW-X225Y080*** | ***TMW-X225Y080*** | ***B-809012-1*** | ***B-809012-1*** | ***B-809012-1*** | ***B-809012-2*** | ***B-809012-2*** |
| ***Sample ID:*** | | ***S-071602-CLM-011*** | ***S-071602-CLM-012*** | ***S-080802-JN-001*** | ***S-080802-JN-002*** | ***S-080802-JN-003*** | ***S-809-040802-MG-001*** | ***S-809-040802-MG-002*** | ***S-809-040802-MG-003*** | ***S-809-040802-MG-004*** | ***S-809-040802-MG-005*** |
| ***Sample Date:*** | | ***7/16/2002*** | ***7/16/2002*** | ***8/8/2002*** | ***8/8/2002*** | ***8/8/2002*** | ***4/8/2002*** | ***4/8/2002*** | ***4/8/2002*** | ***4/8/2002*** | ***4/8/2002*** |
| ***Sample Depth:*** | | ***(10-12)*** | ***(10.5-12.5)*** | ***(0-2)*** | ***(6-8)*** | ***(12-14)*** | ***(0-2)*** | ***(6-8)*** | ***(16-17)*** | ***(0-2)*** | ***(6-8)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| Fluorene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Hexachlorobenzene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Hexachlorobutadiene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (1800) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) |
| Hexachloroethane | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Isophorone | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Naphthalene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Nitrobenzene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| N-Nitrosodiphenylamine | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Pentachlorophenol | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Phenanthrene | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Phenol | µg/kg | ND (410) | ND (400) | ND (410) | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| Pyrene | µg/kg | ND (410) | ND (400) | 92 J | ND (420) | ND (360) | ND (410) | ND (420) | ND (420) | ND (420) | ND (420) |
| ***Metals*** | | | | | | | | | | | |
| Aluminum | mg/kg | 12400 | 15100 | 9480 | 9230 | 1670 | 8970 | 12400 | 16200 | 8810 | 8610 |
| Antimony | mg/kg | ND (7.4) UJ | ND (7.4) UJ | 1.6 J | 0.70 J | 1.3 J | ND (7.5) UJ | ND (7.6) UJ | ND (7.6) UJ | ND (7.7) UJ | ND (7.7) UJ |
| Arsenic | mg/kg | 6.6 | 8.1 | 5.9 | 6.5 | 1.4 | 8.0 | 8.2 | 22.8 | 8.7 | 6.0 |
| Barium | mg/kg | 54.2 | 66.2 | 38.8 | 53.0 | 106 | 72.2 | 73.5 | 132 | 95.2 | 67.1 |
| Beryllium | mg/kg | 0.53 J | 0.70 | 0.28 J | 0.29 J | 0.12 J | 0.59 J | 0.79 J | 1.7 J | 0.74 J | 0.63 J |
| Cadmium | mg/kg | ND (0.62) | ND (0.61) | ND (0.62) | 0.21 J | 0.19 J | ND (0.63) | ND (0.63) | 0.57 J | 0.12 J | ND (0.64) |
| Chromium Total | mg/kg | 18.5 | 23.4 | 22.3 | 19.2 | 4.2 | 12.3 | 13.0 | 37.4 | 14.0 | 10.2 |
| Cobalt | mg/kg | 7.7 | 10.7 | 3.1 J | 3.1 J | 2.1 J | 10.6 | 10.3 | 11.4 | 11.6 | 10.8 |
| Copper | mg/kg | 13.6 | 15.9 | 8.8 | 9.2 | 5.5 | 10.7 | 11.4 | 12.2 | 10.4 | 6.7 |
| Cyanide (amenable) | mg/kg | ND (0.62) | ND (0.61) | ND (0.62) | ND (0.63) | ND (0.55) | ND (0.63) | ND (0.63) | ND (0.64) | ND (0.64) | ND (0.64) |
| Cyanide (total) | mg/kg | ND (0.62) | ND (0.61) | ND (0.62) | ND (0.63) | ND (0.55) | ND (0.63) | 0.39 J | ND (0.64) | ND (0.64) | ND (0.64) |
| Iron | mg/kg | 21000 | 23900 | 19000 | 18200 | 4570 | 16600 | 18800 | 35300 | 17400 | 14000 |
| Lead | mg/kg | 15.2 | 16.2 | 14.7 | 11.3 | 3.2 | 16.2 | 14.0 | 21.6 | 15.4 | 14.3 |
| Manganese | mg/kg | 266 J | 292 J | 126 | 111 | 155 | 984 | 1330 | 838 | 1370 | 1330 |
| Mercury | mg/kg | 0.048 J | 0.065 J | 0.086 J | 0.028 J | 0.023 J | 0.070 J | ND (0.13) | 0.076 J | 0.046 J | 0.030 J |
| Nickel | mg/kg | 12.7 | 18.5 | 7.9 | 7.6 | 8.2 | 10.0 | 12.0 | 20.1 | 11.9 | 8.9 |
| Selenium | mg/kg | ND (0.62) | ND (0.61) | ND (0.62) | ND (0.63) | ND (0.55) | 0.59 J | ND (0.63) | ND (0.64) | 0.44 J | ND (0.64) |
| Silver | mg/kg | ND (1.2) | ND (1.2) | ND (1.2) | ND (1.3) | ND (1.1) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.3) |
| Thallium | mg/kg | ND (1.2) | ND (1.2) | ND (1.2) | 0.93 J | ND (1.1) | ND (1.3) | 0.71 J | 0.97 J | ND (1.3) | ND (1.3) |
| Vanadium | mg/kg | 31.1 | 35.3 | 35.5 | 30.6 | 3.3 J | 25.1 | 29.2 | 65.6 | 28.5 | 22.0 |
| Zinc | mg/kg | 33.8 | 44.1 | 27.3 | 28.2 | 26.2 | 39.8 | 49.3 | 71.2 | 41.6 | 37.4 |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (200) | ND (400) | ND (81) | ND (84) | ND (72) | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (200) | ND (400) | ND (81) | ND (84) | ND (72) | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (200) | ND (400) | ND (81) | ND (84) | ND (72) | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg/kg | 1200 | 2800 | 84 | 360 | ND (72) | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (200) | ND (400) | ND (81) | ND (84) | 750 | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (200) | ND (400) | ND (81) | ND (84) | ND (72) | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (200) | ND (400) | 810 | 530 | 350 | ND (41) | ND (42) | ND (42) | ND (42) | ND (42) |
| ***General Chemistry*** | | | | | | | | | | | |
| Chloride | mg/kg | 16.3 | 12.8 | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Solids | % | 81.1 | 81.6 | 81.1 | 78.8 | 91.0 | 79.5 | 79.1 | 78.6 | 78.3 | 78.0 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P217* | *P217* | *P217* | *P217* | *P217* | *P217* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-809012-2* | *B-809012-9* | *B-809012-9* | *B-809012-9* | *B-809012-23* | *B-809012-23* | *B-X261Y356* | *B-X261Y356* | *B-X261Y356* |
| *Sample ID:* | | *S-809-040802-MG-006* | *S-809-041002-MG-024* | *S-809-041002-MG-025* | *S-809-041002-MG-026* | *S-809-090602-CLM-015* | *S-809-090602-CLM-016* | *S-011102-KMV-506* | *S-011102-KMV-507* | *S-011102-KMV-508* |
| *Sample Date:* | | *4/8/2002* | *4/10/2002* | *4/10/2002* | *4/10/2002* | *9/6/2002* | *9/6/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* |
| *Sample Depth:* | | *(10.5-11.5)* | *(0-2)* | *(0-2)* | *(2-3.5)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* | *(6-8)* |
| | | | | *Duplicate* | | | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,1,2-Trichloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,1-Dichloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,1-Dichloroethene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (17) | ND (13) | ND (12) | ND (23) | ND (660) | ND (11) | ND (11) | ND (11) | ND (11) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,2-Dichlorobenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,2-Dichloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,2-Dichloropropane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,3-Dichlorobenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 1,4-Dichlorobenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (35) | ND (26) | ND (25) | ND (46) | ND (1300) UJ | ND (22) | ND (21) | ND (21) | ND (22) |
| 2-Hexanone | µg/kg | ND (35) | ND (26) | ND (25) | ND (46) | ND (1300) | ND (22) | ND (21) | ND (21) | ND (22) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (35) | ND (26) | ND (25) | ND (46) | ND (1300) | ND (22) | ND (21) UJ | ND (21) UJ | ND (22) UJ |
| Acetone | µg/kg | ND (35) UJ | ND (26) U | ND (25) | ND (46) | ND (1300) UJ | ND (22) | ND (21) | ND (21) U | ND (22) |
| Benzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Bromodichloromethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Bromoform | µg/kg | ND (8.7) UJ | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (8.7) UJ | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) UJ | ND (5.3) UJ | ND (5.4) UJ |
| Carbon disulfide | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Carbon tetrachloride | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Chlorobenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Chloroethane | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Chloroform (Trichloromethane) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) UJ | ND (5.3) UJ | ND (5.4) UJ |
| cis-1,2-Dichloroethene | µg/kg | ND (4.3) | ND (3.3) | ND (3.1) | ND (5.7) | ND (160) | ND (2.8) | ND (2.7) | ND (2.6) | ND (2.7) |
| cis-1,3-Dichloropropene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Cyclohexane | µg/kg | ND (17) | ND (13) | ND (12) | ND (23) | ND (660) | ND (11) | ND (11) | ND (11) | ND (11) |
| Dibromochloromethane | µg/kg | ND (8.7) UJ | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) UJ | ND (5.3) UJ | ND (5.4) UJ |
| Ethylbenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Isopropylbenzene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Methyl acetate | µg/kg | ND (17) | 7.3 J | 5.2 J | 5.2 J | ND (660) | ND (11) | ND (11) UJ | ND (11) UJ | ND (11) UJ |
| Methyl cyclohexane | µg/kg | ND (17) | ND (13) | ND (12) | ND (23) | ND (660) | ND (11) | ND (11) | ND (11) | ND (11) |
| Methyl Tert Butyl Ether | µg/kg | ND (35) | ND (26) | ND (25) | ND (46) | ND (1300) | ND (22) | ND (21) | ND (21) | ND (22) |
| Methylene chloride | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) U | ND (5.3) U | ND (5.4) U |
| Styrene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Tetrachloroethene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Toluene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | 81 J | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| trans-1,2-Dichloroethene | µg/kg | ND (4.3) | ND (3.3) | ND (3.1) | ND (5.7) | ND (160) | ND (2.8) | ND (2.7) | ND (2.6) | ND (2.7) |
| trans-1,3-Dichloropropene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Trichloroethene | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) UJ | ND (5.3) UJ | ND (5.4) UJ |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) UJ | ND (5.3) UJ | ND (5.4) UJ |
| Vinyl chloride | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | ND (330) | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |
| Xylene (total) | µg/kg | ND (8.7) | ND (6.6) | ND (6.2) | ND (11) | 180 J | ND (5.6) | ND (5.4) | ND (5.3) | ND (5.4) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P217* | *P217* | *P217* | *P217* | *P217* | *P217* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-809012-2* | *B-809012-9* | *B-809012-9* | *B-809012-9* | *B-809012-23* | *B-809012-23* | *B-X261Y356* | *B-X261Y356* | *B-X261Y356* |
| *Sample ID:* | | *S-809-040802-MG-006* | *S-809-041002-MG-024* | *S-809-041002-MG-025* | *S-809-041002-MG-026* | *S-809-090602-CLM-015* | *S-809-090602-CLM-016* | *S-011102-KMV-506* | *S-011102-KMV-507* | *S-011102-KMV-508* |
| *Sample Date:* | | *4/8/2002* | *4/10/2002* | *4/10/2002* | *4/10/2002* | *9/6/2002* | *9/6/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* |
| *Sample Depth:* | | *(10.5-11.5)* | *(0-2)* | *(0-2)* | *(2-3.5)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* | *(6-8)* |
| | | | | *Duplicate* | | | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,4,5-Trichlorophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,4,6-Trichlorophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,4-Dichlorophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,4-Dimethylphenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,4-Dinitrophenol | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2300) | ND (3900) UJ | ND (2000) UJ | ND (2100) | ND (2000) | ND (1900) |
| 2,4-Dinitrotoluene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2,6-Dinitrotoluene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2-Chloronaphthalene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2-Chlorophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2-Methylnaphthalene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | 4500 | ND (420) | ND (440) | ND (420) | ND (400) |
| 2-Methylphenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 2-Nitroaniline | µg/kg | ND (2000) | ND (2000) UJ | ND (2000) UJ | ND (2300) UJ | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| 2-Nitrophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2300) | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| 3-Nitroaniline | µg/kg | ND (2000) | ND (2000) UJ | ND (2000) UJ | ND (2300) UJ | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2300) | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 4-Chloro-3-methylphenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 4-Chloroaniline | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 4-Methylphenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| 4-Nitroaniline | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2300) | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| 4-Nitrophenol | µg/kg | ND (2000) | ND (2000) UJ | ND (2000) UJ | ND (2300) UJ | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| Acenaphthene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Acenaphthylene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Acetophenone | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Anthracene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Atrazine | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzaldehyde | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzo(a)anthracene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzo(a)pyrene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzo(b)fluoranthene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzo(g,h,i)perylene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Benzo(k)fluoranthene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Biphenyl | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| bis(2-Chloroethyl)ether | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Butyl benzylphthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Caprolactam | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Carbazole | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Chrysene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Dibenz(a,h)anthracene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Dibenzofuran | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Diethyl phthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Dimethyl phthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Di-n-butylphthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Di-n-octyl phthalate | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Fluoranthene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P217* | *P217* | *P217* | *P217* | *P217* | *P217* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-809012-2* | *B-809012-9* | *B-809012-9* | *B-809012-9* | *B-809012-23* | *B-809012-23* | *B-X261Y356* | *B-X261Y356* | *B-X261Y356* |
| *Sample ID:* | | *S-809-040802-MG-006* | *S-809-041002-MG-024* | *S-809-041002-MG-025* | *S-809-041002-MG-026* | *S-809-090602-CLM-015* | *S-809-090602-CLM-016* | *S-011102-KMV-506* | *S-011102-KMV-507* | *S-011102-KMV-508* |
| *Sample Date:* | | *4/8/2002* | *4/10/2002* | *4/10/2002* | *4/10/2002* | *9/6/2002* | *9/6/2002* | *1/11/2002* | *1/11/2002* | *1/11/2002* |
| *Sample Depth:* | | *(10.5-11.5)* | *(0-2)* | *(0-2)* | *(2-3.5)* | *(0-2)* | *(6-7)* | *(0-2)* | *(0-2)* | *(6-8)* |
| | | | | *Duplicate* | | | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| Fluorene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Hexachlorobenzene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Hexachlorobutadiene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Hexachlorocyclopentadiene | µg/kg | ND (2000) | ND (2000) | ND (2000) | ND (2300) | ND (3900) | ND (2000) | ND (2100) | ND (2000) | ND (1900) |
| Hexachloroethane | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Isophorone | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Naphthalene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Nitrobenzene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| N-Nitrosodiphenylamine | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Pentachlorophenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Phenanthrene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | 110 J | ND (420) | ND (440) | ND (420) | ND (400) |
| Phenol | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| Pyrene | µg/kg | ND (420) | ND (420) | ND (420) | ND (470) | ND (800) | ND (420) | ND (440) | ND (420) | ND (400) |
| ***Metals*** | | | | | | | | | | |
| Aluminum | mg/kg | 15600 | 10100 | 10700 | 19100 | 9690 | 10800 | 12100 | 11300 | 15500 |
| Antimony | mg/kg | ND (7.7) UJ | ND (7.6) | ND (7.6) | ND (8.6) | ND (7.3) UJ | ND (7.6) UJ | R | R | R |
| Arsenic | mg/kg | 18.0 | 10.7 | 9.4 | 24.2 | 6.8 | 7.7 | 7.9 | 7.9 | 13.6 |
| Barium | mg/kg | 88.7 | 78.6 | 73.5 | 130 | 80.5 | 82.8 | 85.5 | 82.2 | 64.9 |
| Beryllium | mg/kg | 0.97 J | 0.73 | 0.62 J | 1.7 | 0.35 J | 0.34 J | ND (0.66) U | ND (0.64) U | 1.4 |
| Cadmium | mg/kg | 0.20 J | ND (0.64) | ND (0.64) | ND (0.71) | ND (0.60) U | ND (0.63) U | 0.23 J | 0.24 J | 0.43 J |
| Chromium Total | mg/kg | 29.4 | 16.8 | 17.1 | 34.2 | 13.3 J | 12.9 J | 16.1 | 13.8 | 32.1 |
| Cobalt | mg/kg | 9.8 | 11.3 | 10.9 | 10.5 | 13.0 | 11.1 | 12.8 | 10.7 | 7.8 |
| Copper | mg/kg | 14.0 | 14.9 | 50.8 | 14.4 | 32.5 J | 11.3 J | 43.6 | 23.1 | 15.4 |
| Cyanide (amenable) | mg/kg | ND (0.64) | ND (0.64) | ND (0.64) | ND (0.71) | ND (0.60) | ND (0.63) | ND (0.66) | ND (0.64) | ND (0.61) |
| Cyanide (total) | mg/kg | ND (0.64) | ND (0.64) | ND (0.64) | ND (0.71) | ND (0.60) | ND (0.63) | ND (0.66) | ND (0.64) | ND (0.61) |
| Iron | mg/kg | 30600 | 18600 | 17500 | 35400 | 14300 | 16700 | 16800 | 16800 | 32400 |
| Lead | mg/kg | 16.9 | 19.0 | 28.6 | 19.0 | 21.1 | 14.1 | 24.2 | 18.9 | 19.1 |
| Manganese | mg/kg | 651 | 980 | 782 | 1280 | 1150 | 958 | 739 | 623 | 278 |
| Mercury | mg/kg | 0.061 J | 0.024 J | 0.061 J | 0.057 J | 0.065 J | 0.039 J | 0.051 J | 0.050 J | 0.090 J |
| Nickel | mg/kg | 18.2 | 12.8 | 20.7 | 26.8 | 16.1 | 10.9 | 21.4 | 12.8 | 17.6 |
| Selenium | mg/kg | ND (0.64) | 0.45 J | ND (0.64) | ND (0.71) | ND (0.60) | ND (0.63) | ND (0.66) | ND (0.64) | ND (0.61) |
| Silver | mg/kg | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.4) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) |
| Thallium | mg/kg | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.4) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) |
| Vanadium | mg/kg | 54.4 | 31.5 | 28.3 | 63.2 | 22.3 | 26.0 | 25.8 | 25.4 | 53.2 |
| Zinc | mg/kg | 81.2 | 43.1 | 58.8 | 77.3 | 45.8 J | 39.8 J | 48.0 | 39.9 | 48.3 |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | ND (40) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | ND (40) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | ND (40) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | ND (40) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | 380 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | ND (40) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | ND (42) | ND (42) | ND (47) | ND (40) | ND (42) | ND (44) | ND (42) | 49 |
| ***General Chemistry*** | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | -- | -- | -- | -- | -- | 28000 | 7900 | 690 |
| Total Solids | % | 78.4 | 78.6 | 78.5 | 70.1 | 82.8 | 79.0 | 75.6 | 78.3 | 82.3 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X261Y356* | *MW-X178Y367D* | *MW-X178Y367D* | *MW-X234Y157D* | *MW-X234Y157D* | *MW-X234Y157D* | *MW-X269Y201D* | *MW-X269Y201D* | *MW-X269Y201D* |
| *Sample ID:* | | *S-011102-KMV-509* | *S-010902-KMV-504* | *S-010902-KMV-505* | *S-012502-KMV-514* | *S-012502-KMV-515* | *S-012502-KMV-516* | *S-012202-KMV-511* | *S-012202-KMV-512* | *S-012202-KMV-513* |
| *Sample Date:* | | *1/11/2002* | *1/9/2002* | *1/9/2002* | *1/25/2002* | *1/25/2002* | *1/25/2002* | *1/22/2002* | *1/22/2002* | *1/22/2002* |
| *Sample Depth:* | | *(16-18)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(4-6)* | *(0-2)* | *(0-2)* | *(7-9)* |
| | | | | *Duplicate* | | *Duplicate* | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,1,2,2-Tetrachloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,1,2-Trichloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,1-Dichloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,1-Dichloroethene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,2,4-Trichlorobenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/kg | ND (14) | ND (12) UJ | ND (11) UJ | ND (11) UJ | ND (11) UJ | ND (13) UJ | ND (11) | ND (12) | ND (14) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,2-Dichlorobenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,2-Dichloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,2-Dichloropropane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,3-Dichlorobenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 1,4-Dichlorobenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/kg | ND (29) | 4.5 J | 3.2 J | ND (22) | ND (22) | ND (27) | ND (22) | ND (24) | ND (27) |
| 2-Hexanone | µg/kg | ND (29) | ND (23) | ND (22) | ND (22) | ND (22) | ND (27) | ND (22) | ND (24) | ND (27) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/kg | ND (29) UJ | ND (23) | ND (22) | ND (22) | ND (22) | ND (27) | ND (22) | ND (24) | ND (27) |
| Acetone | µg/kg | ND (29) | 110 | ND (52) U | ND (22) | ND (22) | ND (27) U | ND (22) | ND (24) | ND (27) |
| Benzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Bromodichloromethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Bromoform | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Bromomethane (Methyl Bromide) | µg/kg | ND (7.2) UJ | ND (5.8) UJ | ND (5.6) UJ | ND (5.5) UJ | ND (5.4) UJ | ND (6.7) UJ | ND (5.5) | ND (6.1) | ND (6.8) |
| Carbon disulfide | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Carbon tetrachloride | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) UJ | ND (5.4) UJ | ND (6.7) UJ | ND (5.5) | ND (6.1) | ND (6.8) |
| Chlorobenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Chloroethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Chloroform (Trichloromethane) | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Chloromethane (Methyl Chloride) | µg/kg | ND (7.2) UJ | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| cis-1,2-Dichloroethene | µg/kg | ND (3.6) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.7) | ND (3.3) | ND (2.7) | ND (3.1) | ND (3.4) |
| cis-1,3-Dichloropropene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Cyclohexane | µg/kg | ND (14) | ND (12) | ND (11) | ND (11) | ND (11) | ND (13) | ND (11) | ND (12) | ND (14) |
| Dibromochloromethane | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Dichlorodifluoromethane (CFC-12) | µg/kg | ND (7.2) UJ | ND (5.8) U | ND (5.6) U | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Ethylbenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Isopropylbenzene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Methyl acetate | µg/kg | ND (14) UJ | 11 J | 5.5 J | 3.3 J | 5 J | ND (13) | ND (11) | ND (12) | ND (14) |
| Methyl cyclohexane | µg/kg | ND (14) | ND (12) | ND (11) | ND (11) | ND (11) | ND (13) | ND (11) | ND (12) | ND (14) |
| Methyl Tert Butyl Ether | µg/kg | ND (29) | ND (23) | ND (22) | ND (22) | ND (22) | ND (27) | ND (22) | ND (24) | ND (27) |
| Methylene chloride | µg/kg | ND (7.2) U | ND (5.8) U | ND (5.6) U | ND (5.5) U | ND (5.4) U | ND (6.7) U | ND (5.5) | ND (6.1) | ND (6.8) |
| Styrene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Tetrachloroethene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Toluene | µg/kg | ND (7.2) | 0.75 J | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | 0.96 J | ND (6.8) |
| trans-1,2-Dichloroethene | µg/kg | ND (3.6) | ND (2.9) | ND (2.8) | ND (2.8) | ND (2.7) | ND (3.3) | ND (2.7) | ND (3.1) | ND (3.4) |
| trans-1,3-Dichloropropene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Trichloroethene | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Trichlorofluoromethane (CFC-11) | µg/kg | ND (7.2) UJ | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Trifluorotrichloroethane (Freon 113) | µg/kg | ND (7.2) UJ | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Vinyl chloride | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |
| Xylene (total) | µg/kg | ND (7.2) | ND (5.8) | ND (5.6) | ND (5.5) | ND (5.4) | ND (6.7) | ND (5.5) | ND (6.1) | ND (6.8) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *B-X261Y356* | *MW-X178Y367D* | *MW-X178Y367D* | *MW-X234Y157D* | *MW-X234Y157D* | *MW-X234Y157D* | *MW-X269Y201D* | *MW-X269Y201D* | *MW-X269Y201D* |
| *Sample ID:* | | *S-011102-KMV-509* | *S-010902-KMV-504* | *S-010902-KMV-505* | *S-012502-KMV-514* | *S-012502-KMV-515* | *S-012502-KMV-516* | *S-012202-KMV-511* | *S-012202-KMV-512* | *S-012202-KMV-513* |
| *Sample Date:* | | *1/11/2002* | *1/9/2002* | *1/9/2002* | *1/25/2002* | *1/25/2002* | *1/25/2002* | *1/22/2002* | *1/22/2002* | *1/22/2002* |
| *Sample Depth:* | | *(16-18)* | *(0-2)* | *(0-2)* | *(0-2)* | *(0-2)* | *(4-6)* | *(0-2)* | *(0-2)* | *(7-9)* |
| | | | | *Duplicate* | | *Duplicate* | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Semi-Volatiles*** | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,4,5-Trichlorophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,4,6-Trichlorophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,4-Dichlorophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,4-Dimethylphenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,4-Dinitrophenol | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 2,4-Dinitrotoluene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2,6-Dinitrotoluene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2-Chloronaphthalene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2-Chlorophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2-Methylnaphthalene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2-Methylphenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 2-Nitroaniline | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 2-Nitrophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 3,3'-Dichlorobenzidine | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 3-Nitroaniline | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 4,6-Dinitro-2-methylphenol | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 4-Bromophenyl phenyl ether | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 4-Chloro-3-methylphenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 4-Chloroaniline | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 4-Chlorophenyl phenyl ether | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 4-Methylphenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| 4-Nitroaniline | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| 4-Nitrophenol | µg/kg | ND (2400) | ND (2000) UJ | ND (2000) UJ | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| Acenaphthene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Acenaphthylene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Acetophenone | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Anthracene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Atrazine | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzaldehyde | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzo(a)anthracene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzo(a)pyrene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzo(b)fluoranthene | µg/kg | ND (500) | ND (420) | ND (420) | 74 J | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzo(g,h,i)perylene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Benzo(k)fluoranthene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Biphenyl | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| bis(2-Chloroethoxy)methane | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| bis(2-Chloroethyl)ether | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| bis(2-Ethylhexyl)phthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Butyl benzylphthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Caprolactam | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Carbazole | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Chrysene | µg/kg | ND (500) | ND (420) | ND (420) | 65 J | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Dibenz(a,h)anthracene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Dibenzofuran | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Diethyl phthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Dimethyl phthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Di-n-butylphthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Di-n-octyl phthalate | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Fluoranthene | µg/kg | ND (500) | ND (420) | ND (420) | 140 J | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***B-X261Y356*** | ***MW-X178Y367D*** | ***MW-X178Y367D*** | ***MW-X234Y157D*** | ***MW-X234Y157D*** | ***MW-X234Y157D*** | ***MW-X269Y201D*** | ***MW-X269Y201D*** | ***MW-X269Y201D*** |
| ***Sample ID:*** | | ***S-011102-KMV-509*** | ***S-010902-KMV-504*** | ***S-010902-KMV-505*** | ***S-012502-KMV-514*** | ***S-012502-KMV-515*** | ***S-012502-KMV-516*** | ***S-012202-KMV-511*** | ***S-012202-KMV-512*** | ***S-012202-KMV-513*** |
| ***Sample Date:*** | | ***1/11/2002*** | ***1/9/2002*** | ***1/9/2002*** | ***1/25/2002*** | ***1/25/2002*** | ***1/25/2002*** | ***1/22/2002*** | ***1/22/2002*** | ***1/22/2002*** |
| ***Sample Depth:*** | | ***(16-18)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(0-2)*** | ***(4-6)*** | ***(0-2)*** | ***(0-2)*** | ***(7-9)*** |
| | | | | ***Duplicate*** | | ***Duplicate*** | | | ***Duplicate*** | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| Fluorene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Hexachlorobenzene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Hexachlorobutadiene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Hexachlorocyclopentadiene | µg/kg | ND (2400) | ND (2000) | ND (2000) | ND (2000) | ND (2000) | ND (2100) | ND (2000) | ND (2000) | ND (2100) |
| Hexachloroethane | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Indeno(1,2,3-cd)pyrene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Isophorone | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Naphthalene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Nitrobenzene | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| N-Nitrosodi-n-propylamine | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| N-Nitrosodiphenylamine | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Pentachlorophenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Phenanthrene | µg/kg | ND (500) | ND (420) | ND (420) | 110 J | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Phenol | µg/kg | ND (500) | ND (420) | ND (420) | ND (410) | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| Pyrene | µg/kg | ND (500) | ND (420) | ND (420) | 100 J | ND (420) | ND (440) | ND (420) | ND (400) | ND (430) |
| ***Metals*** | | | | | | | | | | |
| Aluminum | mg/kg | 26100 | 14100 | 14400 | 9280 | 13000 | 12200 | 11600 | 13100 | 14100 |
| Antimony | mg/kg | R | ND (7.7) UJ | ND (7.7) UJ | ND (7.5) | ND (7.6) | ND (8.0) | ND (7.7) | ND (7.3) | ND (7.8) |
| Arsenic | mg/kg | 15.5 | 9.9 | 9.1 | 7.3 | 10.4 | 13.6 | 8.3 | 9.9 | 18.0 |
| Barium | mg/kg | 94.8 | 43.3 | 56.6 | 77.7 | 77.6 | 137 | 68.0 | 85.2 | 114 |
| Beryllium | mg/kg | 1.6 | ND (0.64) U | 0.26 J | 0.64 | 0.64 | 0.96 | 0.27 J | 0.46 J | 1.3 |
| Cadmium | mg/kg | 0.56 J | 0.17 J | 0.18 J | 0.10 J | 0.084 J | 0.12 J | ND (0.64) U | 0.42 J | 0.75 |
| Chromium Total | mg/kg | 47.3 | 18.5 J | 17.1 J | 21.9 | 21.6 | 18.8 | 17.4 | 18.6 | 28.3 |
| Cobalt | mg/kg | 5.1 J | 15.2 J | 8.8 J | 17.2 | 11.6 | 12.5 | 6.9 | 11.2 | 8.9 |
| Copper | mg/kg | 17.2 | 13.5 J | 23.3 J | 27.5 | 42.1 | 11.8 | 16.2 | 19.2 | 23.6 |
| Cyanide (amenable) | mg/kg | ND (0.75) | ND (0.64) | ND (0.64) | ND (0.62) | ND (0.64) | ND (0.67) | ND (0.64) | ND (0.61) | ND (0.65) |
| Cyanide (total) | mg/kg | ND (0.75) | ND (0.64) | ND (0.64) | ND (0.62) | ND (0.64) | ND (0.67) | ND (0.64) | ND (0.61) | ND (0.65) |
| Iron | mg/kg | 32900 | 21400 J | 21000 J | 16100 | 24200 | 28200 | 20100 | 22100 | 34600 |
| Lead | mg/kg | 13.7 | 16.8 J | 15.0 J | 28.2 | 22.4 | 21.1 | 22.1 | 37.3 | 20.1 |
| Manganese | mg/kg | 98.6 | 433 J | 505 J | 457 | 325 | 1260 | 276 | 484 | 553 |
| Mercury | mg/kg | 0.22 | 0.045 J | 0.053 J | 0.059 J | 0.076 J | 0.057 J | 0.24 | 0.25 | 0.094 J |
| Nickel | mg/kg | 27.6 | 10.1 J | 11.6 J | 43.4 | 23.2 | 24.5 | 12.3 | 15.8 | 65.0 |
| Selenium | mg/kg | ND (0.75) | ND (0.64) | ND (0.64) | 0.66 | 1.3 | 1.2 | ND (0.64) | ND (0.61) | ND (0.65) |
| Silver | mg/kg | ND (1.5) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.3) | ND (1.3) | ND (1.3) | ND (1.2) | ND (1.3) |
| Thallium | mg/kg | 1.0 J | ND (1.3) | ND (1.3) | 0.77 J | ND (1.3) | 1.1 J | ND (1.3) | ND (1.2) | ND (1.3) |
| Vanadium | mg/kg | 60.6 | 34.9 | 31.6 | 24.9 | 33.0 | 31.8 | 28.1 | 31.4 | 41.0 |
| Zinc | mg/kg | 69.7 | 36.3 J | 42.8 J | 45.7 | 66.6 | 68.3 | 75.2 | 135 | 108 |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (50) | ND (42) | ND (42) | ND (4100) | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (50) | ND (42) | ND (42) | ND (4100) | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (50) | ND (42) | ND (42) | ND (4100) | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (50) | ND (42) | ND (42) | ND (4100) | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (50) | ND (42) | ND (42) | 14000 | 12000 | 30 J | 18 J | ND (40) | 16 J |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (50) | ND (42) | ND (42) | ND (4100) | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (50) | ND (42) | ND (42) | 1100 J | ND (4200) | ND (44) | ND (42) | ND (40) | ND (43) |
| ***General Chemistry*** | | | | | | | | | | |
| Chloride | mg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Organic Carbon (TOC) | mg/kg | -- | 1100 J | 780 J | 8000 | 5700 | 4000 | 4900 | 1300 | 470 |
| Total Solids | % | 66.7 | 78.4 | 78.2 | 80.2 | 78.4 | 74.9 | 78.2 | 81.8 | 76.7 |

**TABLE 2.3**

**RFI SOIL SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Notes:
µg/L - microgram per Liter
mg/kg - millograms per kilogram
ND - Non Detect
PCB - Polychlorinated Biphenyl
J - Estimated
R - Rejected
U - Non-detect at associated value.
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limited is an estimated quantity.

**TABLE 2.4**

**RFI WIPE SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | | |
|---|---|---|---|
| ***Area of Interest:*** | | ***A003 P200(GM)*** | ***A003 P200(GM)*** |
| ***Sample Location:*** | | ***W-X197Y070*** | ***W-X199Y070*** |
| ***Sample ID:*** | | ***W-012502-MO-002*** | ***W-012502-MO-001*** |
| ***Sample Date:*** | | ***1/25/2002*** | ***1/25/2002*** |
| ***Parameters*** | ***Units*** | | |
| ***PCBs*** | | | |
| Aroclor-1016 (PCB-1016) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1221 (PCB-1221) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1232 (PCB-1232) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1242 (PCB-1242) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1248 (PCB-1248) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1254 (PCB-1254) | µg/100 sq cm | ND (4.0) | ND (4.0) |
| Aroclor-1260 (PCB-1260) | µg/100 sq cm | ND (4.0) | ND (4.0) |

Notes:
µg/100 sq cm - microgram per 100 sqaure centimeters
ND - Non Detect
PCB - Polychlorinated Biphenyl

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *TMW-X193Y251* | *TMW-X193Y251* | *SU-X168Y224* | *MW-X233Y095* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y100* | *MW-X233Y100* |
| *Sample ID:* | | *GW-031903-JK-004* | *GW-031903-JK-005* | *GW-021302-JW-001* | *GW-102403-ME-048* | *GW-102403-ME-048(DISS PCB)* | *GW-102203-ME-046* | *GW-102203-ME-046-DISS PCB* | *GW-102203-ME-047* |
| *Sample Date:* | | *3/19/2003* | *3/19/2003* | *2/13/2002* | *10/24/2003* | *10/24/2003* | *10/22/2003* | *10/22/2003* | *10/22/2003* |
| | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| ***Volatiles*** | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,1,2,2-Tetrachloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,1,2-Trichloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,1-Dichloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,1-Dichloroethene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,2,4-Trichlorobenzene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/L | ND (8.0) | ND (8.0) | ND (2) | ND (2.0) | -- | ND (2.0) | -- | ND (2.0) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichlorobenzene | µg/L | 3.5 J | 3.9 J | ND (1) | 0.18 | -- | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichloropropane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| 1,3-Dichlorobenzene | µg/L | ND (4.0) | ND (4.0) | ND (1) | 1.0 | -- | ND (1.0) | -- | 0.21 |
| 1,4-Dichlorobenzene | µg/L | ND (4.0) | ND (4.0) | ND (1) | 2.2 | -- | 0.39 | -- | 0.41 |
| 2-Butanone (Methyl Ethyl Ketone) | µg/L | ND (40) | ND (40) U | ND (10) UJ | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Hexanone | µg/L | ND (40) | ND (40) | ND (10) UJ | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/L | ND (40) | ND (40) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Acetone | µg/L | ND (40) U | ND (40) U | 3.2 J | 1.6 | -- | ND (10) | -- | ND (10) |
| Benzene | µg/L | 1.5 J | 1.6 J | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Bromodichloromethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Bromoform | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Bromomethane (Methyl Bromide) | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Carbon disulfide | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Carbon tetrachloride | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Chlorobenzene | µg/L | 140 J | 150 | ND (1) | 0.39 | -- | 1.7 | -- | 1.7 |
| Chloroethane | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Chloroform (Trichloromethane) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Chloromethane (Methyl Chloride) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| cis-1,2-Dichloroethene | µg/L | ND (2.0) | ND (2.0) | ND (0.5) | ND (0.50) | -- | ND (0.50) | -- | ND (0.50) |
| cis-1,3-Dichloropropene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Cyclohexane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Dibromochloromethane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Dichlorodifluoromethane (CFC-12) | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Ethylbenzene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Isopropylbenzene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Methyl acetate | µg/L | ND (40) | ND (40) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Methyl cyclohexane | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Methyl Tert Butyl Ether | µg/L | ND (20) | ND (20) | ND (5) | ND (5.0) | -- | ND (5.0) | -- | ND (5.0) |
| Methylene chloride | µg/L | ND (4.0) | ND (4.0) | ND (1) UJ | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Styrene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *TMW-X193Y251* | *TMW-X193Y251* | *SU-X168Y224* | *MW-X233Y095* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y100* | *MW-X233Y100* |
| *Sample ID:* | | *GW-031903-JK-004* | *GW-031903-JK-005* | *GW-021302-JW-001* | *GW-102403-ME-048* | *GW-102403-ME-048(DISS PCB)* | *GW-102203-ME-046* | *GW-102203-ME-046-DISS PCB* | *GW-102203-ME-047* |
| *Sample Date:* | | *3/19/2003* | *3/19/2003* | *2/13/2002* | *10/24/2003* | *10/24/2003* | *10/22/2003* | *10/22/2003* | *10/22/2003* |
| | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| Tetrachloroethene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Toluene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| trans-1,2-Dichloroethene | µg/L | ND (2.0) | ND (2.0) | ND (0.5) | ND (0.50) | -- | ND (0.50) | -- | ND (0.50) |
| trans-1,3-Dichloropropene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Trichloroethene | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Trichlorofluoromethane (CFC-11) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Trifluorotrichloroethane (Freon 113) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Vinyl chloride | µg/L | 5.3 | 5.3 | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| Xylene (total) | µg/L | ND (4.0) | ND (4.0) | ND (1) | ND (1.0) | -- | ND (1.0) | -- | ND (1.0) |
| ***Semi-Volatiles*** | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,4,5-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,4,6-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,4-Dichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,4-Dimethylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,4-Dinitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 2,4-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2,6-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Chloronaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Chlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Methylnaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 2-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 2-Nitrophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 3,3'-Dichlorobenzidine | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 3-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 4,6-Dinitro-2-methylphenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 4-Bromophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Chloro-3-methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Chloroaniline | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Chlorophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| 4-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| 4-Nitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| Acenaphthene | µg/L | ND (10) | ND (10) | ND (10) | 1.9 | -- | ND (10) | -- | ND (10) |
| Acenaphthylene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Acetophenone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Atrazine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *TMW-X193Y251* | *TMW-X193Y251* | *SU-X168Y224* | *MW-X233Y095* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y100* | *MW-X233Y100* |
| *Sample ID:* | | *GW-031903-JK-004* | *GW-031903-JK-005* | *GW-021302-JW-001* | *GW-102403-ME-048* | *GW-102403-ME-048(DISS PCB)* | *GW-102203-ME-046* | *GW-102203-ME-046-DISS PCB* | *GW-102203-ME-047* |
| *Sample Date:* | | *3/19/2003* | *3/19/2003* | *2/13/2002* | *10/24/2003* | *10/24/2003* | *10/22/2003* | *10/22/2003* | *10/22/2003* |
| | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| Benzaldehyde | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Benzo(a)anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Benzo(a)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Benzo(b)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Benzo(g,h,i)perylene | µg/L | ND (10) UJ | ND (10) UJ | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Benzo(k)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Biphenyl | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| bis(2-Chloroethoxy)methane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| bis(2-Chloroethyl)ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| bis(2-Ethylhexyl)phthalate | µg/L | ND (10) | ND (10) | ND (10) | 0.67 | -- | 0.80 | -- | ND (10) |
| Butyl benzylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Caprolactam | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Carbazole | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Chrysene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Dibenz(a,h)anthracene | µg/L | ND (10) UJ | ND (10) UJ | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Dibenzofuran | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Diethyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Dimethyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Di-n-butylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Di-n-octyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Fluorene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Hexachlorobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Hexachlorobutadiene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Hexachlorocyclopentadiene | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) | -- | ND (50) |
| Hexachloroethane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Indeno(1,2,3-cd)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Isophorone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Naphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Nitrobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| N-Nitrosodi-n-propylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| N-Nitrosodiphenylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Pentachlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Phenanthrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |
| Phenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | -- | 11 | -- | 8.5 |
| Pyrene | µg/L | ND (10) UJ | ND (10) UJ | ND (10) | ND (10) | -- | ND (10) | -- | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *TMW-X193Y251* | *TMW-X193Y251* | *SU-X168Y224* | *MW-X233Y095* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y100* | *MW-X233Y100* |
| *Sample ID:* | | *GW-031903-JK-004* | *GW-031903-JK-005* | *GW-021302-JW-001* | *GW-102403-ME-048* | *GW-102403-ME-048(DISS PCB)* | *GW-102203-ME-046* | *GW-102203-ME-046-DISS PCB* | *GW-102203-ME-047* |
| *Sample Date:* | | *3/19/2003* | *3/19/2003* | *2/13/2002* | *10/24/2003* | *10/24/2003* | *10/22/2003* | *10/22/2003* | *10/22/2003* |
| | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| ***Metals*** | | | | | | | | | |
| Aluminum | mg/L | ND (0.20) | ND (0.20) | 0.095 J | ND (0.20) | -- | ND (0.20) | -- | ND (0.20) |
| Aluminum (Dissolved) | mg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) | -- | ND (0.20) |
| Antimony | mg/L | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | -- | ND (0.060) | -- | ND (0.060) |
| Antimony (Dissolved) | mg/L | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | -- | ND (0.060) | -- | ND (0.060) |
| Arsenic | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Arsenic (Dissolved) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Barium | mg/L | 0.037 J | 0.036 J | 0.049 J | 0.087 | -- | 0.081 | -- | 0.078 |
| Barium (Dissolved) | mg/L | 0.038 J | 0.036 J | 0.045 J | 0.088 | -- | 0.078 | -- | 0.081 |
| Beryllium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Beryllium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Cadmium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Cadmium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Chromium Total | mg/L | 0.0035 J | 0.0039 J | ND (0.010) | 0.012 | -- | ND (0.010) | -- | 0.001 |
| Chromium Total (Dissolved) | mg/L | ND (0.010) U | ND (0.010) U | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Cobalt | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | 0.0012 | -- | ND (0.050) | -- | ND (0.050) |
| Cobalt (Dissolved) | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | 0.0013 | -- | ND (0.050) | -- | ND (0.050) |
| Copper | mg/L | ND (0.025) | ND (0.025) | 0.0049 J | 0.0046 | -- | 0.014 | -- | 0.016 |
| Copper (Dissolved) | mg/L | ND (0.025) | ND (0.025) | 0.0051 J | ND (0.025) | -- | ND (0.025) | -- | ND (0.025) |
| Cyanide (amenable) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Cyanide (total) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Iron | mg/L | 4.7 | 4.7 | 0.16 | 0.21 | -- | 0.079 | -- | 0.19 |
| Iron (Dissolved) | mg/L | 4.7 | 4.6 | ND (0.10) | 0.048 | -- | ND (0.10) | -- | ND (0.10) |
| Lead | mg/L | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | -- | ND (0.0030) | -- | ND (0.0030) |
| Lead (Dissolved) | mg/L | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | -- | ND (0.0030) | -- | ND (0.0030) |
| Manganese | mg/L | 0.067 | 0.066 | 0.075 | 0.021 | -- | 0.014 | -- | 0.014 |
| Manganese (Dissolved) | mg/L | 0.065 | 0.064 | 0.024 | 0.021 | -- | 0.013 | -- | 0.014 |
| Mercury | mg/L | 0.000091 J | ND (0.00020) | ND (0.00020) | ND (0.00020) | -- | ND (0.00020) | -- | ND (0.00020) |
| Mercury (Dissolved) | mg/L | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | -- | ND (0.00020) | -- | ND (0.00020) |
| Nickel | mg/L | ND (0.040) | 0.0029 J | ND (0.040) | 0.011 | -- | 0.0037 | -- | 0.004 |
| Nickel (Dissolved) | mg/L | ND (0.040) | ND (0.040) | ND (0.040) | 0.0094 | -- | 0.0038 | -- | 0.0035 |
| Selenium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Selenium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) | -- | ND (0.0050) |
| Silver | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Silver (Dissolved) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) | -- | ND (0.010) |
| Thallium | mg/L | ND (0.0010) | ND (0.0010) | ND (0.010) | ND (0.0010) | -- | ND (0.0010) | -- | ND (0.0010) |
| Thallium (Dissolved) | mg/L | ND (0.0010) | ND (0.0010) | 0.0055 J | ND (0.0010) | -- | ND (0.0010) | -- | ND (0.0010) |
| Vanadium | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) | -- | ND (0.050) |
| Vanadium (Dissolved) | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) | -- | ND (0.050) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A007* | *A008* | *A008* | *A008* | *A008* | *A008* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *TMW-X193Y251* | *TMW-X193Y251* | *SU-X168Y224* | *MW-X233Y095* | *MW-X233Y095* | *MW-X233Y100* | *MW-X233Y100* | *MW-X233Y100* |
| *Sample ID:* | | *GW-031903-JK-004* | *GW-031903-JK-005* | *GW-021302-JW-001* | *GW-102403-ME-048* | *GW-102403-ME-048(DISS PCB)* | *GW-102203-ME-046* | *GW-102203-ME-046-DISS PCB* | *GW-102203-ME-047* |
| *Sample Date:* | | *3/19/2003* | *3/19/2003* | *2/13/2002* | *10/24/2003* | *10/24/2003* | *10/22/2003* | *10/22/2003* | *10/22/2003* |
| | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| Zinc | mg/L | ND (0.020) | ND (0.020) | 0.028 | ND (0.020) | -- | 0.015 | -- | ND (0.020) |
| Zinc (Dissolved) | mg/L | ND (0.020) | ND (0.020) | 0.017 J | ND (0.020) | -- | ND (0.020) | -- | ND (0.020) |
| ***PCBs*** | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/L | ND (0.20) | ND (0.20) | 0.59 J | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1016 (PCB-1016) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | 0.066 J | -- | -- | -- | -- | -- |
| Aroclor-1221 (PCB-1221) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) UJ | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1221 (PCB-1221) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) | -- | -- | -- | -- | -- |
| Aroclor-1232 (PCB-1232) | µg/L | ND (0.40) | ND (0.40) | ND (0.4) UJ | 42 | ND (0.40) | 14 | ND (0.40) | 11 |
| Aroclor-1232 (PCB-1232) (Dissolved) | µg/L | ND (0.40) | ND (0.40) | ND (0.4) | -- | -- | -- | -- | -- |
| Aroclor-1242 (PCB-1242) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) UJ | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1242 (PCB-1242) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) | -- | -- | -- | -- | -- |
| Aroclor-1248 (PCB-1248) | µg/L | 2.3 | 2.1 | ND (0.2) UJ | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1248 (PCB-1248) (Dissolved) | µg/L | 1.2 | 0.83 | ND (0.2) | -- | -- | -- | -- | -- |
| Aroclor-1254 (PCB-1254) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) UJ | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1254 (PCB-1254) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) | -- | -- | -- | -- | -- |
| Aroclor-1260 (PCB-1260) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) UJ | ND (4.0) | ND (0.20) | ND (1.0) | ND (0.20) | ND (2.0) |
| Aroclor-1260 (PCB-1260) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.2) | -- | -- | -- | -- | -- |
| ***Field Parameters*** | | | | | | | | | |
| Conductivity | mS/cm | 2.251 | -- | 158 | 0.859 | -- | 1.026 | -- | -- |
| Dissolved Oxygen | mg/L | 6.00 | -- | 17.53 | 2.81 | -- | 0.8 | -- | -- |
| Oxidation reduction potential | millivolts | -54.0 | -- | 159.8 | -52.3 | -- | 43.2 | -- | -- |
| pH (water) | s.u. | 6.48 | -- | 7.76 | 6.82 | -- | 6.4 | -- | -- |
| Temperature | Deg C | 16.92 | -- | 10.70 | 18.22 | -- | 16.58 | -- | -- |
| Turbidity | NTU | 1.52 | -- | 0 | 1.34 | -- | 3.1 | -- | -- |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A015* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y100* | *MW-X233Y087S* | *SU-X208Y096* | *SU-X208Y096* | *MW-X143Y245D-1* | *MW-X143Y245D-2* | *MW-X143Y245S* |
| *Sample ID:* | | *GW-102203-ME-047-DISS PCB* | *GW-031403-BT-003* | *GW-021302-JW-002* | *GW-021302-JW-003* | *GW-052903-IW-025* | *GW-042803-MG-015* | *GW-031203-BT-002* |
| *Sample Date:* | | *10/22/2003* | *3/14/2003* | *2/13/2002* | *2/13/2002* | *5/29/2003* | *4/28/2003* | *3/12/2003* |
| | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| ***Volatiles*** | | | | | | | | |
| 1,1,1-Trichloroethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1,2,2-Tetrachloroethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1,2-Trichloroethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | µg/L | -- | ND (1.0) | 0.78 J | 0.69 J | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2,4-Trichlorobenzene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/L | -- | ND (2.0) | ND (2) | ND (2) | ND (2.0) | ND (2.0) | ND (2.0) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichlorobenzene | µg/L | -- | ND (1.0) | 0.27 J | 0.22 J | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloroethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloropropane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,3-Dichlorobenzene | µg/L | -- | ND (1.0) | 2.8 | 2.6 | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,4-Dichlorobenzene | µg/L | -- | ND (1.0) | 6 | 5.5 | ND (1.0) | ND (1.0) | ND (1.0) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/L | -- | ND (10) | ND (10) UJ | ND (10) UJ | ND (10) | 0.88 J | ND (10) UJ |
| 2-Hexanone | µg/L | -- | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) | ND (10) | ND (10) UJ |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetone | µg/L | -- | ND (10) UJ | ND (10) UJ | 1.4 J | ND (10) U | ND (10) | ND (10) UJ |
| Benzene | µg/L | -- | ND (1.0) | 0.16 J | 0.19 J | ND (1.0) | ND (1.0) | ND (1.0) |
| Bromodichloromethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | 0.97 J | ND (1.0) | ND (1.0) |
| Bromoform | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) UJ | ND (1.0) | ND (1.0) |
| Bromomethane (Methyl Bromide) | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) | ND (1.0) | ND (1.0) UJ |
| Carbon disulfide | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Carbon tetrachloride | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) | ND (1.0) | ND (1.0) |
| Chlorobenzene | µg/L | -- | ND (1.0) | 7.9 | 7.2 | ND (1.0) | ND (1.0) | ND (1.0) |
| Chloroethane | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) | ND (1.0) | ND (1.0) |
| Chloroform (Trichloromethane) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | 6.0 | ND (1.0) | ND (1.0) |
| Chloromethane (Methyl Chloride) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethene | µg/L | -- | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.50) | ND (0.50) | ND (0.50) |
| cis-1,3-Dichloropropene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Cyclohexane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Dibromochloromethane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Dichlorodifluoromethane (CFC-12) | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) | ND (1.0) UJ | ND (1.0) |
| Ethylbenzene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Isopropylbenzene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Methyl acetate | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Methyl cyclohexane | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Methyl Tert Butyl Ether | µg/L | -- | ND (5.0) | ND (5) | ND (5) | ND (5.0) | ND (5.0) | ND (5.0) |
| Methylene chloride | µg/L | -- | ND (1.0) | ND (1) UJ | ND (1) UJ | ND (1.0) U | ND (1.0) | ND (1.0) |
| Styrene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A015* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y100* | *MW-X233Y087S* | *SU-X208Y096* | *SU-X208Y096* | *MW-X143Y245D-1* | *MW-X143Y245D-2* | *MW-X143Y245S* |
| *Sample ID:* | | *GW-102203-ME-047-DISS PCB* | *GW-031403-BT-003* | *GW-021302-JW-002* | *GW-021302-JW-003* | *GW-052903-IW-025* | *GW-042803-MG-015* | *GW-031203-BT-002* |
| *Sample Date:* | | *10/22/2003* | *3/14/2003* | *2/13/2002* | *2/13/2002* | *5/29/2003* | *4/28/2003* | *3/12/2003* |
| | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| Tetrachloroethene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | µg/L | -- | ND (1.0) | 0.19 J | 0.28 J | 9.7 | 3.9 | ND (1.0) |
| trans-1,2-Dichloroethene | µg/L | -- | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.50) | ND (0.50) | ND (0.50) |
| trans-1,3-Dichloropropene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichloroethene | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichlorofluoromethane (CFC-11) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trifluorotrichloroethane (Freon 113) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| Xylene (total) | µg/L | -- | ND (1.0) | ND (1) | ND (1) | ND (1.0) | ND (1.0) | ND (1.0) |
| ***Semi-Volatiles*** | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,5-Trichlorophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,6-Trichlorophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dichlorophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dimethylphenol | µg/L | -- | ND (10) | 1.2 J | 1.5 J | ND (10) | ND (10) | ND (10) |
| 2,4-Dinitrophenol | µg/L | -- | R | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 2,4-Dinitrotoluene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,6-Dinitrotoluene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chloronaphthalene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chlorophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylnaphthalene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylphenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Nitroaniline | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 2-Nitrophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 3,3'-Dichlorobenzidine | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 3-Nitroaniline | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 4,6-Dinitro-2-methylphenol | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 4-Bromophenyl phenyl ether | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloro-3-methylphenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloroaniline | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chlorophenyl phenyl ether | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Methylphenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Nitroaniline | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 4-Nitrophenol | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| Acenaphthene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acenaphthylene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetophenone | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Anthracene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Atrazine | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A015* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y100* | *MW-X233Y087S* | *SU-X208Y096* | *SU-X208Y096* | *MW-X143Y245D-1* | *MW-X143Y245D-2* | *MW-X143Y245S* |
| *Sample ID:* | | *GW-102203-ME-047-DISS PCB* | *GW-031403-BT-003* | *GW-021302-JW-002* | *GW-021302-JW-003* | *GW-052903-IW-025* | *GW-042803-MG-015* | *GW-031203-BT-002* |
| *Sample Date:* | | *10/22/2003* | *3/14/2003* | *2/13/2002* | *2/13/2002* | *5/29/2003* | *4/28/2003* | *3/12/2003* |
| | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| Benzaldehyde | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)anthracene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)pyrene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(b)fluoranthene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(g,h,i)perylene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(k)fluoranthene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Biphenyl | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethoxy)methane | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethyl)ether | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Ethylhexyl)phthalate | µg/L | -- | ND (10) | 16 | 15 | ND (10) U | ND (10) | ND (10) |
| Butyl benzylphthalate | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Caprolactam | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Carbazole | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Chrysene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenz(a,h)anthracene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenzofuran | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Diethyl phthalate | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Dimethyl phthalate | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Di-n-butylphthalate | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | 1.6 J | ND (10) |
| Di-n-octyl phthalate | µg/L | -- | ND (10) | 22 | 14 | ND (10) | ND (10) | ND (10) |
| Fluoranthene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Fluorene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobenzene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobutadiene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorocyclopentadiene | µg/L | -- | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| Hexachloroethane | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Indeno(1,2,3-cd)pyrene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Isophorone | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Naphthalene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Nitrobenzene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodi-n-propylamine | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodiphenylamine | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Pentachlorophenol | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Phenanthrene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Phenol | µg/L | -- | ND (10) | 2.8 J | 28 | ND (10) | ND (10) | ND (10) |
| Pyrene | µg/L | -- | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A015* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y100* | *MW-X233Y087S* | *SU-X208Y096* | *SU-X208Y096* | *MW-X143Y245D-1* | *MW-X143Y245D-2* | *MW-X143Y245S* |
| *Sample ID:* | | *GW-102203-ME-047-DISS PCB* | *GW-031403-BT-003* | *GW-021302-JW-002* | *GW-021302-JW-003* | *GW-052903-IW-025* | *GW-042803-MG-015* | *GW-031203-BT-002* |
| *Sample Date:* | | *10/22/2003* | *3/14/2003* | *2/13/2002* | *2/13/2002* | *5/29/2003* | *4/28/2003* | *3/12/2003* |
| | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| ***Metals*** | | | | | | | | |
| Aluminum | mg/L | -- | ND (0.20) | 0.030 J | ND (0.20) | ND (0.20) U | ND (0.20) | ND (0.20) |
| Aluminum (Dissolved) | mg/L | -- | ND (0.20) | -- | -- | ND (0.20) U | ND (0.20) | ND (0.20) |
| Antimony | mg/L | -- | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) |
| Antimony (Dissolved) | mg/L | -- | ND (0.060) | -- | -- | ND (0.060) | ND (0.060) | ND (0.060) |
| Arsenic | mg/L | -- | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | 0.0038 J | ND (0.010) |
| Arsenic (Dissolved) | mg/L | -- | ND (0.010) | -- | -- | ND (0.010) | 0.0071 J | ND (0.010) |
| Barium | mg/L | -- | 0.061 J | 0.21 | 0.21 | 0.044 J | 0.060 J | 0.080 J |
| Barium (Dissolved) | mg/L | -- | 0.051 J | -- | -- | 0.050 J | 0.067 J | 0.081 J |
| Beryllium | mg/L | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Beryllium (Dissolved) | mg/L | -- | ND (0.0050) | -- | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Cadmium | mg/L | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) U | ND (0.0050) | ND (0.0050) |
| Cadmium (Dissolved) | mg/L | -- | ND (0.0050) | -- | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Chromium Total | mg/L | -- | 0.0038 J | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Chromium Total (Dissolved) | mg/L | -- | ND (0.010) | -- | -- | ND (0.010) | ND (0.010) | ND (0.010) |
| Cobalt | mg/L | -- | ND (0.050) | ND (0.050) | ND (0.050) | 0.0017 J | 0.00086 J | ND (0.050) U |
| Cobalt (Dissolved) | mg/L | -- | ND (0.050) | -- | -- | 0.0020 J | 0.0017 J | ND (0.050) U |
| Copper | mg/L | -- | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) U | ND (0.025) | ND (0.025) |
| Copper (Dissolved) | mg/L | -- | ND (0.025) | -- | -- | ND (0.025) U | ND (0.025) | ND (0.025) |
| Cyanide (amenable) | mg/L | -- | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Cyanide (total) | mg/L | -- | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Iron | mg/L | -- | 0.14 | 5.1 | 4.8 | ND (0.10) | 1.4 | 0.37 |
| Iron (Dissolved) | mg/L | -- | ND (0.10) | -- | -- | ND (0.10) | 1.5 | ND (0.10) |
| Lead | mg/L | -- | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) |
| Lead (Dissolved) | mg/L | -- | ND (0.0030) | -- | -- | ND (0.0030) | ND (0.0030) | ND (0.0030) |
| Manganese | mg/L | -- | 0.024 | 2.0 | 2.0 | 0.038 | 0.044 | 0.014 J |
| Manganese (Dissolved) | mg/L | -- | 0.0093 J | -- | -- | 0.040 | 0.050 | 0.014 J |
| Mercury | mg/L | -- | ND (0.00020) | 0.00017 J | 0.00012 J | ND (0.00020) | ND (0.00020) | ND (0.00020) |
| Mercury (Dissolved) | mg/L | -- | 0.000096 J | -- | -- | ND (0.00020) | ND (0.00020) | ND (0.00020) |
| Nickel | mg/L | -- | 0.0031 J | ND (0.040) | ND (0.040) | 0.011 J | ND (0.040) | 0.0031 J |
| Nickel (Dissolved) | mg/L | -- | ND (0.040) | -- | -- | 0.012 J | ND (0.040) | 0.0042 J |
| Selenium | mg/L | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Selenium (Dissolved) | mg/L | -- | ND (0.0050) | -- | -- | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Silver | mg/L | -- | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Silver (Dissolved) | mg/L | -- | ND (0.010) | -- | -- | ND (0.010) | ND (0.010) | ND (0.010) |
| Thallium | mg/L | -- | ND (0.0010) | 0.0064 J | ND (0.010) | ND (0.0010) | ND (0.0010) | ND (0.0010) |
| Thallium (Dissolved) | mg/L | -- | ND (0.0010) | -- | -- | ND (0.0010) | ND (0.0010) | ND (0.0010) |
| Vanadium | mg/L | -- | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | 0.00099 J |
| Vanadium (Dissolved) | mg/L | -- | ND (0.050) | -- | -- | ND (0.050) | ND (0.050) | 0.00094 J |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A008* | *A008 P200(GM)* | *A008 P200(GM)* | *A008 P200(GM)* | *A015* | *A015* | *A015* |
|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X233Y100* | *MW-X233Y087S* | *SU-X208Y096* | *SU-X208Y096* | *MW-X143Y245D-1* | *MW-X143Y245D-2* | *MW-X143Y245S* |
| *Sample ID:* | | *GW-102203-ME-047-DISS PCB* | *GW-031403-BT-003* | *GW-021302-JW-002* | *GW-021302-JW-003* | *GW-052903-IW-025* | *GW-042803-MG-015* | *GW-031203-BT-002* |
| *Sample Date:* | | *10/22/2003* | *3/14/2003* | *2/13/2002* | *2/13/2002* | *5/29/2003* | *4/28/2003* | *3/12/2003* |
| | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | |
| Zinc | mg/L | -- | ND (0.039) U | ND (0.020) | ND (0.020) | 0.038 | ND (0.020) | ND (0.020) |
| Zinc (Dissolved) | mg/L | -- | ND (0.020) | -- | -- | 0.034 | ND (0.020) | ND (0.020) |
| ***PCBs*** | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/L | ND (0.20) | ND (4.0) | ND (1000) | ND (200) | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1016 (PCB-1016) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1221 (PCB-1221) | µg/L | ND (0.20) | ND (4.0) | ND (1000) | ND (200) | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1221 (PCB-1221) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1232 (PCB-1232) | µg/L | ND (0.40) | 43 | ND (2000) | ND (400) | ND (0.40) | ND (0.40) UJ | ND (0.40) |
| Aroclor-1232 (PCB-1232) (Dissolved) | µg/L | -- | 1.2 | -- | -- | ND (0.40) | ND (0.40) | ND (0.40) |
| Aroclor-1242 (PCB-1242) | µg/L | ND (0.20) | ND (4.0) | 8200 | 2900 | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1242 (PCB-1242) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1248 (PCB-1248) | µg/L | ND (0.20) | ND (4.0) | ND (1000) | ND (200) | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1248 (PCB-1248) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1254 (PCB-1254) | µg/L | ND (0.20) | ND (4.0) | ND (1000) | ND (200) | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1254 (PCB-1254) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1260 (PCB-1260) | µg/L | ND (0.20) | ND (4.0) | ND (1000) | ND (200) | ND (0.20) | ND (0.20) UJ | ND (0.20) |
| Aroclor-1260 (PCB-1260) (Dissolved) | µg/L | -- | ND (0.20) | -- | -- | ND (0.20) | ND (0.20) | ND (0.20) |
| ***Field Parameters*** | | | | | | | | |
| Conductivity | mS/cm | -- | 0.459 | -- | -- | 0.860 | 0.815 | 0.825 |
| Dissolved Oxygen | mg/L | -- | 9.37 | -- | -- | 1.92 | 2.41 | 5.16 |
| Oxidation reduction potential | millivolts | -- | 222.1 | -- | -- | 479.6 | -25.4 | 316.6 |
| pH (water) | s.u. | -- | 7.03 | -- | -- | 7.50 | 7.29 | 7.15 |
| Temperature | Deg C | -- | 9.62 | -- | -- | 22.03 | 15.43 | 13.49 |
| Turbidity | NTU | -- | 1.21 | -- | -- | 1.89 | 0.41 | 3.78 |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|
| *Sample Location:* | *MW-X178Y367D-2* | *MW-X178Y367D-2* | *MW-X178Y367D-3* | *MW-X178Y367D-4* | *MW-X234Y157D-1* | *MW-X234Y157D-2* | *MW-X234Y157D-2* |
| *Sample ID:* | *GW-061103-BT-037* | *GW-061103-BT-038* | *GW-061203-BT-040* | *GW-061203-BT-042* | *GW-050703-IW-021* | *GW-042903-BT-013* | *GW-042903-BT-014* |
| *Sample Date:* | *6/11/2003* | *6/11/2003* | *6/12/2003* | *6/12/2003* | *5/7/2003* | *4/29/2003* | *4/29/2003* |
| | | *Duplicate* | | | | | *Duplicate* |
| ***Parameters*** | | | | | | | |
| ***Volatiles*** | | | | | | | |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1,2,2-Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1,2-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2,4-Trichlorobenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) UJ | ND (1.0) | ND (1.0) |
| 1,2-Dibromo-3-chloropropane (DBCP) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) |
| 1,2-Dibromoethane (Ethylene Dibromide) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichlorobenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloropropane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,3-Dichlorobenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,4-Dichlorobenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 2-Butanone (Methyl Ethyl Ketone) | ND (10) | ND (10) | ND (10) UJ | ND (10) UJ | 4.8 J | ND (10) | ND (10) U |
| 2-Hexanone | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) | ND (10) | ND (10) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetone | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) U | ND (10) | ND (10) U |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Bromodichloromethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Bromoform | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Bromomethane (Methyl Bromide) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) UJ | ND (1.0) UJ | ND (1.0) UJ |
| Carbon disulfide | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | 0.24 J | ND (1.0) | ND (1.0) |
| Carbon tetrachloride | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Chlorobenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Chloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Chloroform (Trichloromethane) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Chloromethane (Methyl Chloride) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethene | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) |
| cis-1,3-Dichloropropene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Cyclohexane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Dibromochloromethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Dichlorodifluoromethane (CFC-12) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) UJ | ND (1.0) UJ | ND (1.0) UJ |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Isopropylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Methyl acetate | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Methyl cyclohexane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Methyl Tert Butyl Ether | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) |
| Methylene chloride | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Styrene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** |
|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | ***MW-X178Y367D-2*** | ***MW-X178Y367D-2*** | ***MW-X178Y367D-3*** | ***MW-X178Y367D-4*** | ***MW-X234Y157D-1*** | ***MW-X234Y157D-2*** | ***MW-X234Y157D-2*** |
| ***Sample ID:*** | ***GW-061103-BT-037*** | ***GW-061103-BT-038*** | ***GW-061203-BT-040*** | ***GW-061203-BT-042*** | ***GW-050703-IW-021*** | ***GW-042903-BT-013*** | ***GW-042903-BT-014*** |
| ***Sample Date:*** | ***6/11/2003*** | ***6/11/2003*** | ***6/12/2003*** | ***6/12/2003*** | ***5/7/2003*** | ***4/29/2003*** | ***4/29/2003*** |
| | | ***Duplicate*** | | | | | ***Duplicate*** |
| ***Parameters*** | | | | | | | |
| Tetrachloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | 6.4 | 6.6 | 3.9 | 3.1 | 2.8 | 0.75 J | 0.76 J |
| trans-1,2-Dichloroethene | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) |
| trans-1,3-Dichloropropene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichlorofluoromethane (CFC-11) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trifluorotrichloroethane (Freon 113) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| ***Semi-Volatiles*** | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,5-Trichlorophenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,6-Trichlorophenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dichlorophenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dimethylphenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dinitrophenol | ND (50) UJ | ND (50) UJ | ND (50) | ND (50) UJ | ND (50) | ND (50) | ND (50) |
| 2,4-Dinitrotoluene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,6-Dinitrotoluene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chloronaphthalene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chlorophenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylnaphthalene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylphenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Nitroaniline | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 2-Nitrophenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 3,3'-Dichlorobenzidine | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 3-Nitroaniline | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) |
| 4,6-Dinitro-2-methylphenol | ND (50) | ND (50) | ND (50) | ND (50) UJ | ND (50) | ND (50) | ND (50) |
| 4-Bromophenyl phenyl ether | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloro-3-methylphenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloroaniline | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chlorophenyl phenyl ether | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Methylphenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Nitroaniline | ND (50) | ND (50) | ND (50) | ND (50) UJ | ND (50) | ND (50) | ND (50) |
| 4-Nitrophenol | ND (50) | ND (50) | ND (50) | ND (50) UJ | ND (50) | ND (50) | ND (50) |
| Acenaphthene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acenaphthylene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetophenone | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Anthracene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Atrazine | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|
| *Sample Location:* | *MW-X178Y367D-2* | *MW-X178Y367D-2* | *MW-X178Y367D-3* | *MW-X178Y367D-4* | *MW-X234Y157D-1* | *MW-X234Y157D-2* | *MW-X234Y157D-2* |
| *Sample ID:* | *GW-061103-BT-037* | *GW-061103-BT-038* | *GW-061203-BT-040* | *GW-061203-BT-042* | *GW-050703-IW-021* | *GW-042903-BT-013* | *GW-042903-BT-014* |
| *Sample Date:* | *6/11/2003* | *6/11/2003* | *6/12/2003* | *6/12/2003* | *5/7/2003* | *4/29/2003* | *4/29/2003* |
| | | *Duplicate* | | | | | *Duplicate* |
| *Parameters* | | | | | | | |
| Benzaldehyde | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)anthracene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)pyrene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(b)fluoranthene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(g,h,i)perylene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(k)fluoranthene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Biphenyl | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethoxy)methane | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethyl)ether | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Ethylhexyl)phthalate | ND (10) U | ND (10) U | ND (10) U | ND (10) U | ND (10) | ND (10) | 6.9 J |
| Butyl benzylphthalate | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Caprolactam | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Carbazole | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Chrysene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenz(a,h)anthracene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenzofuran | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Diethyl phthalate | ND (10) | ND (10) | ND (10) | ND (10) | 1.7 J | 0.76 J | ND (10) |
| Dimethyl phthalate | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Di-n-butylphthalate | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | 1.5 J | 0.76 J |
| Di-n-octyl phthalate | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Fluoranthene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Fluorene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobenzene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobutadiene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorocyclopentadiene | ND (50) | ND (50) | ND (50) | ND (50) UJ | ND (50) | ND (50) | ND (50) |
| Hexachloroethane | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Indeno(1,2,3-cd)pyrene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Isophorone | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Naphthalene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Nitrobenzene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodi-n-propylamine | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodiphenylamine | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Pentachlorophenol | ND (10) | ND (10) | ND (10) | ND (10) UJ | ND (10) | ND (10) | ND (10) |
| Phenanthrene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Phenol | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |
| Pyrene | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** |
|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | ***MW-X178Y367D-2*** | ***MW-X178Y367D-2*** | ***MW-X178Y367D-3*** | ***MW-X178Y367D-4*** | ***MW-X234Y157D-1*** | ***MW-X234Y157D-2*** | ***MW-X234Y157D-2*** |
| ***Sample ID:*** | ***GW-061103-BT-037*** | ***GW-061103-BT-038*** | ***GW-061203-BT-040*** | ***GW-061203-BT-042*** | ***GW-050703-IW-021*** | ***GW-042903-BT-013*** | ***GW-042903-BT-014*** |
| ***Sample Date:*** | ***6/11/2003*** | ***6/11/2003*** | ***6/12/2003*** | ***6/12/2003*** | ***5/7/2003*** | ***4/29/2003*** | ***4/29/2003*** |
| | | ***Duplicate*** | | | | | ***Duplicate*** |
| ***Parameters*** | | | | | | | |
| ***Metals*** | | | | | | | |
| Aluminum | ND (0.20) | ND (0.20) | ND (0.20) U | ND (0.20) U | ND (0.20) | 0.75 | ND (0.20) |
| Aluminum (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) U | ND (0.20) U | ND (0.20) | ND (0.20) | ND (0.20) U |
| Antimony | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) |
| Antimony (Dissolved) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) U | ND (0.060) | ND (0.060) |
| Arsenic | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Arsenic (Dissolved) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Barium | 0.085 J | 0.078 J | 0.037 J | 0.036 J | 0.065 J | 0.079 J | 0.076 J |
| Barium (Dissolved) | 0.080 J | 0.081 J | 0.036 J | 0.037 J | 0.065 J | 0.074 J | 0.073 J |
| Beryllium | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Beryllium (Dissolved) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Cadmium | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Cadmium (Dissolved) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Chromium Total | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Chromium Total (Dissolved) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Cobalt | 0.0011 J | 0.00087 J | ND (0.050) U | ND (0.050) U | ND (0.050) U | ND (0.050) | ND (0.050) |
| Cobalt (Dissolved) | 0.00087 J | 0.00087 J | ND (0.050) U | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) |
| Copper | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) |
| Copper (Dissolved) | ND (0.025) | 0.0027 J | ND (0.025) | ND (0.025) | ND (0.025) U | ND (0.025) | ND (0.025) |
| Cyanide (amenable) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Cyanide (total) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Iron | 0.19 | 0.16 | 0.12 J | 0.17 J | 0.18 | 0.34 | 0.26 |
| Iron (Dissolved) | 0.14 | 0.15 | 0.092 J | 0.13 | 0.10 | 0.23 | 0.23 |
| Lead | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) |
| Lead (Dissolved) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) |
| Manganese | 0.014 J | 0.013 J | 0.0047 J | ND (0.015) U | 0.013 J | 0.0054 J | 0.0053 J |
| Manganese (Dissolved) | 0.013 J | 0.014 J | 0.0061 J | ND (0.015) U | 0.017 | 0.0044 J | 0.0040 J |
| Mercury | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) |
| Mercury (Dissolved) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) |
| Nickel | 0.0042 J | 0.0041 J | ND (0.040) | ND (0.040) U | ND (0.040) | ND (0.040) | ND (0.040) |
| Nickel (Dissolved) | 0.0041 J | 0.0041 J | ND (0.040) | ND (0.040) U | ND (0.040) | ND (0.040) | ND (0.040) |
| Selenium | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Selenium (Dissolved) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) |
| Silver | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | 0.00098 J | ND (0.010) | ND (0.010) |
| Silver (Dissolved) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) |
| Thallium | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) |
| Thallium (Dissolved) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) |
| Vanadium | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) |
| Vanadium (Dissolved) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|
| *Sample Location:* | *MW-X178Y367D-2* | *MW-X178Y367D-2* | *MW-X178Y367D-3* | *MW-X178Y367D-4* | *MW-X234Y157D-1* | *MW-X234Y157D-2* | *MW-X234Y157D-2* |
| *Sample ID:* | *GW-061103-BT-037* | *GW-061103-BT-038* | *GW-061203-BT-040* | *GW-061203-BT-042* | *GW-050703-IW-021* | *GW-042903-BT-013* | *GW-042903-BT-014* |
| *Sample Date:* | *6/11/2003* | *6/11/2003* | *6/12/2003* | *6/12/2003* | *5/7/2003* | *4/29/2003* | *4/29/2003* |
| | | *Duplicate* | | | | | *Duplicate* |
| ***Parameters*** | | | | | | | |
| Zinc | ND (0.020) | ND (0.020) | ND (0.020) | 0.037 | 0.015 J | ND (0.020) | 0.043 |
| Zinc (Dissolved) | 0.014 J | ND (0.020) | ND (0.020) | ND (0.020) | ND (0.020) | 0.017 J | ND (0.020) |
| ***PCBs*** | | | | | | | |
| Aroclor-1016 (PCB-1016) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1016 (PCB-1016) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1221 (PCB-1221) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1221 (PCB-1221) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1232 (PCB-1232) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) |
| Aroclor-1232 (PCB-1232) (Dissolved) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) |
| Aroclor-1242 (PCB-1242) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1242 (PCB-1242) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1248 (PCB-1248) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1248 (PCB-1248) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1254 (PCB-1254) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1254 (PCB-1254) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1260 (PCB-1260) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| Aroclor-1260 (PCB-1260) (Dissolved) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) |
| ***Field Parameters*** | | | | | | | |
| Conductivity | 0.667 | -- | 0.571 | 0.589 | 0.785 | 0.724 | -- |
| Dissolved Oxygen | 2.52 | -- | 4.84 | 3.90 | 2.39 | 2.39 | -- |
| Oxidation reduction potential | 16.2 | -- | -33.2 | 44.2 | -162.0 | -9.2 | -- |
| pH (water) | 6.78 | -- | 6.90 | 6.60 | 7.15 | 7.15 | -- |
| Temperature | 14.76 | -- | 13.84 | 15.51 | 15.45 | 13.20 | -- |
| Turbidity | 0.11 | -- | 0.56 | 0.36 | 1.31 | 0.83 | -- |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X234Y157S* | *MW-X251Y189D-2* | *MW-X251Y189D-4* | *MW-X251Y189D-7* | *MW-X251Y189D-3* | *MW-X251Y189D-5* | *MW-X261Y356D-2* | *MW-X261Y356D-3* | *MW-X269Y201D-1* |
| *Sample ID:* | | *GW-031103-BT-001* | *GW-042303-MG-011* | *GW-060903-BT-032* | *GW-050503-BT-020* | *GW-051503-BT-023* | *GW-060403-BT-029* | *GW-061103-JM-039* | *GW-061003-JM-036* | *GW-050703-MG-022* |
| *Sample Date:* | | *3/11/2003* | *4/23/2003* | *6/9/2003* | *5/5/2003* | *5/15/2003* | *6/4/2003* | *6/11/2003* | *6/10/2003* | *5/7/2003* |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Volatiles*** | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,1,2,2-Tetrachloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,1,2-Trichloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,1-Dichloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,1-Dichloroethene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,2,4-Trichlorobenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) UJ | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/L | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.0) | ND (2.5) | ND (2.0) | -- | ND (2.0) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichlorobenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,2-Dichloropropane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,3-Dichlorobenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 1,4-Dichlorobenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/L | 1.4 J | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) UJ | 80 J | ND (11) U | -- | ND (10) |
| 2-Hexanone | µg/L | ND (10) | ND (10) | ND (10) UJ | ND (10) | ND (10) UJ | ND (12) | ND (10) UJ | -- | ND (10) UJ |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (12) | ND (10) | -- | ND (10) |
| Acetone | µg/L | ND (10) | ND (10) UJ | ND (10) UJ | 1.2 J | 2.5 J | ND (12) UJ | ND (10) UJ | -- | ND (10) UJ |
| Benzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Bromodichloromethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | 2.2 |
| Bromoform | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Bromomethane (Methyl Bromide) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Carbon disulfide | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | 0.77 J | ND (1.0) | -- | ND (1.0) |
| Carbon tetrachloride | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Chlorobenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Chloroethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Chloroform (Trichloromethane) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | 1.0 | ND (1.2) | ND (1.0) | -- | 10 |
| Chloromethane (Methyl Chloride) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| cis-1,2-Dichloroethene | µg/L | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.62) | ND (0.50) | -- | ND (0.50) |
| cis-1,3-Dichloropropene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Cyclohexane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Dibromochloromethane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Dichlorodifluoromethane (CFC-12) | µg/L | ND (1.0) UJ | ND (1.0) | ND (1.0) | ND (1.0) UJ | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Ethylbenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Isopropylbenzene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Methyl acetate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (12) | 1.4 J | -- | ND (10) |
| Methyl cyclohexane | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Methyl Tert Butyl Ether | µg/L | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) | ND (5.0) | ND (6.2) | ND (5.0) | -- | ND (5.0) |
| Methylene chloride | µg/L | ND (1.0) UJ | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) U |
| Styrene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** | ***RFI Boundary*** |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***MW-X234Y157S*** | ***MW-X251Y189D-2*** | ***MW-X251Y189D-4*** | ***MW-X251Y189D-7*** | ***MW-X251Y189D-3*** | ***MW-X251Y189D-5*** | ***MW-X261Y356D-2*** | ***MW-X261Y356D-3*** | ***MW-X269Y201D-1*** |
| ***Sample ID:*** | | ***GW-031103-BT-001*** | ***GW-042303-MG-011*** | ***GW-060903-BT-032*** | ***GW-050503-BT-020*** | ***GW-051503-BT-023*** | ***GW-060403-BT-029*** | ***GW-061103-JM-039*** | ***GW-061003-JM-036*** | ***GW-050703-MG-022*** |
| ***Sample Date:*** | | ***3/11/2003*** | ***4/23/2003*** | ***6/9/2003*** | ***5/5/2003*** | ***5/15/2003*** | ***6/4/2003*** | ***6/11/2003*** | ***6/10/2003*** | ***5/7/2003*** |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| Tetrachloroethene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Toluene | µg/L | ND (1.0) | ND (1.0) | 1.2 | ND (1.0) | 2.7 | 1.1 J | 16 | -- | 1.1 |
| trans-1,2-Dichloroethene | µg/L | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.50) | ND (0.62) | ND (0.50) | -- | ND (0.50) |
| trans-1,3-Dichloropropene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Trichloroethene | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Trichlorofluoromethane (CFC-11) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Trifluorotrichloroethane (Freon 113) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Vinyl chloride | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| Xylene (total) | µg/L | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.2) | ND (1.0) | -- | ND (1.0) |
| ***Semi-Volatiles*** | | | | | | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,4,5-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,4,6-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,4-Dichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,4-Dimethylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,4-Dinitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | -- | -- | ND (50) UJ | -- | ND (50) |
| 2,4-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2,6-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2-Chloronaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2-Chlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2-Methylnaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 2-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| 2-Nitrophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 3,3'-Dichlorobenzidine | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| 3-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| 4,6-Dinitro-2-methylphenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| 4-Bromophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 4-Chloro-3-methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 4-Chloroaniline | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 4-Chlorophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| 4-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | 1.6 J# | -- | ND (10) |
| 4-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| 4-Nitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) UJ | ND (50) | -- | ND (50) |
| Acenaphthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Acenaphthylene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Acetophenone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Atrazine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X234Y157S* | *MW-X251Y189D-2* | *MW-X251Y189D-4* | *MW-X251Y189D-7* | *MW-X251Y189D-3* | *MW-X251Y189D-5* | *MW-X261Y356D-2* | *MW-X261Y356D-3* | *MW-X269Y201D-1* |
| *Sample ID:* | | *GW-031103-BT-001* | *GW-042303-MG-011* | *GW-060903-BT-032* | *GW-050503-BT-020* | *GW-051503-BT-023* | *GW-060403-BT-029* | *GW-061103-JM-039* | *GW-061003-JM-036* | *GW-050703-MG-022* |
| *Sample Date:* | | *3/11/2003* | *4/23/2003* | *6/9/2003* | *5/5/2003* | *5/15/2003* | *6/4/2003* | *6/11/2003* | *6/10/2003* | *5/7/2003* |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| Benzaldehyde | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Benzo(a)anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Benzo(a)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Benzo(b)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Benzo(g,h,i)perylene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Benzo(k)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Biphenyl | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| bis(2-Chloroethoxy)methane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| bis(2-Chloroethyl)ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| bis(2-Ethylhexyl)phthalate | µg/L | ND (10) | ND (10) | ND (10) U | ND (10) | ND (10) | ND (10) | ND (10) U | -- | ND (10) |
| Butyl benzylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Caprolactam | µg/L | ND (10) | ND (10) | 18 | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Carbazole | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Chrysene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Dibenz(a,h)anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Dibenzofuran | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Diethyl phthalate | µg/L | ND (10) | ND (10) | 2.0 J | ND (10) | 31 | ND (10) | 1.4 J | -- | 0.79 J |
| Dimethyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Di-n-butylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | 3.1 J | ND (10) | ND (10) | -- | ND (10) |
| Di-n-octyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Fluorene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Hexachlorobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Hexachlorobutadiene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Hexachlorocyclopentadiene | µg/L | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | ND (50) | -- | ND (50) |
| Hexachloroethane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Indeno(1,2,3-cd)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Isophorone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Naphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Nitrobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| N-Nitrosodi-n-propylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| N-Nitrosodiphenylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Pentachlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Phenanthrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |
| Phenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | ND (10) | 2.6 J | -- | ND (10) |
| Pyrene | µg/L | ND (10) | ND (10) | ND (10) UJ | ND (10) | ND (10) | ND (10) | ND (10) | -- | ND (10) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X234Y157S* | *MW-X251Y189D-2* | *MW-X251Y189D-4* | *MW-X251Y189D-7* | *MW-X251Y189D-3* | *MW-X251Y189D-5* | *MW-X261Y356D-2* | *MW-X261Y356D-3* | *MW-X269Y201D-1* |
| *Sample ID:* | | *GW-031103-BT-001* | *GW-042303-MG-011* | *GW-060903-BT-032* | *GW-050503-BT-020* | *GW-051503-BT-023* | *GW-060403-BT-029* | *GW-061103-JM-039* | *GW-061003-JM-036* | *GW-050703-MG-022* |
| *Sample Date:* | | *3/11/2003* | *4/23/2003* | *6/9/2003* | *5/5/2003* | *5/15/2003* | *6/4/2003* | *6/11/2003* | *6/10/2003* | *5/7/2003* |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***Metals*** | | | | | | | | | | |
| Aluminum | mg/L | ND (0.20) U | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aluminum (Dissolved) | mg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Antimony | mg/L | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | -- | ND (0.060) |
| Antimony (Dissolved) | mg/L | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | ND (0.060) | -- | ND (0.060) |
| Arsenic | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | 0.0038 J | 0.0029 J | -- | ND (0.010) |
| Arsenic (Dissolved) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | 0.0031 J | 0.0030 J | -- | 0.0038 J |
| Barium | mg/L | 0.087 J | 0.052 J | 0.056 J | 0.057 J | 0.052 J | 0.072 J | 0.40 | -- | 0.051 J |
| Barium (Dissolved) | mg/L | 0.081 J | 0.057 J | 0.052 J | 0.058 J | 0.053 J | 0.069 J | 0.37 | -- | 0.056 J |
| Beryllium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Beryllium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Cadmium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Cadmium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) U | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Chromium Total | mg/L | 0.0064 J | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | 0.28 | 0.059 | -- | ND (0.010) |
| Chromium Total (Dissolved) | mg/L | 0.0036 J | ND (0.010) | ND (0.010) | ND (0.010) | 0.0075 J | 0.14 | 0.13 | -- | 0.0076 J |
| Cobalt | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | 0.0020 J | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) |
| Cobalt (Dissolved) | mg/L | 0.0012 J | ND (0.050) | ND (0.050) | 0.0022 J | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) |
| Copper | mg/L | ND (0.025) U | ND (0.025) | ND (0.025) | ND (0.025) U | ND (0.025) | ND (0.025) | ND (0.025) | -- | ND (0.025) |
| Copper (Dissolved) | mg/L | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) U | ND (0.025) | ND (0.025) | ND (0.025) | -- | ND (0.025) |
| Cyanide (amenable) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) |
| Cyanide (total) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) |
| Iron | mg/L | 0.23 | 0.23 | 0.13 | 0.17 | 0.056 J | 0.28 | 4.8 | -- | 0.35 |
| Iron (Dissolved) | mg/L | ND (0.10) | 0.13 | 0.095 J | ND (0.10) | ND (0.10) | 0.26 | 4.1 | -- | 0.32 |
| Lead | mg/L | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | -- | ND (0.0030) |
| Lead (Dissolved) | mg/L | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | ND (0.0030) | -- | ND (0.0030) |
| Manganese | mg/L | 0.074 | 0.0038 J | ND (0.015) U | 0.060 | ND (0.015) U | 0.0080 J | 0.028 | -- | 0.016 |
| Manganese (Dissolved) | mg/L | 0.070 | 0.0041 J | ND (0.015) U | 0.059 | ND (0.015) U | 0.0077 J | 0.025 | -- | 0.016 |
| Mercury | mg/L | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | -- | ND (0.00020) |
| Mercury (Dissolved) | mg/L | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | ND (0.00020) | -- | ND (0.00020) |
| Nickel | mg/L | 0.0052 J | ND (0.040) | ND (0.040) | 0.024 J | ND (0.040) | ND (0.040) | 0.016 J | -- | 0.0052 J |
| Nickel (Dissolved) | mg/L | 0.0037 J | ND (0.040) | ND (0.040) | 0.027 J | ND (0.040) | ND (0.040) | 0.014 J | -- | 0.0062 J |
| Selenium | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Selenium (Dissolved) | mg/L | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | ND (0.0050) | -- | ND (0.0050) |
| Silver | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) |
| Silver (Dissolved) | mg/L | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | ND (0.010) | -- | ND (0.010) |
| Thallium | mg/L | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | -- | ND (0.0010) |
| Thallium (Dissolved) | mg/L | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | ND (0.0010) | -- | ND (0.0010) |
| Vanadium | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) |
| Vanadium (Dissolved) | mg/L | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | ND (0.050) | -- | ND (0.050) |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* | *RFI Boundary* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *MW-X234Y157S* | *MW-X251Y189D-2* | *MW-X251Y189D-4* | *MW-X251Y189D-7* | *MW-X251Y189D-3* | *MW-X251Y189D-5* | *MW-X261Y356D-2* | *MW-X261Y356D-3* | *MW-X269Y201D-1* |
| *Sample ID:* | | *GW-031103-BT-001* | *GW-042303-MG-011* | *GW-060903-BT-032* | *GW-050503-BT-020* | *GW-051503-BT-023* | *GW-060403-BT-029* | *GW-061103-JM-039* | *GW-061003-JM-036* | *GW-050703-MG-022* |
| *Sample Date:* | | *3/11/2003* | *4/23/2003* | *6/9/2003* | *5/5/2003* | *5/15/2003* | *6/4/2003* | *6/11/2003* | *6/10/2003* | *5/7/2003* |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| Zinc | mg/L | 0.017 J | ND (0.020) | 0.027 | 0.53 | ND (0.020) | ND (0.020) U | ND (0.020) | -- | 0.11 |
| Zinc (Dissolved) | mg/L | ND (0.020) | ND (0.020) | ND (0.020) | 0.52 | ND (0.020) | ND (0.020) | ND (0.020) | -- | ND (0.020) |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1016 (PCB-1016) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| Aroclor-1221 (PCB-1221) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1221 (PCB-1221) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| Aroclor-1232 (PCB-1232) | µg/L | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | -- | ND (0.40) |
| Aroclor-1232 (PCB-1232) (Dissolved) | µg/L | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) | ND (0.40) UJ | ND (0.40) | -- | ND (0.40) |
| Aroclor-1242 (PCB-1242) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1242 (PCB-1242) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| Aroclor-1248 (PCB-1248) | µg/L | 0.38 | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1248 (PCB-1248) (Dissolved) | µg/L | 0.15 J | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| Aroclor-1254 (PCB-1254) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1254 (PCB-1254) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| Aroclor-1260 (PCB-1260) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | -- | ND (0.20) |
| Aroclor-1260 (PCB-1260) (Dissolved) | µg/L | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) | ND (0.20) UJ | ND (0.20) | -- | ND (0.20) |
| ***Field Parameters*** | | | | | | | | | | |
| Conductivity | mS/cm | 0.716 | 0.563 | -- | 0.801 | 0.589 | 0.689 | 3.677 | 0.569 | 0.719 |
| Dissolved Oxygen | mg/L | 5.12 | 0.81 | -- | 5.87 | 3.56 | 0.29 | 0.25 | 0.48 | 7.15 |
| Oxidation reduction potential | millivolts | 95.9 | 19.5 | -- | 249.3 | -112.3 | -259.8 | -104.0 | -61.3 | 113.2 |
| pH (water) | s.u. | 7.46 | 7.68 | -- | 7.18 | 7.64 | 6.94 | 6.74 | 7.20 | 8.12 |
| Temperature | Deg C | 12.23 | 13.63 | -- | 15.63 | 20.03 | 13.24 | 18.06 | 15.80 | 15.40 |
| Turbidity | NTU | 4.80 | 0.58 | -- | 1.98 | 0.51 | 2.30 | 2.00 | 0.80 | 3.79 |

**TABLE 2.5**

**RFI GROUNDWATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Notes:
µg/L - microgram per Liter
ND - Non Detect
PCB - Polychlorinated Biphenyl
mS/cm - milliSiemens per centimeter
mg/L - milligrams per Liter
s.u. - standard units
Deg C - Degrees Celsius
NTU - Nephelometric Turbidity Units
J - Estimated
R - Rejected
U - Non-detect at associated value.
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limited is an estimated quantity.

**TABLE 2.6**

**RFI SURFACE WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *P215(GM) P216(GM)* |
|---|---|---|---|
| *Sample Location:* | | *TEMP (AOI-6 PONDED WATER)* | *SW-100201-SP1SK001* |
| *Sample ID:* | | *AOI 6 PONDED WATER* | *SW-100201-SP1SK001* |
| *Sample Date:* | | *5/20/2003* | *10/2/2001* |
| *Parameters* | *Units* | | |
| *Volatiles* | | | |
| 1,1,1-Trichloroethane | µg/L | -- | ND (1) |
| 1,1,2,2-Tetrachloroethane | µg/L | -- | ND (1) |
| 1,1,2-Trichloroethane | µg/L | -- | ND (1) |
| 1,1-Dichloroethane | µg/L | -- | ND (1) |
| 1,1-Dichloroethene | µg/L | -- | ND (1) |
| 1,2,4-Trichlorobenzene | µg/L | -- | ND (1) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/L | -- | ND (2) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/L | -- | ND (1) |
| 1,2-Dichlorobenzene | µg/L | -- | ND (1) |
| 1,2-Dichloroethane | µg/L | -- | ND (1) |
| 1,2-Dichloropropane | µg/L | -- | ND (1) |
| 1,3-Dichlorobenzene | µg/L | -- | ND (1) |
| 1,4-Dichlorobenzene | µg/L | -- | ND (1) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/L | -- | ND (10) |
| 2-Hexanone | µg/L | -- | ND (10) |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/L | -- | ND (10) |
| Acetone | µg/L | -- | 0.67 J |
| Benzene | µg/L | -- | ND (1) |
| Bromodichloromethane | µg/L | -- | ND (1) |
| Bromoform | µg/L | -- | ND (1) |
| Bromomethane (Methyl Bromide) | µg/L | -- | ND (1) |
| Carbon disulfide | µg/L | -- | ND (1) |
| Carbon tetrachloride | µg/L | -- | ND (1) |
| Chlorobenzene | µg/L | -- | ND (1) |
| Chloroethane | µg/L | -- | ND (1) |
| Chloroform (Trichloromethane) | µg/L | -- | ND (1) |
| Chloromethane (Methyl Chloride) | µg/L | -- | ND (1) |
| cis-1,2-Dichloroethene | µg/L | -- | ND (0.5) |
| cis-1,3-Dichloropropene | µg/L | -- | ND (1) |
| Cyclohexane | µg/L | -- | ND (1) |
| Dibromochloromethane | µg/L | -- | ND (1) |
| Dichlorodifluoromethane (CFC-12) | µg/L | -- | ND (1) |
| Ethylbenzene | µg/L | -- | ND (1) |
| Isopropylbenzene | µg/L | -- | ND (1) |
| Methyl acetate | µg/L | -- | ND (10) |
| Methyl cyclohexane | µg/L | -- | ND (1) |
| Methyl Tert Butyl Ether | µg/L | -- | ND (5) |
| Methylene chloride | µg/L | -- | ND (1) |
| Styrene | µg/L | -- | ND (1) |
| Tetrachloroethene | µg/L | -- | ND (1) |

**TABLE 2.6**

**RFI SURFACE WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *P215(GM) P216(GM)* |
|---|---|---|---|
| *Sample Location:* | | *TEMP (AOI-6 PONDED WATER)* | *SW-100201-SP1SK001* |
| *Sample ID:* | | *AOI 6 PONDED WATER* | *SW-100201-SP1SK001* |
| *Sample Date:* | | *5/20/2003* | *10/2/2001* |
| ***Parameters*** | ***Units*** | | |
| Toluene | µg/L | -- | ND (1) |
| trans-1,2-Dichloroethene | µg/L | -- | ND (0.5) |
| trans-1,3-Dichloropropene | µg/L | -- | ND (1) |
| Trichloroethene | µg/L | -- | ND (1) |
| Trichlorofluoromethane (CFC-11) | µg/L | -- | ND (1) |
| Trifluorotrichloroethane (Freon 113) | µg/L | -- | ND (1) |
| Vinyl chloride | µg/L | -- | ND (1) |
| Xylene (total) | µg/L | -- | ND (1) |
| ***Semi-Volatiles*** | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/L | -- | ND (10) |
| 2,4,5-Trichlorophenol | µg/L | -- | ND (10) |
| 2,4,6-Trichlorophenol | µg/L | -- | ND (10) |
| 2,4-Dichlorophenol | µg/L | -- | ND (10) |
| 2,4-Dimethylphenol | µg/L | -- | ND (10) |
| 2,4-Dinitrophenol | µg/L | -- | ND (50) |
| 2,4-Dinitrotoluene | µg/L | -- | ND (10) |
| 2,6-Dinitrotoluene | µg/L | -- | ND (10) |
| 2-Chloronaphthalene | µg/L | -- | ND (10) |
| 2-Chlorophenol | µg/L | -- | ND (10) |
| 2-Methylnaphthalene | µg/L | -- | ND (10) |
| 2-Methylphenol | µg/L | -- | ND (10) |
| 2-Nitroaniline | µg/L | -- | ND (50) |
| 2-Nitrophenol | µg/L | -- | ND (10) |
| 3,3'-Dichlorobenzidine | µg/L | -- | ND (50) UJ |
| 3-Nitroaniline | µg/L | -- | ND (50) |
| 4,6-Dinitro-2-methylphenol | µg/L | -- | ND (50) |
| 4-Bromophenyl phenyl ether | µg/L | -- | ND (10) |
| 4-Chloro-3-methylphenol | µg/L | -- | ND (10) |
| 4-Chloroaniline | µg/L | -- | ND (10) |
| 4-Chlorophenyl phenyl ether | µg/L | -- | ND (10) |
| 4-Methylphenol | µg/L | -- | ND (10) |
| 4-Nitroaniline | µg/L | -- | ND (50) |
| 4-Nitrophenol | µg/L | -- | ND (50) |
| Acenaphthene | µg/L | -- | ND (10) |

**TABLE 2.6**

**RFI SURFACE WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *P215(GM) P216(GM)* |
|---|---|---|---|
| *Sample Location:* | | *TEMP (AOI-6 PONDED WATER)* | *SW-100201-SP1SK001* |
| *Sample ID:* | | *AOI 6 PONDED WATER* | *SW-100201-SP1SK001* |
| *Sample Date:* | | *5/20/2003* | *10/2/2001* |
| ***Parameters*** | ***Units*** | | |
| Acenaphthylene | µg/L | -- | ND (10) |
| Acetophenone | µg/L | -- | ND (10) |
| Anthracene | µg/L | -- | ND (10) |
| Atrazine | µg/L | -- | ND (10) |
| Benzaldehyde | µg/L | -- | ND (10) |
| Benzo(a)anthracene | µg/L | -- | ND (10) UJ |
| Benzo(a)pyrene | µg/L | -- | ND (10) UJ |
| Benzo(b)fluoranthene | µg/L | -- | ND (10) UJ |
| Benzo(g,h,i)perylene | µg/L | -- | ND (10) UJ |
| Benzo(k)fluoranthene | µg/L | -- | ND (10) UJ |
| Biphenyl | µg/L | -- | ND (10) |
| bis(2-Chloroethoxy)methane | µg/L | -- | ND (10) |
| bis(2-Chloroethyl)ether | µg/L | -- | ND (10) |
| bis(2-Ethylhexyl)phthalate | µg/L | -- | ND (10) UJ |
| Butyl benzylphthalate | µg/L | -- | ND (10) UJ |
| Caprolactam | µg/L | -- | ND (10) |
| Carbazole | µg/L | -- | ND (10) |
| Chrysene | µg/L | -- | ND (10) UJ |
| Dibenz(a,h)anthracene | µg/L | -- | ND (10) UJ |
| Dibenzofuran | µg/L | -- | ND (10) |
| Diethyl phthalate | µg/L | -- | ND (10) |
| Dimethyl phthalate | µg/L | -- | ND (10) |
| Di-n-butylphthalate | µg/L | -- | ND (10) |
| Di-n-octyl phthalate | µg/L | -- | ND (10) UJ |
| Fluoranthene | µg/L | -- | ND (10) |
| Fluorene | µg/L | -- | ND (10) |
| Hexachlorobenzene | µg/L | -- | ND (10) |
| Hexachlorobutadiene | µg/L | -- | ND (10) |
| Hexachlorocyclopentadiene | µg/L | -- | ND (50) |
| Hexachloroethane | µg/L | -- | ND (10) |
| Indeno(1,2,3-cd)pyrene | µg/L | -- | ND (10) UJ |
| Isophorone | µg/L | -- | ND (10) |
| Naphthalene | µg/L | -- | ND (10) |
| Nitrobenzene | µg/L | -- | ND (10) |
| N-Nitrosodi-n-propylamine | µg/L | -- | ND (10) |
| N-Nitrosodiphenylamine | µg/L | -- | ND (10) |
| Pentachlorophenol | µg/L | -- | ND (10) UJ |
| Phenanthrene | µg/L | -- | ND (10) |
| Phenol | µg/L | -- | ND (10) |
| Pyrene | µg/L | -- | ND (10) UJ |

**TABLE 2.6**

**RFI SURFACE WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *P215(GM) P216(GM)* |
|---|---|---|---|
| *Sample Location:* | | *TEMP (AOI-6 PONDED WATER)* | *SW-100201-SP1SK001* |
| *Sample ID:* | | *AOI 6 PONDED WATER* | *SW-100201-SP1SK001* |
| *Sample Date:* | | *5/20/2003* | *10/2/2001* |
| *Parameters* | *Units* | | |
| *Metals* | | | |
| Aluminum | mg/L | -- | ND (0.2) |
| Aluminum (Dissolved) | mg/L | -- | ND (0.2) |
| Antimony | mg/L | -- | ND (0.06) |
| Antimony (Dissolved) | mg/L | -- | 0.0025 J |
| Arsenic | mg/L | -- | ND (0.01) |
| Arsenic (Dissolved) | mg/L | -- | ND (0.01) |
| Barium | mg/L | -- | 0.09 J |
| Barium (Dissolved) | mg/L | -- | 0.085 J |
| Beryllium | mg/L | -- | ND (0.005) |
| Beryllium (Dissolved) | mg/L | -- | ND (0.005) |
| Cadmium | mg/L | -- | ND (0.005) |
| Cadmium (Dissolved) | mg/L | -- | ND (0.005) |
| Chromium Total | mg/L | -- | ND (0.01) |
| Chromium Total (Dissolved) | mg/L | -- | ND (0.01) |
| Cobalt | mg/L | -- | ND (0.05) |
| Cobalt (Dissolved) | mg/L | -- | ND (0.05) |
| Copper | mg/L | -- | ND (0.025) |
| Copper (Dissolved) | mg/L | -- | ND (0.025) |
| Cyanide (amenable) | mg/L | -- | ND (0.01) |
| Cyanide (total) | mg/L | -- | ND (0.01) |
| Iron | mg/L | -- | 0.35 |
| Iron (Dissolved) | mg/L | -- | ND (0.1) |
| Lead | mg/L | -- | ND (0.003) |
| Lead (Dissolved) | mg/L | -- | ND (0.003) |
| Manganese | mg/L | -- | 0.47 |
| Manganese (Dissolved) | mg/L | -- | 0.45 |
| Mercury | mg/L | -- | ND (0.0002) |
| Mercury (Dissolved) | mg/L | -- | ND (0.0002) |
| Nickel | mg/L | -- | 0.0026 J |
| Nickel (Dissolved) | mg/L | -- | ND (0.04) |
| Selenium | mg/L | -- | ND (0.005) |
| Selenium (Dissolved) | mg/L | -- | ND (0.005) |
| Silver | mg/L | -- | ND (0.01) |
| Silver (Dissolved) | mg/L | -- | ND (0.01) |
| Thallium | mg/L | -- | ND (0.011) U |
| Thallium (Dissolved) | mg/L | -- | ND (0.01) U |
| Vanadium | mg/L | -- | ND (0.05) |
| Vanadium (Dissolved) | mg/L | -- | ND (0.05) |
| Zinc | mg/L | -- | ND (0.02) |
| Zinc (Dissolved) | mg/L | -- | ND (0.02) |

**TABLE 2.6**

**RFI SURFACE WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A006* | *P215(GM) P216(GM)* |
|---|---|---|---|
| *Sample Location:* | | *TEMP (AOI-6 PONDED WATER)* | *SW-100201-SP1SK001* |
| *Sample ID:* | | *AOI 6 PONDED WATER* | *SW-100201-SP1SK001* |
| *Sample Date:* | | *5/20/2003* | *10/2/2001* |
| ***Parameters*** | ***Units*** | | |
| ***PCBs*** | | | |
| Aroclor-1016 (PCB-1016) | µg/L | ND (0.20) | ND (0.4) |
| Aroclor-1016 (PCB-1016) (Dissolved) | µg/L | -- | ND (0.2) |
| Aroclor-1221 (PCB-1221) | µg/L | ND (0.20) | ND (0.4) |
| Aroclor-1221 (PCB-1221) (Dissolved) | µg/L | -- | ND (0.2) |
| Aroclor-1232 (PCB-1232) | µg/L | ND (0.40) | ND (0.8) |
| Aroclor-1232 (PCB-1232) (Dissolved) | µg/L | -- | ND (0.4) |
| Aroclor-1242 (PCB-1242) | µg/L | ND (0.20) | 1.3 |
| Aroclor-1242 (PCB-1242) (Dissolved) | µg/L | -- | 0.55 |
| Aroclor-1248 (PCB-1248) | µg/L | 0.61 | ND (0.4) |
| Aroclor-1248 (PCB-1248) (Dissolved) | µg/L | -- | ND (0.2) |
| Aroclor-1254 (PCB-1254) | µg/L | ND (0.20) | ND (0.4) |
| Aroclor-1254 (PCB-1254) (Dissolved) | µg/L | -- | ND (0.2) |
| Aroclor-1260 (PCB-1260) | µg/L | ND (0.20) | ND (0.4) |
| Aroclor-1260 (PCB-1260) (Dissolved) | µg/L | -- | ND (0.2) |
| ***General Chemistry*** | | | |
| Ammonia | mg/L | -- | 0.6 |
| Total Dissolved Solids (TDS) | mg/L | -- | 1000 |
| Total Kjeldahl Nitrogen (TKN) | mg/L | -- | ND (1) U |
| Total Suspended Solids (TSS) | mg/L | -- | 3 J |

Notes:
µg/L - microgram per liter
mg/L - milligram per liter
ND - Non Detect
PCB - Polychlorinated Biphenyl
J - Estimated
U - Non-detect at associated value
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limit is an estimated quantity.

**TABLE 2.7**

**RFI SPRING WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004 A010 GMPT* | *A004 A010 GMPT* |
|---|---|---|---|---|---|
| *Sample Location:* | | *SW-X216Y274* | *SW-X216Y274* | *SW-X256Y260* | *SW-X256Y260* |
| *Sample ID:* | | *SW-031502-JW-1428* | *SW-052102-JW-5042* | *SW-031502-JW-1427* | *SW-031502-JW-1427A* |
| *Sample Date:* | | *3/15/2002* | *5/21/2002* | *3/15/2002* | *3/15/2002* |
| | | | | | *Duplicate* |
| *Parameters* | *Units* | | | | |
| *Volatiles* | | | | | |
| 1,1,1-Trichloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,1,2,2-Tetrachloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,1,2-Trichloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,2,4-Trichlorobenzene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,2-Dibromo-3-chloropropane (DBCP) | µg/L | ND (2.0) | ND (2) | ND (2.0) | ND (2.0) |
| 1,2-Dibromoethane (Ethylene Dibromide) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,2-Dichlorobenzene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,2-Dichloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,2-Dichloropropane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| 1,3-Dichlorobenzene | µg/L | 0.15 J | ND (1) | ND (1.0) | ND (1.0) |
| 1,4-Dichlorobenzene | µg/L | 0.29 J | 0.27 J | ND (1.0) | ND (1.0) |
| 2-Butanone (Methyl Ethyl Ketone) | µg/L | ND (10) UJ | ND (10) | ND (10) UJ | ND (10) UJ |
| 2-Hexanone | µg/L | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) UJ |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetone | µg/L | ND (10) UJ | ND (10) UJ | ND (10) UJ | ND (10) UJ |
| Benzene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Bromodichloromethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Bromoform | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Bromomethane (Methyl Bromide) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Carbon disulfide | µg/L | ND (1.0) | 0.37 J | ND (1.0) | ND (1.0) |
| Carbon tetrachloride | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Chlorobenzene | µg/L | 0.18 J | 0.29 J | ND (1.0) | ND (1.0) |
| Chloroethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Chloroform (Trichloromethane) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Chloromethane (Methyl Chloride) | µg/L | ND (1.0) UJ | ND (1) | ND (1.0) UJ | ND (1.0) UJ |
| cis-1,2-Dichloroethene | µg/L | ND (0.50) | ND (0.5) | ND (0.50) | ND (0.50) |
| cis-1,3-Dichloropropene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Cyclohexane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Dibromochloromethane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Dichlorodifluoromethane (CFC-12) | µg/L | ND (1.0) UJ | ND (1) | ND (1.0) UJ | ND (1.0) UJ |
| Ethylbenzene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Isopropylbenzene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Methyl acetate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Methyl cyclohexane | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Methyl Tert Butyl Ether | µg/L | ND (5.0) | ND (5) | ND (5.0) | ND (5.0) |
| Methylene chloride | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Styrene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Tetrachloroethene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Toluene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | µg/L | ND (0.50) | ND (0.5) | ND (0.50) | ND (0.50) |
| trans-1,3-Dichloropropene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Trichloroethene | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Trichlorofluoromethane (CFC-11) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Trifluorotrichloroethane (Freon 113) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Vinyl chloride | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |
| Xylene (total) | µg/L | ND (1.0) | ND (1) | ND (1.0) | ND (1.0) |

**TABLE 2.7**

**RFI SPRING WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004 A010 GMPT* | *A004 A010 GMPT* |
|---|---|---|---|---|---|
| *Sample Location:* | | *SW-X216Y274* | *SW-X216Y274* | *SW-X256Y260* | *SW-X256Y260* |
| *Sample ID:* | | *SW-031502-JW-1428* | *SW-052102-JW-5042* | *SW-031502-JW-1427* | *SW-031502-JW-1427A* |
| *Sample Date:* | | *3/15/2002* | *5/21/2002* | *3/15/2002* | *3/15/2002* |
| | | | | | *Duplicate* |
| *Parameters* | *Units* | | | | |
| *Semi-Volatiles* | | | | | |
| 2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether) | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,5-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4,6-Trichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dichlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dimethylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,4-Dinitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| 2,4-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2,6-Dinitrotoluene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chloronaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Chlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylnaphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 2-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| 2-Nitrophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 3,3'-Dichlorobenzidine | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| 3-Nitroaniline | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| 4,6-Dinitro-2-methylphenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| 4-Bromophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloro-3-methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chloroaniline | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Chlorophenyl phenyl ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Methylphenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| 4-Nitroaniline | µg/L | ND (50) | ND (50) UJ | ND (50) | ND (50) |
| 4-Nitrophenol | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| Acenaphthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Acenaphthylene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Acetophenone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Atrazine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzaldehyde | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(a)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(b)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(g,h,i)perylene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Benzo(k)fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Biphenyl | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethoxy)methane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Chloroethyl)ether | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| bis(2-Ethylhexyl)phthalate | µg/L | ND (10) | ND (10) | 2.9 J | ND (10) |
| Butyl benzylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Caprolactam | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Carbazole | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Chrysene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenz(a,h)anthracene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Dibenzofuran | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Diethyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Dimethyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Di-n-butylphthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Di-n-octyl phthalate | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Fluoranthene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Fluorene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Hexachlorobutadiene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |

**TABLE 2.7**

**RFI SPRING WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004 A010 GMPT* | *A004 A010 GMPT* |
|---|---|---|---|---|---|
| *Sample Location:* | | *SW-X216Y274* | *SW-X216Y274* | *SW-X256Y260* | *SW-X256Y260* |
| *Sample ID:* | | *SW-031502-JW-1428* | *SW-052102-JW-5042* | *SW-031502-JW-1427* | *SW-031502-JW-1427A* |
| *Sample Date:* | | *3/15/2002* | *5/21/2002* | *3/15/2002* | *3/15/2002* |
| | | | | | *Duplicate* |
| *Parameters* | *Units* | | | | |
| Hexachlorocyclopentadiene | µg/L | ND (50) | ND (50) | ND (50) | ND (50) |
| Hexachloroethane | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Indeno(1,2,3-cd)pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Isophorone | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Naphthalene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Nitrobenzene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodi-n-propylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| N-Nitrosodiphenylamine | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Pentachlorophenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Phenanthrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Phenol | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| Pyrene | µg/L | ND (10) | ND (10) | ND (10) | ND (10) |
| *Metals* | | | | | |
| Aluminum | mg/L | 9.7 | 56.2 | ND (0.20) | ND (0.20) |
| Aluminum (Dissolved) | mg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Antimony | mg/L | ND (0.060) | 0.0043 J | ND (0.060) | ND (0.060) |
| Antimony (Dissolved) | mg/L | ND (0.060) | ND (0.06) | ND (0.060) | ND (0.060) |
| Arsenic | mg/L | 0.015 | 0.081 | ND (0.010) | ND (0.010) |
| Arsenic (Dissolved) | mg/L | ND (0.010) | ND (0.01) | ND (0.010) | ND (0.010) |
| Barium | mg/L | 0.32 | 0.89 | 0.066 J | 0.066 J |
| Barium (Dissolved) | mg/L | 0.085 J | 0.093 J | 0.064 J | 0.064 J |
| Beryllium | mg/L | ND (0.0050) | 0.0014 J | ND (0.0050) | ND (0.0050) |
| Beryllium (Dissolved) | mg/L | ND (0.0050) | ND (0.005) | ND (0.0050) | ND (0.0050) |
| Cadmium | mg/L | ND (0.0050) | ND (0.005) | ND (0.0050) | ND (0.0050) |
| Cadmium (Dissolved) | mg/L | ND (0.0050) | ND (0.005) | ND (0.0050) | ND (0.0050) |
| Chromium Total | mg/L | 0.014 | 0.087 | ND (0.010) | ND (0.010) |
| Chromium Total (Dissolved) | mg/L | ND (0.010) | ND (0.01) | ND (0.010) | ND (0.010) |
| Cobalt | mg/L | 0.022 J | 0.12 | ND (0.050) | ND (0.050) |
| Cobalt (Dissolved) | mg/L | ND (0.050) | ND (0.05) | ND (0.050) | ND (0.050) |
| Copper | mg/L | 0.077 | 0.38 | ND (0.025) | ND (0.025) |
| Copper (Dissolved) | mg/L | ND (0.025) | ND (0.025) | ND (0.025) | ND (0.025) |
| Cyanide (amenable) | mg/L | ND (0.010) | ND (0.01) | ND (0.010) | ND (0.010) |
| Cyanide (total) | mg/L | ND (0.010) | ND (0.01) | ND (0.010) | ND (0.010) |
| Iron | mg/L | 72.5 | 306 | 0.31 | 0.31 |
| Iron (Dissolved) | mg/L | ND (0.10) | ND (0.1) | ND (0.10) | ND (0.10) |
| Lead | mg/L | 0.0094 | 0.067 | ND (0.0030) | ND (0.0030) |
| Lead (Dissolved) | mg/L | ND (0.0030) | ND (0.003) | ND (0.0030) | ND (0.0030) |
| Manganese | mg/L | 12.7 | 57.4 | 0.54 | 0.53 |
| Manganese (Dissolved) | mg/L | 0.26 | 0.71 | 0.52 | 0.51 |
| Mercury | mg/L | 0.0010 | 0.00058 | ND (0.00020) UJ | ND (0.00020) UJ |
| Mercury (Dissolved) | mg/L | ND (0.00020) UJ | ND (0.0002) | ND (0.00020) UJ | ND (0.00020) UJ |
| Nickel | mg/L | 0.025 J | 0.15 | ND (0.040) | ND (0.040) |
| Nickel (Dissolved) | mg/L | ND (0.040) | ND (0.04) | ND (0.040) | ND (0.040) |
| Selenium | mg/L | ND (0.0050) | ND (0.025) | ND (0.0050) | ND (0.0050) |
| Selenium (Dissolved) | mg/L | ND (0.0050) | ND (0.005) | ND (0.0050) | ND (0.0050) |
| Silver | mg/L | ND (0.010) | 0.0031 J | ND (0.010) | ND (0.010) |
| Silver (Dissolved) | mg/L | ND (0.010) | ND (0.01) | ND (0.010) | ND (0.010) |
| Thallium | mg/L | 0.0098 J | ND (0.001) | 0.0081 J | 0.0075 J |
| Thallium (Dissolved) | mg/L | 0.0085 J | ND (0.001) | 0.0075 J | 0.0090 J |
| Vanadium | mg/L | 0.016 J | 0.096 | ND (0.050) | ND (0.050) |
| Vanadium (Dissolved) | mg/L | ND (0.050) | ND (0.05) | ND (0.050) | ND (0.050) |
| Zinc | mg/L | 0.071 | 0.42 | ND (0.020) | ND (0.020) |
| Zinc (Dissolved) | mg/L | ND (0.020) | ND (0.02) | ND (0.020) | 0.013 J |

**TABLE 2.7**

**RFI SPRING WATER SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *A004* | *A004* | *A004 A010 GMPT* | *A004 A010 GMPT* |
|---|---|---|---|---|---|
| *Sample Location:* | | *SW-X216Y274* | *SW-X216Y274* | *SW-X256Y260* | *SW-X256Y260* |
| *Sample ID:* | | *SW-031502-JW-1428* | *SW-052102-JW-5042* | *SW-031502-JW-1427* | *SW-031502-JW-1427A* |
| *Sample Date:* | | *3/15/2002* | *5/21/2002* | *3/15/2002* | *3/15/2002* |
| | | | | | *Duplicate* |
| *Parameters* | *Units* | | | | |
| ***PCBs*** | | | | | |
| Aroclor-1016 (PCB-1016) | µg/L | ND (0.20) UJ | ND (1) UJ | ND (0.40) | ND (0.40) |
| Aroclor-1016 (PCB-1016) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Aroclor-1221 (PCB-1221) | µg/L | ND (0.20) UJ | ND (1) UJ | ND (0.40) | ND (0.40) |
| Aroclor-1221 (PCB-1221) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Aroclor-1232 (PCB-1232) | µg/L | ND (0.40) UJ | ND (1) UJ | ND (0.80) | ND (0.80) |
| Aroclor-1232 (PCB-1232) (Dissolved) | µg/L | ND (0.40) | ND (0.4) | ND (0.40) | ND (0.40) |
| Aroclor-1242 (PCB-1242) | µg/L | ND (0.20) UJ | ND (1) UJ | 3.8 | 4.6 |
| Aroclor-1242 (PCB-1242) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Aroclor-1248 (PCB-1248) | µg/L | 2.4 J | 4.6 J | ND (0.40) | ND (0.40) |
| Aroclor-1248 (PCB-1248) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Aroclor-1254 (PCB-1254) | µg/L | ND (0.20) UJ | ND (1) UJ | ND (0.40) | ND (0.40) |
| Aroclor-1254 (PCB-1254) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| Aroclor-1260 (PCB-1260) | µg/L | ND (0.20) UJ | ND (1) UJ | ND (0.40) | ND (0.40) |
| Aroclor-1260 (PCB-1260) (Dissolved) | µg/L | ND (0.20) | ND (0.2) | ND (0.20) | ND (0.20) |
| ***General Chemistry*** | | | | | |
| Ammonia | mg/L | -- | 0.4 | -- | -- |
| pH (water) | none | -- | 8 | -- | -- |
| Total Dissolved Solids (TDS) | mg/L | -- | 890 | -- | -- |
| Total Kjeldahl Nitrogen (TKN) | mg/L | -- | 2 | -- | -- |
| Total Suspended Solids (TSS) | mg/L | -- | 960 | -- | -- |
| ***Field Parameters*** | | | | | |
| Conductivity | mS/cm | -- | -- | 1.136 | -- |
| Dissolved Oxygen | mg/L | 12.02 | -- | 28.61 | -- |
| Oxidation reduction potential | millivolts | 84 | -- | 4 | -- |
| pH (water) | s.u. | 7.77 | -- | 7.82 | -- |
| Temperature | Deg C | 13.54 | -- | 11.7 | -- |
| Turbidity | NTU | 27.6 | -- | 1.85 | -- |

Notes:
µg/L - microgram per liter
mg/L - milligram per liter
ND - Non Detect
PCB - Polychlorinated Biphenyl
mS/cm - milliSiemens per centimeter
s.u. - standard units
Deg C - Degrees Celsius
NTU - Nephelometric Turbidity Units
J - Estimated
R - Rejected
U - Non-detect at associated value
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limit is an estimated quantity.

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *604* | *605* | *607* | *608* | *609* | *610* | *610* | *611* | *612* | *612* | *613* |
| *Sample ID:* | | *S-00-012102-LM-604* | *S-00-012102-LM-605* | *S-00-012102-LM-607* | *S-00-012102-LM-608* | *S-00-012102-LM-609* | *S-00-012102-LM-610* | *S-00-012102-LM-610A* | *S-00-012102-LM-611* | *S-00-012102-LM-612* | *S-00-012102-LM-612A* | *S-00-012102-LM-613* |
| *Sample Date:* | | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | *Duplicate* | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (49) | ND (430) UJ | ND (83) UJ | ND (1100) | ND (99) | ND (95) | ND (230) | ND (47) | ND (53) UJ | ND (54) | ND (390) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (49) | ND (430) UJ | ND (83) UJ | ND (1100) | ND (99) | ND (95) | ND (230) | ND (47) | ND (53) UJ | ND (54) | ND (390) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (49) | ND (430) UJ | ND (83) UJ | ND (1100) | ND (99) | ND (95) | ND (230) | ND (47) | ND (53) UJ | ND (54) | ND (390) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (49) | ND (430) UJ | ND (83) UJ | ND (1100) | ND (99) | ND (95) | ND (230) | ND (47) | 200 J | ND (54) | ND (390) |
| Aroclor-1248 (PCB-1248) | µg/kg | 310 | 3700 J | 830 J | 5200 | 360 | 940 | 510 | 31 J | ND (53) UJ | 79 | 3700 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (49) | ND (430) UJ | ND (83) UJ | ND (1100) | ND (99) | ND (95) | ND (230) | ND (47) | ND (53) UJ | ND (54) | ND (390) |
| Aroclor-1260 (PCB-1260) | µg/kg | 160 | 610 J | 250 J | 2100 | 130 | 180 | ND (230) | 36 J | 110 J | 41 J | 1300 |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 67.9 | 77.5 | 79.7 | 61.5 | 66.5 | 69.6 | 72.6 | 70.9 | 62.1 | 61.6 | 83.8 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *614* | *615* | *616* | *616* | *619* | *619* | *620* | *620* | *622* |
| *Sample ID:* | | *S-00-012102-LM-614* | *S-00-012102-LM-615* | *S-00-012102-LM-616* | *S-00-012102-LM-616A* | *S-00-012102-LM-619* | *S-00-012102-LM-619A* | *S-00-LM620* | *S-00-012102-LM-620A* | *S-00-012102-LM-622* |
| *Sample Date:* | | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (43) | ND (47) UJ | ND (49) UJ | ND (44) | ND (47) | ND (42) | ND (45) | ND (44) | ND (930) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (43) | ND (47) UJ | ND (49) UJ | ND (44) | ND (47) | ND (42) | ND (45) | ND (44) | ND (930) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (43) | ND (47) UJ | ND (49) UJ | ND (44) | ND (47) | ND (42) | ND (45) | ND (44) | ND (930) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (43) | ND (47) UJ | 110 J | ND (44) | ND (47) | ND (42) | ND (45) | ND (44) | ND (930) |
| Aroclor-1248 (PCB-1248) | µg / kg | 140 | ND (47) UJ | ND (49) UJ | ND (44) | ND (47) | ND (42) | 150 | ND (44) | 11000 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (43) | 41 J | ND (49) UJ | ND (44) | 100 | ND (42) | ND (45) | 190 | ND (930) |
| Aroclor-1260 (PCB-1260) | µg / kg | 90 | ND (47) UJ | 41 J | 14 J | ND (47) | ND (42) | 150 | ND (44) | 2800 |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 75.9 | 70.9 | 66.8 | 74.6 | 70.3 | 78.6 | 73.4 | 74.6 | 71.1 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *623* | *624* | *625* | *627* | *628* | *629* | *1267* | *1267* | *1270* | *1272* |
| *Sample ID:* | | *S-00-012102-LM-623* | *S-00-012102-LM-624* | *S-00-012102-LM-625* | *S-00-012102-LM-627* | *S-00-012102-LM-628* | *S-00-012102-LM-629* | *S-00-030802-JW-1267* | *S-00-030802-JW-1267A* | *S-00-030802-JW-1270* | *S-00-030802-JW-1272* |
| *Sample Date:* | | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *3/8/2002* | *3/8/2002* | *3/8/2002* | *3/8/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | | *Duplicate* | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (48) | ND (51) | ND (95) UJ | ND (4400) | ND (48) | ND (48) | ND (220) | ND (88) | ND (83) | ND (9500) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (48) | ND (51) | ND (95) UJ | ND (4400) | ND (48) | ND (48) | ND (220) | ND (88) | ND (83) | ND (9500) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (48) | ND (51) | ND (95) UJ | ND (4400) | ND (48) | ND (48) | ND (220) | ND (88) | ND (83) | ND (9500) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (48) | ND (51) | 430 J | ND (4400) | ND (48) | ND (48) | ND (220) | ND (88) | ND (83) | 89000 |
| Aroclor-1248 (PCB-1248) | µg/kg | 29 J | 34 J | ND (95) UJ | 38000 | 35 J | 63 | 1700 | 830 | 810 | ND (9500) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (48) | ND (51) | ND (95) UJ | ND (4400) | ND (48) | ND (48) | ND (220) | ND (88) | ND (83) | ND (9500) |
| Aroclor-1260 (PCB-1260) | µg/kg | 32 J | 29 J | 97 J | 9400 | 38 J | 58 | 330 | 230 | 70 J | ND (9500) |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 68.6 | 64.7 | 69.1 | 75.4 | 69.3 | 69.2 | 75.2 | 75.3 | 79.9 | 34.9 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1274* | *1276* | *1279* | *1280* | *1928* | *1928* | *1929* | *1930* | *1931* | *1932* |
| *Sample ID:* | | *S-00-030802-JW-1274* | *S-00-030802-JW-1276* | *S-00-030802-JW-1279* | *S-00-030802-JW-1280* | *S-061002-GS-1928* | *S-061002-GS-1928A* | *S-061002-JW-1929* | *S-061002-JW-1930* | *S-061002-GS-1931* | *S-061002-GS-1932* |
| *Sample Date:* | | *3/8/2002* | *3/8/2002* | *3/8/2002* | *3/8/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | *Duplicate* | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (42) | ND (420) | ND (44) | ND (49) | ND (83) | ND (82) | ND (4300) | ND (730) | ND (23000) | ND (470) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (42) | ND (420) | ND (44) | ND (49) | ND (83) | ND (82) | ND (4300) | ND (730) | ND (23000) | ND (470) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (42) | ND (420) | ND (44) | ND (49) | ND (83) | ND (82) | ND (4300) | ND (730) | ND (23000) | ND (470) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (42) | ND (420) | ND (44) | ND (49) | ND (83) | ND (82) | ND (4300) | ND (730) | ND (23000) | ND (470) |
| Aroclor-1248 (PCB-1248) | µg / kg | 270 | 3000 | ND (44) | 43 J | 360 | 420 | 27000 | 4800 | 130000 | 3500 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (42) | ND (420) | 65 | ND (49) | ND (83) | ND (82) | ND (4300) | ND (730) | ND (23000) | ND (470) |
| Aroclor-1260 (PCB-1260) | µg / kg | 40 J | 530 | ND (44) | 18 J | 82 J | 110 | 2800 J | 1100 | 12000 J | 800 |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 77.8 | 78.7 | 75.2 | 67.5 | 79.1 | 80.5 | 77.6 | 90.6 | 72.2 | 69.7 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1933* | *1934* | *1935* | *1936* | *1937* | *1938* | *1938* | *1939* | *1940* | *1941* | *1942* | *1983* |
| *Sample ID:* | | *S-061002-GS-1933* | *S-061002-JW-1934* | *S-061002-GS-1935* | *S-061002-GS-1936* | *S-061002-GS-1937* | *S-061002-JW-1938* | *S-061002-JW-1938A* | *S-061002-GS-1939* | *S-061002-JW-1940* | *S-061002-GS-1941* | *S-061002-GS-1942* | *S-072202-JW-1983* |
| *Sample Date:* | | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *6/10/2002* | *7/22/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (1800) | ND (87000) | ND (9100) | ND (1900) | ND (3900) | ND (8700) | ND (2100) | ND (720) | ND (500) | ND (7800) | ND (840) | ND (4300) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (1800) | ND (87000) | ND (9100) | ND (1900) | ND (3900) | ND (8700) | ND (2100) | ND (720) | ND (500) | ND (7800) | ND (840) | ND (4300) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (1800) | ND (87000) | ND (9100) | ND (1900) | ND (3900) | ND (8700) | ND (2100) | ND (720) | ND (500) | ND (7800) | ND (840) | ND (4300) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (1800) | ND (87000) | ND (9100) | ND (1900) | ND (3900) | ND (8700) | ND (2100) | ND (720) | ND (500) | ND (7800) | ND (840) | ND (4300) |
| Aroclor-1248 (PCB-1248) | µg/kg | 13000 | 650000 | 79000 | 12000 | ND (3900) | 88000 | 12000 | 5200 | 1700 | 100000 | 5200 | 35000 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (1800) | ND (87000) | ND (9100) | ND (1900) | 31000 | ND (8700) | ND (2100) | ND (720) | ND (500) | ND (7800) | ND (840) | ND (4300) |
| Aroclor-1260 (PCB-1260) | µg/kg | 1800 | 61000 J | 7200 J | 1600 J | ND (3900) | 9700 | 2100 | 640 J | 270 J | 11000 | 890 | ND (4300) |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 90.8 | 95.3 | 72.6 | 85.3 | 84.7 | 75.5 | 79.1 | 91.1 | 66.2 | 84.7 | 78.2 | 77.3 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***2061*** | ***2061*** | ***2061*** | ***2061*** | ***2206*** | ***2207*** | ***2208*** | ***2208*** | ***2209*** | ***2210*** |
| ***Sample ID:*** | | ***S-073002-LM-2061*** | ***S-073002-LM-2061A*** | ***S-073002-LM-2061B*** | ***S-073002-LM-2061C*** | ***S-071703-JM-2206*** | ***S-071703-JM-2207*** | ***S-071703-JM-2208*** | ***S-071703-JM-2208A*** | ***S-071703-JM-2209*** | ***S-071703-JM-2210*** |
| ***Sample Date:*** | | ***7/30/2002*** | ***7/30/2002*** | ***7/30/2002*** | ***7/30/2002*** | ***7/17/2003*** | ***7/17/2003*** | ***7/17/2003*** | ***7/17/2003*** | ***7/17/2003*** | ***7/17/2003*** |
| ***Sample Depth:*** | | ***(0-0.33)*** | ***(0.33-1)*** | ***(1-1.5)*** | ***(1.5-2)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** |
| | | | | | | | | | ***Duplicate*** | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (38) | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | ND (49) | ND (45) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (38) | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | ND (49) | ND (45) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (38) | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | ND (49) | ND (45) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (38) | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | ND (49) | ND (45) |
| Aroclor-1248 (PCB-1248) | µg/kg | 260 | ND (36) | ND (35) | 35 J | 33 J | 3100 | 47000 | 67000 | 110 | 170 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (38) | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | ND (49) | ND (45) |
| Aroclor-1260 (PCB-1260) | µg/kg | 64 | ND (36) | ND (35) | ND (36) | ND (47) | ND (220) | ND (8900) | ND (4400) | 32 J | 25 J |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 87.9 | 92.3 | 94.7 | 90.5 | 70.7 | 75.8 | 74.1 | 75.8 | 67.9 | 73.5 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2211* | *2212* | *2213* | *2214* | *2215* | *2215* | *2215* | *2216* | *2216* | *2217* | *2218* | *2219* |
| *Sample ID:* | | *S-071703-JM-2211* | *S-071703-JM-2212* | *S-071703-JM-2213* | *S-071703-JM-2214* | *S-072103-JM-2215* | *S-072103-JM-2215A* | *S-072103-JM-2215B* | *S-072103-JM-2216* | *S-072103-JM-2216A* | *S-071703-JM-2217* | *S-071703-JM-2218* | *S-071703-JM-2219* |
| *Sample Date:* | | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (44) | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | ND (970) | ND (44) | ND (2200) | ND (430) | ND (44) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (44) | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | ND (970) UJ | ND (44) | ND (2200) | ND (430) | ND (44) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (44) | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | ND (970) | ND (44) | ND (2200) | ND (430) | ND (44) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (44) | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | ND (970) | ND (44) | ND (2200) | ND (430) | ND (44) |
| Aroclor-1248 (PCB-1248) | µg / kg | 190 | 75000 | ND (450) | 2200 | 36000 | 2200 | 2000 | ND (970) | ND (44) | ND (2200) | 1600 | 100 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (44) | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | 13000 | 260 | 10000 | ND (430) | ND (44) |
| Aroclor-1260 (PCB-1260) | µg / kg | 49 | ND (8700) | ND (450) | ND (870) | ND (4700) | ND (430) | ND (420) | ND (970) | ND (44) | ND (2200) | ND (430) | 20 J |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 75.3 | 75.9 | 73.7 | 76.0 | 70.1 | 77.3 | 78.3 | 68.1 | 75.0 | 74.9 | 76.5 | 74.2 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2220* | *2221* | *2221* | *2222* | *2222* | *2223* | *2224* | *2224* | *2225* | *2226* | *2227* |
| *Sample ID:* | | *S-071703-JM-2220* | *S-072103-JM-2221* | *S-072103-JM-2221A* | *S-072103-JM-2222* | *S-072103-JM-2222A* | *S-071703-JM-2223* | *S-071703-JM-2224* | *S-071703-JM-2224A* | *S-071703-JM-2225* | *S-071703-JM-2226* | *S-071703-JM-2227* |
| *Sample Date:* | | *7/17/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (43) | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | ND (930) | ND (920) | ND (46) | ND (9200) | ND (46) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (43) | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | ND (930) | ND (920) | ND (46) | ND (9200) | ND (46) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (43) | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | ND (930) | ND (920) | ND (46) | ND (9200) | ND (46) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (43) | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | ND (930) | ND (920) | ND (46) | ND (9200) | ND (46) |
| Aroclor-1248 (PCB-1248) | µg / kg | ND (43) | 39 J | ND (42) | 110 | 9.2 J | 29 J | 11000 | 11000 | 220 | ND (9200) | 59 |
| Aroclor-1254 (PCB-1254) | µg / kg | 310 | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | ND (930) | ND (920) | ND (46) | 110000 | ND (46) |
| Aroclor-1260 (PCB-1260) | µg / kg | ND (43) | ND (47) | ND (42) | ND (48) | ND (43) | ND (49) | 940 | 960 | 62 | ND (9200) | 30 J |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 77.4 | 70.6 | 78.7 | 68.9 | 77.2 | 66.9 | 71.3 | 71.8 | 71.4 | 72.0 | 72.5 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2228* | *2229* | *2230* | *2231* | *2232* | *2233* | *2234* | *2235* | *2235* | *2236* | *2236* | *2237* |
| *Sample ID:* | | *S-071703-JM-2228* | *S-071703-JM-2229* | *S-071703-JM-2230* | *S-071703-JM-2231* | *S-071703-JM-2232* | *S-071703-JM-2233* | *S-071703-JM-2234* | *S-072103-JM-2235* | *S-072103-JM-2235A* | *S-072103-JM-2236* | *S-072103-JM-2236A* | *S-072103-JM-2237* |
| *Sample Date:* | | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/17/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (410) | ND (870) | ND (450) | ND (850) | ND (290) | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | ND (48) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (410) | ND (870) | ND (450) | ND (850) | ND (290) | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | ND (48) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (410) | ND (870) | ND (450) | ND (850) | ND (290) | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | ND (48) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (410) | ND (870) | ND (450) | ND (850) | ND (290) | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | ND (48) |
| Aroclor-1248 (PCB-1248) | µg/kg | 6200 | 12000 | 5600 | 8100 | 1000 | 28000 | 9600 | 590 | 28 J | 74000 | 1500 | ND (48) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (410) | ND (870) | ND (450) | ND (850) | ND (290) | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | 85 |
| Aroclor-1260 (PCB-1260) | µg/kg | 600 | 1200 | 820 | 590 J | 270 J | ND (2900) | ND (1100) | ND (91) | ND (44) | ND (5900) | ND (210) | ND (48) |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 79.8 | 75.7 | 73.0 | 77.7 | 55.9 | 57.4 | 58.5 | 72.9 | 74.9 | 56.2 | 77.2 | 69.3 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2237* | *2238* | *2239* | *2239* | *2240* | *2240* | *2241* | *2242* | *2242* | *2243* | *2243* |
| *Sample ID:* | | *S-072103-JM-2237A* | *S-071803-JM-2238* | *S-072103-JM-2239* | *S-072103-JM-2239A* | *S-071803-JM-2240* | *S-071803-JM-2240A* | *S-071803-JM-2241* | *S-072103-JM-2242* | *S-072103-JM-2242A* | *S-072103-JM-2243* | *S-072103-JM-2243A* |
| *Sample Date:* | | *7/21/2003* | *7/18/2003* | *7/21/2003* | *7/21/2003* | *7/18/2003* | *7/18/2003* | *7/18/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* |
| *Sample Depth:* | | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* |
| | | | | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (44) | ND (48) | ND (93) | ND (46) | ND (47) | ND (46) | ND (46) | ND (590000) | ND (4400) | ND (48) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (44) | ND (48) | ND (93) | ND (46) | ND (47) | ND (46) | ND (46) | ND (590000) | ND (4400) UJ | ND (48) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (44) | ND (48) | ND (93) | ND (46) | ND (47) | ND (46) | ND (46) | ND (590000) | ND (4400) | ND (48) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (44) | ND (48) | ND (93) | ND (46) | ND (47) | ND (46) | ND (46) | ND (590000) | ND (4400) | ND (48) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg / kg | ND (44) | 86 | 870 | 340 | 140 | 170 | 91 | 5600000 | 17000 | 160 | ND (42) |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (44) | ND (48) | ND (93) | ND (46) | ND (47) | ND (46) | ND (46) | ND (590000) | ND (4400) | ND (48) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg / kg | ND (44) | 17 J | ND (93) | ND (46) | 16 J | 19 J | 43 J | ND (590000) | ND (4400) | ND (48) | ND (42) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 75.4 | 69.2 | 70.9 | 71.4 | 70.0 | 71.6 | 71.0 | 56.2 | 75.1 | 69.3 | 78.7 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2244* | *2244* | *2245* | *2245* | *2245* | *2246* | *2246* | *2246* | *2247* | *2248* | *2248* | *2249* |
| *Sample ID:* | | *S-072103-JM-2244* | *S-072103-JM-2244A* | *S-072203-JM-2245* | *S-072203-JM-2245A* | *S-072203-JM-2245B* | *S-072103-JM-2246* | *S-072103-JM-2246A* | *S-072103-JM-2246B* | *S-071803-JM-2247* | *S-072203-JM-2248* | *S-072203-JM-2248A* | *S-071803-JM-2249* |
| *Sample Date:* | | *7/21/2003* | *7/21/2003* | *7/22/2003* | *7/22/2003* | *7/22/2003* | *7/21/2003* | *7/21/2003* | *7/21/2003* | *7/18/2003* | *7/22/2003* | *7/22/2003* | *7/18/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) | ND (46) | ND (43) | ND (49) | ND (31000) | ND (2400) | ND (470) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) UJ | ND (46) UJ | ND (43) UJ | ND (49) | ND (31000) | ND (2400) | ND (470) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) | ND (46) | ND (43) | ND (49) | ND (31000) | ND (2400) | ND (470) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) | ND (46) | ND (43) | ND (49) | ND (31000) | ND (2400) | ND (470) |
| Aroclor-1248 (PCB-1248) | µg/kg | 150 | ND (46) | 20000 | 27000 | 210 | 140 | ND (46) | ND (43) | 100 | 370000 | 16000 | 2900 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) | 140 | ND (43) | ND (49) | ND (31000) | ND (2400) | ND (470) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (45) | ND (46) | ND (2300) | ND (5100) | ND (43) | ND (44) | ND (46) | ND (43) | 19 J | ND (31000) | ND (2400) | 180 J |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 72.7 | 71.0 | 70.9 | 64.1 | 76.0 | 74.3 | 71.4 | 76.5 | 68.0 | 53.5 | 67.7 | 70.1 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2250* | *2250* | *2251* | *2252* | *2253* | *2254* | *2255* | *2258* | *2259* | *2260* | *2261* | *2261* |
| *Sample ID:* | | *S-071803-JM-2250* | *S-071803-JM-2250A* | *S-071803-JM-2251* | *S-071803-JM-2252* | *S-071803-JM-2254* | *S-071603-JM-2254* | *S-071603-JM-2255* | *S-071603-JM-2258* | *S-071603-JM-2259* | *S-071603-JM-2260* | *S-071603-JM-2261* | *S-071603-JM-2261A* |
| *Sample Date:* | | *7/18/2003* | *7/18/2003* | *7/18/2003* | *7/18/2003* | *7/18/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | *Duplicate* | | | | | | | | | | *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (2400) | ND (970) | ND (27000) | ND (44) | ND (48) | ND (10000) | ND (87) | ND (47) | ND (490) | ND (44) | ND (44) | ND (44) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (2400) | ND (970) | ND (27000) | ND (44) | ND (48) | ND (10000) | ND (87) | ND (47) | ND (490) | ND (44) | ND (44) | ND (44) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (2400) | ND (970) | ND (27000) | ND (44) | ND (48) | ND (10000) | ND (87) | ND (47) | ND (490) | ND (44) | ND (44) | ND (44) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (2400) | ND (970) | ND (27000) | ND (44) | ND (48) | ND (10000) | ND (87) | ND (47) | ND (490) | ND (44) | ND (44) | ND (44) |
| Aroclor-1248 (PCB-1248) | µg/kg | 15000 | 10000 | 240000 | 56 | 66 | 55000 | 280 | 100 | 2900 | 27 J | 28 J | 28 J |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (2400) | ND (970) | ND (27000) | ND (44) | ND (48) | ND (10000) | ND (87) | ND (47) | ND (490) | ND (44) | ND (44) | ND (44) |
| Aroclor-1260 (PCB-1260) | µg/kg | 800 J | 900 J | 19000 J | ND (44) | ND (48) | ND (10000) | 99 | 38 J | 710 | 14 J | 17 J | 19 J |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 68.9 | 67.9 | 61.9 | 75.3 | 68.3 | 64.8 | 75.7 | 70.7 | 67.6 | 75.8 | 74.2 | 74.9 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2262* | *2262* | *2263* | *2264* | *2265* | *2267* | *2267* | *2269* | *2269* | *2270* |
| *Sample ID:* | | *S-072203-JM-2262* | *S-072203-JM-2262A* | *S-071603-JM-2263* | *S-071603-JM-2264* | *S-071603-JM-2265* | *S-071603-JM-2269* | *S-071603-JM-2269A* | *S-072203-JM-2269* | *S-072203-JM-2269A* | *S-071603-JM-2270* |
| *Sample Date:* | | *7/22/2003* | *7/22/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/16/2003* | *7/22/2003* | *7/22/2003* | *7/16/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* |
| | | | | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | ND (46) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | ND (46) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | ND (46) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | ND (46) |
| Aroclor-1248 (PCB-1248) | µg/kg | 2400 | 150 | 140000 | 550 | 63 | 67 | 21 J | 20 J | ND (46) | 15 J |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | ND (46) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (480) | ND (45) | ND (27000) | ND (100) | ND (52) | ND (48) | ND (46) | ND (44) | ND (46) | 5.8 J |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 69.4 | 72.7 | 60.5 | 64.8 | 63.8 | 69.4 | 71.7 | 75.6 | 72.3 | 72.4 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** | ***GMPT*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***2271*** | ***2272*** | ***2273*** | ***2274*** | ***2274*** | ***2278*** | ***2279*** | ***2289*** | ***2290*** | ***2291*** | ***2292*** | ***2293*** |
| ***Sample ID:*** | | ***S-071603-JM-2271*** | ***S-071603-JM-2272*** | ***S-071603-JM-2273*** | ***S-072203-JM-2274*** | ***S-072203-JM-2274A*** | ***S-071503-JM-2278*** | ***S-071603-JM-2279*** | ***S-071403-JM-2289*** | ***S-071403-JM-2290*** | ***S-071503-JM-2291*** | ***S-071503-JM-2292*** | ***S-072303-JM-2293*** |
| ***Sample Date:*** | | ***7/16/2003*** | ***7/16/2003*** | ***7/16/2003*** | ***7/22/2003*** | ***7/22/2003*** | ***7/15/2003*** | ***7/16/2003*** | ***7/14/2003*** | ***7/14/2003*** | ***7/15/2003*** | ***7/15/2003*** | ***7/23/2003*** |
| ***Sample Depth:*** | | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(1-1.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (46) | ND (44) | ND (46) | ND (220) | ND (42) | ND (28000) | ND (48) | ND (9200) | ND (50) | ND (39) | ND (78) | ND (41) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (46) | ND (44) | ND (46) | ND (220) | ND (42) | ND (28000) | ND (48) | ND (9200) | ND (50) | ND (39) | ND (78) | ND (41) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (46) | ND (44) | ND (46) | ND (220) | ND (42) | ND (28000) | ND (48) | ND (9200) | ND (50) | ND (39) | ND (78) | ND (41) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (46) | ND (44) | ND (46) | ND (220) | ND (42) | ND (28000) | ND (48) | ND (9200) | ND (50) | ND (39) | ND (78) | ND (41) |
| Aroclor-1248 (PCB-1248) | µg/kg | 30 J | 28 J | 33 J | ND (220) | ND (42) | 96000 | 50 | 72000 | 160 | ND (39) | ND (78) | ND (41) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (46) | ND (44) | ND (46) | 590 | 25 J | ND (28000) | ND (48) | ND (9200) | ND (50) | ND (39) | ND (78) | ND (41) |
| Aroclor-1260 (PCB-1260) | µg/kg | 8.9 J | 7.0 J | 16 J | ND (220) | ND (42) | ND (28000) | ND (48) | 7200 J | 75 | 130 | 27 J | 21 J |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 72.2 | 75.1 | 72.1 | 76.4 | 77.7 | 59.8 | 68.9 | 72.0 | 66.1 | 84.1 | 85.1 | 80.4 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2293* | *2294* | *2294* | *2295* | *2296* | *2297* | *2298* | *2298* | *2299* | *2300* | *2301* |
| *Sample ID:* | | *S-072303-JM-2293A* | *S-071403-JM-2294* | *S-071403-JM-2294A* | *S-071403-JM-2295* | *S-071403-JM-2296* | *S-072303-JM-2297* | *S-072303-JM-2298* | *S-072303-JM-2298A* | *S-071403-JM-2299* | *S-071403-JM-2300* | *S-071403-JM-2301* |
| *Sample Date:* | | *7/23/2003* | *7/14/2003* | *7/14/2003* | *7/14/2003* | *7/14/2003* | *7/23/2003* | *7/23/2003* | *7/23/2003* | *7/14/2003* | *7/14/2003* | *7/14/2003* |
| *Sample Depth:* | | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | *Duplicate* | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (42) | ND (8000) | ND (8100) | ND (2100) | ND (420) | ND (4200) | ND (45) | ND (42) | ND (46) | ND (43) | ND (45) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (42) | ND (8000) | ND (8100) | ND (2100) | ND (420) | ND (4200) | ND (45) | ND (42) | ND (46) | ND (43) | ND (45) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (42) | ND (8000) | ND (8100) | ND (2100) | ND (420) | ND (4200) | ND (45) | ND (42) | ND (46) | ND (43) | ND (45) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (42) | ND (8000) | ND (8100) | ND (2100) | ND (420) | ND (4200) | ND (45) | ND (42) | ND (46) | ND (43) | ND (45) |
| Aroclor-1248 (PCB-1248) | µg / kg | 14 J | 46000 | 48000 | 8200 | 1800 | 53000 | 53 | ND (42) | 79 | 82 | 220 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (42) | ND (8000) | ND (8100) | ND (2100) | ND (420) | ND (4200) | ND (45) | ND (42) | ND (46) | ND (43) | ND (45) |
| Aroclor-1260 (PCB-1260) | µg / kg | 6.5 J | 5300 J | 5500 J | 1600 J | 230 J | 12000 | 42 J | ND (42) | 43 J | 56 | 110 |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 79.4 | 82.3 | 81.2 | 76.9 | 78.4 | 78.1 | 73.4 | 78.7 | 71.8 | 76.2 | 73.4 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2302* | *2302* | *2303* | *2304* | *2305* | *2306* | *2307* | *2308* | *2309* | *2310* | *2311* | *2311* |
| *Sample ID:* | | *S-071103-JM-2302* | *S-071103-JM-2302A* | *S-071103-JM-2303* | *S-071403-JM-2304* | *S-071403-JM-2305* | *S-071603-JM-2306* | *S-071103-JM-2307* | *S-071103-JM-2308* | *S-071103-JM-2309* | *S-071103-JM-2310* | *S-071103-JM-2311* | *S-071103-JM-2311A* |
| *Sample Date:* | | *7/11/2003* | *7/11/2003* | *7/11/2003* | *7/14/2003* | *7/14/2003* | *7/16/2003* | *7/11/2003* | *7/11/2003* | *7/11/2003* | *7/11/2003* | *7/11/2003* | *7/11/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | *Duplicate* | | | | | | | | | | *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (44) | ND (51) | ND (570) | ND (45) | ND (46) | ND (62) | ND (44) | ND (46) | ND (280) | ND (88) | ND (46) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (44) | ND (51) | ND (570) | ND (45) | ND (46) | ND (62) | ND (44) | ND (46) | ND (280) | ND (88) | ND (46) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (44) | ND (51) | ND (570) | ND (45) | ND (46) | ND (62) | ND (44) | ND (46) | ND (280) | ND (88) | ND (46) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (44) | ND (51) | ND (570) | ND (45) | ND (46) | ND (62) | ND (44) | ND (46) | ND (280) | ND (88) | ND (46) |
| Aroclor-1248 (PCB-1248) | µg/kg | 26 J | 36 J | 130 J | 2700 | 160 | 28 J | 230 J | 110 J | 66 | 1900 | 390 | 310 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (44) | ND (51) | ND (570) | ND (45) | ND (46) | ND (62) | ND (44) | ND (46) | ND (280) | ND (88) | ND (46) |
| Aroclor-1260 (PCB-1260) | µg/kg | 13 J | 18 J | 36 J | 1200 | 100 | 65 | 74 J | 45 J | 55 | ND (280) | 86 J | 70 |
| ***General Chemistry*** | | | | | | | | | | | | | |
| Total Solids | % | 76.7 | 74.9 | 64.2 | 57.4 | 74.0 | 72.3 | 52.9 | 75.1 | 71.0 | 58.6 | 74.6 | 72.5 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2312* | *2313* | *2314* | *2315* | *2315* | *2315* | *2316* | *2316* | *2317* | *2318* |
| *Sample ID:* | | *S-071103-JM-2312* | *S-071103-JM-2313* | *S-071103-JM-2314* | *S-072303-JM-2315* | *S-072303-JM-2315A* | *S-072303-JM-2315B* | *S-072303-JM-2316* | *S-072303-JM-2316A* | *S-071603-JM-2317* | *S-072303-JM-2318* |
| *Sample Date:* | | *7/11/2003* | *7/11/2003* | *7/11/2003* | *7/23/2003* | *7/23/2003* | *7/23/2003* | *7/23/2003* | *7/23/2003* | *7/16/2003* | *7/23/2003* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (47) | ND (800) | ND (200) | ND (3900) | ND (4000) | ND (800) | ND (4900) | ND (430) | ND (48) | ND (4300) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (47) | ND (800) | ND (200) | ND (3900) | ND (4000) | ND (800) | ND (4900) | ND (430) | ND (48) | ND (4300) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (47) | ND (800) | ND (200) | ND (3900) | ND (4000) | ND (800) | ND (4900) | ND (430) | ND (48) | ND (4300) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (47) | ND (800) | ND (200) | ND (3900) | ND (4000) | ND (800) | ND (4900) | ND (430) | ND (48) | ND (4300) |
| Aroclor-1248 (PCB-1248) | µg/kg | 23 J | 5300 | 1600 | 30000 | 26000 | 10000 | 44000 | 5000 | ND (48) | 30000 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (47) | ND (800) | ND (200) | ND (3900) | ND (4000) | ND (800) | ND (4900) | ND (430) | 85 | ND (4300) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (47) | ND (800) | ND (200) | 6300 | 5300 | 2000 | 11000 | 1100 | ND (48) | 8200 |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 70.5 | 82.3 | 81.5 | 84.9 | 82.9 | 83.0 | 67.4 | 76.9 | 69.5 | 76.7 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *GMPT* | *P003 P205(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *2318* | *2319* | *2319* | *2321* | *2322* | *2322* | *2323* | *2324* | *2324* | *2325* | *127* |
| *Sample ID:* | | *S-072303-JM-2318A* | *S-072203-JM-2319* | *S-072203-JM-2319A* | *S-071603-JM-2321* | *S-072203-JM-2322* | *S-072203-JM-2322A* | *S-071603-JM-2323* | *S-072203-JM-2324* | *S-072203-JM-2324A* | *S-071603-JM-2325* | *S-04-011502-LM-127* |
| *Sample Date:* | | *7/23/2003* | *7/22/2003* | *7/22/2003* | *7/16/2003* | *7/22/2003* | *7/22/2003* | *7/16/2003* | *7/22/2003* | *7/22/2003* | *7/16/2003* | *1/15/2002* |
| *Sample Depth:* | | *(1-1.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* | *(1-1.33)* | *(0-0.33)* | *(0-0.33)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (420) | ND (2000) | ND (88) | ND (52) | ND (3900) | ND (8800) | ND (46) | ND (850) | ND (430) | ND (45) | ND (46) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (420) | ND (2000) | ND (88) | ND (52) | ND (3900) | ND (8800) | ND (46) | ND (850) | ND (430) | ND (45) | ND (46) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (420) | ND (2000) | ND (88) | ND (52) | ND (3900) | ND (8800) | ND (46) | ND (850) | ND (430) | ND (45) | ND (46) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (420) | ND (2000) | ND (88) | ND (52) | ND (3900) | ND (8800) | ND (46) | ND (850) | ND (430) | ND (45) | ND (46) |
| Aroclor-1248 (PCB-1248) | µg / kg | 5200 | 16000 | 200 | ND (52) | 21000 | 78000 | 43 J | 7200 | 4200 | ND (45) | 200 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (420) | ND (2000) | ND (88) | 25 J | ND (3900) | ND (8800) | ND (46) | ND (850) | ND (430) | 42 J | ND (46) |
| Aroclor-1260 (PCB-1260) | µg / kg | 1300 | 6000 | 63 J | ND (52) | 5100 | 20000 | ND (46) | 1900 | 970 | ND (45) | ND (46) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 77.8 | 81.6 | 75.0 | 63.2 | 84.4 | 74.7 | 72.5 | 77.7 | 76.0 | 73.0 | 71.6 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P003 P205(GM)* | *P003 P205(GM)* | *P003 P205(GM)* | *P003 P205(GM) P200(GM)* | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *127* | *150* | *151* | *149* | *205-4140* | *205-4141* | *205-4143* | *205-4144* | *205-4147* | *205-4148* |
| *Sample ID:* | | *S-04-011502-LM-127A* | *S-04-011502-LM-150* | *S-04-011502-LM-151* | *S-04-011502-LM-149* | *S-205-011304-CH-4140* | *S-205-011304-CH-4141* | *S-205-011304-CH-4143* | *S-205-011304-CH-4144* | *S-205-011304-CH-4147* | *S-205-011304-CH-4148* |
| *Sample Date:* | | *1/15/2002* | *1/15/2002* | *1/15/2002* | *1/15/2002* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* |
| | | *Duplicate* | | | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (45) | ND (490) | ND (490) | ND (520) | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | ND (45) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (45) | ND (490) | ND (490) | ND (520) | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | ND (45) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (45) | ND (490) | ND (490) | ND (520) | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | ND (45) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (45) | ND (490) | ND (490) | ND (520) | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | ND (45) |
| Aroclor-1248 (PCB-1248) | µg/kg | 330 | 4000 | 2500 | 9900 | 1800 | 2300 | 2900 | 1400 | 20 J | ND (45) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (45) | ND (490) | ND (490) | ND (520) | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | 26 J |
| Aroclor-1260 (PCB-1260) | µg/kg | 50 | ND (490) | 1400 | 1200 | ND (210) | ND (410) | ND (560) | ND (210) | ND (41) | ND (45) |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 74.1 | 67.3 | 67.1 | 63.3 | 79.7 | 81.0 | 58.7 | 78.7 | 80.0 | 73.2 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *205-4148* | *205-4151* | *205-4152* | *205-4153* | *205-4157* | *205-4159* | *205-4161* | *205-4161* |
| *Sample ID:* | | *S-205-011304-CH-4149* | *S-205-011304-CH-4151* | *S-205-011304-CH-4152* | *S-205-011304-CH-4153* | *S-205-011304-CH-4157* | *S-205-011304-CH-4159* | *S-205-011304-CH-4161* | *S-205-011304-CH-4162* |
| *Sample Date:* | | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/13/2004* |
| *Sample Depth:* | | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* |
| | | *Duplicate* | | | | | | | *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | |
| ***PCBs*** | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (220) | ND (41) | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (220) | ND (41) | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (220) | ND (41) | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (220) | ND (41) | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (43) | ND (220) | ND (41) | 1300 | 1500 | 280 | 240 | 190 |
| Aroclor-1254 (PCB-1254) | µg/kg | 17 J | 900 | 200 J | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | ND (220) | ND (41) | ND (410) | ND (390) | ND (86) | ND (82) | ND (39) |
| ***General Chemistry*** | | | | | | | | | |
| Total Solids | % | 77.1 | 76.4 | 80.4 | 80.9 | 84.9 | 76.9 | 80.8 | 84.2 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***205-4163*** | ***205-4164*** | ***205-4180*** | ***205-4181*** | ***205-4182*** | ***205-4199*** | ***205-4200*** | ***205-4201*** | ***205-4209*** | ***205-4210*** |
| ***Sample ID:*** | | ***S-205-011304-CH-4163*** | ***S-205-011304-CH-4164*** | ***S-205-011304-CH-4180*** | ***S-205-011304-CH-4181*** | ***S-205-011304-CH-4182*** | ***S-205-011304-CH-4199*** | ***S-205-011304-CH-4200*** | ***S-205-011304-CH-4201*** | ***S-205-011304-CH-4209*** | ***S-205-011304-CH-4210*** |
| ***Sample Date:*** | | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** | ***1/13/2004*** |
| ***Sample Depth:*** | | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (42) | ND (47) | ND (41) | ND (40) | ND (45) | ND (41) | ND (41) | ND (42) | ND (81) | ND (43) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (42) | ND (47) | ND (41) | ND (40) | ND (45) | ND (41) | ND (41) | ND (42) | ND (81) | ND (43) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (42) | ND (47) | ND (41) | ND (40) | ND (45) | ND (41) | ND (41) | ND (42) | ND (81) | ND (43) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (42) | ND (47) | ND (41) | ND (40) | ND (45) | ND (41) | ND (41) | ND (42) | ND (81) | ND (43) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (42) | ND (47) | 41 | 96 | ND (45) | ND (41) | ND (41) | ND (42) | 620 J | 380 |
| Aroclor-1254 (PCB-1254) | µg/kg | 54 | 81 | ND (41) | ND (40) | 26 J | ND (41) | 15 J | 11 J | ND (81) | ND (43) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (42) | ND (47) | ND (41) | ND (40) | ND (45) | ND (41) | ND (41) | ND (42) | ND (81) | ND (43) |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 78.3 | 69.5 | 79.7 | 82.2 | 72.8 | 80.1 | 81.3 | 79.0 | 81.1 | 76.7 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* | *P205* |
|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *205-4211* | *205-4212* | *205-4212* | *205-4167* | *205-4168* | *205-4169* | *205-4170* | *205-4178* |
| *Sample ID:* | | *S-205-011304-CH-4211* | *S-205-011304-CH-4212* | *S-205-011304-CH-4213* | *S-205-011304-CH-4167* | *S-205-011304-CH-4168* | *S-205-011304-CH-4169* | *S-205-011304-CH-4170* | *S-205-011304-CH-4178* |
| *Sample Date:* | | *1/13/2004* | *1/13/2004* | *1/13/2004* | *1/14/2004* | *1/14/2004* | *1/14/2004* | *1/14/2004* | *1/14/2004* |
| *Sample Depth:* | | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* |
| | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | |
| ***PCBs*** | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (220) | ND (44) | ND (43) | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (220) | ND (44) | ND (43) | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (220) | ND (44) | ND (43) | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (220) | ND (44) | ND (43) | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| Aroclor-1248 (PCB-1248) | µg/kg | 750 | 210 | 190 | 1100 | 860 | 1200 | 460 J | 770 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (220) | ND (44) | ND (43) | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (220) | ND (44) | 33 J | ND (210) | ND (210) | ND (210) | ND (40) | ND (210) |
| ***General Chemistry*** | | | | | | | | | |
| Total Solids | % | 75.4 | 75.9 | 76.1 | 79.1 | 78.4 | 80.2 | 81.5 | 77.9 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** | ***P205*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***205-4179*** | ***205-4186*** | ***205-4187*** | ***205-4188*** | ***205-4189*** | ***205-4193*** | ***205-4197*** | ***205-4198*** | ***205-4203*** | ***205-4204*** |
| ***Sample ID:*** | | ***S-205-011304-CH-4179*** | ***S-205-011304-CH-4186*** | ***S-205-011304-CH-4187*** | ***S-205-011304-CH-4188*** | ***S-205-011304-CH-4189*** | ***S-205-011304-CH-4193*** | ***S-205-011304-CH-4197*** | ***S-205-011304-CH-4198*** | ***S-205-011304-CH-4203*** | ***S-205-011304-CH-4204*** |
| ***Sample Date:*** | | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** | ***1/14/2004*** |
| ***Sample Depth:*** | | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** | ***(0-0.5)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| Aroclor-1248 (PCB-1248) | µg/kg | 3100 | 5300 | 980 | 900 | 1900 | 5200 | 920 | 80 | 2300 | 1900 |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (420) | ND (860) | ND (220) | ND (200) | ND (400) | ND (790) | ND (220) | ND (41) | ND (440) | ND (400) |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 78.9 | 76.5 | 75.9 | 80.6 | 81.8 | 83.5 | 75.9 | 81.2 | 75.9 | 81.6 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P205* | *P205* | *P205* | *P205* | *P205(GM)* | *P205(GM)* | *P205(GM)* | *P205(GM) P003* | *P205(GM) P003* | *P205(GM) P003* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *205-4205* | *205-4206* | *205-4206* | *205-4208* | *119* | *120* | *123* | *124* | *125* | *126* |
| *Sample ID:* | | *S-205-011304-CH-4205* | *S-205-011304-CH-4206* | *S-205-011304-CH-4207* | *S-205-011304-CH-4208* | *S-04-011502-LM-119* | *S-04-011502-LM-120* | *S-04-011502-LM-123* | *S-04-011502-LM-124* | *S-04-011502-LM-125* | *S-04-011502-LM-126* |
| *Sample Date:* | | *1/14/2004* | *1/14/2004* | *1/14/2004* | *1/14/2004* | *1/15/2002* | *1/15/2002* | *1/15/2002* | *1/15/2002* | *1/15/2002* | *1/15/2002* |
| *Sample Depth:* | | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.5)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | *Duplicate* | | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | ND (100) | ND (92) | ND (240) | ND (930) | ND (24000) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | ND (100) | ND (92) | ND (240) | ND (930) | ND (24000) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | ND (100) | ND (92) | ND (240) | ND (930) | ND (24000) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | ND (100) | ND (92) | ND (240) | ND (930) | ND (24000) |
| Aroclor-1248 (PCB-1248) | µg / kg | 160 | 160 J | 140 | 240 | 490 | 720 | 340 | 1400 | 15000 | 290000 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | ND (100) | ND (92) | ND (240) | ND (930) | ND (24000) |
| Aroclor-1260 (PCB-1260) | µg / kg | ND (42) | R | ND (44) | ND (44) | ND (430) | 64 | 43 | 150 | 1100 | 13000 |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 78.0 | 79.3 | 74.5 | 75.1 | 76.5 | 65.7 | 71.7 | 68.2 | 71.0 | 68.9 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1271* | *1277* | *1277* | *1278* | *1285* | *1285* | *1285* | *1286* | *1286* |
| *Sample ID:* | | *S-00-030802-JW-1271* | *S-00-030802-JW-1277* | *S-00-030802-JW-1277A* | *S-00-030802-JW-1278* | *S-00-031102-JW-1285* | *S-00-031102-JW-1285A* | *S-00-031102-JW-1285B* | *S-00-031102-JW-1286* | *S-00-031102-JW-1286A* |
| *Sample Date:* | | *3/8/2002* | *3/8/2002* | *3/8/2002* | *3/8/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* | *(0.33-2)* |
| | | | | *Duplicate* | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (46000) | ND (23000) | ND (24000) | ND (39) | ND (230) | ND (220) | ND (4500) | ND (500) | ND (43) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (46000) | ND (23000) | ND (24000) | ND (39) | ND (230) | ND (220) | ND (4500) | ND (500) | ND (43) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (46000) | ND (23000) | ND (24000) | ND (39) | ND (230) | ND (220) | ND (4500) | ND (500) | ND (43) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (46000) UJ | ND (23000) UJ | ND (24000) UJ | ND (39) | ND (230) | ND (220) | ND (4500) | ND (500) | 49 |
| Aroclor-1248 (PCB-1248) | µg/kg | 220000 | 92000 | 210000 | 71 | 860 | 1400 | 5000 | 7000 | ND (43) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (46000) | ND (23000) | ND (24000) | ND (39) | ND (230) | ND (220) | ND (4500) | ND (500) | ND (43) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (46000) | 11000 J | 21000 J | 24 J | ND (230) | ND (220) | ND (4500) | ND (500) | ND (43) |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 71.5 | 73.0 | 68.7 | 84.7 | 71.3 | 73.6 | 73.4 | 65.4 | 76.3 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1289* | *1290* | *1292* | *1294* | *1295* | *1296* | *1401* | *1402* | *1403* | *1403* |
| *Sample ID:* | | *S-00-031102-JW-1289* | *S-00-031102-JW-1290* | *S-00-031102-GS-1292* | *S-00-031102-JW-1294* | *S-00-031102-JW-1295* | *S-00-031102-GS-1296* | *S-00-031102-JW-1401* | *S-00-031102-JW-1402* | *S-00-031102-GS-1403* | *S-00-031102-JW-1403A* |
| *Sample Date:* | | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* *Duplicate* |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (470) | ND (90) | ND (45) | ND (46) | ND (2300) | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (470) | ND (90) | ND (45) | ND (46) | ND (2300) | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (470) | ND (90) | ND (45) | ND (46) | ND (2300) | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (470) | ND (90) | ND (45) | ND (46) | ND (2300) | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| Aroclor-1248 (PCB-1248) | µg/kg | 5700 | 860 | 30 J | ND (46) | 39000 | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (470) | ND (90) | ND (45) | 50 | ND (2300) | 230 | 96 | 1200 | 130 | 110 |
| Aroclor-1260 (PCB-1260) | µg/kg | 510 | 86 J | ND (45) | ND (46) | 3200 | ND (44) | ND (46) | ND (290) | ND (50) | ND (45) |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 69.9 | 73.4 | 73.9 | 72.1 | 70.5 | 75.0 | 71.5 | 57.8 | 65.6 | 73.8 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM)* | *P215(GM) P216(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1404* | *2062* | *2062* | *2062* | *2062* | *2062* | *2063* | *2063* | *1405* |
| *Sample ID:* | | *S-00-031102-JW-1404* | *S-073002-LM-2062* | *S-073002-LM-2062A* | *S-073002-LM-2062B* | *S-073002-LM-2062C* | *S-073002-LM-2062D* | *S-073002-LM-2063D* | *S-073002-LM-2063E* | *S-00-031102-GS-1405* |
| *Sample Date:* | | *3/11/2002* | *7/30/2002* | *7/30/2002* | *7/30/2002* | *7/30/2002* | *7/30/2002* | *7/30/2002* | *7/30/2002* | *3/11/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0.33-1)* | *(1-1.5)* | *(1.5-2)* | *(2-3)* | *(3-4)* | *(0-0.33)* |
| | | | | *Duplicate* | | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (44) | ND (27000) | ND (27000) | ND (8800) | ND (48000) | ND (48000) | ND (430) | ND (87) | ND (44) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (44) | ND (27000) | ND (27000) | ND (8800) | ND (48000) | ND (48000) | ND (430) | ND (87) | ND (44) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (44) | ND (27000) | ND (27000) | ND (8800) | ND (48000) | ND (48000) | ND (430) | ND (87) | ND (44) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (44) | ND (27000) | ND (27000) | 68000 | 340000 | 190000 | ND (430) | ND (87) | ND (44) |
| Aroclor-1248 (PCB-1248) | µg/kg | 220 | 210000 | 190000 | ND (8800) | ND (48000) | ND (48000) | 2800 | 660 | ND (44) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (44) | ND (27000) | ND (27000) | ND (8800) | ND (48000) | ND (48000) | ND (430) | ND (87) | 250 |
| Aroclor-1260 (PCB-1260) | µg/kg | 57 | ND (27000) | ND (27000) | ND (8800) | ND (48000) | ND (48000) | ND (430) | ND (87) | ND (44) |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 74.4 | 60.4 | 61.0 | 74.9 | 68.7 | 69.3 | 76.5 | 75.9 | 74.4 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P215(GM) P415* | *P215(GM) P415* | *P215(GM) P416* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1242* | *1247* | *1659* | *632* | *633* | *634* | *634* | *635* | *635* | *638* |
| *Sample ID:* | | *S-00-030702-MD-1242* | *S-00-030702-MD-1247* | *S-00-041002-GS-1659* | *S-00-012102-LM-632* | *S-00-012102-LM-633* | *S-00-012102-LM-634* | *S-00-012102-LM-634A* | *S-00-012102-LM-635* | *S-00-012102-LM-635A* | *S-00-012102-LM-638* |
| *Sample Date:* | | *3/7/2002* | *3/7/2002* | *4/10/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* | *1/21/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* | *(0.33-2)* | *(0-0.33)* |
| ***Parameters*** | ***Units*** | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (48) | ND (46) | ND (48) | ND (4400) | ND (46) | ND (6200) | ND (8900) | ND (1900) | ND (3800) UJ | ND (44) UJ |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (48) | ND (46) | ND (48) | ND (4400) | ND (46) | ND (6200) | ND (8900) | ND (1900) | ND (3800) UJ | ND (44) UJ |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (48) | ND (46) | ND (48) | ND (4400) | ND (46) | ND (6200) | ND (8900) | ND (1900) | ND (3800) UJ | ND (44) UJ |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (48) | ND (46) | ND (48) | ND (4400) | ND (46) | ND (6200) | ND (8900) | ND (1900) | ND (3800) UJ | 51 J |
| Aroclor-1248 (PCB-1248) | µg / kg | ND (48) | ND (46) | ND (48) | 49000 | 9.7 J | 120000 | 180000 | 31000 | 42000 J | ND (44) UJ |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (48) | ND (46) | ND (48) | ND (4400) | ND (46) | ND (6200) | ND (8900) | ND (1900) | ND (3800) UJ | ND (44) UJ |
| Aroclor-1260 (PCB-1260) | µg / kg | ND (48) | ND (46) | ND (48) | 8700 | ND (46) | 21000 | 43000 | 7100 | 14000 J | 20 J |
| ***General Chemistry*** | | | | | | | | | | | |
| Total Solids | % | 68.8 | 71.9 | 68.9 | 75.8 | 71.2 | 53.6 | 74.0 | 87.9 | 86.6 | 75.0 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *638* | *1121* | *1293* | *1293* | *1297* | *1298* | *1299* | *1400* | *1406* |
| *Sample ID:* | | *S-00-012102-LM-638A* | *S-00-022502-GS-1121* | *S-00-031102-GS-1293* | *S-00-031102-GS-1293A* | *S-00-031102-GS-1297* | *S-00-031102-JW-1298* | *S-00-031102-GS-1299* | *S-00-031102-JW-1400* | *S-00-031102-GS-1406* |
| *Sample Date:* | | *1/21/2002* | *2/25/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* | *3/11/2002* |
| *Sample Depth:* | | *(0.33-2)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | *Duplicate* | | | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (43) | ND (47) | ND (47) | ND (52) | ND (51) | ND (250) | ND (47) | ND (87) | ND (52) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (43) | ND (47) | ND (47) | ND (52) | ND (51) | ND (250) | ND (47) | ND (87) | ND (52) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (43) | ND (47) | ND (47) | ND (52) | ND (51) | ND (250) | ND (47) | ND (87) | ND (52) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (43) | ND (47) | ND (47) | ND (52) | ND (51) | ND (250) | ND (47) | ND (87) | ND (52) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (43) | 19 J | 99 | 63 | ND (51) | ND (250) | 46 J | ND (87) | ND (52) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (43) | ND (47) | ND (47) | ND (52) | 370 | 1200 | ND (47) | 1200 | 170 |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (43) | 23 J | ND (47) | ND (52) | ND (51) | ND (250) | 23 J | ND (87) | ND (52) |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 75.9 | 70.7 | 69.5 | 62.9 | 64.7 | 66.6 | 69.7 | 75.9 | 63.6 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* | *P216(GM)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1407* | *1977* | *1979* | *1980* | *1981* | *1982* | *2070* | *2070* | *2070* | *2070* | *2070* |
| *Sample ID:* | | *S-00-031102-GS-1407* | *S-072202-JW-1977* | *S-072202-JW-1979* | *S-072202-JW-1980* | *S-072202-JW-1981* | *S-072202-JW-1982* | *S-073102-BT-2070* | *S-073102-BT-2070A* | *S-073102-BT-2070B* | *S-073102-BT-2070C* | *S-073102-BT-2070D* |
| *Sample Date:* | | *3/11/2002* | *7/22/2002* | *7/22/2002* | *7/22/2002* | *7/22/2002* | *7/22/2002* | *7/31/2002* | *7/31/2002* | *7/31/2002* | *7/31/2002* | *7/31/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0.33-1)* | *(1-1.5)* | *(1.5-2)* |
| | | | | | | | | | *Duplicate* | | | |
| ***Parameters*** | ***Units*** | | | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg/kg | ND (48) | R | ND (2000) | ND (35) | ND (2100) | ND (43) | ND (82) | ND (210) | ND (40) | ND (43) | ND (42) |
| Aroclor-1221 (PCB-1221) | µg/kg | ND (48) | R | ND (2000) | ND (35) | ND (2100) | ND (43) | ND (82) | ND (210) | ND (40) | ND (43) | ND (42) |
| Aroclor-1232 (PCB-1232) | µg/kg | ND (48) | R | ND (2000) | ND (35) | ND (2100) | ND (43) | ND (82) | ND (210) | ND (40) | ND (43) | ND (42) |
| Aroclor-1242 (PCB-1242) | µg/kg | ND (48) | R | ND (2000) | ND (35) | ND (2100) | ND (43) | ND (82) | ND (210) | ND (40) | ND (43) | ND (42) |
| Aroclor-1248 (PCB-1248) | µg/kg | ND (48) | R | 14000 | ND (35) | 21000 | ND (43) | 320 | 540 | 23 J | 71 | ND (42) |
| Aroclor-1254 (PCB-1254) | µg/kg | ND (48) | 67 J | ND (2000) | 220 | ND (2100) | ND (43) | ND (82) | ND (210) | ND (40) | ND (43) | ND (42) |
| Aroclor-1260 (PCB-1260) | µg/kg | ND (48) | R | ND (2000) | ND (35) | ND (2100) | ND (43) | 180 | 250 | 11 J | 27 J | ND (42) |
| ***General Chemistry*** | | | | | | | | | | | | |
| Total Solids | % | 69.1 | 78.2 | 84.6 | 93.8 | 80.2 | 76.8 | 80.9 | 80.4 | 81.7 | 76.7 | 79.3 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Area of Interest:* | | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* | *P401 GMPT* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Sample Location:* | | *1502* | *1504* | *1505* | *1506* | *1507* | *1508* | *1509* | *1509* | *1511* |
| *Sample ID:* | | *S-00-032602-GS-1502* | *S-00-032602-GS-1504* | *S-00-032602-GS-1505* | *S-00-032602-GS-1506* | *S-00-032602-GS-1507* | *S-00-032602-GS-1508* | *S-00-032602-GS-1509* | *S-00-032602-GS-1509A* | *S-00-032602-GS-1511* |
| *Sample Date:* | | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* | *3/26/2002* |
| *Sample Depth:* | | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* | *(0-0.33)* |
| | | | | | | | | | *Duplicate* | |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (87) | ND (47) | ND (48) | ND (44) | ND (46) | ND (45) | ND (450) | ND (220) | ND (47) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (87) | ND (47) | ND (48) | ND (44) | ND (46) | ND (45) | ND (450) | ND (220) | ND (47) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (87) | ND (47) | ND (48) | ND (44) | ND (46) | ND (45) | ND (450) | ND (220) | ND (47) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (87) | ND (47) | ND (48) | ND (44) | ND (46) | ND (45) | ND (450) | ND (220) | ND (47) |
| Aroclor-1248 (PCB-1248) | µg / kg | 1100 | 31 J | ND (48) | 170 | 500 | 230 | 2000 | 1100 | 230 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (87) | ND (47) | ND (48) | ND (44) | ND (46) | ND (45) | ND (450) | ND (220) | ND (47) |
| Aroclor-1260 (PCB-1260) | µg / kg | 480 | ND (47) | ND (48) | 170 | 220 | 62 | 310 J | 200 J | 64 |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 75.6 | 69.9 | 68.4 | 74.2 | 71.5 | 72.6 | 73.6 | 73.9 | 69.8 |

**TABLE 2.8**

**ADDITIONAL STREAM SAMPLE RESULTS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| ***Area of Interest:*** | | ***P401 GMPT*** | ***P401 GMPT*** | ***P401 GMPT*** | ***P401 GMPT*** | ***P401 GMPT*** | ***P401 GMPT*** | ***P201(GM)*** | ***P003 P200(GM)*** | ***P003 P200(GM)*** |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Sample Location:*** | | ***1512*** | ***1513*** | ***1514*** | ***1515*** | ***1516*** | ***1517*** | ***1089*** | ***1094*** | ***1095*** |
| ***Sample ID:*** | | ***S-00-032602-GS-1512*** | ***S-00-032602-GS-1513*** | ***S-00-032602-GS-1514*** | ***S-00-032602-GS-1515*** | ***S-00-032602-GS-1516*** | ***S-00-032602-GS-1517*** | ***S-00-022502-JW-1089*** | ***S-00-022502-GS-1094*** | ***S-00-022502-CH-1095*** |
| ***Sample Date:*** | | ***3/26/2002*** | ***3/26/2002*** | ***3/26/2002*** | ***3/26/2002*** | ***3/26/2002*** | ***3/26/2002*** | ***2/25/2002*** | ***2/25/2002*** | ***2/25/2002*** |
| ***Sample Depth:*** | | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** | ***(0-0.33)*** |
| ***Parameters*** | ***Units*** | | | | | | | | | |
| ***PCBs*** | | | | | | | | | | |
| Aroclor-1016 (PCB-1016) | µg / kg | ND (2200) | ND (480) | ND (400) | ND (460) | ND (69) | ND (46) | ND (110) | ND (44) | ND (230) |
| Aroclor-1221 (PCB-1221) | µg / kg | ND (2200) | ND (480) | ND (400) | ND (460) | ND (69) | ND (46) | ND (110) | ND (44) | ND (230) |
| Aroclor-1232 (PCB-1232) | µg / kg | ND (2200) | ND (480) | ND (400) | ND (460) | ND (69) | ND (46) | ND (110) | ND (44) | ND (230) |
| Aroclor-1242 (PCB-1242) | µg / kg | ND (2200) | ND (480) | ND (400) | ND (460) | ND (69) | ND (46) | ND (110) | ND (44) | ND (230) |
| Aroclor-1248 (PCB-1248) | µg / kg | 14000 | ND (480) | 1200 | 3000 | 770 | 130 | 1600 | 16 J | 960 |
| Aroclor-1254 (PCB-1254) | µg / kg | ND (2200) | 4600 | ND (400) | ND (460) | ND (69) | ND (46) | ND (110) | ND (44) | ND (230) |
| Aroclor-1260 (PCB-1260) | µg / kg | 1800 J | ND (480) | 250 J | 820 | 180 | 47 | 320 | ND (44) | 99 J |
| ***General Chemistry*** | | | | | | | | | | |
| Total Solids | % | 59.4 | 68.3 | 82.0 | 71.9 | 96.2 | 71.3 | 60.3 | 75.0 | 70.6 |

Notes:
µg / kg - micrograms per kilogram
ND - Non Detect
PCB - Polychlorinated Biphenyl
J - Estimated
R - Rejected
U - Non-detect at associated value
UJ - The analyte was detected above the sample quantitation limit. The reported quantitation limit is an estimated quantity.

**TABLE 2.9**

**AOI PCB EXCEEDANCE SUMMARY**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *AOI* | *1.8 mg/kg (yes/no)* | *5.3 mg/kg (yes/no)* | *7.5 mg/kg (yes/no)* | *25 mg/kg (yes/no)* | *50 mg/kg (yes/no)* | *100 mg/kg (yes/no)* | *500 mg/kg (yes/no)* | *1500 mg/kg (yes/no)* |
|---|---|---|---|---|---|---|---|---|
| AOI 3 | No | No | No | No | No | No | No | No |
| AOI 4 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| AOI 5 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| AOI 6 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| AOI 7 | No | No | No | No | No | No | No | No |
| AOI 8 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| AOI 10 | No | No | No | No | No | No | No | No |
| AOI 11 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| AOI 15 | Yes | Yes | Yes | Yes | No | No | No | No |
| AOI 23 | No | No | No | No | No | No | No | No |

Notes:

Yes - exceeds specified level
AOI - Area of Interest
GMPT - GM Powertrain Plant property north of Parcel 200 outside of AOIs
mg/kg - milligram per kilogram

**TABLE 2.10**

**SCENARIO SUMMARY OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | *Scenario 1 (0 Feet to Top of Bedrock)* | | *Scenario 2 (0 To 2 Feet bgs)* | | *Scenario 3 (0 To 10 Feet bgs)* | | *Scenario 4 (0 to 15 Feet bgs)* | |
|---|---|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***1.8*** | 500,431 | 700,604 | 32,602 | 45,643 | 195,726 | 274,016 | 237,676 | 332,747 |
| ***5.3*** | 315,338 | 441,473 | 18,818 | 26,345 | 68,384 | 95,738 | 91,188 | 127,663 |
| ***7.4*** | 306,603 | 429,244 | 18,312 | 25,637 | 67,371 | 94,320 | 89,633 | 125,487 |
| ***25*** | 233,399 | 326,758 | 14,077 | 19,708 | 58,881 | 82,433 | 76,604 | 107,246 |
| ***50*** | 129,415 | 181,181 | 8,061 | 11,286 | 46,821 | 65,549 | 58,096 | 81,335 |
| ***100*** | 119,177 | 166,848 | 7,426 | 10,397 | 43,216 | 60,502 | 53,564 | 74,990 |
| ***500*** | 37,274 | 52,184 | 2,345 | 3,283 | 14,379 | 20,130 | 17,308 | 24,231 |
| ***1,500*** | 9,772 | 13,681 | 618 | 865 | 4,955 | 6,936 | 5,064 | 7,090 |

**Notes:**
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)
bgs - below ground surface

**TABLE 4.1**

**ESTIMATES OF CUMULATIVE CANCER RISK AND HAZARD INDEX FOR POTENTIAL FUTURE EXPOSURES IN THE EAST PLANT AREA IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA GENERAL MOTORS POWERTRAIN BEDFORD FACILITY BEDFORD, INDIANA**

| *Receptor* | *Matrix* | *Cumulative Cancer Risk* | *Hazard Index* |
|---|---|---|---|
| Routine Worker | Surface Soil | 2E-04 | 1E+01 |
| Construction Worker (Small-Scale Scenario) | Soil | 9E-06 | 1E+00 |
| | Groundwater | 4E-03 | 6E+02 |
| Construction Worker (Large-Scale Scenario) | Soil | 3E-05 | 1E+01 |
| Maintenance Worker | Sediment | 6E-07 | 4E-02 |
| | Surface Water | 2E-05 | 1E+00 |
| | Spring Water | 3E-05 | 2E+00 |

**TABLE 4.2**

**ESTIMATES OF CUMULATIVE CANCER RISK AND HAZARD INDEX FOR CONSTRUCTION SCENARIOS FOR 0-10 FOOT DEPTH BGS EXCAVATIONS WITH SOIL COVER**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| PCBs Soil Removal Limit | *Construction Worker (Small-Scale Scenario)* | | *Construction Worker (Large-Scale Scenario)* | |
|---|---|---|---|---|
| | ***Risk*** | ***HI*** | ***Risk*** | ***HI*** |
| No Removal | 4E-06 | 6E-01 | 1E-05 | 6E+00 |
| 1500 mg/kg | 1E-06 | 1E-01 | 3E-06 | 1E+00 |
| 500 mg/kg | 7E-07 | 7E-02 | 2E-06 | 7E-01 |
| 50 mg/kg | 3E-07 | 2E-02 | 7E-07 | 2E-01 |

**Notes:**
Risk estimates are based on soil concentrations from 0 to 7.5 ft bgs and 2.5 ft clean cover.
bgs - below ground surface
HI - Hazard Index
mg/kg - milligrams per kilogram
PCB - Polychlorinated Biphenyl

**TABLE 4.3**

**ESTIMATES OF CUMULATIVE CANCER RISK AND HAZARD INDEX FOR CONSTRUCTION SCENARIOS FOR 0-15 FOOT DEPTH BGS EXCAVATIONS WITH SOIL COVER**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *PCBs Soil Removal Limit* | *Construction Worker (Small-Scale Scenario)* | | *Construction Worker (Large-Scale Scenario)* | |
|---|---|---|---|---|
| | ***Risk*** | ***HI*** | ***Risk*** | ***HI*** |
| No Removal | 1E-05 | 1E+00 | 3E-05 | 1E+01 |
| 1500 mg/kg | 2E-06 | 2E-01 | 5E-06 | 2E+00 |
| 500 mg/kg | 1E-06 | 1E-01 | 3E-06 | 1E+00 |
| 50 mg/kg | 5E-07 | 3E-02 | 1E-06 | 3E-01 |

**Notes:**

Risk estimates are based on soil concentrations from 0 to 12.5 ft bgs and 2.5 ft clean cover.
bgs - below ground surface
HI - Hazard Index
mg/kg - milligrams per kilogram
PCB - Polychlorinated Biphenyl

**TABLE 4.4**

**ESTIMATES OF CUMULATIVE CANCER RISK AND HAZARD INDEX FOR CONSTRUCTION SCENARIOS FOR 0-10 FOOT DEPTH BGS EXCAVATIONS WITH 0-FOOT COVER THICKNESS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *PCBs Soil Removal Limit* | *Construction Worker (Small-Scale Scenario)* | | *Construction Worker (Large-Scale Scenario)* | |
|---|---|---|---|---|
| | ***Risk*** | ***HI*** | ***Risk*** | ***HI*** |
| No Removal | 9E-06 | 1E+00 | 3E-05 | 1E+01 |
| 1500 mg/kg | 2E-06 | 2E-01 | 4E-06 | 2E+00 |
| 500 mg/kg | 1E-06 | 1E-01 | 2E-06 | 1E+00 |
| 50 mg/kg | 5E-07 | 3E-02 | 1E-06 | 3E-01 |

**Notes:**

Risk estimates are based on soil concentrations from 0 to 7.5 ft bgs and 0 ft clean cover.
bgs - below ground surface
HI - Hazard Index
mg/kg - milligrams per kilogram
PCB - Polychlorinated Biphenyl

**TABLE 5.1**

**POTENTIALLY APPLICABLE IM APPROACHS AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Corrective Action Approach* | *Technology* |
|---|---|
| 1. No Action | • No Action |
| 2. Institutional Controls | • Fencing, Signs, Security<br>• Access Restriction, Deed Restriction |
| 3. Physical Soil Containment | • Cover System<br>• Groundwater Cut-off Wall |
| 4. In Situ Soil Treatment | • Biological Treatment<br>• Soil Flushing/Solvent Flushing<br>• Vitrification<br>• Solidification/Stabilization |
| 5. Soil Removal | • Excavation |
| 6. Ex Situ Soil Treatment | • Biological Treatment<br>• Low Temperature Thermal Desorption<br>• Advanced Electric Reactor<br>• Incineration<br>• Chemical Dechlorination<br>• Solidification/Stabilization<br>• Solvent Extraction<br>• Gas-Phase Chemical Reduction |
| 7. Soil Disposal | • On Facility<br>• Off Facility |
| 8. NAPL/Groundwater Collection | • Extraction Wells<br>• Collection Trench PS |
| 9. NAPL/Groundwater Treatment | • Facility WWTP<br>• Off Facility WWTP or Incineration |

Notes:
NAPL - Non-Aqueous Phase Liquid
PS - Perimeter System
WWTP - Wastewater Treatment Plant

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Corrective Action Approach* | *Technology* | *Screening Comments* | *Recommendations* |
|---|---|---|---|
| 1. No Action | a) No Action | - baseline for comparison<br>- will not change existing conditions<br>- soil and groundwater with concentrations exceeding potential cleanup goals will remain in the East Plant Area | - retained for further evaluation |
| 2. Institutional Controls Action | a) Restricted Access and Institutional Controls | - will minimize potential future contact with chemicals in soil and groundwater<br>- soil and groundwater with concentrations exceeding potential cleanup goals will remain in the East Plant Area | - retained for further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|---|
| 3. | Physical Soil Containment | a) Cover System | - will minimize potential contact with chemicals in soil and groundwater (dermal contact and air pathways)<br>- will reduce infiltration and chemical loading to the groundwater<br>- soil and groundwater with concentrations exceeding potential cleanup goals will remain in the East Plant Area<br>- a variety of options available | - retained for further evaluation |
| | | b) Groundwater Cut Off Wall<br>- Slurry Wall | - proven effective<br>- chemical resistant<br>- cost effective | - retained for further evaluation |
| | | - Grout Curtains | - applicable to applications in rock<br>- grout setting and durability problems could arise<br>- integrity of wall may be questionable | - retained for further evaluation |
| | | - Waterloo Barrier Wall | - sealable joints prevent leakage of impacted groundwater<br>- readily available | - retained for further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|
| 4. In Situ Soil Treatment | a) Biological<br>- Bioremediation | - difficult to control environment conditions<br>- PCBs are generally resistant to bioremediation | - eliminated from further evaluation |
| | b) Physical<br>- Soil Flushing/Solvent Flushing | - not effective in reducing PCBs and inorganics with low solubilities<br>- requires hydraulic control<br>- requires collection/disposal of solvent | - eliminated from further evaluation |
| | - Vitrification | - cost prohibitive<br>- not a proven technology<br>- could result in emissions<br>- health and safety concerns | - eliminated from further evaluation |
| | c) Solidification/Stablilization | - will reduce mobility of chemicals in soil (reduces leaching)<br>- effective for organics and inorganics | - retained for further evaluation |
| 5. Soil Removal | a) Excavation | - may be cost prohibitive | - retained for |

Notes:
PCB – Polychlorinated Biphenyl
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RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|
| | | - removes source of contamination<br>- health and safety concerns with deep excavations | further evaluation |
| 6. Ex Situ Soil Treatment | a) Biological<br>- Bioremediation | - limited to wastes which are biologically degradable<br>- not effective for inorganics<br>- requires large surface area for landfarming<br>- PCBs are generally resistant to bioremediation | - eliminated from further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|
| 6. Ex Situ Treatment (cont'd) | b) Physical | | |
| | - Low Temperature Thermal Desorption (LTTD) | - will require thermal treatment of off-gas<br>- potential for significant air emissions during excavation/ handling<br>- separated oil must be incinerated<br>- cost prohibitive | - eliminated from further evaluation |
| | - Advanced Electrical Reactor | - requires waste stream to be free of solids, not applicable to soil | - eliminated from further evaluation |
| | - Incineration | - effective for organic constituents<br>- potential for significant air<br>- emissions during excavation/ handling<br>- not effective for inorganic constituents (special handling of ash)<br>- cost prohibitive | - eliminated from further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|
| 6. Ex Situ Treatment (cont'd) | - Chemical Dechlorination | - unproven technology | - eliminated from further evaluation |
| | c) Solidification/Stablilization | - will reduce mobility of chemicals in soil (reduces leaching)<br>- effective for organics and inorganics | - retained for further evaluation |
| | - Solvent Extraction | - removes contamination from soil<br>- cost prohibitive<br>- oil product waste stream must be collected and treated/ disposed | - eliminated from further evaluation |
| | - Gas-Phase Chemical Reduction | - Similar treatment potential to LTTD<br>- no potential for formation of dioxins or furans<br>- unproven<br>- cost prohibitive | - eliminated from further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 5.2**

**PRESCREENING OF POTENTIAL IM APPROACHES AND ASSOCIATED TECHNOLOGIES**
**IM ALTERNATIVES REVIEW REPORT – EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | *General Response Actions* | *Remedial Technology/Process Option* | *Screening Comments* | *Recommendations* |
|---|---|---|---|---|
| 7. | Soil Disposal | a) Disposal in RCRA/TSCA (or equivalent) Landfill (on or off Facility) | - will remove soil from the Facility (off-Facility disposal only)<br>- secures waste and minimizes future migration of contaminants<br>- subject to TSCA and RCRA regulations | - retained for further evaluation |
| 8. | DNAPL/ Groundwater Collection | a) Extraction Wells | - area of influence unknown in bedrock | - eliminated from further evaluation |
| | | b) Collection Trenches | - provides more technically effective hydraulic containment | - retained for further evaluation |
| 9. | DNAPL/ Groundwater Treatment/Disposal | a) Facility WWTP | - Facility has a technically effective WWTP<br>- cost effective | - retained for further evaluation |
| | | b) Off Facility WWTP or Incineration | - technically effective<br>- cost prohibitive except for DNAPL | - eliminated from further evaluation |

Notes:
PCB – Polychlorinated Biphenyl
LTTD – Low Temperature Thermal Desorption
RCRA – Resource Conservation and Recovery Act
TSCA – Toxic Substances Control Act
WWTP – Wastewater Treatment Plant
DNAPL – Dense Non-Aqueous Phase Liquid

**TABLE 6.1**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 1: GROUNDWATER MONITORING SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 2. | Bonds/Insurance | 5 | % | $ 4,600 | $ 4,600 |
| 3. | Mobilization/Demobilization | 5 | % | $ 4,600 | $ 4,600 |
| 4. | Permits | 2 | % | $ 1,800 | $ 1,800 |
| 5. | Health and Safety | 5 | % | $ 4,600 | $ 4,600 |
| 6. | Construction Facilities/Temporary Controls | 3 | % | $ 2,800 | $ 2,800 |
| | | | Estimated Capital Cost | | $ 110,400 |
| | | | Engineering (20%) | | $ 22,080 |
| | | | Subtotal | | $ 132,480 |
| | | | Contingency (20%) | | $ 26,496 |
| | | | Total Estimated Capital Cost | | $ 158,976 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 3. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 4. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 422,000 to | $ 632,000 |
| | | | Contingency (20%) | $ 84,400 to | $ 126,400 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 506,400 to | $ 758,400 |

**TABLE 6.1**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 1: GROUNDWATER MONITORING SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 158,976 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | | **Total Present Worth (1)** | | | $ 11,913,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
L.S. - Lump Sum
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound

**TABLE 6.2**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 2: INSTITUTIONAL CONTROLS AND GROUNDWATER MONITORING SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 3. | Bonds/Insurance | 5 | % | $ 13,100 | $ 13,100 |
| 4. | Mobilization/Demobilization | 5 | % | $ 13,100 | $ 13,100 |
| 5. | Permits | 2 | % | $ 5,200 | $ 5,200 |
| 6. | Health and Safety | 5 | % | $ 13,100 | $ 13,100 |
| 7. | Construction Facilities/Temporary Controls | 3 | % | $ 7,800 | $ 7,800 |
| | | | | Estimated Capital Cost | $ 313,800 |
| | | | | Engineering (20%) | $ 62,760 |
| | | | | Subtotal | $ 376,560 |
| | | | | Contingency (20%) | $ 75,312 |
| | | | | Total Estimated Capital Cost | $ 451,872 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (fence) | -- | L.S. | -- | $ 2,000 |
| 3. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 4. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 5. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 424,000 to $ 634,000 |
| | | | | Contingency (20%) | $ 84,800 to $ 126,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 508,800 to $ 760,800 |

**TABLE 6.2**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 2: INSTITUTIONAL CONTROLS AND GROUNDWATER MONITORING SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 451,872 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 12,809,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
ft - feet
L.S. - Lump Sum
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound

**TABLE 6.3**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 3: COVER SYSTEM AND PERIMETER COLLECTION SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 6. | Bonds/Insurance | 5 | % | $ 467,300 | $ 467,300 |
| 7. | Mobilization/Demobilization | 5 | % | $ 467,300 | $ 467,300 |
| 8. | Permits | 2 | % | $ 186,900 | $ 186,900 |
| 9. | Health and Safety | 5 | % | $ 467,300 | $ 467,300 |
| 10. | Construction Facilities/Temporary Controls | 3 | % | $ 280,400 | $ 280,400 |
| | | | | Estimated Capital Cost | $ 11,215,300 |
| | | | | Engineering (20%) | $ 2,243,060 |
| | | | | Subtotal | $ 13,458,360 |
| | | | | Contingency (20%) | $ 2,691,672 |
| | | | | Total Estimated Capital Cost | $ 16,150,032 |

**TABLE 6.3**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 3: COVER SYSTEM AND PERIMETER COLLECTION SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 5. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 6. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 470,000 to | $ 680,000 |
| | Contingency (20%) | | | $ 94,000 to | $ 136,000 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 564,000 to | $ 816,000 |
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 16,150,032 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 29,110,000 |

**TABLE 6.3**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 3: COVER SYSTEM AND PERIMETER COLLECTION SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|

Notes:
(1) Total Costs have been rounded to three significant figures.
ft - feet
L.S. - Lump Sum
sq ft - square feet
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |

**TABLE 6.4A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 100,000 | cu yd | $ 15 | $ 1,500,000 |
| | b) Excavation of PCB-Impacted Soil | 130,000 | cu yd | $ 6 | $ 780,000 |
| | c) Transportation and Off-Facility Disposal | 182,000 | Ton | $ 125 | $ 22,750,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 182,000 | Ton | $ 16 | $ 2,912,000 |
| | e) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | f) Sheet pile wall along existing utlities | 250 | ft | $ 100 | $ 25,000 |
| | g) Existing utilities removal and replacement | 1,600 | ft | $ 60 | $ 96,000 |
| | h) Sheet pile wall along existing STM pond (40ft) | 400 | ft | $ 400 | $ 160,000 |
| | i) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 6 Subtotal | $ 28,275,000 |
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 1,887,200 | $ 1,887,200 |
| 9. | Mobilization/Demobilization | 5 | % | $ 1,887,200 | $ 1,887,200 |
| 10. | Permits | 2 | % | $ 754,900 | $ 754,900 |
| 11. | Health and Safety | 5 | % | $ 1,887,200 | $ 1,887,200 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 1,132,300 | $ 1,132,300 |
| | | Estimated Capital Cost | | | $ 45,292,150 |
| | | Engineering (20%) | | | $ 9,058,430 |
| | | Subtotal | | | $ 54,350,580 |
| | | Contingency (20%) | | | $ 10,870,116 |
| | | Total Estimated Capital Cost | | | $ 65,220,696 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.4A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 494,000 to | $ 704,000 |
| | Contingency (20%) | | | $ 98,800 to | $ 140,800 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 592,800 to | $ 844,800 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 65,220,696 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 78,783,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 50,000 | cu yd | $ 15 | $ 750,000 |
| | b) Excavation of PCB-Impacted Soil | 37,500 | cu yd | $ 6 | $ 225,000 |
| | c) Transportation and Off-Facility Disposal | 52,500 | Ton | $ 125 | $ 6,562,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 52,500 | Ton | $ 16 | $ 840,000 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 6 Subtotal | $ 8,530,500 |

**TABLE 6.4B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 899,900 | $ 899,900 |
| 9. | Mobilization/Demobilization | 5 | % | $ 899,900 | $ 899,900 |
| 10. | Permits | 2 | % | $ 360,000 | $ 360,000 |
| 11. | Health and Safety | 5 | % | $ 899,900 | $ 899,900 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 540,000 | $ 540,000 |
| | | | Estimated Capital Cost | | $ 21,598,550 |
| | | | Engineering (20%) | | $ 4,319,710 |
| | | | Subtotal | | $ 25,918,260 |
| | | | Contingency (20%) | | $ 5,183,652 |
| | | | Total Estimated Capital Cost | | $ 31,101,912 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.4B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 31,101,912 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 44,665,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 25,000 | cu yd | $ 15 | $ 375,000 |
| | b) Excavation of PCB-Impacted Soil | 10,000 | cu yd | $ 6 | $ 60,000 |
| | c) Transportation and Off-Facility Disposal | 14,000 | Ton | $ 125 | $ 1,750,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 14,000 | Ton | $ 16 | $ 224,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 2,421,000 |

**TABLE 6.4C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 594,500 | $ 594,500 |
| 9. | Mobilization/Demobilization | 5 | % | $ 594,500 | $ 594,500 |
| 10. | Permits | 2 | % | $ 237,800 | $ 237,800 |
| 11. | Health and Safety | 5 | % | $ 594,500 | $ 594,500 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 356,700 | $ 356,700 |
| | | | Estimated Capital Cost | | $ 14,267,350 |
| | | | Engineering (20%) | | $ 2,853,470 |
| | | | Subtotal | | $ 17,120,820 |
| | | | Contingency (20%) | | $ 3,424,164 |
| | | | Total Estimated Capital Cost | | $ 20,544,984 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.4C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 20,544,984 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 34,108,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4D**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4D: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 42,500 | cu yd | $ 15 | $ 637,500 |
| | b) Excavation of PCB-Impacted Soil | 47,000 | cu yd | $ 6 | $ 282,000 |
| | c) Transportation and Off-Facility Disposal | 65,800 | Ton | $ 125 | $ 8,225,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 65,800 | Ton | $ 16 | $ 1,052,800 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 6 Subtotal | $ 10,350,300 |

**TABLE 6.4D**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4D: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 990,900 | $ 990,900 |
| 9. | Mobilization/Demobilization | 5 | % | $ 990,900 | $ 990,900 |
| 10. | Permits | 2 | % | $ 396,400 | $ 396,400 |
| 11. | Health and Safety | 5 | % | $ 990,900 | $ 990,900 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 594,600 | $ 594,600 |
| | | | Estimated Capital Cost | | $ 23,782,350 |
| | | | Engineering (20%) | | $ 4,756,470 |
| | | | Subtotal | | $ 28,538,820 |
| | | | Contingency (20%) | | $ 5,707,764 |
| | | | Total Estimated Capital Cost | | $ 34,247,000 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.4D**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4D: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 34,247,000 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | | **Total Present Worth (1)** | | | $ 47,810,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
bgs - below ground surface
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4E**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4E: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 15 | $ 225,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Transportation and Off-Facility Disposal | 20,300 | Ton | $ 125 | $ 2,537,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 20,300 | Ton | $ 16 | $ 324,800 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 6 Subtotal | $ 3,198,300 |

**TABLE 6.4E**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4E: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 633,300 | $ 633,300 |
| 9. | Mobilization/Demobilization | 5 | % | $ 633,300 | $ 633,300 |
| 10. | Permits | 2 | % | $ 253,300 | $ 253,300 |
| 11. | Health and Safety | 5 | % | $ 633,300 | $ 633,300 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 380,000 | $ 380,000 |
| | | | Estimated Capital Cost | | $ 15,199,850 |
| | | | Engineering (20%) | | $ 3,039,970 |
| | | | Subtotal | | $ 18,239,820 |
| | | | Contingency (20%) | | $ 3,647,964 |
| | | | Total Estimated Capital Cost | | $ 21,888,000 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.4E**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4E: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 21,888,000 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 35,451,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
bgs - below ground surface
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.4F**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4F: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 7,500 | cu yd | $ 15 | $ 112,500 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,141,500 |

**TABLE 6.4F**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4F: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 530,500 | $ 530,500 |
| 9. | Mobilization/Demobilization | 5 | % | $ 530,500 | $ 530,500 |
| 10. | Permits | 2 | % | $ 212,200 | $ 212,200 |
| 11. | Health and Safety | 5 | % | $ 530,500 | $ 530,500 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 318,300 | $ 318,300 |
| | | | | Estimated Capital Cost | $ 12,731,850 |
| | | | | Engineering (20%) | $ 2,546,370 |
| | | | | Subtotal | $ 15,278,220 |
| | | | | Contingency (20%) | $ 3,055,644 |
| | | | | Total Estimated Capital Cost | $ 18,334,000 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE 6.4F**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 4F: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg, 0-10 FOOT DEPTH BGS)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 18,334,000 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 31,897,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
bgs - below ground surface
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.5A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,128,000 | sq ft | $ 0.30 | $ 338,400 |
| | b) 12-in Clay Barrier Layer | 1,128,000 | sq ft | $ 1.10 | $ 1,240,800 |
| | c) Geocomposite Clay Liner | 1,128,000 | sq ft | $ 0.80 | $ 902,400 |
| | d) Geonet drainage layer | 1,128,000 | sq ft | $ 0.90 | $ 1,015,200 |
| | e) Common Fill | 1,128,000 | sq ft | $ 0.60 | $ 676,800 |
| | f) Vegetative Cover | 1,128,000 | sq ft | $ 0.10 | $ 112,800 |
| | g) 6-in Topsoil | 1,128,000 | sq ft | $ 0.40 | $ 451,200 |
| | | | | Item 4 Subtotal | $ 4,737,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 425,000 | sq ft | $ 0.40 | $ 170,000 |
| | b) 18-in Common Fill | 425,000 | sq ft | $ 0.90 | $ 382,500 |
| | c) 12-in Sand Drainage Layer | 425,000 | sq ft | $ 0.75 | $ 318,750 |
| | d) 20-mil HDPE Liner | 425,000 | sq ft | $ 0.45 | $ 191,250 |
| | e) 24-in Clay Barrier | 425,000 | sq ft | $ 2.20 | $ 935,000 |
| | f) Vegetative Cover | 425,000 | sq ft | $ 0.10 | $ 42,500 |
| | g) Liner System | 425,000 | sq ft | $ 2.85 | $ 1,211,250 |
| | | | | Item 5 Subtotal | $ 3,251,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.5A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 100,000 | cu yd | $ 15 | $ 1,500,000 |
| | b) Excavation of PCB-Impacted Soil | 130,000 | cu yd | $ 6 | $ 780,000 |
| | c) Placement of Soil in On-Facility Vault | 182,000 | Ton | $ 4 | $ 728,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 91,000 | Ton | $ 16 | $ 1,456,000 |
| | e) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | f) Sheet pile wall along existing utlities | 250 | ft | $ 100 | $ 25,000 |
| | g) Existing utilities removal and replacement | 1,600 | ft | $ 60 | $ 96,000 |
| | h) Sheet pile wall along existing STM pond (40ft) | 400 | ft | $ 400 | $ 160,000 |
| | i) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 7 Subtotal | $ 4,797,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 786,600 | $ 786,600 |
| 10. | Mobilization/Demobilization | 5 | % | $ 786,600 | $ 786,600 |
| 11. | Permits | 2 | % | $ 314,600 | $ 314,600 |
| 12. | Health and Safety | 5 | % | $ 786,600 | $ 786,600 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 471,900 | $ 471,900 |
| | | | | Estimated Capital Cost | $ 18,877,900 |
| | | | | Engineering (20%) | $ 3,775,580 |
| | | | | Subtotal | $ 22,653,480 |
| | | | | Contingency (20%) | $ 4,530,696 |
| | | | | Total Estimated Capital Cost | $ 27,184,176 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.5A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 27,184,176 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 40,797,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.5B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.5B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 50,000 | cu yd | $ 15 | $ 750,000 |
| | b) Excavation of PCB-Impacted Soil | 37,500 | cu yd | $ 6 | $ 225,000 |
| | c) Placement of Soil in On-Facility Vault | 52,500 | Ton | $ 4 | $ 210,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 26,250 | Ton | $ 16 | $ 420,000 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 7 Subtotal | $ 1,758,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 591,500 | $ 591,500 |
| 10. | Mobilization/Demobilization | 5 | % | $ 591,500 | $ 591,500 |
| 11. | Permits | 2 | % | $ 236,600 | $ 236,600 |
| 12. | Health and Safety | 5 | % | $ 591,500 | $ 591,500 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 354,900 | $ 354,900 |
| | | | | Estimated Capital Cost | $ 14,196,100 |
| | | | | Engineering (20%) | $ 2,839,220 |
| | | | | Subtotal | $ 17,035,320 |
| | | | | Contingency (20%) | $ 3,407,064 |
| | | | | Total Estimated Capital Cost | $ 20,442,384 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.5B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 20,442,384 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 34,055,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.5C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3.00 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.5C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 25,000 | cu yd | $ 15 | $ 375,000 |
| | b) Excavation of PCB-Impacted Soil | 10,000 | cu yd | $ 6 | $ 60,000 |
| | c) Placement of Soil in On-Facility Vault | 14,000 | Ton | $ 4 | $ 56,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 615,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 517,100 | $ 517,100 |
| 10. | Mobilization/Demobilization | 5 | % | $ 517,100 | $ 517,100 |
| 11. | Permits | 2 | % | $ 206,800 | $ 206,800 |
| 12. | Health and Safety | 5 | % | $ 517,100 | $ 517,100 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 310,300 | $ 310,300 |
| | | Estimated Capital Cost | | | $ 12,410,500 |
| | | Engineering (20%) | | | $ 2,482,100 |
| | | Subtotal | | | $ 14,892,600 |
| | | Contingency (20%) | | | $ 2,978,520 |
| | | Total Estimated Capital Cost | | | $ 17,871,120 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.5C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,871,120 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,484,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.6A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 130,000 | cu yd | $ 40 | $ 5,200,000 |
| | b) Jet grouting | 2,000 | ft | $ 15 | $ 30,000 |
| | | | | Item 6 Subtotal | $ 5,230,000 |

**TABLE 6.6A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 734,900 | $ 734,900 |
| 9. | Mobilization/Demobilization | 5 | % | $ 734,900 | $ 734,900 |
| 10. | Permits | 2 | % | $ 294,000 | $ 294,000 |
| 11. | Health and Safety | 5 | % | $ 734,900 | $ 734,900 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 441,000 | $ 441,000 |
| | | | Estimated Capital Cost | | $ 17,638,050 |
| | | | Engineering (20%) | | $ 3,527,610 |
| | | | Subtotal | | $ 21,165,660 |
| | | | Contingency (20%) | | $ 4,233,132 |
| | | | Total Estimated Capital Cost | | $ 25,398,792 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.6A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 25,398,792 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 38,962,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.6B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 37,500 | cu yd | $ 40 | $ 1,500,000 |
| | b) Jet grouting | 800 | ft | $ 15 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,512,000 |

**TABLE 6.6B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 549,000 | $ 549,000 |
| 9. | Mobilization/Demobilization | 5 | % | $ 549,000 | $ 549,000 |
| 10. | Permits | 2 | % | $ 219,600 | $ 219,600 |
| 11. | Health and Safety | 5 | % | $ 549,000 | $ 549,000 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 329,400 | $ 329,400 |
| | | | Estimated Capital Cost | | $ 13,176,350 |
| | | | Engineering (20%) | | $ 2,635,270 |
| | | | Subtotal | | $ 15,811,620 |
| | | | Contingency (20%) | | $ 3,162,324 |
| | | | Total Estimated Capital Cost | | $ 18,973,944 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE 6.6B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 18,973,944 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 32,537,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.6C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 10,000 | cu yd | $ 40 | $ 400,000 |
| | b) Jet grouting | 200 | ft | $ 15 | $ 3,000 |
| | | | | Item 6 Subtotal | $ 403,000 |

**TABLE 6.6C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 493,600 | $ 493,600 |
| 9. | Mobilization/Demobilization | 5 | % | $ 493,600 | $ 493,600 |
| 10. | Permits | 2 | % | $ 197,400 | $ 197,400 |
| 11. | Health and Safety | 5 | % | $ 493,600 | $ 493,600 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 296,100 | $ 296,100 |
| | | | Estimated Capital Cost | | $ 11,845,650 |
| | | | Engineering (20%) | | $ 2,369,130 |
| | | | Subtotal | | $ 14,214,780 |
| | | | Contingency (20%) | | $ 2,842,956 |
| | | | Total Estimated Capital Cost | | $ 17,057,736 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE 6.6C**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 17,057,736 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 30,620,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.7A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 50,000 | cu yd | $ 10 | $ 500,000 |
| | b) Excavation of PCB-Impacted Soil | 37,500 | cu yd | $ 6 | $ 225,000 |
| | c) Transportation and Off-Facility Disposal | 52,500 | Ton | $ 125 | $ 6,562,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 52,500 | Ton | $ 16 | $ 840,000 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 6 Subtotal | $ 8,280,500 |

**TABLE 6.7A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 92,500 | cu yd | $ 40 | $ 3,700,000 |
| | b) Jet grouting | 1,200 | ft | $ 15 | $ 18,000 |
| | | | | Item 7 Subtotal | $ 3,718,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 390,200 | $ 390,200 |
| 10. | Mobilization/Demobilization | 5 | % | $ 790,700 | $ 790,700 |
| 11. | Permits | 2 | % | $ 420,500 | $ 420,500 |
| 12. | Health and Safety | 5 | % | $ 1,073,300 | $ 1,073,300 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 644,000 | $ 644,000 |
| | | | | Estimated Capital Cost | $ 24,785,550 |
| | | | | Engineering (20%) | $ 4,957,110 |
| | | | | Subtotal | $ 29,742,660 |
| | | | | Contingency (20%) | $ 5,948,532 |
| | | | | Total Estimated Capital Cost | $ 35,691,192 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE 6.7A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 35,691,192 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | | **Total Present Worth (1)** | | | $ | 49,254,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.7B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 25,000 | cu yd | $ 10 | $ 250,000 |
| | b) Excavation of PCB-Impacted Soil | 10,000 | cu yd | $ 6 | $ 60,000 |
| | c) Transportation and Off-Facility Disposal | 14,000 | Ton | $ 125 | $ 1,750,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 14,000 | Ton | $ 16 | $ 224,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 2,296,000 |

**TABLE 6.7B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 27,000 | cu yd | $ 40 | $ 1,080,000 |
| | b) Jet grouting | 600 | ft | $ 15 | $ 9,000 |
| | | | | Item 7 Subtotal | $ 1,089,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 149,600 | $ 149,600 |
| 10. | Mobilization/Demobilization | 5 | % | $ 250,800 | $ 250,800 |
| 11. | Permits | 2 | % | $ 152,000 | $ 152,000 |
| 12. | Health and Safety | 5 | % | $ 642,700 | $ 642,700 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 385,600 | $ 385,600 |
| | | | | Estimated Capital Cost | $ 14,434,050 |
| | | | | Engineering (20%) | $ 2,886,810 |
| | | | | Subtotal | $ 17,320,860 |
| | | | | Contingency (20%) | $ 3,464,172 |
| | | | | Total Estimated Capital Cost | $ 20,785,032 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE 6.7B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 494,000 to | $ 704,000 |
| | Contingency (20%) | | | $ 98,800 to | $ 140,800 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 592,800 to | $ 844,800 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 20,785,032 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 34,348,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.8A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.8A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 50,000 | cu yd | $ 10 | $ 500,000 |
| | b) Excavation of PCB-Impacted Soil | 37,500 | cu yd | $ 6 | $ 225,000 |
| | c) Placement of Soil in On-Facility Vault | 52,500 | Ton | $ 4 | $ 210,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 26,250 | Ton | $ 16 | $ 420,000 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 7 Subtotal | $ 1,508,000 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 92,500 | cu yd | $ 40 | $ 3,700,000 |
| | b) Jet grouting | 1,200 | ft | $ 15 | $ 18,000 |
| | | | | Item 8 Subtotal | $ 3,718,000 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 764,900 | $ 764,900 |
| 11. | Mobilization/Demobilization | 5 | % | $ 764,900 | $ 764,900 |
| 12. | Permits | 2 | % | $ 306,000 | $ 306,000 |
| 13. | Health and Safety | 5 | % | $ 764,900 | $ 764,900 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 458,900 | $ 458,900 |
| | | | | Estimated Capital Cost | $ 18,357,700 |
| | | | | Engineering (20%) | $ 3,671,540 |
| | | | | Subtotal | $ 22,029,240 |
| | | | | Contingency (20%) | $ 4,405,848 |
| | | | | Total Estimated Capital Cost | $ 26,435,088 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.8A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 26,435,088 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 40,048,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.8B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.8B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 25,000 | cu yd | $ 10 | $ 250,000 |
| | b) Excavation of PCB-Impacted Soil | 10,000 | cu yd | $ 6 | $ 60,000 |
| | c) Placement of Soil in On-Facility Vault | 14,000 | Ton | $ 4 | $ 56,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 490,000 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 27,000 | cu yd | $ 40 | $ 1,080,000 |
| | b) Jet grouting | 600 | ft | $ 15 | $ 9,000 |
| | | | | Item 8 Subtotal | $ 1,089,000 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 565,300 | $ 565,300 |
| 11. | Mobilization/Demobilization | 5 | % | $ 565,300 | $ 565,300 |
| 12. | Permits | 2 | % | $ 226,100 | $ 226,100 |
| 13. | Health and Safety | 5 | % | $ 565,300 | $ 565,300 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 339,200 | $ 339,200 |
| | | | | Estimated Capital Cost | $ 13,567,300 |
| | | | | Engineering (20%) | $ 2,713,460 |
| | | | | Subtotal | $ 16,280,760 |
| | | | | Contingency (20%) | $ 3,256,152 |
| | | | | Total Estimated Capital Cost | $ 19,536,912 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE 6.8B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 19,536,912 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 33,150,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.9A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL (50 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,128,000 | sq ft | $ 0.30 | $ 338,400 |
| | b) 12-in Clay Barrier Layer | 1,128,000 | sq ft | $ 1.10 | $ 1,240,800 |
| | c) Geocomposite Clay Liner | 1,128,000 | sq ft | $ 0.80 | $ 902,400 |
| | d) Geonet drainage layer | 1,128,000 | sq ft | $ 0.90 | $ 1,015,200 |
| | e) Common Fill | 1,128,000 | sq ft | $ 0.60 | $ 676,800 |
| | f) Vegetative Cover | 1,128,000 | sq ft | $ 0.10 | $ 112,800 |
| | g) 6-in Topsoil | 1,128,000 | sq ft | $ 0.40 | $ 451,200 |
| | | | | Item 4 Subtotal | $ 4,737,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 400,000 | sq ft | $ 0.40 | $ 160,000 |
| | b) 18-in Common Fill | 400,000 | sq ft | $ 0.90 | $ 360,000 |
| | c) 12-in Sand Drainage Layer | 400,000 | sq ft | $ 0.75 | $ 300,000 |
| | d) 20-mil HDPE Liner | 400,000 | sq ft | $ 0.45 | $ 180,000 |
| | e) 24-in Clay Barrier | 400,000 | sq ft | $ 2.20 | $ 880,000 |
| | f) Vegetative Cover | 400,000 | sq ft | $ 0.10 | $ 40,000 |
| | g) Liner System | 400,000 | sq ft | $ 2.85 | $ 1,140,000 |
| | | | | Item 5 Subtotal | $ 3,060,000 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.9A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL (50 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 100,000 | cu yd | $ 15 | $ 1,500,000 |
| | b) Excavation of PCB-Impacted Soil | 130,000 | cu yd | $ 6 | $ 780,000 |
| | c) Placement of Soil in On-Facility Vault | 168,000 | Ton | $ 4 | $ 672,000 |
| | d) Transportation and Off-Facility Disposal | 14,000 | Ton | $ 125 | $ 1,750,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 84,000 | Ton | $ 16 | $ 1,344,000 |
| | f) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | g) Sheet pile wall along existing utilities | 250 | ft | $ 100 | $ 25,000 |
| | h) Existing utilities removal and replacement | 1,600 | ft | $ 60 | $ 96,000 |
| | i) Sheet pile wall along existing STM pond (40ft) | 400 | ft | $ 400 | $ 160,000 |
| | j) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 7 Subtotal | $ 6,379,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 856,100 | $ 856,100 |
| 10. | Mobilization/Demobilization | 5 | % | $ 856,100 | $ 856,100 |
| 11. | Permits | 2 | % | $ 342,400 | $ 342,400 |
| 12. | Health and Safety | 5 | % | $ 856,100 | $ 856,100 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 513,700 | $ 513,700 |
| | | | | Estimated Capital Cost | $ 20,546,750 |
| | | | | Engineering (20%) | $ 4,109,350 |
| | | | | Subtotal | $ 24,656,100 |
| | | | | Contingency (20%) | $ 4,931,220 |
| | | | | Total Estimated Capital Cost | $ 29,587,320 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE 6.9A**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL (50 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to $ | 706,000 |
| | Contingency (20%) | | | $ 99,200 to $ | 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to $ | 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 29,587,320 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 43,200,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.9B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 130,000 | sq ft | $ 0.40 | $ 52,000 |
| | b) 18-in Common Fill | 130,000 | sq ft | $ 0.90 | $ 117,000 |
| | c) 12-in Sand Drainage Layer | 130,000 | sq ft | $ 0.75 | $ 97,500 |
| | d) 20-mil HDPE Liner | 130,000 | sq ft | $ 0.45 | $ 58,500 |
| | e) 24-in Clay Barrier | 130,000 | sq ft | $ 2.20 | $ 286,000 |
| | f) Vegetative Cover | 130,000 | sq ft | $ 0.10 | $ 13,000 |
| | g) Liner System | 130,000 | sq ft | $ 2.85 | $ 370,500 |
| | | | | Item 5 Subtotal | $ 994,500 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE 6.9B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 50,000 | cu yd | $ 15 | $ 750,000 |
| | b) Excavation of PCB-Impacted Soil | 37,500 | cu yd | $ 6 | $ 225,000 |
| | c) Placement of Soil in On-Facility Vault | 38,500 | Ton | $ 4 | $ 154,000 |
| | d) Transportation and Off-Facility Disposal | 14,000 | Ton | $ 125 | $ 1,750,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 19,250 | Ton | $ 16 | $ 308,000 |
| | f) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | g) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | h) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 7 Subtotal | $ 3,340,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 653,400 | $ 653,400 |
| 10. | Mobilization/Demobilization | 5 | % | $ 653,400 | $ 653,400 |
| 11. | Permits | 2 | % | $ 261,400 | $ 261,400 |
| 12. | Health and Safety | 5 | % | $ 653,400 | $ 653,400 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 392,000 | $ 392,000 |
| | | | | Estimated Capital Cost | $ 15,681,450 |
| | | | | Engineering (20%) | $ 3,136,290 |
| | | | | Subtotal | $ 18,817,740 |
| | | | | Contingency (20%) | $ 3,763,548 |
| | | | | Total Estimated Capital Cost | $ 22,581,288 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE 6.9B**

**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT AND**
**(PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 22,581,288 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 36,194,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE 6.10**

**SUMMARY OF ALTERNATIVES**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Alternative* | *Alternative Components* | | | | | | | | | | *Cost Analysis* | | | *References* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Groundwater Seep/Spring Monitoring* | *Institutional Controls* | *Cover System* | *Perimeter Collection System* | *Groundwater Source Removal System - AOI 8* | *Soil Source Removal* | *Off-Facility Disposal* | *On-Facility Disposal (Vault)* | *In Situ Soil Stabilization* | *<50 mg/kg RA Soil Re-Use* [1] | *Capital Costs* | *Annual O&M Costs* | *Present Worth* | *Table/Figure* |
| 1 | Yes | -- | -- | -- | -- | -- | -- | -- | -- | NA | $ 159,000 | $ 758,000 | $ 11,913,000 | 6.1 |
| 2 | Yes | Yes | -- | -- | -- | -- | -- | -- | -- | NA | $ 452,000 | $ 761,000 | $ 12,809,000 | 6.2 |
| 3 | Yes | Yes | Yes | Yes | -- | -- | -- | -- | -- | NA | $ 16,150,000 | $ 816,000 | $ 29,110,000 | 6.3 |
| 4A | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 50 mg/kg | Yes | -- | -- | yes | $ 65,221,000 | $ 845,000 | $ 78,783,000 | 6.4A |
| 4B | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 500 mg/kg | Yes | -- | -- | NA | $ 31,102,000 | $ 845,000 | $ 44,665,000 | 6.4B |
| 4C | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 1,500 mg/kg | Yes | -- | -- | NA | $ 20,545,000 | $ 845,000 | $ 34,108,000 | 6.4C |
| 4D | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 50 mg/kg, 0 to 10 ft bgs | Yes | -- | -- | NA | $ 33,982,000 | $ 845,000 | $ 47,810,000 | 6.4D |
| 4E | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 500 mg/kg, 0 to 10 ft bgs | Yes | -- | -- | NA | $ 21,846,000 | $ 845,000 | $ 35,451,000 | 6.4E |
| 4F | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 1,500 mg/kg, 0 to 10 ft bgs | Yes | -- | -- | NA | $ 18,313,000 | $ 845,000 | $ 31,897,000 | 6.4F |
| 5A[2] | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 50 mg/kg | -- | Yes | -- | Yes | $ 27,184,000 | $ 847,000 | $ 40,797,000 | 6.5A |
| 5B[2] | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 500 mg/kg | -- | Yes | -- | No | $ 20,442,000 | $ 847,000 | $ 34,055,000 | 6.5B |
| 5C | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 1,500 mg/kg | -- | Yes | -- | NA | $ 17,871,000 | $ 847,000 | $ 31,484,000 | 6.5C |
| 6A | Yes | Yes | Yes | Yes | Yes | -- | -- | -- | PCBs ≥ 50 mg/kg | NA | $ 25,399,000 | $ 845,000 | $ 38,962,000 | 6.6A |
| 6B | Yes | Yes | Yes | Yes | Yes | -- | -- | -- | PCBs ≥ 500 mg/kg | NA | $ 18,974,000 | $ 845,000 | $ 32,537,000 | 6.6B |
| 6C | Yes | Yes | Yes | Yes | Yes | -- | -- | -- | PCBs ≥ 1,500 mg/kg | NA | $ 17,058,000 | $ 845,000 | $ 30,620,000 | 6.6C |
| 7A | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 500 mg/kg | Yes | -- | 50 mg/kg ≤ PCBs < 500 mg/kg | NA | $ 35,691,000 | $ 845,000 | $ 49,254,000 | 6.7A |
| 7B | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 1,500 mg/kg | Yes | -- | 500 mg/kg ≤ PCBs < 1,500 mg/kg | NA | $ 20,785,000 | $ 845,000 | $ 34,348,000 | 6.7B |
| 8A | Yes | Yes | Yes | Yes | Yes | PCBs≥ 500 mg/kg | -- | Yes | 50 mg/kg ≤ PCBs < 500 mg/kg | NA | $ 26,435,000 | $ 847,000 | $ 40,048,000 | 6.8A |
| 8B | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 1,500 mg/kg | -- | Yes | 500 mg/kg ≤ PCBs < 1,500 mg/kg | NA | $ 19,537,000 | $ 847,000 | $ 33,150,000 | 6.8B |
| 9A[2] | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 50 mg/kg | Yes ( ≥1500 mg/kg) | Yes | -- | Yes | $ 29,587,320 | $ 847,000 | $ 43,200,000 | 6.9A |
| 9B[2] | Yes | Yes | Yes | Yes | Yes | PCBs ≥ 500 mg/kg | Yes ( ≥1500 mg/kg) | Yes | -- | No | $ 22,581,288 | $ 847,000 | $ 36,194,000 | 6.9B |

Notes:

PCBs - Polychlorinated Biphenyls
mg/kg - milligrams per kilogram
AOI - Area of Interest
O&M - Operation and Maintenance
(1) - Based upon review by U.S. EPA
(2) - U.S. EPA identified alternatives

**TABLE 7.1**

**SUMMARY OF EVALUTION OF INTERIM MEASURES ALTERNATIVES**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Alternative* | *Evaluation Criteria Scores (1)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Protect Human Health and the Environment* | *Achieve Media Cleanup Objectives* | *Remediate the Sources of Releases* | *Long-Term Effectiveness* | *Toxicity, Mobility and Volume Reduction* | *Short-Term Effectiveness* | *Implementability* | *Cost* | *Community Acceptance* | *State Acceptance* |
| 1 | 1 | 5 | 1 | 1 | 1 | 4 | 5 | 5 | TBD | TBD |
| 2 | 1 | 5 | 1 | 2 | 1 | 4 | 5 | 5 | TBD | TBD |
| 3 | 2 | 5 | 4 | 3 | 3 | 4 | 4 | 3 | TBD | TBD |
| 4A | 5 | 3 | 5 | 5 | 3 | 2 | 3 | 1 | TBD | TBD |
| 4B | 5 | 3.5 | 4 | 4 | 3 | 2.5 | 3.25 | 1 | TBD | TBD |
| 4C | 5 | 4 | 3 | 4 | 3 | 3.5 | 3.25 | 3 | TBD | TBD |
| 4D | 5 | 3.5 | 4 | 4 | 3 | 2.5 | 3.25 | 1 | TBD | TBD |
| 4E | 5 | 4 | 4 | 4 | 3 | 3.5 | 3.5 | 3 | TBD | TBD |
| 4F | 5 | 4.5 | 3 | 3.5 | 3 | 3.75 | 3.5 | 3 | TBD | TBD |
| 5A | 5 | 3 | 5 | 5 | 3 | 3 | 3.5 | 2 | TBD | TBD |
| 5B | 5 | 3.5 | 4 | 4 | 3 | 3.5 | 3.75 | 3 | TBD | TBD |
| 5C | 5 | 4 | 3 | 4 | 3 | 3.75 | 3.75 | 3 | TBD | TBD |
| 6A | 5 | 2.5 | 5 | 5 | 5 | 3.5 | 2 | 2 | TBD | TBD |
| 6B | 5 | 3 | 4 | 4 | 4.5 | 3.5 | 2.5 | 3 | TBD | TBD |
| 6C | 5 | 3.25 | 3 | 4 | 4 | 3.5 | 3 | 3 | TBD | TBD |
| 7A | 5 | 2.5 | 5 | 5 | 4 | 2.25 | 2.25 | 1 | TBD | TBD |
| 7B | 5 | 3 | 4 | 4 | 3.25 | 2.75 | 2.5 | 3 | TBD | TBD |
| 8A | 5 | 2.5 | 5 | 5 | 4 | 2.5 | 2.5 | 2 | TBD | TBD |
| 8B | 5 | 3 | 4 | 4 | 3.5 | 3.25 | 2.5 | 3 | TBD | TBD |
| 9A | 5 | 3 | 5 | 5 | 3 | 2 | 3.5 | 2 | TBD | TBD |
| 9B | 5 | 3.5 | 4 | 4 | 3 | 2.5 | 3.75 | 2 | TBD | TBD |

Notes:
1. Numerical score indicates how well a particular criteria has been met: 1 - poor; 2 - fair; 3 - average; 4 - good; and 5 - excellent.
TBD - To Be Determined

Revision 0
April 13, 2005

# RCRA CORRECTIVE ACTION PROGRAM

# INTERIM MEASURES ALTERNATIVES REVIEW REPORT
# EAST PLANT AREA

## VOLUME II OF II – APPENDICES

## GENERAL MOTORS POWERTRAIN BEDFORD FACILITY
## BEDFORD, INDIANA
## U.S. EPA ID NO. IND 006036099

**Prepared For:**
**General Motors Corporation**

DISCLAIMER:
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**Prepared by:**
**Conestoga-Rovers & Associates**

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: (519) 884-0510
Fax: (519) 884-0525

web: http:\\www.CRAworld.com

APRIL 13, 2005
REF. NO. 13968 (151)

# APPENDIX A

# ASSESSMENT OF VOLUMES OF PCB-IMPACTED MEDIA - EAST PLANT AREA

REVISION 0
APRIL 13, 2005

# APPENDIX A

# ASSESSMENT OF VOLUMES OF PCB-IMPACTED MEDIA
# EAST PLANT AREA

# RCRA CORRECTIVE ACTION PROGRAM

# IM ALTERNATIVES REVIEW REPORT

## GENERAL MOTORS POWERTRAIN BEDFORD FACILITY
## BEDFORD, INDIANA
## U.S. EPA ID NO. IND 006036099

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| | | |
|---|---|---|
| Agreement | - | Performance-Based Corrective Action Agreement |
| ASTs | - | aboveground storage tanks |
| amsl | - | above mean see level |
| AOI | - | Area of Interest |
| AOI 10 | - | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | - | Aboveground Storage Tanks |
| AOI 14 | - | McBride Cows Disposal Area |
| AOI 15 | - | Former Equipment Storage Area |
| AOI 16 | - | Former East Electrical Substation |
| AOI 23 | - | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |
| AOI 3 | - | PCB Storage Area |
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| AOI 5 | - | Former East Sand Disposal Area |
| AOI 6 | - | Former Sludge Disposal and Fire Training Area |
| AOI 7 | - | Former North Lagoons and Outfall 001 |
| AOI 8 | - | Former South Lagoons and Outfall 002 |
| bgs | - | below ground surface |
| CA | - | Corrective Action |
| CCR | - | Current Conditions Report |
| CRA | - | Conestoga-Rovers & Associates, Inc. |
| cu yd | - | cubic yards |
| EVS | - | Environmental Visualization System |
| Facility | - | GM Powertrain Bedford Facility |
| GM | - | General Motors Corporation |
| IM | - | Interim Measures |
| mg/kg | - | milligrams per kilogram |
| PCB | - | Polychlorinated Biphenyl |
| PCB Volume Assessment | - | Assessment of Volumes of PCB-Impacted Media – East Plant Area |
| RA | - | Removal Action |
| RCRA | - | Resource Conservation and Recovery Act |
| RFI | - | RCRA Facility Investigation |
| RFI Work Plan | - | RCRA Facility Investigation Work Plan |
| SOIL TM | - | RFI Technical Memorandum – Soil; Sediment; Surface Water; Wipe Sampling (CRA, April 2004) |
| STREAM TM | - | Technical Memorandum, Phase II Stream Investigations (CRA, February 2003) |
| USDA | - | United States Department of Agriculture |
| U.S. EPA | - | United States Environmental Protection Agency |

# 1.0 INTRODUCTION

This Assessment of Volumes of Polychlorinated Biphenyl (PCB)-Impacted Media (PCB Volume Assessment) presents the methodology utilized to assess the distribution and volumes of PCB-impacted media within the East Plant Area of the General Motors Corporation (GM) Powertrain Bedford Facility (Facility) located in Bedford, Indiana. Conestoga-Rovers & Associates, Inc. (CRA) has prepared this PCB Volume Assessment on behalf of GM as part of the Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) activities being conducted under the Performance-Based Corrective Action Agreement (Agreement) (effective March 20, 2001, and modified on October 1, 2002) between United States Environmental Protection Agency (U.S. EPA) and GM for the GM Powertrain Bedford Facility (Facility). More specifically, this PCB Volume Assessment has been prepared to support the evaluation of Interim Measure (IM) alternatives presented in the IM Alternatives Review Report (CRA, April 2005).

The Facility location is presented on Figure A.1. The East Plant Area and Area of Interest (AOI) locations are presented on Figure A.2.

## 1.1 GENERAL

This PCB Volume Assessment will present an overview of the known current conditions within the East Plant Area and provide details related to the determination of soil and shallow bedrock volumes, and the assessment of PCB-impacted media volumes within the East Plant Area.

This PCB Volume Assessment includes the following elements:

i) review of existing geological data;

ii) development of isopachs and volumes of overburden/fill and the St. Louis Limestone within the East Plant Area;

iii) review of existing PCB analytical data;

iv) screening of PCB analytical data;

v) development of PCB isoconcentration contours by elevation and depth; and

vi) determination of volumes of PCB-impacted overburden/fill within the East Plant Area.

## 1.2 PURPOSE OF PCB VOLUME ASSESSMENT

The purpose of this PCB Volume Assessment is to estimate the volumes of soil and shallow bedrock materials within the East Plant Area, and also to estimate the volumes of PCB-impacted media within the East Plant Area of the Facility.

## 1.3 PCB VOLUME ASSESSMENT SUPPORT DOCUMENTS

This PCB Volume Assessment utilizes data presented in or developed from the following sources:

- Current Conditions Report (CCR) (CRA, May 2001);
- RCRA Facility Investigation Work Plan (RFI Work Plan) (CRA, October 2001);
- RFI Technical Memorandum – Soil; Sediment; Surface Water; Wipe Sampling (SOIL TM) (CRA, April 2004);
- Technical Memorandum, Phase II Stream Investigation (STREAM TM) (CRA, February 2003);
- RFI Work Plan Addendum No. 1 (CRA, November 2002);
- RFI Work Plan Addendum No. 2 (CRA, May 2003);
- RFI Work Plan Addendum No. 3 (CRA, March 2004);
- RFI Work Plan Addendum No. 4 (CRA, May 2004);
- RFI Work Plan Addendum No. 5 (CRA, February 2004);
- RFI Work Plan Addendum No. 6 (CRA, June 2004); and
- RFI Work Plan Addendum No. 7 (CRA, September 2004).

## 1.4 PCB VOLUME ASSESSMENT ORGANIZATION

The remainder of this PCB Volume Assessment is organized as follows:

**Section 2.0 – Review of Existing Conditions**
This Section presents a description of the East Plant Area and brief discussion of previous investigations that have formed the basis for this PCB Volume Assessment.

**Section 3.0 – Volume Assessment of Geologic Materials**

This Section outlines the process used to determine the volumes of the soil and shallow bedrock materials of interest within the East Plant Area.

**Section 4.0 – Volume Assessment of PCB-Impacted Media**

This Section outlines the process used to determine the volumes of PCB-impacted media within the East Plant Area.

**Section 5.0 – References**

This Section presents references cited in the PCB Volume Assessment.

# 2.0 REVIEW OF EXISTING CONDITIONS

## 2.1 LOCAL SETTING

The local setting is based upon the various phases of investigations that have been completed at the Facility since 2001.

### 2.1.1 LOCAL GEOLOGY

The native soil in the immediate vicinity of the Bedford Facility is known as Crider. Crider soil is a fine-grained, silt loam to silty clay loam. Crider soil develops on 20 inches to 45 inches of silty loess over clayey material derived from limestone [United States Department of Agriculture (USDA), 1985].

The overburden materials at the East Plant Area consist of fill materials, and clay and silt. The thickness of the overburden materials varies considerably across the East Plant Area. Overburden is generally thickest in AOIs 4, 5, 6, and 7, where foundry sands and other filling activities are known to have occurred over the years.

The overburden within the East Plant Area is underlain by the St. Louis and Salem Limestone Formations. The St. Louis Formation has been identified to be highly weathered and fractured near surface. Fracture density appears to decrease with depth. The highly weathered and fractured St. Louis Limestone is underlain by the Salem Limestone (also known as the Indiana, Bedford, or Oolitic Limestone) which is the limestone formation utilized by local quarries for fine building stone. The Salem Limestone is generally more massive and less weathered and fractured than the St. Louis Limestone.

Additional information on the East Plant Area geology is presented in the SOIL TM (CRA, April 2004), the RFI Work Plan (CRA, October 2001), and the IM Alternatives Review Report (CRA, April 2005).

### 2.1.2 LOCAL HYDROGEOLOGY

The IM Alternatives Review Report for fill/overburden and shallow bedrock groundwater flow describes the shallow groundwater flow (i.e., unconfined water table) through the unconsolidated overburden and upper fractured/weathered bedrock at the Facility. Recharge to the water table aquifer occurs through the overburden materials

and directly into bedrock, where exposed. Discharge of the shallow bedrock groundwater occurs through springs and seeps in topographically low areas (e.g., creeks and ditches). The results of groundwater sampling across the Facility and the preliminary results of the dye trace testing completed in September 2004 support this IM Alternatives Review Report.

## 2.2 EAST PLANT AREA AREAS OF INTEREST

The following AOIs fall within the East Plant Area:

- AOI 3 – PCB Storage Area;
- AOI 4 – Former North Disposal Area;
- Area North of AOI 4;
- AOI 5 – Former East sand Disposal Area;
- AOI 6 – Former Sludge Disposal and Fire Training Area;
- AOI 7 – Former North Lagoons and Outfall 001;
- AOI 8 – Former South Lagoons and Outfall 002;
- AOI 10 – Existing Stormwater Lagoon and Outfall 003;
- AOI 11 – Aboveground Storage Tanks (ASTs);
- AOI 15 – Former Equipment Storage Area; and
- AOI 23 – Area Affected by the 1996 Wastewater Treatment Filter Cake Release.

## 2.3 EAST PLANT AREA EXISTING SAMPLE LOCATIONS

The locations in the East Plant Area where sampling and investigative boreholes were conducted during the RFI Work Plan are presented on Figure A.3. East Plant Area borehole logs are presented in Attachment A.

# 3.0 VOLUME ASSESSMENT OF GEOLOGIC MATERIALS

## 3.1 STRATIGRAPHIC SURFACES

The stratigraphic layers across the Facility were initially developed and described in the SOIL TM (CRA, April 2004). The stratigraphic layers of primary interest within the East Plant Area are:

- Overburden/Fill;
- St. Louis Limestone Formation; and
- Salem Limestone Formation.

The existing overburden/fill topography within the East Plant Area is presented on Figure A.4. The bedrock contours (top of rock) have been updated based on recent investigations within the East Plant Area and are presented on Figure A.5. Additionally, the St. Louis Limestone surface contours have been updated (Figure A.6) and the Salem Limestone surface contours have been updated (Figure A.7). These contours were entered into Autodesk® Land Desktop along with the property limits of the East Plant Area to generate surfaces that represent a three dimensional boundary between the stratigraphic layers. These stratigraphic surfaces are used within Autodesk® Land Desktop to determine isopachs and volumes of material estimates within the East Plant Area.

## 3.2 ISOPACHS OF MEDIA

The stratigraphic surfaces in conjunction with the property boundaries for the East Plant area were used within Autodesk® Land Desktop to generate isopachs of the overburden/fill layer (Figure A.8) and the St. Louis Limestone (Figure A.9) within the East Plant Area. These isopachs present the thicknesses of the overburden/fill layer and the St. Louis Limestone within the East Plant Area.

## 3.3 VOLUMES OF MEDIA

The stratigraphic surfaces discussed in Section 3.1 were also used to determine the volumes of the overburden/fill layer and the St. Louis Limestone in the East Plant Area. The volume data sheets developed to calculate the volume of overburden/fill and St.

Louis Limestone are presented in Attachment B. The volumes of the East Plant Area stratigraphic layers are summarized below.

| *Stratigraphic Layer* | *Volume of Materials (cubic yards (cu yd))* |
|---|---|
| Overburden/Fill | 1,372,576 |
| St. Louis Limestone | 1,470,757 |

These volume estimates are provided for reference in relation to the estimates of impacted media presented in Section 4.0

# 4.0 VOLUME ASSESSMENT OF PCB-IMPACTED MEDIA

## 4.1 VOLUME ESTIMATE SCENARIOS

PCB-impacted volume estimates are developed for the following scenarios:

Scenario 1: 0 feet to the top of bedrock;

Scenario 2: 0-2 foot depth (below ground surface (bgs));

Scenario 3: 0-10 foot in depth (bgs); and

Scenario 4: 0-15 foot in depth (bgs).

PCB volume estimates were developed for the following PCB concentrations:

- 1.8 milligrams per kilogram (mg/kg);
- 5.3 mg/kg;
- 7.4 mg/kg;
- 25 mg/kg;
- 50 mg/kg;
- 100 mg/kg;
- 500 mg/kg; and
- 1500 mg/kg.

## 4.2 REVIEW OF EXISTING PCB ANALYTICAL DATA

The current project database was queried for all data within the East Plant Area. The data utilized to compute the volume of PCB-impacted media is summarized in Table A4.1.

## 4.3 SCREENING OF PCB ANALYTICAL DATA

The East Plant Area data was screened to remove data points that have been removed as part of the Upstream Parcels Removal Action Work Plan (CRA, 2004). Data associated with verification sampling was not included. Within the Removal Action (RA) areas, this represents PCB concentrations outside/below the limits of the RA.

The coordinates and concentrations of these data were then organized into five-foot elevation intervals above mean sea level (amsl). These data were plotted on 24 figures that represent the full elevation range of observed PCB-impacted media (605 ft amsl through 725 ft amsl) within the East Plant Area.

## 4.4 DEVELOPMENT OF PCB ISOCONCENTRATION CONTOURS

The 24 data plot figures were assessed and interpreted to develop isoconcentration contours to interpret the data in consideration of geology, past land use, and known conditions within the East Plant Area. The isoconcentration contours were plotted with AutoCAD®. Figures A.10 through A.33 present the isoconcentration contours associated with each 5 ft amsl elevation interval within the East Plant Area.

The following isoconcentration contours were developed based on existing data within the East Plant Area:

- 1.8 mg/kg PCBs;
- 5.3 mg/kg PCBs;
- 50 mg/kg PCBs;
- 500 mg/kg PCBs; and
- 1,500 mg/kg PCBs.

Volumes of PCB-impacted materials at concentrations of 7.5 mg/kg, 25 mg/kg, and 100 mg/kg are interpolated from the volume estimates.

## 4.5 ENVIRONMENTAL VISUALIZATION SYSTEM

Environmental Visualization System (EVS) performs three-dimensional visualization and geostatistical analysis of data to create illustrative 3-D images and 3-D animations. EVS is useful for analyzing and presenting data for assessments, remediation planning, and public relations.

The twenty-four isoconcentration contours associated with each 5-ft interval were used to generate the EVS model. The contours were assumed to be continuous over the 5ft depth (i.e. no interpolation), such that each depth interval was essentially layered overtop of one another to produce the 3-D visualization. Figure A.34 presents a plan view of the East Plant Area isoconcentration visualization. Figure A.35 presents an

oblique view to show both the horizontal and vertical distribution of PCBs within the East Plant Area.

The full-animated EVS is presented on the compact disc at the back of this document.

## 4.6 SCENARIO 1: 0 FEET TO TOP OF BEDROCK

Figures A.10 through A.33 present the total area by PCB isoconcentration for each associated 5 ft thick elevation layer. These areas are assumed to be the horizontal boundary for the entire elevation interval, and the thickness is 5 feet. The isoconcentration areas multiplied by depth result in volumes per elevation interval. These volumes are added up by PCB isoconcentration to determine the total volumes by concentration of PCB-impacted media within the East Plant Area. Table A4.2 presents the calculation of areas and volumes of PCB-impacted media within the East Plant Area. Table A4.3 presents volume conversions. Table A4.4 presents the interpolation of PCB concentrations and Table A4.5 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted for Scenario 1 within the East Plant Area.

| *PCB Isoconcentration (mg/kg)* | *Volume of PCB-impacted Media (cu yd)* | *Tons (1.4 tons/cu yd)* |
|---|---|---|
| 1.8 | 500,431 | 700,604 |
| 5.3 | 315,338 | 441,473 |
| 7.4 | 306,603 | 429,244 |
| 25 | 233,399 | 326,759 |
| 50 | 129,415 | 181,181 |
| 100 | 119,177 | 166,848 |
| 500 | 37,274 | 52,184 |
| 1,500 | 9,772 | 13,681 |

## 4.7 SCENARIO 2: 0-2 FOOT DEPTH (BGS)

The PCB data for the 0-2 foot depth interval is presented and contoured on Figure A.36. The following presents a summary of the PCB-impacted media within the 0-2 foot depth interval. Table A4.6 presents the calculation of areas volumes and associated conversions. Table A4.7 presents the interpolation of PCB concentrations and Table A4.8 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 2 within the East Plant Area.

| *PCB Isoconcentration (mg/kg)* | *Volume of PCB-impacted Media (cu yd)* | *Tons (1.4 tons/cu yd)* |
|---|---|---|
| 1.8 | 32,602 | 45,643 |
| 5.3 | 18,818 | 26,345 |
| 7.4 | 18,312 | 25,637 |
| 25 | 14,077 | 19,708 |
| 50 | 8,061 | 11,286 |
| 100 | 7,426 | 10,396 |
| 500 | 2,345 | 3,283 |
| 1,500 | 618 | 865 |

## 4.8 SCENARIO 3: 0-10 FOOT DEPTH (BGS)

The PCB data for the 0-10 foot depth interval is presented and contoured in intervals of 0-5 foot depth and 5-10 foot depth on Figures A.37 and A.38, respectively. The following presents a summary of the PCB-impacted media within the 0-10 foot depth interval. Table A4.9 presents the calculation of areas volumes and associated conversions. Table A4.10 presents the interpolation of PCB concentrations and Table A4.11 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 3 within the East Plant Area.

| *PCB Isoconcentration (mg/kg)* | *Volume of PCB-impacted Media (cu yd)* | *Tons (1.4 tons/cu yd)* |
|---|---|---|
| 1.8 | 195,726 | 274,016 |
| 5.3 | 68,384 | 95,738 |
| 7.4 | 67,371 | 94,319 |
| 25 | 58,881 | 82,433 |
| 50 | 46,821 | 65,549 |
| 100 | 43,216 | 60,502 |
| 500 | 14,379 | 20,130 |
| 1,500 | 4,995 | 6,936 |

## 4.9 SCENARIO 4: 0-15 FOOT DEPTH (BGS)

The PCB data for the 0-15 foot depth interval is presented and contoured in intervals of 0-5 foot depth, 5-10 foot depth, and 10-15 foot depth on Figures A37, A.38, and A.39, respectively. The following presents a summary of the PCB-impacted media within the 0-15 foot depth interval. Table A4.12 presents the calculation of areas volumes and associated conversions. Table A4.13 presents the interpolation of PCB concentrations and Table A4.14 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 4 within the East Plant Area.

| *PCB Isoconcentration (mg/kg)* | *Volume of PCB-impacted Media (cu yd)* | *Tons (1.4 tons/cu yd)* |
|---|---|---|
| 1.8 | 237,676 | 332,747 |
| 5.3 | 91,188 | 127,663 |
| 7.4 | 89,633 | 125,486 |
| 25 | 76,604 | 107,246 |
| 50 | 58,096 | 81,335 |
| 100 | 53,564 | 74,990 |
| 500 | 17,308 | 24,231 |
| 1,500 | 5,064 | 7,090 |

## 4.10 PCB-IMPACTED MEDIA SUMMARY

### 4.10.1 SUMMARY OF PCB-IMPACTED OVERBURDEN/FILL

Table A4.15 presents a summary of the four scenarios and the volumes of PCB-impacted overburden/fill associated with each scenario by PCB isoconcentration (mg/kg) and the associated tons by PCB isoconcentration (mg/kg).

The quantity of potentially PCB-impacted St. Louis Limestone and Salem Limestone is not currently defined.

The following presents a summary (by tons) of the four scenarios.

| *PCB Isoconcentration (mg/kg)* | *Scenario 1 All Depths to Bedrock (tons)* | *Scenario 2 0-2 ft depth (tons)* | *Scenario 3 0-5 ft depth (tons)* | *Scenario 4 0-10 ft depth (tons)* |
|---|---|---|---|---|
| 1.8 | 700,604 | 45,643 | 274,016 | 332,747 |
| 5.3 | 441,473 | 26,345 | 95,738 | 127,663 |
| 7.4 | 429,244 | 25,637 | 94,319 | 125,486 |
| 25 | 326,758 | 19,708 | 82,433 | 107,246 |
| 50 | 181,181 | 11,286 | 65,549 | 81,335 |
| 100 | 166,848 | 10,397 | 60,502 | 74,990 |
| 500 | 52,184 | 3,283 | 20,130 | 24,231 |
| 1,500 | 13,681 | 865 | 6,936 | 7,090 |

### 4.10.2 SUMMARY OF PCB-IMPACTED SHALLOW BEDROCK

PCB delineation samples have not been taken within the bedrock during previous investigations. The quantity of PCB-impacted St. Louis Limestone and Salem Limestone is not currently defined. However, based on observations during field investigations, the approximate thickness of weathered bedrock within the East Plant Area is between 2 to 10 feet.

## 5.0 REFERENCES

CRA, Current Conditions Report (CCR), 13968(1), May 2001.

CRA, RCRA Facility Investigation (RFI) Work Plan, 13968(8), October 2001.

CRA, RFI Work Plan Addendum No. 1, 13968(29), November 2002.

CRA, RFI Work Plan Addendum No. 2, 13968(52), May 2003.

CRA, RFI Work Plan Addendum No. 3, 13968(68), March 2004.

CRA, RFI Work Plan Addendum No. 4, 13968(28), May 2004.

CRA, RFI Work Plan Addendum No. 5, 13968(83), February 2004.

CRA, RFI Work Plan Addendum No. 6, 13968(107), June 2004.

CRA, RFI Work Plan Addendum No. 7, 13968(106), September 2004.

CRA, Site Source Control Work Plan (SSC Work Plan), 13968(53), November 2003.

CRA, RFI Technical Memorandum – Soil; Sediment; Surface Water; Wipe Sampling (SOIL TM), 13968(45), April 2004.

CRA, Technical Memorandum, Phase II Stream Investigations (STREAM TM), 13968(32), February 2003.

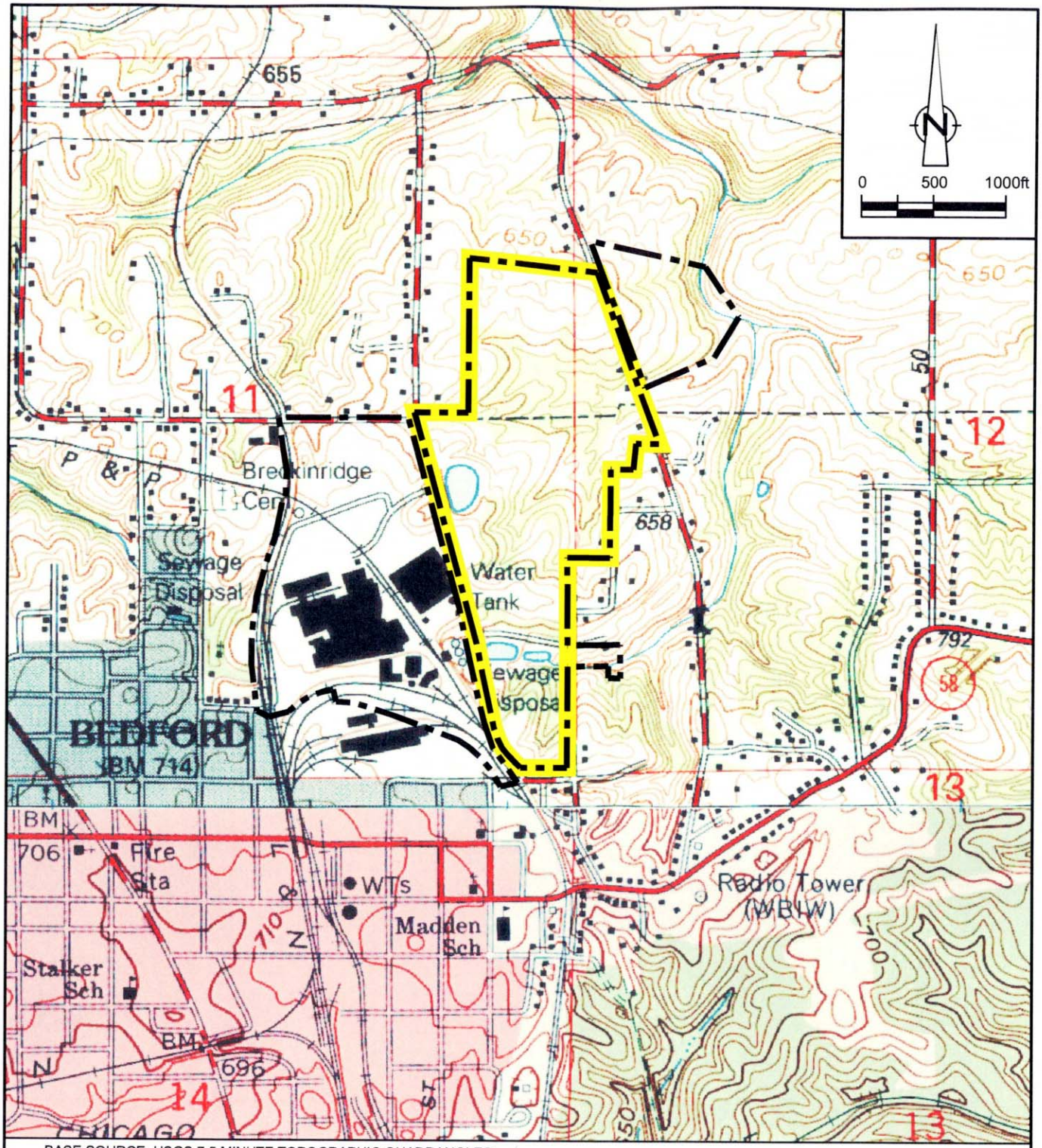
CRA, Upstream Parcels Removal Action Work Plan, 13968 (30), July 2003.

Exponent, Bedford RFI Technical Memorandum 1, 2001 Stream Investigation Data Summary, March 2002.

Exponent, Stream Investigation Assessment, June 2001.

U.S. EPA Performance Based Corrective Action Agreement, March 2001.

U.S. Environmental Protection Agency (U.S. EPA). 1996. 61 FR 19432, May 1, 1996; OSWER Directive 9355.0-30 1991.




BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES;
BARTLETTSVILLE, INDIANA 1994
BEDFORD EAST, INDIANA 1978
BEDFORD WEST, INDIANA 1993
OOLITIC, INDIANA 1987

LEGEND

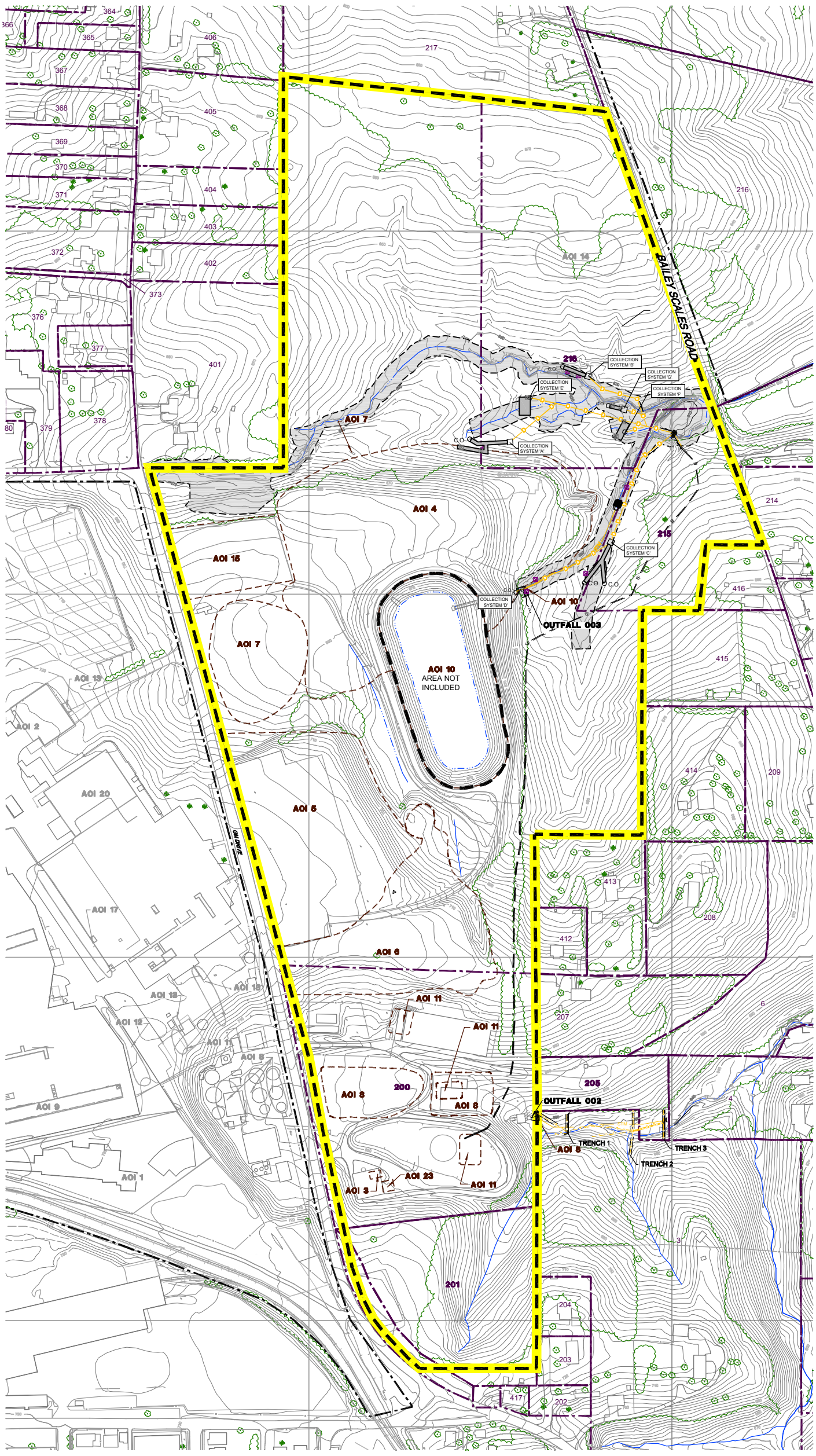
FACILITY BOUNDARY

EAST PLANT AREA

figure A.1

FACILITY LOCATION
ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA
- EAST PLANT AREA
GM POWERTRAIN BEDFORD FACILITY
*Bedford, Indiana*

13968-00(151)GN-WA076 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- SEEP SAMPLE LOCATION
- SPRING SAMPLE LOCATION
- LOCATION OF OBSERVED SPRING
- HIGH FLOW SAMPLE LOCATION
- PROPOSED HDPE FORCEMAIN TO CONVEY COLLECTED WATER TO FACILITY WWTP / TEMPORARY STORAGE TANKS
- SSC EXTRACTION TRENCH
- PROPOSED SSC SUMP STRUCTURE
- STM — PROPOSED 42" DIA. CORRUGATED HDPE STORM SEWER
- PROPOSED GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- PROPOSED GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- C.O. PROPOSED CLEANOUT
- PROPOSED WET WELL
- DIRECTION OF FLOW
- E — ELECTRICAL POWER LINE
- F — EXISTING FORCEMAIN TO TREATMENT FACILITY

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

# EAST PLANT AREA AND AOI LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.2 |

13968-00(151)GN-WA077 APR 07/2005

AOI 14

AOI 7

AOI 4

AOI 15

AOI 10

AOI 5

AOI 6

AOI 18

AOI 13

AOI 11

AOI 8

AOI 23

AOI 3

BAILEY SCALES ROAD

GM DRIVE

BARLOW LANE

4TH STREET

FORMER NPDES OUTFALL 001

NPDES OUTFALL 003

NPDES OUTFALL 002

SPRING

SES North Frac Tank

Eastern Seep Area 01

Eastern Seep Area 02

SALARY PARKING

PISTON BUILDING

HENRY SYSTEM TOWER

SUBSTATION

CALCON BUILDING

AERATION TANK

SURGE BASIN

MILLION GALLON TANK (WEST SLUDGE SURGE TANK) (REMOVED)

MILLION GALLON TANK (EAST SLUDGE SURGE TANK)

SLUDGE BUILDING

NORTHERN SPRING

SOUTHERN SPRING

FORMER ROUNDHOUSE

FILTER BUILDING

PARKING AREA

TEMP (AOI-6 PONDED WATER)

BOTTOM PORTION OF EAST PLANT AREA

LEGEND

- EXISTING BUILDINGS
- AOI BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- EAST PLANT AREA
- 215-1247 SAMPLE LOCATION
- B-X243Y257 TOP OF BEDROCK SAMPLE LOCATION
- B-X223Y247D BOTTOM OF BEDROCK SAMPLE LOCATION

**AOI SUMMARY**

AOI ID Description

AOI 1 Former Railroad Operations and Minerals Processing Facility
AOI 2 Waste Storage Area
AOI 3 PCB Storage Areas
AOI 4 Former North Disposal Area
AOI 5 Former East Sand Disposal Area
AOI 6 Former Sludge Disposal and Fire Training Area
AOI 7 Former North Lagoon and Outfall 001
AOI 8 Former South Lagoons and Outfall 002
AOI 9 Service Tunnels
AOI 10 Existing Stormwater Lagoon and Outfall 003
AOI 11 Aboveground Storage Tanks
AOI 12 Area Affected by the Reclaimed Hydraulic Fluid Release
AOI 13 Underground Storage Tanks
AOI 14 McBride Cows Disposal Area
AOI 15 Former Equipment Storage Area
AOI 17 Piston Building Oil Accumulations
AOI 18 Area Affected by the Henry System Discharge
AOI 19 Area Affected by Paint and Thinner Spill
AOI 20 Northern Portion of the Piston Building
AOI 21 Filled Ravine North of Die Cast Building
AOI 22 Tool Room Annex Dock Release
AOI 23 Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 24 Area Affected by the June 2000 Die Lube 5150 Release

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

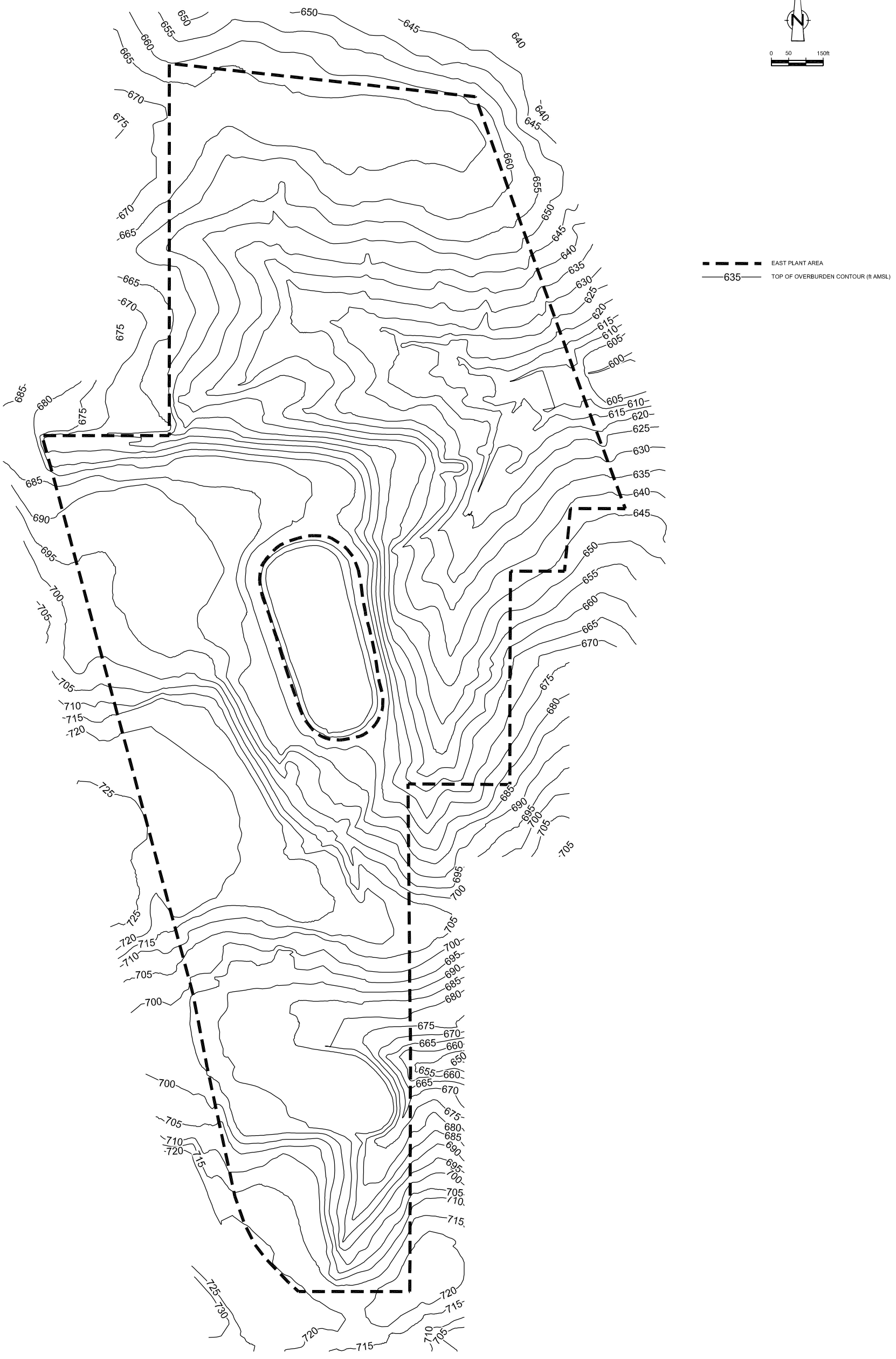
EXISTING SAMPLE LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.3 |

13968-00(151)GN-WA078 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

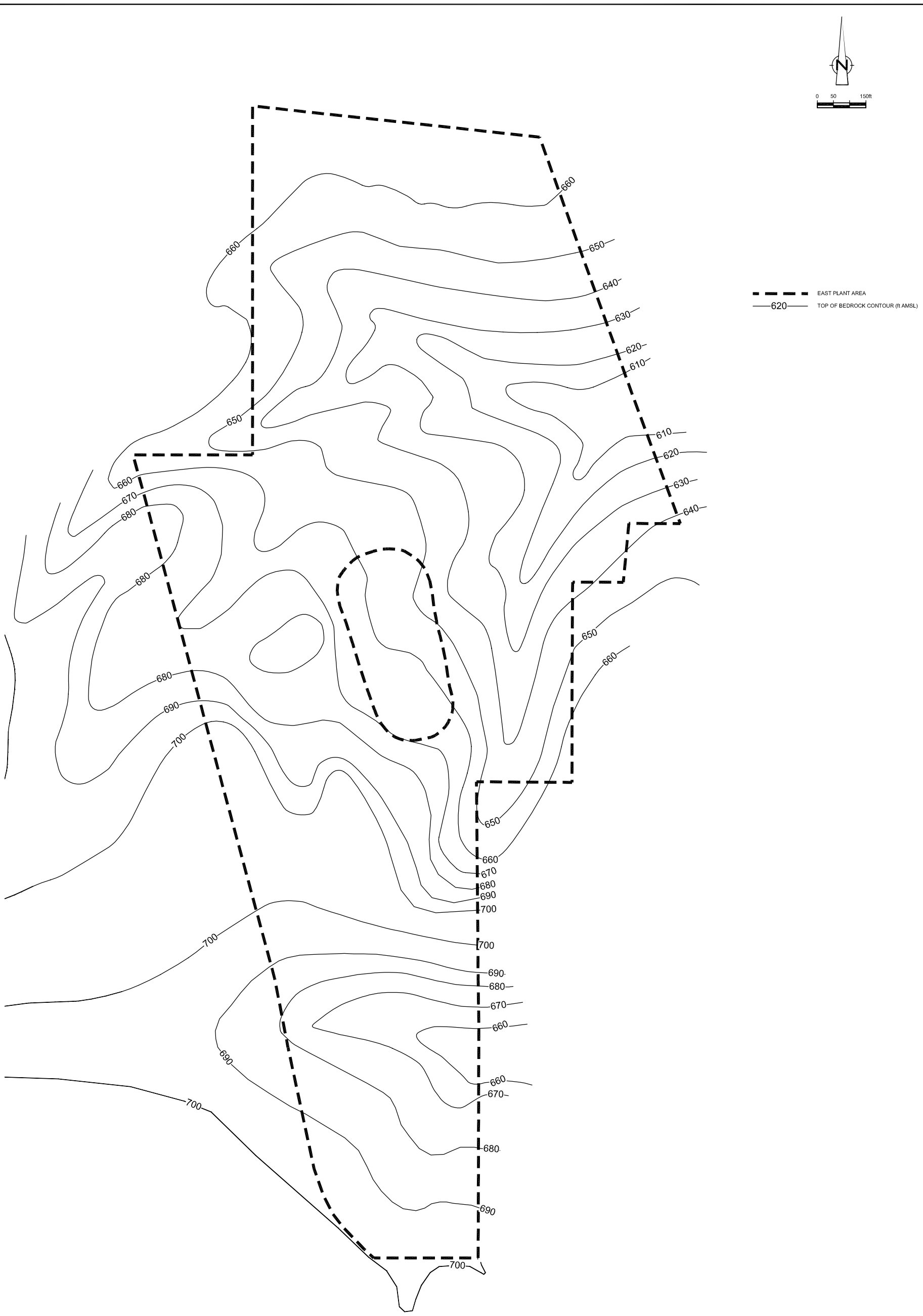
EXISTING OVERBURDEN/ FILL TOPOGRAPHY

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.4 |

13968-00(151)GN-WA079 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

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Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

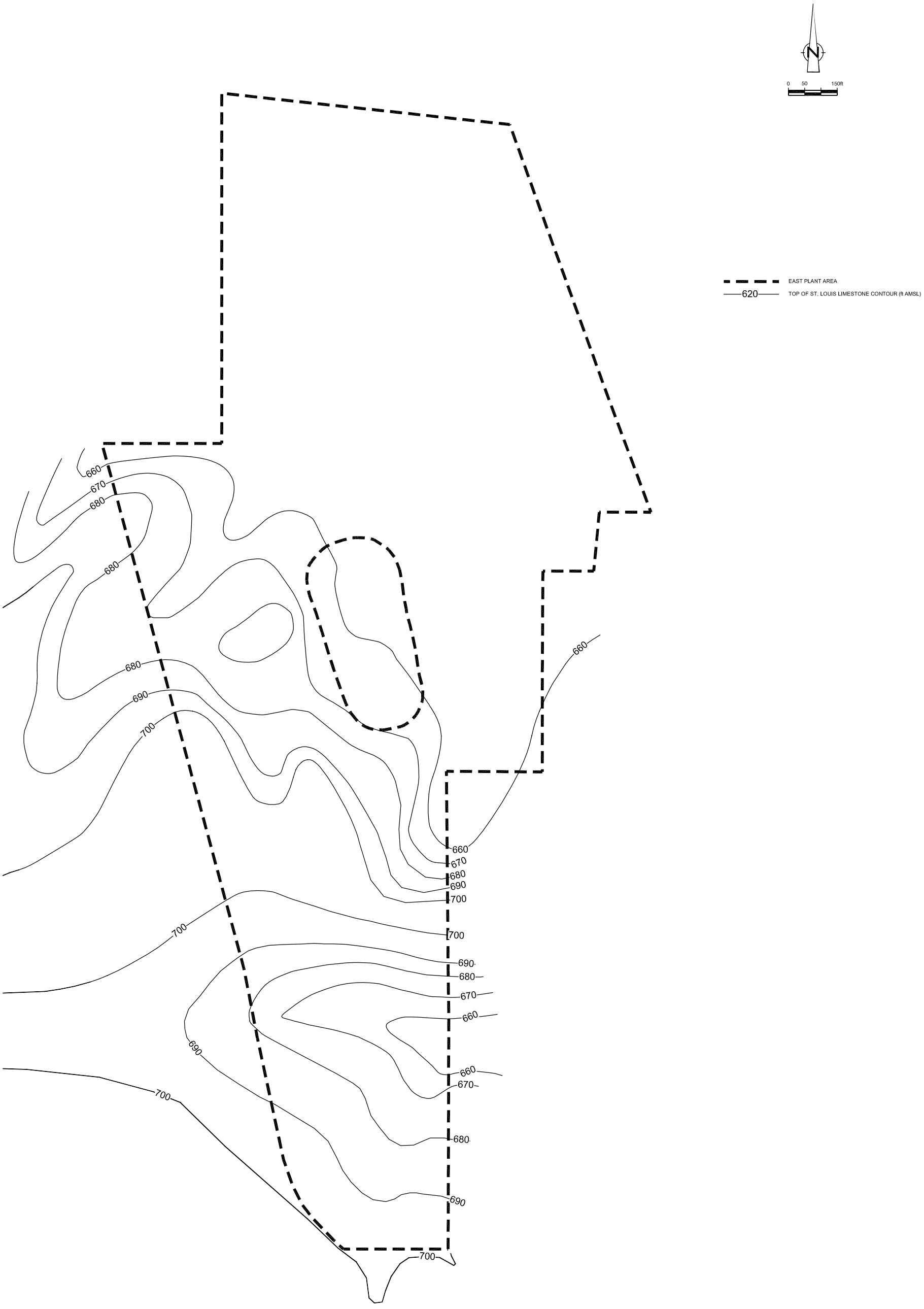
# EXISTING BEDROCK TOPOGRAPHY

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.5 |

13968-00(151)GN-WA080 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

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Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

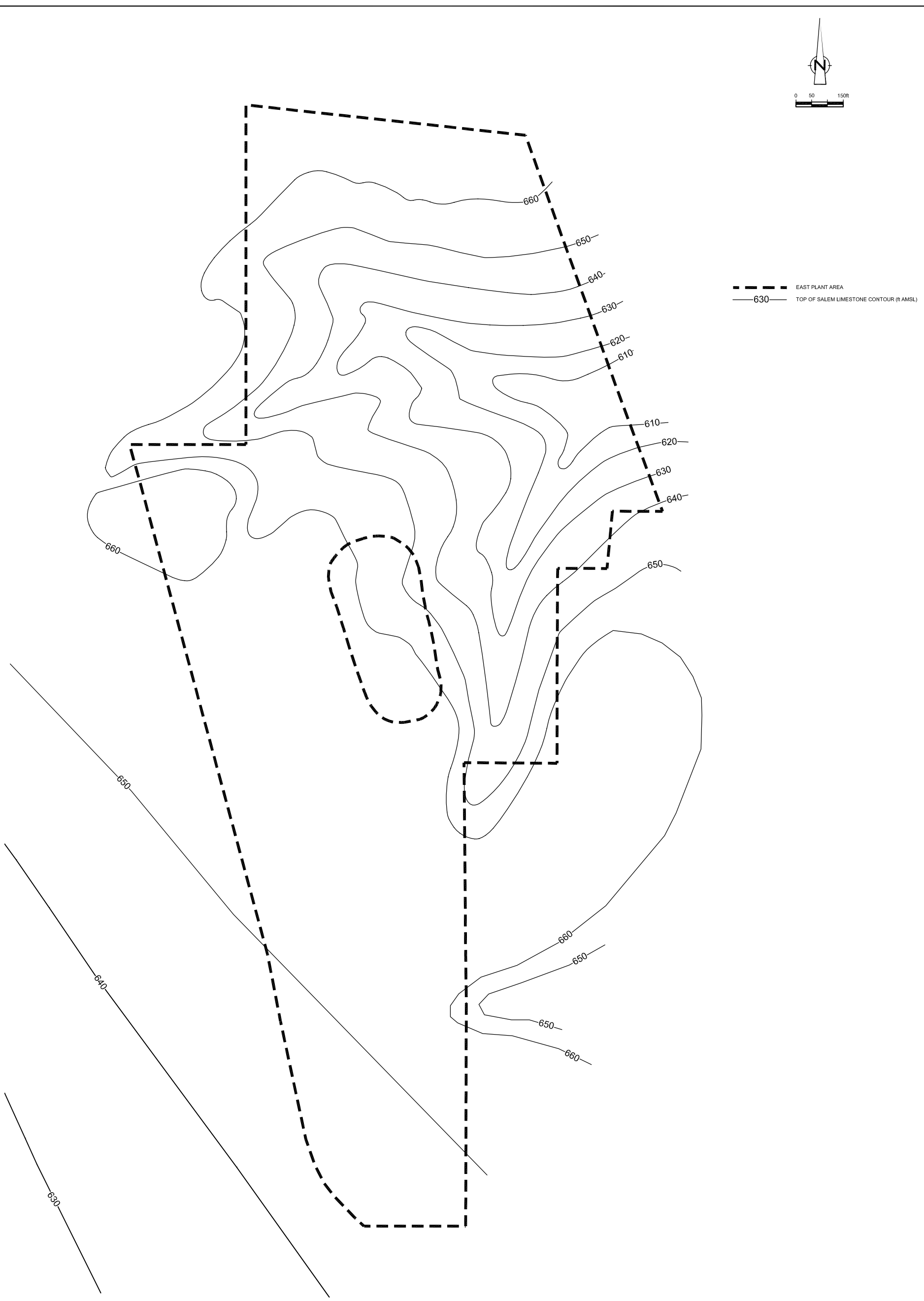
ST. LOUIS LIMESTONE
TOPOGRAPHY

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.6 |

13968-00(151)GN-WA081 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

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GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

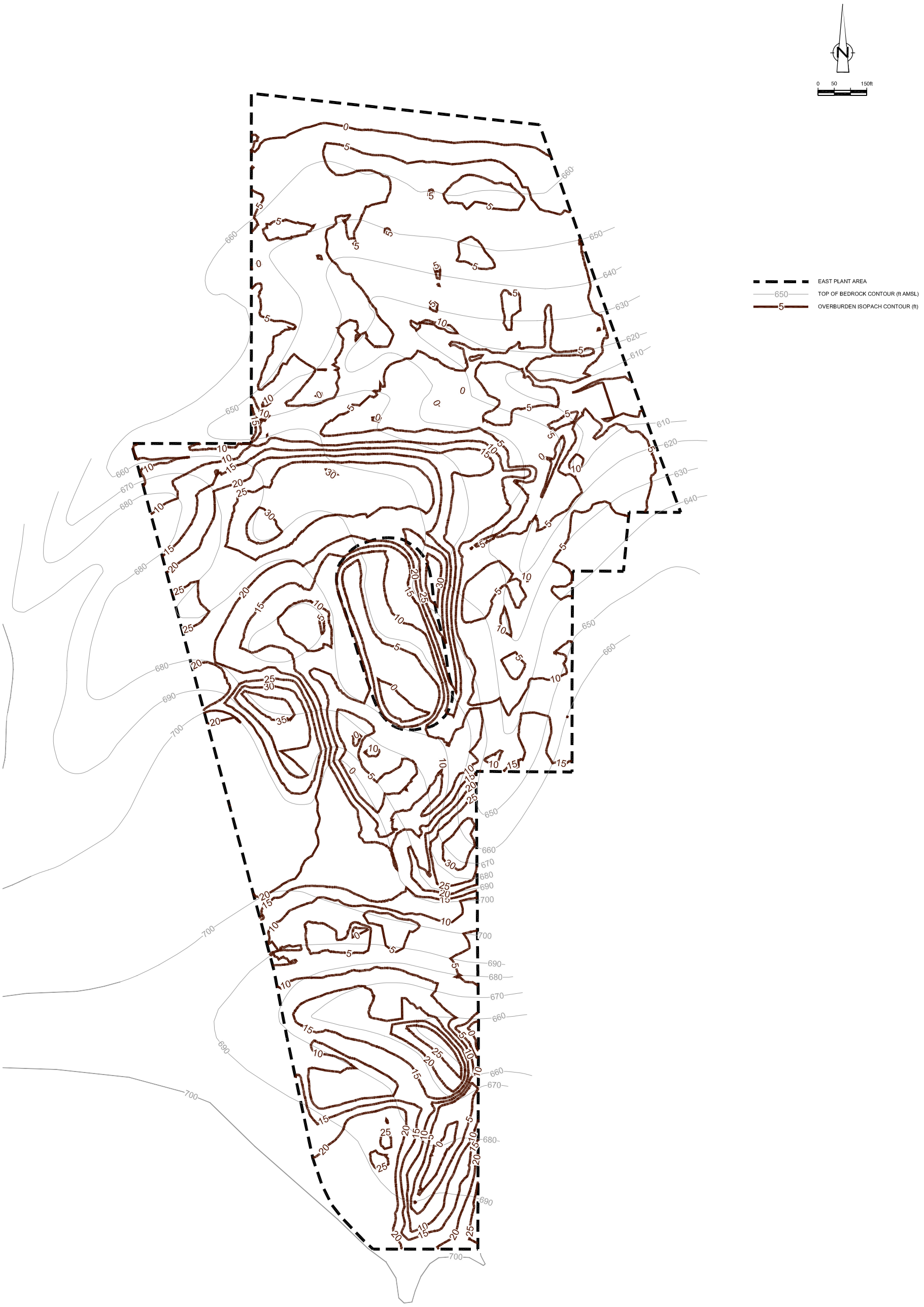
SALEM LIMESTONE
TOPOGRAPHY

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.7 |

13968-00(151)GN-WA082 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

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Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

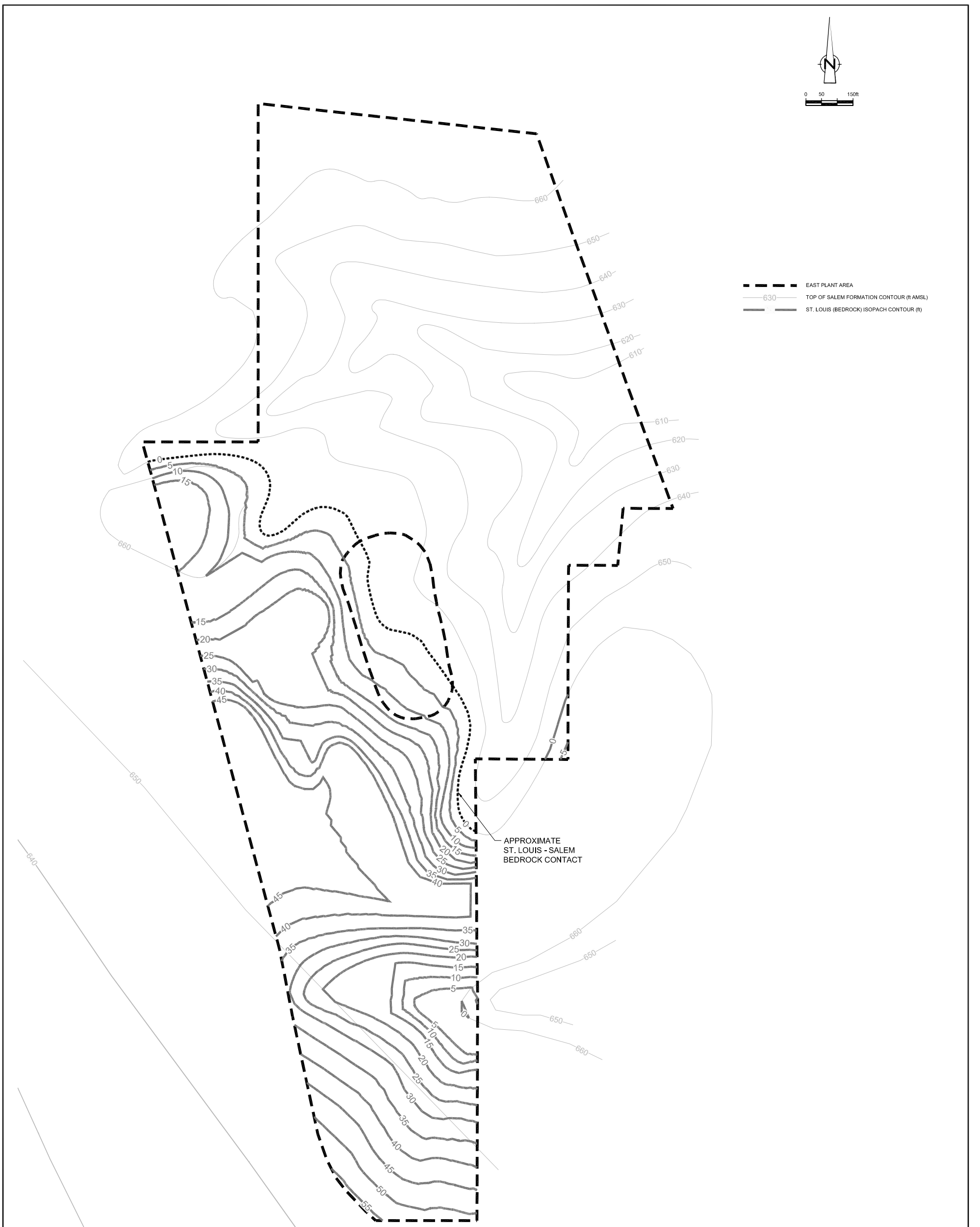
OVERBURDEN/ FILL
ISOPACH CONTOURS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.8 |

13968-00(151)GN-WA083 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

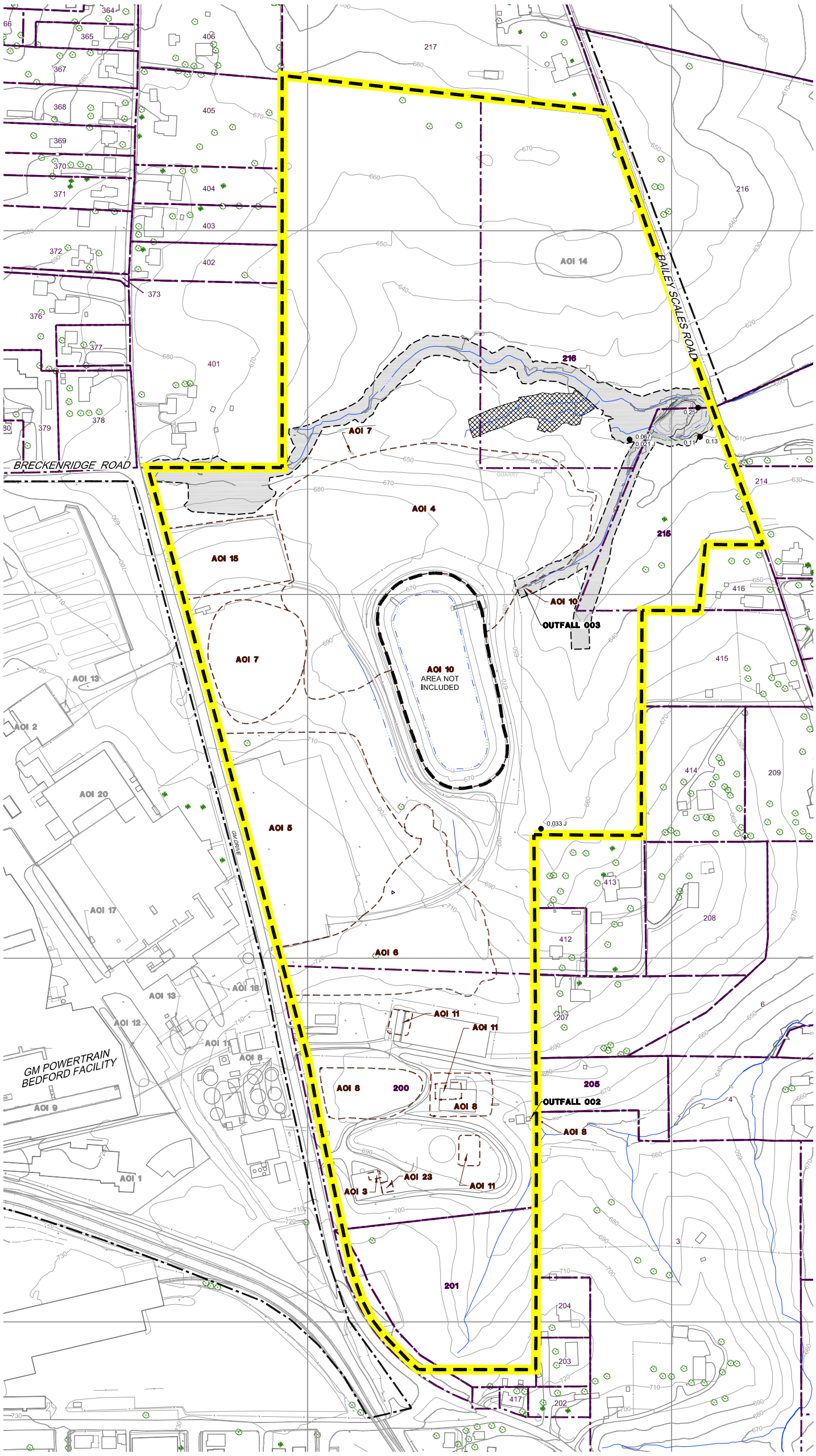
ST. LOUIS LIMESTONE FORMATION
ISOPACH CONTOURS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: 1" = 150' | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.9 |

13968-00(151)GN-WA084 APR 07/2005




N

0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA

NOTE:

PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

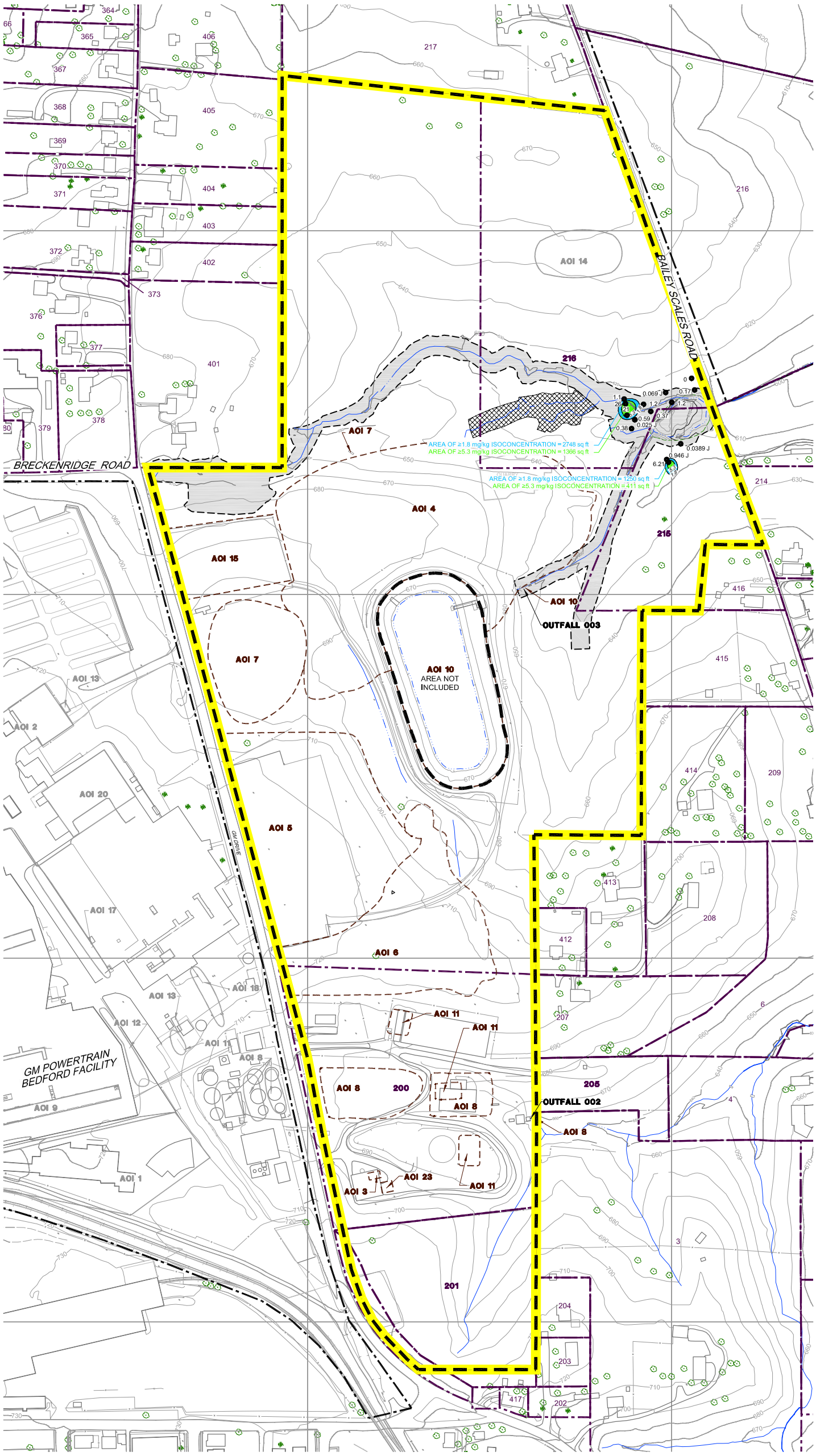
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
605-610 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.10 |

13968-00(151)GN-WA085 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 3998 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 1777sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

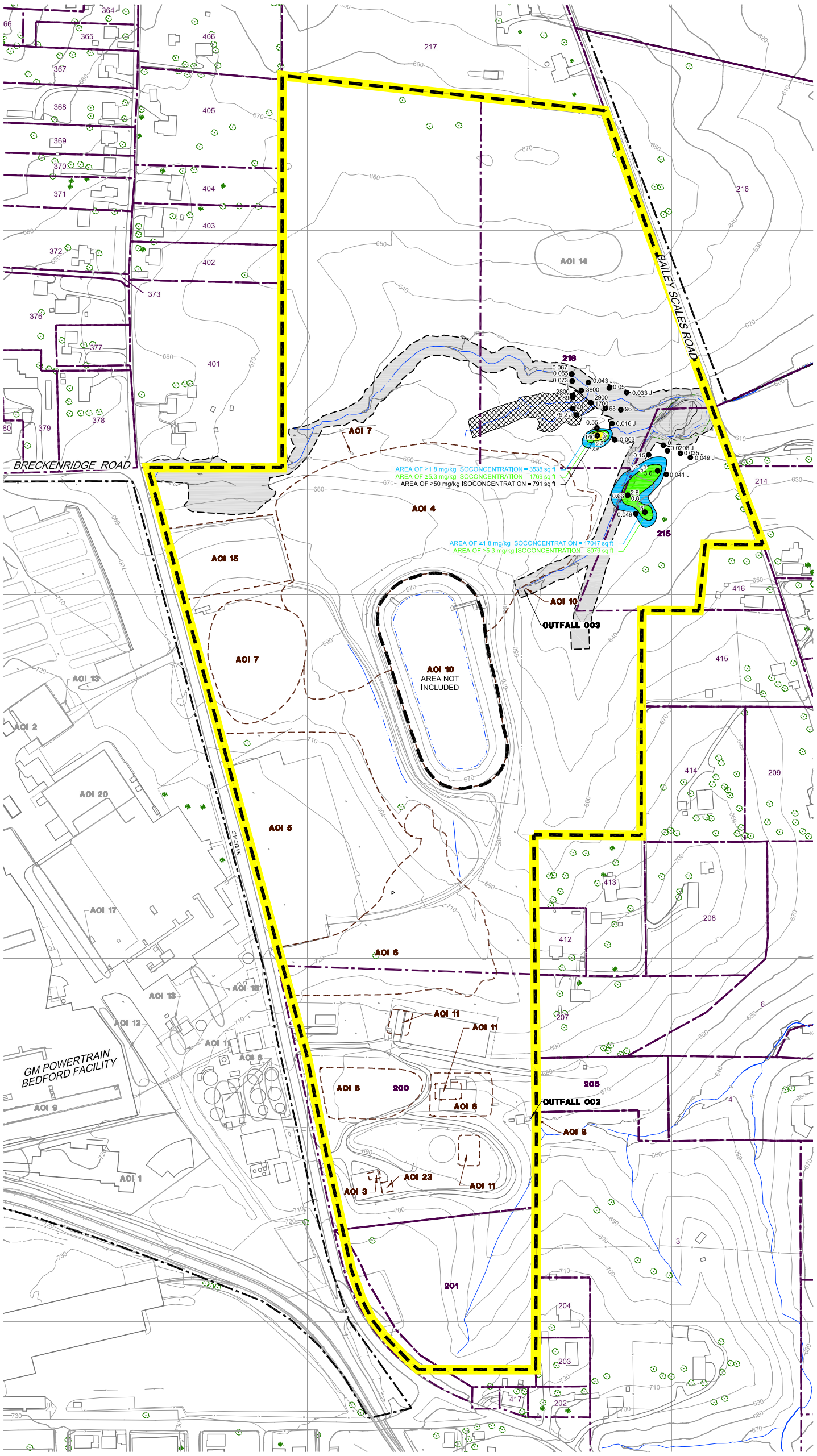
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
610-615 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.11 |

13968-00(151)GN-WA086 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 20585 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 9848 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 791 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

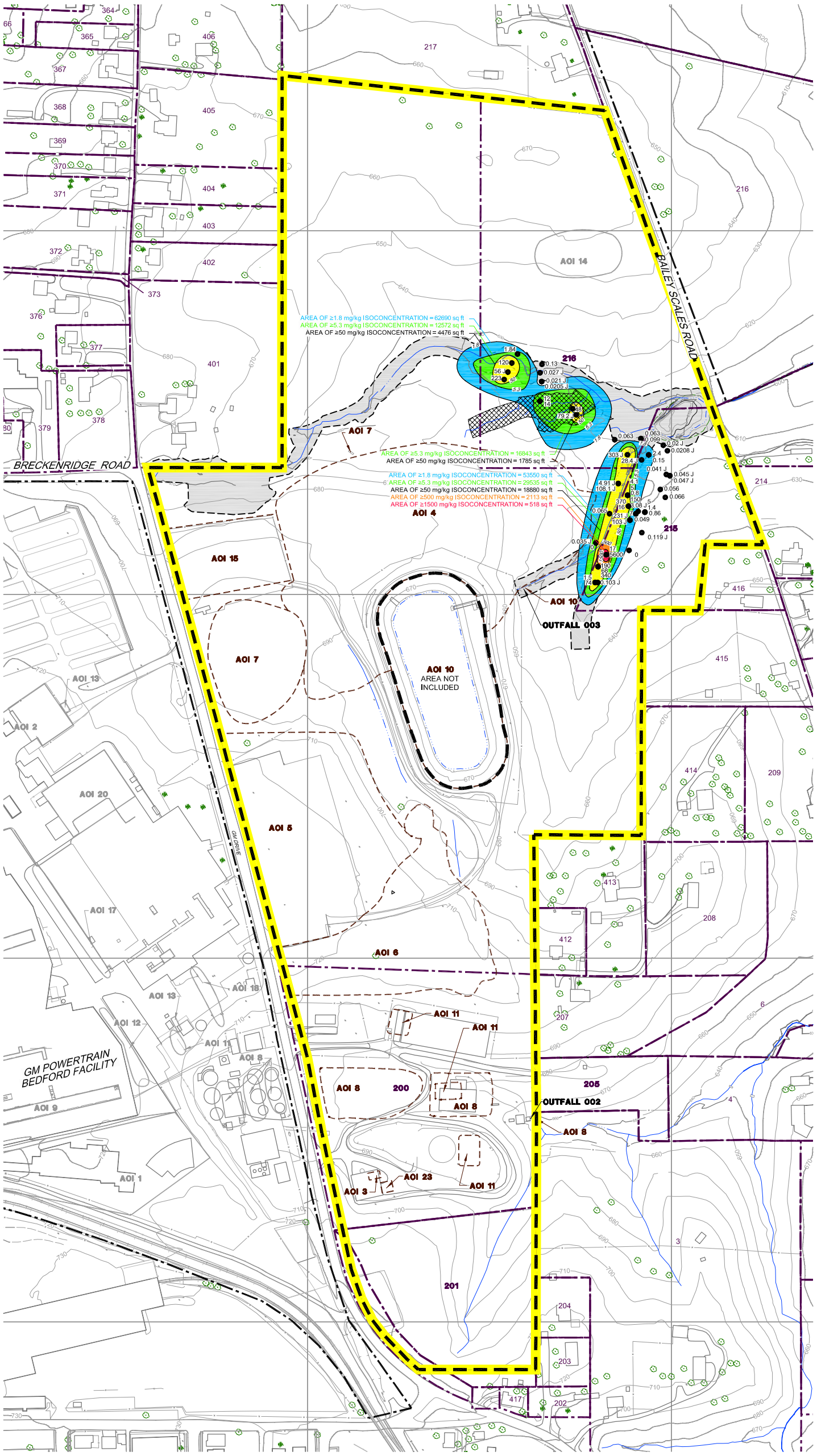
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
615-620 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.12 |

13968-00(151)GN-WA087 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 116240 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 58950 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 25141 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 2113 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 518 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

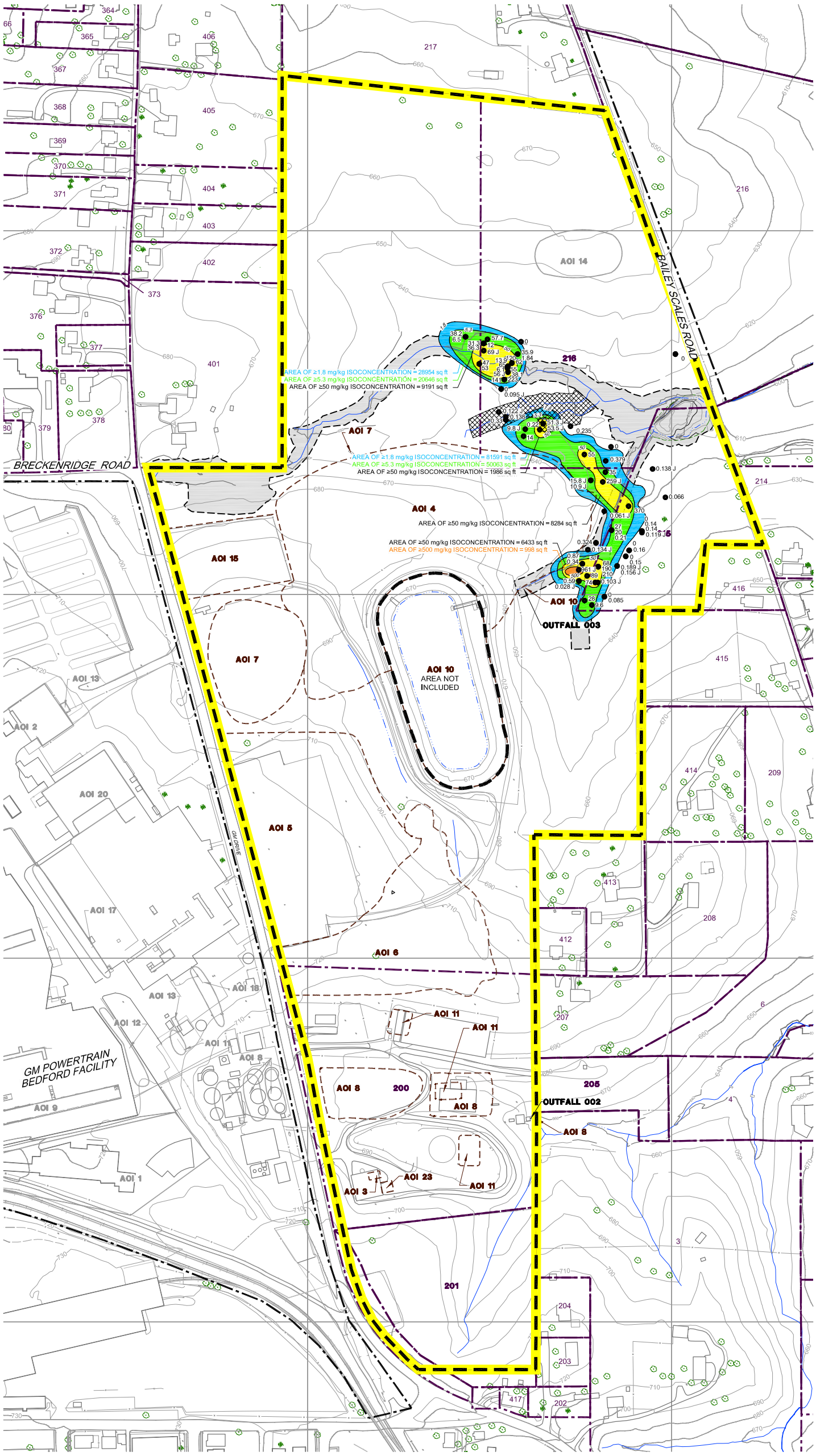
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
620-625 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.13 |

13968-00(151)GN-WA088 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 110545 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 70709 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 16703 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 998 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

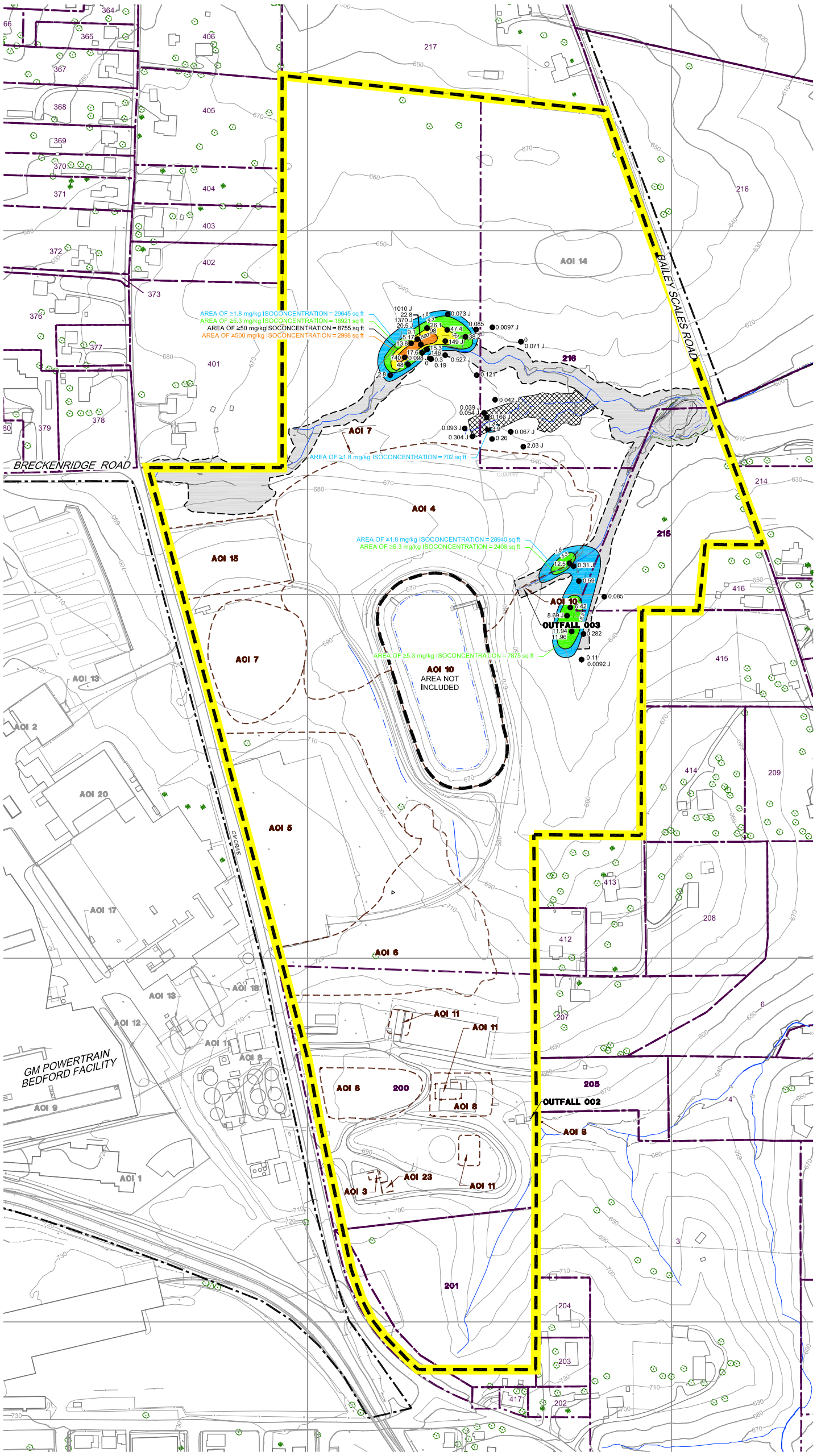
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
625-630 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.14 |

13968-00(151)GN-WA089 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 59286 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 29201 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 8755 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 2998 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge DIsposal and Fire TraInIng Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment FIlter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

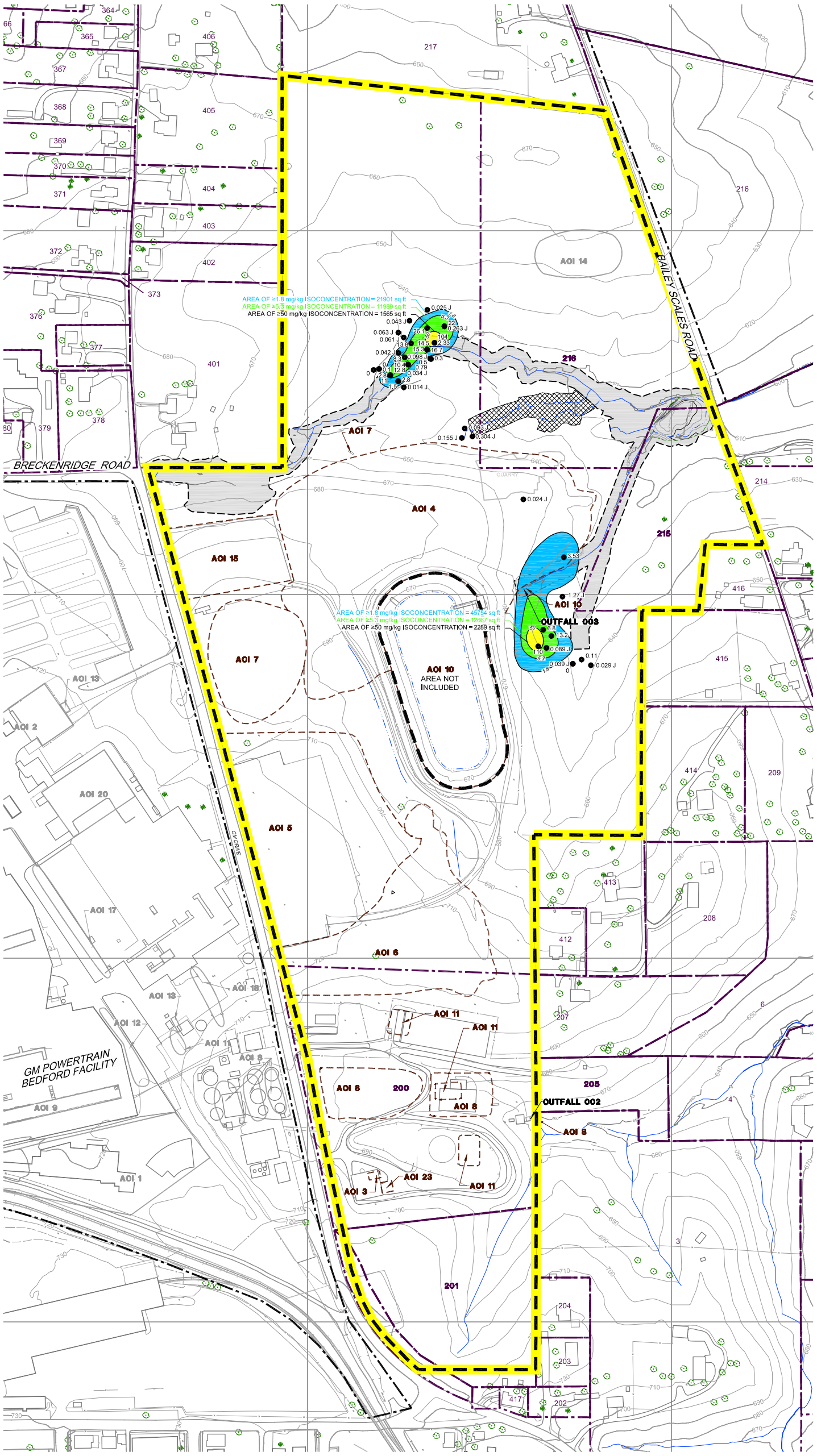
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
630-635 FEET AMSL

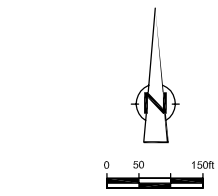
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.15 |

13968-00(151)GN-WA090 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 67655 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 24656 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 3854 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand DIsposal Area |
| AOI 6 | Former Sludge DIsposal and Fire TraInIng Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

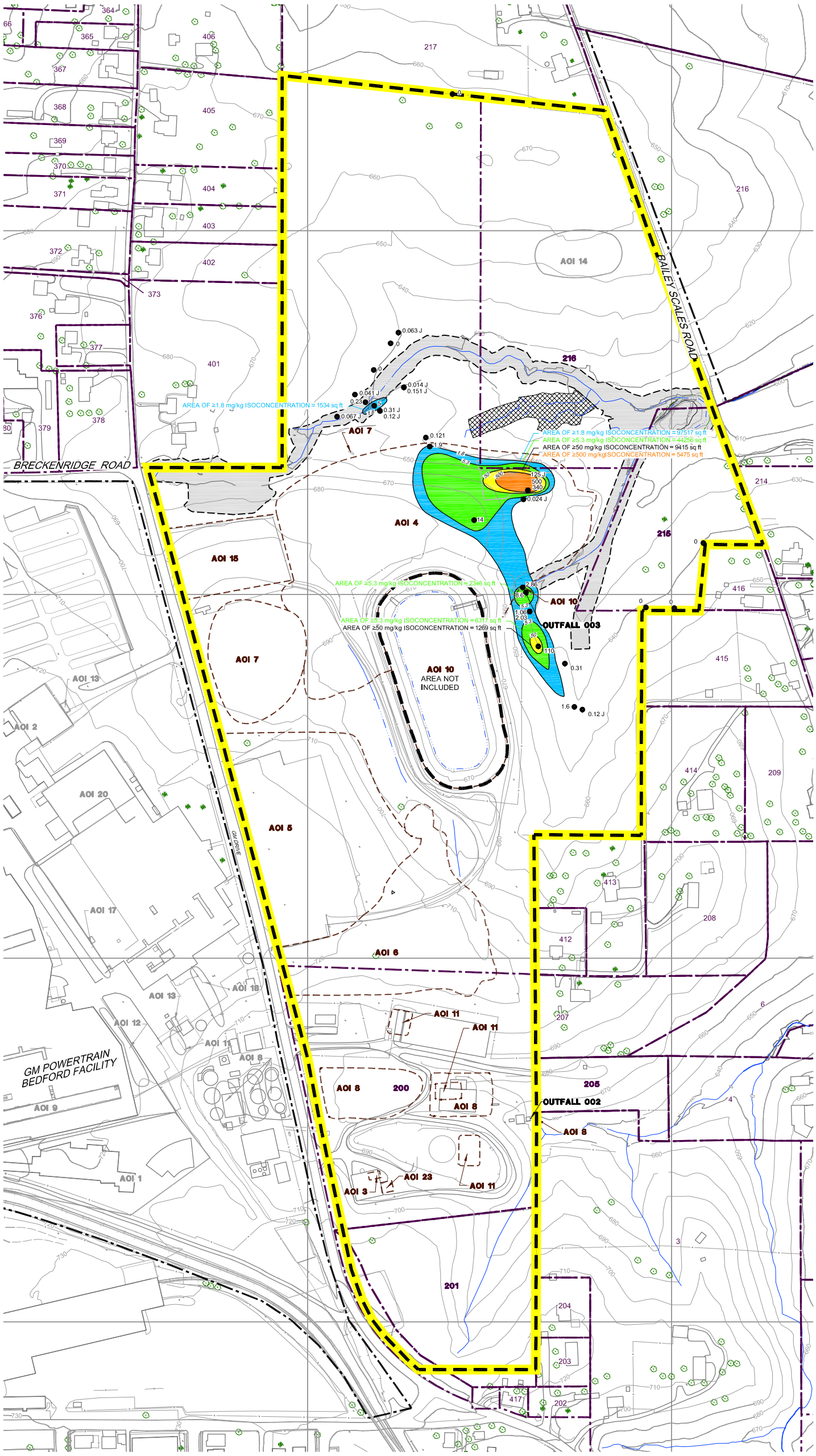
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
635-640 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.16 |

13968-00(151)GN-WA091 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 99051 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 52920 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 10684 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 5475 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

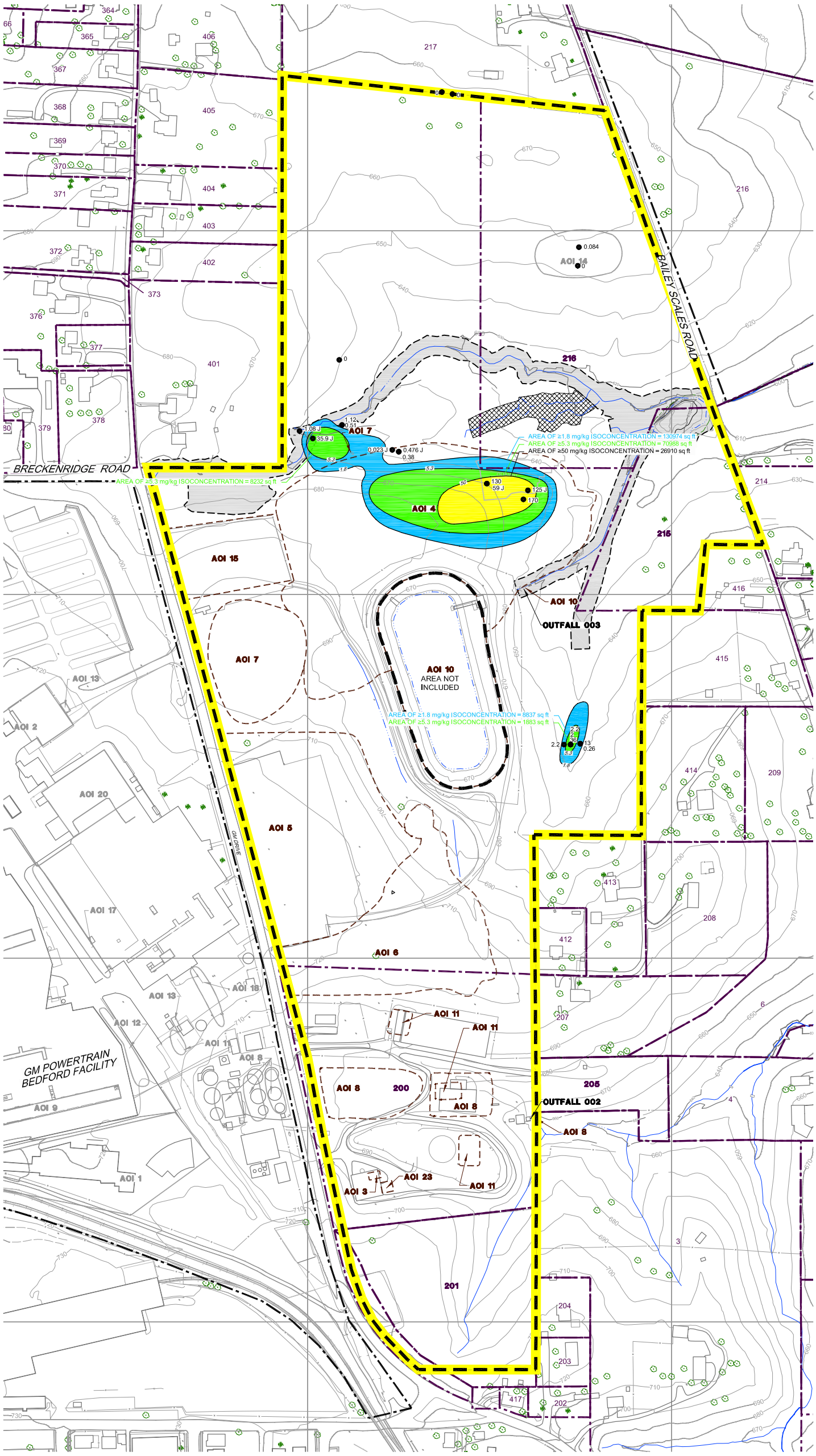
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
640-645 FEET AMSL

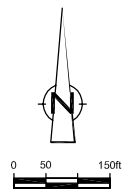
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.17 |

13968-00(151)GN-WA092 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 139811 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 81103 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 26910 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

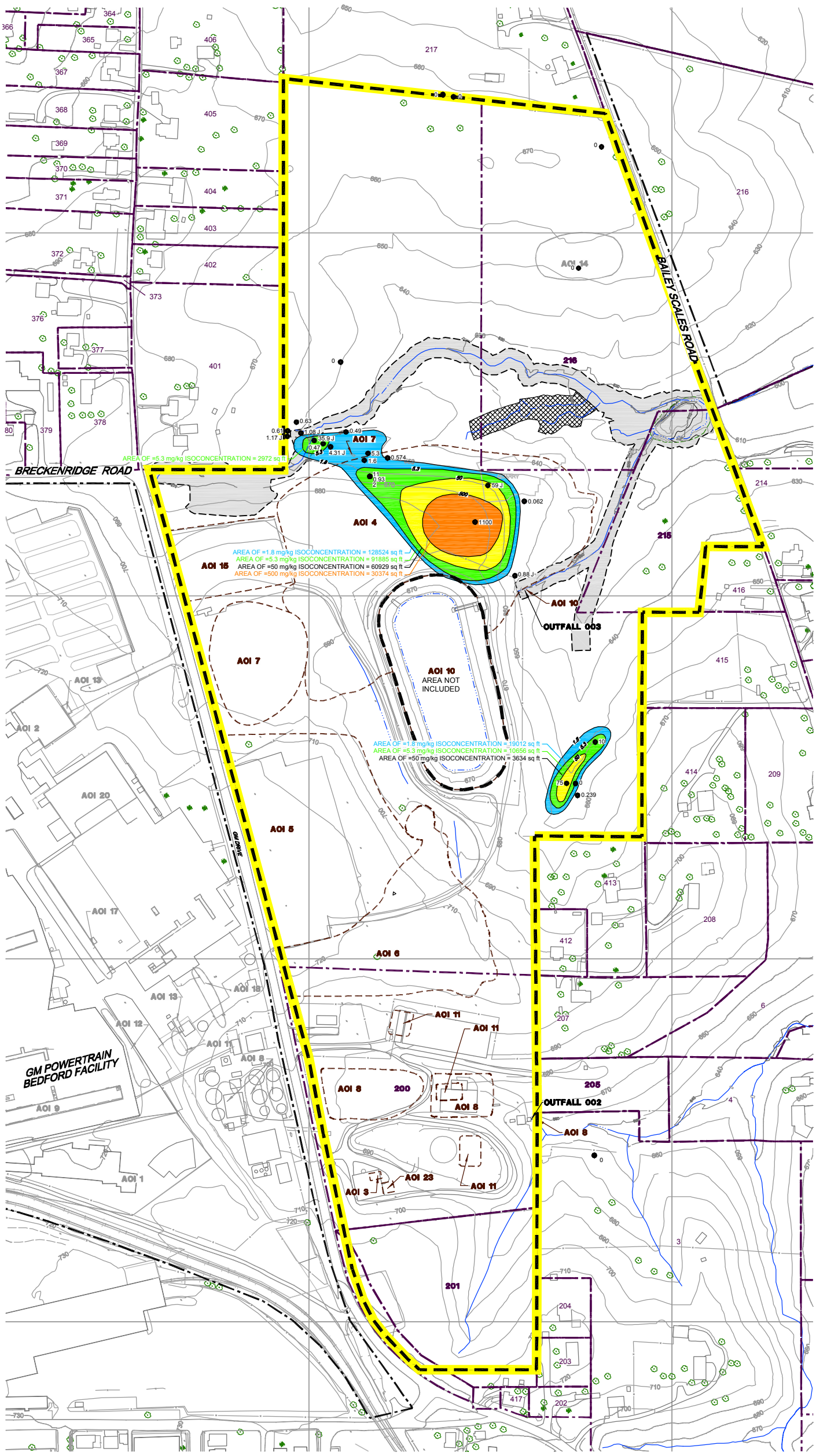
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
645-650 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.18 |

13968-00(151)GN-WA093 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 147535 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 105513 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 64563 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 30374 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

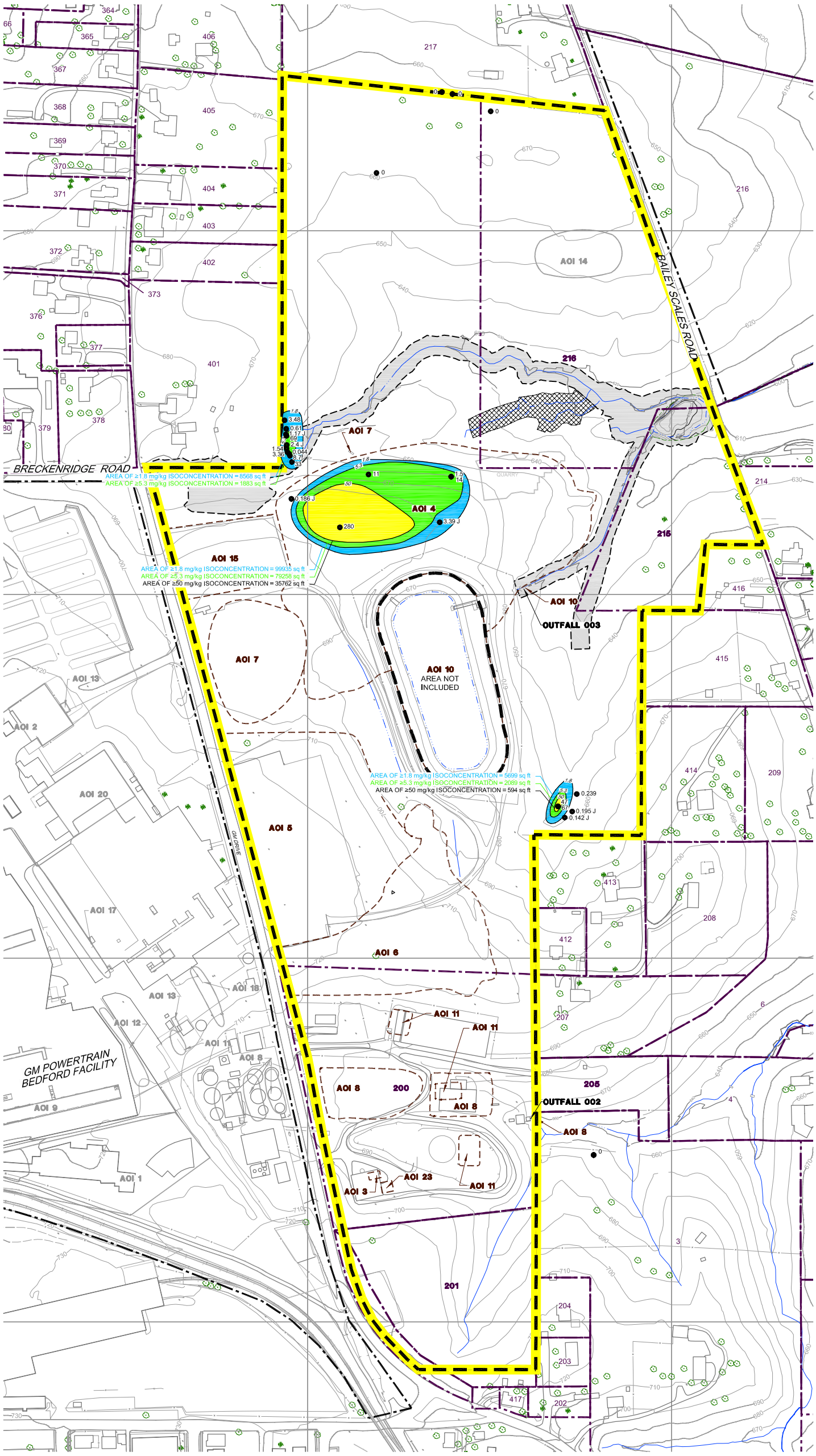
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
650-655 FEET AMSL

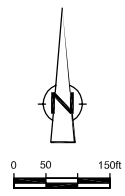
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.19 |

13968-00(151)GN-WA094 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 114203 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 83230 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 36355 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

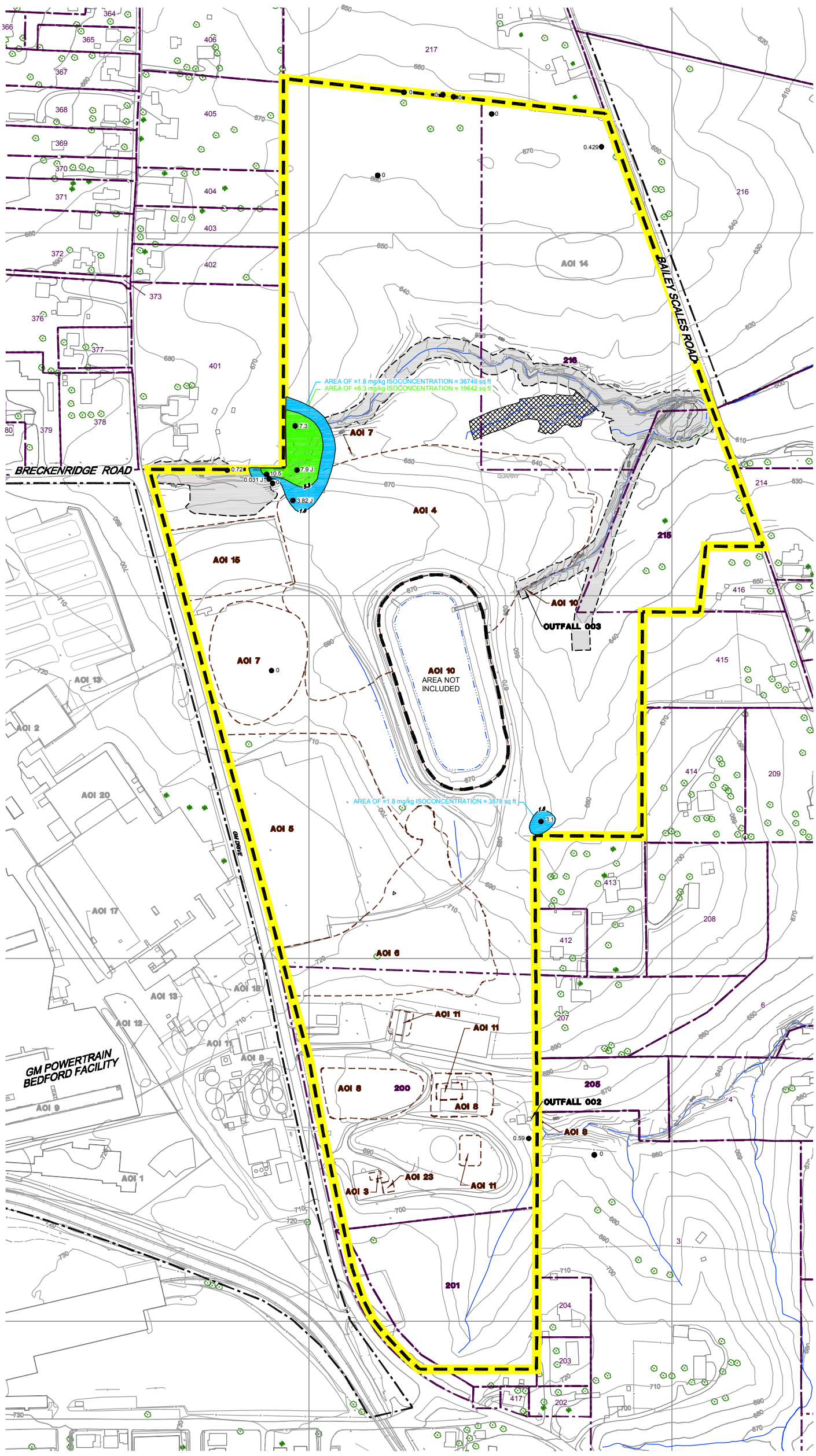
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
655-660 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.20 |

13968-00(151)GN-WA095 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 40327 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 19642 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

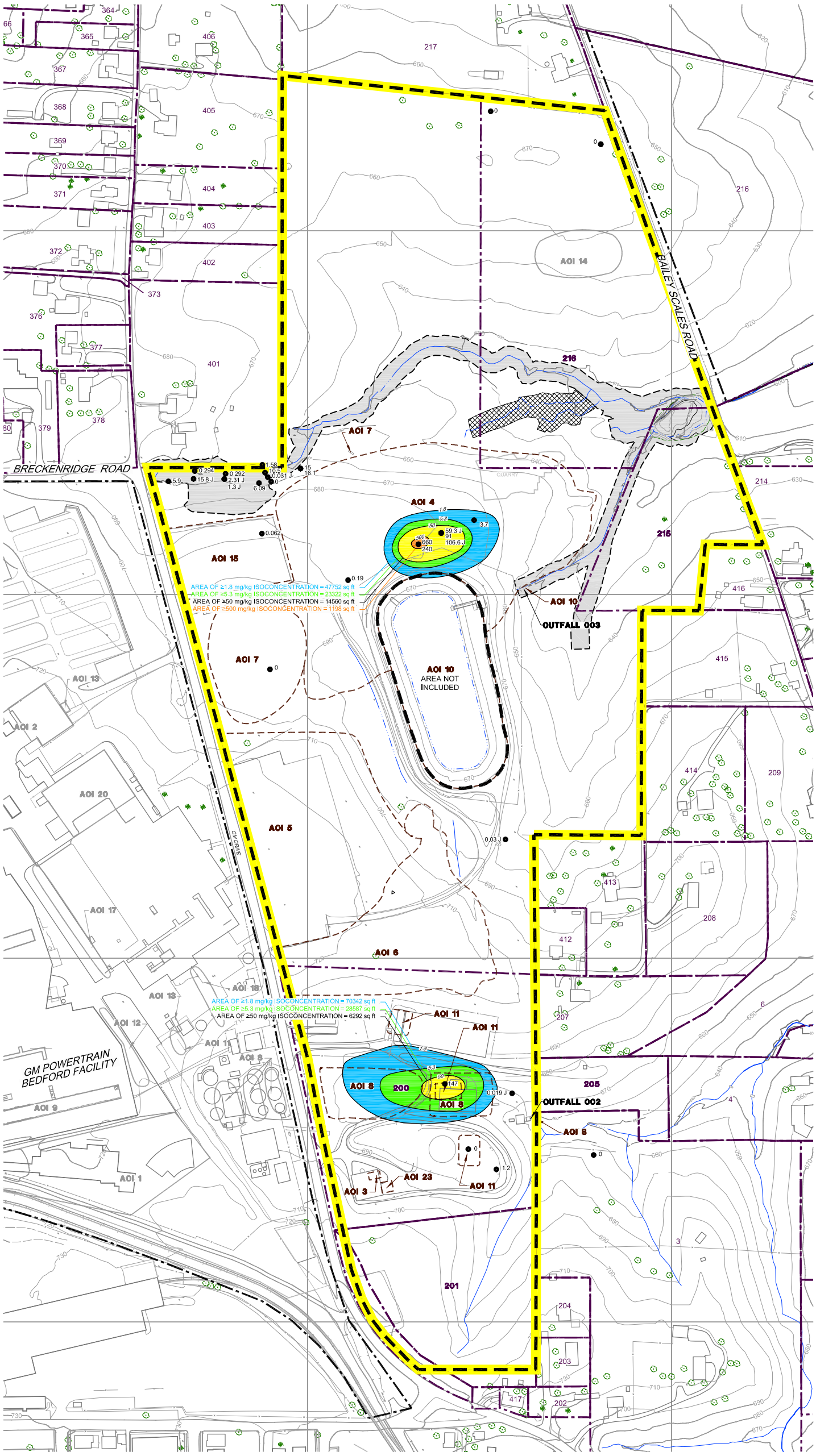
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
660-665 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.21 |

13968-00(151)GN-WA096 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 118094 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 51909 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 20853 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 1198 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

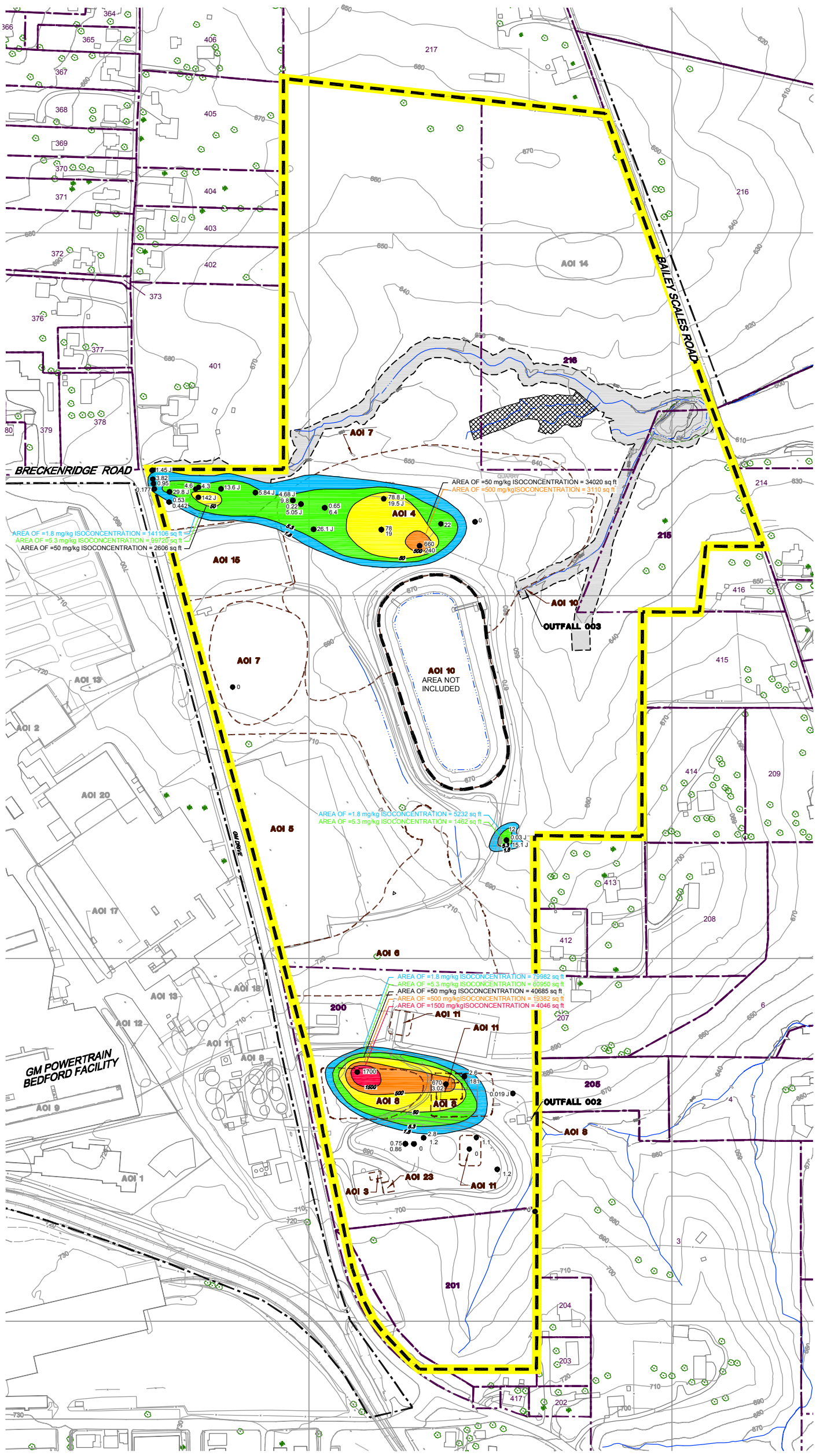
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
665-670 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.22 |

13968-00(151)GN-WA097 APR 07/2005




| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

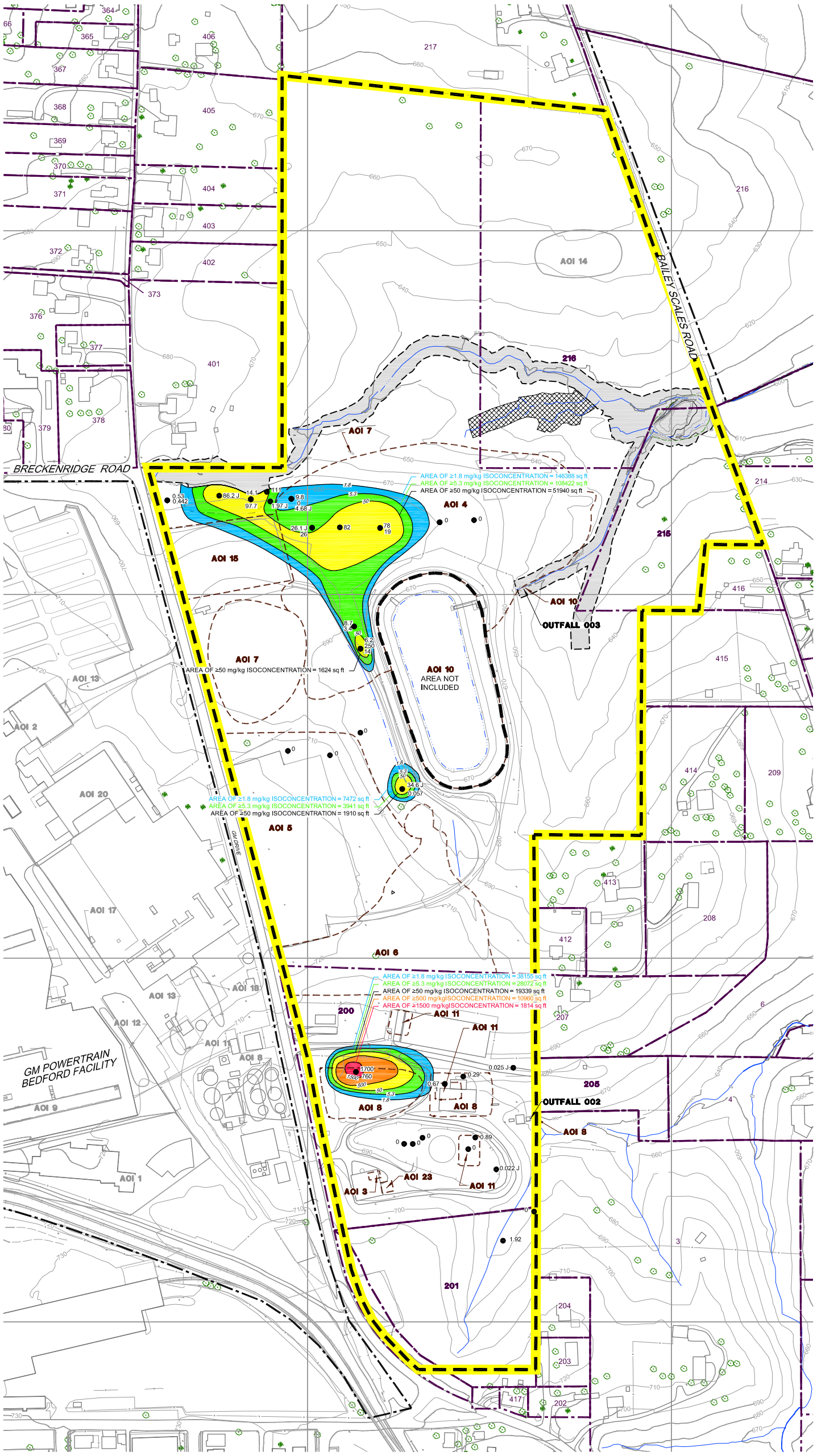
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
670-675 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.23 |

13968-00(151)GN-WA098 APR 07/2005




NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 192016 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 140436 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 74812 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 10960 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 1814 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

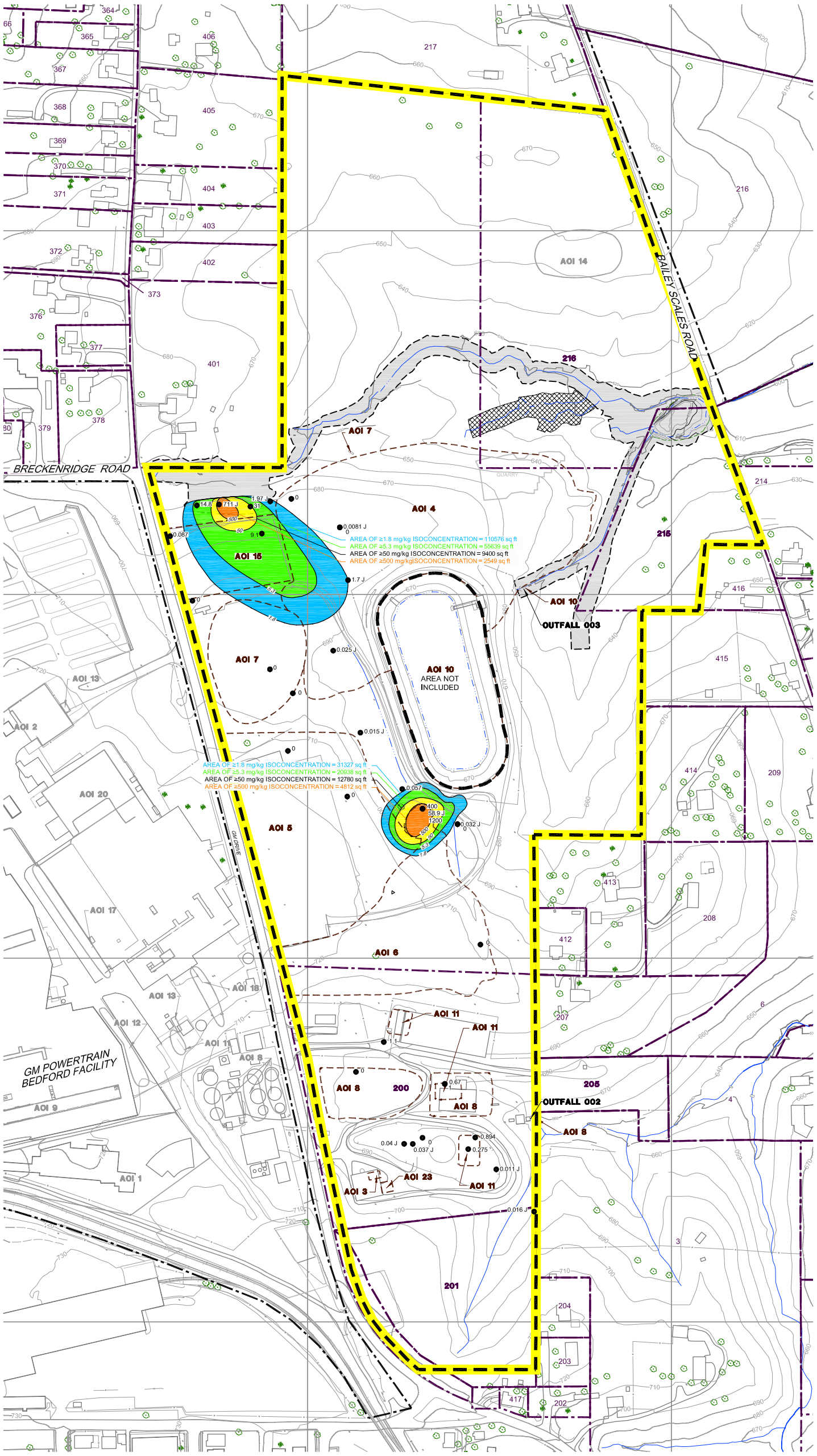
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
675-680 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.24 |

13968-00(151)GN-WA099 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 141904 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 76577 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 22181 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 7362 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

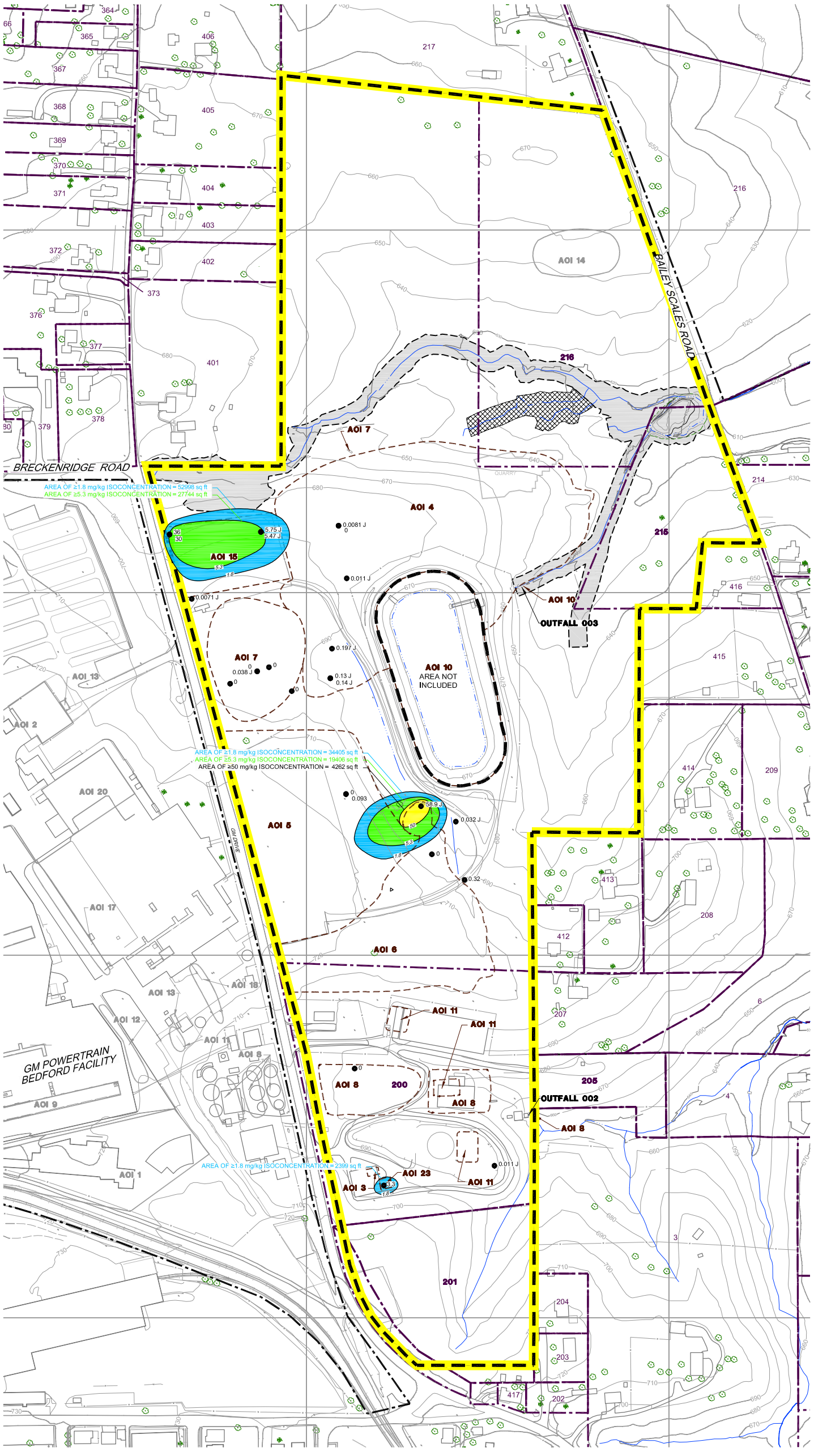
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
680-685 FEET AMSL

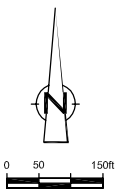
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.25 |

13968-00(151)GN-WA100 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 89803 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 47150 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 4262 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

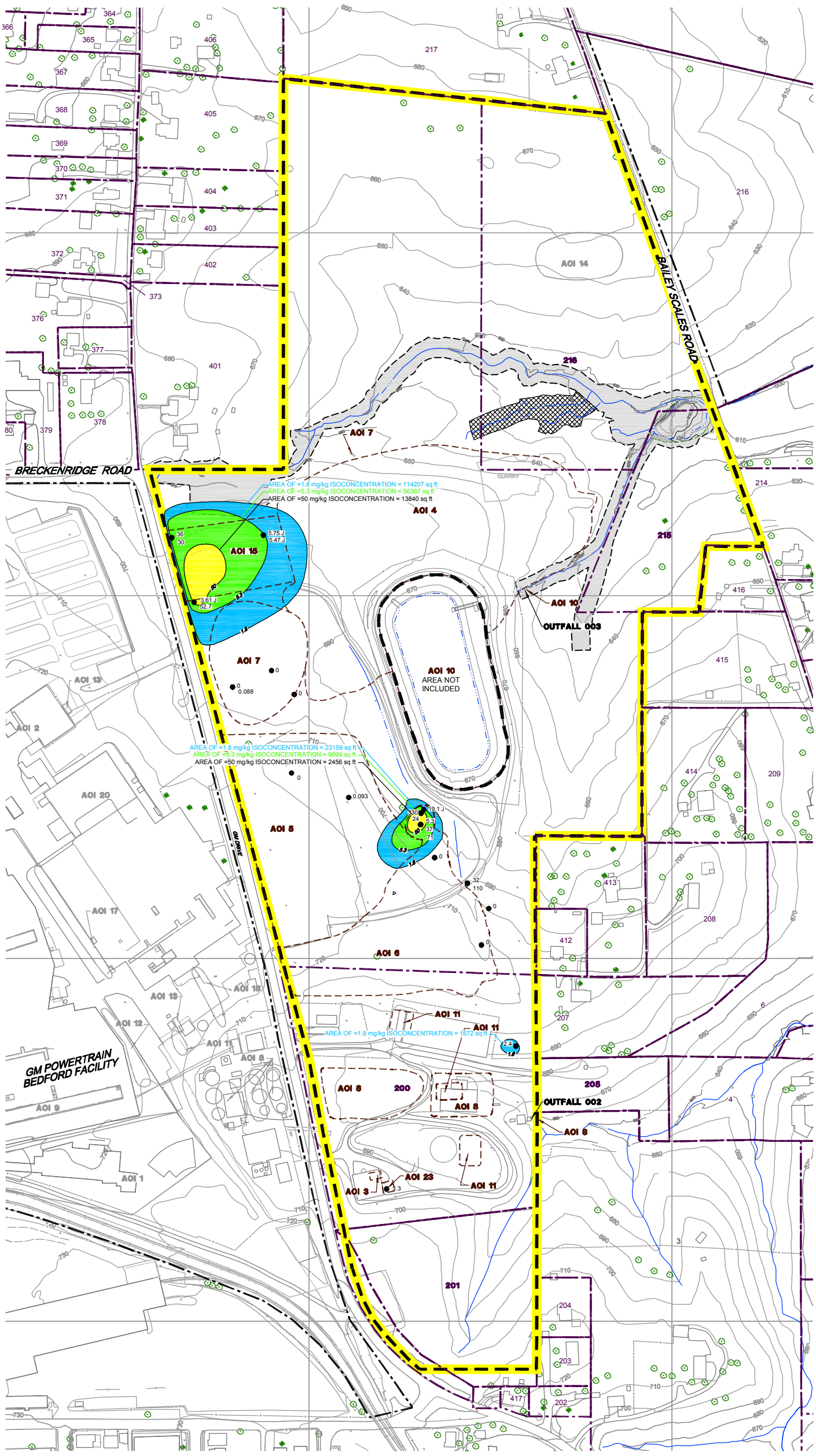
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
685-690 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.26 |

13968-00(151)GN-WA101 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 139039 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 66066 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 2456 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| NO. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

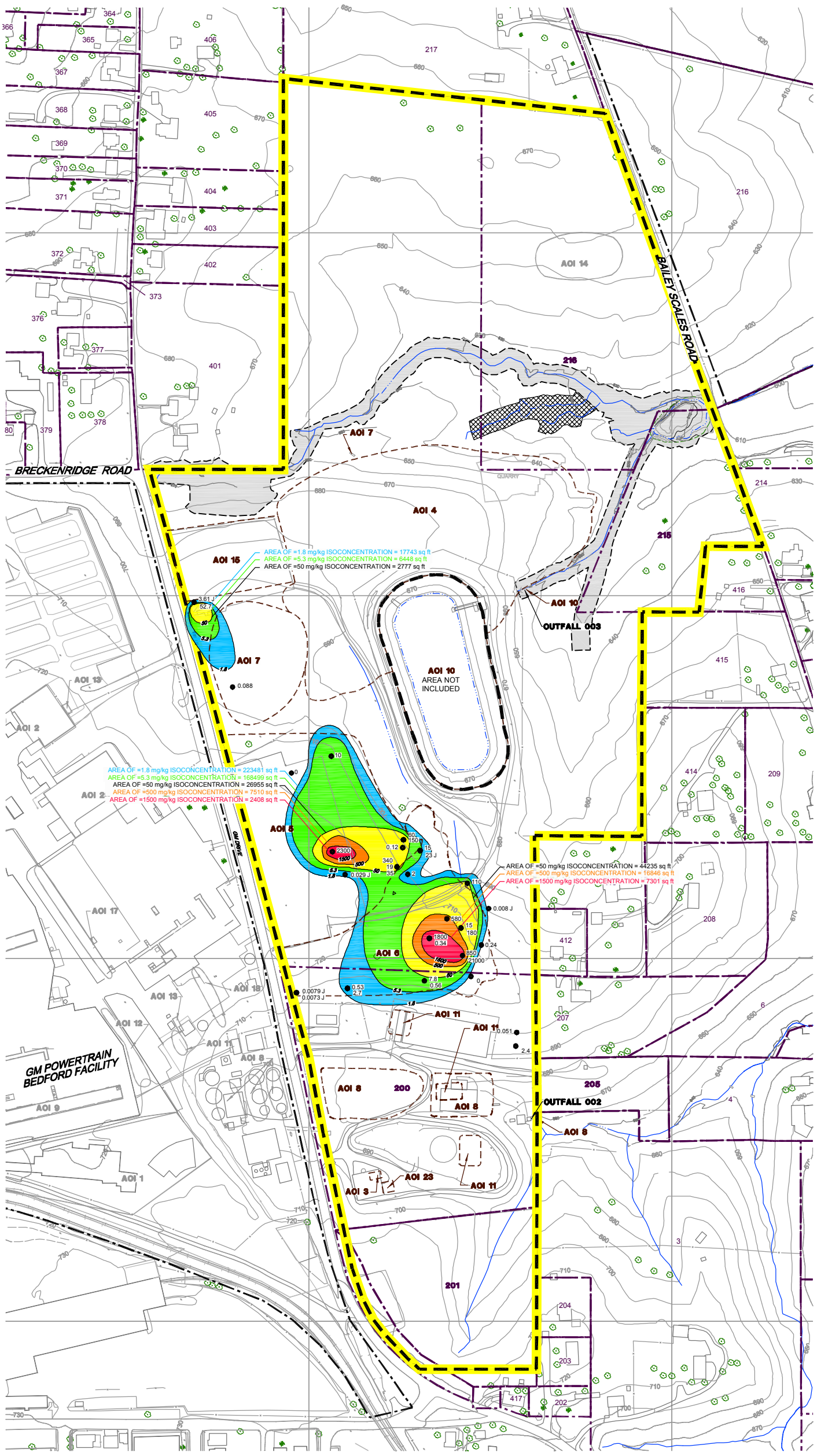
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
690-695 FEET AMSL

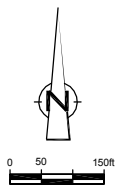
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.27 |

13968-00(151)GN-WA102 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 241223 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 174947 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 73968 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 24357 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 9710 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

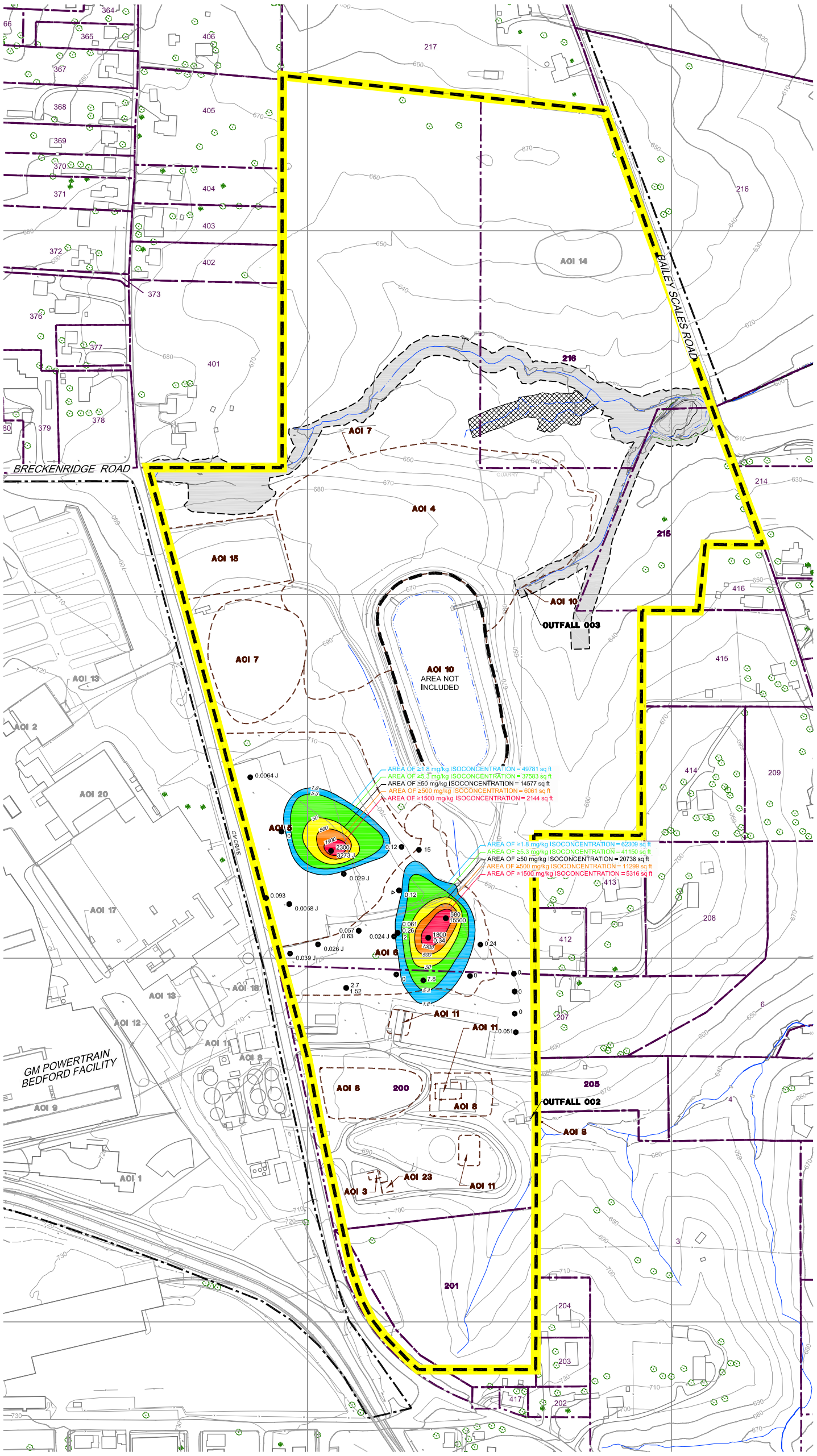
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
695-700 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.28 |

13968-00(151)GN-WA103 APR 07/2005




N

0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 112090 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 78732 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 35313 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 17359 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 7460 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

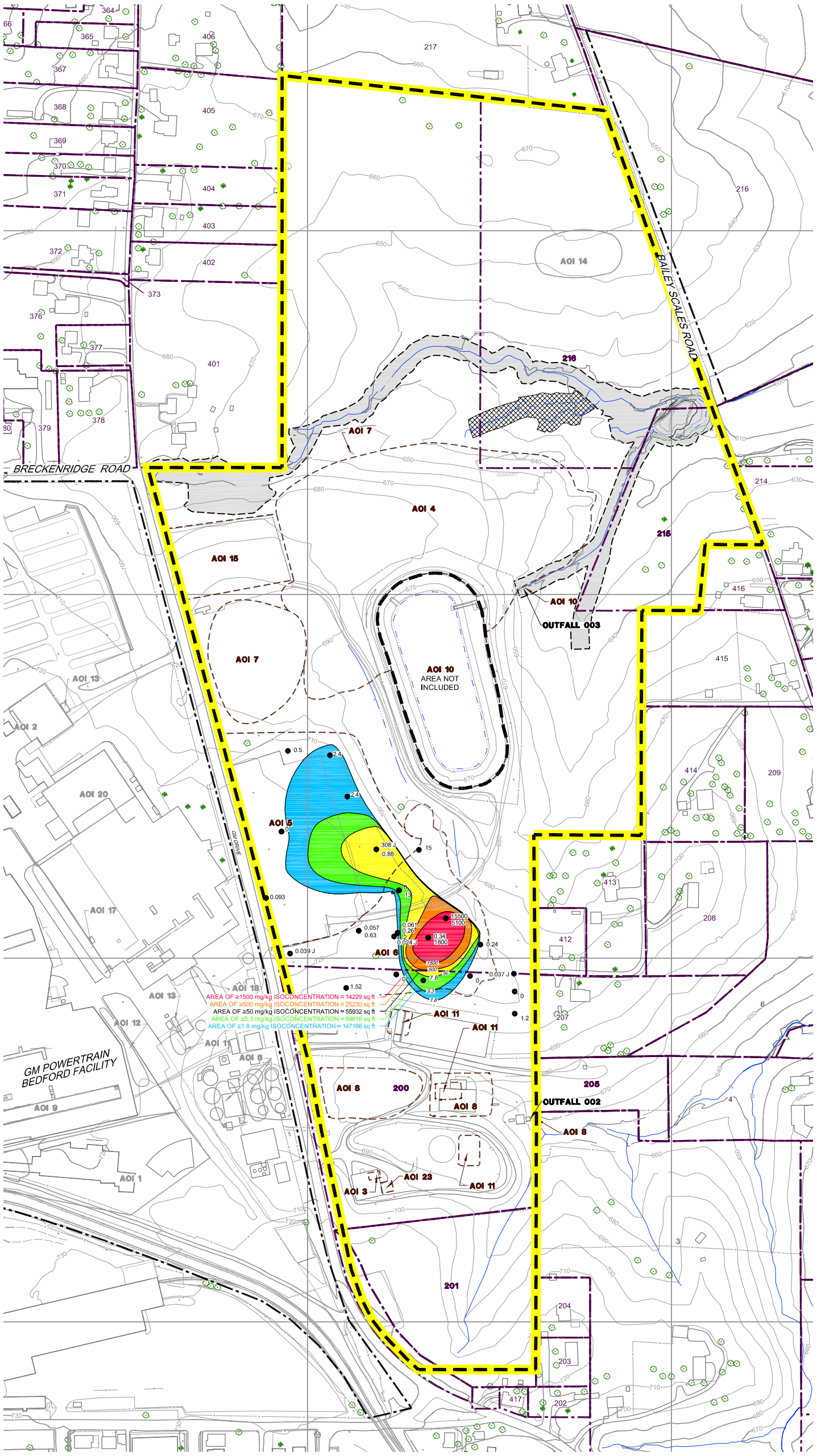
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
700-705 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.29 |

13968-00(151)GN-WA104 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 147165 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 89616 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 55932 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 25230 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 14230 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

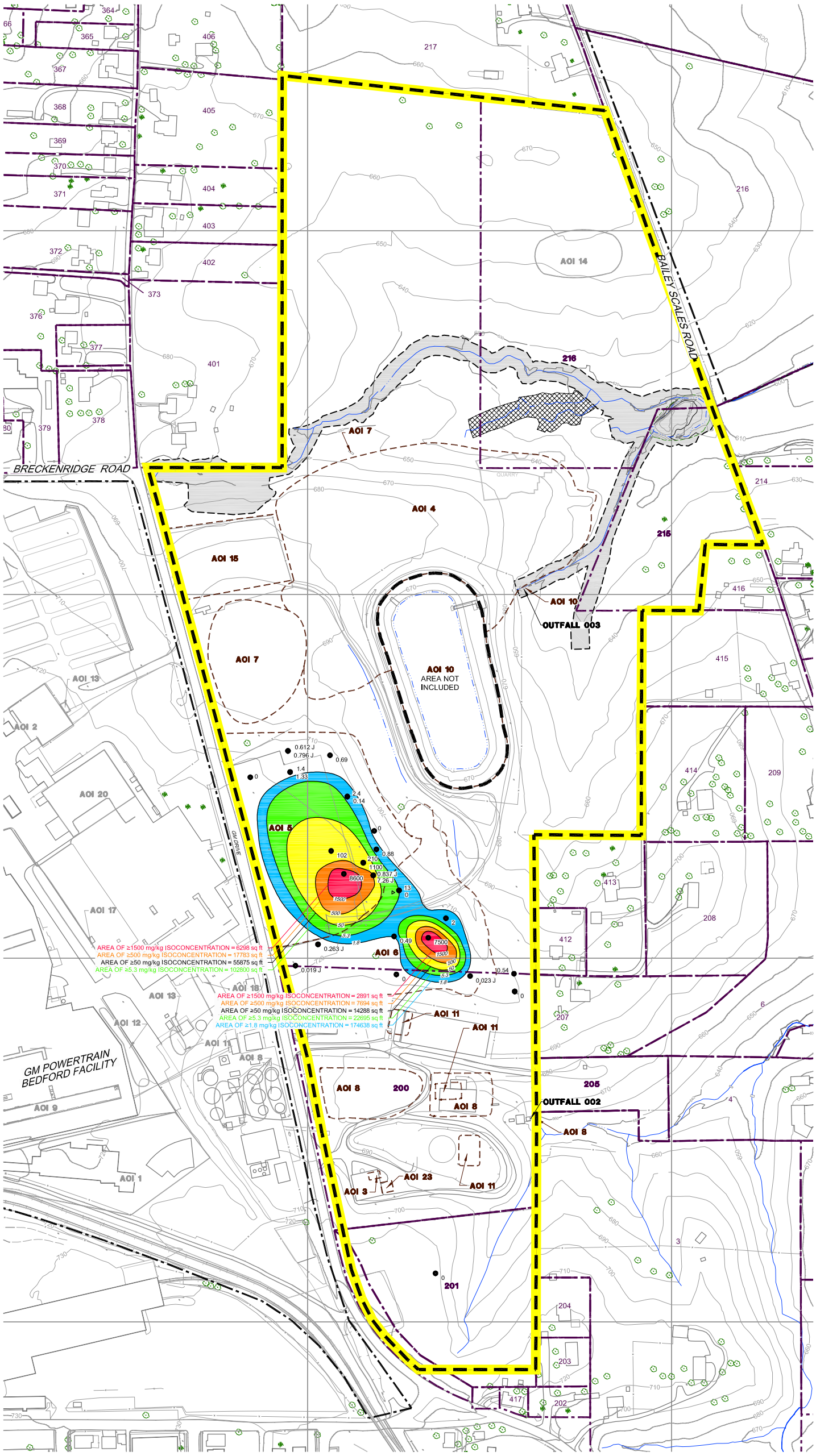
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
705-710 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.30 |

13968-00(151)GN-WA105 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 174638 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 125494 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 70163 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 25477 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 9189 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

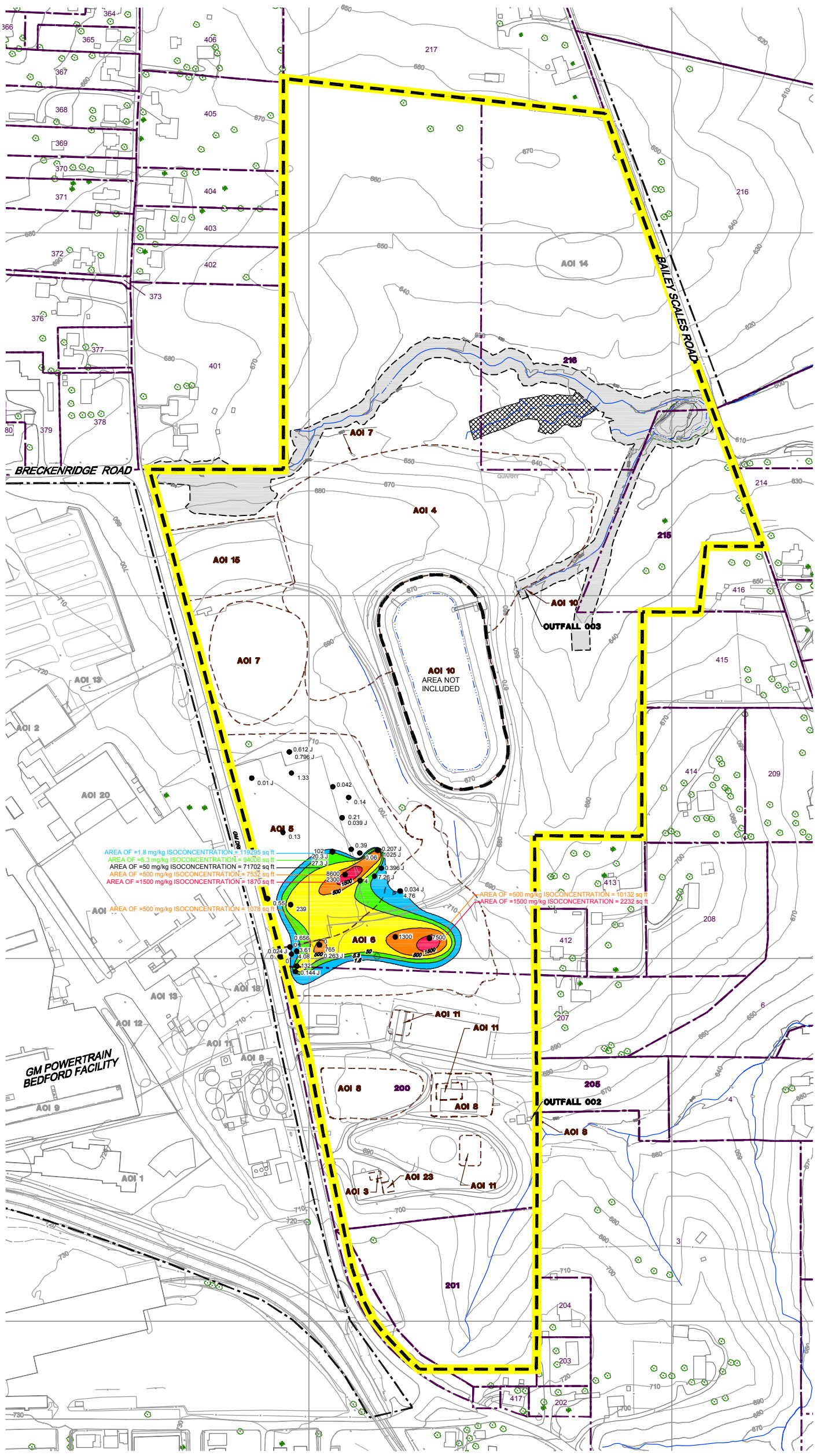
## SCENARIO 1
## PCB ISOCONCENTRATION CONTOURS
## 710-715 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.31 |

13968-00(151)GN-WA106 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 119295 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 94006 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 71702 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 18742 sq ft
TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 4102 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

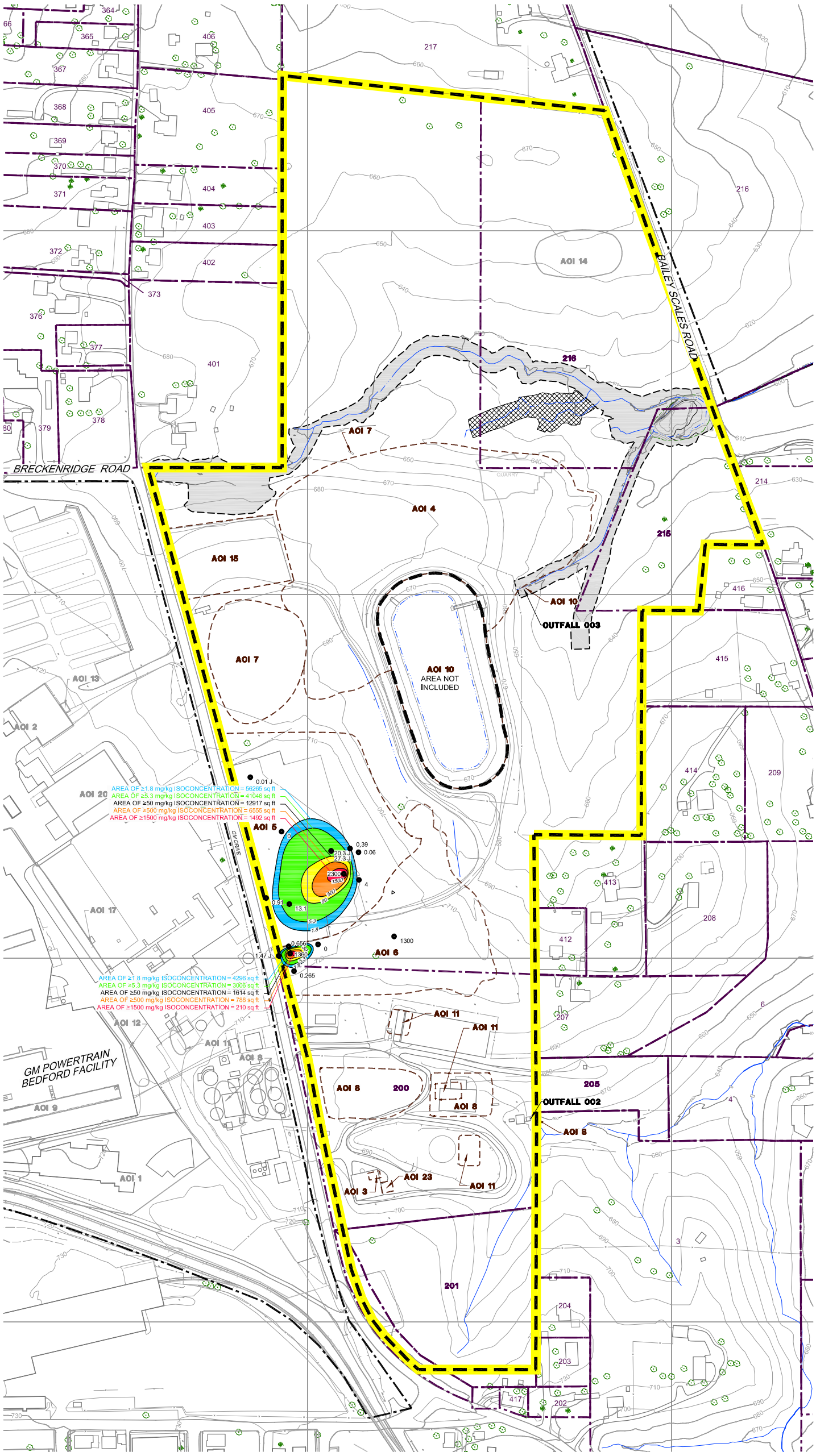
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
715-720 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.32 |

13968-00(151)GN-WA107 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF ≥1.8 mg/kg ISOCONCENTRATION = 60561 sq ft
TOTAL AREA OF ≥5.3 mg/kg ISOCONCENTRATION = 44053 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 14531 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 7343 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 1702 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

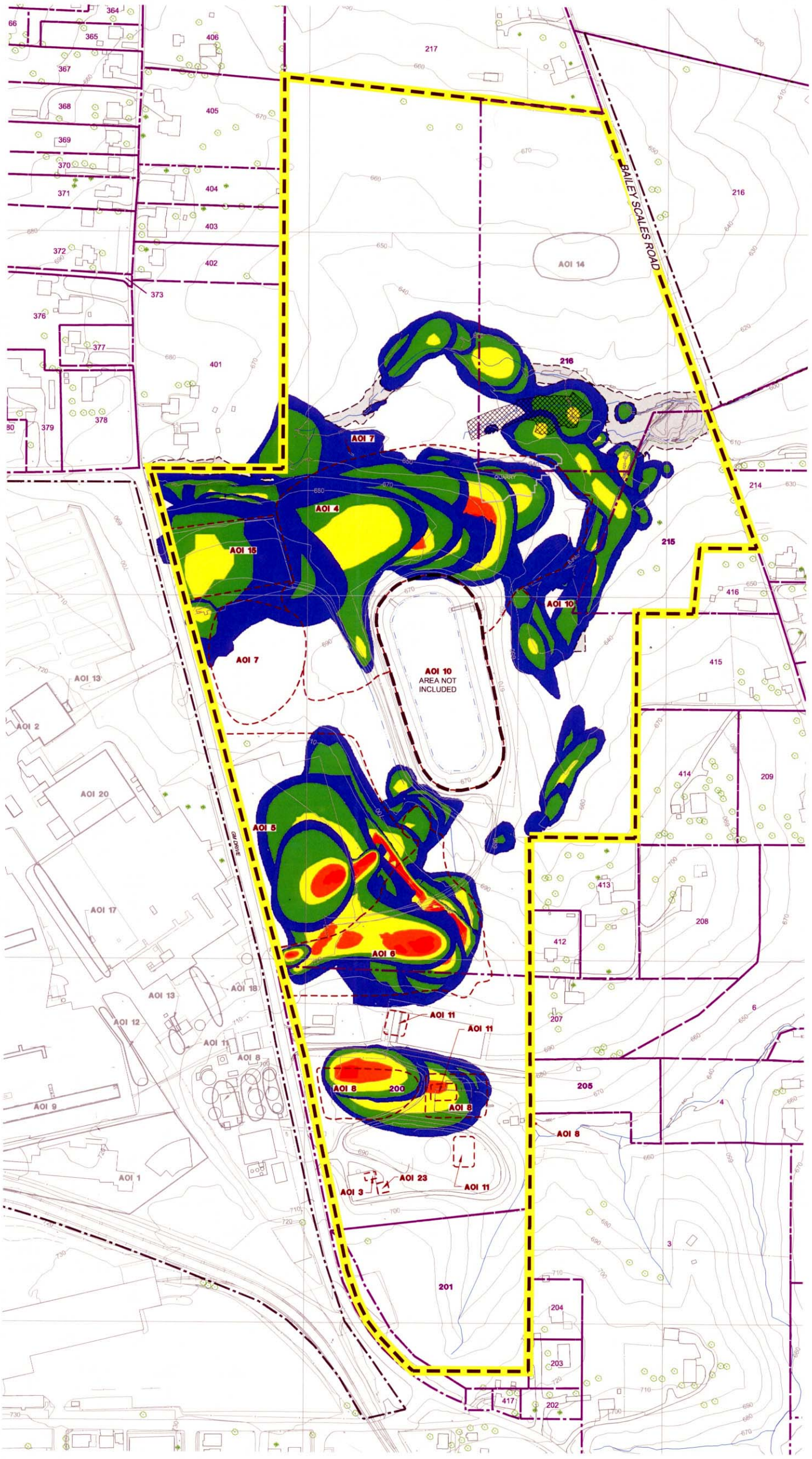
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
720-725 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure A.33 |

13968-00(151)GN-WA108 APR 07/2005




| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

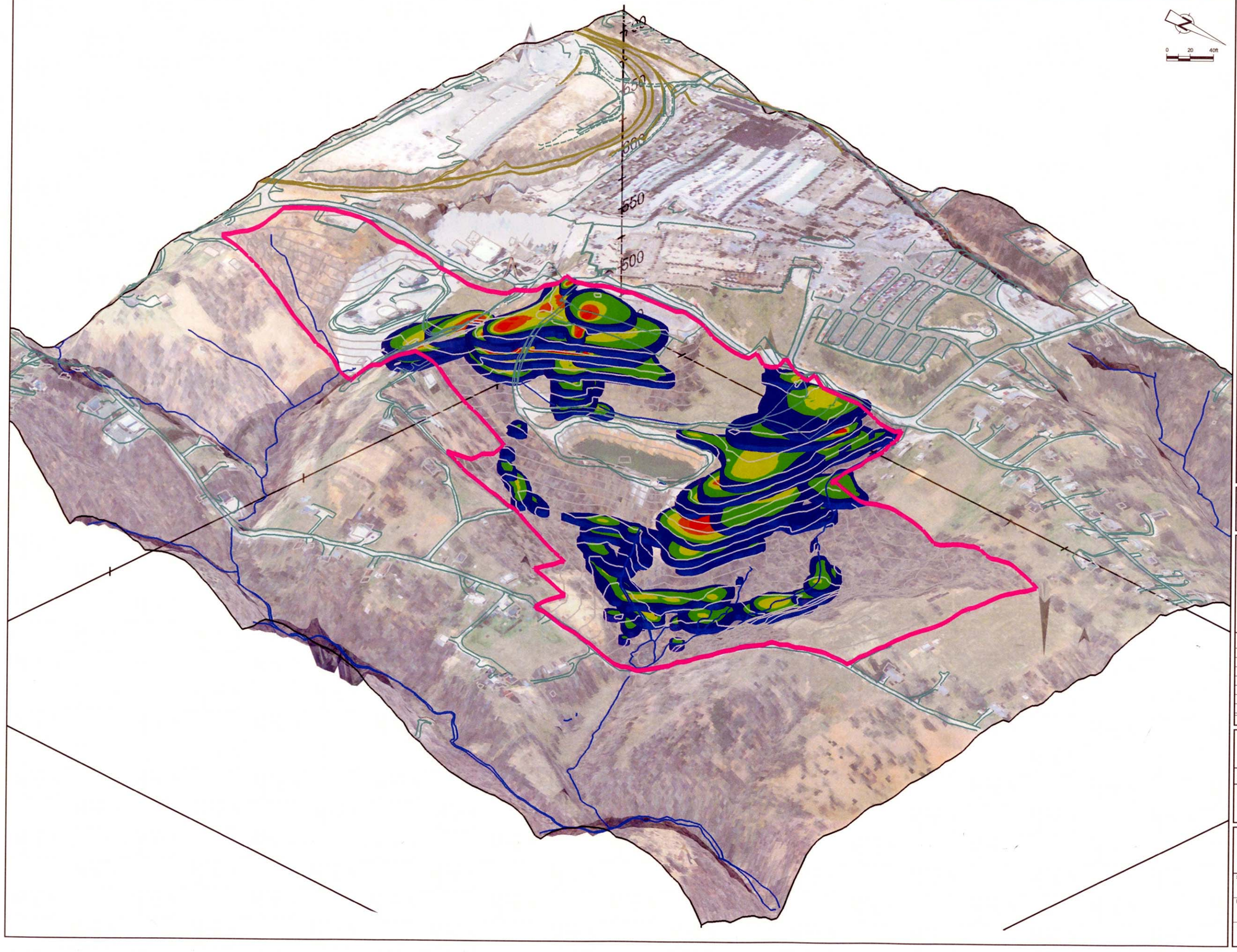
3-D PCB DISTRIBUTION
IN EAST PLANT AREA
PLAN VIEW

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure A.34 |

13968-00(151)GN-WA109 APR 07/2005




| NO | Revision | Date | Initial |
|---|---|---|---|
| | | | |

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- ≥1.8 mg/kg ISOCONCENTRATION
- ≥5.3 mg/kg ISOCONCENTRATION
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION

NOTE:

PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

# GM POWERTRAIN BEDOFRD FACILITY
# BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

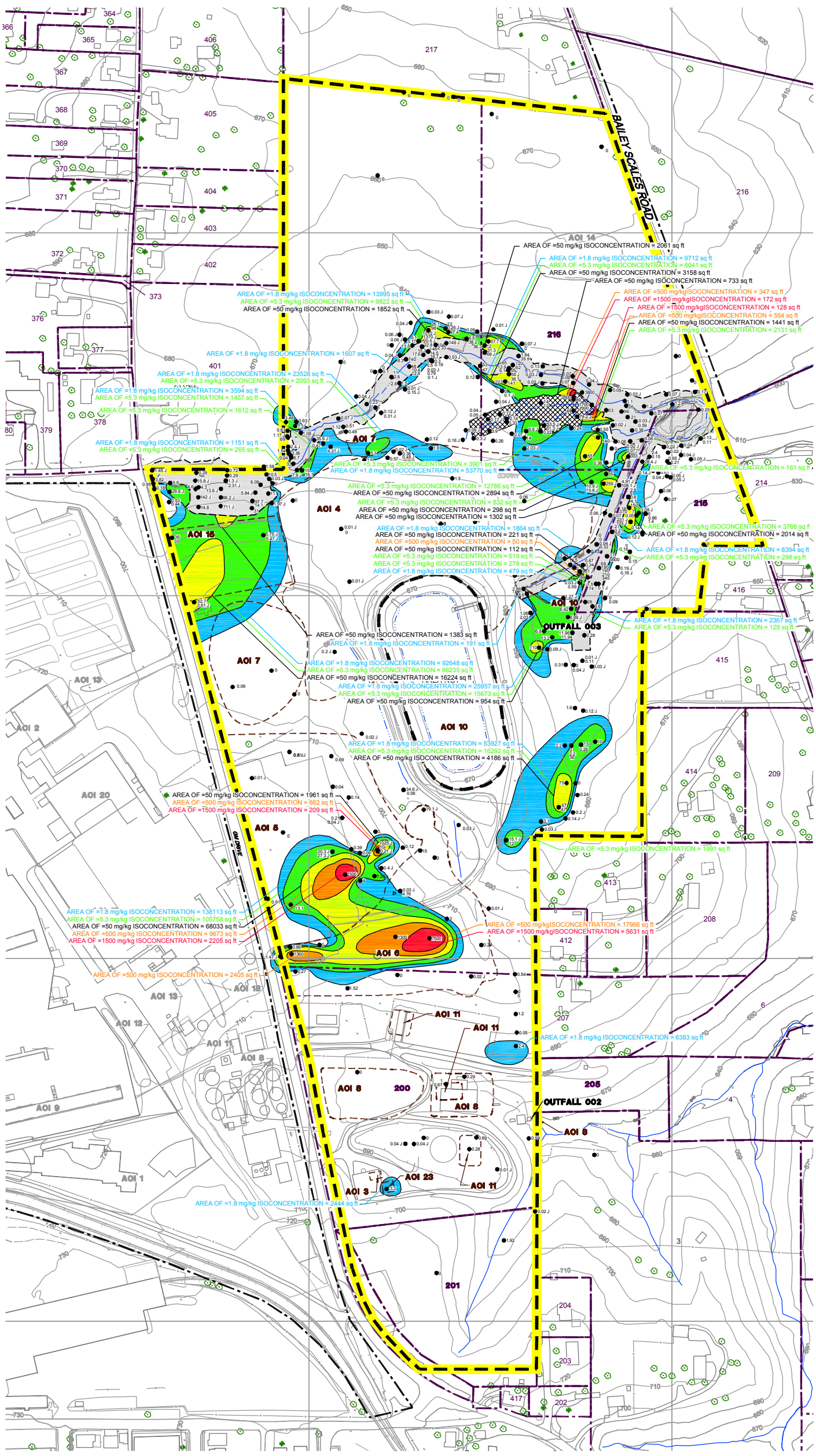
## 3-D PCB DISTRIBUTION IN EAST PLANT AREA OBLIQUE VIEW

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure A.35 |

13968-00(151)GN-WA110 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 440126 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 254040 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 108829 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 31657 sq ft
TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 8345 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

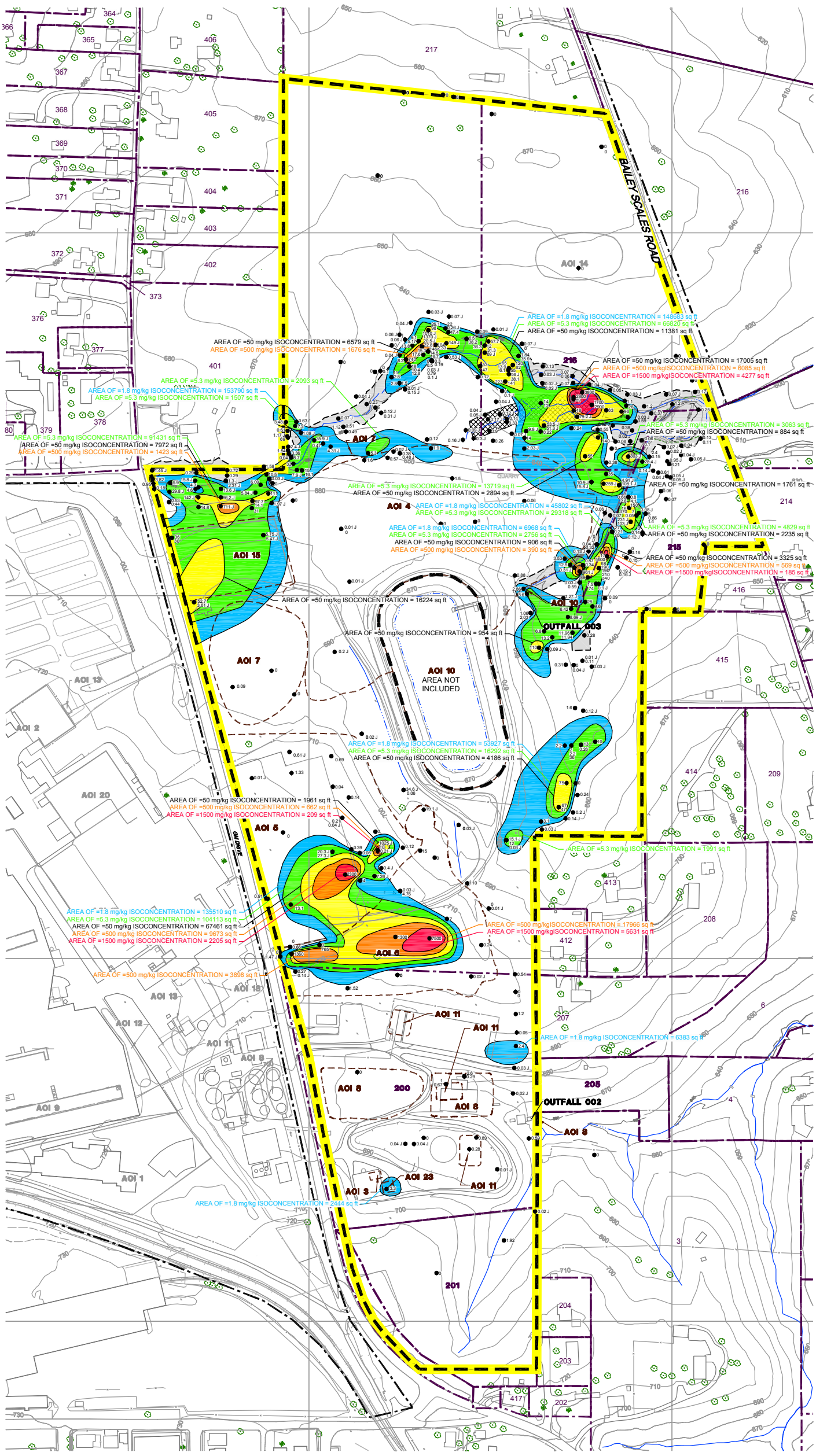
# SCENARIO 2
# PCB ISOCONCENTRATION CONTOURS
# 0-2 FEET BGS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.36 |

13968-00(151)GN-WA111 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA 0F =1.8 mg/kg ISOCONCENTRATION = 553507 sq ft
TOTAL AREA 0F =5.3 mg/kg ISOCONCENTRATION = 337931 sq ft
TOTAL AREA 0F =50 mg/kg ISOCONCENTRATION = 145727 sq ft
TOTAL AREA 0F =500 mg/kg ISOCONCENTRATION = 42342 sq ft
TOTAL AREA 0F =1500 mg/kg ISOCONCENTRATION = 12507 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

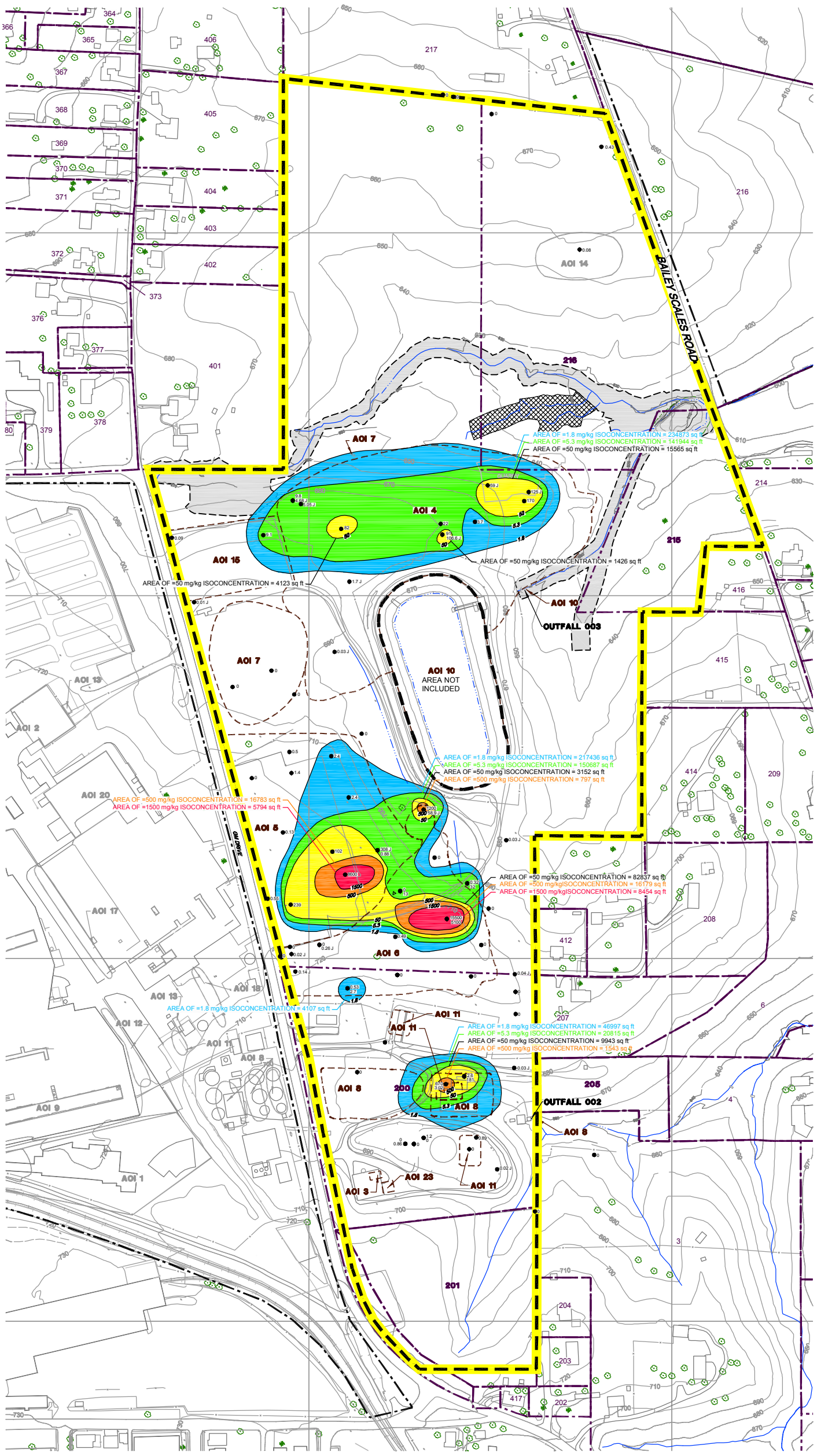
# SCENARIO 3
# PCB ISOCONCENTRATION CONTOURS
# 0-5 FEET BGS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.37 |

13968-00(151)GN-WA112 APR 07/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 503412 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 313445 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 107104 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 35302 sq ft
TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 14248 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

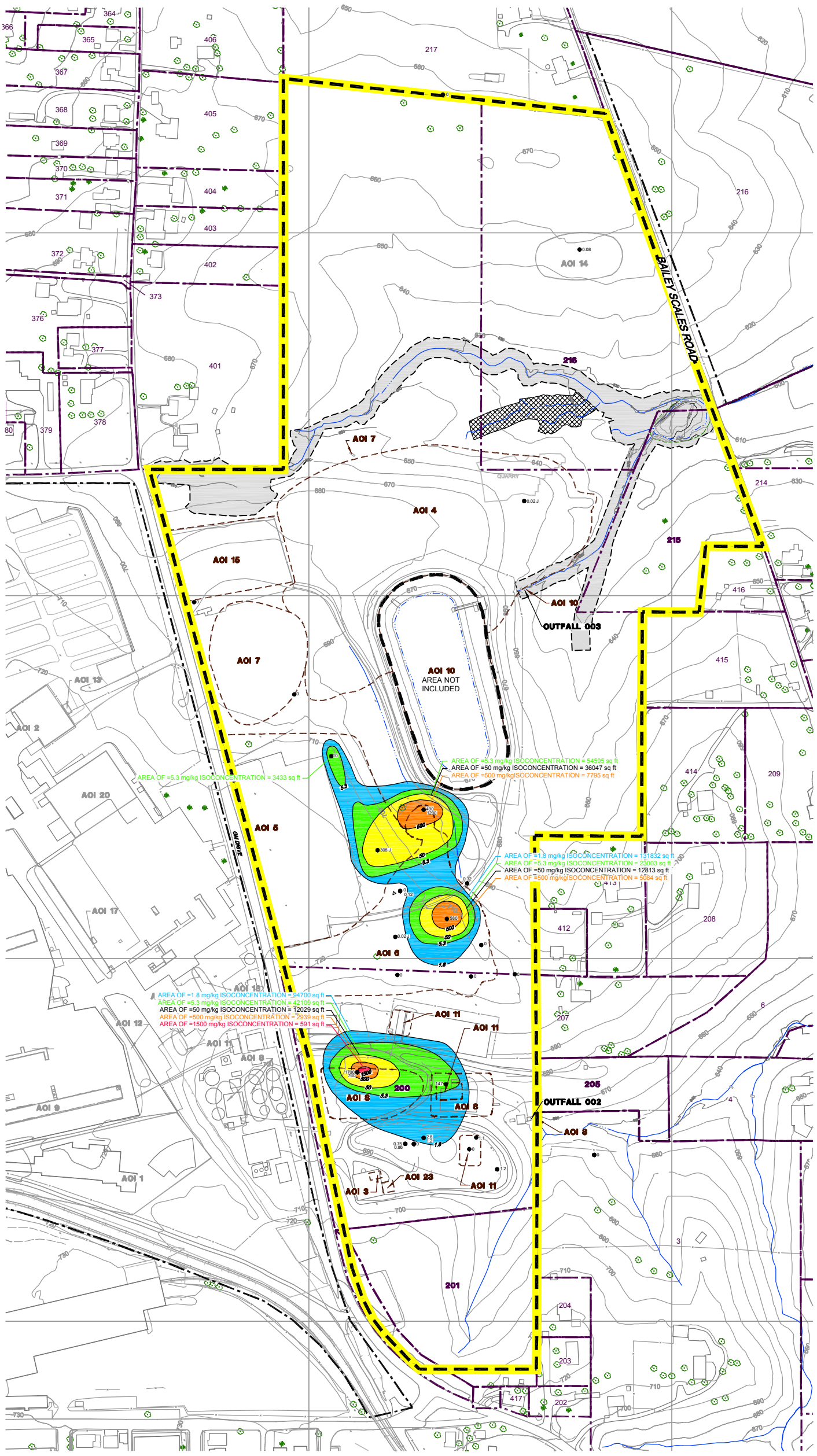
SCENARIO 3
PCB ISOCONCENTRATION CONTOURS
5-10 FEET BGS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.38 |

13968-00(151)GN-WA113 APR 07/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1.8 mg/kg ISOCONCENTRATION
- =5.3 mg/kg ISOCONCENTRATION
- =50 mg/kg ISOCONCENTRATION
- =500 mg/kg ISOCONCENTRATION
- =1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL AREA OF =1.8 mg/kg ISOCONCENTRATION = 226533 sq ft
TOTAL AREA OF =5.3 mg/kg ISOCONCENTRATION = 123140 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 60889 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 15818 sq ft
TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 591 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No. | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

ASSESSMENT OF VOLUMES OF PCB IMPACTED MEDIA - EAST PLANT AREA

SCENARIO 4
PCB ISOCONCENTRATION CONTOURS
10-15 FEET BGS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No.: 13968-00 | Report No.: 151 | Drawing No.: figure A.39 |

13968-00(151)GN-WA114 APR 07/2005

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-00-012102-LM-600 | 1324346.09 | 3123980.77 | 0 | 0.33 | 16.1 |
| S-00-012102-LM-600A | 1324346.09 | 3123980.77 | 0 | 0.33 | 15 |
| S-00-012102-LM-601 | 1324346.63 | 3123967.09 | 0 | 0.33 | 7.9 J |
| S-00-012102-LM-602 | 1324364.31 | 3123957.1 | 0 | 0.33 | 33 |
| S-00-012102-LM-603 | 1324381.32 | 3123951.57 | 0 | 0.33 | 8.7 |
| S-00-012102-LM-604 | 1324419.96 | 3124039.1 | 0 | 0.33 | 0.47 |
| S-00-012102-LM-605 | 1324411.27 | 3124059.43 | 0 | 0.33 | 4.31 J |
| S-00-012102-LM-606 | 1324428.92 | 3124014.43 | 0 | 0.33 | 35.9 J |
| S-00-012102-LM-607 | 1324449.34 | 3123977.95 | 0 | 0.33 | 1.08 J |
| S-00-012102-LM-608 | 1324468.19 | 3123962.03 | 0 | 0.33 | 7.3 |
| S-00-012102-LM-609 | 1324452.38 | 3124101.92 | 0 | 0.33 | 0.49 |
| S-00-012102-LM-610 | 1324465.84 | 3124094.7 | 0 | 0.33 | 1.12 |
| S-00-012102-LM-610A | 1324465.84 | 3124094.7 | 0 | 0.33 | 0.51 |
| S-00-012102-LM-611 | 1324488.71 | 3124080.91 | 0 | 0.33 | 0.07 J |
| S-00-012102-LM-612 | 1324504.58 | 3124198.93 | 0 | 0.33 | 0.31 J |
| S-00-012102-LM-612A | 1324504.58 | 3124198.93 | 0 | 0.33 | 0.12 J |
| S-00-012102-LM-613 | 1324518.76 | 3124182.97 | 0 | 0.33 | 5 |
| S-00-012102-LM-614 | 1324528.52 | 3124159.04 | 0 | 0.33 | 0.23 |
| S-00-012102-LM-615 | 1324549.5 | 3124130.22 | 0 | 0.33 | 0.04 J |
| S-00-012102-LM-616 | 1324569.32 | 3124264.84 | 0 | 0.33 | 0.15 J |
| S-00-012102-LM-616A | 1324569.32 | 3124264.84 | 0.33 | 2 | 0.01 J |
| S-00-012102-LM-617 | 1324586.19 | 3124249.12 | 0 | 0.33 | 2.8 |
| S-00-012102-LM-617A | 1324586.19 | 3124249.12 | 0.33 | 2 | 1.5 |
| S-00-012102-LM-618 | 1324602.86 | 3124227.34 | 0 | 0.33 | 11 |
| S-00-012102-LM-618A | 1324602.86 | 3124227.34 | 0.33 | 2 | 2.8 |
| S-00-012102-LM-619 | 1324619.91 | 3124196.65 | 0 | 0.33 | 0.1 |
| S-00-012102-LM-619A | 1324619.91 | 3124196.65 | 0.33 | 2 | 0 |
| S-00-012102-LM-620A | 1324647.19 | 3124339.38 | 0.33 | 2 | 0.19 |
| S-00-012102-LM-621 | 1324664.32 | 3124315.17 | 0 | 0.33 | 17.6 |
| S-00-012102-LM-622 | 1324690.42 | 3124284.87 | 0 | 0.33 | 13.8 |
| S-00-012102-LM-623 | 1324706.5 | 3124264.41 | 0 | 0.33 | 0.06 J |
| S-00-012102-LM-624 | 1324719.73 | 3124249.46 | 0 | 0.33 | 0.06 J |
| S-00-012102-LM-625 | 1324657.89 | 3124378.26 | 0 | 0.33 | 0.53 J |
| S-00-012102-LM-626 | 1324696.58 | 3124378.51 | 0 | 0.33 | 149 J |
| S-00-012102-LM-627 | 1324727.14 | 3124383.71 | 0 | 0.33 | 47.4 |
| S-00-012102-LM-628 | 1324769.9 | 3124385.5 | 0 | 0.33 | 0.07 J |
| S-00-012102-LM-629 | 1324602.96 | 3124464.99 | 0 | 0.33 | 0.12 |
| S-00-012102-LM-630 | 1324633.76 | 3124471.78 | 0 | 0.33 | 47 |
| S-00-012102-LM-630A | 1324633.76 | 3124471.78 | 0 | 0.33 | 53 |
| S-00-012102-LM-631 | 1324670.16 | 3124483.96 | 0 | 0.33 | 69 J |
| S-00-012102-LM-632 | 1324701.48 | 3124494.28 | 0 | 0.33 | 57.7 |
| S-00-012102-LM-633 | 1324734.36 | 3124507.9 | 0 | 0.33 | 0.01 J |
| S-00-012102-LM-634 | 1324591.03 | 3124540.43 | 0 | 0.33 | 141 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-00-012102-LM-634A | 1324591.03 | 3124540.43 | 0.33 | 2 | 223 |
| S-00-012102-LM-635 | 1324611.24 | 3124550.77 | 0 | 0.33 | 38.1 |
| S-00-012102-LM-635A | 1324611.24 | 3124550.77 | 0.33 | 2 | 56 J |
| S-00-012102-LM-636 | 1324636.37 | 3124561.44 | 0 | 0.33 | 62 |
| S-00-012102-LM-636A | 1324636.37 | 3124561.44 | 0.33 | 2 | 120 |
| S-00-012102-LM-637 | 1324660.93 | 3124577.15 | 0 | 0.33 | 35.9 |
| S-00-012102-LM-637A | 1324660.93 | 3124577.15 | 0.33 | 2 | 1.84 |
| S-00-012102-LM-638 | 1324694.87 | 3124586.55 | 0 | 0.33 | 0.07 J |
| S-00-012102-LM-638A | 1324694.87 | 3124586.55 | 0.33 | 2 | 0 |
| S-00-022502-GS-1121 | 1324535.3432 | 3124515.4564 | 0 | 0.33 | 0.04 J |
| S-00-022502-JW-1089 | 1322223.2853 | 3124537.2179 | 0 | 0.33 | 1.92 |
| S-00-030702-MD-1242 | 1323962.572 | 3125007.5153 | 0 | 0.33 | 0 |
| S-00-030702-MD-1247 | 1323964.1217 | 3124929.6446 | 0 | 0.33 | 0 |
| S-00-030802-JW-1267 | 1323952.95 | 3124610.18 | 0 | 0.33 | 2.03 |
| S-00-030802-JW-1267A | 1323952.95 | 3124610.18 | 0 | 0.33 | 1.06 |
| S-00-030802-JW-1268 | 1324005.92 | 3124600.14 | 0 | 0.33 | 8.6 |
| S-00-030802-JW-1269 | 1324019.37 | 3124591.17 | 0 | 0.33 | 2.86 |
| S-00-030802-JW-1270 | 1324056.23 | 3124567.17 | 0 | 0.33 | 0.88 J |
| S-00-030802-JW-1272 | 1324050.95 | 3124767.9 | 0 | 0.33 | 89 |
| S-00-030802-JW-1273 | 1324067.34 | 3124744.88 | 0 | 0.33 | 961 J |
| S-00-030802-JW-1274 | 1324077.68 | 3124731.05 | 0 | 0.33 | 0.31 J |
| S-00-030802-JW-1275 | 1324085.62 | 3124719.69 | 0 | 0.33 | 12.5 |
| S-00-030802-JW-1276 | 1324102.36 | 3124704.43 | 0 | 0.33 | 3.53 |
| S-00-030802-JW-1277 | 1324204.07 | 3124886.08 | 0 | 0.33 | 103 J |
| S-00-030802-JW-1277A | 1324204.07 | 3124886.08 | 0 | 0.33 | 231 J |
| S-00-030802-JW-1279 | 1324222.03 | 3124829.84 | 0 | 0.33 | 0.07 |
| S-00-030802-JW-1280 | 1324228.76 | 3124815.02 | 0 | 0.33 | 0.06 J |
| S-00-031102-GS-1293 | 1324428.27 | 3124916.18 | 0 | 0.33 | 0.1 |
| S-00-031102-GS-1293A | 1324428.27 | 3124916.18 | 0 | 0.33 | 0.06 |
| S-00-031102-GS-1297 | 1324503.18 | 3124943.02 | 0 | 0.33 | 0.37 |
| S-00-031102-GS-1299 | 1324555.18 | 3124983.78 | 0 | 0.33 | 0.07 J |
| S-00-031102-GS-1403 | 1324433.34 | 3125078.31 | 0 | 0.33 | 0.13 |
| S-00-031102-GS-1405 | 1324513.45 | 3125072.76 | 0 | 0.33 | 0.25 |
| S-00-031102-GS-1406 | 1324562.17 | 3125063.31 | 0 | 0.33 | 0.17 |
| S-00-031102-GS-1407 | 1324594.13 | 3125055.16 | 0 | 0.33 | 0 |
| S-00-031102-JW-1285 | 1324226.22 | 3124927.2 | 0 | 0.33 | 0.86 |
| S-00-031102-JW-1285A | 1324226.22 | 3124927.2 | 0 | 0.33 | 1.4 |
| S-00-031102-JW-1285B | 1324226.22 | 3124927.2 | 0.33 | 2 | 5 |
| S-00-031102-JW-1286 | 1324221.72 | 3124902.14 | 0 | 0.33 | 7 |
| S-00-031102-JW-1286A | 1324221.72 | 3124902.14 | 0.33 | 2 | 0.05 |
| S-00-031102-JW-1289 | 1324363.45 | 3124991.7 | 0 | 0.33 | 6.21 |
| S-00-031102-JW-1290 | 1324370.91 | 3124986.64 | 0 | 0.33 | 0.95 J |
| S-00-031102-JW-1298 | 1324522.66 | 3124923.1 | 0 | 0.33 | 1.2 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-00-031102-JW-1400 | 1324528.21 | 3125000.59 | 0 | 0.33 | 1.2 |
| S-00-031102-JW-1403A | 1324433.34 | 3125078.31 | 0 | 0.33 | 0.11 |
| S-00-031102-LM-1288 | 1324304.98 | 3124853.92 | 0 | 0.33 | 108.1 J |
| S-00-031102-LM-1288A | 1324304.98 | 3124853.92 | 0.33 | 2 | 4.91 J |
| S-00-032602-GS-1502 | 1324356.35 | 3123875.93 | 0 | 0.33 | 1.58 |
| S-00-032602-GS-1503 | 1324334.9 | 3123883.21 | 0 | 0.33 | 10.5 |
| S-00-032602-GS-1504 | 1324322.64 | 3123890.57 | 0 | 0.33 | 0.03 J |
| S-00-032602-GS-1505 | 1324310.21 | 3123899.99 | 0 | 0.33 | 0 |
| S-00-032602-GS-1507 | 1324346.49 | 3123774.83 | 0 | 0.33 | 0.72 |
| S-00-032602-GS-1508 | 1324331.65 | 3123774.63 | 0 | 0.33 | 0.29 |
| S-00-032602-GS-1509 | 1324317.08 | 3123771.16 | 0 | 0.33 | 2.31 J |
| S-00-032602-GS-1509A | 1324317.08 | 3123771.16 | 0 | 0.33 | 1.3 J |
| S-00-032602-GS-1511 | 1324339.34 | 3123689.98 | 0 | 0.33 | 0.29 |
| S-00-032602-GS-1512 | 1324317.64 | 3123686.88 | 0 | 0.33 | 15.8 J |
| S-00-032602-GS-1513 | 1324294.41 | 3123687.83 | 0 | 0.33 | 4.6 |
| S-00-032602-GS-1514 | 1324345.8 | 3123568.08 | 0 | 0.33 | 1.45 J |
| S-00-032602-GS-1515 | 1324321.98 | 3123570.2 | 0 | 0.33 | 3.82 |
| S-00-032602-GS-1516 | 1324309.48 | 3123571.7 | 0 | 0.33 | 0.95 |
| S-00-032602-GS-1517 | 1324294.46 | 3123574.12 | 0 | 0.33 | 0.18 |
| S-00-041002-GS-1659 | 1324141.313 | 3125087.284 | 0 | 0.33 | 0 |
| S-003-102003-NZ-4115 | 1322504.56575 | 3124605.41697 | 0 | 1.5 | 0.59 |
| S-00-LM620 | 1324647.19 | 3124339.38 | 0 | 0.33 | 0.3 |
| S-010223-MO-001 | 1324660.79 | 3125010.7 | 0 | 2 | 0 |
| S-010223-MO-002 | 1322133.59 | 3124351.45 | 0 | 2 | 0 |
| S-010223-MO-005 | 1324660.79 | 3125010.7 | 0 | 2 | 0 |
| S-010402-MG-001 | 1322475.041 | 3124441.675 | 0 | 2 | 0.28 |
| S-010402-MG-002 | 1322475.041 | 3124441.675 | 6 | 8 | 0 |
| S-010402-MG-003 | 1322475.041 | 3124441.675 | 13 | 15 | 0 |
| S-010702-KMV-501 | 1324160.29 | 3123622.54 | 0 | 2 | 30 |
| S-010702-KMV-502 | 1324160.29 | 3123622.54 | 0 | 2 | 36 |
| S-010702-KMV-503 | 1324160.29 | 3123622.54 | 6 | 8 | 0.09 |
| S-010702-MG-004 | 1322687.332 | 3124133.173 | 0 | 2 | 0 |
| S-010702-MG-005 | 1322687.332 | 3124133.173 | 6 | 8 | 0 |
| S-010702-MG-006 | 1322687.332 | 3124133.173 | 12 | 13 | 760 |
| S-010702-MG-007 | 1322687.332 | 3124133.173 | 13 | 14 | 1700 |
| S-010802-MG-008 | 1322654.226 | 3124377.29 | 0 | 2 | 1 |
| S-010802-MG-009 | 1322654.226 | 3124377.29 | 0 | 2 | 0.67 |
| S-010802-MG-010 | 1322654.226 | 3124377.29 | 6 | 8 | 3.02 |
| S-010802-MG-011 | 1322654.226 | 3124377.29 | 8 | 9 | 670 |
| S-010802-MG-012 | 1322654.226 | 3124377.29 | 13 | 14 | 147 |
| S-010802-MG-013 | 1322674.742 | 3124427.961 | 0 | 2 | 0.29 |
| S-010802-MG-014 | 1322674.742 | 3124427.961 | 6 | 8 | 181 |
| S-010802-MG-015 | 1322676.32 | 3124428.136 | 5 | 6 | 2.6 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-010802-MG-016 | 1322769.553 | 3124209.72 | 6.5 | 7.5 | 1.1 |
| S-010902-MG-017 | 1323148.756 | 3123949.822 | 0 | 2 | 13.1 |
| S-010902-MG-018 | 1323148.756 | 3123949.822 | 6 | 8 | 239 |
| S-010902-MG-019 | 1323148.756 | 3123949.822 | 21 | 23 | 0.01 J |
| S-010902-MG-020 | 1323148.756 | 3123949.822 | 21 | 23 | 0 |
| S-010902-MG-021 | 1323497.58 | 3123842.746 | 0 | 2 | 0.01 J |
| S-010902-MG-022 | 1323497.58 | 3123842.746 | 6 | 8 | 0 |
| S-010902-MG-023 | 1323497.58 | 3123842.746 | 16 | 18 | 0.01 J |
| S-011002-MG-024 | 1323557.923 | 3124061.731 | 0 | 2 | 0.69 |
| S-011002-MG-025 | 1323557.923 | 3124061.731 | 6 | 8 | 2.4 |
| S-011002-MG-026 | 1323557.923 | 3124061.731 | 14 | 15 | 10 |
| S-011002-MG-027 | 1323557.923 | 3124061.731 | 33.5 | 35.5 | 0 |
| S-011002-MG-028 | 1323299.162 | 3124189.161 | 0 | 2 | 1025 J |
| S-011002-MG-029 | 1323299.162 | 3124189.161 | 0 | 2 | 10 |
| S-011002-MG-030 | 1323299.162 | 3124189.161 | 6 | 8 | 0.88 |
| S-011002-MG-031 | 1323299.162 | 3124189.161 | 9 | 11 | 308 J |
| S-011002-MG-032 | 1323186.416 | 3124251.206 | 0 | 2 | 4.76 |
| S-011002-MG-033 | 1323186.416 | 3124251.206 | 6 | 8 | 13 |
| S-011002-MG-034 | 1323186.416 | 3124251.206 | 15 | 16 | 0.12 |
| S-011102-KMV-506 | 1325237.79 | 3124805.64 | 0 | 2 | 0 |
| S-011102-KMV-507 | 1325237.79 | 3124805.64 | 0 | 2 | 0 |
| S-011102-KMV-508 | 1325237.79 | 3124805.64 | 6 | 8 | 0.43 |
| S-011102-KMV-509 | 1325237.79 | 3124805.64 | 16 | 18 | 0 |
| S-011102-MG-035 | 1323109.794 | 3124380.132 | 0 | 2 | 2 |
| S-011102-MG-036 | 1323109.794 | 3124380.132 | 6 | 8 | 5100 |
| S-011102-MG-037 | 1323109.794 | 3124380.132 | 8 | 10 | 15500 |
| S-011102-MG-038 | 1323109.794 | 3124380.132 | 14 | 15.5 | 580 |
| S-011102-MG-039 | 1323038.03 | 3124028.89 | 0 | 2 | 0 |
| S-011102-MG-040 | 1323038.03 | 3124028.89 | 3.5 | 4.5 | 765 |
| S-011102-MG-041 | 1323038.03 | 3124028.89 | 6 | 8 | 0.26 J |
| S-011102-MG-042 | 1323038.03 | 3124028.89 | 6 | 8 | 0 |
| S-011102-MG-043 | 1323038.03 | 3124028.89 | 18 | 19 | 0.03 J |
| S-011102-MG-044 | 1323059.953 | 3124237.818 | 0 | 2 | 1300 |
| S-011102-MG-045 | 1323059.953 | 3124237.818 | 6 | 8 | 0.49 |
| S-011102-MG-046 | 1323059.953 | 3124237.818 | 14 | 15.5 | 0.02 J |
| S-011402-MG-047 | 1322951.071 | 3124446.586 | 0 | 2 | 0.02 J |
| S-011402-MG-048 | 1322951.071 | 3124446.586 | 6 | 8 | 0 |
| S-011402-MG-049 | 1322951.071 | 3124446.586 | 14 | 15 | 0 |
| S-011402-MG-050 | 1323410.817 | 3124316.144 | 0 | 2 | 19.1 J |
| S-011402-MG-051 | 1323410.817 | 3124316.144 | 6 | 8 | 58.9 J |
| S-011402-MG-052 | 1323410.817 | 3124316.144 | 10 | 11 | 1200 |
| S-011402-MG-053 | 1323410.817 | 3124316.144 | 12 | 12.5 | 400 |
| S-011502-MG-054 | 1322918.235 | 3124106.285 | 0 | 2 | 1.52 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-011502-MG-055 | 1322918.235 | 3124106.285 | 6 | 8 | 2.7 |
| S-011502-MG-056 | 1322918.235 | 3124106.285 | 8 | 10 | 0.53 |
| S-012202-MG-063 | 1324954.51 | 3124745.6 | 10 | 11 | 0.08 |
| S-012202-MG-064 | 1324903.62 | 3124742.41 | 3 | 3.5 | 0 |
| S-012203-MG-236 | 1324204.27 | 3124457.64 | 0 | 2 | 0 |
| S-012203-MG-237 | 1324204.27 | 3124457.64 | 8 | 10 | 3.7 |
| S-012203-MG-238 | 1324204.27 | 3124457.64 | 22 | 24 | 1100 |
| S-012303-MG-239 | 1324204.27 | 3124457.64 | 34 | 35 | 14 |
| S-012402-MO-004 | 1324644.9 | 3124087.18 | 0 | 2 | 0 |
| S-012502-KMV-514 | 1323326.58 | 3124543.77 | 0 | 2 | 15.1 J |
| S-012502-KMV-515 | 1323326.58 | 3124543.77 | 0 | 2 | 12 |
| S-012502-KMV-516 | 1323326.58 | 3124543.77 | 4 | 6 | 0.03 J |
| S-022003-MG-240 | 1324262.89 | 3123955.59 | 0 | 2 | 0 |
| S-022003-MG-241 | 1324262.89 | 3123955.59 | 6 | 8 | 4.68 J |
| S-022003-MG-242 | 1324262.89 | 3123955.59 | 6 | 8 | 9.8 |
| S-022003-MG-243 | 1324262.89 | 3123955.59 | 18 | 20 | 3.82 J |
| S-022003-MG-244 | 1324262.89 | 3123955.59 | 24 | 25 | 0.19 J |
| S-022102-KMV-528 | 1324167.33 | 3123874.51 | 0 | 2 | 5.47 J |
| S-022102-KMV-529 | 1324167.33 | 3123874.51 | 0 | 2 | 5.75 J |
| S-022102-KMV-530 | 1324167.33 | 3123874.51 | 6 | 8 | 9.1 |
| S-022102-KMV-531 | 1324167.33 | 3123874.51 | 22 | 24 | 0.06 |
| S-022102-MG-122 | 1323569.79 | 3123946.12 | 0 | 2 | 0.8 J |
| S-022102-MG-123 | 1323569.79 | 3123946.12 | 0 | 2 | 0.61 J |
| S-022102-MG-124 | 1323569.79 | 3123946.12 | 8 | 10 | 0.5 |
| S-022102-MG-125 | 1323569.79 | 3123946.12 | 36 | 38 | 0 |
| S-022102-MG-126 | 1323620.05 | 3124145.38 | 0 | 2 | 0.02 J |
| S-022102-MG-127 | 1323620.05 | 3124145.38 | 5 | 7 | 0 |
| S-022202-KMV-532 | 1323982.75 | 3123683.83 | 0 | 2 | 52.7 |
| S-022202-KMV-533 | 1323982.75 | 3123683.83 | 0 | 2 | 3.61 J |
| S-022202-KMV-534 | 1323982.75 | 3123683.83 | 6 | 8 | 0.01 J |
| S-022202-KMV-535 | 1323982.75 | 3123683.83 | 12 | 14 | 0 |
| S-022202-MG-128 | 1323511.66 | 3123952.06 | 3.5 | 5 | 1.33 |
| S-022202-MG-129 | 1323511.66 | 3123952.06 | 6 | 8 | 1.4 |
| S-022202-MG-130 | 1323511.66 | 3123952.06 | 24 | 26 | 0 |
| S-022502-KMV-536 | 1324198.48 | 3124363.19 | 0 | 2 | 0 |
| S-022502-KMV-537 | 1324198.48 | 3124363.19 | 0 | 2 | 0 |
| S-022502-MG-131 | 1322955.19 | 3124243.89 | 0 | 2 | 0 |
| S-022502-MG-132 | 1322955.19 | 3124243.89 | 6 | 8 | 0 |
| S-022502-MG-133 | 1322955.19 | 3124243.89 | 10 | 11.5 | 0 |
| S-022502-MG-134 | 1322955.19 | 3124243.89 | 5 | 6 | 0 |
| S-022502-MG-136 | 1323037.46 | 3124475.03 | 0 | 2 | 0.24 |
| S-022502-MG-137 | 1323037.46 | 3124475.03 | 6 | 8 | 0 |
| S-022502-MG-138 | 1323037.46 | 3124475.03 | 14 | 16 | 0 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-022602-KMV-538 | 1324198.48 | 3124363.19 | 6 | 8 | 22 |
| S-022602-KMV-539 | 1324198.48 | 3124363.19 | 22 | 23 | 3.39 J |
| S-022702-MG-139 | 1323368.41 | 3124412.22 | 0 | 2 | 0.03 J |
| S-022702-MG-140 | 1323368.41 | 3124412.22 | 4 | 5 | 0 |
| S-022702-MG-141 | 1323278.29 | 3124346.11 | 0 | 2 | 0 |
| S-022702-MG-142 | 1323278.29 | 3124346.11 | 6 | 7 | 0 |
| S-022702-MG-143 | 1323207.72 | 3124436.23 | 3 | 4 | 110 |
| S-022702-MG-144 | 1323207.72 | 3124436.23 | 6 | 8 | 32 |
| S-022702-MG-145 | 1323207.72 | 3124436.23 | 10 | 12 | 0.32 |
| S-030402-MG-146 | 1324184.56 | 3124088.87 | 0 | 2 | 0 |
| S-030402-MG-147 | 1324184.56 | 3124088.87 | 0 | 2 | 0.01 J |
| S-030402-MG-148 | 1324184.56 | 3124088.87 | 6 | 8 | 82 |
| S-030402-MG-149 | 1324184.56 | 3124088.87 | 26 | 28 | 280 |
| S-030502-MG-150 | 1324261.41 | 3124593.01 | 0 | 2 | 0.06 |
| S-030502-MG-151 | 1324261.41 | 3124593.01 | 6 | 8 | 170 |
| S-030502-MG-152 | 1324261.41 | 3124593.01 | 14 | 16 | 0.02 J |
| S-030502-MG-153 | 1324039.35 | 3124111.36 | 0 | 2 | 0.01 J |
| S-030502-MG-154 | 1324039.35 | 3124111.36 | 6 | 8 | 1.7 J |
| S-030502-MG-155 | 1324039.35 | 3124111.36 | 20 | 22 | 0.19 |
| S-030602-MG-156 | 1323845.55 | 3124070.68 | 0 | 2 | 0.2 J |
| S-030602-MG-157 | 1323845.55 | 3124070.68 | 6 | 8 | 0.03 J |
| S-030602-MG-158 | 1323794.11 | 3123896.94 | 0 | 2 | 0 |
| S-030602-MG-159 | 1323794.11 | 3123896.94 | 6 | 8 | 0 |
| S-030602-MG-160 | 1323794.11 | 3123896.94 | 26 | 28 | 0 |
| S-030602-MG-161 | 1323748.66 | 3123789.81 | 0 | 2 | 0.09 |
| S-030602-MG-162 | 1323748.66 | 3123789.81 | 6 | 8 | 0 |
| S-030602-MG-163 | 1323748.66 | 3123789.81 | 22 | 24 | 0 |
| S-031102-MG-175 | 1323186.31 | 3124251.53 | 0 | 2 | 0.03 J |
| S-031102-MG-176 | 1323186.31 | 3124251.53 | 6 | 8 | 0 |
| S-031102-MG-177 | 1323186.31 | 3124251.53 | 15 | 17 | 0 |
| S-031402-JW-1429 | 1324380.64 | 3124216.62 | 0 | 0.33 | 0.57 |
| S-031402-MG-181 | 1323012.76 | 3123951.99 | 0 | 2 | 1360 |
| S-031402-MG-182 | 1323012.76 | 3123951.99 | 6 | 8 | 0.02 J |
| S-031402-MG-183 | 1323012.76 | 3123951.99 | 18 | 20 | 0.04 J |
| S-031402-MG-184 | 1323464.99 | 3124260.34 | 0 | 2 | 0.06 |
| S-031402-MG-185 | 1323464.99 | 3124260.34 | 2 | 4 | 34.6 J |
| S-031502-MG-186 | 1323728.21 | 3123959.66 | 0 | 2 | 0 |
| S-031502-MG-187 | 1323728.21 | 3123959.66 | 6 | 8 | 0 |
| S-031502-MG-188 | 1323728.21 | 3123959.66 | 11 | 12.5 | 0 |
| S-031802-MG-189 | 1323138.14 | 3124495.14 | 0 | 2 | 0.01 J |
| S-031802-MG-190 | 1323138.14 | 3124495.14 | 4.5 | 6.5 | 0 |
| S-031802-MG-191 | 1323444.37 | 3124109.37 | 0 | 2 | 0.14 |
| S-031802-MG-192 | 1323444.37 | 3124109.37 | 6 | 8 | 2.4 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-031802-MG-193 | 1323444.37 | 3124109.37 | 25 | 27 | 0.09 |
| S-031802-MG-194 | 1323444.37 | 3124109.37 | 31 | 33 | 0 |
| S-032002-MG-195 | 1323294.86 | 3124064.82 | 1 | 3 | 27.3 J |
| S-032002-MG-196 | 1323294.86 | 3124064.82 | 1 | 3 | 20.3 J |
| S-032002-MG-197 | 1323294.86 | 3124064.82 | 6 | 8 | 102 |
| S-032002-MG-198 | 1323294.86 | 3124064.82 | 18 | 20 | 3273 J |
| S-032002-MG-199 | 1323294.86 | 3124064.82 | 21 | 23 | 2300 |
| S-032102-MG-200 | 1323231.73 | 3124099.77 | 0 | 2 | 2300 |
| S-032102-MG-201 | 1323231.73 | 3124099.77 | 6 | 8 | 8600 |
| S-032102-MG-202 | 1323231.73 | 3124099.77 | 20 | 22 | 0.03 J |
| S-032102-MG-203 | 1323165.41 | 3123886.26 | 0 | 2 | 0.91 |
| S-032102-MG-204 | 1323165.41 | 3123886.26 | 6 | 8 | 0.55 |
| S-032102-MG-205 | 1323165.41 | 3123886.26 | 19.5 | 21.5 | 0.09 |
| S-032202-MG-206 | 1323348.09 | 3123928.61 | 0 | 2 | 0 |
| S-032202-MG-207 | 1323348.09 | 3123928.61 | 6 | 8 | 0.13 |
| S-032202-MG-208 | 1323348.09 | 3123928.61 | 18 | 20 | 0 |
| S-032202-MG-209 | 1323348.09 | 3123928.61 | 18 | 20 | 0 |
| S-041503-KMV-569 | 1322758.92 | 3124569.93 | 0 | 2 | 2.4 |
| S-041503-KMV-570 | 1322796.5 | 3124572.35 | 0 | 2 | 0.05 |
| S-041603-KMV-571 | 1322847.51 | 3124569.36 | 0 | 2 | 1.2 |
| S-041603-KMV-572 | 1322847.51 | 3124569.36 | 6 | 7 | 0 |
| S-042203-JM-1000 | 1322908.5 | 3124569.23 | 0 | 2 | 0 |
| S-042203-JM-1001 | 1322908.5 | 3124569.23 | 0 | 2 | 0 |
| S-042203-JM-1002 | 1322908.5 | 3124569.23 | 6 | 8 | 0 |
| S-042203-JM-1003 | 1322908.5 | 3124569.23 | 8 | 10 | 0 |
| S-042203-JM-1004 | 1322957.2 | 3124567.26 | 0 | 2 | 0.54 |
| S-042203-JM-1005 | 1322957.2 | 3124567.26 | 6 | 8 | 0.04 J |
| S-042203-JM-1006 | 1322957.2 | 3124567.26 | 12 | 14 | 0 |
| S-042204-JC-076 | 1322458.99 | 3124786.01 | 0 | 2 | 0 |
| S-042204-JC-077 | 1322458.99 | 3124786.01 | 6 | 8 | 0 |
| S-042204-JC-078 | 1322458.99 | 3124786.01 | 11 | 13 | 0 |
| S-042204-JC-079 | 1322458.99 | 3124786.01 | 11 | 13 | 0 |
| S-042403-JM-1007 | 1322698.67 | 3124565.46 | 5 | 6 | 0.03 J |
| S-042403-JM-1008 | 1322628.651 | 3124561.85 | 2.6 | 4 | 0.02 J |
| S-051704-KMV-583 | 1324479.25 | 3123965.38 | 0 | 2 | 0.63 |
| S-051804-KMV-584 | 1324617.06 | 3124181.76 | 0 | 2 | 0 |
| S-051904-DD-019 | 1322419.38 | 3124518.73 | 0 | 2 | 0.01 J |
| S-051904-DD-020 | 1322419.38 | 3124518.73 | 6 | 8 | 0.02 J |
| S-051904-DD-021 | 1322419.38 | 3124518.73 | 14 | 16 | 1.2 |
| S-051904-DD-022 | 1322303.28 | 3124622.69 | 0 | 2 | 0.02 J |
| S-051904-DD-023 | 1322303.28 | 3124622.69 | 6 | 8 | 0 |
| S-052404-KMV-585 | 1324690.51 | 3124228.08 | 0 | 2 | 0 |
| S-060302-MG-214 | 1323032.33 | 3123947.94 | 2 | 4 | 0.66 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-060302-MG-215 | 1323032.33 | 3123947.94 | 4 | 6 | 0 |
| S-060302-MG-216 | 1323006.18 | 3123920.66 | 0 | 2 | 1.47 J |
| S-060302-MG-217 | 1323006.18 | 3123920.66 | 4 | 6 | 0 |
| S-060302-MG-218 | 1323006.18 | 3123920.66 | 4 | 6 | 0 |
| S-060302-MG-219 | 1322964.52 | 3123962.9 | 0 | 2 | 0.27 |
| S-060302-MG-220 | 1322964.52 | 3123962.9 | 4 | 6 | 0.14 J |
| S-060302-MG-221 | 1323249.52 | 3124199.47 | 0 | 2 | 0.4 J |
| S-060302-MG-222 | 1323291.21 | 3124139.98 | 0 | 2 | 0.06 |
| S-060302-MG-223 | 1323350.11 | 3124183.15 | 0 | 2 | 0 |
| S-060302-MG-224 | 1323305.99 | 3124258.48 | 0 | 2 | 0.12 |
| S-060602-MG-225 | 1325158.84 | 3124189.39 | 0 | 2 | 0 |
| S-060602-MG-226 | 1325158.84 | 3124189.39 | 2 | 4 | 0 |
| S-061002-GS-1928 | 1324258.5843 | 3123614.6439 | 0 | 0.33 | 0.44 |
| S-061002-GS-1928A | 1324258.5843 | 3123614.6439 | 0 | 0.33 | 0.53 |
| S-061002-GS-1931 | 1324271.7044 | 3123695.3341 | 0 | 0.33 | 142 J |
| S-061002-GS-1932 | 1324299.2784 | 3123696.0526 | 0 | 0.33 | 4.3 |
| S-061002-GS-1933 | 1324244.7556 | 3123695.9475 | 0 | 0.33 | 14.8 |
| S-061002-GS-1935 | 1324271.5169 | 3123757.3871 | 0 | 0.33 | 86.2 J |
| S-061002-GS-1936 | 1324294.8504 | 3123757.8216 | 0 | 0.33 | 13.6 J |
| S-061002-GS-1937 | 1324241.6875 | 3123842.9615 | 0 | 0.33 | 31 |
| S-061002-GS-1939 | 1324284.6396 | 3123852.467 | 0 | 0.33 | 5.84 J |
| S-061002-GS-1941 | 1324281.9512 | 3123888.254 | 0 | 0.33 | 111 |
| S-061002-GS-1942 | 1324306.0643 | 3123866.5579 | 0 | 0.33 | 6.09 |
| S-061002-JW-1929 | 1324286.8011 | 3123616.044 | 0 | 0.33 | 29.8 J |
| S-061002-JW-1930 | 1324310.9086 | 3123617.8066 | 0 | 0.33 | 5.9 |
| S-061002-JW-1934 | 1324247.4356 | 3123757.0182 | 0 | 0.33 | 711 J |
| S-061002-JW-1938 | 1324261.7154 | 3123844.3051 | 0 | 0.33 | 97.7 |
| S-061002-JW-1938A | 1324261.7154 | 3123844.3051 | 0 | 0.33 | 14.1 |
| S-061002-JW-1940 | 1324255.895 | 3123897.5916 | 0 | 0.33 | 1.97 J |
| S-071103-JM-2302 | 1324499.01 | 3124485.32 | 0 | 0.33 | 0.04 J |
| S-071103-JM-2302A | 1324499.01 | 3124485.32 | 0 | 0.33 | 0.05 J |
| S-071103-JM-2303 | 1324486.46 | 3124492.79 | 0 | 0.33 | 0.17 J |
| S-071103-JM-2307 | 1324434.23 | 3124453.13 | 0 | 0.33 | 0.3 J |
| S-071103-JM-2308 | 1324430.08 | 3124424.03 | 0 | 0.33 | 0.16 J |
| S-071103-JM-2309 | 1324431.25 | 3124324.96 | 0 | 0.33 | 0.12 |
| S-071103-JM-2310 | 1324406.62 | 3124335.77 | 0 | 0.33 | 1.9 |
| S-071103-JM-2311 | 1324392.54 | 3124250.59 | 0 | 0.33 | 0.48 J |
| S-071103-JM-2311A | 1324392.54 | 3124250.59 | 0 | 0.33 | 0.38 |
| S-071103-JM-2312 | 1324397.42 | 3124232.75 | 0 | 0.33 | 0.02 J |
| S-071103-JM-2313 | 1324393.26 | 3124162.8 | 0 | 0.33 | 5.3 |
| S-071103-JM-2314 | 1324374.03 | 3124152.49 | 0 | 0.33 | 1.6 |
| S-071403-JM-2289 | 1324493.56 | 3124738.75 | 0 | 0.33 | 79.2 J |
| S-071403-JM-2290 | 1324462.51 | 3124722.38 | 0 | 0.33 | 0.24 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-071403-JM-2294 | 1324469.51 | 3124647.28 | 0 | 0.33 | 51.3 J |
| S-071403-JM-2294A | 1324469.51 | 3124647.28 | 0 | 0.33 | 53.5 J |
| S-071403-JM-2295 | 1324454.33 | 3124598.16 | 0 | 0.33 | 9.8 J |
| S-071403-JM-2296 | 1324406.06 | 3124592.96 | 0 | 0.33 | 2.03 J |
| S-071403-JM-2299 | 1324501.45 | 3124525.27 | 0 | 0.33 | 0.12 J |
| S-071403-JM-2300 | 1324488.01 | 3124544.76 | 0 | 0.33 | 0.14 |
| S-071403-JM-2301 | 1324479.87 | 3124544.53 | 0 | 0.33 | 0.33 |
| S-071403-JM-2304 | 1324454.59 | 3124497.13 | 0 | 0.33 | 3.9 |
| S-071403-JM-2305 | 1324427.45 | 3124507.04 | 0 | 0.33 | 0.26 |
| S-071503-JM-2278 | 1324507.85 | 3124860.85 | 0 | 0.33 | 96 |
| S-071503-JM-2280 | 1324511.88 | 3124818.57 | 0 | 0.33 | 63 |
| S-071503-JM-2281 | 1324526.72 | 3124778.71 | 0 | 0.33 | 2900 |
| S-071503-JM-2281A | 1324526.72 | 3124778.71 | 0 | 0.33 | 1700 |
| S-071503-JM-2283 | 1324560.84 | 3124752.35 | 0 | 0.33 | 3800 |
| S-071503-JM-2285 | 1324586.42 | 3124727.47 | 0 | 0.33 | 0.07 |
| S-071503-JM-2286 | 1324547.48 | 3124728.91 | 0 | 0.33 | 2800 |
| S-071503-JM-2287 | 1324542.48 | 3124728.77 | 0 | 0.33 | 89 |
| S-071503-JM-2288 | 1324510.59 | 3124728.66 | 0 | 0.33 | 48 |
| S-071503-JM-2291 | 1324632.63 | 3124644.2 | 0 | 0.33 | 0.13 |
| S-071503-JM-2292 | 1324609.41 | 3124639.08 | 0 | 0.33 | 0.03 J |
| S-071602-CLM-001 | 1322489.32 | 3124289.33 | 6 | 8 | 0 |
| S-071602-CLM-002 | 1322489.32 | 3124289.33 | 10 | 12 | 0 |
| S-071602-CLM-003 | 1322489.32 | 3124289.33 | 10.5 | 12.5 | 0 |
| S-071602-CLM-004 | 1322489.56 | 3124265.54 | 2 | 4 | 0.04 J |
| S-071602-CLM-005 | 1322489.56 | 3124265.54 | 6 | 8 | 0 |
| S-071602-CLM-006 | 1322489.56 | 3124265.54 | 10 | 12 | 0.86 |
| S-071602-CLM-007 | 1322489.56 | 3124265.54 | 11.5 | 13.5 | 0.75 |
| S-071602-CLM-008 | 1322489.32 | 3124289.33 | 2 | 4 | 0.04 J |
| S-071602-CLM-009 | 1322506.28 | 3124316 | 2 | 4 | 0 |
| S-071602-CLM-010 | 1322506.28 | 3124316 | 6 | 8 | 0 |
| S-071602-CLM-011 | 1322506.28 | 3124316 | 10 | 12 | 1.2 |
| S-071602-CLM-012 | 1322506.28 | 3124316 | 10.5 | 12.5 | 2.8 |
| S-071602-CLM-013 | 1322489.32 | 3124289.33 | 10 | 12 | 0 |
| S-071603-JM-2254 | 1324384.74 | 3124760.43 | 0 | 0.33 | 55 |
| S-071603-JM-2255 | 1324367.16 | 3124819.07 | 0 | 0.33 | 0.38 |
| S-071603-JM-2256 | 1324384.15 | 3124879.1 | 0 | 0.33 | 303 J |
| S-071603-JM-2257 | 1324369.97 | 3124918.07 | 0 | 0.33 | 28.4 J |
| S-071603-JM-2258 | 1324344.93 | 3124947.99 | 0 | 0.33 | 0.14 J |
| S-071603-JM-2259 | 1324339.78 | 3124962.03 | 0 | 0.33 | 3.61 |
| S-071603-JM-2260 | 1324329.88 | 3124985.8 | 0 | 0.33 | 0.04 J |
| S-071603-JM-2261 | 1324326.38 | 3124995.65 | 0 | 0.33 | 0.05 J |
| S-071603-JM-2261A | 1324326.38 | 3124995.65 | 0 | 0.33 | 0.05 J |
| S-071603-JM-2263 | 1324436.79 | 3124796.18 | 0 | 0.33 | 140 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-071603-JM-2264 | 1324457.73 | 3124795.35 | 0 | 0.33 | 0.55 |
| S-071603-JM-2265 | 1324425.43 | 3124844.13 | 0 | 0.33 | 0.06 |
| S-071603-JM-2266 | 1324469.9 | 3124836.77 | 0 | 0.33 | 0.02 J |
| S-071603-JM-2268 | 1324456 | 3124890.16 | 0 | 0.33 | 0.38 |
| S-071603-JM-2269 | 1324425.86 | 3124884.82 | 0 | 0.33 | 0.07 |
| S-071603-JM-2269A | 1324425.86 | 3124884.82 | 0 | 0.33 | 0.02 J |
| S-071603-JM-2270 | 1324395 | 3124988.94 | 0 | 0.33 | 0.02 J |
| S-071603-JM-2271 | 1324414.09 | 3125025.24 | 0 | 0.33 | 0.04 J |
| S-071603-JM-2272 | 1324388.05 | 3125024.73 | 0 | 0.33 | 0.04 J |
| S-071603-JM-2273 | 1324376.41 | 3125051.89 | 0 | 0.33 | 0.05 J |
| S-071603-JM-2275 | 1324555.08 | 3124876.85 | 0 | 0.33 | 0.03 J |
| S-071603-JM-2276 | 1324537.1 | 3124869.78 | 0 | 0.33 | 1.1 |
| S-071603-JM-2277 | 1324523.88 | 3124873.61 | 0 | 0.33 | 26 |
| S-071603-JM-2279 | 1324567.47 | 3124829.27 | 0 | 0.33 | 0.05 |
| S-071603-JM-2282 | 1324582.53 | 3124771.7 | 0 | 0.33 | 0.04 J |
| S-071603-JM-2284 | 1324605.73 | 3124726.07 | 0 | 0.33 | 0.06 |
| S-071603-JM-2284A | 1324605.73 | 3124726.07 | 0 | 0.33 | 0.07 |
| S-071603-JM-2306 | 1324456.5 | 3124431.89 | 0 | 0.33 | 0.09 J |
| S-071603-JM-2317 | 1324728.53 | 3124463.24 | 0 | 0.33 | 0.09 |
| S-071603-JM-2321 | 1324782.48 | 3124329.23 | 0 | 0.33 | 0.03 J |
| S-071603-JM-2323 | 1324752.44 | 3124280.25 | 0 | 0.33 | 0.04 J |
| S-071603-JM-2325 | 1324663.96 | 3124249.88 | 0 | 0.33 | 0.04 J |
| S-071703-JM-2206 | 1323355.87 | 3124641.35 | 0 | 0.33 | 0.03 J |
| S-071703-JM-2207 | 1323378.06 | 3124639.19 | 0 | 0.33 | 3.1 |
| S-071703-JM-2208 | 1323417.42 | 3124687.85 | 0 | 0.33 | 47 |
| S-071703-JM-2208A | 1323417.42 | 3124687.85 | 0 | 0.33 | 67 |
| S-071703-JM-2209 | 1323386.62 | 3124706.6 | 0 | 0.33 | 0.14 J |
| S-071703-JM-2210 | 1323403.16 | 3124727.07 | 0 | 0.33 | 0.2 J |
| S-071703-JM-2211 | 1323451.17 | 3124739.58 | 0 | 0.33 | 0.24 |
| S-071703-JM-2212 | 1323484.13 | 3124709.67 | 0 | 0.33 | 75 |
| S-071703-JM-2213 | 1323483.44 | 3124734.14 | 0 | 0.33 | 0 |
| S-071703-JM-2214 | 1323587.19 | 3124704.62 | 0 | 0.33 | 2.2 |
| S-071703-JM-2217 | 1323597.93 | 3124788.31 | 0 | 0.33 | 10 |
| S-071703-JM-2218 | 1323690.78 | 3124733.03 | 0 | 0.33 | 1.6 |
| S-071703-JM-2219 | 1323683.4 | 3124755.14 | 0 | 0.33 | 0.12 J |
| S-071703-JM-2220 | 1323809.92 | 3124707.04 | 0 | 0.33 | 0.31 |
| S-071703-JM-2223 | 1323805.32 | 3124778.64 | 0 | 0.33 | 0.03 J |
| S-071703-JM-2224 | 1323898.34 | 3124725.9 | 0 | 0.33 | 11.94 |
| S-071703-JM-2224A | 1323898.34 | 3124725.9 | 0 | 0.33 | 11.96 |
| S-071703-JM-2225 | 1323891.32 | 3124758.43 | 0 | 0.33 | 0.28 |
| S-071703-JM-2226 | 1323857.4 | 3124633.98 | 0 | 0.33 | 110 |
| S-071703-JM-2227 | 1323853.03 | 3124656.48 | 0 | 0.33 | 0.09 J |
| S-071703-JM-2228 | 1323902.66 | 3124647.65 | 0 | 0.33 | 6.8 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-071703-JM-2229 | 1323885.9 | 3124670.1 | 0 | 0.33 | 13.2 |
| S-071703-JM-2230 | 1323963.96 | 3124722.1 | 0 | 0.33 | 6.42 |
| S-071703-JM-2231 | 1323941.52 | 3124713.12 | 0 | 0.33 | 8.69 J |
| S-071703-JM-2232 | 1323993.97 | 3124700.54 | 0 | 0.33 | 1.27 J |
| S-071703-JM-2233 | 1323983.22 | 3124761.03 | 0 | 0.33 | 28 |
| S-071703-JM-2234 | 1323970.88 | 3124780.98 | 0 | 0.33 | 9.6 |
| S-071802-CLM-001 | 1323473.99 | 3124065.98 | 0 | 2 | 0.04 |
| S-071802-CLM-002 | 1323388.35 | 3124091.75 | 0 | 2 | 0.04 J |
| S-071802-CLM-003 | 1323301.5 | 3124116.76 | 0 | 2 | 0.39 |
| S-071802-CLM-004 | 1323215.17 | 3124141.2 | 0 | 2 | 4 |
| S-071802-CLM-005 | 1323388.35 | 3124091.75 | 0 | 2 | 0.21 |
| S-071803-JM-2238 | 1324033.06 | 3124797.57 | 0 | 0.33 | 0.1 J |
| S-071803-JM-2240 | 1324078.34 | 3124850.37 | 0 | 0.33 | 0.16 J |
| S-071803-JM-2240A | 1324078.34 | 3124850.37 | 0 | 0.33 | 0.19 J |
| S-071803-JM-2241 | 1324123.03 | 3124770.17 | 0 | 0.33 | 0.13 J |
| S-071803-JM-2247 | 1324169.92 | 3124918.69 | 0 | 0.33 | 0.12 J |
| S-071803-JM-2249 | 1324228.32 | 3124908.52 | 0 | 0.33 | 3.08 J |
| S-071803-JM-2250 | 1324313.61 | 3124778.1 | 0 | 0.33 | 15.8 J |
| S-071803-JM-2250A | 1324313.61 | 3124778.1 | 0 | 0.33 | 10.9 J |
| S-071803-JM-2251 | 1324309.43 | 3124811.09 | 0 | 0.33 | 259 J |
| S-071803-JM-2252 | 1324288.67 | 3124969.34 | 0 | 0.33 | 0.06 |
| S-071803-JM-2254 | 1324266.96 | 3124983.25 | 0 | 0.33 | 0.07 |
| S-072103-JM-2215 | 1323587.14 | 3124722.66 | 0 | 0.33 | 36 |
| S-072103-JM-2215A | 1323587.14 | 3124722.66 | 1 | 1.33 | 2.2 |
| S-072103-JM-2215B | 1323587.14 | 3124722.66 | 1 | 1.33 | 2 |
| S-072103-JM-2216 | 1323589.7 | 3124749.22 | 0 | 0.33 | 13 |
| S-072103-JM-2216A | 1323589.7 | 3124749.22 | 1 | 1.33 | 0.26 |
| S-072103-JM-2221 | 1323809.4 | 3124729.07 | 0 | 0.33 | 0.04 J |
| S-072103-JM-2221A | 1323809.4 | 3124729.07 | 1 | 1.33 | 0 |
| S-072103-JM-2222 | 1323821.06 | 3124753.07 | 0 | 0.33 | 0.11 |
| S-072103-JM-2222A | 1323821.06 | 3124753.07 | 1 | 1.33 | 0.01 J |
| S-072103-JM-2235 | 1324036.9 | 3124745.66 | 0 | 0.33 | 0.59 |
| S-072103-JM-2235A | 1324036.9 | 3124745.66 | 1 | 1.33 | 0.03 J |
| S-072103-JM-2236 | 1324033.03 | 3124790.42 | 0 | 0.33 | 74 |
| S-072103-JM-2236A | 1324033.03 | 3124790.42 | 1 | 1.33 | 1.5 |
| S-072103-JM-2237 | 1323993.72 | 3124815.37 | 0 | 0.33 | 0.09 |
| S-072103-JM-2237A | 1323993.72 | 3124815.37 | 1 | 1.33 | 0 |
| S-072103-JM-2239 | 1324084.38 | 3124754.86 | 0 | 0.33 | 0.87 |
| S-072103-JM-2239A | 1324084.38 | 3124754.86 | 1 | 1.33 | 0.34 |
| S-072103-JM-2242 | 1324109.15 | 3124820.92 | 0 | 0.33 | 5600 |
| S-072103-JM-2242A | 1324109.15 | 3124820.92 | 1 | 1.33 | 17 |
| S-072103-JM-2243 | 1324121.14 | 3124883.48 | 0 | 0.33 | 0.16 |
| S-072103-JM-2243A | 1324121.14 | 3124883.48 | 1 | 1.33 | 0 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-072103-JM-2244 | 1324104.79 | 3124874.23 | 0 | 0.33 | 0.15 |
| S-072103-JM-2244A | 1324104.79 | 3124874.23 | 1 | 1.33 | 0 |
| S-072103-JM-2246 | 1324174.08 | 3124918.3 | 0 | 0.33 | 0.14 |
| S-072103-JM-2246A | 1324174.08 | 3124918.3 | 0 | 0.33 | 0.14 |
| S-072103-JM-2246B | 1324174.08 | 3124918.3 | 1 | 1.33 | 0 |
| S-072202-JW-1977 | 1324447.1976 | 3124558.6142 | 0 | 0.33 | 0.07 J |
| S-072202-JW-1978 | 1324531.2972 | 3124638.4698 | 0 | 0.33 | 12 |
| S-072202-JW-1978A | 1324531.2972 | 3124638.4698 | 0 | 0.33 | 14 |
| S-072202-JW-1979 | 1324435.1655 | 3124593.4454 | 0 | 0.33 | 14 |
| S-072202-JW-1980 | 1324452.8201 | 3124637.8305 | 0 | 0.33 | 0.22 |
| S-072202-JW-1981 | 1324492.6412 | 3124877.5643 | 0 | 0.33 | 21 |
| S-072202-JW-1982 | 1324405.8072 | 3124833.6947 | 0 | 0.33 | 0 |
| S-072202-JW-1983 | 1324336.1686 | 3124818.1985 | 0 | 0.33 | 35 |
| S-072203-JM-2245 | 1324176.74 | 3124834.96 | 0 | 0.33 | 20 |
| S-072203-JM-2245A | 1324176.74 | 3124834.96 | 0 | 0.33 | 27 |
| S-072203-JM-2245B | 1324176.74 | 3124834.96 | 1 | 1.33 | 0.21 |
| S-072203-JM-2248 | 1324242.71 | 3124882.04 | 0 | 0.33 | 370 |
| S-072203-JM-2248A | 1324242.71 | 3124882.04 | 1 | 1.33 | 16 |
| S-072203-JM-2262 | 1324383.58 | 3124937.5 | 0 | 0.33 | 2.4 |
| S-072203-JM-2262A | 1324383.58 | 3124937.5 | 1 | 1.33 | 0.15 |
| S-072203-JM-2269 | 1324410.18 | 3124977.72 | 0 | 0.33 | 0.02 J |
| S-072203-JM-2269A | 1324410.18 | 3124977.72 | 1 | 1.33 | 0 |
| S-072203-JM-2274 | 1324480.53 | 3124899.26 | 0 | 0.33 | 0.59 |
| S-072203-JM-2274A | 1324480.53 | 3124899.26 | 1 | 1.33 | 0.03 J |
| S-072203-JM-2319 | 1324737.03 | 3124375.87 | 0 | 0.33 | 22 |
| S-072203-JM-2319A | 1324737.03 | 3124375.87 | 1 | 1.33 | 0.26 J |
| S-072203-JM-2320 | 1324691.92 | 3124348.96 | 0 | 0.33 | 104 |
| S-072203-JM-2320A | 1324691.92 | 3124348.96 | 1 | 1.33 | 2.33 |
| S-072203-JM-2322 | 1324732.19 | 3124328.67 | 0 | 0.33 | 26.1 |
| S-072203-JM-2322A | 1324732.19 | 3124328.67 | 1 | 1.33 | 98 |
| S-072203-JM-2324 | 1324702 | 3124301.72 | 0 | 0.33 | 9.1 |
| S-072203-JM-2324A | 1324702 | 3124301.72 | 1 | 1.33 | 5.17 |
| S-072203-JM-2326 | 1324651.78 | 3124267.29 | 0 | 0.33 | 8.3 |
| S-072203-JM-2326A | 1324651.78 | 3124267.29 | 1 | 1.33 | 740 |
| S-072203-JM-2327 | 1324632.16 | 3124276.44 | 0 | 0.33 | 12.8 |
| S-072203-JM-2327A | 1324632.16 | 3124276.44 | 0 | 0.33 | 10.4 |
| S-072203-JM-2327B | 1324632.16 | 3124276.44 | 1 | 1.33 | 48 |
| S-072303-JM-2293 | 1324585.09 | 3124643.35 | 0 | 0.33 | 0.02 J |
| S-072303-JM-2293A | 1324585.09 | 3124643.35 | 1 | 1.33 | 0.02 J |
| S-072303-JM-2297 | 1324627.31 | 3124550.64 | 0 | 0.33 | 65 |
| S-072303-JM-2297A | 1324627.31 | 3124550.64 | 1 | 1.33 | 13.9 |
| S-072303-JM-2298 | 1324564.84 | 3124532.01 | 0 | 0.33 | 0.1 J |
| S-072303-JM-2298A | 1324564.84 | 3124532.01 | 1 | 1.33 | 0 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-072303-JM-2315 | 1324690.09 | 3124483.9 | 0 | 0.33 | 36.3 |
| S-072303-JM-2315A | 1324690.09 | 3124483.9 | 0 | 0.33 | 31.3 |
| S-072303-JM-2315B | 1324690.09 | 3124483.9 | 1 | 1.33 | 12 |
| S-072303-JM-2316 | 1324622.57 | 3124548.99 | 0 | 0.33 | 55 |
| S-072303-JM-2316A | 1324622.57 | 3124548.99 | 1 | 1.33 | 6.1 |
| S-072303-JM-2318 | 1324708.51 | 3124434 | 0 | 0.33 | 38.2 |
| S-072303-JM-2318A | 1324708.51 | 3124434 | 1 | 1.33 | 6.5 |
| S-073002-LM-2061 | 1324141.8335 | 3124792.3844 | 0 | 0.33 | 0.32 |
| S-073002-LM-2061A | 1324141.8335 | 3124792.3844 | 0.33 | 1 | 0 |
| S-073002-LM-2061B | 1324141.8335 | 3124792.3844 | 1 | 1.5 | 0 |
| S-073002-LM-2061C | 1324141.8335 | 3124792.3844 | 1.5 | 2 | 0.04 J |
| S-073002-LM-2062 | 1324076.2883 | 3124798.4565 | 0 | 0.33 | 210 |
| S-073002-LM-2062A | 1324076.2883 | 3124798.4565 | 0 | 0.33 | 190 |
| S-073002-LM-2062B | 1324076.2883 | 3124798.4565 | 0.33 | 1 | 68 |
| S-073002-LM-2062C | 1324076.2883 | 3124798.4565 | 1 | 1.5 | 340 |
| S-073002-LM-2062D | 1324076.2883 | 3124798.4565 | 1.5 | 2 | 190 |
| S-073002-LM-2063 | 1324272.5677 | 3124879.7272 | 0 | 0.33 | 150 |
| S-073002-LM-2063A | 1324272.5677 | 3124879.7272 | 0.33 | 1 | 4.1 |
| S-073002-LM-2063B | 1324272.5677 | 3124879.7272 | 1 | 1.5 | 5 |
| S-073002-LM-2063C | 1324272.5677 | 3124879.7272 | 1.5 | 2 | 0.8 |
| S-073002-LM-2063D | 1324272.5677 | 3124879.7272 | 2 | 3 | 2.8 |
| S-073002-LM-2063E | 1324272.5677 | 3124879.7272 | 3 | 4 | 0.66 |
| S-073102-BT-2070 | 1324648.6755 | 3124337.5061 | 0 | 0.33 | 0.5 |
| S-073102-BT-2070A | 1324648.6755 | 3124337.5061 | 0 | 0.33 | 0.79 |
| S-073102-BT-2070B | 1324648.6755 | 3124337.5061 | 0.33 | 1 | 0.03 J |
| S-073102-BT-2070C | 1324648.6755 | 3124337.5061 | 1 | 1.5 | 0.1 J |
| S-073102-BT-2070D | 1324648.6755 | 3124337.5061 | 1.5 | 2 | 0 |
| S-073102-BT-2071 | 1324673.6891 | 3124328.3048 | 0 | 0.33 | 14.5 |
| S-073102-BT-2071A | 1324673.6891 | 3124328.3048 | 0.33 | 1 | 16.7 |
| S-073102-BT-2071B | 1324673.6891 | 3124328.3048 | 1 | 1.5 | 15.3 |
| S-073102-BT-2071C | 1324673.6891 | 3124328.3048 | 1.5 | 2 | 146 |
| S-073102-BT-2072 | 1324686.7025 | 3124311.5151 | 0 | 0.33 | 20.5 J |
| S-073102-BT-2072A | 1324686.7025 | 3124311.5151 | 0.33 | 1 | 1370 J |
| S-073102-BT-2072B | 1324686.7025 | 3124311.5151 | 1 | 1.5 | 1010 J |
| S-073102-BT-2072C | 1324686.7025 | 3124311.5151 | 1.5 | 2 | 22.8 |
| S-080802-JN-001 | 1322507.06 | 3124460.92 | 0 | 2 | 0.89 |
| S-080802-JN-002 | 1322507.06 | 3124460.92 | 6 | 8 | 0.89 |
| S-080802-JN-003 | 1322507.06 | 3124460.92 | 12 | 14 | 1.1 |
| S-082702-JW-006 | 1323298.15 | 3124189.68 | 0 | 2 | 0.21 J |
| S-401-021704-CH-5082 | 1324436.0842 | 3123942.4159 | 0 | 0.5 | 69 |
| S-401-040704-CH-5155 | 1324401.2845 | 3123942.297 | 0 | 0.33 | 1.54 |
| S-401-041204-CH-5159 | 1324391.547 | 3123944.553 | 0 | 0.33 | 3.36 |
| S-401-042204-CH-5221 | 1324411.014 | 3123942.8975 | 0 | 0.33 | 2.4 J |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-401-060304-CH-5360 | 1324386.441 | 3123949.519 | 0 | 0.33 | 0.04 |
| S-401-061404-CH-5411 | 1324440.027 | 3123940.529 | 0 | 0.33 | 1.17 J |
| S-401-061404-CH-5412 | 1324455.204 | 3123941.341 | 0 | 0.33 | 0.61 |
| S-401-061404-CH-5413 | 1324478.968 | 3123936.822 | 0 | 0.33 | 3.48 |
| S-809-040802-MG-001 | 1325375.67 | 3124398.01 | 0 | 2 | 0 |
| S-809-040802-MG-002 | 1325375.67 | 3124398.01 | 6 | 8 | 0 |
| S-809-040802-MG-003 | 1325375.67 | 3124398.01 | 16 | 17 | 0 |
| S-809-040802-MG-004 | 1325381.46 | 3124369.05 | 0 | 2 | 0 |
| S-809-040802-MG-005 | 1325381.46 | 3124369.05 | 6 | 8 | 0 |
| S-809-040802-MG-006 | 1325381.46 | 3124369.05 | 10.5 | 11.5 | 0 |
| S-809-041002-MG-024 | 1325388.09 | 3124261.45 | 0 | 2 | 0 |
| S-809-041002-MG-025 | 1325388.09 | 3124261.45 | 0 | 2 | 0 |
| S-809-041002-MG-026 | 1325388.09 | 3124261.45 | 2 | 3.5 | 0 |
| S-809-090602-CLM-015 | 1325328.23 | 3124503.17 | 0 | 2 | 0 |
| S-809-090602-CLM-016 | 1325328.23 | 3124503.17 | 6 | 7 | 0 |
| SS-010902-MG-001 | 1322365.024 | 3124213.87 | 2 | 4 | 3.3 |
| S-TP-10-061504-JC-119 | 1324168.9858 | 3124367.3538 | | 11.5 | 59.3 J |
| S-TP-10-061504-JC-120 | 1324168.9858 | 3124367.3538 | 9.5 | 11.5 | 106.6 J |
| S-TP-10-061504-JC-121 | 1324168.9858 | 3124367.3538 | 9.5 | 11.5 | 91 |
| S-TP-1-061604-JC-131 | 1324252.8199 | 3123978.0147 | | 12 | 0.22 |
| S-TP-1-061604-JC-132 | 1324252.8199 | 3123978.0147 | 10 | 12 | 5.05 J |
| S-TP-11-061604-JC-140 | 1324323.8226 | 3124394.6789 | | 3 | 14 |
| S-TP-11-061604-JC-141 | 1324323.8226 | 3124394.6789 | 1 | 3 | 1.5 |
| S-TP-12-061504-JC-129 | 1324304.6814 | 3124492.5749 | | 12 | 130 |
| S-TP-12-061504-JC-130 | 1324304.6814 | 3124492.5749 | 10 | 12 | 59 J |
| S-TP-13-061504-JC-126 | 1324286.0609 | 3124605.3366 | | 12 | 500 |
| S-TP-13-061504-JC-127 | 1324286.0609 | 3124605.3366 | | 12 | 340 |
| S-TP-13-061504-JC-128 | 1324286.0609 | 3124605.3366 | 10 | 12 | 125 J |
| S-TP-15-061704-JC-144 | 1323911.9875 | 3124128.1542 | 9 | | 8.7 |
| S-TP-15-061704-JC-145 | 1323911.9875 | 3124128.1542 | 9 | | 3.4 |
| S-TP-17-070104-JC-198 | 1323850.7112 | 3124145.4441 | | 9 | 14 |
| S-TP-17-070104-JC-199 | 1323850.7112 | 3124145.4441 | | 9 | 6.2 |
| S-TP-17-070104-JC-200 | 1323850.7112 | 3124145.4441 | 7 | 9 | 250 |
| S-TP-18-061704-JC-142 | 1323763.7118 | 3124066.0166 | 5 | | 0.13 J |
| S-TP-18-061704-JC-143 | 1323763.7118 | 3124066.0166 | 5 | | 0.14 J |
| S-TP-19-062304-JC-166 | 1323262.4748 | 3124152.9431 | | 8 | 210 |
| S-TP-19-062304-JC-167 | 1323262.4748 | 3124152.9431 | 6 | 8 | 1100 |
| S-TP-20-062204-JC-160 | 1323227.6587 | 3124180.4505 | | 4 | 0.84 J |
| S-TP-20-062204-JC-161 | 1323227.6587 | 3124180.4505 | 2 | 4 | 7.26 J |
| S-TP-2-061404-JC-117 | 1324242.9859 | 3124043.2998 | | 12 | 0.65 |
| S-TP-2-061404-JC-118 | 1324242.9859 | 3124043.2998 | 10 | 12 | 6.4 |
| S-TP-21-062104-JC-153 | 1323327.7899 | 3124260.6874 | | 8 | 150 |
| S-TP-21-062104-JC-154 | 1323327.7899 | 3124260.6874 | 6 | 8 | 60 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-TP-22-062104-JC-157 | 1323252.8001 | 3124242.6814 | | 12 | 340 |
| S-TP-22-062104-JC-158 | 1323252.8001 | 3124242.6814 | 10 | 12 | 19 |
| S-TP-22-062104-JC-159 | 1323252.8001 | 3124242.6814 | 10 | 12 | 35 |
| S-TP-23-061704-JC-146 | 1323400.3688 | 3124308.7506 | 12 | | 330 |
| S-TP-23-061704-JC-147 | 1323400.3688 | 3124308.7506 | 12 | | 24 |
| S-TP-24-061704-JC-148 | 1323369.6986 | 3124307.249 | 10 | | 71 |
| S-TP-24-061704-JC-149 | 1323369.6986 | 3124307.249 | 10 | | 37 |
| S-TP-24-061704-JC-150 | 1323369.6986 | 3124307.249 | 10 | | 5.3 |
| S-TP-25-062104-JC-151 | 1323297.9075 | 3124306.3449 | | 3.5 | 23 J |
| S-TP-25-062104-JC-152 | 1323297.9075 | 3124306.3449 | 1.5 | 3.5 | 15 |
| S-TP-26-062104-JC-155 | 1323232.379 | 3124272.3265 | | 12 | 0 |
| S-TP-26-062104-JC-156 | 1323232.379 | 3124272.3265 | 10 | 12 | 2 |
| S-TP-28-062304-JC-173 | 1323075.4169 | 3124140.8958 | | 12 | 0.06 |
| S-TP-28-062304-JC-174 | 1323075.4169 | 3124140.8958 | 10 | 12 | 0.63 |
| S-TP-29-062304-JC-169 | 1323069.4795 | 3124247.7318 | | 12 | 0.06 |
| S-TP-29-062304-JC-170 | 1323069.4795 | 3124247.7318 | | 12 | 0.26 |
| S-TP-29-062304-JC-171 | 1323069.4795 | 3124247.7318 | 10 | 12 | 2 |
| S-TP-30-062204-JC-162 | 1323056.2134 | 3124331.8423 | | 12 | 0.34 |
| S-TP-30-062204-JC-163 | 1323056.2134 | 3124331.8423 | 10 | 12 | 1800 |
| S-TP-30-062204-JC-164 | 1323056.2134 | 3124331.8423 | 1 | 3 | 7500 |
| S-TP-3-061604-JC-133 | 1324183.2991 | 3124012.7214 | | 12 | 26 |
| S-TP-3-061604-JC-134 | 1324183.2991 | 3124012.7214 | 10 | 12 | 26.1 J |
| S-TP-31-062404-JC-181 | 1323084.5158 | 3124419.0595 | | 12 | 180 |
| S-TP-31-062404-JC-182 | 1323084.5158 | 3124419.0595 | 10 | 12 | 15 |
| S-TP-32-062404-JC-178 | 1323008.5982 | 3124423.3375 | | 12 | 21000 |
| S-TP-32-062404-JC-179 | 1323008.5982 | 3124423.3375 | 10 | 12 | 850 |
| S-TP-33-062304-JC-176 | 1322938.9437 | 3124318.1563 | | 12 | 0.56 |
| S-TP-33-062304-JC-177 | 1322938.9437 | 3124318.1563 | 10 | 12 | 7.8 |
| S-TP-34-062504-JC-186 | 1323020.4236 | 3123966.3498 | | 5.5 | 3.61 |
| S-TP-34-062504-JC-187 | 1323020.4236 | 3123966.3498 | 3.5 | 5.5 | 4.08 |
| S-TP-35-062504-JC-189 | 1322979.4049 | 3123966.8308 | | 12 | 0.02 J |
| S-TP-35-062504-JC-190 | 1322979.4049 | 3123966.8308 | 4 | 6 | 132 |
| S-TP-36-062404-JC-184 | 1322906.2947 | 3123965.8779 | | 12 | 0.01 J |
| S-TP-36-062404-JC-185 | 1322906.2947 | 3123965.8779 | 10 | 12 | 0.01 J |
| S-TP-37-070104-JC-196 | 1323782.8396 | 3123864.4 | | 12 | 0 |
| S-TP-37-070104-JC-197 | 1323782.8396 | 3123864.4 | 10 | 12 | 0.04 J |
| S-TP-5-061604-JC-137 | 1324329.8743 | 3124167.5108 | | 10 | 0.93 |
| S-TP-5-061604-JC-138 | 1324329.8743 | 3124167.5108 | | 10 | 2 |
| S-TP-5-061604-JC-139 | 1324329.8743 | 3124167.5108 | 8 | 10 | 11 |
| S-TP-6-061504-JC-124 | 1324267.6607 | 3124206.0274 | | 9 | 78.8 J |
| S-TP-6-061504-JC-125 | 1324267.6607 | 3124206.0274 | 7 | 9 | 19.5 J |
| S-TP-7-061604-JC-135 | 1324182.8293 | 3124199.5151 | | 9 | 78 |
| S-TP-7-061604-JC-136 | 1324182.8293 | 3124199.5151 | 7 | 9 | 19 |

**TABLE A4.1**

**DATA UTILIZED TO COMPUTE VOLUME OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Sample ID* | *Northing* | *Easting* | *Start Depth (feet)* | *End Depth (feet)* | *Total PCB (mg/kg)* |
|---|---|---|---|---|---|
| S-TP-9-061504-JC-122 | 1324138.0188 | 3124304.6552 | | 12 | 240 |
| S-TP-9-061504-JC-123 | 1324138.0188 | 3124304.6552 | 10 | 12 | 660 |

**Note:**
PCB - Polychlorinated Biphenyls
J Estimated Result. Result is less than Reporting Limit.

**TABLE A4.2**

**SCENARIO 1: PCB ISOCONCENTRATION VOLUME CALCULATIONS (0 FEET TO TOP OF BEDROCK)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Elevation Range (ft amsl)* | | *PCB Isoconcentration (mg/kg)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *1.8 mg/kg Area (sq ft)* | *5.3 mg/kg Area (sq ft)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *1.8 mg/kg Volume (cu ft)* | *5.3 mg/kg Volume (cu ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
| 605 | 610 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 610 | 615 | 3,998 | 1,777 | 0 | 0 | 0 | 19,990 | 8,885 | 0 | 0 | 0 |
| 615 | 620 | 20,585 | 9,848 | 791 | 0 | 0 | 102,925 | 49,240 | 3,955 | 0 | 0 |
| 620 | 625 | 116,240 | 58,950 | 25,141 | 2,113 | 518 | 581,200 | 294,750 | 125,705 | 10,565 | 2,590 |
| 625 | 630 | 110,545 | 70,709 | 16,703 | 998 | 0 | 552,725 | 353,545 | 83,515 | 4,990 | 0 |
| 630 | 635 | 59,286 | 29,201 | 8,755 | 2,998 | 0 | 296,430 | 146,005 | 43,775 | 14,990 | 0 |
| 635 | 640 | 67,655 | 24,656 | 3,854 | 0 | 0 | 338,275 | 123,280 | 19,270 | 0 | 0 |
| 640 | 645 | 99,051 | 52,920 | 10,684 | 5,475 | 0 | 495,255 | 264,600 | 53,420 | 27,375 | 0 |
| 645 | 650 | 139,811 | 81,103 | 26,910 | 0 | 0 | 699,055 | 405,515 | 134,550 | 0 | 0 |
| 650 | 655 | 147,535 | 105,513 | 64,563 | 30,374 | 0 | 737,675 | 527,565 | 322,815 | 151,870 | 0 |
| 655 | 660 | 114,203 | 83,230 | 36,355 | 0 | 0 | 571,015 | 416,150 | 181,775 | 0 | 0 |
| 660 | 665 | 40,327 | 19,642 | 0 | 0 | 0 | 201,635 | 98,210 | 0 | 0 | 0 |
| 665 | 670 | 118,094 | 51,909 | 20,853 | 1,198 | 0 | 960,080 | 702,180 | 374,060 | 54,800 | 9,070 |
| 670 | 675 | 226,320 | 162,132 | 77,310 | 22,492 | 4,046 | 709,520 | 382,885 | 110,905 | 36,810 | 0 |
| 675 | 680 | 192,016 | 140,436 | 74,812 | 10,960 | 1,814 | 1,131,600 | 810,660 | 386,550 | 112,460 | 20,230 |
| 680 | 685 | 141,904 | 76,577 | 22,181 | 7,362 | 0 | 695,195 | 330,330 | 12,280 | 0 | 0 |
| 685 | 690 | 89,803 | 47,150 | 4,262 | 0 | 0 | 449,015 | 235,750 | 21,310 | 0 | 0 |
| 690 | 695 | 139,039 | 66,066 | 2,456 | 0 | 0 | 695,195 | 330,330 | 12,280 | 0 | 0 |
| 695 | 700 | 241,223 | 174,947 | 73,968 | 24,357 | 9,710 | 1,206,115 | 874,735 | 369,840 | 121,785 | 48,550 |
| 700 | 705 | 112,090 | 78,732 | 35,313 | 17,359 | 7,460 | 560,450 | 393,660 | 176,565 | 86,795 | 37,300 |
| 705 | 710 | 147,165 | 89,616 | 55,932 | 25,230 | 14,230 | 735,825 | 448,080 | 279,660 | 126,150 | 71,150 |
| 710 | 715 | 174,638 | 125,494 | 70,163 | 25,477 | 9,189 | 873,190 | 627,470 | 350,815 | 127,385 | 45,945 |
| 715 | 720 | 119,295 | 94,006 | 71,702 | 18,742 | 4,102 | 596,475 | 470,030 | 358,510 | 93,710 | 20,510 |
| 720 | 725 | 60,561 | 44,053 | 14,531 | 7,343 | 1,702 | 302,805 | 220,265 | 72,655 | 36,715 | 8,510 |
| **Total Volumes** | | | | | | | **13,511,645** | **8,514,120** | **22,025,765** | **1,006,400** | **263,855** |

**Notes:**
mg/kg - milligrams per kilogram
amsl - above mean sea level
sq ft - square feet
cu ft - cubic feet
ft - feet
PCB - Polychlorinated Biphenyl

**TABLE A4.3**

**SCENARIO 1: PCB ISOCONCENTRATION VOLUME CONVERSIONS (0 FEET TO TOP OF BEDROCK)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | *PCB Isoconcentration Areas* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Elevation Range (ft amsl)* | | *1.8 mg/kg Volume (cu yd)* | *5.3 mg/kg Volume (cu yd)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *1.8 mg/kg Volume (tons)* | *5.3 mg/kg Volume (tons)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
| 605 | 610 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 610 | 615 | 740 | 329 | 0 | 0 | 0 | 1,037 | 461 | 0 | 0 | 0 |
| 615 | 620 | 3,812 | 1,824 | 146 | 0 | 0 | 5,337 | 2,553 | 205 | 0 | 0 |
| 620 | 625 | 21,526 | 10,917 | 4,656 | 391 | 96 | 30,136 | 15,283 | 6,518 | 548 | 134 |
| 625 | 630 | 20,471 | 13,094 | 3,093 | 185 | 0 | 28,660 | 18,332 | 4,330 | 259 | 0 |
| 630 | 635 | 10,979 | 5,408 | 1,621 | 555 | 0 | 15,370 | 7,571 | 2,270 | 777 | 0 |
| 635 | 640 | 12,529 | 4,566 | 714 | 0 | 0 | 17,540 | 6,392 | 999 | 0 | 0 |
| 640 | 645 | 18,343 | 9,800 | 1,979 | 1,014 | 0 | 25,680 | 13,720 | 2,770 | 1,419 | 0 |
| 645 | 650 | 25,891 | 15,019 | 4,983 | 0 | 0 | 36,247 | 21,027 | 6,977 | 0 | 0 |
| 650 | 655 | 27,321 | 19,539 | 11,956 | 5,625 | 0 | 38,250 | 27,355 | 16,739 | 7,875 | 0 |
| 655 | 660 | 21,149 | 15,413 | 6,732 | 0 | 0 | 29,608 | 21,578 | 9,425 | 0 | 0 |
| 660 | 665 | 7,468 | 3,637 | 0 | 0 | 0 | 10,455 | 5,092 | 0 | 0 | 0 |
| 665 | 670 | 35,559 | 26,007 | 13,854 | 2,030 | 336 | 49,782 | 36,409 | 19,396 | 2,841 | 470 |
| 670 | 675 | 26,279 | 14,181 | 4,108 | 1,363 | 0 | 36,790 | 19,853 | 5,751 | 1,909 | 0 |
| 675 | 680 | 41,911 | 30,024 | 14,317 | 4,165 | 749 | 58,676 | 42,034 | 20,043 | 5,831 | 1,049 |
| 680 | 685 | 25,748 | 12,234 | 455 | 0 | 0 | 36,047 | 17,128 | 637 | 0 | 0 |
| 685 | 690 | 16,630 | 8,731 | 789 | 0 | 0 | 23,282 | 12,224 | 1,105 | 0 | 0 |
| 690 | 695 | 25,748 | 12,234 | 455 | 0 | 0 | 36,047 | 17,128 | 637 | 0 | 0 |
| 695 | 700 | 44,671 | 32,398 | 13,698 | 4,511 | 1,798 | 62,539 | 45,357 | 19,177 | 6,315 | 2,517 |
| 700 | 705 | 20,757 | 14,580 | 6,539 | 3,215 | 1,381 | 29,060 | 20,412 | 9,155 | 4,500 | 1,934 |
| 705 | 710 | 27,253 | 16,596 | 10,358 | 4,672 | 2,635 | 38,154 | 23,234 | 14,501 | 6,541 | 3,689 |
| 710 | 715 | 32,340 | 23,240 | 12,993 | 4,718 | 1,702 | 45,277 | 32,535 | 18,190 | 6,605 | 2,382 |
| 715 | 720 | 22,092 | 17,409 | 13,278 | 3,471 | 760 | 30,928 | 24,372 | 18,589 | 4,859 | 1,063 |
| 720 | 725 | 11,215 | 8,158 | 2,691 | 1,360 | 315 | 15,701 | 11,421 | 3,767 | 1,904 | 441 |
| **Total Volume** | | **500,431** | **315,338** | **129,415** | **37,274** | **9,772** | **700,604** | **441,473** | **181,181** | **52,184** | **13,681** |

**Notes:**
mg/kg - milligrams per kilogram
amsl - above mean sea level
cu yd - cubic yard
ft - feet
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
PCB - Polychlorinated Biphenyl
tons - short tons (2,000 pounds)

**TABLE A4.4**

**SCENARIO 1: INTERPOLATION OF VOLUMES OF PCB-IMPACTED MEDIA AT 7.4, 25, AND 100 MG/KG (0 FEET TO TOP OF BEDROCK)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Isoconcentration Contour Volumes (From Table 4.3)

| Isoconcentration (mg/kg) | *Volume (cu yd)* |
|---|---|
| ***1.8*** | 500,431 |
| ***5.3*** | 315,338 |
| ***50*** | 129,415 |
| ***500*** | 37,274 |
| ***1,500*** | 9,772 |

***Interpolation of Volume of PCB-Impacted Media Exceeding 7.4 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 7.4) = | -4159 | 7.4 | | 337,382 |
| *Y (cu yd) =* | *306,603* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 25 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 25) = | -4159 | 25 | | 337,382 |
| *Y (cu yd) =* | *233,399* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 100 mg/kg***

| **Y=** | **m (50 - 500)** | **x** | **+** | **b (50 - 500)** |
|---|---|---|---|---|
| Y(@ 100) = | -205 | 100 | | 139,653 |
| *Y (cu yd) =* | *119,177* | | | |

**Notes:**
PCB - Polychlorinated Biphenyls
Assumed linear relationship between isoconcentration contours
mg/kg - milligrams per kilogram
cu yd - cubic yard
Y - volume interpolated at specific "x" concentration
m - slope of line between known PCB isoconcentration contours eg. (5.3 - 50)
x - PCB concentration(mg/kg) to interpolate associated volume
b - Y intercept between known concentrations (eg 5.3 - 50)

**TABLE A4.5**

**SCENARIO 1: SUMMARY OF PCB-IMPACTED MEDIA (0 FEET TO TOP OF BEDROCK)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***1.8*** | 500,431 | 700,604 |
| ***5.3*** | 315,338 | 441,473 |
| ***7.4*** | 306,603 | 429,244 |
| ***25*** | 233,399 | 326,758 |
| ***50*** | 129,415 | 181,181 |
| ***100*** | 119,177 | 166,848 |
| ***500*** | 37,274 | 52,184 |
| ***1,500*** | 9,772 | 13,681 |

**Notes:**
PCB - Polychlorinated Biphenyls
Conversion rate of cubic yards to tons = 1.4 tons/cubic yard.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)

**TABLE A4.6**

**SCENARIO 2: PCB ISOCONCENTRATION VOLUME CALCULATIONS AND CONVERSIONS (0 TO 2 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | *PCB Isoconcentration (mg/kg)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Depth Range (ft bgs)* | | *1.8 mg/kg Area (sq ft)* | *5.3 mg/kg Area (sq ft)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *1.8 mg/kg Volume (cu ft)* | *5.3 mg/kg Volume (cu ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
| **Scenario 2: 0-2 Foot Depth** | | | | | | | | | | | |
| 0 | 2 | 440,126 | 254,040 | 108,829 | 31,657 | 8,345 | 880,252 | 508,080 | 217,658 | 63,314 | 16,690 |
| ***Total Volumes*** | | | | | | | ***880,252*** | ***508,080*** | ***217,658*** | ***63,314*** | ***16,690*** |

| | | *PCB Isoconcentration Volume Conversions* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Depth Range (ft bgs)* | | *1.8 mg/kg Volume (cu yd)* | *5.3 mg/kg Volume (cu yd)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *1.8 mg/kg Volume (tons)* | *5.3 mg/kg Volume (tons)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
| 0 | 2 | 32,602 | 18,818 | 8,061 | 2,345 | 618 | 45,643 | 26,345 | 11,286 | 3,283 | 865 |
| ***Total Volumes*** | | ***32,602*** | ***18,818*** | ***8,061*** | ***2,345*** | ***618*** | ***45,643*** | ***26,345*** | ***11,286*** | ***3,283*** | ***865*** |

**Notes:**
bgs - below ground surface
sq ft - square feet
cu ft - cubic feet
PCB - Polychlorinated Biphenyl
ft - feet
cu yd - cubic yard
tons - short tons (2,000 pounds)
mg/kg - milligrams per kilogram

**TABLE A4.7**

**SCENARIO 2: INTERPOLATION OF VOLUMES OF PCB-IMPACTED MEDIA AT 7.4, 25, AND 100 MG/KG (0 TO 2 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Isoconcentration Contour Volumes (From Table 4.6)

| Isoconcentration (mg/kg) | *Volume (cu yd)* |
|---|---|
| ***1.8*** | 32,602 |
| ***5.3*** | 18,818 |
| ***50*** | 8,061 |
| ***500*** | 2,345 |
| ***1,500*** | 618 |

***Interpolation of Volume of PCB-Impacted Media Exceeding 7.4 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 7.4) = | -241 | 7.4 | | 20,093 |
| *Y (cu yd) =* | *18,312* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 25 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 25) = | -241 | 25 | | 20,093 |
| *Y (cu yd) =* | *14,077* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 100 mg/kg***

| **Y=** | **m (50 - 500)** | **x** | **+** | **b (50 - 500)** |
|---|---|---|---|---|
| Y(@ 100) = | -13 | 100 | | 8,697 |
| *Y (cu yd) =* | *7,426* | | | |

**Notes:**
PCB - Polychlorinated Biphenyl
Assumed linear relationship between isoconcentration contours
cu yd - cubic yard
Y - volume interpolated at specific "x" concentration
m - slope of line between known PCB isoconcentration contours eg. (5.3 - 50)
x - PCB concentration(mg/kg) to interpolate associated volume
b - Y intercept between known concentrations (eg 5.3 - 50)
mg/kg - milligrams per kilogram

**TABLE A4.8**

**SCENARIO 2: SUMMARY OF PCB-IMPACTED MEDIA (0 TO 2 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Isoconcentration* ***(mg/kg)*** | *Volume* ***(cu yd)*** | *Mass* ***(tons)*** |
|---|---|---|
| ***1.8*** | 32,602 | 45,643 |
| ***5.3*** | 18,818 | 26,345 |
| ***7.4*** | 18,312 | 25,637 |
| ***25*** | 14,077 | 19,708 |
| ***50*** | 8,061 | 11,286 |
| ***100*** | 7,426 | 10,397 |
| ***500*** | 2,345 | 3,283 |
| ***1,500*** | 618 | 865 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 tons/cubic yard.
cu yd - cubic yard
tons - short tons (2,000 lbs)
mg/kg - milligrams per kilogram

**TABLE A4.9**

**SCENARIO 3: PCB ISOCONCENTRATION VOLUME CALCULATIONS AND CONVERSIONS (0 TO 10 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | *PCB Isoconcentration (mg/kg)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Depth Range (ft bgs)* | | *1.8 mg/kg Area (sq ft)* | *5.3 mg/kg Area (sq ft)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *1.8 mg/kg Volume (cu ft)* | *5.3 mg/kg Volume (cu ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
| **Scenario 3: 0-10 Foot Depth** | | | | | | | | | | | |
| 0 | 5 | 553,507 | 337,931 | 145,727 | 42,342 | 12,507 | 2,767,535 | 1,689,655 | 728,635 | 211,710 | 62,535 |
| 5 | 10 | 503,412 | 31,345 | 107,104 | 35,302 | 14,248 | 2,517,060 | 156,725 | 535,520 | 176,510 | 71,240 |
| ***Total Volumes*** | | | | | | | ***5,284,595*** | ***1,846,380*** | ***1,264,155*** | ***388,220*** | ***133,775*** |

| | | *PCB Isoconcentration Volume Conversions* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *1.8 mg/kg Volume (cu yd)* | *5.3 mg/kg Volume (cu yd)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *1.8 mg/kg Volume (tons)* | *5.3 mg/kg Volume (tons)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
| 0 | 5 | 102,501 | 62,580 | 26,986 | 7,841 | 2,316 | 143,502 | 87,612 | 37,781 | 10,978 | 3,243 |
| 5 | 10 | 93,224 | 5,805 | 19,834 | 6,537 | 2,639 | 130,514 | 8,126 | 27,768 | 9,152 | 3,694 |
| ***Total Volumes*** | | ***195,726*** | ***68,384*** | ***46,821*** | ***14,379*** | ***4,955*** | ***274,016*** | ***95,738*** | ***65,549*** | ***20,130*** | ***6,936*** |

**Notes:**
bgs - below ground surface
sq ft - square feet
cu ft - cubic feet
PCB - Polychlorinated Biphenyl
ft - feet
cu yd - cubic yard
tons - short tons (2,000 pounds)
mg/kg - milligrams per kilogram

**TABLE A4.10**

**SCENARIO 3: INTERPOLATION OF VOLUMES OF PCB-IMPACTED MEDIA AT 7.4, 25, AND 100 MG/KG (0 TO 10 FOOT DEPTH (BGS)) IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA GM POWERTRAIN BEDFORD FACILITY BEDFORD, INDIANA**

Isoconcentration Contour Volumes (From Table 4.9)

| Isoconcentration (mg/kg) | *Volume (cu yd)* |
|---|---|
| ***1.8*** | 195,726 |
| ***5.3*** | 68,384 |
| ***50*** | 46,821 |
| ***500*** | 14,379 |
| ***1,500*** | 4,955 |

***Interpolation of Volume of PCB-Impacted Media Exceeding 7.4 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 7.4) = | -482 | 7.4 | | 70,941 |
| *Y (cu yd) =* | *67,371* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 25 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 25) = | -482 | 25 | | 70,941 |
| *Y (cu yd) =* | *58,881* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 100 mg/kg***

| **Y=** | **m (50 - 500)** | **x** | **+** | **b (50 - 500)** |
|---|---|---|---|---|
| Y(@ 100) = | -72 | 100 | | 50,425 |
| *Y (cu yd) =* | *43,216* | | | |

**Notes:**
PCB - Polychlorinated Biphenyl
Assumed linear relationship between isoconcentration contours
cu yd - cubic yard
Y - volume interpolated at specific "x" concentration
m - slope of line between known PCB isoconcentration contours eg. (5.3 - 50)
x - PCB concentration(mg/kg) to interpolate associated volume
b - Y intercept between known concentrations (eg 5.3 - 50)
mg/kg - milligrams per kilogram

**TABLE A4.11**

**SCENARIO 3: SUMMARY OF PCB-IMPACTED MEDIA (0 TO 10 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Isoconcentration* ***(mg/kg)*** | *Volume* ***(cu yd)*** | *Mass* ***(tons)*** |
|---|---|---|
| ***1.8*** | 195,726 | 274,016 |
| ***5.3*** | 68,384 | 95,738 |
| ***7.4*** | 67,371 | 94,320 |
| ***25*** | 58,881 | 82,433 |
| ***50*** | 46,821 | 65,549 |
| ***100*** | 43,216 | 60,502 |
| ***500*** | 14,379 | 20,130 |
| ***1,500*** | 4,955 | 6,936 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 tons/cubic yard.
cu yd - cubic yard
tons - short tons (2,000 lbs)
mg/kg - milligrams per kilogram

**TABLE A4.12**

**SCENARIO 4: PCB ISOCONCENTRATION VOLUME CALCULATIONS AND CONVERSIONS (0-15 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | *PCB Isoconcentration (mg/kg)* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Depth Range (ft bgs)* | | *1.8 mg/kg Area (sq ft)* | *5.3 mg/kg Area (sq ft)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *1.8 mg/kg Volume (cu ft)* | *5.3 mg/kg Volume (cu ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
| **Scenario 3: 0-10 Foot Depth** | | | | | | | | | | | |
| 0 | 5 | 553,507 | 337,931 | 145,727 | 42,342 | 12,507 | 2,767,535 | 1,689,655 | 728,635 | 211,710 | 62,535 |
| 5 | 10 | 503,412 | 31,345 | 107,104 | 35,302 | 14,248 | 2,517,060 | 156,725 | 535,520 | 176,510 | 71,240 |
| 10 | 15 | 226,533 | 123,140 | 60,889 | 15,818 | 591 | 1,132,665 | 615,700 | 304,445 | 79,090 | 2,955 |
| ***Total Volumes*** | | | | | | | ***6,417,260*** | ***2,462,080*** | ***1,568,600*** | ***467,310*** | ***136,730*** |

| | | *PCB Isoconcentration Volume Conversions* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *1.8 mg/kg Volume (cu yd)* | *5.3 mg/kg Volume (cu yd)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *1.8 mg/kg Volume (tons)* | *5.3 mg/kg Volume (tons)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
| 0 | 5 | 102,501 | 62,580 | 26,986 | 7,841 | 2,316 | 143,502 | 87,612 | 37,781 | 10,978 | 3,243 |
| 5 | 10 | 93,224 | 5,805 | 19,834 | 6,537 | 2,639 | 130,514 | 8,126 | 27,768 | 9,152 | 3,694 |
| 10 | 15 | 41,951 | 22,804 | 11,276 | 2,929 | 109 | 58,731 | 31,925 | 15,786 | 4,101 | 153 |
| ***Total Volumes*** | | ***237,676*** | ***91,188*** | ***58,096*** | ***17,308*** | ***5,064*** | ***332,747*** | ***127,663*** | ***81,335*** | ***24,231*** | ***7,090*** |

**Notes:**
bgs - below ground surface
sq ft - square feet
cu ft - cubic feet
PCB - Polychlorinated Biphenyl
ft - feet
cu yd - cubic yard
tons - short tons (2,000 pounds)
mg/kg - milligrams per kilogram

**TABLE A4.13**

**SCENARIO 4: INTERPOLATION OF VOLUMES OF PCB-IMPACTED MEDIA AT 7.4, 25, AND 100 MG/KG (0 TO 15 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Isoconcentration Contour Volumes (From Table 4.12)

| Isoconcentration (mg/kg) | *Volume (cu yd)* |
|---|---|
| ***1.8*** | 237,676 |
| ***5.3*** | 91,188 |
| ***50*** | 58,096 |
| ***500*** | 17,308 |
| ***1,500*** | 5,064 |

***Interpolation of Volume of PCB-Impacted Media Exceeding 7.4 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 7.4) = | -740 | 7.4 | | 95,112 |
| *Y (cu yd) =* | *89,633* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 25 mg/kg***

| **Y=** | **m (5.3 - 50)** | **x** | **+** | **b (5.3 - 50)** |
|---|---|---|---|---|
| Y(@ 25) = | -740 | 25 | | 95,112 |
| *Y (cu yd) =* | *76,604* | | | |

***Interpolation of Volume of PCB-Impacted Media Exceeding 100 mg/kg***

| **Y=** | **m (50 - 500)** | **x** | **+** | **b (50 - 500)** |
|---|---|---|---|---|
| Y(@ 100) = | -91 | 100 | | 62,628 |
| *Y (cu yd) =* | *53,564* | | | |

**Notes:**
PCB - Polychlorinated Biphenyl
Assumed linear relationship between isoconcentration contours
mg/kg - milligrams per kilogram
cu yd - cubic yard
Y - volume interpolated at specific "x" concentration
m - slope of line between known PCB isoconcentration contours eg. (5.3 - 50)
x - PCB concentration(mg/kg) to interpolate associated volume
b - Y intercept between known concentrations (eg 5.3 - 50)

**TABLE A4.14**

**SCENARIO 4: SUMMARY OF PCB-IMPACTED MEDIA (0 TO 15 FOOT DEPTH (BGS))**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Isoconcentration* ***(mg/kg)*** | *Volume* ***(cu yd)*** | *Mass* ***(tons)*** |
|---|---|---|
| ***1.8*** | 237,676 | 332,747 |
| ***5.3*** | 91,188 | 127,663 |
| ***7.4*** | 89,633 | 125,487 |
| ***25*** | 76,604 | 107,246 |
| ***50*** | 58,096 | 81,335 |
| ***100*** | 53,564 | 74,990 |
| ***500*** | 17,308 | 24,231 |
| ***1,500*** | 5,064 | 7,090 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 tons/cubic yard.
cu yd - cubic yard
tons - short tons (2,000 lbs)
mg/kg - milligrams per kilogram

**TABLE A4.15**

**SCENARIO SUMMARY OF PCB-IMPACTED MEDIA**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | *Scenario 1 (0 Feet to Top of Bedrock)* | | *Scenario 2 (0 To 2 Feet bgs)* | | *Scenario 3 (0 To 10 Feet bgs)* | | *Scenario 4 (0 to 15 Feet bgs)* | |
|---|---|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***1.8*** | 500,431 | 700,604 | 32,602 | 45,643 | 195,726 | 274,016 | 237,676 | 332,747 |
| ***5.3*** | 315,338 | 441,473 | 18,818 | 26,345 | 68,384 | 95,738 | 91,188 | 127,663 |
| ***7.4*** | 306,603 | 429,244 | 18,312 | 25,637 | 67,371 | 94,320 | 89,633 | 125,487 |
| ***25*** | 233,399 | 326,758 | 14,077 | 19,708 | 58,881 | 82,433 | 76,604 | 107,246 |
| ***50*** | 129,415 | 181,181 | 8,061 | 11,286 | 46,821 | 65,549 | 58,096 | 81,335 |
| ***100*** | 119,177 | 166,848 | 7,426 | 10,397 | 43,216 | 60,502 | 53,564 | 74,990 |
| ***500*** | 37,274 | 52,184 | 2,345 | 3,283 | 14,379 | 20,130 | 17,308 | 24,231 |
| ***1,500*** | 9,772 | 13,681 | 618 | 865 | 4,955 | 6,936 | 5,064 | 7,090 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 tons/cubic yard.
cu yd - cubic yard
tons - short tons (2,000 lbs)
mg/kg - milligrams per kilogram
summary includes 100% contingency

# ATTACHMENT A

# BOREHOLE LOGS

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: A004-1
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 691.3 | | | | | | |
| 0 | TOPSOIL | 691.0 | | | | | | |
| | CL-CLAY, little silt, firm, medium plasticity, strong brown, moist | | | | | | | |
| 2 | | | | 1 | P/S | 2.2 | | 0.0 |
| 4 | | | | | | | | |
| | - trace silt at 5.3ft BGS | | | | | | | |
| 6 | | | | 2 | P/S | 2.8 | | 0.0 |
| 8 | | | | | | | | |
| 10 | | | BENTONITE SEAL | 3 | P/S | 3.8 | | 0.0 |
| 12 | | | | | | | | |
| 14 | | | | 4 | P/S | 4.0 | | 0.0 |
| 16 | | | | | | | | |
| 18 | - very moist to Wet at 18.0ft BGS | | | 5 | P/S | 2.6 | | 0.0 |
| 20 | | | | | | | | |
| | - Refusal, limestone, moist at 20.5ft BGS | 670.8 | | | | | | |
| | END OF BOREHOLE @ 20.5ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: A004-2
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.8 | | | | | | |
| 0 | TOPSOIL | | | | | | | |
| | CL-CLAY, little silt, firm, low plasticity, strong brown, moist | 690.3 | | | | | | |
| 2 | | | | 1 | P/S | 2.4 | | 0.0 |
| 4 | | | BENTONITE SEAL | | | | | |
| 6 | | | | 2 | P/S | 2.2 | | 0.0 |
| | - Refusal, limestone at 7.2ft BGS | 683.6 | | | | | | |
| 8 | END OF BOREHOLE @ 7.2ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-1
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 642.3 | | | | | | |
| 2 | CL-CLAY, trace silt, firm, medium plasticity, brown, moist | | BENTONITE SEAL | 1 | P/S | 2.2 | | 0.0 |
| 4 | - Refusal, limestone at 4.6ft BGS | 637.7 | | 2 | P/S | 0.0 | | NA |
| | END OF BOREHOLE @ 4.6ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

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# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-2
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 651.1 | | | | | | |
| 0 | CL-CLAY, little silt, firm, low plasticity, strong brown, moist | | BENTONITE SEAL | 1 | P/S | 2.4 | | 0.0 |
| 4 | | | | 2 | P/S | 1.0 | | 0.0 |
| 5.2 | - Refusal, limestone at 5.2ft BGS | 645.9 | | | | | | |
| | END OF BOREHOLE @ 5.2ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-3
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 665.8 | | | | | | |
| 0 | CL-CLAY, trace silt, firm, medium plasticity, strong brown, moist | | | | | | | |
| 2 | | | BENTONITE SEAL | 1 | P/S | 2.8 | | 0.0 |
| 4 | | | | 2 | P/S | 1.0 | | 0.0 |
| 5.6 | - Refusal, limestone at 5.6ft BGS | 660.2 | | | | | | |
| 6 | END OF BOREHOLE @ 5.6ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

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# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-4
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 671.3 | | | | | | |
| 0 | CL-CLAY, trace silt, firm, low plasticity, strong brown, moist | | | | | | | |
| 2 | | | | 1 | P/S | 2.8 | | 0.0 |
| 4 | | | BENTONITE SEAL | | | | | |
| 6 | | | | 2 | P/S | 2.0 | | 0.0 |
| | - Refusal at 6.9ft BGS | 664.4 | | | | | | |
| | END OF BOREHOLE @ 6.9ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

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# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-5
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 643.4 | | | | | | |
| 2 | CL-CLAY, little silt, firm, low plasticity, strong brown, moist | | BENTONITE SEAL | 1 | P/S | 2.0 | | 0.0 |
| 4 | - Refusal, limestone at 3.9ft BGS | 639.5 | | | | | | |
| | END OF BOREHOLE @ 3.9ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: EA010-6
DATE COMPLETED: November 4, 2004
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 637.1 | | | | | | |
| 0 | CL-CLAY, little silt, firm, low plasticity, strong brown, moist to Wet | | BENTONITE SEAL | 1 | P/S | 2.4 | | 0.0 |
| 4 | - Refusal, limestone at 4.0ft BGS | 633.1 | | | | | | |
| | END OF BOREHOLE @ 4.0ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968- EAST LAGOON.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 694.1<br>690.2 | | | | | | |
| 0 | SW-GW - SAND and GRAVEL (Fill), little silt, dense fine to medium grained, well graded, brown, moist, glass. | | | 1 | | 1.7 | 35 | 0.0 |
| 2 | SP - SAND (Fill), compact, fine grained, poorly graded, dark brown/dark grey, moist. | 688.2 | 10" DIA. STEEL CASING TO 9' | 2 | | 1.5 | 13 | 0.0 |
| 4 | CL - CLAY with silt, very stiff, low plasticity, moist, 5YR4/6 yellowish red. | 685.7 | 4" DIA. STEEL CASING | 3 | | 1.3 | 19 | 0.0 |
| 6 | | | | 4 | | 2.0 | 15 | 0.0 |
| 8 | END OF OVERBURDEN HOLE @ 8.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245S
DATE COMPLETED: June 11, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 692.9<br>690.4 | | | | | |
| 0 | SW/GW SAND AND GRAVEL (FILL), little silt, dense, fine to medium grained, well graded, brown, moist, glass | | | | | | |
| 2 | SP-SAND (FILL), compact, fine grained, poorly graded, dark brown/dark gray, moist | 688.4 | CEMENT / BENTONITE GROUT | | | | |
| 4 | CL-CLAY, little silt, very stiff, low plasticity, 5YR 4/6, (yellowish red), moist | 685.9 | | | | | |
| 6 | | | | | | | |
| 8 | END OF OVERBURDEN HOLE @ 8.5ft BGS | | 10" DIA. STEEL CASING | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X184Y285
DATE COMPLETED: May 18, 2004
DRILLING METHOD: HSA AUGER / HQ CORE
FIELD PERSONNEL: J. CLOSE

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 654.6<br>652.3 | | | | | | |
| 0 | CL-CLAY, with silt, firm, medium plasticity, brown, damp | | | 1 | P/S | 1.0 | | 0 |
| 2 | - piece of wood at 0.6ft BGS<br>- moist at 3.0ft BGS | | 4" DIA. STEEL CASING | 2 | P/S | 1.0 | | 0 |
| 4 | | | | 3 | P/S | 0.8 | | 0 |
| 6 | Rock | 647.5 | CEMENT / BENTONITE SEAL | | | | | |
| | Clay | 645.8 | | | | | | |
| | Rock | 645.3 | | | | | | |
| 8 | Clay | 644.3 | | | | | | |
| 10 | LIMESTONE (SALEM FORMATION), thin bedded, medium grained, brown-light gray | 643.8 | | | | | | |
| 12 | - fossils, gray at 12.5ft BGS | | | | | | | |
| 14 | - horizontal fracture at 13.6ft BGS<br>- horizontal fracture at 14.4ft BGS<br>- open stylolite at 15.1ft BGS | | | | | | | |
| 16 | | | | | | | | |
| 18 | - stylolite at 17.4ft BGS<br>- horizontal fracture at 18.7ft BGS | | | | | | | |
| 20 | | | HQ CORE HOLE | | | | | |
| 22 | - stylolite at 21.1ft BGS<br>- horizontal fracture at 22.6ft BGS | | | | | | | |
| 24 | | | | | | | | |
| 26 | - stylolite at 26.5ft BGS<br>- stylolite at 26.8ft BGS | | | | | | | |
| 28 | - horizontal fracture at 26.9ft BGS<br>- horizontal fracture at 28.1ft BGS | | | | | | | |
| 30 | - horizontal fracture at 30.0ft BGS | | SUMP | | | | | |
| | END OF BOREHOLE @ 31.0ft BGS | 621.3 | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X204Y288
DATE COMPLETED: May 19, 2004
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: D. DEITNER

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 642.9<br>640.4 | | | | | | |
| 0 | TOPSOIL | 640.2 | | | P/S | | | |
| | CL-CLAY, little silt, firm, medium plasticity, strong brown, moist | | | | | | | |
| 2 | END OF OVERBURDEN HOLE @ 1.0ft BGS | | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X220Y088S
DATE COMPLETED: August 15, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 684.5<br>682.0 | | | | | |
| 0 | SW-GW SAND & GRAVEL (FILL) | | | | | | |
| 2 | | 679.5 | | | | | |
| | CL-CLAY, little silt, stiff, low plasticity, strong brown, moist | | CEMENT / BENTONITE GROUT<br>4" DIA. STEEL CASING | | | | |
| 16 | END OF OVERBURDEN HOLE @ 17.0ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X225Y080S
DATE COMPLETED: August 13, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 686.7<br>684.3 | | | | | |
| | Same stratigraphy as TMW-X225Y080 | | 4" DIA. STEEL CASING<br>CEMENT / BENTONITE GROUT<br>10" DIA. HOLE | | | | |
| 22 | END OF OVERBURDEN HOLE @ 22.5ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y071A
DATE COMPLETED: November 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 687.7 | | | | | |
| 0 | GW-GRAVEL (FILL), little silt, little fine sand, medium to coarse grained, well graded, gray | | | | | | |
| 2 | | | | 1 | | 0.9 | |
| | | 2.5 | | | | | |
| 4 | CL-CLAY, little silt, medium plasticity, firm, strong brown, moist, slight black stain at clay contact | | | 2 | | 1.0 | |
| 6 | | | | 3 | | 1.0 | |
| 8 | | | | 4 | | 1.0 | |
| 10 | | | | 5 | | 1.2 | |
| | - limestone fragments at 10.5ft BGS | | | | | | |
| | ROCK | 10.9 | | | | | |
| 12 | | 12.5 | | | | | |
| | IN AND OUT OF ROCK | | | | | | |
| 14 | | 14.5 | | | | | |
| | CL-CLAY, little silt, medium plasticity, firm, strong brown, moist, slight black stain at clay contact | | CEMENT / BENTONITE GROUT | 6 | | 1.0 | |
| 16 | | | | 7 | | 0.4 | |
| | ROCK | 17.0 | | | | | |
| 18 | | | | | | | |
| 20 | | 20.0 | 4" DIA. STEEL CASING | | | | |
| | CL-CLAY, little silt, medium plasticity, firm, strong brown, moist, slight black stain at clay contact | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| | END OF OVERBURDEN HOLE @ 26.7ft BGS | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y071B
DATE COMPLETED: November 10, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 687.7 | | | | | |
| | SAME STRATIGRAPHY AS MW-X233Y071A | | | | | | |
| 12 | POSSIBLE ROCK SHELF - in and out of rock and clay, water lost | 12.0 | | | | | |
| 20 | | | 4" DIA. STEEL CASING | | | | |
| 21 | CL-CLAY, little silt, medium plasticity, firm, strong brown | 21.0 | CEMENT / BENTONITE GROUT | | | | |
| 27 | END OF OVERBURDEN HOLE @ 27.0ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y087S
DATE COMPLETED: August 16, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 673.5<br>671.8 | | | | | |
| 0 | SW-GW SAND & GRAVEL (FILL) | | | | | | |
| 2 | | 669.3 | | | | | |
| 4 | CL-CLAY, little silt, stiff, low plasticity, strong brown, moist | | 4" DIA. STEEL CASING | | | | |
| 6 | | | CEMENT / BENTONITE GROUT | | | | |
| 8 | | | | | | | |
| 10 | END OF OVERBURDEN HOLE @ 10.0ft BGS | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y095
DATE COMPLETED: April 29, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 675.2 | | | | | | |
| 0 | LIMESTONE CHIPS (FILL) | 1.0 | | | | | | |
| | CL-CLAY, trace sand, trace cobbles, firm, medium plasticity, 10YR 5/6, moist | 1.3 | | | | | | |
| 2 | Rock ledge | 2.6 | 4" DIA. STEEL CASING | | | | | |
| | CL-CLAY, trace sand, trace rootlets, firm, mottled, 10YR 5/6 with gray, moist | | | 1 | | 0.5 | | 0.6 / 0.7 |
| 4 | | | | 2 | | 0.0 | | |
| 6 | END OF OVERBURDEN HOLE @ 5.5ft BGS | | CEMENT / BENTONITE GROUT | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y100
DATE COMPLETED: April 30, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 684.5 | | | | | | |
| 0 | TOPSOIL | 1.0 | | 1 | | 1.0 | | 0.6 |
| 2 | LIMESTONE LEDGE | 3.0 | CEMENT / BENTONITE GROUT | | | 0.0 | | 1.5 |
| 4 | CL-CLAY, trace sand, trace cobbles, moderate plasticity, 10YR 5/6, moist | | | 2 | | 0.3 | | 0.8 |
| 6 | END OF OVERBURDEN HOLE @ 6.0ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (2)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y105A
DATE COMPLETED: May 2, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 698.3 | | | | | | |
| 2 | ML-SILT, trace to little clay, trace gravel, rootlets, compact, yellowish red (5YR 4/6), moist<br>- little clay at 2.0ft BGS | | 4" DIA. STEEL CASING | 1 | | 1.5 | | 0.0 |
| | | | | 2 | | 1.0 | | 0.0 |
| | END OF OVERBURDEN HOLE @ 3.0ft BGS | | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y105B
DATE COMPLETED: May 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 697.3 | | | | | |
| | SAME STRATIGRAPHY AS MW-X233Y105A | | 4" DIA. STEEL CASING | | | | |
| | END OF OVERBURDEN HOLE @ 5.0ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y110A
DATE COMPLETED: May 8, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 703.5 | | | | | | |
| 0 | CL-CLAY, trace silt, firm, yellowish red (5YR 5/8), medium plasticity, moist | | 4" DIA. STEEL CASING | 1 | | 1.5 | | 0.0 |
| 2 | | | CEMENT / BENTONITE GROUT | 2 | | 1.8 | | 0.0 |
| 4 | END OF OVERBURDEN HOLE @ 3.8ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

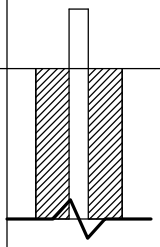
# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y110B
DATE COMPLETED: May 21, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 703.3 | | | | | |
| | SAME STRATIGRAPHY AS MW-X233Y110A | | | | | | |
| 4 | END OF OVERBURDEN HOLE @ 3.8ft BGS | | | | | | |



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y115A
DATE COMPLETED: May 14, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 709.5 | | | | | | |
| 0 | CL-CLAY, trace to little silt, firm, strong brown (7.5YR 4/6), moist | | CEMENT / BENTONITE GROUT | 1 | | 1.5 | | 0.0 |
| 2 | | | | 2 | | 1.0 | | 0.0 |
| 4 | | | | 3 | | 1.5 | | 0.0 |
| 6 | - little silt at 6.0ft BGS | | 4" DIA. STEEL CASING | 4 | | 1.0 | | 0.0 |
| | END OF OVERBURDEN HOLE @ 7.0ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y115B
DATE COMPLETED: November 17, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 708.7 | | | | | |
| | Same stratigraphy as MW-X233Y115A | | CEMENT / BENTONITE GROUT | | | | |
| | END OF OVERBURDEN HOLE @ 7.0ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y120A
DATE COMPLETED: May 15, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 715.8 | | | | | | |
| 0 | GRAVEL PAD | 1.0 | | | | | | |
| | TOPSOIL | 1.3 | | | | | | |
| 2 | CL-CLAY, trace vegetation, medium plasticity, hard, 7.5YR 4/6, moist | | | 1 | | 1.6 | | 0.6 |
| 4 | - mottled 5YR 4/6 with 10YR 5/6 at 4.1ft BGS | | CEMENT / BENTONITE GROUT | 2 | | 1.3 | | 0.6 |
| 6 | - trace black staining at 5.9ft BGS | | | 3 | | 1.7 | | 0.3 |
| 8 | - trace silt at 7.5ft BGS<br>- 3 cm silt lens at 7.8ft BGS<br>- little silt at 8.0ft BGS | 8.5 | | 4 | | 1.7 | | 0.5 |
| 10 | ML-SILT, trace to little clay, hard, 5Y 8/4, moist | | 4" DIA. STEEL CASING | 5 | | 2.0 | | 1.4 |
| 12 | - 3 cm medium grained sand lens, reddish at 10.9ft BGS<br>END OF OVERBURDEN HOLE @ 11.2ft BGS | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y120B
DATE COMPLETED: November 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 715.4 | | | | | |
| | Same stratigraphy as MW-X233Y120A | | | | | | |
| 2 | | | | | | | |
| 4 | | | | | | | |
| 6 | | | 4" DIA. STEEL CASING | | | | |
| | END OF OVERBURDEN HOLE @ 7.0ft BGS | | | | | | |
| 8 | | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y125A
DATE COMPLETED: May 16, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 716.3 | | | | | | |
| 0 | GRAVEL PAD | 3.5 | | | | | | |
| 4 | TOPSOIL | 3.6 | | | | | | |
| | CL-CLAY, rootlets, hard, medium plasticity, 7.5YR 4/6, moist | | | 1 | | 0.6 | | 1.3 |
| | - mottled with yellow at 5.5ft BGS | | CEMENT / BENTONITE GROUT | 2 | | 1.5 | | 0.2 |
| | - some black mineralization at 7.7ft BGS | | | 3 | | 2.0 | | 0.3 |
| | | | | 4 | | 2.0 | | 0.5 |
| 12 | ML-SILT, rootlets | 12.2 | 4" DIA. STEEL CASING | 5 | | 2.0 | | 0.5 |
| 14 | CL-CLAY, trace vegetation, hard, medium plasticity, mottled with 7.5YR 4/6 and 10YR 7/8, trace black, moist | 14.5 | | 6 | | 1.0 | | 0.4 |
| 16 | - increase silt, mottled yellow and gray at 16.5ft BGS | | | 7 | | 1.6 | | 0.5 |
| 18 | END OF OVERBURDEN HOLE @ 17.1ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

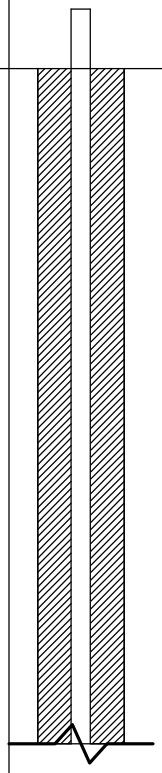
# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y125B
DATE COMPLETED: November 24, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 716.2 | | | | | |
| | Same stratigraphy as MW-X233Y125B | | | | | | |
| 16 | END OF OVERBURDEN HOLE @ 17.1ft BGS | | | | | | |




NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 678.4<br>674.9 | | | | | | |
| 0 | TOPSOIL | 674.6 | | | | | | |
| | CL-CLAY, little silt, trace very fine sand, stiff, low to medium plasticity, moist | | | 1 | | 1.6 | 5 | 0 |
| 2 | - with silt at 1.5ft BGS | | CEMENT / BENTONITE GROUT | 2 | | 1.7 | 7 | 0 |
| 4 | | | 4" DIA. STEEL CASING | | | | | |
| | - medium plasticity, wet at 5.0ft BGS | | 10" DIA. HOLE | 3 | | 1.3 | <100 | 0 |
| 6 | END OF OVERBURDEN HOLE @ 6.0ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157S
DATE COMPLETED: June 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 677.3<br>674.9 | | | | | | |
| 0 | TOPSOIL | 674.6 | | | | | | |
| | CL-CLAY, little silt, trace very fine sand, stiff, low-medium plasticity, moist | | | 1 | | 1.6 | 5 | 0 |
| 2 | - with silt at 1.5ft BGS | | CEMENT / BENTONITE GROUT | 2 | | 1.7 | 7 | 0 |
| 4 | | | 10" DIA. HOLE | | | | | |
| | - medium plasticity, wet at 5.0ft BGS | | 4" DIA. STEEL CASING | 3 | | 1.3 | >100 | 0 |
| 6 | END OF OVERBURDEN HOLE @ 6.0ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X242Y060S
DATE COMPLETED: November 12, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER | 684.5 | | | | | |
| 0 | GW-GRAVEL (FILL), medium grained sand, limestone chips, gray/tan | | CEMENT / BENTONITE GROUT | | | | |
| 3.0 | CL-CLAY, little silt, low plasticity, firm, strong brown, moist<br>- medium plasticity at 5.0ft BGS | | 4" DIA. STEELCASING | 1<br>2<br>3<br>4 | | 1.0<br>1.3<br>1.0<br>1.0 | |
| 11.0 | END OF OVERBURDEN HOLE @ 11.0ft BGS | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 666.2<br>663.5 | | | | | |
| 0 | GW-GRAVEL (FILL), some well graded sands, medium to coarse gravel, well graded, gray, dry | 662.6 | 10" DIA. STEEL CASING | | | | |
| 2 | CL-CLAY, some silt, firm, low plasticity, strong brown, moist | | | | | | |
| | END OF OVERBURDEN HOLE @ 2.5ft BGS | | | | | | |
| 4 | | | | | | | |
| 6 | | | | | | | |
| 8 | | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | | 682.2 | | | | |
| 10 | LIMESTONE (ST. LOUIS FORMATION), fine grained (micritic), interbedded with calcareous shale lenses, thinly bedded, light blue/grey.<br>- porous at 10.5ft BGS<br>- vugs at 11.2ft BGS | | | 1 | 80 | 80 |
| 12 | - 1" clay seam, water loss at 11.3ft BGS | | 10" DIA. HOLE | | | |
| 14 | | | | | | |
| 16 | - 4" vug with clay filling at 15.1ft BGS<br>- 3" large horizontal non-continuous opening with little clay filling at 16.3ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 18 | - medium horizontal fracture at 17.2ft BGS<br>- medium horizontal fracture at 18.3ft BGS | | | 2 | 98 | 93 |
| 20 | | | 4" DIA. STEEL CASING | | | |
| 22 | - medium horizontal fracture at 21.0ft BGS | | | | | |
| 24 | - stylolite at 23.2ft BGS<br>- 1/2" horizontal non-continuous opening at 24.4ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 26 | | 664.8 | | | | |
| 28 | LIMESTONE (SALEM FORMATION), 1/2" horizontal non-continuous opening, granular, thick bedding (medium to coarse grained ( comprised mostly of micro fossils and fossil fragments) ), oolitic in texture, calcarenite<br>- thin horizontal fracture at 28.0ft BGS<br>- 3.5" section of open vugs at 28.6ft BGS | | | 3 | 100 | 100 |
| 30 | | | | | | |
| 32 | - 2" horizontal non-continuous opening at 30.9ft BGS<br>- stylolite at 32.6ft BGS | | | | | |
| 34 | - stylolite at 33.8ft BGS | | | | | |
| 36 | | | | | | |
| 38 | | | | 4 | 100 | 100 |
| 40 | - 1/2" thick open horizontal stylolite at 38.9ft BGS<br>- stylolite at 40.5ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 42 | - stylolite at 41.4ft BGS | | | | | |
| 44 | | | | | | |
| 46 | - open stylolite at 45.2ft BGS | | | | | |
| 48 | | | | 5 | 100 | 100 |
| 50 | - stylolite at 50.7ft BGS | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |
| 56 | | | ← 4" DIA. HQ COREHOLE | | | |
| 58 | - stylolite at 58.8ft BGS | | | 6 | 100 | 100 |
| 60 | | | | | | |
| 62 | - stylolite at 62.8ft BGS<br>- 26' no fractures, have fossils at 63.5ft BGS | | | | | |
| 64 | - stylolite, horizontal at 65.1ft BGS | | | | | |
| 66 | | | | | | |
| 68 | - stylolite, horizontal at 67.2ft BGS | | | 7 | 100 | 100 |
| 70 | - stylolite, horizontal at 70.8ft BGS | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 78 | - stylolite, horizontal at 78.5ft BGS | | | 8 | 100 | 100 |
| 80 | | | | | | |
| 82 | | | | | | |
| 84 | - stylolite, horizontal at 84.1ft BGS | | | | | |
| 86 | | | | | | |
| 88 | | | | 9 | 100 | 100 |
| 90 | - 1/2" thick non-continuous opening at 89.5ft BGS | | | | | |
| 92 | - open at 91.9ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 94 | - stylolite at 94.6ft BGS | | | | | |
| 96 | - thin horizontal fracture at 96.2ft BGS | | DOW PACKER | | | |
| 98 | | | | 10 | 100 | 100 |
| | | 591.2 | | | | |
| 100 | LIMESTONE (UPPER HARRODSBURG FORMATION), stylolite, coarse grained, well cemented, bioclastic calcarenite with shale, interbedded with argillaceous limestone lenses, light grey | | | | | |
| 102 | - stylolite at 101.1ft BGS<br>- 2' highly fossilized (crinoid, brachiopods, abundant fan bryozoan), vuggy at 102.2ft BGS | | | | | |
| 104 | - stylolite at 104.5ft BGS | | | | | |
| 106 | - stylolite at 106.0ft BGS | | SAMPLE ZONE 2 | | | |
| 108 | - thin horizontal fracture at 108.7ft BGS | | | 11 | 100 | 100 |
| 110 | - thin horizontal fracture at 110.4ft BGS | | DOW PACKER | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 112 | - shale, thin horizontal fracture at 110.7ft BGS<br>- stylolite at 112.7ft BGS | | | | | |
| 114 | - 3" of highly fractured rock, horizontal at 113.7ft BGS | | | | | |
| 116 | - stylolite at 117.0ft BGS<br>- shale parting, black at 117.1ft BGS<br>- shale parting, black at 118.0ft BGS<br>- shale parting, black at 118.6ft BGS<br>- shale parting, black at 118.9ft BGS<br>- shale parting, black at 119.2ft BGS<br>- 1/2" shale parting at 121.1ft BGS | | | 12 | 100 | 100 |
| 118 | | | | | | |
| 120 | | | | | | |
| 122 | - stylolite at 122.2ft BGS | | | | | |
| 124 | - near horizontal fracture at 125.1ft BGS | | | | | |
| 126 | | | 4" DIA. HQ COREHOLE | | | |
| 128 | - horizontal fracture at 128.7ft BGS | | | 13 | 100 | 100 |
| 130 | - horizontal fracture at 131.0ft BGS | | | | | |
| 132 | - horizontal fracture at 132.2ft BGS | | | | | |
| 134 | - stylolite at 134.1ft BGS<br>- stylolite at 135.4ft BGS | | | | | |
| 136 | - stylolite at 135.7ft BGS<br>- stylolite at 136.5ft BGS<br>- stylolite at 137.5ft BGS | | | | | |
| 138 | - stylolite at 138.0ft BGS<br>- stylolite at 138.5ft BGS<br>- stylolite at 138.9ft BGS | | NON-MONITORING ZONE | 14 | 100 | 100 |
| 140 | - stylolite at 139.6ft BGS<br>- stylolite at 141.0ft BGS | | | | | |
| 142 | - open stylolite at 141.5ft BGS<br>- stylolite at 142.7ft BGS<br>- open stylolite at 143.0ft BGS | | | | | |
| 144 | LIMESTONE (LOWER HARRODSBURG FORMATION), stylolite, horizontal, medium to coarse grained, mostly argillaceous with shale | 546.2 | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 148 | lenses, calcareous, abundant geodes and siliceous towards the bottom, light to dark grey<br>- shale parting at 145.0ft BGS<br>- thin horizontal fracture at 145.7ft BGS<br>- open stylolite at 147.2ft BGS<br>- open stylolite at 147.8ft BGS<br>- 2" geode with quartz crystal fillings at 149.4ft BGS<br>- stylolite at 150.0ft BGS<br>- open stylolite at 152.0ft BGS | | | 15 | 100 | 100 |
| 154 | - open stylolite at 154.8ft BGS | | | | | |
| 156 | - stylolite at 157.5ft BGS | | | | | |
| 158 | - open stylolite at 158.4ft BGS | | | 16 | 100 | 100 |
| 160 | - open stylolite at 159.8ft BGS<br>- 2' highly fractured, horizontal at 160.7ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 162 | | | | | | |
| 164 | - 2' interbedded shale beds at 163.6ft BGS | | | | | |
| 166 | LIMESTONE (RAMP CREEK FORMATION), very fine grained, contains small amounts of shale, 1" geode | 524.2 | DOW PACKER | | | |
| 168 | - 10' numerous geodes with calcite fillings at 167.7ft BGS | | | 17 | 100 | 100 |
| 170 | | | | | | |
| 172 | - 2" geodes, calcite fillings at 171.8ft BGS<br>- 2" geodes, calcite fillings at 172.5ft BGS | | | | | |
| 174 | - 2" geodes, calcite fillings at 173.6ft BGS | | | | | |
| 176 | - open fracture at 175.5ft BGS<br>- 1" geode, quartz filled at 176.7ft BGS | | | | | |
| 178 | - 3" interbedded shale at 177.0ft BGS | | | 18 | 100 | 100 |
| 180 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 182 | | | | | | |
| 184 | | | 4" DIA. HQ COREHOLE | | | |
| 186 | | 503.3 | | | | |
| 188 | SHALE (EDWARDSVILLE FORMATION), calcareous, light blue/grey, soft. | | SAMPLE ZONE 1 | 19 | 100 | 100 |
| 190 | | | | | | |
| 192 | | | | | | |
| 194 | END OF BOREHOLE @ 193.5ft BGS | 496.7 | | | | |
| 196 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 198 | | | | | | |
| 200 | | | | | | |
| 202 | | | | | | |
| 204 | | | | | | |
| 206 | | | | | | |
| 208 | | | | | | |
| 210 | | | | | | |
| 212 | | | | | | |
| 214 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245S
DATE COMPLETED: June 11, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | | 681.9 | 10" DIA. STEEL CASING; 4" DIA. STEEL CASING | | | |
| 10 | LIMESTONE (ST. LOUIS FORMATION), fine grained (micritic), calcite, thin bedded, gray, interbedded with calcareous shale lenses | | | | | |
| 12 | - horizontal fracture at 11.4ft BGS<br>- 8-inch of porous rock at 11.5ft BGS<br>- horizontal fracture at 12.2ft BGS<br>- horizontal fracture at 13.4ft BGS | | | | | |
| 14 | - 4-inch near vertical non-continuous opening at 13.6ft BGS | | 4" DIA. HQ COREHOLE | 1 | 100 | 95 |
| 16 | - horizontal fracture at 14.3ft BGS<br>- horizontal fracture at 16.1ft BGS | | | | | |
| 18 | - horizontal fracture at 16.3ft BGS<br>- horizontal fracture at 16.5ft BGS<br>- horizontal fracture at 17.1ft BGS<br>- stylolite at 17.4ft BGS<br>- open stylolite at 18.4ft BGS | | | | | |
| 20 | | | | | | |
| 22 | - horizontal fracture at 20.8ft BGS<br>- horizontal fracture at 21.4ft BGS<br>- horizontal fracture at 21.7ft BGS<br>- horizontal fracture at 22.8ft BGS | | | | | |
| 24 | - horizontal fracture at 23.2ft BGS<br>- stylolite at 23.3ft BGS<br>- open stylolite at 24.5ft BGS | | BENTONITE CHIPS | 2 | 100 | 100 |
| 26 | - horizontal fracture at 24.7ft BGS | 664.9 | | | | |
| 28 | LIMESTONE (SALEM FORMATION), granular, thick bedding , medium to coarse grained (comprised mostly of micro fossils and fossil fragments), massive, calcite, oolitic in texture, light gray<br>- horizontal fracture at 27.3ft BGS | 662.8 | | | | |
| 30 | END OF BOREHOLE @ 27.6ft BGS | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X184Y285
DATE COMPLETED: May 18, 2004
DRILLING METHOD: HSA AUGER / HQ CORE
FIELD PERSONNEL: J. CLOSE

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 654.6<br>652.3 | | | | |
| 0 | CL-CLAY, with silt, firm, medium plasticity, brown, damp<br>- piece of wood at 0.6ft BGS | | | | | |
| 2 | - moist at 3.0ft BGS | | 4" DIA. STEEL CASING | | | |
| 4 | Rock | 647.5 | | | | |
| 6 | Clay | 645.8 | CEMENT / BENTONITE SEAL | | | |
| | Rock | 645.3 | | | | |
| 8 | Clay | 644.3<br>643.8 | | | | |
| | LIMESTONE (SALEM FORMATION), thin bedded, medium grained, brown-light gray | | | | | |
| 10 | | | | | | |
| 12 | - fossils, gray at 12.5ft BGS | | | | | |
| | - horizontal fracture at 13.6ft BGS | | | | | |
| 14 | - horizontal fracture at 14.4ft BGS<br>- open stylolite at 15.1ft BGS | | | | | |
| 16 | | | | | | |
| | - stylolite at 17.4ft BGS | | | | | |
| 18 | - horizontal fracture at 18.7ft BGS | | | | | |
| 20 | | | HQ CORE HOLE | | | |
| | - stylolite at 21.1ft BGS | | | | | |
| 22 | - horizontal fracture at 22.6ft BGS | | | | | |
| 24 | | | | | | |
| 26 | - stylolite at 26.5ft BGS<br>- stylolite at 26.8ft BGS | | | | | |
| 28 | - horizontal fracture at 26.9ft BGS<br>- horizontal fracture at 28.1ft BGS | | | | | |
| 30 | - horizontal fracture at 30.0ft BGS | | SUMP | | | |
| | END OF BOREHOLE @ 31.0ft BGS | 621.3 | | | | |
| 32 | | | | | | |
| 34 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X204Y288
DATE COMPLETED: May 19, 2004
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: D. DEITNER

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | TOP OF RISER | 642.9 | | | | |
| | GROUND SURFACE | 640.4 | | | | |
| | TOPSOIL | 640.2 | | | | |
| | CL-CLAY, little silt, firm, medium plasticity, strong brown, moist | | | | | |
| | LIMESTONE (SALEM FORMATION), gray, strong, medium grained, thick bedded | 634.9 | CEMENT / BENTONITE SEAL; 4" DIA. STEEL CASING | | | |
| 12 | - half-inch vertical fracture at 12.5ft BGS | | | | | |
| 14 | - thin horizontal fracture, trace fossils at 13.5ft BGS | | | | | |
| 18 | - thin horizontal fracture at 17.9ft BGS<br>- 1/8-inch vug at 18.2ft BGS | | | 1 | 100 | 100 |
| 20 | - thin horizontal fracture at 21.0ft BGS | | | | | |
| 24 | - thin horizontal fracture at 25.1ft BGS | | | | | |
| 26 | - thin horizontal fracture at 26.0ft BGS<br>- thin horizontal fracture at 26.9ft BGS | | | | | |
| 28 | - thin horizontal fracture at 27.8ft BGS<br>- stylolite at 28.9ft BGS | | | 2 | 100 | 100 |
| 30 | - increase in grain size, fossils at 29.3ft BGS<br>- stylolite at 29.4ft BGS<br>- stylolite at 30.5ft BGS | | | | | |
| 32 | - near vertical fracture at 30.8ft BGS<br>- near vertical fracture at 31.0ft BGS | | SUMP | | | |
| 34 | - stylolite at 31.1ft BGS<br>- stylolite at 31.7ft BGS<br>- stylolite at 32.7ft BGS | 607.7 | | | | |
| | END OF BOREHOLE @ 32.7ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X220Y088S
DATE COMPLETED: August 15, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 18 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, light gray | 665.0 | | | | |
| | - horizontal fracture at 18.6ft BGS | | | | | |
| | - horizontal fracture at 18.9ft BGS | | | | | |
| 20 | - horizontal fracture, 2-inch porous section at 19.3ft BGS | | 4" DIA. HQ COREHOLE | | | |
| | - horizontal fracture at 19.9ft BGS | | | 1 | 100 | 94 |
| 22 | - granular, gray/tan, fossils, 2.2 feet of highly porous section ("honeycomb") at 20.3ft BGS | | | | | |
| | - horizontal fracture at 20.7ft BGS | | | | | |
| 24 | - slightly porous, gray, fossils, coarser at 22.2ft BGS | 658.2 | | | | |
| | - horizontal fracture at 22.8ft BGS | | | | | |
| 26 | END OF BOREHOLE @ 23.8ft BGS | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |
| 42 | | | | | | |
| 44 | | | | | | |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X225Y080S
DATE COMPLETED: August 13, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 22 | | 661.8 | | | | |
| 24 | LIMESTONE (SALEM FORMATION), fine grained, thin bedded, light gray, light gray, calcite<br>- light gray/tan, granular, porous, fossils at 24.2ft BGS<br>- 2-feet of porous rock ("honeycomb"), at 24.3ft BGS<br>- horizontal fracture at 24.4ft BGS<br>- horizontal fracture at 25.1ft BGS<br>- horizontal fracture at 26.1ft BGS<br>- horizontal fracture, light gray at 27.2ft BGS<br>- horizontal fracture, black staining at 28.1ft BGS<br>- horizontal fracture, black staining at 28.5ft BGS<br>- horizontal fracture at 29.7ft BGS<br>- 5-inches of interbedded shale at 29.8ft BGS<br>- horizontal fracture at 30.3ft BGS<br>- horizontal fracture, black staining at 30.9ft BGS<br>- horizontal fracture, black staining at 31.3ft BGS<br>- 3-inch void, contains numerous fossils at 31.7ft BGS<br>- horizontal fracture at 32.6ft BGS | | 4" DIA. HQ COREHOLE | 1 | 97.5 | 98 |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | 650.7 | | | | |
| 36 | END OF BOREHOLE @ 33.6ft BGS | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |
| 42 | | | | | | |
| 44 | | | | | | |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y071A
DATE COMPLETED: November 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 26 | | 26.7 | | | | |
| | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, calcite, gray | | | | | |
| 28 | | | | | | |
| 30 | - half-inch open stylolite at 30.0ft BGS | | | | | |
| | - fracture at 31.6ft BGS | | | | | |
| 32 | - fracture at 32.1ft BGS | | | | | |
| | - fracture at 33.8ft BGS | | 4" DIA. HQ CORE HOLE | 1 | 80 | 70 |
| 34 | | | | | | |
| 36 | - 2-foot void, water lost, clay parting at 36.2ft BGS | | | | | |
| 38 | - fracture at 38.5ft BGS | | SUMP | | | |
| | - fracture at 39.7ft BGS | | | | | |
| 40 | END OF BOREHOLE @ 40.0ft BGS | 40.0 | | | | |
| 42 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 44 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 46 | Ground surface elevation of 685.73 ft. AMSL. | | | | | |
| 48 | | | | | | |
| 50 | | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |
| 56 | | | | | | |
| 58 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y071B
DATE COMPLETED: November 10, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 28 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, calcite, gray | 27.0 | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | 4" DIA. HQ CORE HOLE | | | |
| 36 | - 1.7-foot void at 36.3ft BGS | | | | | |
| 38 | | | | | | |
| 40 | - 3-inch vertical non-continuous opening, oxidized, gray at 39.1ft BGS<br>- horizontal fracture, black beddings at 39.2ft BGS | | | 1 | 100 | 100 |
| 42 | - horizontal fracture at 40.3ft BGS<br>- horizontal fracture at 41.1ft BGS<br>- stylolite at 42.1ft BGS | | | | | |
| 44 | - open stylolite at 44.1ft BGS | | | | | |
| 46 | LIMESTONE (SALEM FORMATION), fine - coarse grained, fossils, gray<br>- 1-foot section of stylolites at 46.7ft BGS | 45.0 | | 2 | 100 | 100 |
| 48 | | | | | | |
| 50 | - stylolite at 49.4ft BGS<br>- 5-inch section of stylolites at 50.3ft BGS | | | | | |
| 52 | - stylolite at 51.9ft BGS | | | | | |
| 54 | - horizontal fractures, dark gray clay partings, very faint sheen at 52.9ft BGS | | | 3 | 100 | 100 |
| 56 | - medium grained at 55.8ft BGS | | | | | |
| 58 | | | SUMP | | | |
| 60 | END OF BOREHOLE @ 60.0ft BGS | 60.0 | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y071B
DATE COMPLETED: November 10, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % | |
|---|---|---|---|---|---|---|---|
| 62 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical)<br><br>Overburden pilot boring advanced utilizing 7 7/8 inch tri-cone roller bit<br><br>Ground surface elevation of 685.55 ft. AMSL. | | | | | | |
| 64 | | | | | | | |
| 66 | | | | | | | |
| 68 | | | | | | | |
| 70 | | | | | | | |
| 72 | | | | | | | |
| 74 | | | | | | | |
| 76 | | | | | | | |
| 78 | | | | | | | |
| 80 | | | | | | | |
| 82 | | | | | | | |
| 84 | | | | | | | |
| 86 | | | | | | | |
| 88 | | | | | | | |
| 90 | | | | | | | |
| 92 | | | | | | | |
| 94 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y087S
DATE COMPLETED: August 16, 2002
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 10 | LIMESTONE (SALEM FORMATION), granular, fossils, massive, tan, 2-inch highly fractured | 661.8 | | | | |
| 12 | - horizontal fracture at 12.4ft BGS<br>- horizontal fracture at 13.1ft BGS<br>- horizontal fracture at 13.2ft BGS<br>- horizontal fracture at 13.5ft BGS<br>- horizontal fracture at 13.8ft BGS<br>- horizontal fracture at 14.7ft BGS<br>- horizontal fracture, 2-inch broken rock at 14.9ft BGS<br>- horizontal fracture, light gray at 15.4ft BGS<br>- 1-inch vertical non-continuous opening at 16.0ft BGS<br>- horizontal fracture at 16.2ft BGS<br>- horizontal fracture at 16.7ft BGS<br>- horizontal fracture at 17.0ft BGS<br>- horizontal fracture at 17.4ft BGS<br>- horizontal fracture at 18.2ft BGS<br>- horizontal fracture, shale parting, 1-inch shale bed at 18.5ft BGS<br>- horizontal fracture, fine grained at 19.0ft BGS<br>- horizontal fracture, shale parting at 19.6ft BGS<br>- 3-inch vertical non-continuous opening at 21.1ft BGS<br>- horizontal fracture at 21.3ft BGS | | 4" DIA. HQ COREHOLE<br>SUMP | 1 | 100 | 72 |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | | |
| 22 | | 650.1 | | | | |
| 24 | END OF BOREHOLE @ 21.7ft BGS | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |
| 42 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y095
DATE COMPLETED: April 29, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 6 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, light gray | 5.5 | CEMENT / BENTONITE GROUT | | | |
| 8 | | | | | | |
| 10 | - one foot of fractured rock at 9.4ft BGS<br>- 2-inch non-continuous opening at 10.8ft BGS | | | | | |
| 12 | - fracture at 12.2ft BGS<br>- fracture at 12.6ft BGS | | | | | |
| 14 | - 3-inch near vertical non-continuous opening at 12.9ft BGS | | | 1 | 100 | 90 |
| 16 | - fracture with clay parting, oxidized at 13.2ft BGS<br>- fracture at 14.4ft BGS | 15.0 | | | | |
| 18 | LIMESTONE (SALEM FORMATION), gradational contact, medium grained, porous, occasional fossils, calcarenite, beige/gray<br>- thin fracture at 17.5ft BGS<br>- thin fracture at 18.0ft BGS | | | | | |
| 20 | - thin fracture with silt parting at 18.6ft BGS<br>- stylolite at 19.0ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 22 | - 3-inches of fractured rock at 19.5ft BGS<br>- fracture at 20.2ft BGS<br>- open stylolite at 20.8ft BGS<br>- stylolite at 21.2ft BGS | | | 2 | 100 | 98 |
| 24 | - 5-inch section of stylolites at 23.4ft BGS | | | | | |
| 26 | - gray at 26.1ft BGS | | | | | |
| 28 | - stylolite at 27.3ft BGS | | | | | |
| 30 | - stylolite at 29.0ft BGS | | | 3 | 100 | 100 |
| 32 | | | SUMP | | | |
| 34 | END OF BOREHOLE @ 34.5ft BGS | 34.7 | | | | |
| 36 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical). Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method. | | | | | |
| 38 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y095
DATE COMPLETED: April 29, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % | |
|---|---|---|---|---|---|---|---|
| | Ground surface elevation of 672.86 ft. AMSL | | | | | | |
| 40 | | | | | | | |
| 42 | | | | | | | |
| 44 | | | | | | | |
| 46 | | | | | | | |
| 48 | | | | | | | |
| 50 | | | | | | | |
| 52 | | | | | | | |
| 54 | | | | | | | |
| 56 | | | | | | | |
| 58 | | | | | | | |
| 60 | | | | | | | |
| 62 | | | | | | | |
| 64 | | | | | | | |
| 66 | | | | | | | |
| 68 | | | | | | | |
| 70 | | | | | | | |
| 72 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y100
DATE COMPLETED: April 30, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 6 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray | 6.0 | 4" DIA. STEEL CASING | | | |
| 8 | | | | | | |
| 10 | - fracture at 9.4ft BGS<br>- fracture at 10.2ft BGS<br>- interbedded shale at 10.3ft BGS | | | | | |
| 12 | - fracture at 11.8ft BGS | | | | | |
| 14 | - fracture at 14.0ft BGS<br>- dark gray at 14.8ft BGS | | | 1 | 100 | 93 |
| 16 | | | | | | |
| 18 | - light gray at 17.6ft BGS<br>- 6-inches of fractures, interbedded shale, gray at 18.3ft BGS | | | | | |
| 20 | - thin fracture at 19.5ft BGS | | | | | |
| 22 | - light gray at 21.3ft BGS<br>- stylolite at 22.2ft BGS<br>- stylolite at 22.7ft BGS | | | | | |
| 24 | - open stylolite at 24.4ft BGS | 24.5 | | 2 | 100 | 100 |
| 26 | LIMESTONE (SALEM FORMATION), gradational contact, beige/gray, medium grained, calcarenite, fossils, 9-inch porous section<br>- open stylolite with silt parting, slightly oxidized at 25.4ft BGS | | | | | |
| 28 | | | | | | |
| 30 | - fracture at 29.4ft BGS<br>- fracture at 30.7ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 32 | - stylolite at 32.2ft BGS | | | | | |
| 34 | | | | 3 | 100 | 100 |
| 36 | - open stylolite at 35.8ft BGS | | | | | |
| 38 | - stylolite at 37.1ft BGS<br>- stylolite at 37.7ft BGS<br>- open stylolite at 38.2ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y100
DATE COMPLETED: April 30, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 40 | - open stylolite at 40.0ft BGS | | | 4 | 100 | 100 |
| 42 | | | | | | |
| 44 | | | | | | |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | | | | 5 | 100 | 100 |
| 52 | - open stylolite at 52.6ft BGS | | | | | |
| 54 | | | SUMP | | | |
| | | 55.5 | | | | |
| 56 | END OF BOREHOLE @ 55.5ft BGS | | | | | |
| | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 58 | | | | | | |
| | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 60 | | | | | | |
| | Ground surface elevation of 683.04 ft. AMSL | | | | | |
| 62 | | | | | | |
| 64 | | | | | | |
| 66 | | | | | | |
| 68 | | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y105A
DATE COMPLETED: May 2, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 4 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray | 3.0 | CEMENT / BENTONITE GROUT | | | |
| 6 | | | | | | |
| 8 | - near vertical fracture at 7.0ft BGS<br>- near vertical fracture and 2-feet near 30 degree (shallow angle) fracture that cross cuts near vertical fracture at 7.5ft BGS | | | 1 | 100 | 33 |
| 10 | - near vertical fracture, oxidized at 8.0ft BGS<br>- near vertical fracture, oxidized at 8.6ft BGS<br>- near vertical fracture at 9.3ft BGS | | 4" DIA. COREHOLE | | | |
| 12 | - near vertical fracture at 9.6ft BGS<br>- 1.7-feet heavily dissolved / weathered limestone, high silt / clay content, oxidized and mostly washed out, red / brown at 10.2ft BGS | | SUMP | 2 | 58 | |
| 14 | - near vertical fracture, sharp contact with more competent limestone, gray at 11.9ft BGS | 12.6 | | | | |
| 16 | - near vertical fracture cross cut by short shallow angle fracture, weathered, oxidized at 12.3ft BGS<br>END OF BOREHOLE @ 12.8ft BGS | | | | | |
| 18 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 20 | Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 22 | Ground surface elevation of 696.42 ft. AMSL | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y105B
DATE COMPLETED: May 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 6 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, micritic, gray and tan | 5.0 | | | | |
| 8 | | | | | | |
| 10 | - ROCK & CLAY CONTENT at 9.0ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | - 5.5 feet of rock and clay, easy drilling at 16.5ft BGS | | | | | |
| 18 | | | | | | |
| 20 | | | | | | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | - horizontal fracture along a shale stringer, dark gray at 26.0ft BGS | | | | | |
| 28 | | | | | | |
| 30 | - horizontal fracture along a shale stringer, dark gray, slightly weathered at 29.4ft BGS | | 4" DIA. COREHOLE | 1 | 99 | 100 |
| 32 | - 0.3 foot zone of oxidized/stained limestone centered around subhorizontal fracture at 31.6ft BGS | | | | | |
| 34 | - 0.5 foot zone of interbedded shale and limestone, 4-inch parting along bedding plains at 31.9ft BGS | | SUMP | 2 | 100 | 100 |
| 36 | - fracture/parting along bedding slightly mineralized, dark gray at 32.3ft BGS<br>- trace solution pits approximately 0.2 foot zone, gray at 34.0ft BGS | 35.2 | | | | |
| 38 | - near vertical fracture, unweathered at 34.6ft BGS<br>- 0.2 foot zone of solution pits / weathered, gray | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y105B
DATE COMPLETED: May 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % | |
|---|---|---|---|---|---|---|---|
| | at 34.8ft BGS<br>END OF BOREHOLE @ 35.2ft BGS<br><br>Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical)<br><br>Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method<br><br>Ground surface elevation of 695.70 ft. AMSL | | | | | | |

40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y110A
DATE COMPLETED: May 8, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 4 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray | 3.8 | CEMENT / BENTONITE GROUT | | | |
| 6 | - 7-inch highly fractured rock at 6.0ft BGS<br>- fracture with silt parting, oxidized, brown discoloration at 6.2ft BGS | | | | | |
| 8 | - fracture with silt parting, oxidized, brown discoloration at 6.4ft BGS<br>- near vertical fracture at 6.7ft BGS | | | 1 | 100 | 68 |
| 10 | - 2-inch non-continuous opening, rock chips at 7.5ft BGS<br>- near vertical fracture, oxidized, brown at 8.3ft BGS | | | | | |
| 12 | - 4-inch fractured rock at 8.9ft BGS<br>- large fracture at 9.3ft BGS | | 4" DIA. HQ COREHOLE | 2 | 92 | 80 |
| 14 | - 2-inch near vertical non-continuous opening at 10.5ft BGS<br>- oxidized fracture at 11.2ft BGS | | SUMP | | | |
| 16 | - 6-inch clay wash-out at 11.4ft BGS<br>- 5-inches of easy drilling at 11.8ft BGS<br>- oxidized fracture at 12.6ft BGS<br>- oxidized fracture, coral fossils at 14.3ft BGS | 15.0 | | | | |
| 18 | END OF BOREHOLE @ 15.0ft BGS | | | | | |
| 20 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 22 | Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 24 | Ground surface elevation of 701.39 ft. AMSL | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y110B
DATE COMPLETED: May 21, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 4 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, micritic,gray and tan | 3.8 | 4"` DIA. STEEL CASING | | | |
| 6 | | | | | | |
| 8 | | | | | | |
| 10 | | | | | | |
| 12 | - lost all water circulation at 12.0ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | - 2-inch clay seam, moderate plasticity, tan at 19.3ft BGS<br>- 3-inch zone of heavily dissolved limestone, oxidized, contact gradational with more competent rock at 19.4ft BGS | | | 1 | 100 | 83 |
| 22 | - fracture along bedding at 20.4ft BGS<br>- fracture along bedding at 21.3ft BGS | | | | | |
| 24 | - 2.5-inch moderate clay zone, tan at 23.7ft BGS<br>- 2.8-foot void at 24.0ft BGS | | 4" DIA. COREHOLE | | | |
| 26 | | | | 2 | 64 | |
| 28 | - 2-inch dense shale layer, dark brown to black, sharp contact at 28.3ft BGS | | SUMP | | | |
| 30 | - near vertical fracture, unweathered at 29.1ft BGS<br>- near vertical fracture, unweathered at 29.5ft BGS | 30.0 | | | | |
| 32 | END OF BOREHOLE @ 30.0ft BGS | | | | | |
| 34 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical)<br>Overburden pilot boring advanced utilizing 7-7/8- inch tri-cone roller bit<br>Ground surface elevation of 701.15 ft. AMSL | | | | | |
| 36 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y115A
DATE COMPLETED: May 14, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray | 7.0 | 4" DIA. STEEL CASING | | | |
| 10 | | | | | | |
| 12 | - near vertical fracture, weathered oxidized zone at 11.3ft BGS<br>- 1.3-feet of highly fractured rock, near vertical fractures cross cut by shallow angle fractures at 12.0ft BGS | | | | | |
| 14 | - 2-inch void at 12.1ft BGS | | | | | |
| 16 | - 2.2-feet highly weathered brown high silt content with near vertical fractures cross cut by shallow angle fractures at 15.1ft BGS | | | 1 | 98 | 73 |
| 18 | | | | | | |
| 20 | - 4-inch near vertical weathered zone with high silt content with single near vertical fracture at 18.6ft BGS<br>- near vertical fracture with siderite mineralization, coral 2-inch above at 19.8ft BGS | | 4" DIA. COREHOLE | | | |
| 22 | - thin near vertical fracture at 20.7ft BGS<br>- 2-feet near vertical fractures within granular zone, oxidized, brown at 22.9ft BGS | | | | | |
| 24 | | | | | | |
| 26 | - near vertical fracture within gray micritic limestone at 24.8ft BGS<br>- beige / tan micritic limestone with sharp contact with gray limestone at 26.5ft BGS | | | 2 | 100 | 80 |
| 28 | - near vertical fracture mineralized with calcite at 26.8ft BGS<br>- 0.3-feet heavily dissolved zone, dark brown at 27.4ft BGS | | SUMP | | | |
| 30 | - 1-feet fractured zone containing 3 near vertical fractures that transition to dark shaley limestone at 27.9ft BGS<br>- near vertical fracture at 29.6ft BGS<br>END OF BOREHOLE @ 30.0ft BGS | 30.0 | | | | |
| 32 | | | | | | |
| 34 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 36 | Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 38 | Ground surface elevation of 707.62 ft. AMSL | | | | | |
| 40 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y115B
DATE COMPLETED: November 17, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | | | | | | |
| 10 | | | 4" DIA. STEEL CASING | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, calcite, gray/tan<br>- 1-foot section of broken rock, slightly oxidized at 33.4ft BGS<br>- 2-inch non-continuous opening, gray at 34.4ft BGS<br>- 2-inch near vertical non-continuous opening at 35.4ft BGS<br>- fracture at 36.5ft BGS<br>- fracture at 37.6ft BGS<br>- fracture at 39.1ft BGS | 33.0 | | 1 | 100 | 72 |
| 36 | | | | | | |
| 38 | | | 4" DIA. COREHOLE | | | |
| 40 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y115B
DATE COMPLETED: November 17, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 42 | - fracture at 41.0ft BGS | | | 2 | 95 | 100 |
| 44 | | | SUMP | | | |
| | END OF BOREHOLE @ 45.0ft BGS | 45.0 | | | | |
| 46 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 48 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers. | | | | | |
| 50 | Ground surface elevation of 707.04 ft. AMSL | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |
| 56 | | | | | | |
| 58 | | | | | | |
| 60 | | | | | | |
| 62 | | | | | | |
| 64 | | | | | | |
| 66 | | | | | | |
| 68 | | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y120A
DATE COMPLETED: May 15, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 12 | - 3 cm medium grained sand lens, reddish at 10.9ft BGS<br>LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray to tan, shaley | 11.2 | 4" DIA. STEEL CASING | | | |
| 14 | | | | | | |
| 16 | - 3.2-feet of highly weathered and oxidized, silty and clayey, thin incomplete fractures at 15.0ft BGS<br>- near vertical fracture, dissolved at 15.9ft BGS | | 4" DIA. COREHOLE | 1 | 94 | 95 |
| 18 | - parting along bedding plane at 16.3ft BGS<br>- parting along bedding plane and 0.6-feet of abundant partings at 17.0ft BGS | | SUMP | | | |
| 20 | - 0.3-feet of shallow angle fractures, dark gray shaley at 18.9ft BGS<br>- 1-inch coral fossil at 19.2ft BGS<br>END OF BOREHOLE @ 19.8ft BGS | 19.8 | | | | |
| 22 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 24 | Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 26 | Ground surface elevation of 712.71 ft. AMSL | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |
| 42 | | | | | | |
| 44 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y120B
DATE COMPLETED: November 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | | | 4" DIA. STEEL CASING | | | |
| 10 | | | CEMENT / BENTONITE GROUT | | | |
| 12 | | | | | | |
| 14 | | | | | | |
| 16 | | | | | | |
| 18 | | | | | | |
| 20 | | | | | | |
| 22 | | | | | | |
| | | 23.0 | | | | |
| 24 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, tan<br>- fracture at 23.8ft BGS<br>- 4-inch of porous rock at 24.0ft BGS<br>- fracture at 25.0ft BGS | | | | | |
| 26 | - fracture, oxidized at 26.7ft BGS<br>- fracture at 27.2ft BGS | | | | | |
| 28 | - fracture at 28.5ft BGS | | | 1 | 95 | 85 |
| 30 | - 2.5-inch void, plus 3 inches of broken rock, slightly oxidized at 29.9ft BGS<br>- fracture at 30.0ft BGS | | 4" DIA. COREHOLE | | | |
| 32 | - fracture at 31.4ft BGS<br>- 1-foot section of clay / rock, soft, tan at 32.0ft BGS | | | | | |
| 34 | - 1.5-foot section of broken rock, tan / gray at 33.4ft BGS | | | | | |
| 36 | - 3-inch section of broken rock at 35.4ft BGS<br>- 5-inch section of clay / limestone at 36.4ft BGS | | | | | |
| 38 | - 1.5-foot section of possible clay / void, no water return at 36.5ft BGS<br>- 1.5-feet of clay with little limestone at 38.6ft BGS | | | 2 | 85 | 67 |
| 40 | - fracture, gray at 40.6ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y120B
DATE COMPLETED: November 19, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 42 | - fracture at 41.3ft BGS<br>- fracture at 41.8ft BGS<br>- calcarcite, gray at 42.5ft BGS | | | | | |
| 44 | | | | | | |
| 46 | | | | 3 | 100 | 100 |
| 48 | | | SUMP | | | |
| 50 | END OF BOREHOLE @ 50.0ft BGS | 50.0 | | | | |
| 52 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 54 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers. | | | | | |
| 56 | Ground surface elevation of 712.64 ft. AMSL | | | | | |
| 58 | | | | | | |
| 60 | | | | | | |
| 62 | | | | | | |
| 64 | | | | | | |
| 66 | | | | | | |
| 68 | | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y125A
DATE COMPLETED: May 16, 2003
DRILLING METHOD: 6 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: J. MC COMBS & K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 18 | - increase silt, mottled yellow and gray at 16.5ft BGS<br>LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray and tan | 17.1 | | | | |
| 20 | | | | | | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | - 3.8-feet weathered limestone, oxidized, brown with some dissolution pits, little silty at 25.1ft BGS<br>- near 45 degree fracture, oxidized and weathered at 25.5ft BGS | | 4" DIA. COREHOLE | 1 | 98 | 78 |
| 28 | - sub-horizontal fracture, oxidized and silty at 28.4ft BGS | | | | | |
| 30 | - 2 sub-horizontal fractures, mineralized with calcite at 28.6ft BGS<br>- 0.8-feet of heavily weathered and oxidized shaley limestone, 3 horizontal shale partings, possible void at 29.4ft BGS | | | | | |
| 32 | - near vertical fracture, slightly weathered at 30.5ft BGS | 32.0 | SUMP | | | |
| 34 | - 2 sub-horizontal fractures, slightly weathered, 2-inch of thin sub-horizontal vugs mineralized by siderite at 30.8ft BGS | | | | | |
| 36 | END OF BOREHOLE @ 32.0ft BGS | | | | | |
| 38 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 40 | Overburden pilot boring advanced utilizing 6-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 42 | Ground surface elevation of 714.27 ft. AMSL | | | | | |
| 44 | | | | | | |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y125B
DATE COMPLETED: November 24, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 18 | | | CEMENT / BENTONITE GROUT | | | |
| 20 | | | | | | |
| 22 | | | | | | |
| 24 | | | | | | |
| 26 | | | | | | |
| 28 | | | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | LIMESTONE (ST. LOUIS FORMATION), fine grained, thin bedded, light gray<br>- 1-foot highly fracture rock, weathered, oxidized, clay partings, tan at 36.0ft BGS<br>- 3-inch vertical non-continuous opening, oxidized at 36.7ft BGS<br>- cherty, clay & rock, tan at 37.0ft BGS<br>- void (1.5-feet), water lost at 38.5ft BGS<br>- tan / gray at 40.0ft BGS<br>- fracture at 40.5ft BGS<br>- fracture at 40.6ft BGS<br>- gray at 41.1ft BGS<br>- fracture at 41.3ft BGS<br>- fracture at 41.9ft BGS<br>- 3-inch vertical non-continuous opening at 42.0ft BGS<br>- fracture at 42.5ft BGS<br>- fracture at 42.7ft BGS<br>- light gray at 45.0ft BGS<br>- fracture at 46.5ft BGS | 35.0 | | 1 | 69 | 50 |
| 38 | | | | | | |
| 40 | | | | | | |
| 42 | | | 4" DIA. COREHOLE | | | |
| 44 | | | | | | |
| 46 | | | SUMP | 2 | 100 | 100 |
| 48 | END OF BOREHOLE @ 47.0ft BGS<br><br>Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | 47.0 | | | | |
| 50 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X233Y125B
DATE COMPLETED: November 24, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % | |
|---|---|---|---|---|---|---|---|
| 52 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers.<br><br>Ground surface elevation of 713.30 ft. AMSL | | | | | | |
| 54 | | | | | | | |
| 56 | | | | | | | |
| 58 | | | | | | | |
| 60 | | | | | | | |
| 62 | | | | | | | |
| 64 | | | | | | | |
| 66 | | | | | | | |
| 68 | | | | | | | |
| 70 | | | | | | | |
| 72 | | | | | | | |
| 74 | | | | | | | |
| 76 | | | | | | | |
| 78 | | | | | | | |
| 80 | | | | | | | |
| 82 | | | | | | | |
| 84 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | - medium plasticity, wet at 5.0ft BGS | | 4" DIA. STEEL CASING<br>10" DIA. HOLE | | | |
| 6 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, gray micritic limestone | 668.9 | | | | |
| 8 | - horizontal fracture at 8.5ft BGS<br>- horizontal fracture with clay partings at 8.9ft BGS | | | | | |
| 10 | - horizontal fracture with clay partings at 9.1ft BGS | | | 1 | 100 | 90 |
| 12 | - horizontal fracture at 10.2ft BGS<br>- horizontal fracture at 12.5ft BGS | | | | | |
| 14 | - horizontal fracture at 12.7ft BGS<br>- horizontal fracture at 14.1ft BGS | | | | | |
| 16 | - horizontal fracture at 14.9ft BGS<br>- horizontal fracture at 15.1ft BGS<br>- horizontal fracture at 15.6ft BGS<br>- stylolite at 16.8ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 18 | LIMESTONE (SALEM FORMATION), granular, thick bedding, medium to coarse grained | 657.4 | | 2 | 100 | 100 |
| 20 | - stylolite at 18.7ft BGS<br>- stylolite at 18.9ft BGS<br>- stylolite at 19.7ft BGS<br>- horizontal fracture, stylolite at 20.7ft BGS | | | | | |
| 22 | - stylolite at 22.1ft BGS | | | | | |
| 24 | - fossils, light gray/white, granular, calcite at 22.9ft BGS | | | | | |
| 26 | | | 4" DIA. STEEL CASING | | | |
| 28 | - open stylolite at 26.8ft BGS<br>- stylolite at 27.6ft BGS | | | 3 | 100 | 100 |
| 30 | - stylolite at 28.8ft BGS<br>- open stylolite at 29.2ft BGS<br>- stylolite at 30.0ft BGS | | | | | |
| 32 | - stylolite at 32.3ft BGS | | | | | |
| 34 | - rough/granular texture at 33.3ft BGS | | | | | |
| 36 | | | | | | |
| 38 | - stylolite at 36.6ft BGS | | | 4 | 100 | 100 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 40 | | | | | | |
| | - stylolite at 41.3ft BGS | | | | | |
| 42 | - stylolite at 42.5ft BGS<br>- calcite, light gray, fine grained,occasional shell fossils at 43.0ft BGS | | | | | |
| 44 | - open stylolite at 44.1ft BGS | | | | | |
| 46 | | | | | | |
| 48 | | | | 5 | 100 | 100 |
| | - stylolite at 48.7ft BGS | | | | | |
| 50 | - stylolite at 49.6ft BGS | | | | | |
| 52 | | | | | | |
| | - stylolite at 52.7ft BGS<br>- open stylolite at 53.2ft BGS | | | | | |
| 54 | - half-inch open stylolite at 53.7ft BGS<br>- medium grained at 54.0ft BGS | | | | | |
| 56 | | | | | | |
| 58 | | | | 6 | 100 | 100 |
| 60 | | | 4" DIA. HQ COREHOLE | | | |
| 62 | - stylolite at 62.0ft BGS<br>- stylolite at 62.7ft BGS | | | | | |
| 64 | | | | | | |
| | - stylolite at 64.6ft BGS | | | | | |
| 66 | | | | | | |
| | - stylolite at 67.4ft BGS | | | 7 | 100 | 100 |
| 68 | | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |
| | - 2-inch vertical non-continuous opening at 72.3ft BGS<br>- horizontal fracture at 73.6ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 76 | - start of shale layering at 73.9ft BGS<br>- horizontal fracture at 74.3ft BGS<br>- stylolite with calcite filling at 76.4ft BGS<br>- horizontal fracture at 77.5ft BGS | | DOW PACKER | 8 | 100 | 100 |
| 78 | | | | | | |
| 80 | | | | | | |
| 82 | | | 4" DIA. HQ COREHOLE | | | |
| 84 | - horizontal fracture at 83.6ft BGS<br>LIMESTONE (UPPER HARRODSBURG FORMATION), porous, fossils (bryozoan), gray calcarenite and calcirudite | 591.2 | | | | |
| 86 | - stylolite at 85.7ft BGS<br>- stylolite at 86.7ft BGS<br>- stylolite at 87.1ft BGS | | | | | |
| 88 | - horizontal fracture at 87.8ft BGS | | SAMPLE ZONE 4 | 9 | 100 | 100 |
| 90 | - stylolite at 89.8ft BGS | | | | | |
| 92 | - stylolite at 90.8ft BGS<br>- stylolite at 91.4ft BGS<br>- stylolite at 92.0ft BGS | | DOW PACKER | | | |
| 94 | - stylolite at 93.3ft BGS<br>- stylolite at 94.0ft BGS | | | | | |
| 96 | | | | | | |
| 98 | - horizontal fracture at 97.0ft BGS | | | 10 | 100 | 100 |
| 100 | | | SAMPLE ZONE 3 | | | |
| 102 | - horizontal fracture at 102.6ft BGS<br>- stylolite at 103.0ft BGS | | | | | |
| 104 | | | DOW PACKER | | | |
| 106 | - stylolite at 105.7ft BGS<br>- horizontal fracture at 105.9ft BGS<br>- horizontal fracture at 107.2ft BGS | | | | | |
| 108 | - horizontal fracture at 108.5ft BGS | | | 11 | 100 | 100 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 110 | - 1-inch interbedded shale at 110.0ft BGS | | NON-MONITORING ZONE | | | |
| 112 | - horizontal fracture & 1-inch vertical non-continuous opening at 111.4ft BGS<br>- horizontal fracture at 112.9ft BGS | | DOW PACKER | | | |
| 114 | - light gray at 113.0ft BGS<br>- near vertical stylolite at 114.0ft BGS<br>- stylolite at 115.1ft BGS | | | | | |
| 116 | - stylolite at 116.4ft BGS<br>- 2-foot porous section at 116.7ft BGS | | | | | |
| 118 | | | | 12 | 100 | 100 |
| 120 | - horizontal fracture at 119.7ft BGS<br>- stylolite at 120.1ft BGS<br>- horizontal fracture at 120.4ft BGS | | | | | |
| 122 | - 9-inch vertical non-continuous opening at 120.7ft BGS<br>- stylolite at 122.2ft BGS | | SAMPLE ZONE 2 | | | |
| 124 | - horizontal fracture at 122.5ft BGS<br>- horizontal fracture at 124.3ft BGS | | | | | |
| 126 | - horizontal fracture at 125.5ft BGS | | DOW PACKER | | | |
| 128 | | | | 13 | 100 | 100 |
| 130 | - stylolite at 128.5ft BGS<br>- stylolite at 129.0ft BGS | | | | | |
| 132 | - stylolite at 130.9ft BGS<br>- stylolite at 131.3ft BGS | | | | | |
| 134 | LIMESTONE (LOWER HARRODSBURG FORMATION), 3-inch section of fractured rock | 541.9 | | | | |
| 136 | - horizontal fracture at 135.2ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 138 | - stylolite at 136.8ft BGS<br>- stylolite at 137.2ft BGS<br>- stylolite at 137.5ft BGS<br>- stylolite at 138.1ft BGS | | | 14 | 100 | 100 |
| 140 | - stylolite at 138.6ft BGS<br>- stylolite at 139.2ft BGS<br>- stylolite at 140.5ft BGS | | | | | |
| 142 | - stylolite at 141.5ft BGS<br>- interbedded shale at 142.5ft BGS<br>- abundance of fossils at 143.0ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 146 | - stylolite at 144.4ft BGS<br>- stylolite at 144.9ft BGS<br>- stylolite at 145.2ft BGS<br>- stylolite at 145.6ft BGS<br>- interbedded shale, dark gray at 146.0ft BGS | | | | | |
| 148 | - 3-foot section of geodes at 147.2ft BGS<br>- 1.5-inch calcite filled geode at 147.5ft BGS | | NON-MONITORING ZONE | 15 | 100 | 100 |
| 150 | - light gray at 150.0ft BGS | | | | | |
| 152 | - horizontal fracture at 152.1ft BGS | | | | | |
| 154 | - horizontal fracture at 153.3ft BGS<br>- stylolite at 153.4ft BGS<br>- stylolite at 153.9ft BGS | | | | | |
| 156 | - interbedded shale, dark gray at 155.8ft BGS<br>- 6-foot section of calcite filled geodes at 156.4ft BGS | | | | | |
| 158 | | | | 16 | 100 | 100 |
| 160 | LIMESTONE (RAMP CREEK FORMATION),very fine grained, contains small amounts of shale, even bedded | 515.4 | 4" DIA. HQ COREHOLE | | | |
| 162 | - 1-foot of layering at 162.9ft BGS | | | | | |
| 164 | - half-inch calcite vug at 164.3ft BGS | | | | | |
| 166 | | | | | | |
| 168 | - half-inch calcite vug at 167.2ft BGS<br>- half-inch calcite vug at 167.5ft BGS | | | 17 | 100 | 100 |
| 170 | - half-inch calcite vug at 169.1ft BGS<br>- 1.4 feet of layering at 169.7ft BGS | | DOW PACKER | | | |
| 172 | - horizontal fracture at 171.1ft BGS<br>- calcite vugs at 171.5ft BGS | | | | | |
| 174 | - calcite vug at 172.8ft BGS<br>- 2-inch geode at 173.0ft BGS<br>- 2-inch geode at 174.1ft BGS<br>- horizontal fracture at 174.4ft BGS | | | | | |
| 176 | - horizontal fracture at 175.9ft BGS | | | | | |
| 178 | - horizontal fracture at 177.0ft BGS | | SAMPLE ZONE 1 | 18 | 100 | 100 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157D
DATE COMPLETED: June 26, 2002
DRILLING METHOD: 10-INCH TR-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 180 | SHALE (EDWARDSVILLE FORMATION), pyrite, soft, green/gray | 494.5 | 4" DIA. HQ COREHOLE | | | |
| 182 | END OF BOREHOLE @ 182.3ft BGS | 492.6 | | | | |
| 184 | | | | | | |
| 186 | | | | | | |
| 188 | | | | | | |
| 190 | | | | | | |
| 192 | | | | | | |
| 194 | | | | | | |
| 196 | | | | | | |
| 198 | | | | | | |
| 200 | | | | | | |
| 202 | | | | | | |
| 204 | | | | | | |
| 206 | | | | | | |
| 208 | | | | | | |
| 210 | | | | | | |
| 212 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157S
DATE COMPLETED: June 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | - medium plasticity, wet at 5.0ft BGS | | 10" DIA. HOLE; 4" DIA. STEEL CASING | | | |
| 6 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, light gray, first 7-inches highly fractured, micritic limestone | 668.9 | | | | |
| 8 | - 3-inch horizontal non-continuous opening at 9.1ft BGS | | | | | |
| 10 | - horizontal fractured at 10.6ft BGS<br>- horizontal fracture at 10.8ft BGS | | | | | |
| 12 | - horizontal fracture at 11.2ft BGS<br>- horizontal fracture at 11.5ft BGS<br>- horizontal fracture at 13.1ft BGS | | | | | |
| 14 | - horizontal fracture at 13.6ft BGS<br>- horizontal fracture at 14.5ft BGS | | | 1 | 100 | 85 |
| 16 | - horizontal fracture at 15.3ft BGS | | | | | |
| 18 | - LIMESTONE (SALEM FORMATION), horizontal fracture, gradational contact, granular, thick bedding, medium to coarse grained at 17.2ft BGS | 657.7 | | | | |
| 20 | - stylolite at 19.3ft BGS | | | | | |
| 22 | - stylolite at 20.9ft BGS<br>- stylolite at 21.3ft BGS<br>- horizontal fracture at 22.1ft BGS<br>- horizontal fracture at 22.8ft BGS | | | | | |
| 24 | | | | 2 | 100 | 100 |
| 26 | - horizontal fracture at 26.6ft BGS<br>- stylolite at 26.9ft BGS | | | | | |
| 28 | | | | | | |
| 30 | - stylolite at 30.6ft BGS<br>- massive, calcite, fossils at 30.8ft BGS | | | | | |
| 32 | - stylolite at 32.4ft BGS | | | | | |
| 34 | - horizontal fracture at 33.7ft BGS<br>- horizontal fracture at 33.9ft BGS<br>- slightly porous, granular at 34.0ft BGS | | | 3 | 100 | 100 |
| 36 | - stylolite at 36.3ft BGS<br>- stylolite at 36.5ft BGS | | | | | |
| 38 | | | BENTONITE SEAL | | | |

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LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X234Y157S
DATE COMPLETED: June 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 40 | END OF BOREHOLE @ 39.4ft BGS | | | | | |
| 42 | | | | | | |
| 44 | | | | | | |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |
| 56 | | | | | | |
| 58 | | | | | | |
| 60 | | | | | | |
| 62 | | | | | | |
| 64 | | | | | | |
| 66 | | | | | | |
| 68 | | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X242Y060S
DATE COMPLETED: November 12, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 12 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, gray | 11.0 | | | | |
| 14 | - 1.5-inch vertical non-continuous opening, trace brown clay parting at 14.3ft BGS<br>- near vertical fracture at 15.0ft BGS | | | | | |
| 16 | - near vertical fracture, brown clay parting at 16.2ft BGS | | | 1 | 100 | 100 |
| 18 | - near vertical fracture, brown clay parting at 17.0ft BGS | | | | | |
| 20 | | | 4" DIA. COREHOLE | | | |
| 22 | - 0.5-inch clay parting, near vertical at 21.5ft BGS<br>- near vertical fracture at 22.2ft BGS | | | | | |
| 24 | - near vertical fracture at 24.8ft BGS | | | 2 | 100 | 90 |
| 26 | - fracture, clay parting at 26.6ft BGS | | | | | |
| 28 | - 1-foot sections of 2 to 3 inch fractures at 27.8ft BGS | | | | | |
| 30 | | | | | | |
| 32 | - fracture at 31.3ft BGS<br>- fracture, water lost (approx. 2 to 3 gpm) at 31.7ft BGS | | | | | |
| 34 | - stylolite at 33.8ft BGS<br>- open stylolite at 34.3ft BGS<br>- stylolite at 35.0ft BGS | 34.8 | | 3 | 100 | 100 |
| 36 | LIMESTONE (SALEM FORMATION), medium to coarse grained, fossils, gray/tan | | | | | |
| 38 | | | SUMP | | | |
| 40 | END OF BOREHOLE @ 40.0ft BGS | 40.0 | | | | |
| 42 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 44 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X242Y060S
DATE COMPLETED: November 12, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE WELL | RUN NUMBER | CORE RECOVERY % | RQD % | |
|---|---|---|---|---|---|---|---|
| 46 | Ground surface elevation of 682.51 ft. AMSL | | | | | | |
| 48 | | | | | | | |
| 50 | | | | | | | |
| 52 | | | | | | | |
| 54 | | | | | | | |
| 56 | | | | | | | |
| 58 | | | | | | | |
| 60 | | | | | | | |
| 62 | | | | | | | |
| 64 | | | | | | | |
| 66 | | | | | | | |
| 68 | | | | | | | |
| 70 | | | | | | | |
| 72 | | | | | | | |
| 74 | | | | | | | |
| 76 | | | | | | | |
| 78 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 666.2<br>663.5 | | | | |
| 0 | GW-GRAVEL (FILL), some well graded sands, medium to coarse gravel, well graded, gray, dry | 662.6 | 10" DIA. STEEL CASING | | | |
| 2 | CL-CLAY, some silt, firm, low plasticity, strong brown, moist | 661.0 | | | | |
| 4 | LIMESTONE (ST. LOUIS FORMATION), thin bedded, fine grained, micritic, gray, trace calcite | | | | | |
| 6 | | | | | | |
| 8 | | | | | | |
| 10 | - horizontal fracture at 8.7ft BGS<br>- horizontal fracture at 9.2ft BGS<br>- horizontal fracture at 10.6ft BGS<br>- horizontal fracture, mud parting at 11.1ft BGS | | | 1 | 100 | 81 |
| 12 | - horizontal fracture at 11.6ft BGS<br>- horizontal fracture, mud parting at 13.0ft BGS | | | | | |
| 14 | | | | | | |
| 16 | - horizontal fracture, black shale parting at 16.6ft BGS | | 4" HQ COREHOLE | | | |
| 18 | - horizontal fracture, mud parting at 18.0ft BGS<br>- horizontal fracture at 18.8ft BGS | | | 2 | 100 | 95 |
| 20 | - horizontal fracture at 19.0ft BGS | | SAMPLE ZONE 7 | | | |
| 22 | - horizontal fracture at 21.7ft BGS<br>- 3-inch section of vugs with silt fillings at 22.7ft BGS | 641.1 | DOW PACKER | | | |
| 24 | LIMESTONE (SALEM FORMATION), gradational contact, beige, medium grained, calcarenite<br>- 2 feet of blue/gray in color at 23.2ft BGS | | | | | |
| 26 | - stylolite at 23.7ft BGS<br>- stylolite at 27.0ft BGS | | | | | |
| 28 | - stylolite, blue/gray for 1 foot at 28.5ft BGS | | | 3 | 100 | 100 |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
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DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 36 | | | | | | |
| | - stylolite at 37.2ft BGS | | | | | |
| 38 | | | NON-MONITORING ZONE | 4 | 100 | 100 |
| 40 | | | | | | |
| | - stylolite at 41.5ft BGS | | | | | |
| 42 | | | | | | |
| 44 | - stylolite at 44.3ft BGS | | | | | |
| 46 | | | | | | |
| 48 | - 5 feet of thin bedded blue/gray, fine grained at 48.0ft BGS | | | 5 | 100 | 100 |
| 50 | - 2-inch horizontal non-continuous opening at 50.5ft BGS | | 4" HQ COREHOLE | | | |
| 52 | | | | | | |
| 54 | - approximate half-inch horizontal non-continuous opening at 54.2ft BGS | | DOW PACKER | | | |
| 56 | | | | | | |
| 58 | - 3-inch section of shale with fractures at 57.9ft BGS | | | 6 | 100 | 100 |
| 60 | - 2-foot section of open vugs at 60.0ft BGS | | | | | |
| 62 | - thin horizontal fractures at 62.0ft BGS | | SAMPLE ZONE 6 | | | |
| 64 | | | DOW PACKER | | | |
| | - stylolite at 65.0ft BGS | | | | | |
| 66 | | | NON-MONITORING ZONE | | | |
| 68 | | | | 7 | 100 | 100 |
| | - thin horizontal fracture at 68.8ft BGS | | DOW PACKER | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 72 | | | | | | |
| 74 | | | | | | |
| 76 | LIMESTONE (UPPER HARRODSBURG FORMATION), porous throughout, abundance of fossils (well cemented bioclastic), light gray to bluish gray, calcite | 587.6 | | | | |
| 78 | - stylolite at 76.3ft BGS<br>- thin horizontal fracture at 77.8ft BGS | | SAMPLE ZONE 5 | 8 | 100 | 100 |
| 80 | | | | | | |
| 82 | - thin horizontal fracture at 81.4ft BGS<br>- stylolite at 81.7ft BGS | | DOW PACKER | | | |
| 84 | - stylolite at 83.4ft BGS | | | | | |
| 86 | - 2-inch horizontal non-continuous opening at 85.7ft BGS | | 4" HQ COREHOLE | | | |
| 88 | | | SAMPLE ZONE 4 | 9 | 100 | 100 |
| 90 | - 1-inch horizontal non-continuous opening at 89.7ft BGS | | | | | |
| 92 | | | DOW PACKER | | | |
| 94 | - stylolite at 93.5ft BGS<br>- stylolite at 94.9ft BGS | | SAMPLE ZONE 3 | | | |
| 96 | - thin horizontal fracture at 96.3ft BGS | | | | | |
| 98 | - stylolite at 97.5ft BGS<br>- 5 feet of rock white in color at 98.0ft BGS | | DOW PACKER | 10 | 100 | 100 |
| 100 | - stylolite at 99.5ft BGS | | | | | |
| 102 | | | DOW PACKER | | | |
| 104 | - thin horizontal fracture at 102.7ft BGS<br>- less fossils present at 103.0ft BGS<br>- thin horizontal fracture at 104.4ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



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DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 106 | - thin horizontal fracture at 105.9ft BGS | | | | | |
| 108 | - highly fossiliferous (shells, calcite), vugs at 108.0ft BGS<br>- thin horizontal fracture at 108.3ft BGS | | SAMPLE ZONE 2 | 11 | 100 | 100 |
| 110 | - 2-inch section of highly horizontal fractures at 108.9ft BGS<br>- horizontal fracture at 110.0ft BGS | | DOW PACKER | | | |
| 112 | - stylolite at 110.9ft BGS<br>- less fossils present at 111.0ft BGS | | | | | |
| 114 | | | | | | |
| 116 | | | | | | |
| 118 | - 4-inch vertical stylolite at 118.0ft BGS<br>- 4-inch shale bed at 118.5ft BGS | | | 12 | 100 | 100 |
| 120 | - 1-inch horizontal non-continuous opening at 119.4ft BGS | | 4" HQ COREHOLE | | | |
| 122 | - thin horizontal fracture, shale at 121.0ft BGS<br>- vugs at 122.2ft BGS<br>- thin horizontal fracture, shale at 122.6ft BGS | | | | | |
| 124 | - thin horizontal fracture at 123.6ft BGS<br>- horizontal fracture at 124.5ft BGS<br>- horizontal fracture at 124.8ft BGS | | | 13 | 100 | 100 |
| 126 | - 1-inch horizontal non-continuous opening at 125.7ft BGS<br>- horizontal shale fracture at 126.1ft BGS | | | | | |
| 128 | - stylolite at 127.5ft BGS | | | | | |
| | | 534.5 | | | | |
| 130 | LIMESTONE (LOWER HARRODSBURG FORMATION)<br>- stylolite at 129.5ft BGS | | | | | |
| 132 | - 1.5 foot section of interbedded shale at 130.5ft BGS<br>- stylolite at 131.6ft BGS<br>- half-inch geode at 132.5ft BGS | | | | | |
| 134 | - 5 feet of interbedded shale at 133.9ft BGS<br>- horizontal fracture at 134.7ft BGS | | | | | |
| 136 | - horizontal fracture at 136.1ft BGS | | | | | |
| 138 | - half-inch horizontal non-continuous opening at 137.1ft BGS<br>- thin horizontal fracture along the stylolite at 138.8ft BGS | | | 14 | 100 | 100 |

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# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



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PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 142 | - stylolite at 139.8ft BGS<br>- stylolite at 141.4ft BGS<br>- stylolite, horizontal fracture at 142.8ft BGS | | NON-MONITORING ZONE | | | |
| 144 | - gray in color, stylolite at 144.3ft BGS<br>- stylolite at 145.4ft BGS | | | | | |
| 146 | - 1-inch shale bed at 146.2ft BGS | | | | | |
| 148 | - 4-inch section of geodes with calcite fillings at 148.6ft BGS | | | 15 | 100 | 100 |
| 150 | - thin horizontal fracture at 150.6ft BGS<br>- thin horizontal fracture at 151.4ft BGS | | | | | |
| 152 | - stylolite at 152.1ft BGS<br>- thin horizontal fracture along the stylolite at 152.8ft BGS | | | | | |
| 154 | - horizontal fracture at 155.0ft BGS<br>- horizontal fracture at 155.5ft BGS | | 4" HQ COREHOLE | | | |
| 156 | | | | | | |
| 158 | - 3.2-foot section of geodes with calcite fillings at 158.0ft BGS | | | 16 | 100 | 100 |
| 160 | LIMESTONE (RAMP CREEK FORMATION), very fine grained, contains small amounts of shale, even bedded | 503.6 | | | | |
| 162 | | | | | | |
| 164 | - 3-foot section of interbedded shale at 163.5ft BGS | | | | | |
| 166 | SHALE, light blue/gray | 497.0 | | | | |
| 168 | LIMESTONE, medium grained, interbedded shale | 495.2 | | 17 | 100 | 100 |
| 170 | - occasional geodes/vugs with calcite fillings at 170.3ft BGS<br>- 1-inch vugs with calcite fillings at 171.2ft BGS | | | | | |
| 172 | - 3 feet section of interbedded layers of very small shells at 171.5ft BGS | | DOW PACKER | | | |
| 174 | | | | | | |

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# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
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LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X251Y189D
DATE COMPLETED: March 18, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 176 | | | | | | |
| 178 | | | 4" HQ COREHOLE | 18 | 100 | 100 |
| 180 | | | SAMPLE ZONE 1 | | | |
| | SHALE ( EDWARDSVILLE FORMATION ), soft, light blue/gray, with occasional green discoloration | 483.1 | | | | |
| 182 | | | | | | |
| | END OF BOREHOLE @ 183.5ft BGS | 480.0 | | | | |
| 184 | | | | | | |
| 186 | | | | | | |
| 188 | | | | | | |
| 190 | | | | | | |
| 192 | | | | | | |
| 194 | | | | | | |
| 196 | | | | | | |
| 198 | | | | | | |
| 200 | | | | | | |
| 202 | | | | | | |
| 204 | | | | | | |
| 206 | | | | | | |
| 208 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: TMW-X193Y251
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 689.7<br>685.5 | | | | | |
| | SAME STRATIGRAPHY AS B-X193Y251 | | BENTONITE CHIPS | | | | |
| | | | SAND PACK<br>WELL SCREEN | | | | |
| | END OF BOREHOLE @ 31.0ft BGS | 654.5 | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

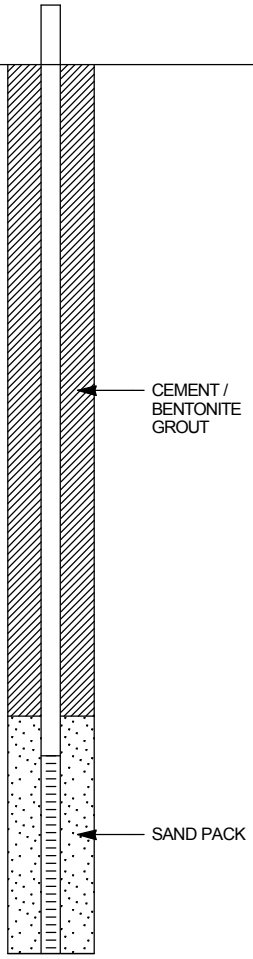


PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: TMW-X225Y080
DATE COMPLETED: August 8, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: J. NICHOLS

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL |
|---|---|---|
| | TOP OF RISER | 686.7 |
| | GROUND SURFACE | 684.3 |
| 0 | SW-SAND (FILL), loose sand and gravel, well graded | |
| 2 | | 682.3 |
| | CL-CLAY (FILL), trace gravel, little silt, dense, medium plasticity, strong brown (7.5YR 4/6), moist | |
| 4 | | |
| 6 | | |
| | | 677.3 |
| 8 | SW-SAND (FILL), trace gravel, trace clay, loose,well graded | |
| 10 | | |
| 12 | | 672.3 |
| | CL-CLAY, trace silt, dense, low plastic, reddish brown (7.5YR 5/6), moist to wet | |
| 14 | - wet at 14.0ft BGS | |
| 16 | | |
| 18 | | |
| 20 | | |
| 22 | | 661.8 |
| | END OF BOREHOLE @ 22.5ft BGS | |
| 24 | | |
| 26 | | |
| 28 | | |
| 30 | | |
| 32 | | |
| 34 | | |

MONITORING WELL




WELL DETAILS
Screened interval:
666.8 to 661.8ft AMSL
17.5 to 22.5ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Material: PVC
Seal:
667.8 to 684.3ft AMSL
16.5 to 0.0ft BGS
Material: Bentonite Seal
Sand Pack:
661.8 to 667.8ft AMSL
22.5 to 16.5ft BGS
Material: Silica Sand

| SAMPLE NUMBER | INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|
| 1 | | 2.0 | 9 | <1 |
| 2 | | 2.0 | 9 | <1 |
| 3 | | 2.0 | 38 | <1 |
| 4 | | 2.0 | 16 | <1 |
| 5 | | 2.0 | 25 | <1 |
| 6 | | 2.0 | 24 | <1 |
| 7 | | 2.0 | 11 | <1 |
| 8 | | 2.0 | 8 | <1 |
| 9 | | 2.0 | 16 | <1 |
| 10 | | 2.0 | 12 | <1 |
| 11 | | 2.0 | 10 | <1 |
| 12 | | 0.5 | 18 | <1 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X148Y233
DATE COMPLETED: February 22, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 695.6 | | | | | | |
| 0 | SW-GW SAND AND GRAVEL (FILL), rock fragments, compact, medium to coarse grained, well graded | | | 1 | | 2.0 | 25 | 0 |
| 2 | CL-CLAY, little silt, very stiff, low to medium plasticity, 10YR 4/8 (red), iron staining, moist | 693.6 | | 2 | | 2.0 | 22 | 0 |
| 4 | | | | 3 | | 2.0 | 23 | 0 |
| 6 | - 2.5YR 4/8 (red) at 6.0ft BGS | | | 4 | | 2.0 | 24 | 0 |
| 8 | | | BENTONITE GROUT | 5 | | 2.0 | 28 | 0 |
| 10 | | | | 6 | | 2.0 | 22 | 0 |
| 12 | ML-SILT, trace clay, compact, 2.5YR 6/2 (pale red), very moist to wet | 684.6 | | 7 | | 2.0 | 10 | 0 |
| 14 | CL-CLAY, little silt, firm, medium plasticity, 5YR 5/8 (yellowish red), moist | 683.1 | | 8 | | 1.0 | >50 | 0 |
| 16 | BEDROCK, refusal | 681.1 | | | | | | |
| 18 | END OF BOREHOLE @ 15.0ft BGS | 680.6 | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X158Y207
DATE COMPLETED: March 6, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 696.5 | | | | | | |
| 0 | TOPSOIL | 696.3 | | | | | | |
| | CL-CLAY (FILL), trace silt, stiff, 7.5YR 5/8 (strong brown), moist | | | 1 | P/S | 3.0 | | 0 |
| 6 | - some silt, 2.5Y 3/2 (very dark grayish brown) at 6.0ft BGS | | | 2 | P/S | 3.0 | | 0 |
| 10 | | | | 3 | P/S | 2.5 | | 0 |
| 12 | | | BENTONITE CHIPS | | | | | |
| 14 | | | | 4 | P/S | 3.0 | | 0 |
| | - stiff at 15.0ft BGS | | | | | | | |
| 18 | | | | 5 | P/S | 2.5 | | 0 |
| 22 | - 7.5YR 5/8 (strong brown) at 22.0ft BGS | | | 6 | P/S | 4.0 | | 0 |
| 24 | - refusal at 24.0ft BGS | 672.5 | | | | | | |
| | END OF BOREHOLE @ 24.0ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X169Y248
DATE COMPLETED: February 21, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.9 | | | | | | |
| 0 | SW-GW SAND AND GRAVEL (FILL), little silt, dense, fine to coarse grained, well graded, grey, moist, rock fragments | 689.4 | | 1 | | 2.0 | 44 | 0 |
| 2 | CL-CLAY (FILL), little silt, trace gravel, very stiff, low to medium plasticity, 5YR 4/6 (yellowish red), moist | 686.9 | | 2 | | 2.0 | 19 | 0 |
| 4 | wood fragments | 686.4 | | 3 | | 2.0 | 22 | 0 |
| 6 | SP-SAND (FILL), little gravel, trace silt, compact, fine grained, poorly graded, grey/black, moist, (foundry sand)<br>- black/light grey, reddish brown/yellow and light blue, faint odor, loose at 6.0ft BGS | | | 4 | | 2.0 | 32 | 0 |
| 8 | | | | 5 | | 2.0 | 6 | 0 |
| 10 | | | | 6 | | 2.0 | 6 | 0 |
| 12 | | | BENTONITE GROUT | 7 | | 2.0 | 4 | 0.9 |
| 14 | | | | 8 | | 2.0 | 4 | 1.3 |
| 16 | | | | 9 | | 2.0 | 10 | 0 |
| 18 | | | | 10 | | 2.0 | 8 | 0 |
| 20 | CL-CLAY, little silt, rootlets, firm, low to medium plasticity, brown with some black staining, very moist | 670.9 | | 11 | | 2.0 | 8 | 0 |
| 22 | - yellowish red at 22.0ft BGS | | | 12 | | 2.0 | 11 | 0 |
| 24 | BEDROCK | 666.4 | | 13 | | 1.0 | >50 | 0 |
| | END OF BOREHOLE @ 25.0ft BGS | 665.9 | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X170Y211
DATE COMPLETED: February 6, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 692.5 | | | | | | |
| 0 | TOPSOIL | 692.3 | | | | | | |
| | CL-CLAY, trace silt, soft, low plasticity, 5YR 5/8 (yellowish red), moist | | | 1 | P/S | 3.0 | | <1 |
| 6 | - 2.5YR 5/4 (light olive brown) at 6.0ft BGS | | | 2 | P/S | 3.5 | | <1 |
| 10 | | | | 3 | P/S | 3.0 | | <1 |
| 14 | | | BENTONITE CHIPS | 4 | P/S | 3.5 | | 0 |
| 18 | | | | 5 | P/S | 2.5 | | 0 |
| 22 | | | | 6 | P/S | 4.0 | | 0 |
| 24 | - hard, 7.5YR 5/8 (strong brown) at 23.5ft BGS | | | | | | | |
| 26 | | | | 7 | P/S | 4.0 | | 0 |
| 28 | - refusal at 28.0ft BGS | 664.5 | | | | | | |
| | END OF BOREHOLE @ 28.0ft BGS | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X176Y179
DATE COMPLETED: February 22, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL |
|---|---|---|
| | GROUND SURFACE | 719.1 |
| 0 | ASPHALT | 718.7 |
| | SP-SAND (FILL), fine grained, poorly graded, dark reddish brown (5YR 3/3), moist | |
| 4 | CL-CLAY, trace silt, trace sand, low plasticity, stiff, dark reddish brown (5YR 25/2), moist | 715.6 |
| 16 | - very stiff, red (2.5YR 4/8) at 15.5ft BGS | |
| 26 | - refusal at 26.0ft BGS | 693.1 |
| | END OF BOREHOLE @ 26.0ft BGS | |

BOREHOLE: ASPHALT; BENTONITE CHIPS

| SAMPLE NUMBER | INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|
| 1 | SPT/SS | 2.0 | | 0 |
| 2 | SPT/SS | 2.0 | | <1 |
| 3 | SPT/SS | 2.0 | | <1 |
| 4 | SPT/SS | 2.0 | | 0 |
| 5 | SPT/SS | 2.0 | | 0 |
| 6 | SPT/SS | 2.0 | | 0 |
| 7 | SPT/SS | 2.0 | | 0 |
| 8 | SPT/SS | 2.0 | | 0 |
| 9 | SPT/SS | 2.0 | | 0 |
| 10 | SPT/SS | 2.0 | | 0 |
| 11 | SPT/SS | 2.0 | | 0 |
| 12 | SPT/SS | 2.0 | | 0 |
| 13 | SPT/SS | 2.0 | | 0 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X176Y187
DATE COMPLETED: February 21, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 716.7 | | | | | | |
| 0 | TOPSOIL | 716.4 | | | | | | |
| | CL-CLAY (FILL), trace silt, low plasticity, soft, strong brown (7.5YR 5/8), moist | | | 1 | SPT/S | 2.0 | | 0 |
| 2 | SP-SAND (FILL), fine grained, poorly graded, dark reddish brown (5YR 3/3) | 714.7 | | 2 | SPT/S | 2.0 | | 0 |
| 4 | | | | 3 | SPT/S | 2.0 | | <1 |
| 6 | - trace gravel at 6.5ft BGS | | | 4 | SPT/S | 2.0 | | 0 |
| 8 | | | | 5 | SPT/S | 2.0 | | 1 |
| 10 | CL-CLAY, trace silt, soft, low plasticity, olive brown (2.5YR 4/6), moist | 707.2 | | 6 | SPT/S | 2.0 | | <1 |
| 12 | | | | 7 | SPT/S | 2.0 | | 0 |
| 14 | | | | 8 | SPT/S | 2.0 | | 0 |
| 16 | - very stiff, red (2.5YR 4/6) at 15.5ft BGS | | | 9 | SPT/S | 2.0 | | 0 |
| 18 | | | | 10 | SPT/S | 2.0 | | 0 |
| 20 | | | BENTONITE CHIPS | 11 | SPT/S | 2.0 | | 0 |
| 22 | | | | 12 | SPT/S | 2.0 | | 0 |
| 24 | | | | 13 | SPT/S | 2.0 | | 0 |
| 26 | - yellowish red (5YR 6/6) at 25.0ft BGS | | | 14 | SPT/S | 2.0 | | 0 |
| 28 | | | | 15 | SPT/S | 2.0 | | 0 |
| 30 | | | | 16 | SPT/S | 2.0 | | 0 |
| 32 | | | | 17 | SPT/S | 2.0 | | 0 |
| 34 | | | | | SPT/S | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X176Y187
DATE COMPLETED: February 21, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| 36 | | | | 18 | P/S | 2.0 | | 0 |
| 38 | - refusal at 38.0ft BGS | 678.7 | | 19 | P/S | 2.0 | | 0 |
| | END OF BOREHOLE @ 38.0ft BGS | | | | | | | |
| 40 | | | | | | | | |
| 42 | | | | | | | | |
| 44 | | | | | | | | |
| 46 | | | | | | | | |
| 48 | | | | | | | | |
| 50 | | | | | | | | |
| 52 | | | | | | | | |
| 54 | | | | | | | | |
| 56 | | | | | | | | |
| 58 | | | | | | | | |
| 60 | | | | | | | | |
| 62 | | | | | | | | |
| 64 | | | | | | | | |
| 66 | | | | | | | | |
| 68 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (19)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS |
|---|---|---|
| 0 | TOPSOIL | 0.3 |
| | CL-CLAY (FILL), trace silt, soft, yellowish red (5 YR 4/6), moist | 2.0 |
| 2 | SP-SAND (FILL), fine grained, poorly graded, loose, dark reddish brown (5 YR 4/4), moist | |
| 4 | - reddish brown (5 YR 4/4) at 5.0ft BGS | |
| 6 | | |
| 8 | | |
| 10 | SC-SANDY CLAY (FILL), soft, brown (7.5 YR 4/4), moist | 10.0 |
| | Gravel layer (FILL) | 11.0 |
| 12 | SP-SAND (FILL), fine grained, poorly graded, loose, very dark brown (7.5 YR 2.5/2), moist, yellow & orange layers | 12.2 |
| 14 | | |
| 16 | | |
| 18 | - black (7.5 YR 2.5/1), no odor and colors present at 18.5ft BGS | |
| 20 | CL-CLAY, trace silt and sand, soft, low plasticity, dark grayish brown (2.5 Y 3/2), moist, black stains, odor | 20.0 |
| 22 | - no black stains present at 21.0ft BGS<br>- no silt and sand, dark yellowish brown (10 YR 3/6), stiff at 21.5ft BGS | |
| 24 | - very stiff, rock chips at 23.0ft BGS<br>- bedrock at 24.5ft BGS | |
| | END OF OVERBURDEN HOLE @ 25.0ft BGS | |
| 26 | | |
| 28 | | |
| 30 | | |
| 32 | | |
| 34 | | |

ANGLE BORING

CEMENT / BENTONITE GROUT
4" DIA. STEEL CASING
CEMENT / BENTONITE SEAL

| SAMPLE NUMBER | INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|
| 1 | SPT | 1.5 | | 0.4 |
| 2 | SPT | 0.9 | | 0.2 |
| 3 | SPT | 0.5 | | 0.2 |
| 4 | SPT | 1.5 | | 0.2 |
| 5 | SPT | 0.9 | | 0.3 |
| 6 | SPT | 0.9 | | 0.5 |
| 7 | SPT | 1.5 | | 0.2 |
| 8 | SPT | 1.7 | | 0.8 |
| 9 | SPT | 1.7 | | 2.4 |
| 10 | SPT | 1.8 | | 4.0 |
| 11 | SPT | 2.0 | | 0.4 |
| 12 | SPT | 1.7 | | 0.2 |
| 13 | SPT | 1.0 | | 0.5 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X185Y195
DATE COMPLETED: March 15, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 693.8 | | | | | | |
| 0 | Topsoil | 693.5 | | | | | | |
| | CL - CLAY, trace silt to gravel, soft, medium plasticity, strong brown (7.5YR 5/8), moist | | | 1 | P/S | 2.0 | | <1 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| 4 | - yellowish red (5YR 4/6), hard, no trace gravel at 4.0ft BGS | | | 3 | P/S | 2.0 | | 0 |
| 6 | - olive (5Y 5/6), some silt, stiff at 7.0ft BGS | | BENTONITE CHIPS | 4 | P/S | 2.0 | | 0 |
| 8 | - yellowish red (5YR 4/6), very stiff at 8.5ft BGS | | | 5 | P/S | 2.0 | | 0 |
| 10 | | | | 6 | P/S | 2.0 | | 0 |
| 12 | | 681.3 | | 7 | P/S | 1.0 | | |
| | Weathered rock | 680.8 | | | | | | |
| 14 | - refusal at 13.0ft BGS<br>END OF BOREHOLE @ 13.0ft BGS | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X187Y217
DATE COMPLETED: March 6, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 689.1 | | | | | | |
| 0 | TOPSOIL | 688.9 | | | | | | |
| | CL-CLAY, trace silt, stiff, low plasticity, strong brown, (7.5YR 5/8) | | BENTONITE CHIPS | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | | | | 4 | P/S | 2.0 | | 0 |
| 8 | - refusal, weathered rock at 8.0ft BGS | 681.1 | | | | | | |
| | END OF BOREHOLE @ 8.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (P/S)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X192Y234
DATE COMPLETED: March 5, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 688.6 | | | | | | |
| 0 | TOPSOIL | 688.4 | | | | | | |
| | CL-CLAY (FILL), trace silt, stiff, low plasticity, 5YR 5/8 (yellowish red), moist | | | 1 | 4P/S | 2.0 | | 0 |
| 2 | | | | 2 | 4P/S | 2.0 | | 0 |
| 4 | SP-SAND (FILL), trace gravel, loose, fine grained, poorly graded, 5Y 3/2 (dark olive gray), moist | 684.1 | | 3 | 4P/S | 2.0 | | <1 |
| 6 | | | | 4 | 4P/S | 2.0 | | <1 |
| 8 | - no gravel at 9.0ft BGS | | | 5 | 4P/S | 2.0 | | 1.5 |
| 10 | - GLEY2 7/5PB (light bluish gray) at 10.0ft BGS | | BENTONITE CHIPS | 6 | 4P/S | 2.0 | | 1.2 |
| 12 | - 10YR 7/2 (pale brown) at 12.0ft BGS | | | 7 | 4P/S | 2.0 | | 1.4 |
| 14 | | | | 8 | 4P/S | 2.0 | | <1 |
| 16 | - 5Y 3/2 (dark olive gray) at 17.0ft BGS | | | 9 | 4P/S | 2.0 | | <1 |
| 18 | | | | 10 | 4P/S | 2.0 | | <1 |
| 20 | CL-CLAY, trace silt, low plasticity, 7.5YR 5/8 (strong brown), moist | 668.6 | | | | | | |
| 22 | - rock fragments, refusal at 22.0ft BGS | 666.6 | | 11 | 4P/S | 2.0 | | <1 |
| | END OF BOREHOLE @ 22.0ft BGS | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y172
DATE COMPLETED: March 18, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 716.1 | | | | | | |
| 0 | Topsoil | 715.9 | | 1 | | 2.0 | | 0 |
| 2 | CL - CLAY (FILL), trace silt, soft, medium plasticity, dark yellowish brown (10YR 4/4), moist | | | 2 | P/S | 2.0 | | <1 |
| 4 | - stiff, yellowish red (5YR 4/6) at 3.5ft BGS | | | 3 | P/S | 2.0 | | 0 |
| 6 | - trace gravel at 5.0ft BGS | | | 4 | P/S | 2.0 | | <1 |
| 8 | SP - SAND (FILL), loose, fine grained, poorly graded, very dark brown (7.5YR 25/2), moist | 709.1 | | 5 | P/S | 2.0 | | <1 |
| 10 | | | | 6 | P/S | 2.0 | | <1 |
| 12 | | | | 7 | P/S | 2.0 | | <1 |
| 14 | | | | 8 | P/S | 2.0 | | <1 |
| 16 | | | BENTONITE CHIPS | 9 | P/S | 2.0 | | <1 |
| 18 | | | | 10 | P/S | 2.0 | | <1 |
| 20 | | | | 11 | P/S | 2.0 | | 0 |
| 22 | | | | 12 | P/S | 2.0 | | 0 |
| 24 | | | | 13 | P/S | 2.0 | | 0 |
| 26 | CL - CLAY, trace silt, soft, low plasticity, ligh olive brown (2.5YR 5/4), moist, trace black stain | 691.1 | | 14 | P/S | 2.0 | | 0 |
| 28 | - stiff, yellowish brown (10YR 5/6), no staining at 27.0ft BGS | | | 15 | P/S | 2.0 | | 0 |
| 30 | | | | 16 | P/S | 2.0 | | 0 |
| 32 | | | | 17 | P/S | 1.5 | | 0 |
| 34 | Weathered rock<br>- refusal at 33.5ft BGS<br>END OF BOREHOLE @ 33.5ft BGS | 683.1<br>682.6 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACROR: RDNP

HOLE DESIGNATION: B-X193Y194
DATE COMPLETED: February 21, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 682.9 | | | | | |
| 0 | TOPSOIL | 682.5 | | | | | |
| | CL-CLAY, trace silt, low plasticity, soft, light olive brown (2.5YR 5/4), moist | | | 1 | P/S | 2.0 | |
| 2 | | | | 2 | P/S | 2.0 | |
| 4 | | | BENTONITE CHIPS | 3 | P/S | 2.0 | |
| 6 | - very stiff, yellowish red (5YR 4/6) at 6.0ft BGS | | | 4 | P/S | 1.0 | |
| | - refusal at 7.0ft BGS | 675.9 | | | | | |
| 8 | END OF BOREHOLE @ 7.0ft BGS | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y251
DATE COMPLETED: March 4, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 685.4 | | | | | | |
| 0 | TOPSOIL | 685.2 | | | | | | |
| | CL-CLAY (FILL), trace silt, stiff, yellowish brown (10YR 5/6), moist | | | 1 | 4P/S4 | 2.0 | | 0 |
| 2 | | | | 2 | 4P/S4 | 2.0 | | 0 |
| | SP-SAND (FILL), trace gravel, loose, fine grained, poorly graded, olive brown (2.5Y 4/4), moist | 682.4 | | | | | | |
| 4 | - trace gravel at 5.0ft BGS | | | 3 | 4P/S4 | 2.0 | | <1 |
| 6 | - black (GLEY1 2.5/N) at 6.0ft BGS | | | 4 | 4P/S4 | 2.0 | | <1 |
| 8 | | | | 5 | 4P/S4 | 2.0 | | <1 |
| 10 | | | | 6 | 4P/S4 | 2.0 | | <1 |
| 12 | | | | 7 | 4P/S4 | 2.0 | | <1 |
| 14 | | | | 8 | 4P/S4 | 2.0 | | <1 |
| 16 | | | BENTONITE CHIPS | 9 | 4P/S4 | 2.0 | | <1 |
| 18 | | | | 10 | 4P/S4 | 2.0 | | <1 |
| 20 | | | | 11 | 4P/S4 | 2.0 | | <1 |
| 22 | | | | 12 | 4P/S4 | 2.0 | | <1 |
| 24 | | | | 13 | 4P/S4 | 2.0 | | 0 |
| 26 | | | | 14 | 4P/S4 | 2.0 | | 0 |
| 28 | - becomes wet, heaving sands at 28.0ft BGS | | | 15 | 4P/S4 | 2.0 | | 0 |
| 30 | | | | 16 | 4P/S4 | 2.0 | | 0 |
| 32 | | | | 17 | 4P/S4 | 1.0 | | 0 |
| 34 | - dark greenish gray (GLEY1 4/5GY) at 33.5ft BGS<br>- Refusal at 34.0ft BGS | 651.4 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y251
DATE COMPLETED: March 4, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | END OF BOREHOLE @ 34.0ft BGS | | | | | | | |

36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X209Y177
DATE COMPLETED: March 14, 2002
DRILLING METHOD: 4 1/4-inch HSA
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 681.9 | | | | | | |
| 0 | Topsoil | 681.6 | | | | | | |
| | CL - CLAY, trace silt, soft, low plasticity, strong brown (7.5YR 5/8), moist | | BENTONITE CHIPS | 1 | | 1.3 | 4 | 0 |
| 2 | | | | 2 | | 1.0 | 25 | 0 |
| 4 | Rock fragments | 677.9 | | 3 | | 0.5 | 25 | 0 |
| | - refusal at 4.5ft BGS | 677.4 | | | | | | |
| 6 | END OF BOREHOLE @ 4.5ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X219Y249
DATE COMPLETED: February 26, 2002
DRILLING METHOD: 4 1/4-inch HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 679.6 | | | | | | |
| 0 | TOPSOIL | 679.4 | | | | | | |
| | CL-CLAY (FILL), little to some silt, little gravel, stiff, low plasticity, brown, moist | | | 1 | | 2.0 | 9 | 0 |
| 2 | | | | 2 | | 2.0 | 22 | 0 |
| | GW-GRAVEL (FILL), some sand, compact, medium to coarse grained, well graded, gray, moist | 676.6 | | | | | | |
| 4 | | 675.6 | | 3 | | 2.0 | 14 | 0 |
| | CL-CLAY (FILL), some silt, stiff, medium plasticity, brown, moist | | | | | | | |
| 6 | | 673.6 | | 4 | | 2.0 | 32 | 0 |
| | SP-SAND (FILL), some silt, trace gravel, compact, fine grained, poorly graded, black, wet, bits of wood and plastic | | | | | | | |
| 8 | - trace to little clay, dense, moist at 8.0ft BGS | | | 5 | | 2.0 | 25 | 0 |
| 10 | | | | 6 | | 2.0 | 44 | 0 |
| | - bricks, rock fragments at 11.0ft BGS | | CEMENT / BENTONITE GROUT | | | | | |
| 12 | | | | 7 | | 2.0 | 47 | 0 |
| 14 | | | | 8 | | 2.0 | 42 | 0 |
| | - rock fragments, bits of metal at 15.0ft BGS | | | | | | | |
| 16 | | | | 9 | | 2.0 | 27 | 0 |
| 18 | - compact at 18.0ft BGS | | | 10 | | 2.0 | 13 | 0 |
| 20 | | | | 11 | | 2.0 | 12 | 0 |
| 22 | | 657.6 | | | | | | |
| | CL-CLAY (NATIVE), rock fragments, some silt, very stiff, low plasticity, brown, moist | | | 12 | | 2.0 | >50 | 0 |
| | | 656.1 | | | | | | |
| 24 | BEDROCK, refusal | 655.6 | | | | | | |
| | END OF BOREHOLE @ 24.0ft BGS | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| 0 | TOPSOIL, with roots | 0.3 | | 1 | | 1.0 | | 0.1 |
| | CL-CLAY (FILL), trace silt, stiff, low plasticity, strong brown (7.5 YR 5/8), moist | 1.8 | | | | | | |
| 2 | SP-SAND (FILL), fine grained, poorly graded, loose, dark reddish brown (5 YR 3/2), moist | | | 2 | | 1.2 | | 0.2 |
| 4 | | | CEMENT / BENTONITE GROUT | 3 | | 0.5 | | 0.6 |
| 6 | - rock fragments at 6.0ft BGS | | | 4 | | 1.0 | | 0.5 |
| 8 | CL-CLAY (FILL), trace sand and gravel, medium plasticity, soft, dark yellowish brown (10 YR 9/7), moist | 8.0 | | 5 | | 0.5 | | NA |
| 10 | | | 4" DIA. STEEL CASING | 6 | | 0.6 | | 0.2 |
| 12 | - no gravel at 12.5ft BGS | | | 7 | | 0.5 | | 1.0 |
| 14 | | | | 8 | | 1.3 | | 0.5 |
| 16 | - 2-inch section of gravel fragments at 17.0ft BGS | | | 9 | | 0.6 | | 1.1 |
| 18 | - trace sand at 18.0ft BGS | | | 10 | | 1.0 | | 0.8 |
| 20 | | | CEMENT / BENTONITE SEAL | | | | | |
| | SC-CLAYEY SAND (FILL), non-plastic, soft, black (5 YR 2.5/2), moist | 21.0 | | 11 | | 1.5 | | 0.5 |
| 22 | SP-SAND (FILL), fine grained, poorly graded, compact, black (5 YR 2.5/2), moist | 22.0 | | 12 | | 1.0 | | 3.3 |
| 24 | | | CEMENT / BENTONITE GROUT | 13 | | 1.7 | | 2.4 |
| 26 | SC-CLAYEY SAND (FILL), same as above | 26.5 | | 14 | | 1.7 | | 1.9 |
| 28 | | | | 15 | | 2.0 | | 2.0 |
| 30 | CL-CLAY (FILL), trace sand and silt, low plasticity, dark reddish brown (5 YR 3/2), moist | 29.5 | 4" DIA. STEEL CASING | 16 | | 2.0 | | 1.7 |
| | SC-CLAYEY SAND (FILL), same as above | 31.0 | | 17 | | 1.5 | | 1.0 |
| 32 | | | | | | | | |
| 34 | | 34.5 | | 18 | | 1.0 | | 1.0 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X243Y257
DATE COMPLETED: March 5, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 654.7 | | | | | | |
| 0 | TOPSOIL | 654.5 | | | | | | |
| | CL-CLAY (FILL), trace silt, soft, low plasticity, 7.5YR 4/6 (strong brown), moist | | | 1 | SPT/S | 2.0 | | 0 |
| 2 | - 2.5Y 4/4 (olive brown) at 3.0ft BGS | | | 2 | SPT/S | 2.0 | | 0 |
| 4 | | | | 3 | SPT/S | 2.0 | | <1 |
| 6 | SP-SAND (FILL), loose, fine grained, poorly graded, GLEY2 2.5/5PB (bluish black), moist | 648.7 | | 4 | SPT/S | 2.0 | | <1 |
| | CL-CLAY, some sand, soft, low plasticity, 2.5Y 3/2 (very dark grayish brown) | 647.2 | BENTONITE CHIPS | 5 | SPT/S | 2.0 | | <1 |
| 8 | - trace sand at 9.5ft BGS | | | | | | | |
| 10 | - no sand at 10.5ft BGS | | | 6 | SPT/S | 2.0 | | <1 |
| 12 | - 7.5YR 4/6 (strong brown) at 11.5ft BGS | | | 7 | SPT/S | 2.0 | | 0 |
| 14 | | | | 8 | SPT/S | 2.0 | | 0 |
| 16 | Fractured rock and rock fragments | 638.7 | | 9 | SPT/S | 1.0 | | 0 |
| | - Refusal at 17.0ft BGS | 637.7 | | | | | | |
| 18 | END OF BOREHOLE @ 17.0ft BGS | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BORING | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 26 | - bedrock at 24.5ft BGS<br>LIMESTONE (ST. LOUIS FORMATION) | 25.0 | | | | |
| | SHALE, soft, green / blue | 26.5 | | | | |
| | - 2-inch void at 27.1ft BGS | 27.0 | | 1 | 100 | 100 |
| 28 | LIMESTONE (ST. LOUIS FORMATION), coarse grained, fossil, beige micritic limestone | 27.6 | | | | |
| 30 | LIMESTONE (SALEM FORMATION), fine to medium grained, granular, very thick bedding, fossil, stylolites, grey<br>- 6-inch tan section at 30.0ft BGS | | | | | |
| 32 | - grey at 30.6ft BGS<br>- stylolite at 31.0ft BGS<br>- tan at 31.6ft BGS | | | | | |
| 34 | - grey at 32.5ft BGS<br>- stylolite at 32.7ft BGS<br>- tan, fracture at 33.2ft BGS | | | 2 | 100 | 100 |
| 36 | - grey at 34.1ft BGS<br>- stylolite, white / grey at 35.4ft BGS | | | | | |
| 38 | - fracture at 36.6ft BGS<br>- fracture at 37.2ft BGS<br>- stylolite at 37.7ft BGS | | | | | |
| | - fracture at 38.0ft BGS<br>- stylolite at 38.7ft BGS | | | 3 | 100 | 100 |
| 40 | - open stylolite at 39.8ft BGS<br>- 1-inch non-continuous opening at 39.9ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 42 | - open stylolite at 40.0ft BGS<br>- stylolite at 41.9ft BGS<br>- fracture at 42.5ft BGS | | | | | |
| 44 | | | | | | |
| | - fracture at 45.2ft BGS | | | 4 | 100 | 100 |
| 46 | - fracture at 45.6ft BGS<br>- stylolite at 46.5ft BGS | | | | | |
| 48 | | | | | | |
| 50 | - half-inch non-continuous opening at 50.2ft BGS | | CEMENT / BENTONITE SEAL | | | |
| 52 | | | | | | |
| 54 | - open stylolite at 53.2ft BGS<br>- open stylolite at 53.6ft BGS | | | 5 | 100 | 100 |
| 56 | | | | | | |
| 58 | - open stylolite at 57.4ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BORING | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 60 | | | 4" DIA. HQ COREHOLE | | | |
| 62 | - stylolite at 61.6ft BGS<br>- Water lose occurred during last core run. Therefore, boring terminated. at 61.9ft BGS<br>END OF BOREHOLE @ 61.9ft BGS | 61.9 | | 6 | 100 | 100 |
| 64 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 66 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by Split-spoon | | | | | |
| 68 | Ground surface elevation of 681.72 ft. AMSL | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |
| 76 | | | | | | |
| 78 | | | | | | |
| 80 | | | | | | |
| 82 | | | | | | |
| 84 | | | | | | |
| 86 | | | | | | |
| 88 | | | | | | |
| 90 | | | | | | |
| 92 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | CL-CLAY, trace silt, low plasticity, soft, strong brown (7.5 YR 5/2), moist | 34.5<br>35.0 | | | | |
| 36 | LIMESTONE (SALEM FORMATION), innerbeded tan/gray top 1.1 feet, fine to coarse grained, massive, granular, very thick bedding<br>- fracture at 37.1ft BGS | | | | | |
| 38 | - stylolite at 37.7ft BGS<br>- fracture, tan, mud filling at 37.8ft BGS | | | 1 | 100 | 100 |
| 40 | - coarse grained, gray at 38.6ft BGS<br>- tan, stylolite at 39.7ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 42 | - stylolite at 41.1ft BGS<br>- gray at 41.4ft BGS<br>- tan at 41.6ft BGS<br>- gray at 42.4ft BGS | | | | | |
| 44 | - stylolite at 44.4ft BGS | | | 2 | 100 | 100 |
| 46 | - stylolite at 46.3ft BGS<br>- stylolite at 46.7ft BGS | | | | | |
| 48 | - open stylolite at 47.4ft BGS<br>- fracture at 48.9ft BGS | | | | | |
| 50 | | | CEMENT / BENTONITE SEAL | | | |
| 52 | - stylolite at 50.8ft BGS<br>- stylolite at 51.1ft BGS<br>- tan, fossils (bryozoan) at 51.4ft BGS | | | | | |
| 54 | | | | 3 | 100 | 100 |
| 56 | | | | | | |
| 58 | - gray at 59.3ft BGS | | | | | |
| 60 | | | 4" DIA. HQ COREHOLE | | | |
| 62 | | | | | | |
| 64 | | | | 4 | 100 | 100 |
| 66 | | | | | | |
| 68 | - stylolite at 68.0ft BGS<br>- half-inch calcite filled vug at 68.2ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 70 | | | | | | |
| 72 | - stylolite at 71.6ft BGS | | | | | |
| 74 | | | | 5 | 100 | 100 |
| 76 | | | | | | |
| 78 | - stylolite at 77.3ft BGS<br>- fracture at 78.6ft BGS | | | | | |
| 80 | - fracture at 79.7ft BGS | | | | | |
| 82 | | | | | | |
| 84 | - stylolite at 83.3ft BGS<br>- stylolite at 84.1ft BGS | | | 6 | 100 | 100 |
| 86 | - fracture at 85.6ft BGS | | | | | |
| 88 | - fracture at 87.2ft BGS | | | | | |
| 90 | - stylolite at 89.1ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 92 | - stylolite at 90.6ft BGS<br>- fracture at 91.4ft BGS<br>- stylolite at 92.5ft BGS | | | | | |
| 94 | - open stylolite at 93.1ft BGS<br>- stylolite at 93.3ft BGS | 93.4 | | 7 | 100 | 100 |
| 96 | LIMESTONE (UPPER HARRODSBURG FORMATION), coarse, gray, fossils well cemented bioclastic (bryozoan & brachipods) calcarenite and calcirudite limestone<br>- fracture at 94.6ft BGS | | | | | |
| 98 | - stylolite at 95.8ft BGS<br>- stylolite at 96.6ft BGS<br>- fracture at 97.1ft BGS | | | | | |
| 100 | - fracture at 98.8ft BGS<br>- stylolite at 99.1ft BGS<br>- fracture at 99.4ft BGS | | | | | |
| 102 | - stylolite at 100.3ft BGS<br>- stylolite at 100.8ft BGS<br>- stylolite at 103.3ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | - fracture, shale parting at 103.4ft BGS<br>- fracture at 104.1ft BGS | | | 8 | 100 | 100 |
| 106 | - stylolite at 106.8ft BGS | | | | | |
| 108 | - fracture, shale parting at 108.0ft BGS<br>- stylolite at 108.2ft BGS<br>- fracture at 108.8ft BGS | 109.4 | | | | |
| 110 | - fracture, shale parting at 109.2ft BGS<br>LIMESTONE (LOWER HARRODSBURG FORMATION), fine grained, white, abundance of fine fossils, trace calcite<br>- half-inch vug at 110.7ft BGS | | | 9 | 100 | 100 |
| 112 | - stylolite at 113.4ft BGS | | | | | |
| 114 | - stylolite at 114.3ft BGS<br>- stylolite at 114.8ft BGS | | | | | |
| 116 | - stylolite at 115.5ft BGS | | | | | |
| 118 | - fracture at 118.1ft BGS<br>- fracture at 118.5ft BGS<br>- fracture, shale parting at 119.3ft BGS | | | | | |
| 120 | - light gray, stylolite at 120.0ft BGS | | ← 4" DIA. HQ COREHOLE | | | |
| 122 | - stylolite at 121.2ft BGS<br>- stylolite at 121.8ft BGS | | | | | |
| 124 | - open stylolite at 123.2ft BGS<br>- 1.5 foot section of abundance of fossils at 124.3ft BGS | | | 10 | 100 | |
| 126 | - fracture at 125.4ft BGS<br>- fracture at 126.1ft BGS<br>- open stylolite at 126.5ft BGS | | | | | |
| 128 | - 1.8 foot of porous vuggy calcite filled section containing fossils at 127.0ft BGS | | | | | |
| 130 | - open stylolite at 129.0ft BGS<br>- open stylolite at 130.0ft BGS | | | | | |
| 132 | - open stylolite at 132.8ft BGS | | ← CEMENT / BENTONITE SEAL | | | |
| 134 | - stylolite at 134.5ft BGS | | | 11 | 100 | 100 |
| 136 | - open stylolite at 135.7ft BGS<br>- open stylolite at 136.1ft BGS | | | | | |
| 138 | - stylolite at 137.6ft BGS<br>- open stylolite at 138.0ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 140 | | | | | | |
| 142 | - fracture at 142.0ft BGS | | | | | |
| 144 | | | CEMENT / BENTONITE SEAL | 12 | 100 | 100 |
| 146 | | | | | | |
| 148 | - fracture, blue shale parting at 148.2ft BGS | | | | | |
| 150 | - 7-inches of non-continuous openings with blue shale partings at 149.3ft BGS<br>- stylolite at 150.7ft BGS<br>- fracture, shale parting at 150.8ft BGS | | | | | |
| 152 | - open stylolite at 151.6ft BGS<br>- stylolite at 152.2ft BGS<br>- open stylolite at 153.3ft BGS | | | | | |
| 154 | - stylolite at 154.3ft BGS | | | | | |
| | - stylolite at 155.2ft BGS | | 4" DIA. HQ COREHOLE | 13 | 100 | 100 |
| 156 | - fracture, shale parting at 156.4ft BGS | | | | | |
| 158 | - fracture, shale parting at 157.7ft BGS | | | | | |
| 160 | - fracture, shale parting at 159.1ft BGS<br>- stylolite at 159.4ft BGS<br>- stylolite at 160.0ft BGS<br>- 2-foot section of interbedded shale at 160.9ft BGS | | | | | |
| 162 | | | | | | |
| 164 | - open fracture, shale parting at 164.5ft BGS | | | 14 | 100 | 100 |
| 166 | - open fracture, shale parting at 165.6ft BGS<br>- fracture at 165.9ft BGS | | | | | |
| 168 | - fracture at 167.2ft BGS<br>- stylolite at 168.0ft BGS | | | | | |
| 170 | | | | | | |
| 172 | - shale seam at 171.5ft BGS | | | | | |
| | - 1.5-inch calcite filled vug at 173.2ft BGS | 173.0 | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 176 | LIMESTONE (RAMP CREEK), 1.4 foot section of interbedded shale with vugs, very fine grained, contains small amounts of shale, even bedded<br>- shale seam at 174.7ft BGS<br>- 9-inch of interbedded shale at 177.0ft BGS | | | 15 | 100 | 100 |
| 178 | | | | | | |
| 180 | - large fracture at 179.9ft BGS<br>- high shale content at 180.0ft BGS<br>- half-inch vug at 181.1ft BGS | | CEMENT / BENTONITE SEAL | | | |
| 182 | | | | | | |
| 184 | - 1-inch vug at 184.8ft BGS | | | 16 | 100 | 100 |
| 186 | | | | | | |
| 188 | - 2-inch geode at 187.5ft BGS | | | | | |
| 190 | - 1.7 feet of interbedded shale at 190.0ft BGS<br>- fracture, shale seam at 191.0ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 192 | | | | | | |
| 194 | | | | 17 | 100 | 100 |
| 196 | | | | | | |
| 198 | | | | | | |
| | SHALE (EDWARDSVILLE FORMATION), light blue | 198.6 | | | | |
| 200 | END OF BOREHOLE @ 200.0ft BGS | 200.0 | | | | |
| 202 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 204 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 206 | Ground surface elevation of 676.24 ft. AMSL | | | | | |
| 208 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X170Y134
DATE COMPLETED: June 3, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 723.0 | | | | | | |
| 0 | TOPSOIL | 722.8 | | | | | | |
| | CL-CLAY (FILL), trace sand, stiff, low plasticity, moist | | | | | | | |
| 2 | - hard at 2.0ft BGS | | | 1 | SPT | 2.0 | | 0 |
| | | | | 2 | SPT | 2.0 | | 0 |
| 4 | | | BENTONITE CHIPS | | | | | |
| | | | | 3 | SPT | 2.0 | | 0 |
| 6 | | | | | | | | |
| | | | | 4 | SPT | 2.0 | | 0 |
| 8 | - refusal at 8.0ft BGS | 715.0 | | | | | | |
| | END OF BOREHOLE @ 8.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X170Y143
DATE COMPLETED: March 21, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 725.2 | | | | | | |
| 0 | Asphalt | 724.9 | ASPHALT | | | | | |
| | SP - SAND (FILL), trace gravel, fine grained, poorly graded, dark brown (10YR 7/3), moist | | | 1 | P/S | 3.0 | | <1 |
| 2 | | | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | 2 | P/S | 3.0 | | <1 |
| 8 | | | | | | | | |
| 10 | - trace clay at 10.0ft BGS | | BENTONITE CHIPS | 3 | P/S | 3.5 | | <1 |
| 12 | | 712.7 | | | | | | |
| | CL - CLAY, trace silt, soft, low plasticity, yellowish brown (10YR 5/6), moist | | | 4 | P/S | 4.0 | | <1 |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | 5 | P/S | 2.0 | | 0 |
| 20 | | | | | | | | |
| | | | | 6 | P/S | 1.5 | | 0 |
| | - refusal at 21.5ft BGS | 703.7 | | | | | | |
| 22 | END OF BOREHOLE @ 21.5ft BGS | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (P/S)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X171Y157
DATE COMPLETED: March 22, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 723.6 | | | | | | |
| 0 | ASPHALT | 723.3 | ASPHALT | | | | | |
| | CL-CLAY, trace sand, low plasticity, stiff, strong brown (7.5YR 4/6), moist | | | 1 | 4P/S4 | 2.0 | | 0 |
| 2 | | | | 2 | 4P/S4 | 2.0 | | 0 |
| | - yellowish red (5YR 4/6), no sand at 3.0ft BGS | | | | | | | |
| 4 | | | | 3 | 4P/S4 | 2.0 | | <1 |
| 6 | | | | 4 | 4P/S4 | 2.0 | | <1 |
| 8 | | | | 5 | 4P/S4 | 2.0 | | 0 |
| 10 | | | BENTONITE | 6 | 4P/S4 | 2.0 | | 0 |
| 12 | | | | 7 | 4P/S4 | 2.0 | | 0 |
| 14 | | | | 8 | 4P/S4 | 2.0 | | 0 |
| 16 | - yellowish brown (10YR 5/8) at 16.5ft BGS | | | 9 | 4P/S4 | 2.0 | | 0 |
| 18 | - trace silt at 18.0ft BGS | | | | | | | |
| | | | | 10 | 4P/S4 | 2.0 | | |
| 20 | - refusal at 20.0ft BGS | 703.6 | | | | | | |
| | END OF BOREHOLE @ 20.0ft BGS | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X173Y125
DATE COMPLETED: June 3, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 722.9 | | | | | | |
| 0 | TOPSOIL | 722.4 | | | | | | |
| | CL-CLAY, trace silt, soft, red, plastic, moist | | | 1 | SPT | 2.0 | | 0 |
| 2 | | | | 2 | SPT | 2.0 | | 0 |
| 4 | - hard at 4.5ft BGS | | BENTONITE CHIPS | 3 | SPT | 2.0 | | 0 |
| 6 | | | | 4 | SPT | 2.0 | | 0 |
| 8 | END OF BOREHOLE @ 8.0ft BGS | 714.9 | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X173Y131
DATE COMPLETED: March 14, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 723.2 | | | | | | |
| 0 | Topsoil | 723.0 | | | | | | |
| | CL - CLAY, trace silt, stiff, low plasticity, dark yellowish brown (10YR 4/6), moist | | | 1 | | 1.5 | 16 | 0 |
| 2 | - yellowish brown (10YR 5/6) at 2.5ft BGS | | | 2 | | 1.7 | 6 | 4 |
| 4 | | | | 3 | | 1.7 | 12 | 0 |
| 6 | | | | 4 | | 1.5 | 12 | <1 |
| 8 | - yellowish red (5YR 5/8) at 8.5ft BGS | | | 5 | | 1.8 | 14 | <1 |
| 10 | | | BENTONITE CHIPS | 6 | | 1.5 | 15 | <1 |
| 12 | | | | 7 | | 1.5 | 12 | 0 |
| 14 | - red (2.5YR 4/8) at 15.0ft BGS | | | 8 | | 2.0 | 13 | 0 |
| 16 | | | | 9 | | 2.0 | 12 | 0 |
| 18 | | | | | | | | |
| | Rock fragments and chips | 704.2 | | 10 | | 1.7 | 14 | 0 |
| 20 | - refusal at 20.0ft BGS | 703.7 | | | | | | |
| | END OF BOREHOLE @ 20.0ft BGS | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (⬭)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X186Y159
DATE COMPLETED: March 20, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 722.4 | | | | | | |
| 0 | Asphalt | 722.1 | | | | | | |
| | SAND & GRAVEL (FILL), aggregate base | 721.5 | | 1 | P/S | 2.0 | | 0 |
| 2 | CL - CLAY, trace silt and sand, stiff, low plasticity, yellowish brown (10YR 5/6), moist | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | - trace gravel, 2' black staining at 6.0ft BGS | | | 4 | P/S | 2.0 | | 2.4 |
| 8 | | | | 5 | P/S | 2.0 | | <1 |
| 10 | | | | 6 | P/S | 2.0 | | <1 |
| 12 | | | BENTONITE CHIPS | 7 | P/S | 2.0 | | <1 |
| | - soft, red (2.5YR 4/8) at 13.0ft BGS | | | 8 | P/S | 2.0 | | <1 |
| 14 | | | | 9 | P/S | 2.0 | | 1.3 |
| 16 | - dark olive grey (5Y 3/2) at 16.0ft BGS | | | 10 | P/S | 2.0 | | 3.4 |
| 18 | - 2' black staining at 18.0ft BGS | | | 11 | P/S | 2.0 | | <1 |
| 20 | - yellowish red (5YR 4/6) at 20.0ft BGS | | | 12 | P/S | 1.0 | | <1 |
| | - trace black staining at 21.0ft BGS | | | | | | | |
| 22 | - refusal at 23.0ft BGS | 699.4 | | | | | | |
| | END OF BOREHOLE @ 23.0ft BGS | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X186Y180
DATE COMPLETED: March 21, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 721.8 | | | | | | |
| 0 | Asphalt | 721.4 | ASPHALT | 1 | P/S | 2.0 | | <1 |
| 2 | CL - CLAY, with trace sand and gravel, soft, low plasticity, dark yellowish brown (10YR 4/4), moist<br>- 2" trace black stain at 1.0ft BGS | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 2.0 | | 2.1 |
| 6 | - no trace sand, black stain at 5.5ft BGS | | | 4 | P/S | 2.0 | | 3.2 |
| 8 | - no staining, strong brown (7.5YR 4/6) at 7.5ft BGS<br>- trace silt at 9.0ft BGS | | | 5 | P/S | 2.0 | | <1 |
| 10 | | | BENTONITE CHIPS | 6 | P/S | 2.0 | | 0 |
| 12 | | | | 7 | P/S | 2.0 | | 0 |
| 14 | | | | 8 | P/S | 2.0 | | 0 |
| 16 | | | | 9 | P/S | 2.0 | | 0 |
| 18 | - dark olive grey (5Y 3/2) at 17.0ft BGS | | | 10 | P/S | 2.0 | | 0 |
| 20 | | | | 11 | P/S | 2.0 | | 0 |
| 22 | - refusal at 22.0ft BGS<br>END OF BOREHOLE @ 22.0ft BGS | 699.8 | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X195Y133
DATE COMPLETED: March 11, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 717.7 | | | | | | |
| 0 | Topsoil | 717.5 | | | | | | |
| | CL - CLAY, trace silt, stiff, low plasticity, yellowish brown (10YR 5/6), moist | | | 1 | P/S | 2.0 | | 0 |
| 2 | - yellowish red (2.5YR 4/6) at 3.0ft BGS | | | 2 | P/S | 2.0 | | 0 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | - some silt at 6.5ft BGS | | | 4 | P/S | 2.0 | | <1 |
| 8 | | | BENTONITE CHIPS | 5 | P/S | 2.0 | | <1 |
| 10 | - dark red (2.5YR 3/6) at 11.0ft BGS | | | 6 | P/S | 2.0 | | <1 |
| 12 | | | | 7 | P/S | 2.0 | | 0 |
| 14 | | | | 8 | P/S | 2.0 | | 0 |
| 16 | - yellowish brown (10YR 5/6) at 16.0ft BGS | | | 9 | P/S | 1.5 | | 0 |
| | Weathered rock | 700.7 | | | | | | |
| 18 | - refusal at 17.5ft BGS | 700.2 | | | | | | |
| | END OF BOREHOLE @ 17.5ft BGS | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X213Y125
DATE COMPLETED: February 25, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 714.3 | | | | | | |
| 0 | TOPSOIL | 714.1 | | | | | | |
| | CL-CLAY, trace silt, soft, low plasticity, strong brown (7.5YR 4/6), moist | | | 1 | P/S | 2.0 | | <1 |
| 2 | | | | 2 | P/S | 2.0 | | 1.4 |
| 4 | - stiff at 4.5ft BGS<br>- 1.5-inch black staining at 5.0ft BGS | | | 3 | P/S | 2.0 | | 1.9 |
| 6 | | | BENTONITE CHIPS | 4 | P/S | 2.0 | | 1.0 |
| 8 | - very stiff, red (2.5YR 4/6) at 7.0ft BGS | | | 5 | P/S | 2.0 | | 1.4 |
| 10 | - dark yellowish brown (10YR 4/4) at 10.0ft BGS | | | 6 | P/S | 1.5 | | 1.8 |
| 12 | - refusal at 11.5ft BGS<br>END OF BOREHOLE @ 11.5ft BGS | 702.8 | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X217Y159
DATE COMPLETED: February 27, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 694.3 | | | | | | |
| 0 | TOPSOIL | 694.0 | | | | | | |
| | CL-CLAY, trace silt, low plasticity, stiff, strong brown (7.5YR 5/8), moist | | BENTONITE CHIPS | 1 | 4P/S | 2.0 | | 0 |
| 2 | | | | 2 | 4P/S | 2.0 | | <1 |
| 4 | | | | 3 | 4P/S | 2.0 | | 0 |
| 6 | | | | 4 | 4P/S | 2.0 | | 0 |
| | weathered and fragmented rock | 687.3 | | | | | | |
| 8 | - refusal at 8.0ft BGS | 686.3 | | | | | | |
| | END OF BOREHOLE @ 8.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X221Y169
DATE COMPLETED: February 27, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 685.2 | | | | | | |
| 0 | TOPSOIL | 684.7 | | | | | | |
| | CL-CLAY, trace silt, stiff, low plasticity, strong brown (7.5YR 5/8), moist | | BENTONITE CHIPS | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 1.5 | | 0 |
| | | 680.2 | | | | | | |
| | fractured and weathered rock | 679.7 | | | | | | |
| 6 | - Refusal at 5.5ft BGS | | | | | | | |
| | END OF BOREHOLE @ 5.5ft BGS | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y150A
DATE COMPLETED: February 27, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 698.2 | | | | | | |
| 0 | GRAVEL / AGGREGATE (FILL) | | BENTONITE CHIPS | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | 0 |
| 4 | - Refusal at 4.5ft BGS | 693.7 | | | | | | |
| | END OF BOREHOLE @ 4.5ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y150B
DATE COMPLETED: February 27, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 698.2 | | | | | | |
| 0 | GRAVEL/AGGREGATE (FILL) | | | 1 | SS | 2.0 | | 0 |
| 2 | | | | | | | | |
| | | 695.2 | | 2 | SS | 2.0 | | 1.7 |
| 4 | CL-CLAY, trace silt, soft, low plasticity, very dark bluish gray (GLEY2 3/1), moist<br>- yellowish brown at 4.0ft BGS | | | 3 | SS | 2.0 | | 1.3 |
| 6 | - very dark gray (2.5Y 3/1) at 6.0ft BGS | | BENTONITE CHIPS | 4 | SS | 2.0 | | 5 |
| 8 | - brown (10YR 4/3) at 8.0ft BGS | | | 5 | SS | 2.0 | | 1.2 |
| 10 | | | | 6 | SS | 2.0 | | <1 |
| 12 | - Refusal at 12.0ft BGS | 686.2 | | | | | | |
| | END OF BOREHOLE @ 12.0ft BGS | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X224Y138A
DATE COMPLETED: February 25, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 704.5 | | | | | | |
| 0 | TOPSOIL | 704.2 | BENTONITE CHIPS | 1 | P/S | 2.0 | | 0 |
| 2 | CL-CLAY, trace silt, soft, low plasticity, dark yellowish brown (10YR 4/6), moist<br>- weathered and fgragment rock at 2.5ft BGS<br>- Refusal at 3.0ft BGS | 701.5 | | 2 | P/S | 1.0 | | 0 |
| 4 | END OF BOREHOLE @ 3.0ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X224Y138B
DATE COMPLETED: February 25, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 704.5 | | | | | | |
| 0 | TOPSOIL | 704.3 | | | | | | |
| | CL-CLAY, some silt, low plasticity, dark yellowish brown (10YR 4/6), moist | | | 1 | 4P/S | 2.0 | | <1 |
| 2 | | | | 2 | 4P/S | 2.0 | | 2.5 |
| 4 | - trace gravel, hard, yellowish red (5YR 4/6) at 4.0ft BGS | | | 3 | 4P/S | 2.0 | | 1.0 |
| 6 | - very hard, dark red (2.5YR 2.5/4) at 6.0ft BGS | | | 4 | 4P/S | 2.0 | | 3.6 |
| 8 | | | BENTONITE CHIPS | 5 | 4P/S | 2.0 | | 1.8 |
| 10 | | | | 6 | 4P/S | 2.0 | | 2.1 |
| 12 | - some silt, yellowish brown (10YR 5/8) at 12.2ft BGS | | | 7 | 4P/S | 2.0 | | <1 |
| 14 | | | | 8 | 4P/S | 2.0 | | <1 |
| 16 | - Refusal at 16.0ft BGS | 688.5 | | | | | | |
| | END OF BOREHOLE @ 16.0ft BGS | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X232Y180
DATE COMPLETED: March 18, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 698.7 | | | | | | |
| 0 | Topsoil | 698.1 | | 1 | P/S | 2.0 | | 0 |
| 2 | CL - CLAY, trace silt, soft, medium plasticity, strong brown (7.5YR 4/6), moist | | BENTONITE CHIPS | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | | 692.2 | | 4 | P/S | 1.0 | | <1 |
| 8 | Weathered rock - Refusal at 7.0ft BGS | 691.7 | | | | | | |
| | END OF BOREHOLE @ 7.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X209Y078A
DATE COMPLETED: July 16, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: C. MARHOEFER

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 684.8 | | | | | | |
| 0 | SM/GP SAND AND GRAVEL (FILL), with silt, trace clay, compact, fine grained, poorly graded, light brown, moist | | | 1 | P/S | 0.0 | | 0 |
| 2 | CL-CLAY (FILL), with silt, firm, low plasticity, strong brown, moist | 682.8 | | 2 | P/S | 2.0 | | 0 |
| 4 | SM-SAND (FILL), with silt, some gravel, trace clay, compact, fine grained, poorly graded, light brown, moist | 680.3 | | 3 | P/S | 2.0 | | 0 |
| 6 | CL-CLAY, with silt, firm, low plasticity, strong brown, moist | 677.8 | BENTONITE CHIPS | 4 | P/S | 2.0 | | 0 |
| 8 | | | | 5 | P/S | 2.0 | | 0 |
| 10 | | | | 6 | P/S | 2.0 | | 0 |
| 12 | | | | 7 | P/S | 1.5 | | 0 |
| 14 | - refusal at 13.5ft BGS<br>END OF BOREHOLE @ 13.5ft BGS | 671.3 | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (P/S)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X209Y078B
DATE COMPLETED: July 16, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: C. MARHOEFER

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 684.9 | | | | | | |
| 0 | SM/GP SAND AND GRAVEL (FILL), trace clay, compact, fine grained, poorly graded, light brown, moist | | | 1 | SPT/SS | 0.0 | | 0 |
| 2 | CL-CLAY (FILL), with silt, firm, low plasticity, strong brown, moist | 682.9 | | 2 | SPT/SS | 2.0 | | 0 |
| 4 | SM-SAND (FILL), with silt, some gravel, trace clay, compact, fine grained, poorly graded, light brown, moist | 680.9 | | 3 | SPT/SS | 2.0 | | 0 |
| 6 | | | BENTONITE CHIPS | 4 | SPT/SS | 2.0 | | 0 |
| 8 | CL-CLAY, with silt, firm, low plasticity, strong brown, moist | 677.4 | | 5 | SPT/SS | 2.0 | | 0 |
| 10 | | | | 6 | SPT/SS | 2.0 | | 0 |
| 12 | - refusal at 12.5ft BGS | 672.4 | | 7 | SPT/SS | 0.5 | | 0 |
| | END OF BOREHOLE @ 12.5ft BGS | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X209Y078C
DATE COMPLETED: July 16, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: C. MARHOEFER

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 684.7 | | | | | | |
| 0 | SM/GP SAND AND GRAVEL (FILL), trace clay, compact, fine grained, poorly graded, light brown, moist | | | 1 | SPT/S | 0.0 | | 0 |
| 2 | CL-CLAY (FILL), with silt, firm, low plasticity, strong brown, moist | 682.7 | | 2 | SPT/S | 2.0 | | 0 |
| 4 | SM-SAND (FILL), with silt, some gravel, trace clay, compact, fine grained, poorly graded, light brown, moist | 680.2 | | 3 | SPT/S | 0.5 | | 0 |
| 6 | | | BENTONITE CHIPS | 4 | SPT/S | 2.0 | | 0 |
| 8 | | | | | | | | |
| 10 | CL-CLAY, with silt, firm, low plasticity, strong brown, moist | 675.7 | | 5 | SPT/S | 1.5 | | 0 |
| 12 | - refusal at 12.5ft BGS | 672.2 | | 6 | SPT/S | 1.5 | | 0 |
| | END OF BOREHOLE @ 12.5ft BGS | | | 7 | SPT/S | 0.5 | | 0 |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X165Y179
DATE COMPLETED: January 9, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 720.48 | | | | | | |
| 0 | ASPHALT | 720.08 | ASPHALT | | | | | |
| | SW/GW - SAND & GRAVEL (FILL) | 719.48 | | 1 | P/S | 2.0 | | 0 |
| 2 | CL - CLAY (FILL), with sand and gravel, stiff, low plasticity, greenish grey (GLEY 1 Y 5/10), moist, trace black staining | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | - trace silt, very hard, red (2.5 YR 4/6), moist at 5.8ft BGS | | | 4 | P/S | 2.0 | | 0 |
| 8 | | | | 5 | P/S | 2.0 | | 0 |
| 10 | | | BENTONITE CHIPS | 6 | P/S | 2.0 | | 0 |
| 12 | | | | 7 | P/S | 2.0 | | 0 |
| 14 | | | | 8 | P/S | 2.0 | | 0 |
| 16 | CL - CLAY, with little silt, soft, medium plasticity, fine grained, olive yellow (2.5 Y 6/6), moist | 704.48 | 2" DIA. BOREHOLE | | | | | |
| | - 2" fine sand seam at 17.0ft BGS | | | 9 | P/S | 2.0 | | 0 |
| 18 | - becoming very silty, hard, REFUSAL at 18.0ft BGS | 702.48 | | | | | | |
| | END OF BOREHOLE @ 18.0ft BGS | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X176Y143
DATE COMPLETED: January 9, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 724.25 | | | | | | |
| 0 | ASPHALT | 723.95 | ASPHALT | | | | | |
| | GW - GRAVEL (FILL) | 723.75 | | 1 | P/S | 2.0 | | 0 |
| 2 | CL- CLAY (FILL), trace gravel, stiff, yellowish brown (10 YR 5/6), moist | | | | | | | |
| | - becoming very dark greyish brown (2.5 Y 3/2) at 1.5ft BGS | 721.25 | | 2 | P/S | 2.0 | | <1 |
| 4 | SW - SAND (FILL), with trace gravel, well graded, dark olive grey (5 Y 3/2), moist | 720.45 | | 3 | P/S | 2.0 | | <1 |
| 6 | CL - CLAY (FILL), trace sand and silt and gravel, very fine grained, sand, poorly graded, dark olive grey (5 Y 3/0), moist | | | 4 | P/S | 2.0 | | 2.2 |
| 8 | | | | 5 | P/S | 2.0 | | <1 |
| 10 | - trace sand, soft, light olive brown (2.5 Y 5/4), trace debris, glass, slight petroleum odor at 10.0ft BGS | | | 6 | P/S | 2.0 | | <1 |
| 12 | | 712.45 | BENTONITE CHIPS | | | | | |
| | GW - GRAVEL(FILL), with sand, loose, fine to coarse grained, well graded, pale yellow (2.5 Y 7/3), dry | 711.45 | | 7 | P/S | 2.0 | | <1 |
| 14 | | 710.85 | | | | | | |
| | SW - SAND (FILL), with trace gravel, well graded, dark olive grey (5 Y 3/2), moist | 710.65 | | 8 | P/S | 2.0 | | 2 |
| | GW - GRAVEL (FILL), with sand, loose, fine to coarse grained, well graded, pale yellow (2.5 Y 7/3), dry | | | | | | | |
| 16 | | 707.75 | | 9 | P/S | 2.0 | | <1 |
| | SW - SAND (FILL), with trace gravel, well graded, dark olive grey (5 Y 3/2), moist | | | | | | | |
| 18 | CL - CLAY, trace silt, soft, medium plasticity, dark yellow brown (10 YR 4/6), moist, red staining | | 2" DIA. BOREHOLE | 10 | P/S | 2.0 | | <1 |
| 20 | - becoming stiff at 18.0ft BGS | | | | | | | |
| | | | | 11 | P/S | 2.0 | | <1 |
| 22 | | | | 12 | P/S | 2.0 | | <1 |
| | - Refusal at 23.0ft BGS | 701.25 | | | | | | |
| 24 | END OF BOREHOLE @ 23.0ft BGS | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X183Y133
DATE COMPLETED: January 11, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL |
|---|---|---|
| | GROUND SURFACE | 722.61 |
| 0 | TOPSOIL | 722.31 |
| | CL - CLAY (FILL), with trace sand and gravel, stiff, medium plasticity, yellowish brown (10 YR 5/6), moist | 720.61 |
| 2 | SC - CLAYEY SAND (FILL), fine grained, non-plastic, poorly graded, dark olive brown (2.5 YR 3/3), moist | 720.11 |
| 4 | SP - SAND (FILL), trace clay, loose, fine grained, poorly graded, dark olive brown (10 YR 3/3), moist | |
| 6 | - 8 inches black with strong petroleum odor at 3.7ft BGS | 716.61 |
| | - becoming grey (2.5 Y 5/1), loose, petroleum odor at 4.5ft BGS | |
| 8 | CL - CLAY, with silt, stiff, medium plasticity, light olive brown (2.5 Y 5/3), moist | |
| 10 | - with trace sand and gravel, very stiff, medium plasticity, yellowish red (5 YR 5/8), moist at 8.0ft BGS | |
| 12 | | |
| 14 | | |
| 16 | | |
| 18 | Fractured bedrock, refusal | 703.81 |
| | END OF BOREHOLE @ 19.0ft BGS | 703.61 |
| 20 | | |
| 22 | | |
| 24 | | |
| 26 | | |
| 28 | | |
| 30 | | |
| 32 | | |
| 34 | | |

BOREHOLE: BENTONITE CHIPS; 2" DIA. BOREHOLE

| SAMPLE NUMBER | INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|
| 1 | P/S | 2.0 | | 0 |
| 2 | P/S | 2.0 | | <1 |
| 3 | P/S | 2.0 | | 11.3 |
| 4 | P/S | 2.0 | | 1.7 |
| 5 | P/S | 2.0 | | <1 |
| 6 | P/S | 2.0 | | <1 |
| 7 | P/S | 2.0 | | 0 |
| 8 | P/S | 2.0 | | 0 |
| 9 | P/S | 2.0 | | 0 |
| 10 | P/S | 1.0 | | 0 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X185Y185
DATE COMPLETED: January 10, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 713.10 | | | | | | |
| 0 | CL - CLAY (FILL), trace silt, fine sand, soft, medium plasticity, dark yellowish brown (10 YR 4/4), moist | | | 1 | SPT/SS | 2.0 | | 0 |
| 2 | | | | 2 | SPT/SS | 2.0 | | 0 |
| 4 | - stiff, fine grained, low plasticity, strong brown (7.5 YR 4/6) at 4.5ft BGS | | | 3 | SPT/SS | 2.0 | | <1 |
| 6 | - trace sand and gravel at 6.5ft BGS | | | 4 | SPT/SS | 2.0 | | <1 |
| 8 | | | | 5 | SPT/SS | 2.0 | | 33.7 |
| 10 | | | | 6 | SPT/SS | 2.0 | | <1 |
| 12 | - 4 inches of gravel at 11.5ft BGS | | | 7 | SPT/SS | 2.0 | | 33.0 |
| 14 | - 4 inches clay, black stained, strong petroleum odor at 13.0ft BGS | | | 8 | SPT/SS | 2.0 | | 36.8 |
| 16 | - soft, low plasticity, dark yellowish brown (10 YR 4/4), moist at 15.0ft BGS | | | 9 | SPT/SS | 2.0 | | 33.0 |
| 18 | | | BENTONITE CHIPS | 10 | SPT/SS | 0.0 | | 5.6 |
| 20 | | | 2" DIA. BOREHOLE | 11 | SPT/SS | 2.0 | | <1 |
| 22 | | | | 12 | SPT/SS | 0.0 | | <1 |
| 24 | - with sand and gravel, stiff, low plasticity, dark yellowish brown (10 YR 4/4), moist at 24.0ft BGS | | | 13 | SPT/SS | 2.0 | | <1 |
| 26 | - trace silt and sand, stiff, yellowish red (5 YR 4/6), moist at 24.5ft BGS | | | 14 | SPT/SS | 2.0 | | <1 |
| | | 686.60 | | | | | | |
| 28 | SW - SAND (FILL), loose, fine grained, poorly graded, dark reddish brown (5 YR 3/3) | | | 15 | SPT/SS | 2.0 | | <1 |
| | | 684.10 | | | | | | |
| 30 | CL - CLAY, with little silt, stiff, medium plasticity, dark olive grey (5 Y 3/2), moist | | | 16 | SPT/SS | 0.0 | | <1 |
| 32 | - trace silt, very hard, yellowish red (5 YR 4/6), moist at 32.4ft BGS | | | 17 | SPT/SS | 2.0 | | <1 |
| 34 | - dark yellowish brown (10 YR 4/6) at 34.0ft BGS | | | 18 | SPT/SS | 1.5 | | <1 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (18)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X185Y185
DATE COMPLETED: January 10, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| 36 | - Refusal at 35.5ft BGS<br>END OF BOREHOLE @ 35.5ft BGS | 677.60 | | | 4P/S4 | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |
| 42 | | | | | | | | |
| 44 | | | | | | | | |
| 46 | | | | | | | | |
| 48 | | | | | | | | |
| 50 | | | | | | | | |
| 52 | | | | | | | | |
| 54 | | | | | | | | |
| 56 | | | | | | | | |
| 58 | | | | | | | | |
| 60 | | | | | | | | |
| 62 | | | | | | | | |
| 64 | | | | | | | | |
| 66 | | | | | | | | |
| 68 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X189Y122
DATE COMPLETED: January 15, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 706.10 | | | | | |
| 0 | TOPSOIL | 705.90 | | | | | |
| | CL - CLAY (FILL), with trace gravel, stiff, strong brown (7.5 YR 5/6), moist | | BENTONITE CHIPS | 1 | P/S | 2.0 | |
| 2 | | | | 2 | P/S | 2.0 | |
| 4 | | | | 3 | P/S | 2.0 | |
| 6 | | | | 4 | P/S | 2.0 | |
| | SW/GW SAND & GRAVEL (FILL), loose, coarse grained, well graded, light grey, (2.5 Y 7/2) | 699.10 | | | | | |
| 8 | CL - CLAY, with trace silt, stiff, medium plasticity, light yellowish brown (2.5 Y 6/4), moist | 698.10 | 2" DIA. BOREHOLE | 5 | P/S | 2.0 | |
| | - Rock Fragments at 9.8ft BGS | | | | | | |
| 10 | - Refusal at 10.0ft BGS | 696.10 | | | | | |
| | END OF BOREHOLE @ 10.0ft BGS | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
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| 24 | | | | | | | |
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| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y098
DATE COMPLETED: January 7, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 688.05 | | | | | | |
| 0 | CL-CLAY (FILL) trace sand, stiff, medium plasticity, brown (7.5 YR 5/8), moist | | | 1 | SPT/SS | 2.0 | | 0 |
| 2 | | | | 2 | SPT/SS | 2.0 | | <1 |
| 4 | | | | 3 | SPT/SS | 2.0 | | <1 |
| 6 | | | BENTONITE CHIPS | 4 | SPT/SS | 2.0 | | <1 |
| 8 | | | | 5 | SPT/SS | 2.0 | | <1 |
| 10 | - becoming very moist at 10.0ft BGS | | 2 " DIA. BOREHOLE | 6 | SPT/SS | 2.0 | | <1 |
| 12 | - 1 ft. petroleum odor turning to grey (10 YR 4/1) then turning greyish black (GLEY 2 2.5/5BG) at 12.0ft BGS | | | 7 | SPT/SS | 2.0 | | <1 |
| | - 3 inch rock layer at 12.0ft BGS | 675.05 | | | | | | |
| 14 | CL-CLAY (FILL), very stiff, medium plasticity, light olive brown (2.5 Y 5/4) | 674.05 | | | | | | |
| | - Refusal at 14.0ft BGS | | | | | | | |
| 16 | END OF BOREHOLE @ 14.0ft BGS | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
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| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X200Y161
DATE COMPLETED: January 10, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 717.32 | | | | | | |
| 0 | Topsoil with roots | 716.32 | 2" DIA. BOREHOLE | 1 | P/S | 2.0 | | 0 |
| 2 | CL - CLAY (FILL), trace silt, stiff, medium plasticity, reddish brown (5 YR 4/4), moist<br>- with well graded sand, trace gravel, stiff, medium plasticity, strong brown (7.5 YR 5/6), moist at 1.8ft BGS | | | 2 | P/S | 2.0 | | 0 |
| 4 | Gravel, coarse | 712.82<br>712.32 | BENTONITE CHIPS | 3 | P/S | 2.0 | | 0 |
| 6 | SP - SAND (FILL), loose, medium grained, very poorly graded, alternating dark reddish brown (5 YR 3/3) and white (5 YR 8/1) at approximately 1cm invervals, moist<br>- turning white (5 YR 8/1) at 6.0ft BGS | | | 4 | P/S | 2.0 | | 0 |
| 8 | - turning dark reddish brown (5 YR 3/3) at 7.5ft BGS | 708.52 | | 5 | P/S | 2.0 | | <1 |
| 10 | CL - CLAY, with trace well graded gravel and sand, stiff, medium plasticity, dark greenish grey (GLEY 1 4/1), moist | 707.32 | | 6 | P/S | 2.0 | | <1 |
| 12 | Weathered Rock and Rock Fragments, very hard, well graded, white (10 YR 8/1), dry<br>- Refusal at 11.5ft BGS | 705.82 | | | | | | |
| 14 | END OF BOREHOLE @ 11.5ft BGS | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
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| 22 | | | | | | | | |
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| 28 | | | | | | | | |
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| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X204Y111A
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.60 | | | | | | |
| 0 | SP/GP SAND & GRAVEL (FILL), coarse grained, poorly graded | | BENTONITE SEAL | 1 | P/S | 2.0 | | 0.0 |
| 2 | | | | 2 | P/S | 2.0 | | 0.0 |
| 4 | - refusal at 4.0ft BGS | 686.60 | | | | | | |
| | END OF BOREHOLE @ 4.0ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
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| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X204Y111B
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.40 | | | | | | |
| 0 | SP/GP SAND & GRAVEL (FILL), coarse grained, poorly graded | | BENTONITE SEAL | 1 | P/S | 2.0 | | 0.0 |
| 2 | | | | 2 | P/S | 2.0 | | 0.0 |
| 4 | - refusal at 4.0ft BGS | 686.40 | | | | | | |
| | END OF BOREHOLE @ 4.0ft BGS | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
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| 24 | | | | | | | | |
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| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X204Y111C
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.44 | | | | | |
| 0 | SP/GP - SAND & GRAVEL (FILL), coarse grained, poorly graded | | 2" DIA. BOREHOLE | 1 | P/S | 2.0 | |
| 2 | | | | 2 | P/S | 2.0 | |
| 4 | | 686.44 | BENTONITE CHIPS | 3 | P/S | 2.0 | |
| 6 | Weathered Bedrock and coarse Rock Fragments and fine sand, stiff, well graded, yellowish brown (10 YR 5/6), moist | | | 4 | P/S | 1.5 | |
| 8 | - Refusal at 7.5ft BGS | 682.94 | | | | | |
| | END OF BOREHOLE @ 7.5ft BGS | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (P/S)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X204Y132
DATE COMPLETED: January 11, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 720.08 | | | | | | |
| 0 | TOPSOIL | 719.88 | | | | | | |
| | CL - CLAY, with silt, trace well graded sand and gravel, stiff, dark yellowish brown (10 YR 4/4), medium plasticity, moist, trace black staining | | | 1 | P/S | 2.0 | | <1 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| | - turning reddish brown (5 YR 4/6) at 3.5ft BGS | | | | | | | |
| 4 | - becoming very stiff, no black staining at 4.0ft BGS | | | 3 | P/S | 2.0 | | 1.5 |
| | - becoming strong brown (7.5 YR 5/6) at 4.3ft BGS | | 2" DIA. BOREHOLE | | | | | |
| 6 | | | | 4 | P/S | 2.0 | | <1 |
| | - trace silt, no sand and gravel, becoming yellowish brown (10 YR 6/6) at 8.2ft BGS | | BENTONITE CHIPS | | | | | |
| 8 | | | | 5 | P/S | 2.0 | | <1 |
| 10 | | | | 6 | P/S | 2.0 | | <1 |
| 12 | | | | 7 | P/S | 2.0 | | 0 |
| 14 | - trace sand, some gravel at 14.0ft BGS | | | | | | | |
| | | 704.58 | | 8 | P/S | 2.0 | | 0 |
| 16 | Weathered Bedrock, Rock Fragments, well graded, light greenish grey (Gley 1 8/1) | | | | | | | |
| | - Refusal at 16.5ft BGS | 703.58 | | | | | | |
| 18 | END OF BOREHOLE @ 16.5ft BGS | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X204Y149
DATE COMPLETED: January 10, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 717.68 | | | | | | |
| 0 | TOPSOIL | 717.38 | | | | | | |
| | CL - CLAY, trace silt and poorly graded sand, soft, medium plasticity, red (2.5 YR 4/8), moist | | | 1 | SS | 2.0 | | <1 |
| 2 | - Rock Fragments at 1.0ft BGS<br>- with trace well graded sand and gravel, stiff, low plasticity, strong brown (7.5 YR 5/6), moist at 1.1ft BGS | | | 2 | SS | 2.0 | | <1 |
| 4 | - trace medium grained gravel, stiff, brown (7.5 YR 4/3), moist at 3.0ft BGS | | | 3 | SS | 2.0 | | 6.5 |
| 6 | - trace silt, no gravel, becoming soft, dark grey (10 YR 4/1), black staining, faint petroleum odor at 6.0ft BGS | | 2" DIA. BOREHOLE | 4 | SS | 2.0 | | 4800 |
| 8 | | | BENTONITE CHIPS | 5 | SS | 2.0 | | 5.1 |
| 10 | - no black staining, no petroleum odor at 10.5ft BGS | | | 6 | SS | 2.0 | | <1 |
| 12 | - trace silt, stiff, medium plasticity, yellowish red (5 YR 5/6), moist at 11.0ft BGS<br>- very stiff at 12.0ft BGS | | | 7 | SS | 2.0 | | <1 |
| 14 | | | | | | | | |
| 16 | Weathered Rock becoming more competent at depth | 702.68 | | 8 | SS | 2.0 | | <1 |
| | - Refusal at 16.0ft BGS | 701.68 | | | | | | |
| | END OF BOREHOLE @ 16.0ft BGS | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X211Y169
DATE COMPLETED: January 14, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 692.53 | | | | | | |
| 0 | TOPSOIL | 692.23 | | | | | | |
| | Gravel | 692.03 | | 1 | SPT/SS | 2.0 | | 0 |
| 2 | SC - CLAYEY SAND (FILL), with some gravel, stiff, fine to coarse grained, well graded, dark yellowish brown (10 YR 3/4) | | | 2 | SPT/SS | 2.0 | | <1 |
| 4 | | | 2" DIA. BOREHOLE | 3 | SPT/SS | 2.0 | | <1 |
| 6 | | | BENTONITE CHIPS | 4 | SPT/SS | 2.0 | | <1 |
| 8 | | | | 5 | SPT/SS | 2.0 | | <1 |
| 10 | - brown (10 YR 3/4) at 10.0ft BGS | | | 6 | SPT/SS | 2.0 | | 2.2 |
| | | 681.03 | | | | | | |
| 12 | CL - CLAY, trace silt, trace poorly graded sand, medium plasticity, olive brown (2.5 Y 4/4) | | | 7 | SPT/SS | 0.5 | | 1.8 |
| | - blueish black (GLEY 2 2.5/1), strong petroleum odor at 12.0ft BGS | 680.03 | | | | | | |
| 14 | - Refusal at 12.5ft BGS | | | | | | | |
| | END OF BOREHOLE @ 12.5ft BGS | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X218Y141
DATE COMPLETED: January 11, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 714.07 | | | | | | |
| 0 | TOPSOIL (1/2") | 713.67 | | | | | | |
| | CL - CLAY, with trace poorly graded gravel, stiff, medium plasticity, yellowish brown (10 YR 5/6), moist | | | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | 2" DIA. BOREHOLE | 3 | P/S | 2.0 | | <1 |
| 6 | - becoming yellowish red (5 YR 5/8) at 6.0ft BGS | | | 4 | P/S | 2.0 | | 5.8 |
| 8 | - blueish black (GLEY 2 2.5/1), strong petroleum odor at 7.5ft BGS | | BENTONITE CHIPS | 5 | P/S | 2.0 | | 10.7 |
| 10 | - trace silt and medium grained gravel, stiff, medium plasticity, yellowish red (5 YR 5/6), moist at 10.5ft BGS | | | 6 | P/S | 2.0 | | 3.1 |
| 12 | | | | 7 | P/S | 2.0 | | <1 |
| 14 | - becoming very stiff at 14.0ft BGS | | | 8 | P/S | 1.5 | | 0 |
| 16 | - Refusal, weathered bedrock, fractured rock fragments, very stiff, fine grained at 15.5ft BGS | 698.57 | | | | | | |
| | END OF BOREHOLE @ 15.5ft BGS | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X219Y095
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 680.42 | | | | | | |
| 0 | GW - GRAVEL (FILL) | 679.62 | | | | | | |
| 2 | CL - CLAY (FILL), trace poorly graded sand and silt, stiff, low plasticity, olive brown (2.5 Y 4/4), moist | | | 1 | 4P/S | 2.0 | | 0 |
| 2 | | | | 2 | 4P/S | 2.0 | | <1 |
| 4 | | | | 3 | 4P/S | 2.0 | | <1 |
| 6 | - becoming dark olive brown, moist at 6.0ft BGS | | 2" DIA. BOREHOLE; BENTONITE CHIPS | 4 | 4P/S | 2.0 | | <1 |
| 8 | | 672.42 | | | | | | |
| 8 | SW - SAND (FILL), with gravel, fine to coarse grained, well graded, blueish black (Gley 2 2.5/10B), wet, strong petroleum odor | 671.62 | | 5 | 4P/S | 2.0 | | 4.1 |
| 10 | SC - CLAYEY SANDS (FILL), soft, fine grained, dark grey (2.5 Y 4/1), wet | | | 6 | 4P/S | 2.0 | | 3.2 |
| 12 | CL - CLAY, trace silt and poorly graded sand, soft, low plasticity, olive brown (2.5 Y 4/4), wet | 669.42 | | | | | | |
| 12 | SW / GW -SAND & GRAVEL, rock fragments, pale yellow (2.5 Y 7/4) | 667.42 | | 7 | 4P/S | 2.0 | | <1 |
| 14 | - Refusal at 14.0ft BGS | 666.42 | | | | | | |
| 14 | END OF BOREHOLE @ 14.0ft BGS | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y097A
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 679.66 | | | | | | |
| 0 | CONCRETE SLAB | 678.86 | CONCRETE | 1 | P/S | 2.0 | | 0 |
| 2 | CL-CLAY, trace silt, stiff, low plasticity, olive brown (2.5 Y 4/4), moist | | 2" DIA. BOREHOLE | 2 | P/S | 2.0 | | 0 |
| 4 | - becoming strong brown (7.5 YR 5/6) at 4.8ft BGS | | BENTONITE CHIPS | 3 | P/S | 2.0 | | NA |
| 6 | - 2 inch layer gravel, medium grained at 6.5ft BGS | | | 4 | P/S | 2.0 | | NA |
| 8 | - trace medium grained sand and gravel, stiff, medium plasticity, yellowish brown (10 YR 5/6), trace black staining at 7.7ft BGS | | | 5 | P/S | 0.0 | | NA |
| 10 | - Refusal at 10.0ft BGS | 669.66 | | | | | | |
| | END OF BOREHOLE @ 10.0ft BGS | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (1)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y097B
DATE COMPLETED: January 8, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 679.81 | | | | | | |
| 0 | CONCRETE SLAB | 679.01 | CONCRETE | 1 | P/S | 2.0 | | 0 |
| 2 | CL - CLAY (FILL), trace silt, stiff, low plasticity, olive brown (7.5 YR 5/6), moist | | 2" DIA. BOREHOLE | 2 | P/S | 2.0 | | 0 |
| 4 | | | BENTONITE CHIPS | | | | | |
| 6 | Weathered bedrock with fine sand and rock fragments, becoming strong brown (7.5 YR 5/6) - Refusal at 6.0ft BGS | 674.81 673.81 | | 3 | P/S | 2.0 | | 0 |
| 8 | END OF BOREHOLE @ 6.0ft BGS | | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (P/S)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y124
DATE COMPLETED: January 14, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 714.24 | | | | | |
| 0 | TOPSOIL | 714.04 | | | | | |
| | CL - CLAY, trace silt, stiff, medium plasticity, yellowish brown (10 YR 5/6), moist | | | 1 | P/S | 2.0 | |
| 2 | | | | 2 | P/S | 2.0 | |
| 4 | - trace gravel, turning reddish brown (5 YR 3/4) at 5.0ft BGS | | | 3 | P/S | 2.0 | |
| 6 | | | | 4 | P/S | 2.0 | |
| 8 | | | BENTONITE CHIPS | 5 | P/S | 2.0 | |
| 10 | - with silt, soft, medium plasticity, olive (5 Y 5/4), moist at 11.0ft BGS | | 2" DIA. BOREHOLE | 6 | P/S | 2.0 | |
| 12 | | | | 7 | P/S | 2.0 | |
| 14 | Weathered bedrock, rock fragments | 699.74 | | 8 | P/S | 1.0 | |
| 15 | - Refusal at 15.0ft BGS | 699.24 | | | | | |
| 16 | END OF BOREHOLE @ 15.0ft BGS | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (⬭)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

DRAFT

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X225Y077
DATE COMPLETED: January 4, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 684.65 | | | | | | |
| 0 | SW / GW - SAND & GRAVEL (FILL) | | | 1 | P/S | 2.0 | | <1 |
| 2 | CL - CLAY (FILL), little silt, trace well graded gravel, relatively dense, medium plastcity, (10 YR 4/6), moist | 682.65 | | 2 | P/S | 2.0 | | <1 |
| 4 | SW - SAND (FILL), trace gravel and clay, well graded, yellow (10 YR 7/6) | 679.65 | | 3 | P/S | 2.0 | | <1 |
| 6 | | | | 4 | P/S | 2.0 | | <1 |
| 8 | | | BENTONITE CHIPS | 5 | P/S | 2.0 | | <1 |
| 10 | CL - CLAY, trace silt, dense, low plastcity, reddish brown (7.5 YR 5/6), moist | 674.65 | 2" DIA. BOREHOLE | 6 | P/S | 2.0 | | <1 |
| 12 | | | | 7 | P/S | 2.0 | | <1 |
| 14 | - Refusal at 15.0ft BGS | 669.65 | | 8 | P/S | 1.0 | | <1 |
| 16 | END OF BOREHOLE @ 15.0ft BGS | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LABORATORY ANALYSIS (oval)

OVERBURDEN LOG 13968-1.GPJ CRA_CORP.GDT 12/15/04

# ATTACHMENT B

# ISOPACH VOLUME DATA SHEETS

DRAFT

# VOLUME DATA SHEET

Conestoga-Rovers & Associates

| | Drawing File Name | Surface Name |
|---|---|---|
| Surface No. 1: | 00-2004-12-29-bedrock-topo | |
| | 13968-00(LDD128)CI-WA005.dwg | |
| Surface No. 2: | 00-2003-08-22-ex-conditions | |

Project No: 13968-00
Project Name: BEDFORD
Date: 29-Dec-04
Requested By: D. CLOWATER
Calc'd By: T. JACOBS
Page: 1 of 1

Units are: 2 (1 for Metric, 2 for Imperial)

## VOLUME CALCULATION RESULTS

| | | | CUT cu.yd. | FILL cu.yd. | NET cu.yd. | |
|---|---|---|---|---|---|---|
| **COMPOSITE** | | | | | | |
| Stratum Name: | 00-2004-12-29-OVERBURDEN | | 754 | 1373300 | 1372546 | Fill |
| Site Name: | 12/29/2004 | Comment: | CUT VOLUME IS A RESULT OF | | | |
| Surface Name: | 00-2004-12-29-OVERBURDEN | | INTERPOLATION ERROR, VALUE TO EQUAL ZERO. | | | |

**GRID**
Stratum Name:
Grid size: feet
Site Name:
Surface Name:
Comment:

**END AREA**
Stratum Name:
Station Interval (grid size): feet
Direction:
Surface Name:
Comment:

**END AREA**
Stratum Name:
Station Interval (grid size): feet
Direction:
Surface Name:
Comment:

**SUBSITES**

Subsite No./Name:
Surface Area: ft2
Comment:

Subsite No./Name:
Surface Area: ft2
Comment:

Subsite No./Name:
Surface Area: ft2
Comment:

Subsite No./Name:
Surface Area: ft2
Comment:

General Information: VOLUME OF OVERBURDEN, BETWEEN TOP OF ST. LOUIS BEDROCK TO EXISTING GROUND SURFACE FOR ENTIRE SITE.

DRAFT

# VOLUME DATA SHEET

Conestoga-Rovers & Associates

| | Drawing File Name | Surface Name |
|---|---|---|
| Surface No. 1: | 00-2004-12-29-salem-formation-topo | |
| | 13968-00(LDD128)CI-WA006.dwg | |
| Surface No. 2: | 00-2003-08-22-ex-conditions | |

Project No: 13968-00
Project Name: BEDFORD
Date: 29-Dec-04
Requested By: D. CLOWATER
Calc'd By: T. JACOBS
Page: 1 of 1

Units are: 2 (1 for Metric, 2 for Imperial)

## VOLUME CALCULATION RESULTS

| | | | CUT cu.yd. | FILL cu.yd. | NET cu.yd. |
|---|---|---|---|---|---|
| **COMPOSITE** | | | | | |
| Stratum Name: | 00-2004-12-29-St LOUIS | | 860 | 1471617 | 1470757 Fill |
| Site Name: | 12/29/2004 | Comment: | CUT VOLUME IS A RESULT OF | | |
| Surface Name: | 00-2004-12-29-St LOUIS | | INTERPOLATION ERROR, VALUE TO EQUAL ZERO. | | |
| **GRID** | | | | | |
| Stratum Name: | | | | | |
| Grid size: | feet | Comment: | | | |
| Site Name: | | | | | |
| Surface Name: | | | | | |
| **END AREA** | | | | | |
| Stratum Name: | | | | | |
| Station Interval (grid size): | feet | Comment: | | | |
| Direction: | | | | | |
| Surface Name: | | | | | |
| **END AREA** | | | | | |
| Stratum Name: | | | | | |
| Station Interval (grid size): | feet | Comment: | | | |
| Direction: | | | | | |
| Surface Name: | | | | | |
| **SUBSITES** | | | | | |
| Subsite No./Name: | | | | | |
| Surface Area: | ft2 | Comment: | | | |
| Subsite No./Name: | | | | | |
| Surface Area: | ft2 | Comment: | | | |
| Subsite No./Name: | | | | | |
| Surface Area: | ft2 | Comment: | | | |
| Subsite No./Name: | | | | | |
| Surface Area: | ft2 | Comment: | | | |

General Information: VOLUME OF ST. LOUIS BEDROCK, BETWEEN TOP OF SALEM BEDROCK TO TOP OF ST. LOUIS BEDROCK FOR ENTIRE SITE.

**DRAFT FOR REVIEW**
**REVISION 0**
**FEBRUARY 1, 2005**

DISC A

SITE VISUALIZATION OF PCB DISTRIBUTION IN EAST PLANT AREA

# APPENDIX B

## GEOTECHNICAL EVALUATION FOR FORMER NORTH DISPOSAL AREA (AOI 4), AUGUST 8, 2003

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

# MEMORANDUM

TO: Cheryl Hiatt

REF. NO.: 13968/rcc/92

FROM: Bruce Polan

DATE: August 8, 2003

C.C.: Ed Peterson
Glenn Turchan
Bill Steinmann
Jim McGuigan
Jeroen Winterink
Jeff Daniel

**RE: Geotechnical Evaluation for Former North Disposal Area (AOI 4)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

## 1.0 INTRODUCTION

This memo provides a summary of a geotechnical evaluation performed for the Former North Disposal Area (AOI 4) at the General Motors Powertrain facility in Bedford, Indiana, herein referred to as the Site. The purpose of the geotechnical evaluation was to obtain additional information on the subsurface conditions within AOI 4, and to use that information to evaluate slope stability issues related to the stability of the existing slopes, and potential placement of additional fill materials on top of this area. Secondly, this evaluation will aid in the evaluation of the slopes for use in determining an interim or final remedy, regardless of the potential placement of additional fill materials. The location of AOI 4 is shown on Figure 1.1.

## 2.0 CURRENT CONDITIONS AT AOI 4

During implementation of the RCRA Facility Investigation Work plan (RFI Work Plan) (CRA, October 29, 2001), ten soil borings were completed through AOI 4, including the installation of two bedrock monitoring wells (shallow and multi-level) and one overburden monitoring well (see Figure 2.1 for locations).

Soil borings (B-X148Y233, B-X169Y248, B-X187Y217, B-X192Y234, B-X193Y251, B-X219Y249, and B-X243Y257) and one monitoring well nest (MW-X143Y245S and MW-X143Y245D) were advanced within the Former North Disposal Area. Two of these soil borings and the monitoring well nest are also included in AOI 15. One overburden well (TMW-X193Y251) was also installed due to the presence of groundwater within the overburden materials. In addition to the soil borings, two surface water samples and one sediment sample were collected from a spring located at the base of the landfill at its northern extent. Soil boring logs are included as Attachment A.

The subsurface conditions encountered within this AOI included approximately 2 to 31 feet of fill materials (gray to black fine-grained, poorly graded sand, with inclusion of gravel, bricks, metal, wood, and plastic).

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

The waste was not fully penetrated at the termination depth of 34 feet at the TMW-X193Y251 location. This fill material is overlain with 3 to 6 feet of clay and topsoil, and is underlain in places by a relatively thin layer of native clay. The native clay directly overlies the limestone bedrock (St. Louis Formation and Salem Formation) in some locations. At other locations, it appears that the fill materials directly overlie the limestone bedrock. Water saturation was encountered at one location at a low point in the bedrock surface where the native clay was absent. A two-inch PVC well screen and riser were installed at this location.

The subsurface stratigraphy encountered in the boreholes is consistent with the regional geology as reported in the RCRA Facility Investigation Work Plan. Standard Penetration testing (SPT) was conducted at the TMW-X193Y251 location. SPT 'N' values varied from 12 to 47 blows per foot, indicating a moderate but variable degree of compaction may have been used during waste placement.

## 3.0 GEOTECHNICAL ASSESSMENT AND ADDITIONAL DATA COLLECTION

### 3.1 VISUAL SLOPE STABILITY ASSESSMENT

A visual assessment was carried out by the Geotechnical Engineer during a walkover conducted on November 20, 2002. The ground surface on AOI 4 is somewhat soft based on the appearance of ruts that were formed by the drill rigs during the previous borehole work. The top surface of the landfill is grassed, and slopes to the east. The south end of AOI 4 abuts an existing stormwater treatment pond. The western end of AOI 4 abuts a gravel surfaced transport trailer yard, and a former lagoon that has been backfilled is located to the south of the trailer yard. The northern and eastern slopes of the disposal area slope downward to forested land. The slopes of the disposal area are treed and vegetated, with some trees up to 1 ft in diameter. The slopes appear visually stable, with no signs of instability noted, other than some shallow erosion due to sparse vegetation between trees. Two seepage zones were observed at the base of the north slope, however, no significant flow was observed, and water ponding was minimal.

The ground surface elevation of AOI 4 is about 690 feet above mean sea level (amsl) at the west end, sloping down to the east to about 630 feet amsl. Based on the topographic contours shown on Figure 2.1, the north and east slopes of AOI 4 slope downward at about 3 horizontal to 1 vertical (3H:1V) or flatter.

### 3.2 CONE PENETRATION TESTS

Cone penetration tests (CPTs) were performed at eleven locations (CPT-1 to CPT-11) by Conetech Inc. under the direction of the CRA Geotechnical Engineer on March 11, 2003. The locations of the CPTs are shown on Figure 2.1. The CPT plots are included in Attachment B. Several of the CPT soundings were repeated (donated by the suffix 'A'), where refusal to CPT advancement (assumed to be the top of the bedrock) was encountered at a depth that was inconsistent with the borehole information.

In general, the CPT data correlates well with the subsurface information obtained through the previously installed augered boreholes. Based on the CPT data, the geology in the vicinity of the slope consists of a cap of clay or clayey silt, that is about 3 to 6 feet thick. This clay cap is underlain by sandy silt/silty sand fill (foundry sand). The foundry sand fill is underlain by a thin native clay layer (up to 5 feet thick at the CPT

locations). Refusal of the CPT probe to advancement occurred at depths of between 6.5 feet and 33.5 feet. In most cases, this refusal depth is representative of the top of the bedrock surface, however, refusal sometimes occurred at shallow depths, likely on larger inclusions in the fill deposit.

Two angled boreholes were drilled in March 2003 (B-X177Y252D and B-X223Y247D) at AOI 4. The logs for the angled boreholes are included in Attachment A. Two samples of the sand fill, and underlying native clay were submitted to Schleede Hampton Associates Inc for grain size distribution testing, and the results of the analyses are included in Attachment C.

One groundwater dissipation tests was also performed at CPT-8 (close to the location of monitoring well TMW-X193Y251) to determine the approximate static groundwater table depth. The groundwater dissipation plot is included in Attachment B. Based on the dissipation test, the groundwater level in CPT-8 was at 27 feet below ground surface, corresponding to elevation 658.6 feet amsl, which is consistent with groundwater level measurements in the monitoring well.

## 4.0 SLOPE STABILITY MODELING

CRA performed an assessment of the existing slope stability using the data summarized above. The slope stability modelling was performed using Slope /W (Version 5.13) limit equilibrium software, using the Bishop Method of slices. This modelling software calculates the factor of safety (FS) for each hypothetical or selected failure surface through the slope. This analysis method is also used to assess potential for movement of deep or shallow masses of soil over a specific failure surface, which is often curved or circular. Shallow (near surface) failure tend to occur mostly in a cohesionless soils (i.e., sands) or competent cohesive soils (i.e., clay soil with a high internal strength). Failures of slopes composed of less competent cohesive soils (i.e., clay soils with a low internal shear strength), tend to be deep rotational failures involving much larger massess of soil.

For a selected surface, the FS is defined as the ratio of the moments of the available soil strength resting movement, divided by the gravitational forces tending to a cause movement. A FS of 1.0 represents a "limiting equilibrium" condition where the slope is at a point of pending failure since the soil resistance is equal of the forces tending to cause the movement. An FS greater than 1.0 is required to ensure stability of the slope. The typical FS used for engineering design of permanent slopes ranges from about 1.25 to 1.5, depending on the severity of a slope failure and the assumed conditions (groundwater level, seismic loads, tension cracks, etc.).

A cross section through the slope is shown on Figure 4.1. As stated in Section 2.0, the existing slope is at about 3H:1V, and appears to be stable in its current configuration, based on the visual assessment discussed in Section 3.1.

Input parameters for the model include the slope geometry and soil and groundwater stratigraphy, as shown on Figure 4.1. Based on the available information, the following conservative values (i.e., values which likely underestimate the actual FS) were assumed for unit weight, friction angle, and undrained shear strength for the soil units:

| Soil Unit | Unit Weight (pcf) | Undrained Soil Strength Parameters: Friction Angle, ϕ (degrees) | Undrained Soil Strength Parameters: Undrained Shear Strength, cu (psf) |
|---|---|---|---|
| Existing Clay Cap | 115 | 0 | 1,000 |
| Foundry Sand | 120 | 30 | 0 |
| Native Clay | 115 | 0 | 2,000 |
| Bedrock* | 150 | --- | --- |

*Note: Strength values assumed much larger than all other soils since failure will not occur through bedrock unless fractures are present.

These soil parameters were selected based on the previous geotechnical data and CPT testing, as well as past experience with similar soils and engineering judgement.

The results of the slope stability analysis for the existing slope are presented on Figure 4.1. For this case, the groundwater table is assumed to be just above the native clay layer, at about elevation 659 ft, and daylighting out at the base of the slope. The FS for the potential failure surface cutting through the existing slope is about 2.8, indicating that the current configuration is stable. It should be noted that FS decreases for shallower slip surfaces, indicating that shallow sloughing type failures could occur on the slope if the slope was not adequately stabilized by the existing vegetative growth and established trees. The stabilizing effect of the vegetation is generally not modeled, but is assessed visually. The slope stability analysis also does not consider seismic effects, however, the FS under static conditions is sufficiently large enough to consider that normal seismic impacts would not have a significant effect on the stability analysis results.

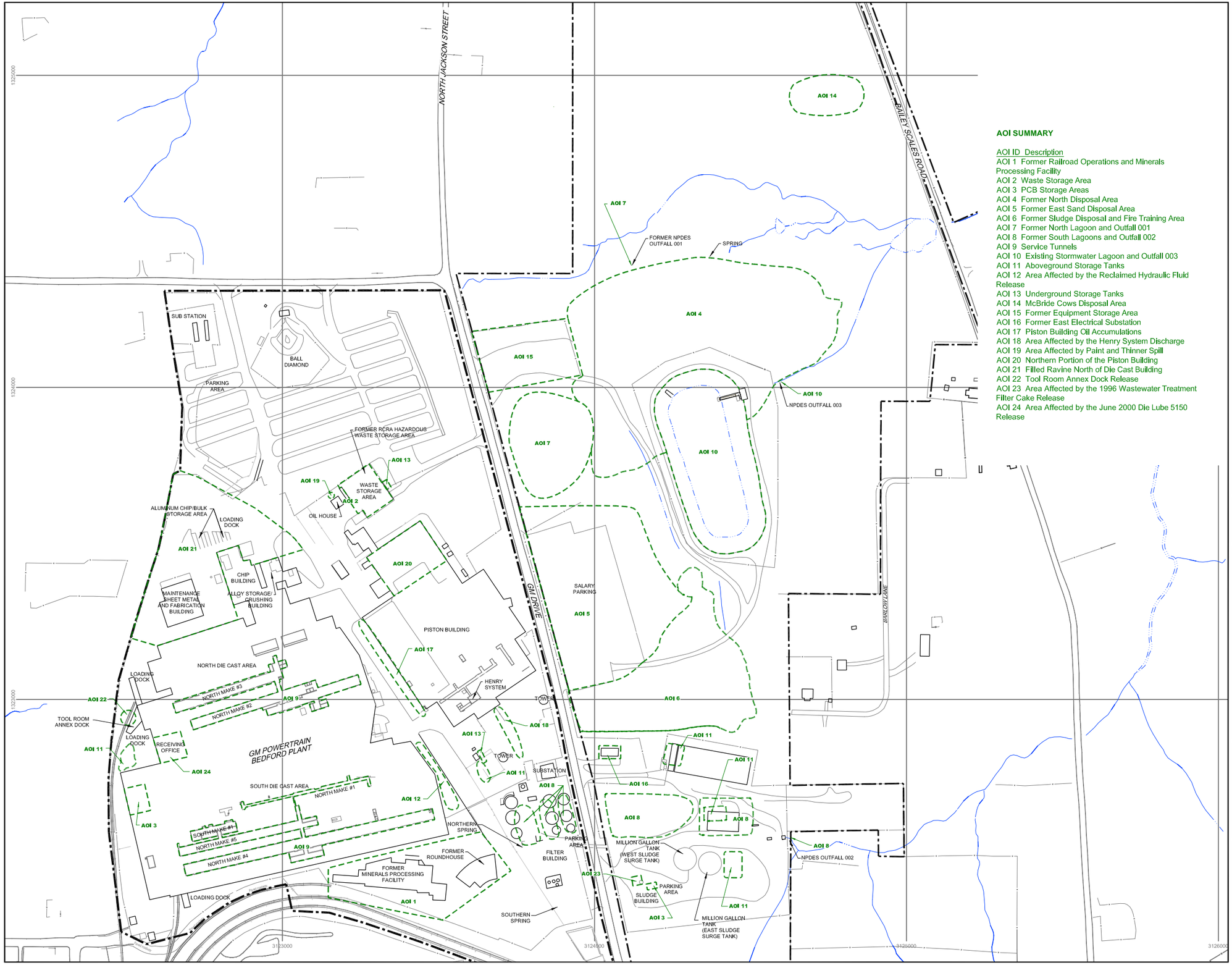
As part of the Removal Action scope of work, AOI 4 may be utilized as a temporary staging area for excavated sediments. CRA has prepared engineering drawings for the staging area (CRA Report 41, Drawing C-13, dated March 5, 2003). The staging area would involve construction of a fill pile up to 12 feet high located on the flat portion of AOI 4. The proposed configuration of the slope is shown in Figure 4.2. The new fill pile will also have side slopes of 3H:1V, and will be protected from erosion by an engineered cover.

A slope stability analysis was carried out to determine the stability of the existing slope after construction of the new fill pile. In this analysis, it has been assumed that the sediments to be placed in the staging area will be sufficiently dewatered and stabilized, if required, to be placed in a safe manner. The geotechnical characteristics of the sediment are currently undefined, so a stability analysis was performed to back-calculate minimum strength properties of the sediments required to maintain stable conditions. Using a minimum FS of 1.5, potential slip surfaces for frictional material (i.e., no cohesion), and cohesive material , were evaluated separately (see Figures 4.2 and 4.3). Based on the stability results, a minimum friction angle of 26 degrees, or a minimum cohesion of 165 lbs per square foot (psf) would be required for the sediment to be constructed at a 3H:1V slope. The sediments used to construct the fill pile may have to be stabilized using a suitable strengthening additive to achieve these strengths (a minimum compressive strength of 5 psi is recommended if stabilizing is required). Figures 4.2 and 4.3 also show deeper potential slip surfaces

cutting through the existing slope. The FS for the deeper slip surface is greater than 1.5, indicating that the placement of the fill pile will not significantly impact the stability of the existing slope.

## 5.0 CONCLUSIONS

Based on the geotechnical data collected and the slope stability analysis performed, the existing slopes at AOI 4 are currently stable, with a FS of about 2.8 for the 3H:1V side slopes. The construction of a temporary staging area on top of the existing foundry sand fill will not have a significant impact on the stability of the existing slopes. The geotechnical characteristics of the sediment that will be placed above the foundry sand in the temporary staging area should be assessed prior to construction of the staging area to determine if stabilization of the sediments will be required. At a minimum, the sediments should be dewatered sufficiently to ensure that they can be placed in a controlled fashion, in thin lifts and moderately compacted.




## AOI SUMMARY

AOI ID Description

AOI 1 Former Railroad Operations and Minerals Processing Facility
AOI 2 Waste Storage Area
AOI 3 PCB Storage Areas
AOI 4 Former North Disposal Area
AOI 5 Former East Sand Disposal Area
AOI 6 Former Sludge Disposal and Fire Training Area
AOI 7 Former North Lagoon and Outfall 001
AOI 8 Former South Lagoons and Outfall 002
AOI 9 Service Tunnels
AOI 10 Existing Stormwater Lagoon and Outfall 003
AOI 11 Aboveground Storage Tanks
AOI 12 Area Affected by the Reclaimed Hydraulic Fluid Release
AOI 13 Underground Storage Tanks
AOI 14 McBride Cows Disposal Area
AOI 15 Former Equipment Storage Area
AOI 16 Former East Electrical Substation
AOI 17 Piston Building Oil Accumulations
AOI 18 Area Affected by the Henry System Discharge
AOI 19 Area Affected by Paint and Thinner Spill
AOI 20 Northern Portion of the Piston Building
AOI 21 Filled Ravine North of Die Cast Building
AOI 22 Tool Room Annex Dock Release
AOI 23 Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 24 Area Affected by the June 2000 Die Lube 5150 Release

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

N

0 50 150ft

LEGEND

- AOI BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

| Status | Date | Initial |
|---|---|---|
| | | |

# GM POWERTRAIN BEDFORD PLANT

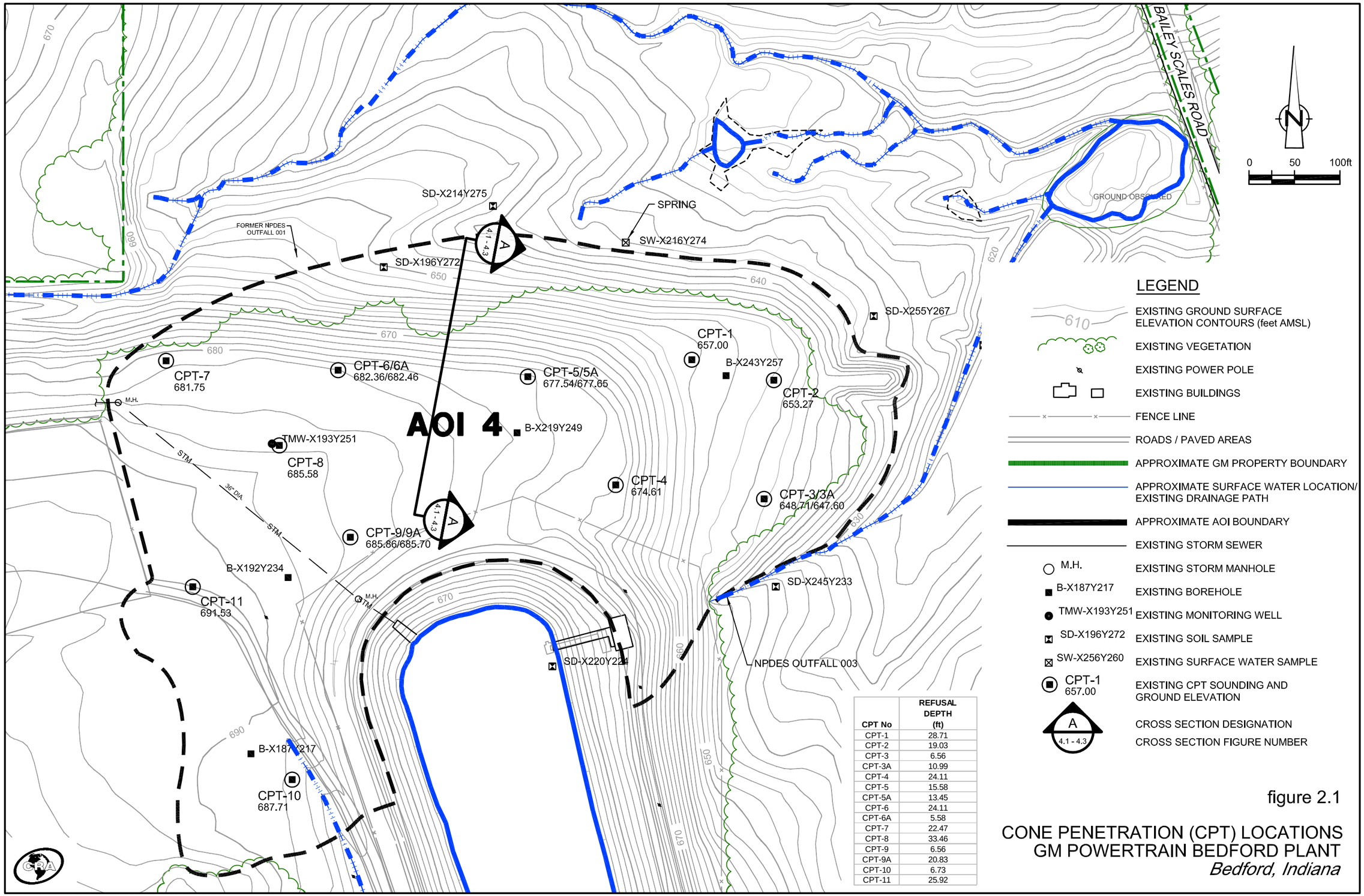
## SITE PLAN AND AOI LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | B.S./S.R. | MAY 2003 | |
| Scale: AS SHOWN | Project No: 13968-00 | Report No: MEMO092 | Drawing No: figure 1.1 |

13968-00(MEMO092)GN-WA002 APR 07/2005




| CPT No | REFUSAL DEPTH (ft) |
|---|---|
| CPT-1 | 28.71 |
| CPT-2 | 19.03 |
| CPT-3 | 6.56 |
| CPT-3A | 10.99 |
| CPT-4 | 24.11 |
| CPT-5 | 15.58 |
| CPT-5A | 13.45 |
| CPT-6 | 24.11 |
| CPT-6A | 5.58 |
| CPT-7 | 22.47 |
| CPT-8 | 33.46 |
| CPT-9 | 6.56 |
| CPT-9A | 20.83 |
| CPT-10 | 6.73 |
| CPT-11 | 25.92 |

figure 2.1

## CONE PENETRATION (CPT) LOCATIONS
## GM POWERTRAIN BEDFORD PLANT
*Bedford, Indiana*

File Name: 13968 Existing.slz
Analysis Method: Bishop

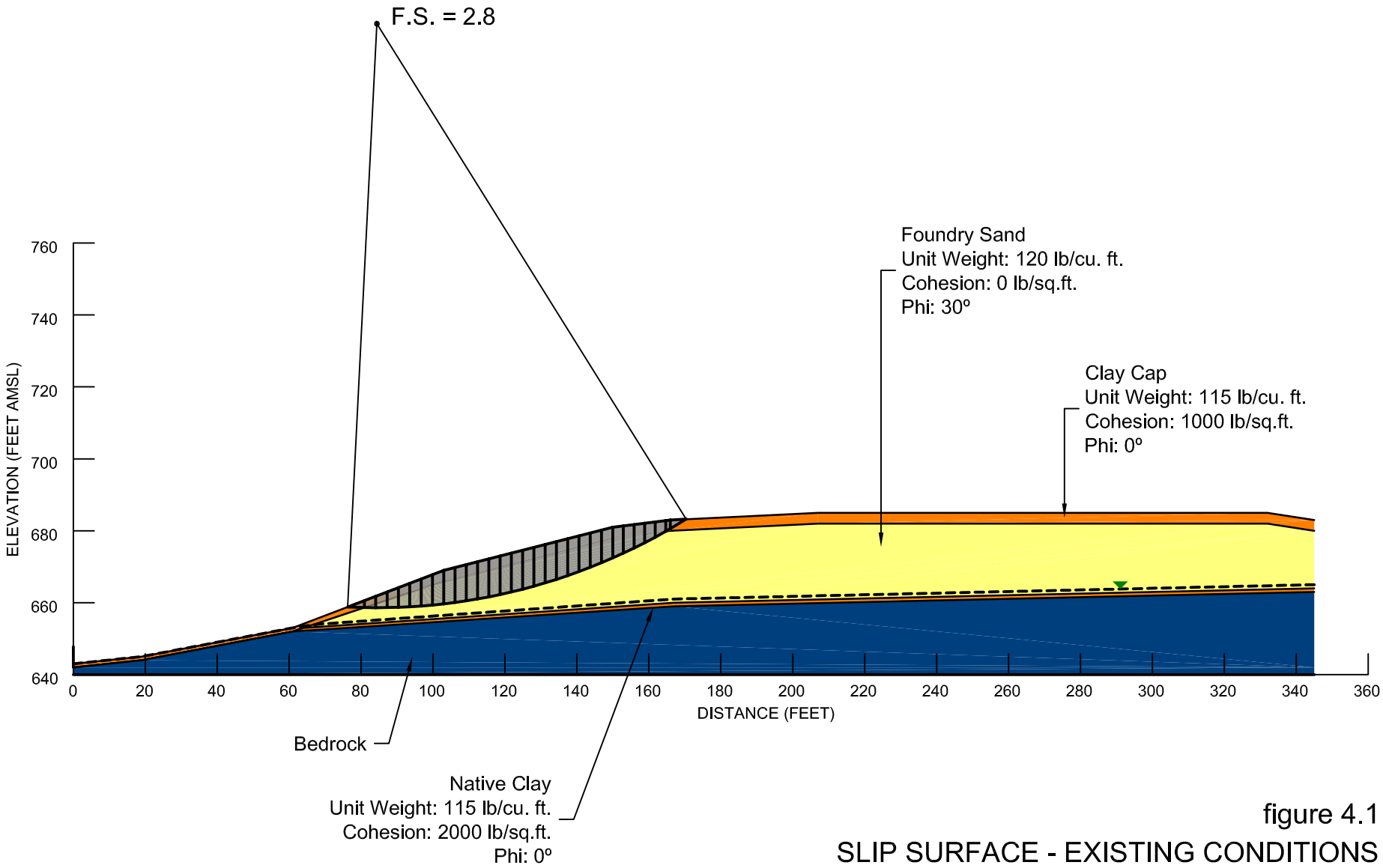



figure 4.1

SLIP SURFACE - EXISTING CONDITIONS
GM POWERTRAIN BEDFORD PLANT
*Bedford, Indiana*

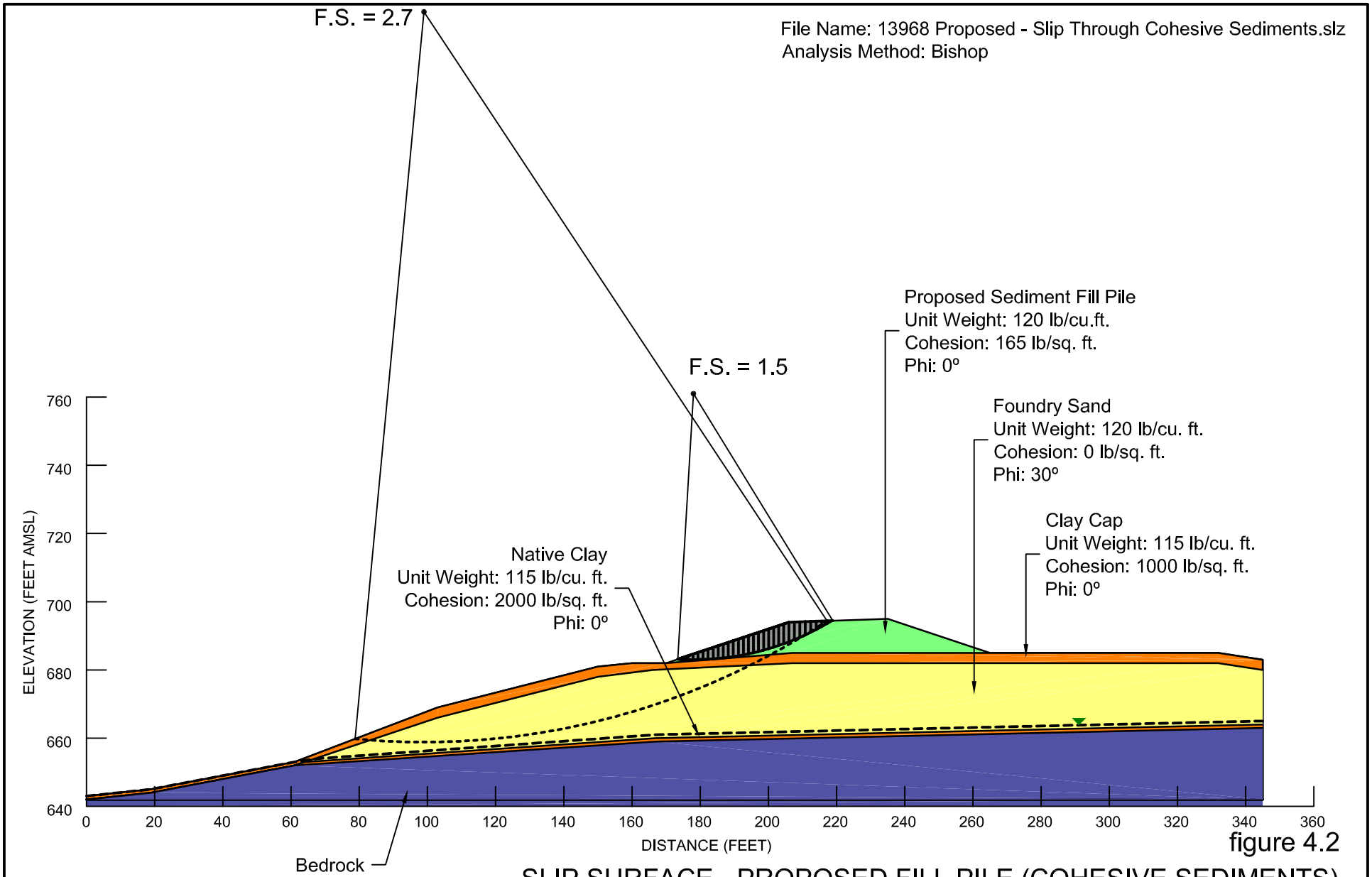



figure 4.2

SLIP SURFACE - PROPOSED FILL PILE (COHESIVE SEDIMENTS)
GM POWERTRAIN BEDFORD PLANT
*Bedford, Indiana*

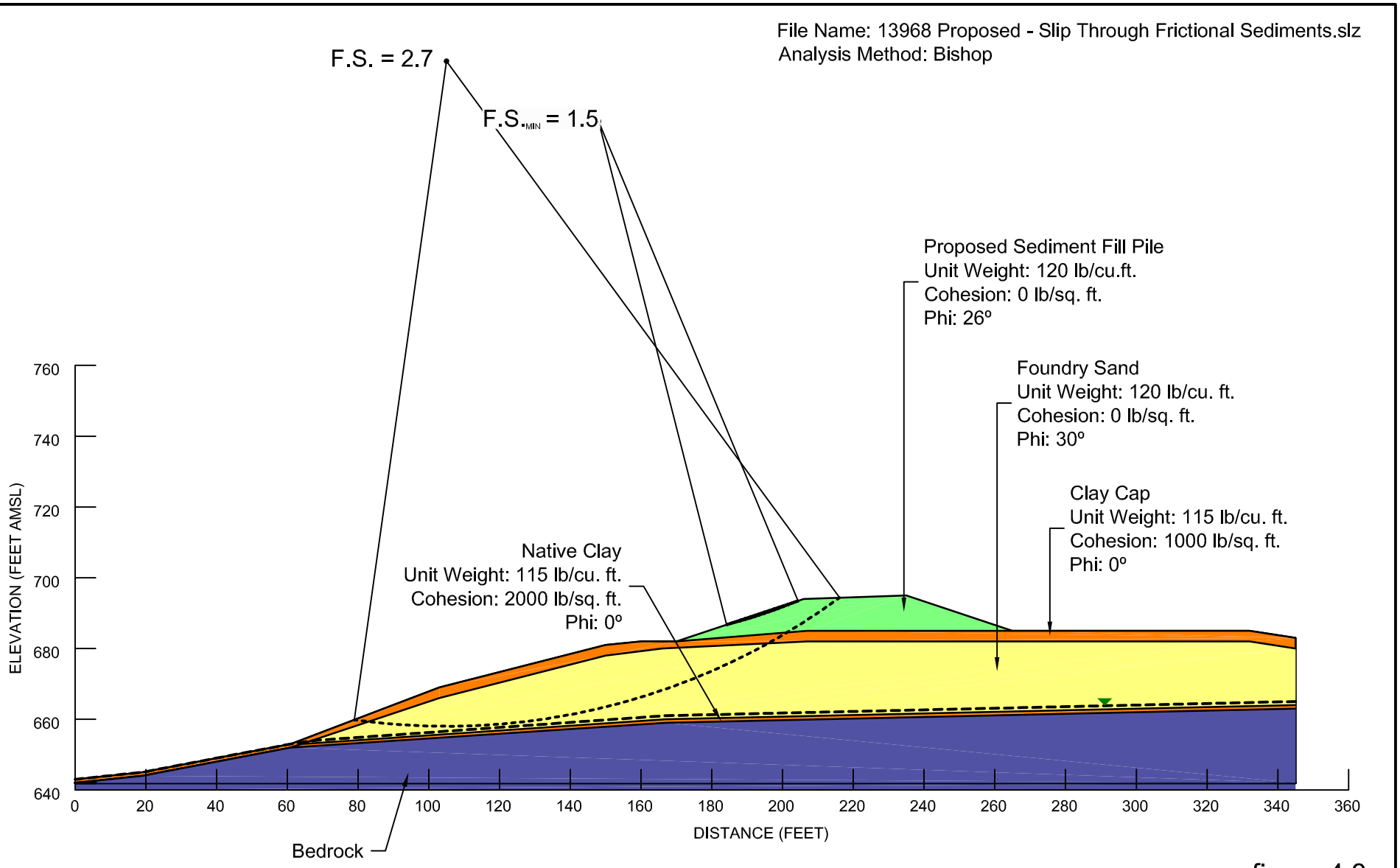



figure 4.3

SLIP SURFACE - PROPOSED FILL PILE (FRICTIONAL SEDIMENTS)
GM POWERTRAIN BEDFORD PLANT
*Bedford, Indiana*

ATTACHMENT A

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X148Y233
DATE COMPLETED: February 22, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 695.6 | | | | | | |
| 0 | SW-GW SAND AND GRAVEL (FILL), rock fragments, compact, medium to coarse grained, well graded | | | 1 | | 2.0 | 25 | 0 |
| 2 | CL-CLAY, little silt, very stiff, low to medium plasticity, 10YR 4/8 (red), iron staining, moist | 693.6 | | 2 | | 2.0 | 22 | 0 |
| 4 | | | | 3 | | 2.0 | 23 | 0 |
| 6 | - 2.5YR 4/8 (red) at 6.0ft BGS | | | 4 | | 2.0 | 24 | 0 |
| 8 | | | BENTONITE GROUT | 5 | | 2.0 | 28 | 0 |
| 10 | | | | 6 | | 2.0 | 22 | 0 |
| 12 | ML-SILT, trace clay, compact, 2.5YR 6/2 (pale red), very moist to wet | 684.0 | | | | | | |
| | CL-CLAY, little silt, firm, medium plasticity, 5YR 5/8 (yellowish red), moist | 683.1 | | 7 | | 2.0 | 10 | 0 |
| 14 | BEDROCK, refusal | 681.1 | | 8 | | 1.0 | >50 | 0 |
| | END OF BOREHOLE @ 15.0ft BGS | 680.6 | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | DRAFT | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○)

OVERBURDEN LOG 13966.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X169Y248
DATE COMPLETED: February 21, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 690.9 | | | | | | |
| 0 | SW-GW SAND AND GRAVEL (FILL), little silt, dense, fine to coarse grained, well graded, grey, moist, rock fragments | 689.4 | | 1 | | 2.0 | 44 | 0 |
| 2 | CL-CLAY (FILL), little silt, trace gravel, very stiff, low to medium plasticity, 5YR 4/6 (yellowish red), moist | | | 2 | | 2.0 | 19 | 0 |
| 4 | wood fragments | 686.9 | | 3 | | 2.0 | 22 | 0 |
| | | 686.4 | | | | | | |
| 6 | SP-SAND (FILL), little gravel, trace silt, compact, fine grained, poorly graded, grey/black, moist, (foundry sand) - black/light grey, reddish brown/yellow and light blue, faint odor, loose at 6.0ft BGS | | | 4 | | 2.0 | 32 | 0 |
| 8 | | | | 5 | | 2.0 | 6 | 0 |
| 10 | | | | 6 | | 2.0 | 6 | 0 |
| 12 | | | BENTONITE GROUT | 7 | | 2.0 | 4 | 0.9 |
| 14 | | | | 8 | | 2.0 | 4 | 1.3 |
| 16 | | | | 9 | | 2.0 | 10 | 0 |
| 18 | | | | 10 | | 2.0 | 8 | 0 |
| 20 | CL-CLAY, little silt, rootlets, firm, low to medium plasticity, brown with some black staining, very moist - yellowish red at 22.0ft BGS | 670.9 | | 11 | | 2.0 | 8 | 0 |
| 22 | | | | 12 | | 2.0 | 11 | 0 |
| 24 | BEDROCK | 666.4 | | 13 | | 1.0 | >50 | 0 |
| | END OF BOREHOLE @ 25.0ft BGS | 665.9 | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG
# (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X187Y217
DATE COMPLETED: March 6, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 689.1 | | | | | | |
| 0 | TOPSOIL | 688.5 | | | | | | |
| | CL-CLAY, trace silt, stiff, low plasticity, strong brown, (7.5YR 5/8) | | | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | <1 |
| 4 | | | BENTONITE CHIPS | 3 | P/S | 2.0 | | <1 |
| 6 | | | | 4 | P/S | 2.0 | | 0 |
| 8 | - refusal, weathered rock at 8.0ft BGS<br>END OF BOREHOLE @ 8.0ft BGS | 681.1 | | | | | | |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X192Y234
DATE COMPLETED: March 5, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 688.6 | | | | | | |
| 0 | TOPSOIL | 688.4 | | | | | | |
| | CL-CLAY (FILL), trace silt, stiff, low plasticity, 5YR 5/8 (yellowish red), moist | | | 1 | P/S | 2.0 | | 0 |
| 2 | | | | 2 | P/S | 2.0 | | 0 |
| 4 | SP-SAND (FILL), trace gravel, loose, fine grained, poorly graded, 5Y 3/2 (dark olive gray), moist | 684.1 | | 3 | P/S | 2.0 | | <1 |
| 6 | | | | 4 | P/S | 2.0 | | <1 |
| 8 | - no gravel at 9.0ft BGS | | | 5 | P/S | 2.0 | | 1.5 |
| 10 | - GLEY2 7/5PB (light bluish gray) at 10.0ft BGS | | BENTONITE CHIPS | 6 | P/S | 2.0 | | 1.2 |
| 12 | - 10YR 7/2 (pale brown) at 12.0ft BGS | | | 7 | P/S | 2.0 | | 1.4 |
| 14 | | | | 8 | P/S | 2.0 | | <1 |
| 16 | - 5Y 3/2 (dark olive gray) at 17.0ft BGS | | | 9 | P/S | 2.0 | | <1 |
| 18 | | | | 10 | P/S | 2.0 | | <1 |
| 20 | CL-CLAY, trace silt, low plasticity, 7.5YR 5/8 (strong brown), moist | 668.6 | | 11 | P/S | 2.0 | | <1 |
| 22 | - rock fragments, refusal at 22.0ft BGS | 666.6 | | | | | | |
| | END OF BOREHOLE @ 22.0ft BGS | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○)

OVERBURDEN LOG 13966.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG
# (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y251
DATE COMPLETED: March 4, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 685.4 | | | | | | |
| 0 | TOPSOIL | 683.2 | | | | | | |
| 2 | CL-CLAY (FILL), trace silt, stiff, yellowish brown (10YR 5/6), moist | | | 1 | P/S | 2.0 | | 0 |
| 4 | SP-SAND (FILL), trace gravel, loose, fine grained, poorly graded, olive brown (2.5Y 4/4), moist | 682.4 | | 2 | P/S | 2.0 | | 0 |
| | - trace gravel at 5.0ft BGS | | | 3 | P/S | 2.0 | | <1 |
| 6 | - black (GLEY1 2.5/N) at 6.0ft BGS | | | 4 | P/S | 2.0 | | <1 |
| 8 | | | | 5 | P/S | 2.0 | | <1 |
| 10 | | | | 6 | P/S | 2.0 | | <1 |
| 12 | | | | 7 | P/S | 2.0 | | <1 |
| 14 | | | | 8 | P/S | 2.0 | | <1 |
| 16 | DRAFT | | BENTONITE CHIPS | 9 | P/S | 2.0 | | <1 |
| 18 | | | | 10 | P/S | 2.0 | | <1 |
| 20 | | | | 11 | P/S | 2.0 | | <1 |
| 22 | | | | 12 | P/S | 2.0 | | <1 |
| 24 | | | | 13 | P/S | 2.0 | | 0 |
| 26 | | | | 14 | P/S | 2.0 | | 0 |
| 28 | - becomes wet, heaving sands at 28.0ft BGS | | | 15 | P/S | 2.0 | | 0 |
| 30 | | | | 16 | P/S | 2.0 | | 0 |
| 32 | | | | 17 | P/S | 1.0 | | 0 |
| 34 | - dark greenish gray (GLEY1 4/5GY) at 33.5ft BGS | 651.4 | | | | | | |
| | - Refusal at 34.0ft BGS | | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG
# (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X193Y251
DATE COMPLETED: March 4, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVA- | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| 36 | END OF BOREHOLE @ 34.0ft BGS | | | | | | | |
| 38 | | | | | | | | |
| 40 | | | | | | | | |
| 42 | | | | | | | | |
| 44 | | | | | | | | |
| 46 | | | | | | | | |
| 48 | | | | | | | | |
| 50 | | | | | | | | |
| 52 | | | | | | | | |
| 54 | | | | | | | | |
| 56 | | | | | | | | |
| 58 | | | | | | | | |
| 60 | | | | | | | | |
| 62 | | | | | | | | |
| 64 | | | | | | | | |
| 66 | | | | | | | | |
| 68 | | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: TMW-X193Y251
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 4 1/4-INCH HSA
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 689.7<br>685.5 | | | | | |
| | SAME STRATIGRAPHY AS B-X193Y251 | | BENTONITE CHIPS | | | | |
| | | | SAND PACK<br>WELL SCREEN | | | | |
| | END OF BOREHOLE @ 31.0ft BGS | 654.5 | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968.GPJ CRA_CCRP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X219Y249
DATE COMPLETED: February 26, 2002
DRILLING METHOD: 4 1/4-inch HSA
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 679.6 | | | | | | |
| 0 | TOPSOIL | 679.4 | | | | | | |
| | CL-CLAY (FILL), little to some silt, little gravel, stiff, low plasticity, brown, moist | | | 1 | | 2.0 | 9 | 0 |
| 2 | | | | | | | | |
| | GW-GRAVEL (FILL), some sand, compact, medium to coarse grained, well graded, gray, moist | 676.6 | | 2 | | 2.0 | 22 | 0 |
| 4 | | 675.6 | | | | | | |
| | CL-CLAY (FILL), some silt, stiff, medium plasticity, brown, moist | | | 3 | | 2.0 | 14 | 0 |
| 6 | | 673.6 | | | | | | |
| | SP-SAND (FILL), some silt, trace gravel, compact, fine grained, poorly graded, black, wet, bits of wood and plastic | | | 4 | | 2.0 | 32 | 0 |
| 8 | - trace to little clay, dense, moist at 8.0ft BGS | | | | | | | |
| | | | | 5 | | 2.0 | 25 | 0 |
| 10 | | | | | | | | |
| | - bricks, rock fragments at 11.0ft BGS | | | 6 | | 2.0 | 44 | 0 |
| 12 | | | CEMENT / BENTONITE GROUT | | | | | |
| | | | | 7 | | 2.0 | 47 | 0 |
| 14 | | | | | | | | |
| | - rock fragments, bits of metal at 15.0ft BGS | | | 8 | | 2.0 | 42 | 0 |
| 16 | | | | | | | | |
| | | | | 9 | | 2.0 | 27 | 0 |
| 18 | - compact at 18.0ft BGS | | | | | | | |
| | | | | 10 | | 2.0 | 13 | 0 |
| 20 | | | | | | | | |
| | | | | 11 | | 2.0 | 12 | 0 |
| 22 | CL-CLAY (NATIVE), rock fragments, some silt, very stiff, low plasticity, brown, moist | 657.6 | | | | | | |
| | BEDROCK, refusal | 656.1 | | 12 | | 2.0 | >50 | 0 |
| 24 | END OF BOREHOLE @ 24.0ft BGS | 655.6 | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 1396E.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X243Y257
DATE COMPLETED: March 5, 2002
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | BOREHOLE | SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | 654.7 | | | | | | |
| 0 | TOPSOIL | 654.5 | | | | | | |
| | CL-CLAY (FILL), trace silt, soft, low plasticity, 7.5YR 4/6 (strong brown), moist | | | 1 | P/S | 2.0 | | 0 |
| 2 | - 2.5Y 4/4 (olive brown) at 3.0ft BGS | | | 2 | P/S | 2.0 | | 0 |
| 4 | | | | 3 | P/S | 2.0 | | <1 |
| 6 | SP-SAND (FILL), loose, fine grained, poorly graded, GLEY2 2.5/5PB (bluish black), moist | 648.7 | | 4 | P/S | 2.0 | | <1 |
| 8 | CL-CLAY, some sand, soft, low plasticity, 2.5Y 3/2 (very dark grayish brown) | 647.2 | BENTONITE CHIPS | 5 | P/S | 2.0 | | <1 |
| 10 | - trace sand at 9.5ft BGS<br>- no sand at 10.5ft BGS | | | 6 | P/S | 2.0 | | <1 |
| 12 | - 7.5YR 4/6 (strong brown) at 11.5ft BGS | | | 7 | P/S | 2.0 | | 0 |
| 14 | | | | 8 | P/S | 2.0 | | 0 |
| 16 | Fractured rock and rock fragments | 638.7 | | 9 | P/S | 1.0 | | 0 |
| | - Refusal at 17.0ft BGS | 637.7 | | | | | | |
| 18 | END OF BOREHOLE @ 17.0ft BGS | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 13986.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

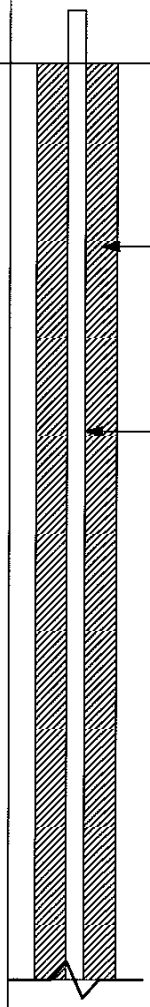


PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS |
|---|---|---|
| 0 | TOPSOIL | 0.3 |
| | CL-CLAY (FILL), trace silt, soft, yellowish red (5 YR 4/6), moist | |
| 2 | SP-SAND (FILL), fine grained, poorly graded, loose, dark reddish brown (5 YR 4/4), moist | 2.0 |
| 4 | | |
| | - reddish brown (5 YR 4/4) at 5.0ft BGS | |
| 6 | | |
| 8 | | |
| 10 | SC-SANDY CLAY (FILL), soft, brown (7.5 YR 4/4), moist | 10.0 |
| | Gravel layer (FILL) | 11.0 |
| 12 | SP-SAND (FILL), fine grained, poorly graded, loose, very dark brown (7.5 YR 2.5/2), moist, yellow & orange layers | 12.2 |
| 14 | | |
| 16 | | |
| 18 | - black (7.5 YR 2.5/1), no odor and colors present at 18.5ft BGS | |
| 20 | CL-CLAY, trace silt and sand, soft, low plasticity, dark grayish brown (2.5 Y 3/2), moist, black stains, odor | 20.0 |
| 22 | - no black stains present at 21.0ft BGS<br>- no silt and sand, dark yellowish brown (10 YR 3/6), stiff at 21.5ft BGS | |
| 24 | - very stiff, rock chips at 23.0ft BGS<br>- bedrock at 24.5ft BGS | |
| | END OF OVERBURDEN HOLE @ 25.0ft BGS | |
| 26 | | |
| 28 | | |
| 30 | | |
| 32 | | |
| 34 | | |

ANGLE BORING




| SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | PID (ppm) |
|---|---|---|---|---|
| 1 | P/S | 1.5 | | 0.4 |
| 2 | P/S | 0.9 | | 0.2 |
| 3 | P/S | 0.5 | | 0.2 |
| 4 | P/S | 1.5 | | 0.2 |
| 5 | P/S | 0.9 | | 0.3 |
| 6 | P/S | 0.9 | | 0.5 |
| 7 | P/S | 1.5 | | 0.2 |
| 8 | P/S | 1.7 | | 0.8 |
| 9 | P/S | 1.7 | | 2.4 |
| 10 | P/S | 1.8 | | 4.0 |
| 11 | P/S | 2.0 | | 0.4 |
| 12 | P/S | 1.7 | | 0.2 |
| 13 | P/S | 1.0 | | 0.5 |

DRAFT

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

OVERBURDEN LOG 13968.GPJ CRA_CORP.3DT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BORING | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | - bedrock at 24.5ft BGS | | | | | |
| | LIMESTONE (ST. LOUIS FORMATION) | 25.0 | | | | |
| 26 | | 26.5 | | | | |
| | SHALE, soft, green / blue | 27.0 | | | | |
| | - 2-inch void at 27.1ft BGS | 27.6 | | | | |
| 28 | LIMESTONE (ST. LOUIS FORMATION), coarse grained, fossils, beige micritic limestone | | | 1 | 100 | 100 |
| 30 | LIMESTONE (SALEM FORMATION), fine to medium grained, granular, very thick bedding, fossils, styloites, grey<br>- 6-inch tan section at 30.0ft BGS<br>- grey at 30.6ft BGS<br>- styloite at 31.0ft BGS<br>- tan at 31.6ft BGS<br>- grey at 32.5ft BGS<br>- styloite at 32.7ft BGS<br>- tan, fracture at 33.2ft BGS<br>- grey at 34.1ft BGS<br>- styloite, white / grey at 35.4ft BGS<br>- fracture at 36.6ft BGS<br>- fracture at 37.2ft BGS<br>- styloite at 37.7ft BGS<br>- fracture at 38.0ft BGS<br>- styloite at 38.7ft BGS<br>- open styloite at 39.8ft BGS<br>- 1-inch fracture at 39.9ft BGS<br>- open styloite at 40.0ft BGS<br>- styloite at 41.9ft BGS<br>- fracture at 42.5ft BGS | | | 2 | 100 | 100 |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | 4" DIA. HQ COREHOLE | 3 | 100 | 100 |
| 42 | | | | | | |
| 44 | | | | | | |
| | - fracture at 45.2ft BGS<br>- fracture at 45.6ft BGS<br>- styloite at 46.5ft BGS | | | 4 | 100 | 100 |
| 46 | | | | | | |
| 48 | | | | | | |
| 50 | half inch fracture at 50.2ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 52 | | | | | | |
| | - open styloite at 53.2ft BGS<br>- open styloite at 53.6ft BGS | | | 5 | 100 | 100 |
| 54 | | | | | | |
| 56 | | | | | | |
| | - open styloite at 57.4ft BGS | | | | | |
| 58 | | | | | | |

DRAFT

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X177Y252D
DATE COMPLETED: March 3, 2003
DRILLING METHOD: 4 1/4-INCH HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BORING | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 60 | | | | | | |
| | - styloite at 61.6ft BGS | | 4" DIA. HQ COREHOLE | 6 | 100 | 100 |
| 62 | END OF BOREHOLE @ 61.9ft BGS | 61.9 | | | | |
| 64 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 66 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by Split spoon | | | | | |
| 68 | Ground surface elevation of 681.72 ft. AMSL | | | | | |
| 70 | | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |
| 76 | | | | | | |
| 78 | | | | | | |
| 80 | DRAFT | | | | | |
| 82 | | | | | | |
| 84 | | | | | | |
| 86 | | | | | | |
| 88 | | | | | | |
| 90 | | | | | | |
| 92 | | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CFA_CORP.GDT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS |
|---|---|---|
| | TOPSOIL, with roots | 0.3 |
| | CL-CLAY (FILL), trace silt, stiff, low plasticity, strong brown (7.5 YR 5/8), moist | 1.8 |
| 2 | SP-SAND (FILL), fine grained, poorly graded, loose, dark reddish brown (5 YR 3/2), moist | |
| 4 | | |
| 6 | - rock fragments at 6.0ft BGS | |
| 8 | | 8.0 |
| | CL-CLAY (FILL), trace sand and gravel, medium plasticity, soft, dark yellowish brown (10 YR 9/7), moist | |
| 10 | | |
| 12 | - no gravel at 12.5ft BGS | |
| 14 | | |
| 16 | | |
| | - 2-inch section of gravel fragments at 17.0ft BGS | |
| 18 | - trace sand at 18.0ft BGS | |
| 20 | | |
| | SC-CLAYEY SAND (FILL), non-plastic, soft, black (5 YR 2.5/2), moist | 21.0 |
| 22 | SP-SAND (FILL), fine grained, poorly graded, compact, black (5 YR 2.5/2), moist | 22.0 |
| 24 | | |
| 26 | | |
| | SC-CLAYEY SAND (FILL), same as above | 26.5 |
| 28 | | |
| | CL-CLAY (FILL), trace sand and silt, low plasticity, dark reddish brown (5 YR 3/2), moist | 29.5 |
| 30 | | 31.0 |
| | SC-CLAYEY SAND (FILL), same as above | |
| 32 | DRAFT | |
| 34 | | 34.5 |

ANGLE BOREHOLE: CEMENT / BENTONITE GROUT; 4" DIA. STEEL CASING; CEMENT / BENTONITE GROUT; 4" DIA. STEEL CASING

| SAMPLE NUMBER | SAMPLE INTERVAL | REC (ft) | 'N' VALUE | FID (ppm) |
|---|---|---|---|---|
| 1 | | 1.0 | | 0.1 |
| 2 | | 1.2 | | 0.2 |
| 3 | | 0.5 | | 0.6 |
| 4 | | 1.0 | | 0.5 |
| 5 | | 0.5 | | NA |
| 6 | | 0.6 | | 0.2 |
| 7 | | 0.5 | | 1.0 |
| 8 | | 1.3 | | 0.5 |
| 9 | | 0.6 | | 1.1 |
| 10 | | 1.0 | | 0.8 |
| 11 | | 1.5 | | 0.5 |
| 12 | | 1.0 | | 3.3 |
| 13 | | 1.7 | | 2.4 |
| 14 | | 1.7 | | 1.9 |
| 15 | | 2.0 | | 2.0 |
| 16 | | 2.0 | | 1.7 |
| 17 | | 1.5 | | 1.0 |
| 18 | | 1.0 | | 1.0 |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○) GRAIN SIZE ANALYSIS (□)

OVERBURDEN LOG 13968.GPJ CRA_CORP.3DT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | CL-CLAY, trace silt, low plasticity, soft, strong brown (7.5 YR 5/2), moist | 34.5 | | | | |
| 36 | LIMESTONE (SALEM FORMATION), innerbeded tan/gray top 1.1 feet, fine to coarse grained, massive, granular, very thick bedding | 35.0 | | | | |
| 38 | - fracture at 37.1ft BGS<br>- styloite at 37.7ft BGS<br>- fracture, tan, mud filling at 37.8ft BGS | | | 1 | 100 | 100 |
| 40 | - coarse grained, gray at 38.6ft BGS<br>- tan, styloite at 39.7ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 42 | - styloite at 41.1ft BGS<br>- gray at 41.4ft BGS<br>- tan at 41.6ft BGS<br>- gray at 42.4ft BGS | | | | | |
| 44 | - styloite at 44.4ft BGS | | | 2 | 100 | 100 |
| 46 | - styloite at 46.3ft BGS<br>- styloite at 46.7ft BGS | | | | | |
| 48 | - open styloite at 47.4ft BGS<br>- fracture at 48.9ft BGS | | | | | |
| 50 | - styloite at 50.8ft BGS<br>- styloite at 51.1ft BGS | | | | | |
| 52 | tan, fossils (bryozoan) at 51.4ft BGS | | | | | |
| 54 | | | | 3 | 100 | 100 |
| 56 | | | | | | |
| 58 | - gray at 59.3ft BGS | | | | | |
| 60 | | | 4" DIA. HQ COREHOLE | | | |
| 62 | DRAFT | | | | | |
| 64 | | | | 4 | 100 | 100 |
| 66 | | | | | | |
| 68 | - styloite at 68.0ft BGS<br>- half-inch calcite filled vug at 68.2ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 70 | | | | | | |
| 72 | - styloite at 71.6ft BGS | | | | | |
| 74 | | | | | | |
| 76 | | | | 5 | 100 | 100 |
| 78 | - styloite at 77.3ft BGS<br>- fracture at 78.6ft BGS | | | | | |
| 80 | - fracture at 79.7ft BGS | | | | | |
| 82 | | | | | | |
| 84 | - styloite at 83.3ft BGS<br>- styloite at 84.1ft BGS | | | 6 | 100 | 100 |
| 86 | - fracture at 85.6ft BGS | | | | | |
| 88 | - fracture at 87.2ft BGS<br>- styloite at 89.1ft BGS | | | | | |
| 90 | - styloite at 90.6ft BGS<br>- fracture at 91.4ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 92 | - styloite at 92.5ft BGS<br>- open styloite at 93.1ft BGS | | | | | |
| 94 | - styloite at 93.3ft BGS<br>LIMESTONE (UPPER HARRODSBURG FORMATION), coarse, gray, fossile well cemented bioclastic (bryozoan & brachipods) calcarenite and calcirudite limestone | 93.4 | | 7 | 100 | 100 |
| 96 | - fracture at 94.6ft BGS<br>- styloite at 95.8ft BGS | | | | | |
| 98 | - styloite at 96.6ft BGS<br>- fracture at 97.1ft BGS<br>- fracture at 98.8ft BGS | | | | | |
| 100 | - styloite at 99.1ft BGS<br>- fracture at 99.4ft BGS<br>- styloite at 100.3ft BGS | | | | | |
| 102 | - styloite at 100.8ft BGS<br>- styloite at 103.3ft BGS | | | | | |

DRAFT

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| | - fracture, shale parting at 103.4ft BGS<br>- fracture at 104.1ft BGS | | | 8 | 100 | 100 |
| 106 | - styloite at 106.8ft BGS | | | | | |
| 108 | - fracture, shale parting at 108.0ft BGS<br>- styloite at 108.2ft BGS<br>- fracture at 108.8ft BGS | | | | | |
| 110 | - fracture, shale parting at 109.2ft BGS<br>LIMESTONE (LOWER HARRODSBURG FORMATION), fine grained, white, abundance of fine fossils, trace calcite | 109.4 | | | | |
| 112 | - half-inch vug at 110.7ft BGS | | | | | |
| | - styloite at 113.4ft BGS | | | | | |
| 114 | - styloite at 114.3ft BGS<br>- styloite at 114.8ft BGS | | | 9 | 100 | 100 |
| 116 | - styloite at 115.5ft BGS | | | | | |
| 118 | - fracture at 118.1ft BGS<br>- fracture at 118.5ft BGS<br>- fracture, shale parting at 119.3ft BGS | | | | | |
| 120 | - light gray, styloite at 120.0ft BGS | | 4" DIA. HQ COREHOLE | | | |
| | - styloite at 121.2ft BGS | | | | | |
| 122 | - styloite at 121.8ft BGS | | | | | |
| | - open styloite at 123.2ft BGS | | | | | |
| 124 | - 1.5 foot section of abundance of fossils at 124.3ft BGS | | | 10 | 100 | |
| 126 | - fracture at 125.4ft BGS<br>- fracture at 126.1ft BGS<br>- open styloite at 126.5ft BGS | | | | | |
| 128 | 1.8 foot of porous vuggy calcite filled section containing fossils at 127.0ft BGS | | | | | |
| | - open styloite at 129.0ft BGS | | | | | |
| 130 | - open styloite at 130.0ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 132 | DRAFT<br>open styloite at 132.8ft BGS | | | | | |
| 134 | - styloite at 134.5ft BGS | | | 11 | 100 | 100 |
| 136 | - open styloite at 135.7ft BGS<br>- open styloite at 136.1ft BGS | | | | | |
| 138 | - styloite at 137.6ft BGS<br>- open styloite at 138.0ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 140 | | | | | | |
| 142 | - fracture at 142.0ft BGS | | | 12 | 100 | 100 |
| 144 | | | | | | |
| 146 | | | | | | |
| 148 | - fracture, blue shale parting at 148.2ft BGS | | | | | |
| | - 7-inches of fractures with blue shale partings at 149.3ft BGS | | | | | |
| 150 | - styloite at 150.7ft BGS | | | | | |
| | - fracture, shale parting at 150.8ft BGS | | | | | |
| 152 | - open styloite at 151.6ft BGS | | | | | |
| | - styloite at 152.2ft BGS | | | | | |
| | - open styloite at 153.3ft BGS | | | | | |
| 154 | - styloite at 154.3ft BGS | | | | | |
| | - styloite at 155.2ft BGS | | ← 4" DIA. HQ COREHOLE | 13 | 100 | 100 |
| 156 | - fracture, shale parting at 156.4ft BGS | | | | | |
| 158 | - fracture, shale parting at 157.7ft BGS | | | | | |
| | - fracture, shale parting at 159.1ft BGS | | | | | |
| 160 | - styloite at 159.4ft BGS | | | | | |
| | - styloite at 160.0ft BGS | | | | | |
| | - 2-foot section of interbedded shale at 160.9ft BGS | | | | | |
| 162 | | | | | | |
| 164 | | | | | | |
| | - open fracture, shale parting at 164.5ft BGS | | | 14 | 100 | 100 |
| 166 | - open fracture, shale parting at 165.6ft BGS | | | | | |
| | - fracture at 165.9ft BGS | | | | | |
| | - fracture at 167.2ft BGS | | | | | |
| 168 | - styloite at 168.0ft BGS | | | | | |
| | DRAFT | | | | | |
| 170 | | | | | | |
| | - shale seam at 171.5ft BGS | | | | | |
| 172 | - 1.5-inch calcite filled vug at 173.2ft BGS | 173.0 | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 3968.GPJ CRA_CORP.GDT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: B-X223Y247D
DATE COMPLETED: February 4, 2003
DRILLING METHOD: 7 7/8-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN / M. GROVES

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | DEPTH ft BGS | ANGLE BOREHOLE | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 176 | LIMESTONE (RAMP CREEK), 1.4 foot section of interbedded shale with vugs, very fine grained, contains small amounts of shale, even bedded<br>- shale seam at 174.7ft BGS<br>- 9-inch of interbedded shale at 177.0ft BGS | | | 15 | 100 | 100 |
| 178 | | | | | | |
| 180 | - large fracture at 179.9ft BGS<br>- high shale content at 180.0ft BGS<br>- half-inch vug at 181.1ft BGS | | | | | |
| 182 | | | | | | |
| 184 | - 1-inch vug at 184.8ft BGS | | | 16 | 100 | 100 |
| 186 | | | | | | |
| 188 | - 2-inch geode at 187.5ft BGS | | | | | |
| 190 | - 1.7 feet of interbedded shale at 190.0ft BGS<br>- fracture, shale seam at 191.0ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 192 | | | | | | |
| 194 | | | | 17 | 100 | 100 |
| 196 | | | | | | |
| 198 | | | | | | |
| | SHALE (EDWARDSVILLE FORMATION), light blue | 198.6 | | | | |
| 200 | END OF BOREHOLE @ 200.0ft BGS | 200.0 | | | | |
| 202 | Boring drilled on an 30 degree angle from vertical (all depths not in relation to vertical) | | | | | |
| 204 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 206 | Ground surface elevation of 676.24 ft. AMSL | | | | | |
| 208 | DRAFT | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 8/11/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBER | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE | SAMPLE PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 694.1<br>690.2 | | | | | | |
| 0 | SW-GW - SAND and GRAVEL (Fill), little silt, dense fine to medium grained, well graded, brown, moist, glass. | | | 1 | | 1.7 | 35 | 0.0 |
| 2 | SP - SAND (Fill), compact, fine grained, poorly graded, dark brown/dark grey, moist. | 688.2 | | 2 | | 1.5 | 13 | 0.0 |
| 4 | CL - CLAY with silt, very stiff, low plasticity, moist, 5YR4/6 yellowish red. | 685.7 | 10" DIA. STEEL CASING TO 9'<br>4" DIA. STEEL CASING<br>CEMENT / BENTONITE GROUT | 3 | | 1.3 | 19 | 0.0 |
| 6 | | | | | | | | |
| 8 | END OF OVERBURDEN HOLE @ 8.0ft BGS | | | 4 | | 2.0 | 15 | 0.0 |
| 10 | | | | | | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | | | | | | | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |
| 30 | | | | | | | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |

DRAFT

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS □

OVERBURDEN LOG 13968.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | LIMESTONE (ST. LOUIS FORMATION), fine grained (micritic), interbedded with calcareous shale lenses, thinly bedded, light blue/grey. | 682.2 | CEMENT / BENTONITE GROUT | | | |
| 10 | - porous at 10.5ft BGS<br>- vugs at 11.2ft BGS | | | | | |
| 12 | - 1" clay seam, water loss at 11.3ft BGS | | 10" DIA. HOLE | 1 | 80 | 80 |
| 14 | - 4" vug with clay filling at 15.1ft BGS | | CEMENT / BENTONITE GROUT | | | |
| 16 | - 3" large horizontal fracture with little clay filling at 16.3ft BGS | | | | | |
| 18 | - medium horizontal fracture at 17.2ft BGS<br>- medium horizontal fracture at 18.3ft BGS | | | 2 | 98 | 93 |
| 20 | - medium horizontal fracture at 21.0ft BGS | | 4" DIA. STEEL CASING | | | |
| 22 | - styloite at 23.2ft BGS | | | | | |
| 24 | - 1/2" horizontal fracture at 24.4ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 26 | LIMESTONE (SALEM FORMATION), 1/2" horizontal fracture, grannular, thick bedding (medium to coarse grained ( comprised mostly of micro fossils and fossil fragments) ), oolitic in texture, calcarenite | 664.8 | | | | |
| 28 | - thin horizontal fracture at 28.0ft BGS<br>- 3.5" section of open vugs at 28.6ft BGS | | | 3 | 100 | 100 |
| 30 | - 2" horizontal fracture at 30.9ft BGS | | | | | |
| 32 | - styloite at 32.6ft BGS | | | | | |
| 34 | - styloite at 33.8ft BGS | | | | | |
| 36 | DRAFT | | | | | |
| 38 | - 1/2" thick open horizontal styloite at 38.9ft BGS | | | 4 | 100 | 100 |
| 40 | - styloite at 40.5ft BGS | | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

BEDROCK LOG 13968.GP_ CRA_CORP.SDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 42 | - styloite at 41.4ft BGS | | | | | |
| 44 | | | | | | |
| 46 | - open styloite at 45.2ft BGS | | | 5 | 100 | 100 |
| 48 | | | | | | |
| 50 | - styloite at 50.7ft BGS | | | | | |
| 52 | | | | | | |
| 54 | | | | | | |
| 56 | | | ← 4" DIA. HQ COREHOLE | 6 | 100 | 100 |
| 58 | - styloite at 58.8ft BGS | | | | | |
| 60 | | | | | | |
| 62 | - styloite at 62.8ft BGS | | | | | |
| 64 | - 26' no fractures, have fossils at 63.5ft BGS | | | 7 | 100 | 100 |
| 66 | - styloite, horizontal at 65.1ft BGS | | | | | |
| 68 | - styloite, horizontal at 67.2ft BGS | | | | | |
| 70 | - styloite, horizontal at 70.8ft BGS | | | | | |
| 72 | | | | | | |
| 74 | | | | | | |

DRAFT

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS □

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 78 | - styloite, horizontal at 78.5ft BGS | | | 8 | 100 | 100 |
| 80 | | | | | | |
| 82 | | | | | | |
| 84 | - styloite, horizontal at 84.1ft BGS | | | | | |
| 86 | | | | | | |
| 88 | | | | 9 | 100 | 100 |
| 90 | - 1/2" thick open at 89.5ft BGS | | | | | |
| 92 | - open at 91.9ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 94 | - styloite at 94.6ft BGS | | | | | |
| 96 | - thin horizontal fracture at 96.2ft BGS | | DOW PACKER | | | |
| 98 | DRAFT | | | 10 | 100 | 100 |
| 100 | LIMESTONE (UPPER HARRODSBURG FORMATION), styloite, coarse grained, well cemented, bioclastic calcarenite with shale, interbedded with argillaceous limestone lenses, light grey | 591.2 | | | | |
| 102 | - styloite at 101.1ft BGS<br>- 2' highly fossilized (crinoid, brachiopods, abundant fan bryozoan), vuggy at 102.2ft BGS | | | | | |
| 104 | - styloite at 104.5ft BGS | | | | | |
| 106 | - styloite at 106.0ft BGS | | SAMPLE ZONE 2 | | | |
| 108 | - thin horizontal fracture at 108.7ft BGS | | | 11 | 100 | 100 |
| 110 | - thin horizontal fracture at 110.4ft BGS | | DOW PACKER | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS □

BEDROCK LOG 13968.GPJ CRA_CORP.3DT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 112 | - shale, thin horizontal fracture at 110.7ft BGS<br>- styloite at 112.7ft BGS | | | | | |
| 114 | - 3" of highly fractured rock, horizontal at 113.7ft BGS | | | | | |
| 116 | | | | | | |
| 118 | - styloite at 117.0ft BGS<br>- shale parting, black at 117.1ft BGS<br>- shale parting, black at 118.0ft BGS<br>- shale parting, black at 118.6ft BGS | | | 12 | 100 | 100 |
| 120 | - shale parting, black at 118.9ft BGS<br>- shale parting, black at 119.2ft BGS<br>- 1/2" shale parting at 121.1ft BGS | | | | | |
| 122 | - styloite at 122.2ft BGS | | | | | |
| 124 | - near horizontal fracture at 125.1ft BGS | | | | | |
| 126 | DRAFT | | 4" DIA. HQ COREHOLE | | | |
| 128 | - horizontal fracture at 128.7ft BGS | | | 13 | 100 | 100 |
| 130 | - horizontal fracture at 131.0ft BGS | | | | | |
| 132 | - horizontal fracture at 132.2ft BGS | | | | | |
| 134 | - styloite at 134.1ft BGS | | | | | |
| 136 | - styloite at 135.4ft BGS<br>- styloite at 135.7ft BGS<br>- styloite at 136.5ft BGS<br>- styloite at 137.5ft BGS | | | | | |
| 138 | - styloite at 138.0ft BGS<br>- styloite at 138.5ft BGS<br>- styloite at 138.9ft BGS | | NON-MONITORING ZONE | 14 | 100 | 100 |
| 140 | - styloite at 139.6ft BGS<br>- styloite at 141.0ft BGS<br>- open styloite at 141.5ft BGS | | | | | |
| 142 | - styloite at 142.7ft BGS<br>- open styloite at 143.0ft BGS | | | | | |
| 144 | LIMESTONE (LOWER HARRODSBURG FORMATION), styloite, horizontal, medium to coarse grained, mostly argillaceous with shale | 546.2 | | | | |

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ☐

BEDROCK LOG 13968.GP_ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 148 | lenses, calcareous, abundant geodes and siliceous towards the bottom, light to dark grey<br>- shale parting at 145.0ft BGS<br>- thin horizontal fracture at 145.7ft BGS<br>- open styloite at 147.2ft BGS<br>- open styloite at 147.8ft BGS<br>- 2" geode with quartz crystal fillings at 149.4ft BGS<br>- styloite at 150.0ft BGS<br>- open styloite at 152.0ft BGS | | | 15 | 100 | 100 |
| 150 | | | | | | |
| 152 | | | | | | |
| 154 | - open styloite at 154.8ft BGS | | | | | |
| 156 | | | | | | |
| 158 | - styloite at 157.5ft BGS<br>- open styloite at 158.4ft BGS | | | 16 | 100 | 100 |
| 160 | - open styloite at 159.8ft BGS<br>- 2' highly fractured, horizontal at 160.7ft BGS | | 4" DIA. HQ COREHOLE | | | |
| 162 | | | | | | |
| 164 | - 2' interbedded shale beds at 163.6ft BGS | | | | | |
| 166 | LIMESTONE (RAMP CREEK FORMATION), very fine grained, contains small amounts of shale, 1" geode | 524.2 | DOW PACKER | | | |
| 168 | - 10' numerous geodes with calcite fillings at 167.7ft BGS | | | 17 | 100 | 100 |
| 170 | | | | | | |
| 172 | - 2" geodes, calcite fillings at 171.8ft BGS<br>- 2" geodes, calcite fillings at 172.5ft BGS | | | | | |
| 174 | - 2" geodes, calcite fillings at 173.6ft BGS | | | | | |
| 176 | - open fracture at 175.5ft BGS<br>- 1" geode, quartz filled at 176.7ft BGS<br>- 3" interbedded shale at 177.0ft BGS | | | | | |
| 178 | | | | 18 | 100 | 100 |
| 180 | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○) GRAIN SIZE ANALYSIS (□)

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245D
DATE COMPLETED: April 2, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 182 | | | | | | |
| 184 | | | 4" DIA. HQ COREHOLE | | | |
| 186 | | | | | | |
| 188 | SHALE (EDWARDSVILLE FORMATION), calcareous, light blue/grey, soft. | 503.3 | SAMPLE ZONE 1 | 19 | 100 | 100 |
| 190 | | | | | | |
| 192 | | | | | | |
| 194 | END OF BOREHOLE @ 193.5ft BGS | 496.7 | | | | |
| 196 | Overburden pilot boring advanced utilizing 4-1/4 inch hollow stem augers and samples collected by STP method | | | | | |
| 198 | | | | | | |
| 200 | | | | | | |
| 202 | | | | | | |
| 204 | | | | | | |
| 206 | | | | | | |
| 208 | | | | | | |
| 210 | | | | | | |
| 212 | | | | | | |
| 214 | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( ) GRAIN SIZE ANALYSIS [ ]

BEDROCK LOG 13968.GPJ CRA_CORP.GDT 8/5/03

# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245S
DATE COMPLETED: June 11, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | SAMPLE NUMBEF | SAMPLE INTERVAL | SAMPLE REC (ft) | SAMPLE 'N' VALUE |
|---|---|---|---|---|---|---|---|
| | TOP OF RISER<br>GROUND SURFACE | 692.9<br>690.4 | | | | | |
| 0 | SW/GW SAND AND GRAVEL (FILL), little silt, dense, fine to medium grained, well graded, brown, moist, glass | | | | | | |
| 2 | SP-SAND (FILL), compact, fine grained, poorly graded, dark brown/dark gray, moist | 688.4 | | | | | |
| 4 | | | CEMENT / BENTONITE GROUT | | | | |
| 6 | CL-CLAY, little silt, very stiff, low plasticity, 5YR 4/6, (yellowish red), moist | 685.9 | 4" DIA. STEEL CASING | | | | |
| 8 | END OF OVERBURDEN HOLE @ 8.5ft BGS | | 10" DIA. STEEL CASING | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | | | | | |
| 18 | | | | | | | |
| 20 | | | | | | | |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 | | | | | | | |
| 28 | | | | | | | |
| 30 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)



PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA
DRILLING CONTRACTOR: RDNP

HOLE DESIGNATION: MW-X143Y245S
DATE COMPLETED: June 11, 2002
DRILLING METHOD: 10-INCH TRI-CONE & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

| DEPTH ft BGS | STRATIGRAPHIC DESCRIPTION & REMARKS | ELEV. ft AMSL | MONITORING WELL | RUN NUMBER | CORE RECOVERY % | RQD % |
|---|---|---|---|---|---|---|
| 8 | | | 4" DIA. STEEL CASING | | | |
| 10 | LIMESTONE (ST. LOUIS FORMATION), fine grained (micritic), calcite, thin bedded, gray, interbedded with calcareous shale lenses | 681.9 | 10" DIA. STEEL CASING<br>4" DIA. STEEL CASING | | | |
| 12 | - horizontal fracture at 11.4ft BGS<br>- 8-inch of porous rock at 11.5ft BGS<br>- horizontal fracture at 12.2ft BGS<br>- horizontal fracture at 13.4ft BGS | | | | | |
| 14 | - 4-inch near vertical fracture at 13.6ft BGS<br>- horizontal fracture at 14.3ft BGS | | 4" DIA. HQ COREHOLE | 1 | 100 | 95 |
| 16 | - horizontal fracture at 16.1ft BGS<br>- horizontal fracture at 16.3ft BGS | | | | | |
| 18 | - horizontal fracture at 16.5ft BGS<br>- horizontal fracture at 17.1ft BGS<br>- styloite at 17.4ft BGS | | | | | |
| 20 | - open styloite at 18.4ft BGS | | | | | |
| 22 | - horizontal fracture at 20.8ft BGS<br>- horizontal fracture at 21.4ft BGS<br>- horizontal fracture at 21.7ft BGS | | | | | |
| 24 | - horizontal fracture at 22.8ft BGS<br>- horizontal fracture at 23.2ft BGS<br>- styloite at 23.3ft BGS<br>- open styloite at 24.5ft BGS | | BENTONITE CHIPS | 2 | 100 | 100 |
| 26 | - horizontal fracture at 24.7ft BGS<br>LIMESTONE (SALEM FORMATION), grannular, thick bedding , medium to coarse grained (comprised mostly of micro fossils and fossil fragments), massive, calcite, oolitic in texture, light gray | 664.9 | | | | |
| 28 | - horizontal fracture at 27.3ft BGS<br>END OF BOREHOLE @ 27.6ft BGS | 662.6 | | | | |
| 30 | | | | | | |
| 32 | | | | | | |
| 34 | | | | | | |
| 36 | | | | | | |
| 38 | | | | | | |
| 40 | | | | | | |

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

ATTACHMENT B

# Table 1 - Summary of CPT Soundings

**ConeTec, Inc.**
**Job No. 03-717**
**Location GM Bedford AOI4**
**Client Conestoga-Rovers & Associates**
**Date 3/11/2003**

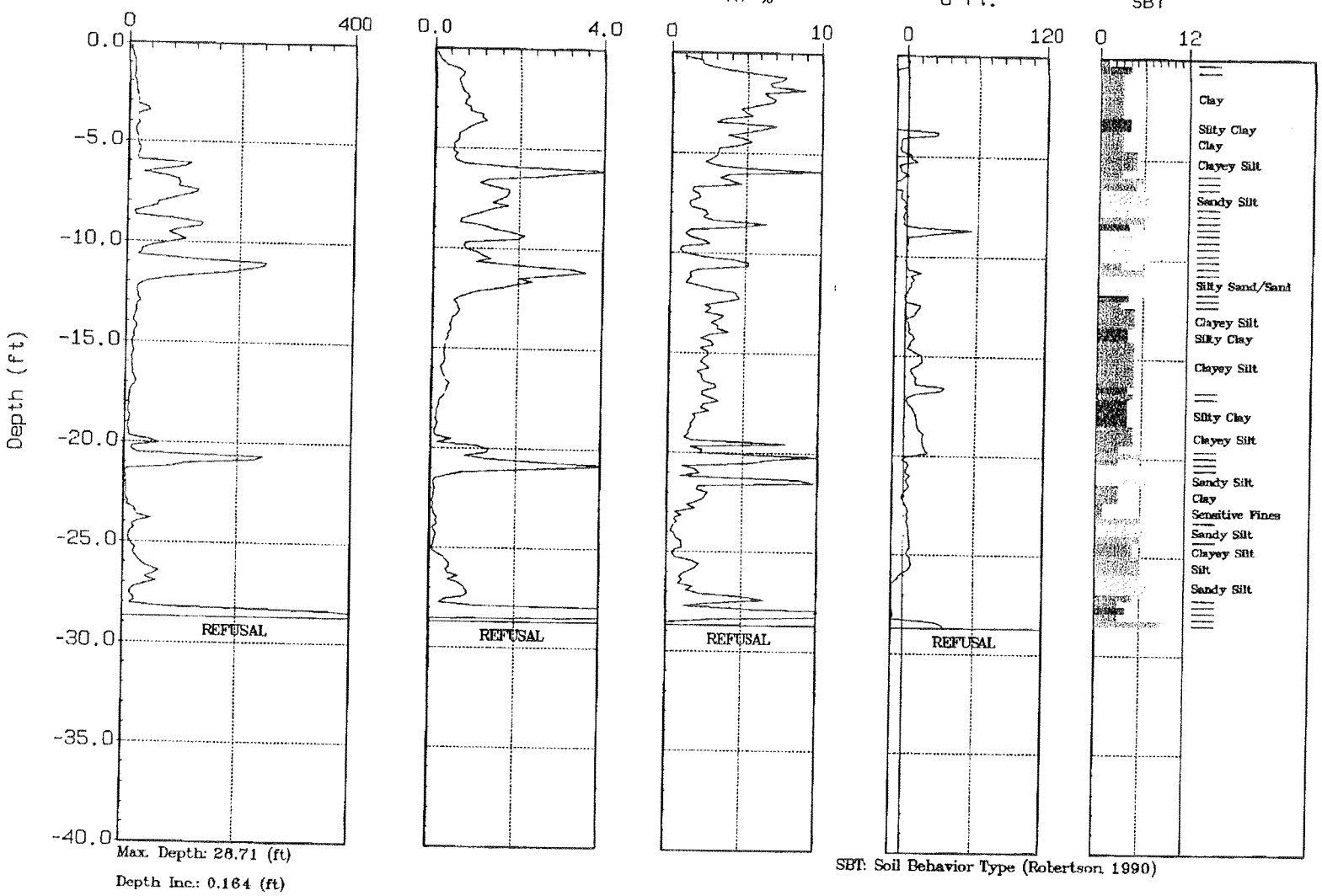
| Date | CPT No. | File Name | Total Depth (ft) | Notes |
|---|---|---|---|---|
| 3/11/03 | CPT-01 | 717cp001.cor | 28.71 | Refusal |
| | CPT-02 | 717cp002.cor | 19.03 | Refusal |
| | CPT-03 | 717cp003.cor | 6.56 | Refusal |
| | CPT-3A | 717cp03a.cor | 10.99 | Refusal |
| | CPT-04 | 717cp004.cor | 24.11 | Refusal |
| | CPT-05 | 717cp005.cor | 15.58 | Refusal |
| | CPT-5A | 717cp05a.cor | 13.45 | Refusal |
| | CPT-06 | 717cp006.cor | 24.11 | Refusal |
| | CPT-6A | 717cp06a.cor | 5.58 | Refusal |
| | CPT-07 | 717cp007.cor | 22.47 | Refusal |
| | CPT-08 | 717cp008.cor | 33.46 | Refusal |
| | CPT-09 | 717cp009.cor | 6.56 | Refusal |
| | CPT-9A | 717cp09a.cor | 20.83 | Refusal |
| | CPT-10 | 717cp010.cor | 6.73 | Refusal |
| | CPT-11 | 717cp011.cor | 25.92 | Refusal |

CONETEC

CRA

Site: CPT-01
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 10:33




Max. Depth: 28.71 (ft)

Depth Inc.: 0.164 (ft)

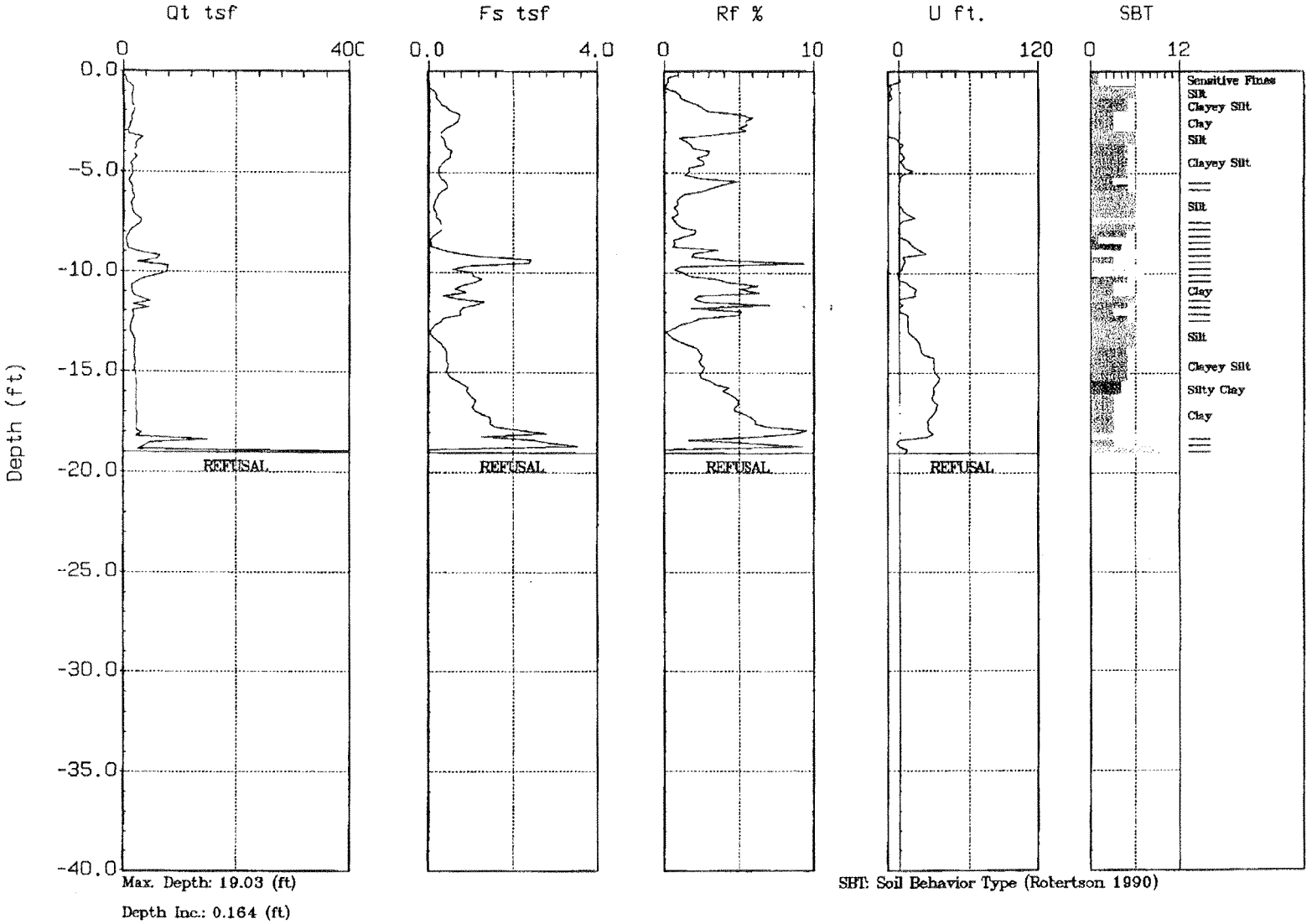
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-02
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 11:07




Max. Depth: 19.03 (ft)

Depth Inc.: 0.164 (ft)

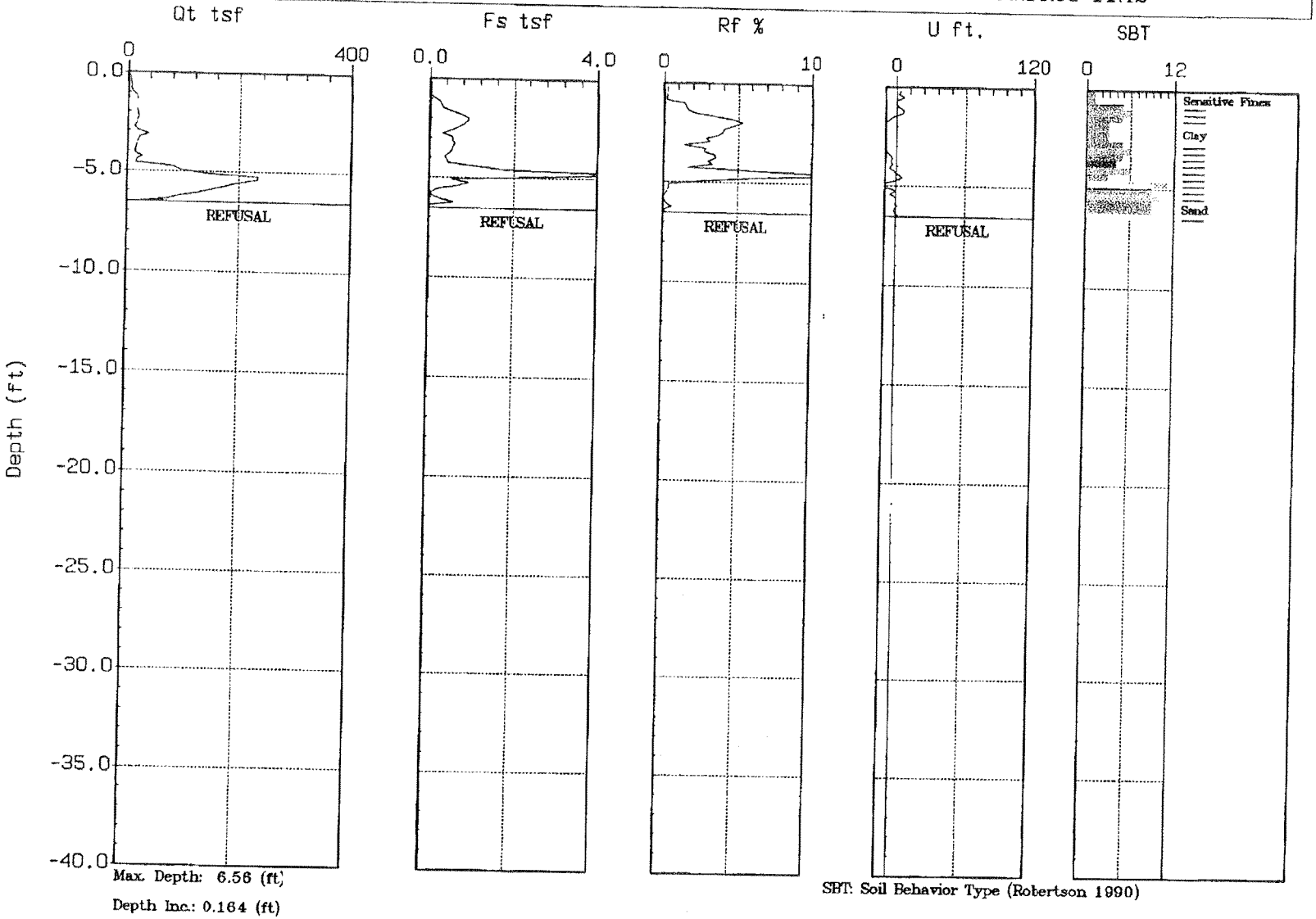
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-03
Location: GM Bedford AOI4

Cone: 20 TON A D106
Date: 03:11:03 11:42




Max. Depth: 6.56 (ft)
Depth Inc.: 0.164 (ft)

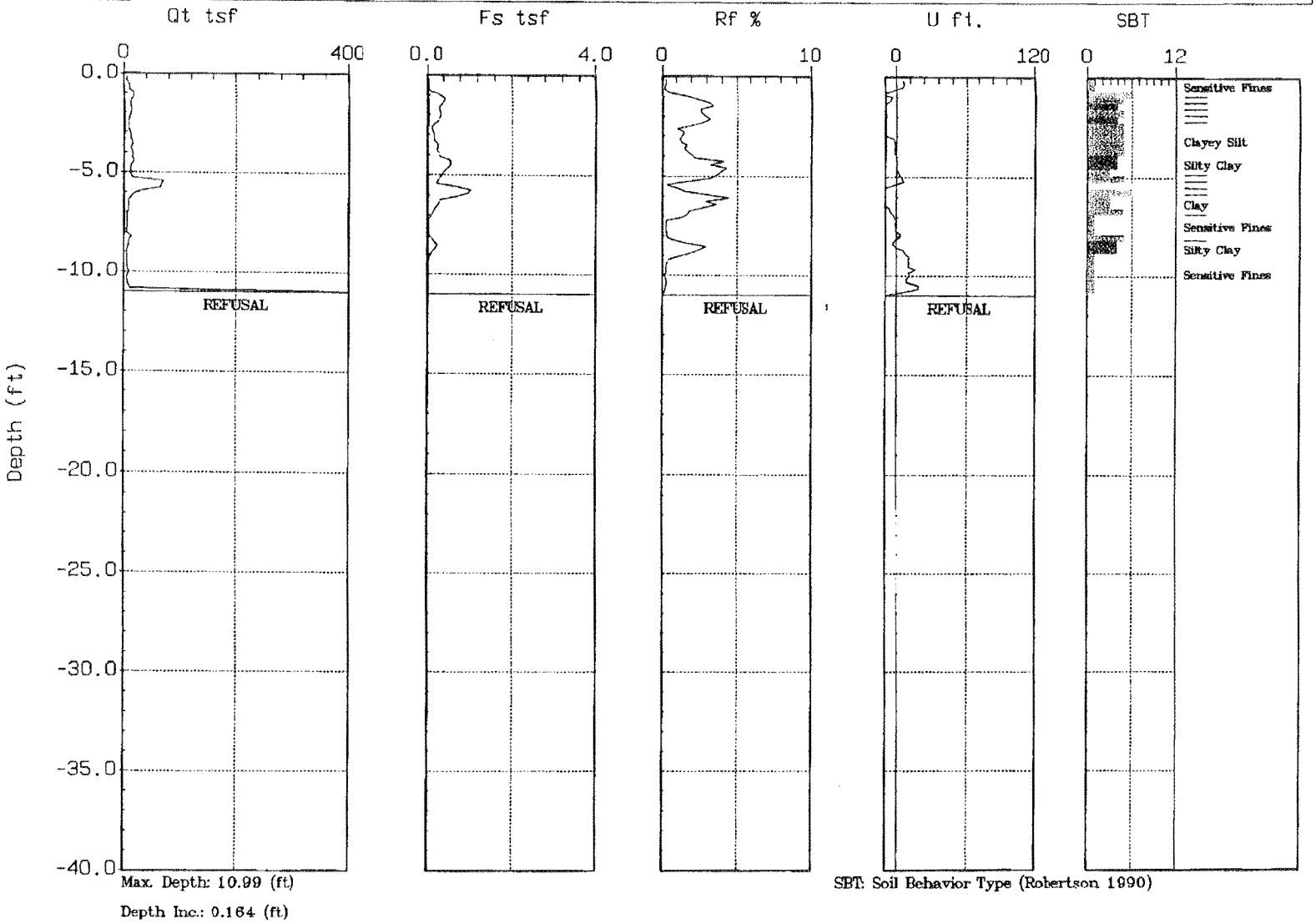
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-3A
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 12:01




Max. Depth: 10.99 (ft)

Depth Inc.: 0.164 (ft)

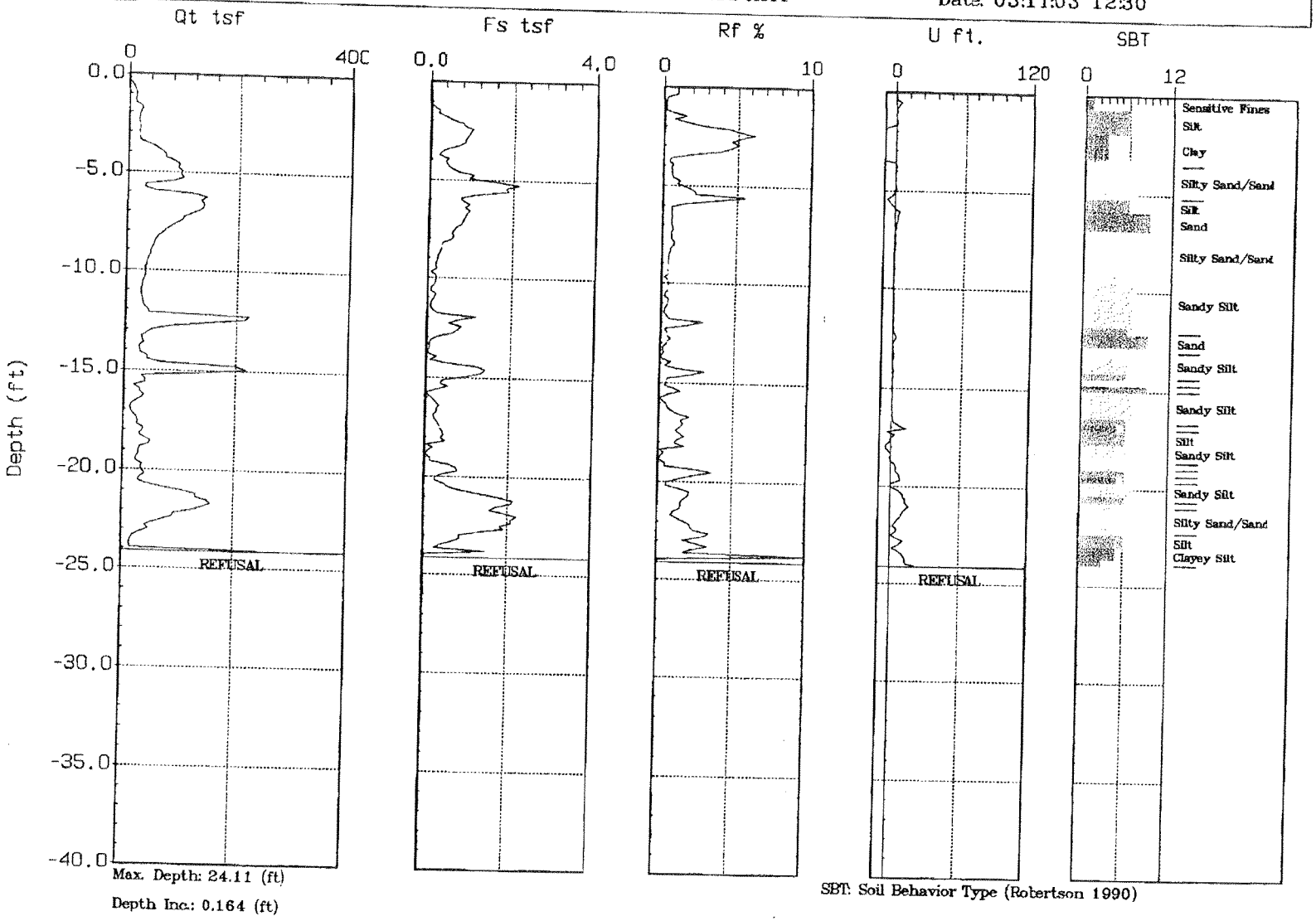
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-04
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 12:30




Max. Depth: 24.11 (ft)

Depth Inc.: 0.164 (ft)

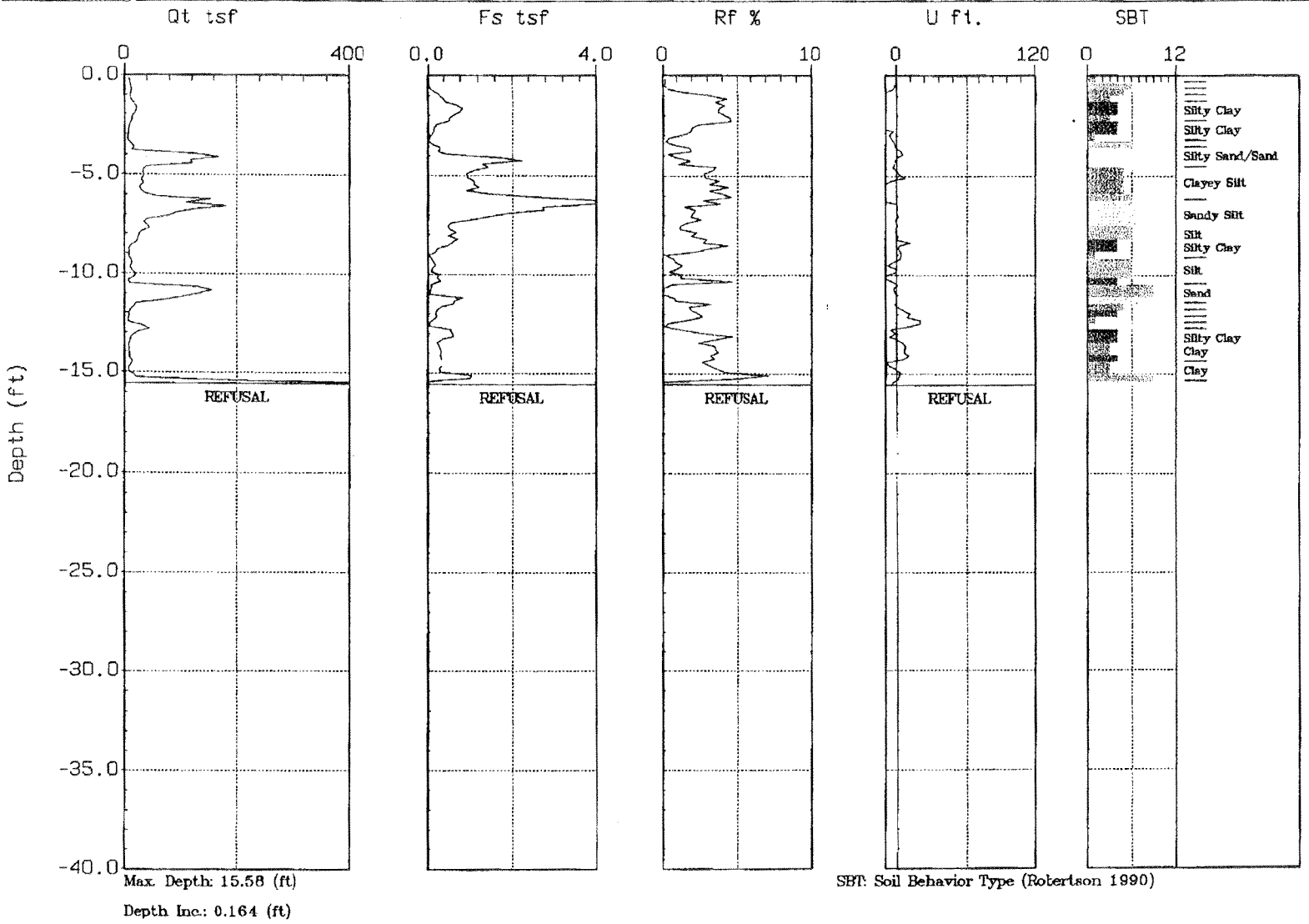
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-05
Location: GM Bedford A014

Cone: 20 TON AD106
Date: 03:11:03 13:06




Max. Depth: 15.58 (ft)

Depth Inc.: 0.164 (ft)

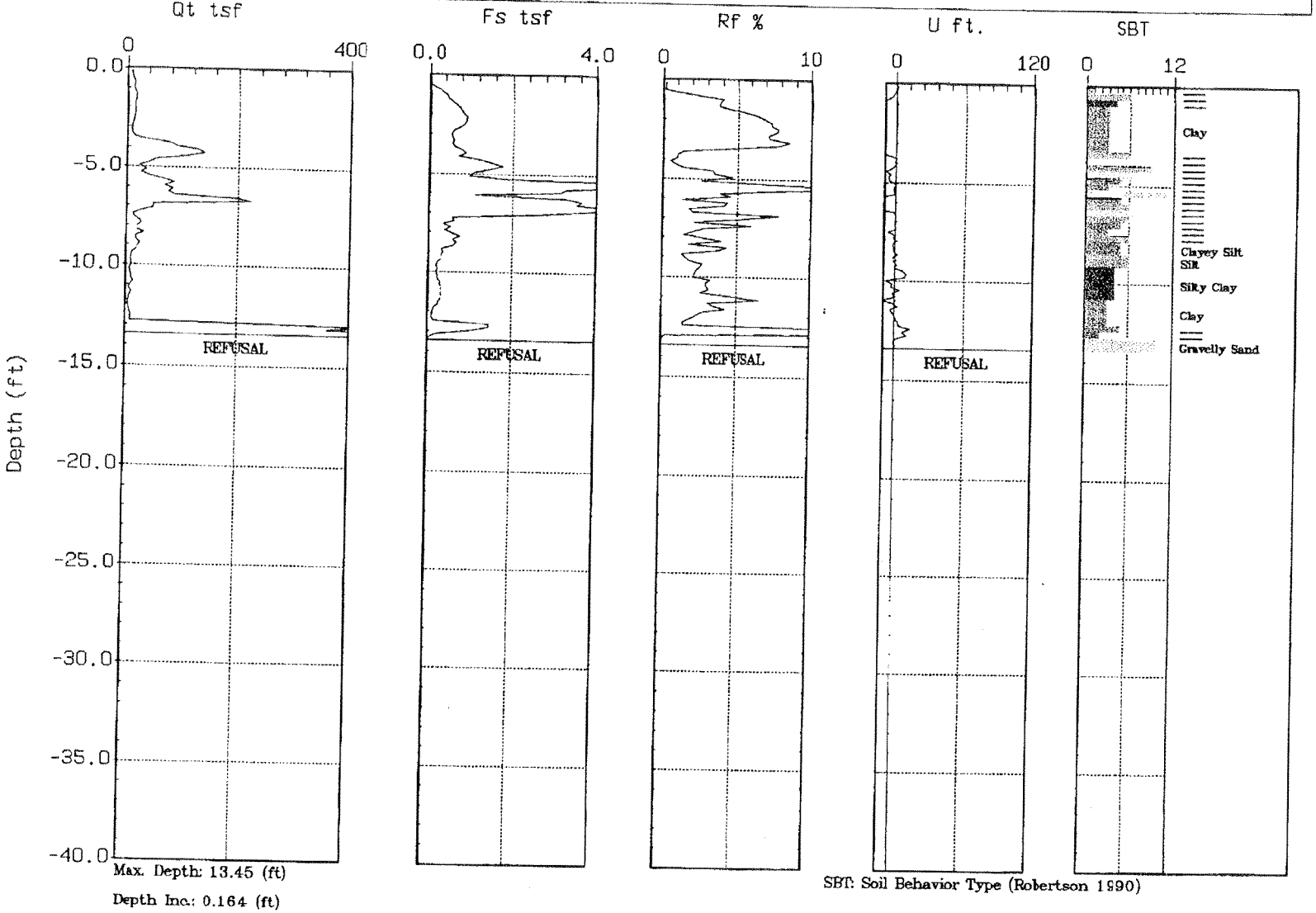
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-5A
Location: GM Bedford A014

Cone: 20 TON AD106
Date: 03:11:03 1325




Max. Depth: 13.45 (ft)
Depth Inc.: 0.164 (ft)

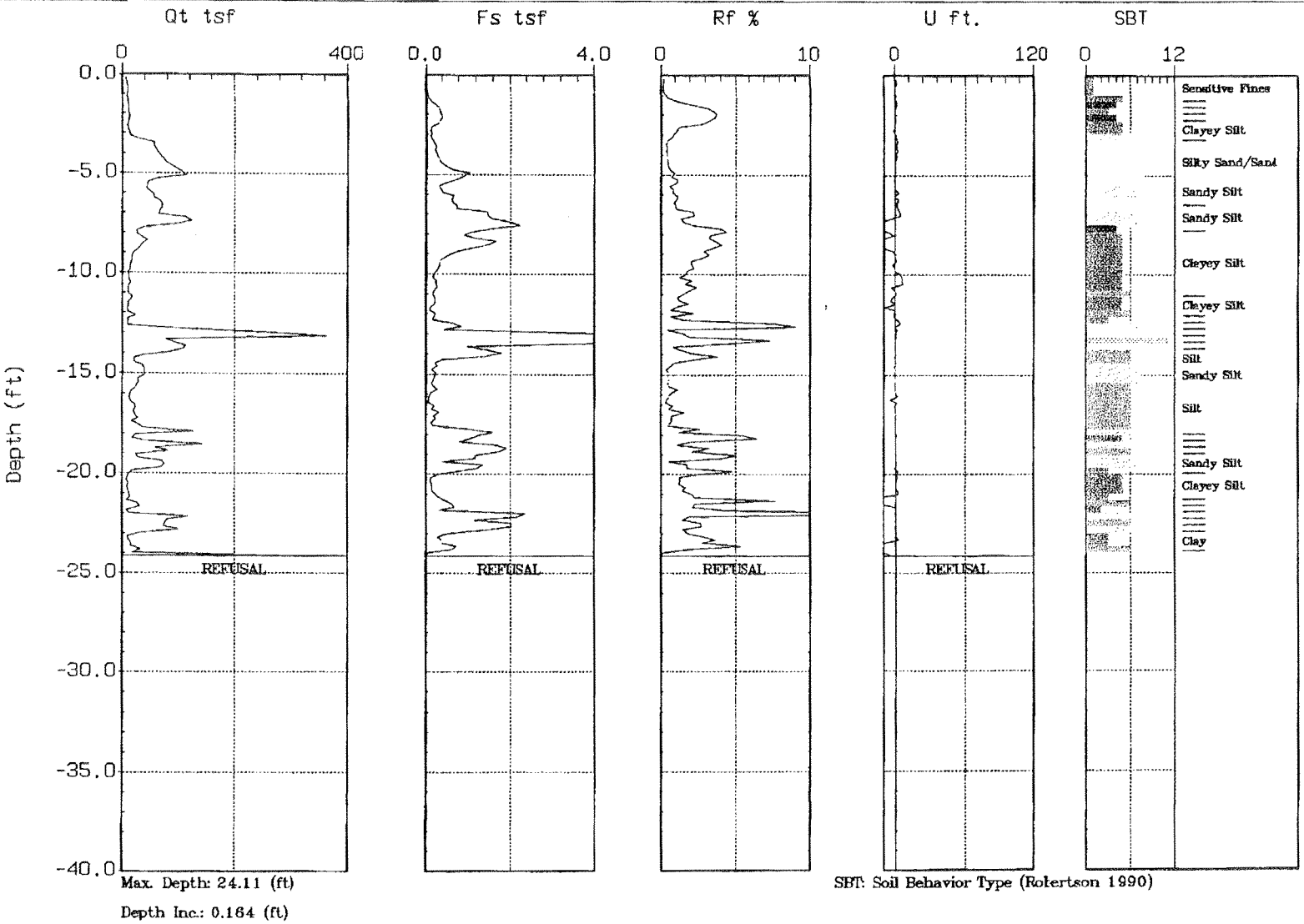
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-06
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 13:48




Max. Depth: 24.11 (ft)

Depth Inc.: 0.164 (ft)

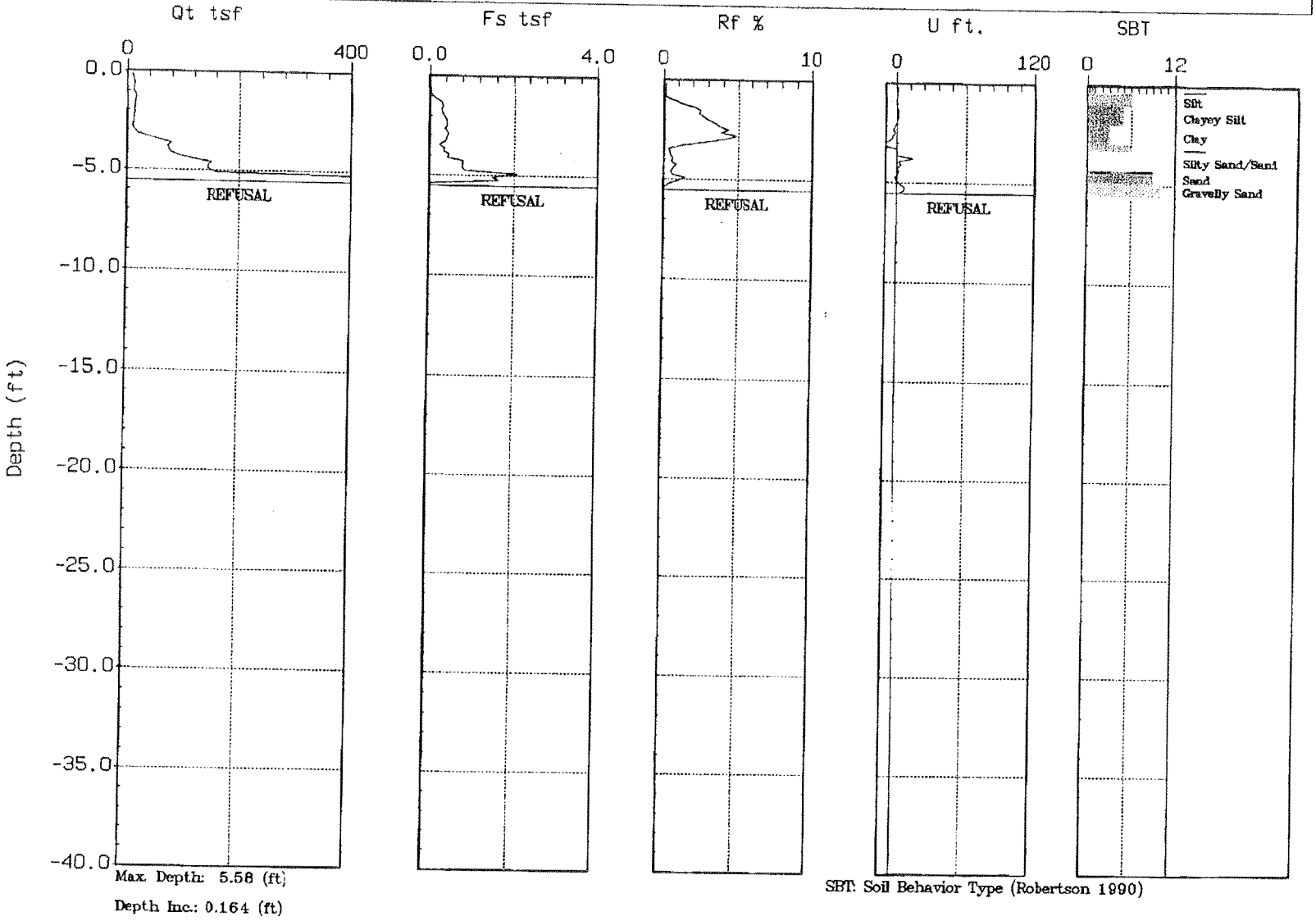
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-6A
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 14:20




Max. Depth: 5.58 (ft)

Depth Inc.: 0.164 (ft)

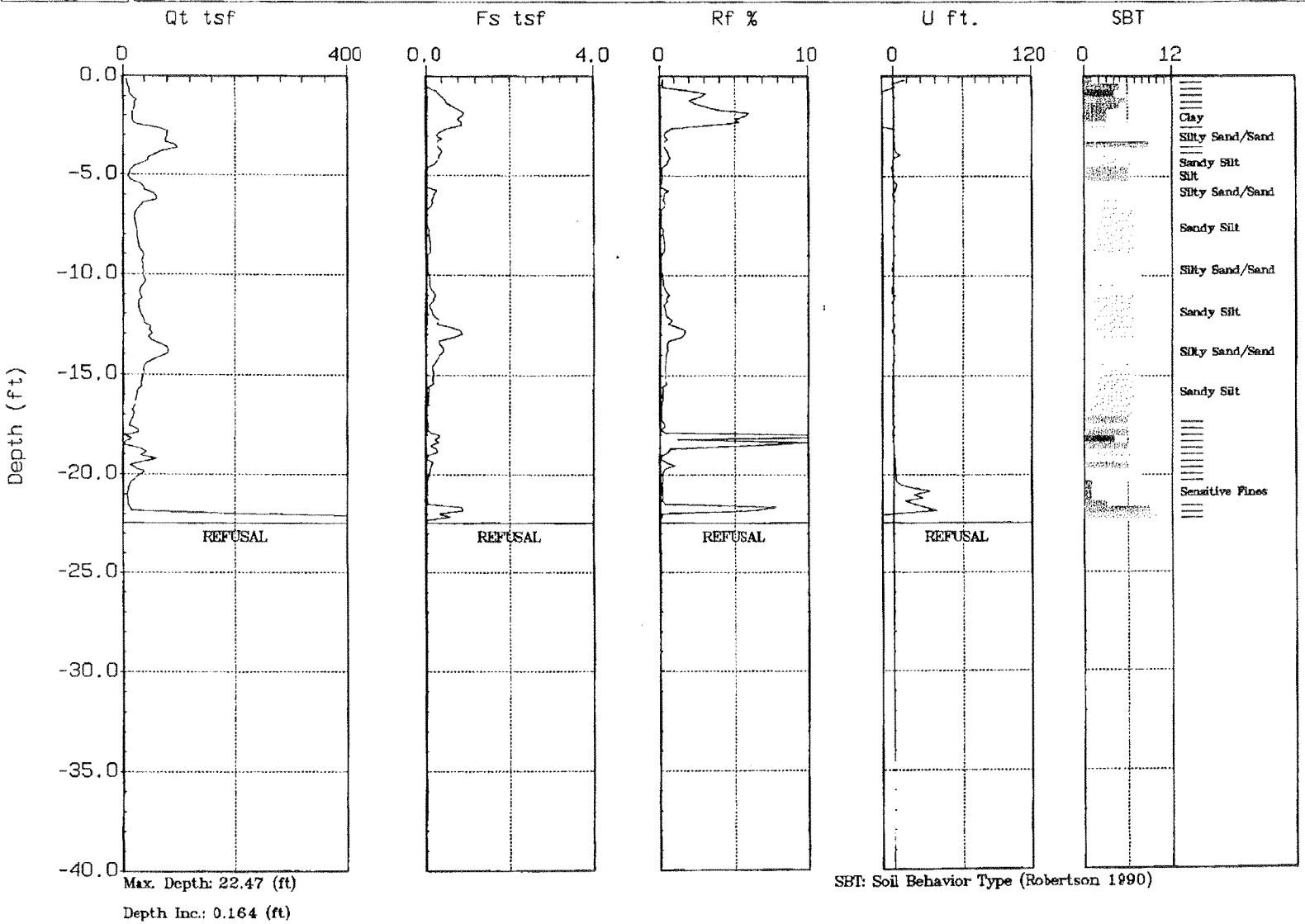
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-07
Location: GM Bedford A014

Cone: 20 TON AD106
Date: 03:11:03 14:41




Max. Depth: 22.47 (ft)

Depth Inc.: 0.164 (ft)

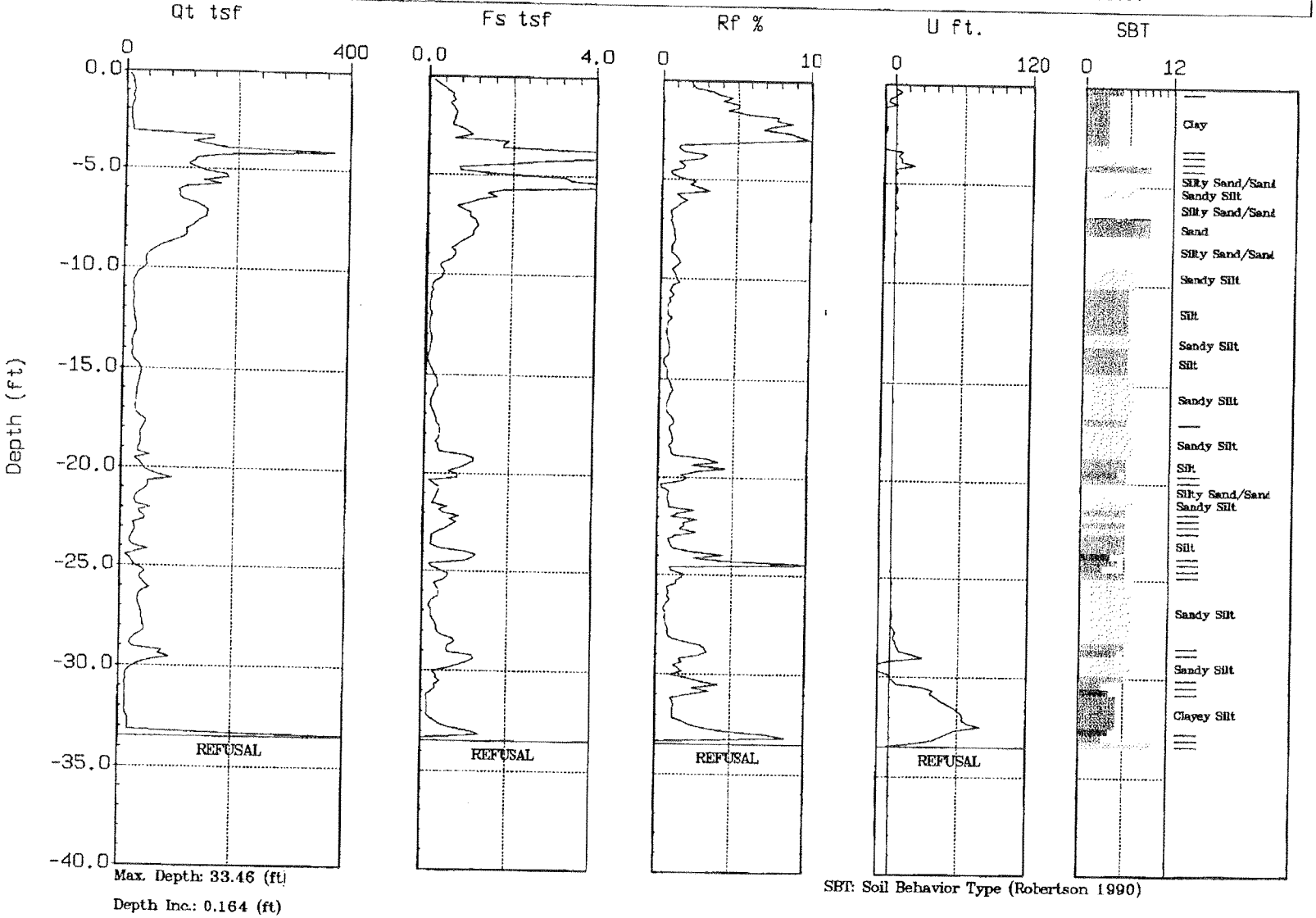
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-08
Location: GM Bedford A014

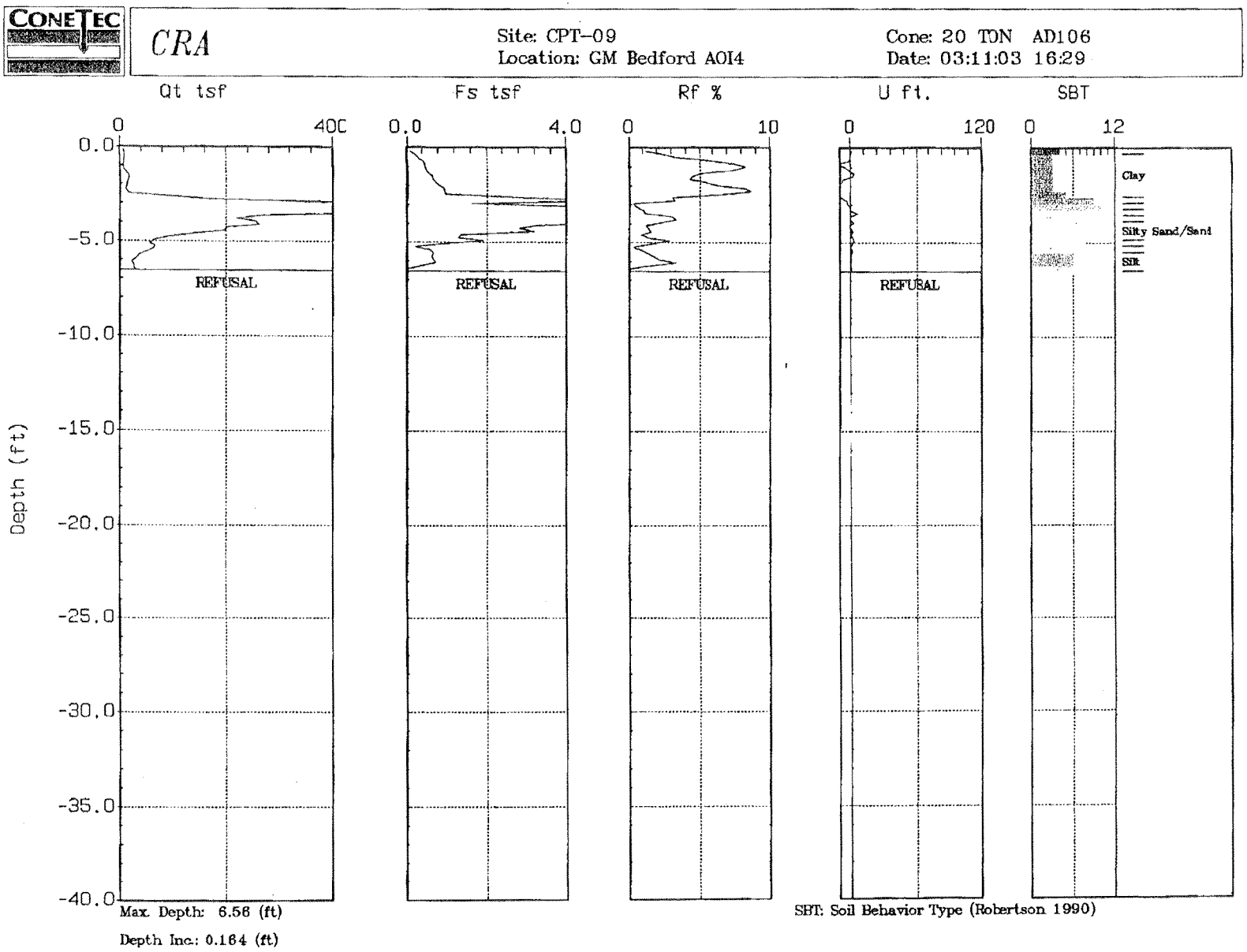
Cone: 20 TON AD106
Date: 03:11:03 15:27




Max. Depth: 33.46 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

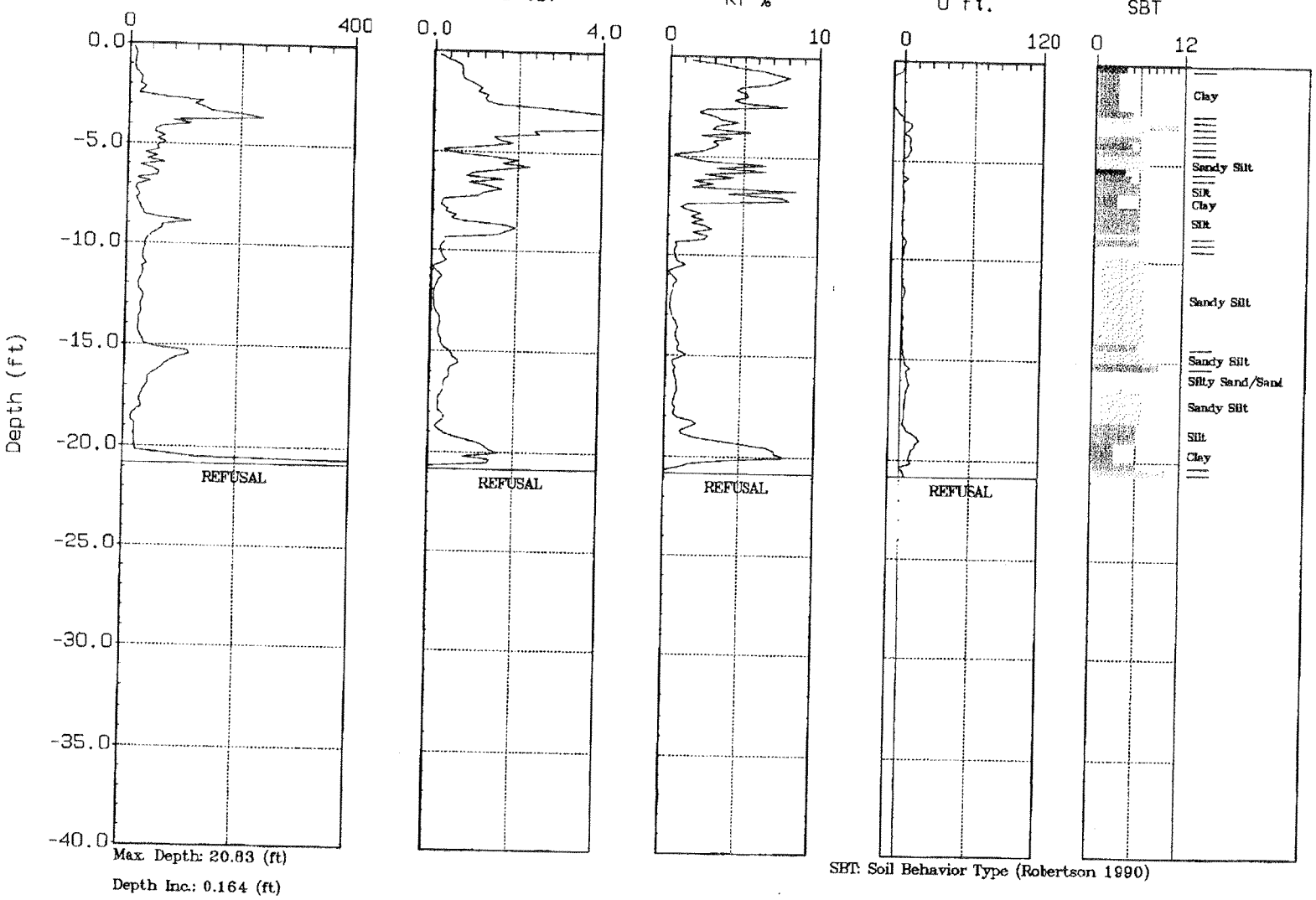

CONETEC
CRA
Site: CPT-09
Location: GM Bedford AOI4
Cone: 20 TON AD106
Date: 03:11:03 16:29
Qt tsf
Fs tsf
Rf %
U ft.
SBT
0
400
0.0
4.0
10
120
12
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
Depth (ft)
REFUSAL
REFUSAL
REFUSAL
REFUSAL
Clay
Silty Sand/Sand
Silt
Max. Depth: 6.56 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-9A
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 16:44




Max. Depth: 20.83 (ft)

Depth Inc.: 0.164 (ft)

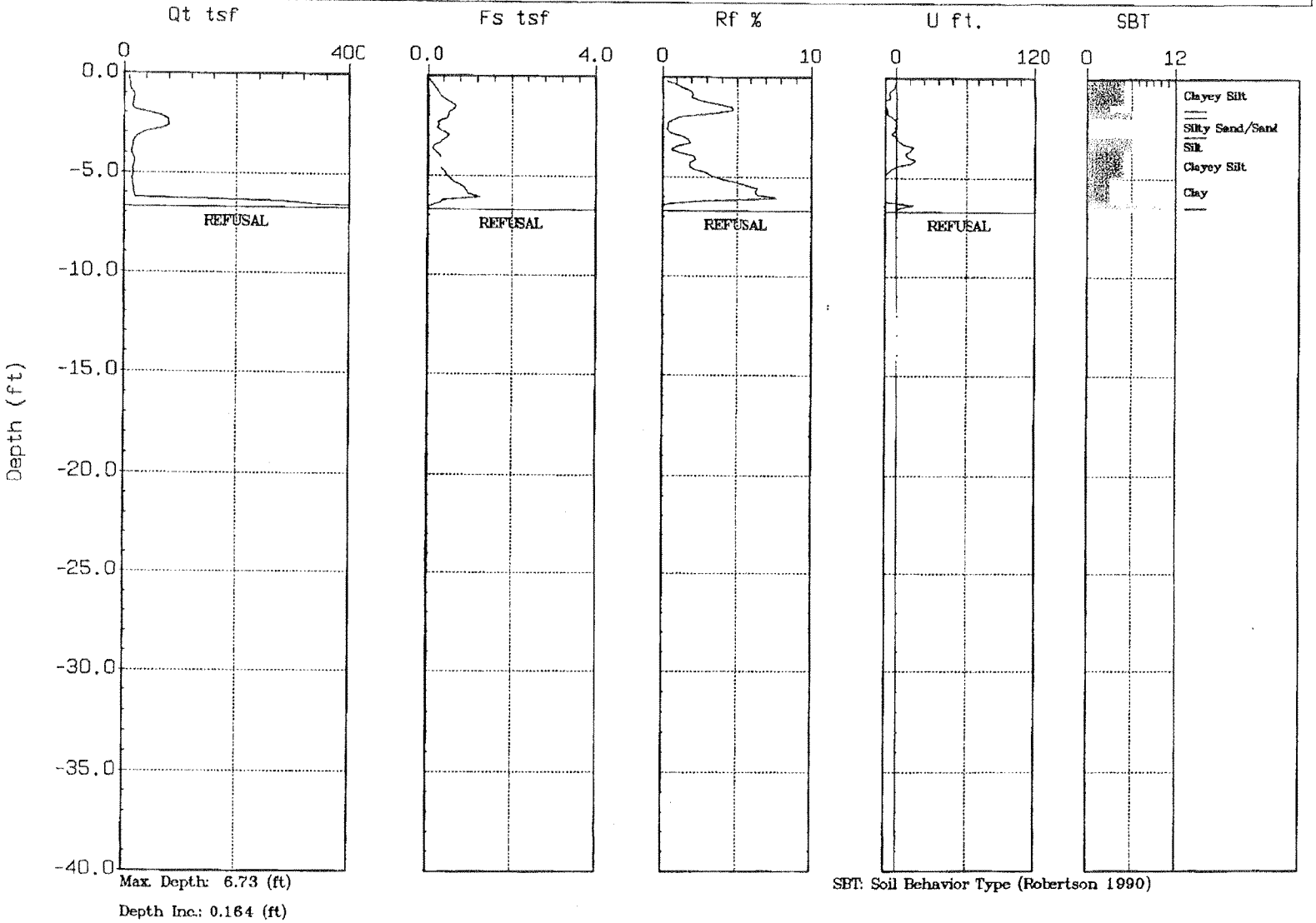
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-10
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 17:13




Max. Depth: 6.73 (ft)

Depth Inc.: 0.164 (ft)

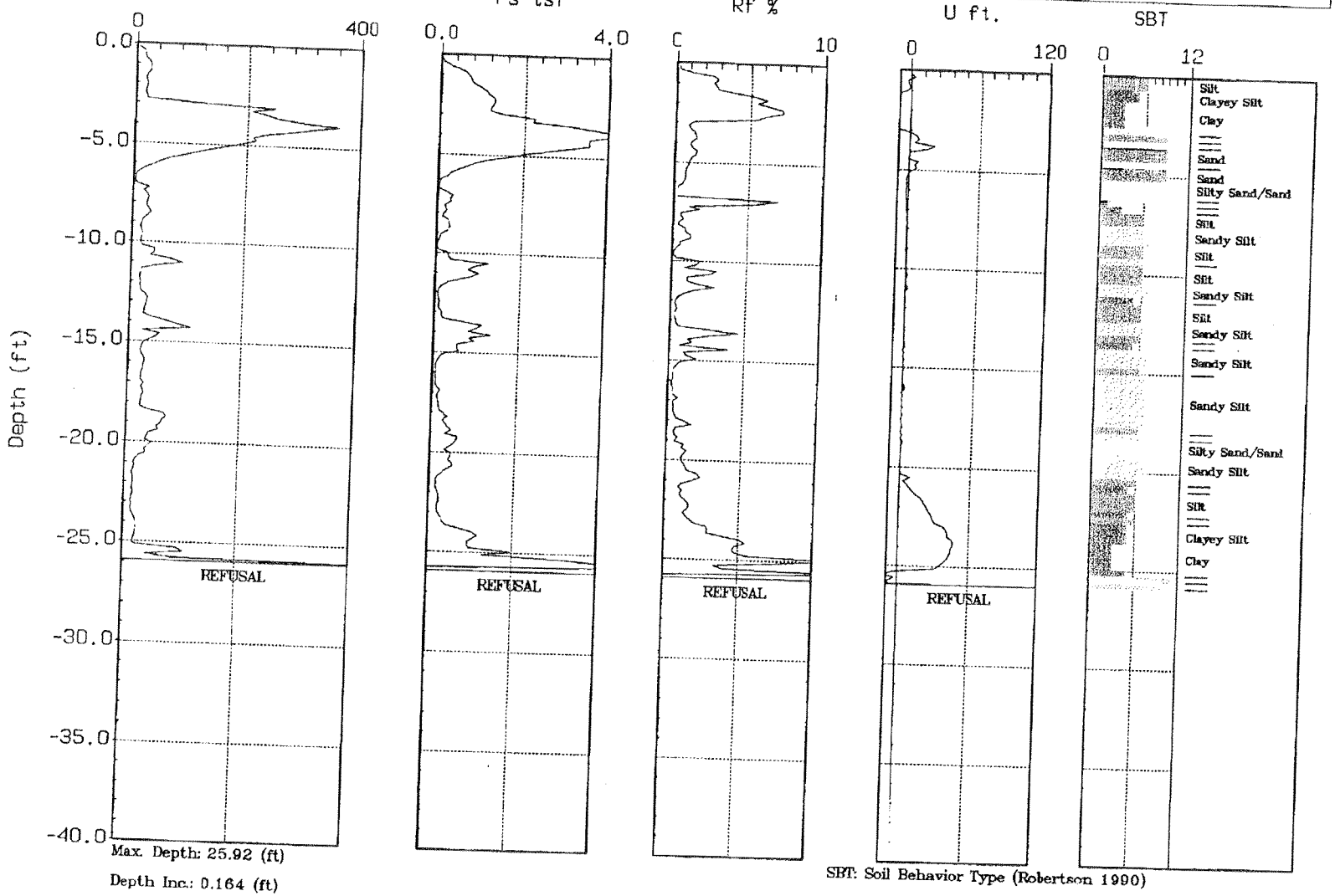
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

CRA

Site: CPT-11
Location: GM Bedford AOI4

Cone: 20 TON AD106
Date: 03:11:03 17:38




Max. Depth: 25.92 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

ATTACHMENT C

SCHLEEDE HAMPTON ASSOCIATES INC
CONSULTING ENGINEERS

April 5, 2003

13968
BP.

CRA Construction Trailer
GM Drive and 4th Street
Bedford, IN 47421

Attn: Mr. Jeff Nichols

Re: Transmittal of Geotechnical Test Results
GM – Bedford, Indiana

We are transmitting the results of Geotechnical QC tests on soil and/or aggregate samples tested for use on the referenced project. A summary of the results is given below, with the supporting test data and report sheets appended.

| | |
|---|---|
| Project Soil I.D.: | S-031203-MG-245<br>S-031203-MG-246<br>S-031203-MG-247 |
| Test Results Appended: | Gradation Data Sheet, Test Method ASTM D 422, D 4318<br>Grain Size Curves |
| Findings: | Test Results transmitted herein. If you have any questions, please contact the undersigned at your convenience. |

Respectfully submitted,
Schleede-Hampton Associates, Inc.

William West

William J. West, P.E.
Project Engineer

Attachments

2254 COLE STREET
BIRMINGHAM, MICHIGAN 48009
248-540-3044 • FAX: 248-540-3282

031203-MG-245 hydro

| | |
|---|---|
| JOB NAME: | Laboratory Testing - GMPT Bedford |
| PROJECT NO. | 62225 |
| SAMPLE ID | S-031203-MG-245 |
| DATE SAMPLED: | 3/12/03 |

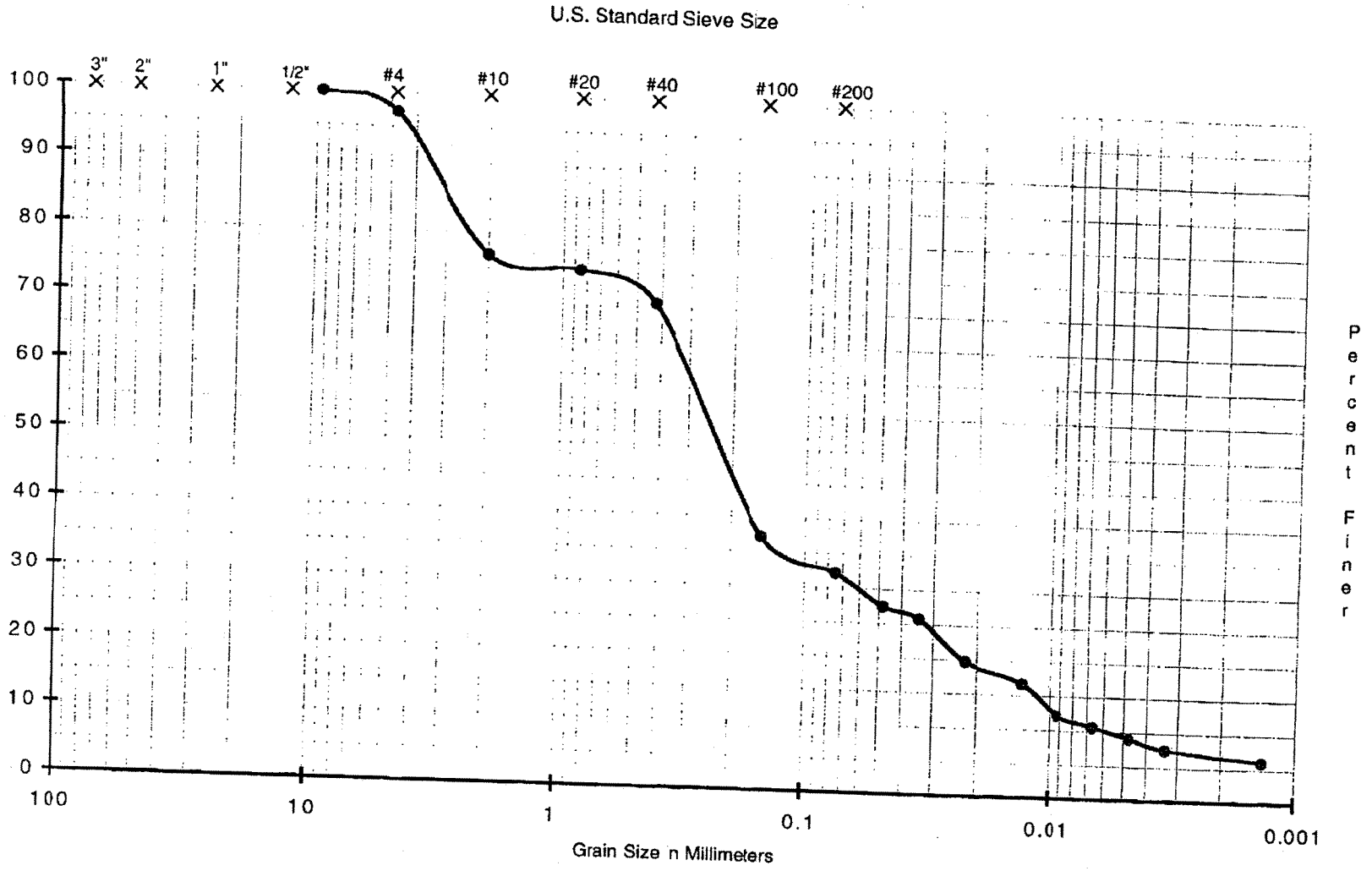
**ASTM D-422 / D1140**

| | | | | | TOTAL | DIAMETER |
|---|---|---|---|---|---|---|
| | TOTAL SAMPLE WT.= | 148.5 (gms.) | | | | |
| **+10 SIEVE PORTION** | SIEVE SIZE | CUM WT. RET | PART % RET | PART % PASS | **PASSING** | **(mm)** |
| | 1 | 0.0 | 0.0% | 100.0% | **100.0%** | **25.000** |
| | 3/4 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **19.000** |
| | 1/2 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **12.500** |
| | 3/8 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **9.500** |
| | #4 | 4.2 | 2.8% | 97.2% | **97.2%** | **4.750** |
| | #10 | 34.3 | 23.1% | 76.9% | **76.9%** | **2.000** |
| | WT. OF SAMPLE AT START OF HYDRO= | 50.0 (gms.) | | | | |
| **-#10 SIEVE PORTION** | #20 | 1.13 | 2.3% | 97.7% | **75.2%** | **0.850** |
| | #40 | 4.05 | 8.1% | 91.9% | **70.7%** | **0.420** |
| | #100 | 25.82 | 51.6% | 48.4% | **37.2%** | **0.150** |
| | #200 | 29.09 | 58.2% | 41.8% | **32.2%** | **0.075** |
| **HYDROMETER** | TEMPERATURE(°C)= | 18.0 | | | | |
| **PORTION** | TEMP BATH BULB READ= | 7.0 | | | | |
| | SPECIFIC GRAVITY Gs= | 2.70 (assumed) | | | | |
| | ELAPSED TIME (MIN) | UNCORR | CORRECTED | % PASS | | |
| | 1 | 25.0 | 18.0 | 35.6% | **27.4%** | **0.0481** |
| | 2 | 24.0 | 17.0 | 33.7% | **25.9%** | **0.0343** |
| | 5 | 20.0 | 13.0 | 25.7% | **19.8%** | **0.0222** |
| | 15 | 18.0 | 11.0 | 21.8% | **16.7%** | **0.0130** |
| | 30 | 15.0 | 8.0 | 15.8% | **12.2%** | **0.0093** |
| | 60 | 14.0 | 7.0 | 13.9% | **10.7%** | **0.0067** |
| | 120 | 13.0 | 6.0 | 11.9% | **9.1%** | **0.0047** |
| | 240 | 12.0 | 5.0 | 9.9% | **7.6%** | **0.0034** |
| | 1450 | 11.0 | 4.0 | 7.9% | **6.1%** | **0.0014** |

***soil classification:*** **SAND, Trace Gravel, Some Silt, SM**

| | |
|---|---|
| **GRAVEL=** | **3 %** |
| **SAND=** | **65 %** |
| **SILT=** | **25 %** |
| **CLAY=** | **7 %** |

**REPORT OF GRAIN SIZE ANALYSIS** **SCHLEEDE-HAMPTON ASSOCIATES,INC.**




SAND, Trace Gravel, Some Silt, SM

S-031203-MG-245

031203-MG-246 hydro

| | |
|---|---|
| JOB NAME: | Laboratory Testing - GMPT Bedford |
| PROJECT NO. | 62225 |
| SAMPLE ID | S-031203-MG-246 |
| DATE SAMPLED: | 3/12/03 |

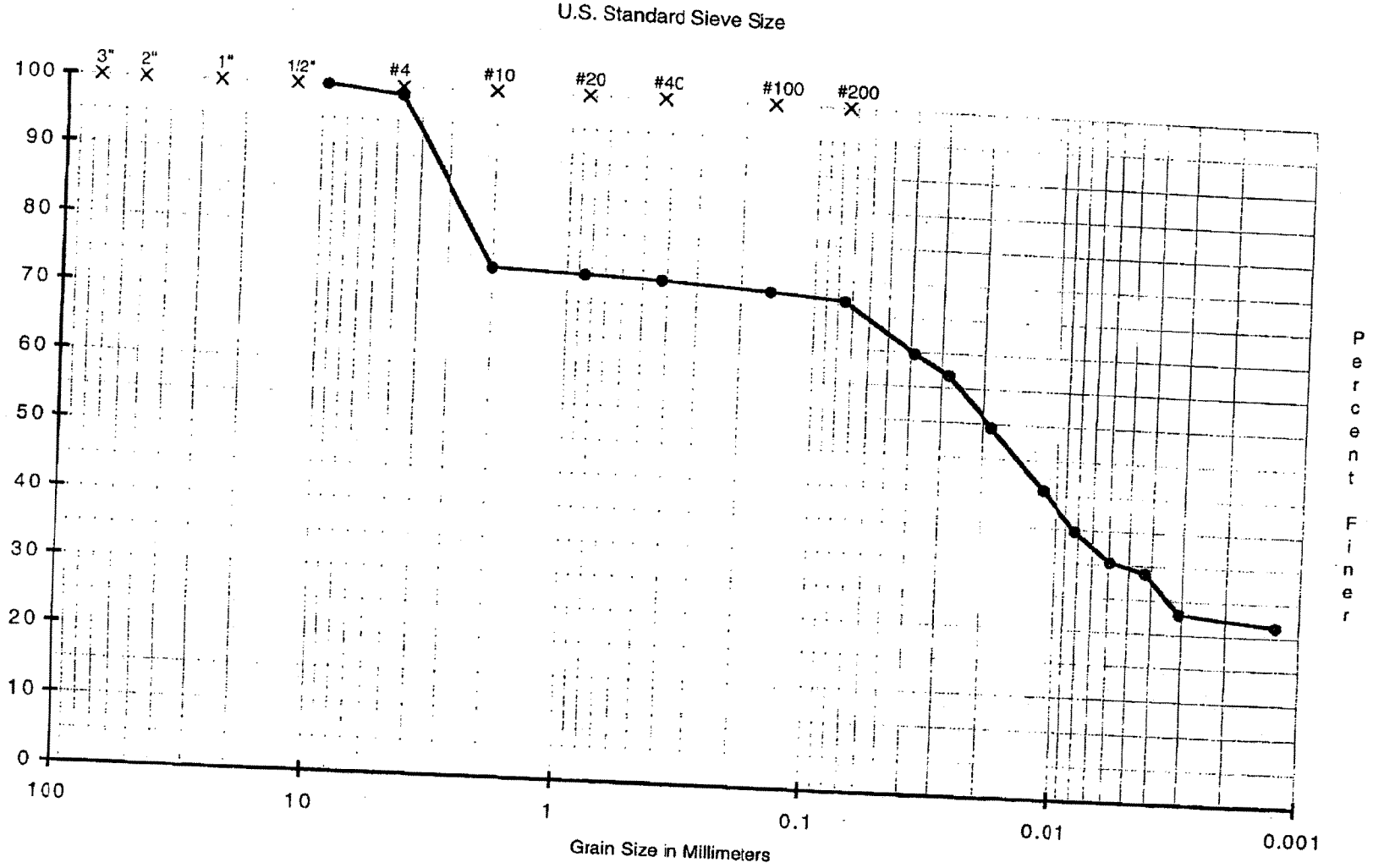
**ASTM D-422 / D1140**

| | | | | | TOTAL | DIAMETER |
|---|---|---|---|---|---|---|
| | TOTAL SAMPLE WT.= | 152.4 (gms.) | | | | |
| **+10 SIEVE PORTION** | SIEVE SIZE | CUM WT. RET | PART % RET | PART % PASS | **PASSING** | **(mm)** |
| | 1 | 0.0 | 0.0% | 100.0% | **100.0%** | **25.000** |
| | 3/4 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **19.000** |
| | 1/2 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **12.500** |
| | 3/8 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **9.500** |
| | #4 | 1.9 | 1.2% | 98.8% | **98.8%** | **4.750** |
| | #10 | 39.1 | 25.7% | 74.3% | **74.3%** | **2.000** |
| | WT. OF SAMPLE AT START OF HYDRO= | 50.0 (gms.) | | | | |
| **-#10 SIEVE PORTION** | #20 | 0.23 | 0.5% | 99.5% | **74.0%** | **0.850** |
| | #40 | 0.45 | 0.9% | 99.1% | **73.7%** | **0.420** |
| | #100 | 1.08 | 2.2% | 97.8% | **72.7%** | **0.150** |
| | #200 | 1.60 | 3.2% | 96.8% | **72.0%** | **0.075** |
| **HYDROMETER** | TEMPERATURE(°C)= | 18.0 | | | | |
| **PORTION** | TEMP BATH BULB READ= | 7.0 | | | | |
| | SPECIFIC GRAVITY Gs= | 2.70 (assumed) | | | | |
| | ELAPSED TIME (MIN) | UNCORR | CORRECTED | % PASS | | |
| | 1 | 51.0 | 44.0 | 87.1% | **64.8%** | **0.0387** |
| | 2 | 49.0 | 42.0 | 83.2% | **61.8%** | **0.0281** |
| | 5 | 44.0 | 37.0 | 73.3% | **54.5%** | **0.0186** |
| | 15 | 38.0 | 31.0 | 61.4% | **45.6%** | **0.0113** |
| | 30 | 34.0 | 27.0 | 53.5% | **39.7%** | **0.0082** |
| | 60 | 31.0 | 24.0 | 47.5% | **35.3%** | **0.0060** |
| | 120 | 30.0 | 23.0 | 45.5% | **33.9%** | **0.0042** |
| | 240 | 26.0 | 19.0 | 37.6% | **28.0%** | **0.0031** |
| | 1450 | 25.0 | 18.0 | 35.6% | **26.5%** | **0.0013** |

***soil classification:*** **Silty CLAY, Some Sand, Trace Gravel, CL**

| | |
|---|---|
| **GRAVEL=** | **1 %** |
| **SAND=** | **27 %** |
| **SILT=** | **45 %** |
| **CLAY=** | **27 %** |

**REPORT OF GRAIN SIZE ANALYSIS** **SCHLEEDE-HAMPTON ASSOCIATES,INC.**




Silty CLAY, Some Sand, Trace Gravel, CL

S-031203-MG-246

031203-MG-247 hydro

| | |
|---|---|
| JOB NAME: | Laboratory Testing - GMPT Bedford |
| PROJECT NO. | 62225 |
| SAMPLE ID | S-031203-MG-247 |
| DATE SAMPLED: | 3/12/03 |

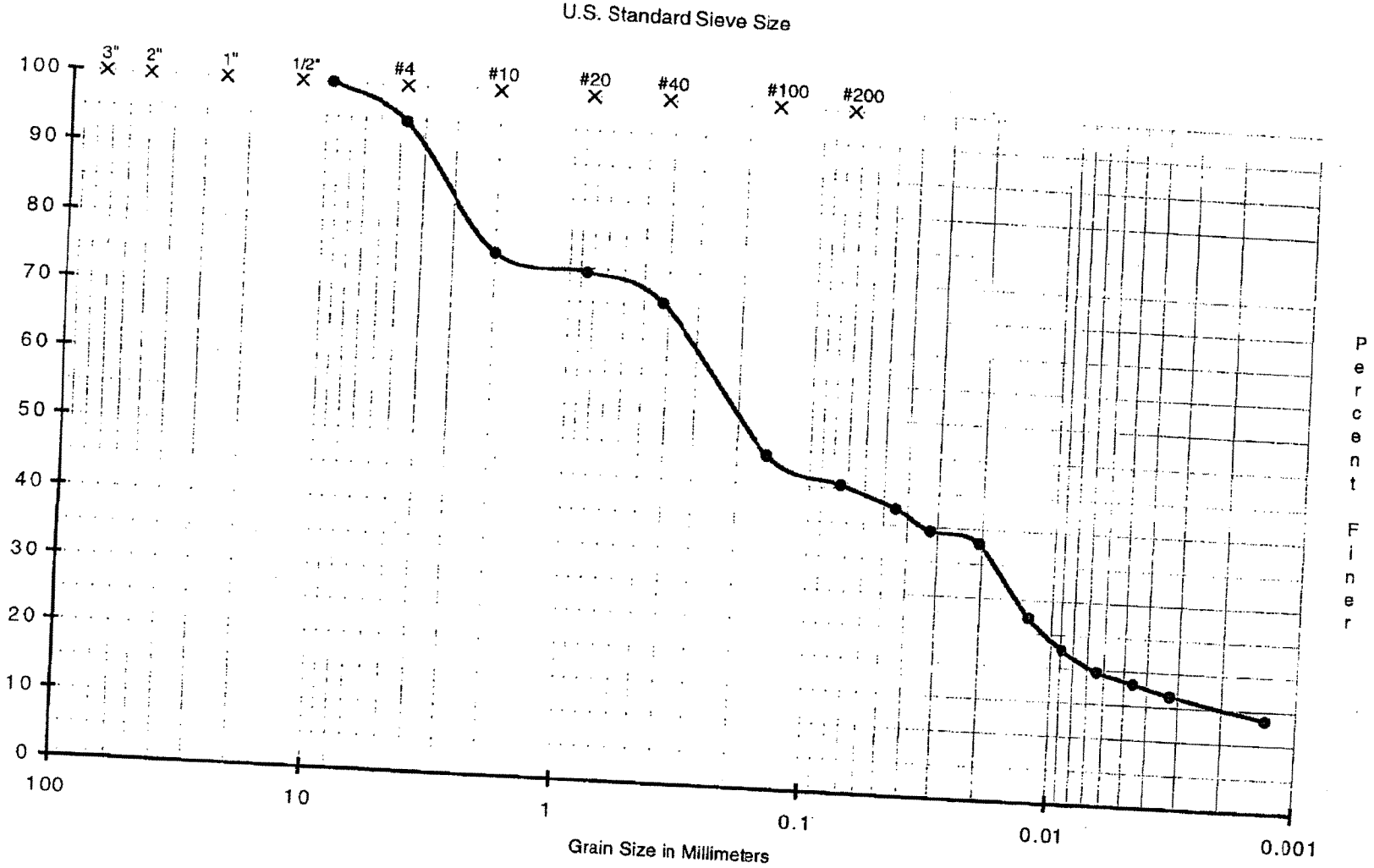
**ASTM D-422 / D1140**

| | TOTAL SAMPLE WT.= | 183.1 (gms.) | | | TOTAL | DIAMETER |
|---|---|---|---|---|---|---|
| **+10 SIEVE PORTION** | SIEVE SIZE | CUM WT. RET | PART % RET | PART % PASS | **PASSING** | **(mm)** |
| | 1 | 0.0 | 0.0% | 100.0% | **100.0%** | **25.000** |
| | 3/4 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **19.000** |
| | 1/2 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **12.500** |
| | 3/8 IN | 0.0 | 0.0% | 100.0% | **100.0%** | **9.500** |
| | #4 | 9.5 | 5.2% | 94.8% | **94.8%** | **4.750** |
| | #10 | 42.9 | 23.4% | 76.6% | **76.6%** | **2.000** |
| | WT. OF SAMPLE AT START OF HYDRO= | 50.0 (gms.) | | | | |
| **-#10 SIEVE PORTION** | #20 | 1.46 | 2.9% | 97.1% | **74.3%** | **0.850** |
| | #40 | 3.95 | 7.9% | 92.1% | **70.5%** | **0.420** |
| | #100 | 17.95 | 35.9% | 64.1% | **49.1%** | **0.150** |
| | #200 | 20.29 | 40.6% | 59.4% | **45.5%** | **0.075** |
| **HYDROMETER** | TEMPERATURE(°C)= | 18.0 | | | | |
| **PORTION** | TEMP BATH BULB READ= | 7.0 | | | | |
| | SPECIFIC GRAVITY Gs= | 2.70 (assumed) | | | | |
| | ELAPSED TIME (MIN) | UNCORR | CORRECTED | % PASS | | |
| | 1 | 35.0 | 28.0 | 55.4% | **42.5%** | **0.0449** |
| | 2 | 33.0 | 26.0 | 51.5% | **39.4%** | **0.0322** |
| | 5 | 32.0 | 25.0 | 49.5% | **37.9%** | **0.0205** |
| | 15 | 25.0 | 18.0 | 35.6% | **27.3%** | **0.0124** |
| | 30 | 22.0 | 15.0 | 29.7% | **22.7%** | **0.0090** |
| | 60 | 20.0 | 13.0 | 25.7% | **19.7%** | **0.0064** |
| | 120 | 19.0 | 12.0 | 23.8% | **18.2%** | **0.0046** |
| | 240 | 18.0 | 11.0 | 21.8% | **16.7%** | **0.0032** |
| | 1450 | 16.0 | 9.0 | 17.8% | **13.6%** | **0.0013** |

***soil classification:*** **Clayey SAND, Trace Gravel, SC**

| | |
|---|---|
| **GRAVEL=** | **5 %** |
| **SAND=** | **49 %** |
| **SILT=** | **31 %** |
| **CLAY=** | **15 %** |

**REPORT OF GRAIN SIZE ANALYSIS** **SCHLEEDE-HAMPTON ASSOCIATES,INC.**




Clayey SAND, Trace Gravel, SC

S-031203-MG-247

# APPENDIX C

# STREAMLINED HUMAN HEALTH RISK ASSESSMENT SUPPORTING INFORMATION AND CALCULATIONS

## C O N T E N T S

C1 INTRODUCTION ..... C-1
C2 ROUTINE WORKERS ..... C-3
C2.1 Contact with Outdoor Soil ..... C-3
C3 CONSTRUCTION WORKERS ..... C-5
C3.1 Contact with Soil ..... C-5
C3.2 Contact with Groundwater ..... C-7
C4 MAINTENANCE WORKER ..... C-8
C4.1 Contact with Sediment ..... C-8
C4.2 Contact with Surface/Spring Water ..... C-8
C5 TRESPASSERS ..... C-9

### A t t a c h m e n t s

Attachment 0 Toxicological, Physical and Chemical Data Used in the Risk Evaluation
Attachment 1 Exposure of Routine Workers to Surface Soil
Attachment 2 Exposure of Construction Workers to Soil in Excavations
Attachment 3 Exposure of Construction Workers to Groundwater in Excavations
Attachment 4 Exposure of Maintenance Workers to Sediment
Attachment 5 Exposure of Maintenance Workers to Surface Water and Spring Water
Attachment 6 Post-Remedy Risk Estimates for Construction Scenarios

## C1 INTRODUCTION

This appendix provides information and calculations that support the discussion of the human health risk evaluation in Section 4 of the Interim Measures (IM) Alternatives Review Report for the East Plant Area. The information in this appendix is organized in sections that correspond to the exposure scenarios for the following potentially exposed populations discussed in Section 4 of the East Plant Area IM Alternatives Review Report:

- Routine Workers
- Construction Workers

- Maintenance Workers
- Trespassers

The references cited in this appendix are included in the East Plant Area IM Alternatives Review Report. Physical and chemical information and toxicity values are provided in Attachment 0. Detailed calculation sheets supporting the risk-based evaluation are provided in Attachments 1 to 6 to this appendix.

The cancer risk associated with potential exposure to a carcinogenic chemical is calculated by multiplying an estimate of the lifetime average daily dose (LADD) for a particular exposure scenario by the cancer slope factor (SF) for the chemical, as follows:

$$\text{Risk} = \text{LADD} \cdot \text{SF}$$

For the inhalation route, the inhalation cancer risk is calculated using the chemical concentration in air ($C_{air}$) and the URF, as follows:

$$\text{Risk} = C_{air} \cdot \text{URF} \cdot \frac{\text{EF} \cdot \text{ED}}{\text{AT}}$$

where EF is exposure frequency, ED is exposure duration, and AT is averaging time.

The noncancer hazard quotient (HQ) associated with potential exposure to a noncarcinogenic chemical is calculated by dividing an estimate of the average daily dose (ADD) for a particular exposure scenario by the reference dose (RfD) for the chemical, as follows:

$$\text{HQ} = \frac{\text{ADD}}{\text{RfD}}$$

For the inhalation route, the inhalation HQ is calculated using $C_{air}$ and the RfC, as follows:

$$\text{HQ} = \frac{C_{air}}{\text{RfC}} \cdot \frac{\text{EF} \cdot \text{ED}}{\text{AT}}$$

The potential cancer risk and noncancer effects that may result from exposure to the combination of constituents at an area are estimated following USEPA guidance (1989), as follows:

$$\text{Cumulative Risk} = \sum_i \text{Risk}_i$$

$$\text{Hazard Index} = \sum_i \text{HQ}_i$$

where:

$\text{Risk}_i$ = estimated cancer risk for the *i*th constituent

$\text{HQ}_i$ = hazard quotient for the *i*th constituent

This approach streamlines the evaluation, but may result in estimates of cumulative cancer and noncancer risks that are more conservative than necessary. For example, different chemicals may cause different and unrelated health effects, so summing the HQs for their individual effects would overestimate the significance of their combined effect. The risk estimates for the potentially exposed populations are discussed in the following sections.

## C2 ROUTINE WORKERS

As discussed in the East Plant Area IM Alternatives Review Report, the risk evaluation evaluates potential exposure of routine workers via contact with outdoor soil. The computation of risk estimates associated with exposure via contact with outdoor soil is discussed in Section C2.1.

### C2.1 Contact with Outdoor Soil

Routine workers could be exposed to surface soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during time spent outdoors. Estimates of cumulative cancer risk and hazard index (HI) associated with potential exposure of routine workers to outdoor soil at the East Plant Area are calculated using risk-based criteria as described below.

The risk-based criteria (RBC) for the ingestion and dermal routes of exposure are calculated as follows:

$$\text{RBC} = \frac{\text{TR}}{\text{LADD}^* \cdot \text{SF}}$$

$$\text{RBC} = \frac{\text{THQ} \cdot \text{RfD}}{\text{ADD}^*}$$

The *TR* and *THQ* are $10^{-5}$ and 1, respectively. The *LADD** and *ADD** are calculated using a concentration of 1 mg/kg in soil and USEPA-recommended standard default exposure factors for estimating RME risks under generic commercial/industrial settings, as shown in Attachment 1.

The risk-based criteria for the inhalation route are calculated as follows:

$$RBC = \frac{TR \cdot AT}{URF \cdot ET \cdot EF \cdot ED}\left(J \cdot C / Q\right)^{-1}$$

$$RBC = \frac{THQ \cdot RfC \cdot AT}{ET \cdot EF \cdot ED}\left(J \cdot C / Q\right)^{-1}$$

where the product $J \cdot C/Q$ is an air concentration that is normalized to unit concentration in soil. The $J$ term is the normalized average vapor or particulate flux, and the $C/Q$ term is a normalized air concentration. The $J \cdot C/Q$ term used in the calculations of vapor and particulate emissions from soil for routine workers is the USEPA default value used in the calculation of the Region 9 PRGs (USEPA 2002).

The risk-based criteria for each route of exposure are then combined to give cancer and noncancer criteria that are based on the combination of all three routes, as follows:

$$RBC = \left(\sum_i RBC_i^{-1}\right)^{-1}$$

The cancer risk and HQ are estimated using these RBC in the following equations:

$$Risk = \frac{C}{RBC} \cdot TR$$

$$HQ = \frac{C}{RBC} \cdot THQ$$

where C is the exposure point concentration. In this risk evaluation, the estimates of cancer risk and HQ are based on the 95% upper confidence limits (UCLs) on the mean for key

constituents and the maximum detected concentrations at the East Plant Area for the other constituents. The 95% UCLs presented are nonparametric bootstrap confidence limits on the mean (Efron and Tibshirani 1998) calculated from 4,000 bootstrap replications. The computation of cumulative cancer risk and HI estimates for this scenario is shown in Attachment 1. The 95% UCLs used in calculating the estimates of the high-end cumulative risk are highlighted with shading on the tables in Attachment 1.

## C3 CONSTRUCTION WORKERS

As discussed in the East Plant Area IM Alternatives Review Report, risk estimates of construction workers to soil and groundwater are calculated using exposure assumptions specific to construction workers. Computation of the risk-based criteria and the corresponding risk estimates is discussed in Sections C3.1 and C3.2 for soil and groundwater, respectively. The results of these calculations are shown in Attachments 2 and 3.

### C3.1 Contact with Soil

Construction workers could be exposed to surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during excavations. Potential exposure of construction workers is evaluated using the exposure assumptions specific to the activities of construction workers under both small-scale and a large-scale construction scenarios as discussed in Section 4.1 of the East Plant Area IM Alternatives Review Report (see Attachment 2). The risk-based criteria for the exposures of construction workers to soil are calculated in a manner analogous to the method discussed in Section C2.1, except the normalized flux ($J$) and the normalized air concentration ($C/Q$) as discussed below. The computations of the risk-based criteria for this scenario are shown in Attachment 2.

The normalized average vapor flux $J_v$ of a chemical from unsaturated soil is conservatively estimated using an unsteady-state model derived by Jury et al. (1983) that USEPA has adapted for screening-level analysis (USEPA 1996). This model conservatively assumes that volatile chemicals are present in the soil to an infinite depth. The equation for $J_v$ is given by:

$$J_v = 2\, C_{s,0}\, \rho_b \sqrt{\frac{D_E}{\pi\, T}}$$

$$D_E = \frac{D_G\, H + D_L}{\rho_b\, K_d + \theta_w + \theta_a\, H}$$

$$D_G = D_{air} \cdot \frac{\theta_a^{10/3}}{n^2}$$

$$D_L = D_{water} \cdot \frac{\theta_w^{10/3}}{n^2}$$

Derivation of this equation and definition of the equation parameters can be found in the Jury et al. 1983 journal article and in USEPA guidance (1996), and therefore, is not repeated here. The values for chemical-specific parameters and default soil parameters recommended in the 1996 USEPA guidance are used in calculating $J_V$.

The *C/Q* term is a normalized air concentration estimated using SCREEN3 (USEPA 1995a) for a 15-foot by 15-foot excavation pit. The SCREEN3 area-source algorithm is used with worst-case meteorological conditions selected by the model to estimate a maximum 1-hour air concentration at ground level. The maximum 1-hour air concentration is converted to a maximum 24-hour air concentration using a conservative factor of 0.4, because workers are conservatively assumed to have inhalation exposure over the entire work day while working around the excavation area. This air concentration is expected to be higher than actual air concentrations to which workers would be exposed during excavation activities.

Emission of respirable soil particulates ($PM_{10}$) during excavation activities at the East Plant Area is expected to comply with the National Ambient Air Quality Standard for $PM_{10}$. Therefore, the $PM_{10}$ standard of 150 (24-hour average) and 50 (annual average) ug/$m^3$ is used as an upper-bound for the *J·C/Q* term for the small-scale and large-scale construction scenarios, respectively.

In this risk evaluation, the estimates of cancer risk and HQ are based on the 95% UCLs on the mean for key constituents and the maximum detected concentrations at the East Plant Area for the other constituents. The computation of cumulative cancer risk and HI estimates for the baseline construction scenarios is shown in Attachment 2. The computation of cumulative

cancer risk and HI estimates for the post-remedy construction scenarios (see Section 4.2) is shown in Attachment 6. The 95% UCLs used in calculating the estimates of the high-end cumulative risk are highlighted with shading on the tables in these attachments.

### C3.2 Contact with Groundwater

Construction workers could be exposed to shallow groundwater and spring water via incidental ingestion, dermal contact, and inhalation of vapors. As discussed in Section 4.1, potential worker exposures to spring water are evaluated indirectly using exposure estimates for maintenance workers because potential construction worker exposures are expected to be lower than potential maintenance worker exposures (see Section C4.2). The cancer risk and HQ estimates for contact with groundwater are calculated using risk-based criteria in a manner analogous to the method discussed in Section C3.1.

In this case, the risk-based criteria for the ingestion and dermal routes of exposure are calculated as discussed in Section C2.1, except *LADD** and *ADD** are calculated using the exposure factors for groundwater contact shown in Attachment 3. The risk-based criteria for the inhalation route are calculated as discussed in Section C2.1, except the normalized flux *J* is calculated as discussed below. The computations of the risk-based criteria for this scenario are shown in Attachment 3.

The normalized vapor flux *J* of a chemical from exposed groundwater in an excavation pit is estimated using an overall mass transfer coefficient that is recommended by USEPA (1995c):

$$K_L = \left(\frac{1}{k_l} + \frac{1}{Hk_g}\right)^{-1}\left(\frac{m}{10^2 cm}\right)\left(\frac{10^3 L}{m^3}\right)$$

where $H$ is the Henry's law constant, and $k_l$ and $k_g$ are the liquid-phase and gas-phase mass transfer coefficients (in cm/s) given by the following:

$$k_l = \left(\frac{MW_o}{MW}\right)^{0.5}\left(\frac{T}{298°K}\right)k_{l,o}$$

$$k_g = \left(\frac{MW_w}{MW}\right)^{0.335}\left(\frac{T}{298°K}\right)^{1.005}k_{g,w}$$

where $MW$, $MW_o$, and $MW_w$ are the molecular weights of the chemical, oxygen, and water, $T$ is the water's absolute temperature, $k_{l,o}$ is the liquid-phase mass transfer coefficient for oxygen (0.002 cm/s), and $k_{g,w}$ is the gas-phase mass transfer coefficient for water vapor (0.833 cm/s).

Estimates of cancer risk and HQ are calculated using RBCs for the combined routes in the same manner as that discussed in Section C2.1. In this risk evaluation, the estimates are based on the highest detected concentration of each constituent in groundwater at the East Plant Area. The computation of cumulative cancer risk and HI estimates for this scenario is shown in Attachment 3.

## C4 MAINTENANCE WORKER

As discussed in the East Plant Area IM Alternatives Review Report, maintenance workers could be exposed to sediments, surface water, and spring water via incidental ingestion, dermal contact, and vapor inhalation (surface and spring water only). Computation of the risk estimates for maintenance worker exposure to sediment is discussed in Section C4.1. Computation of the risk estimates for maintenance worker exposure to surface and spring water is discussed in Section C4.2. The results of these calculations are shown in Attachments 4 and 5.

### C4.1 Contact with Sediment

Maintenance workers could be exposed to sediment via incidental ingestion and dermal contact. The cancer risk and HQ estimates for these potential exposures are calculated using a similar approach to that discussed in Section C3.1, and the exposure factors shown in Attachment 4. Computations of the risk-based criteria for this scenario are also shown in Attachment 4.

The cancer risk and HQ estimates are based on the highest detected concentrations of each constituent detected in sediment at the East Plant Area. These concentrations are used as a conservative estimate of any site-related contribution to concentrations in sediment. Computations of these risk estimates are shown in Attachment 4.

### C4.2 Contact with Surface/Spring Water

Maintenance workers could be exposed to surface and spring water via incidental ingestion, dermal contact, and vapor inhalation. The cancer risk and HQ estimates for these potential

exposures are calculated using a similar approach to that discussed in C3.2, and the exposure factors shown in Attachment 5. Computations of the risk-based criteria for this scenario are also shown in Attachment 5.

The cancer risk and HQ estimates are based on the highest detected concentrations of each constituent detected in surface water and spring water at the East Plant Area. These concentrations are used as a conservative estimate of any site-related contribution to concentrations in surface water and spring water. The computations of these risk estimates are shown in Attachment 5.

## C5 TRESPASSERS

As discussed in the East Plant Area IM Alternatives Review Report, potential exposure of trespassers to soil is evaluated indirectly in the risk evaluation by using risk estimates for exposures of routine workers to soil. These estimates are discussed in Section C2. Potential exposures of trespassers to sediment, surface water, and spring water are evaluated indirectly in the risk evaluation by using risk estimates for exposures of maintenance workers. These estimates are discussed in Section C4.

# A T T A C H M E N T  0

## Toxicological, Physical and Chemical Data Used in the Risk Evaluation

## Attachment 0: Toxicity Values
## Bedford, Indiana

| Chem Group | Chemical | CASRN | Cancer Classification | | | $SF_{oral}$ $(mg/kg/d)^{-1}$ | | | $SF_{dermal}$ $(mg/kg/d)^{-1}$ | | | URF $(mg/m^3)^{-1}$ | | | $RfD_{oral}$ (mg/kg/d) | | | | $RfD_{dermal}$ (mg/kg/d) | | | RfC $(mg/m^3)$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Group | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | UF | Ref | Notes | Value | Ref | Notes | Value | UF | Ref | Notes |
| VOC | Acetone | 67-64-1 | ID | 1 | | | | | | | | | | | 9.00E-01 | 1000 | 1 | | 9.00E-01 | 125 | 104 | 3.15E+00 | 1000 | 1 | 4,44 |
| VOC | Benzene | 71-43-2 | A | 1 | | 5.50E-02 | 1 | 68 | 5.50E-02 | 125 | 104 | 7.80E-03 | 1 | 60 | 4.00E-03 | 300 | 1 | | 4.00E-03 | 125 | 104 | 3.00E-02 | 300 | 1 | |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1 | | 6.20E-02 | 1 | | 6.20E-02 | 125 | 104 | 1.77E-02 | 1 | 4,45 | 2.00E-02 | 1000 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 1000 | 1 | 4,44 |
| VOC | Bromomethane | 74-83-9 | D | 1 | | | | | | | | | | | 1.40E-03 | 1000 | 1 | | 1.40E-03 | 125 | 104 | 0.005 | 100 | 1 | |
| VOC | 2-Butanone | 78-93-3 | ID | 1 | | | | | | | | | | | 6.00E-01 | 1000 | 1 | | 6.00E-01 | 125 | 104 | 5.00E+00 | 300 | 1 | |
| VOC | Carbon Disulfide | 75-15-0 | | | | | | | | | | | | | 1.00E-01 | 100 | 1 | | 1.00E-01 | 125 | 104 | 7.00E-01 | 30 | 1 | |
| VOC | Chlorobenzene | 108-90-7 | D | 1 | | | | | | | | | | | 2.00E-02 | 1000 | 1 | | 2.00E-02 | 125 | 104 | 6.00E-02 | 1000 | 103 | |
| VOC | Chloroethane | 75-00-3 | | | | 2.90E-03 | 4 | | 2.90E-03 | 125 | 104 | | | | 4.00E-01 | | 4 | | 4.00E-01 | 125 | 104 | 1.00E+01 | 300 | 1 | |
| VOC | Chloroform | 67-66-3 | B2 | 1 | | | | | | | | 2.30E-02 | 1 | | 1.00E-02 | 1000 | 1 | | 1.00E-02 | 125 | 104 | 5.00E-02 | 100 | 117 | |
| VOC | Chloromethane | 74-87-3 | D | 1 | | | | | | | | | | | | | | | | | | 9.00E-02 | 1000 | 1 | |
| VOC | Cumene | 98-82-8 | D | 1 | | | | | | | | | | | 1.00E-01 | 1000 | 1 | | 1.00E-01 | 125 | 104 | 4.00E-01 | 1000 | 1 | |
| VOC | Cyclohexane | 110-82-7 | ID | 1 | | | | | | | | | | | | | | | | | | 6.00E+00 | 300 | 1 | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1 | | 8.40E-02 | 1 | | 8.40E-02 | 125 | 104 | 2.40E-02 | 1 | 4,45 | 2.00E-02 | 1000 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 1000 | 1 | 4,44 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1 | | | | | | | | | | | 9.00E-02 | 1000 | 1 | | 9.00E-02 | 125 | 104 | 2.00E-01 | 1000 | 2 | 3 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1 | | | | | | | | | | | 9.00E-04 | | 4 | | 9.00E-04 | 125 | 104 | 1.40E-01 | 1000 | 2 | 3,10,44 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 2 | | 2.40E-02 | 2 | 6 | 2.40E-02 | 125 | 104 | 6.29E-03 | 4 | 45 | 3.00E-02 | | 4 | | 3.00E-02 | 125 | 104 | 8.00E-01 | 100 | 1 | |
| VOC | Dichlorodifluoromethane | 75-71-8 | | | | | | | | | | | | | 2.00E-01 | 100 | 1 | | 2.00E-01 | 125 | 104 | 2.00E-01 | 10000 | 2 | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1 | | | | | | | | | | | 1.00E-01 | 1000 | 2 | 26,6 | 1.00E-01 | 125 | 104 | 5.00E-01 | 1000 | 2 | 3 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1 | | 9.10E-02 | 1 | | 9.10E-02 | 125 | 104 | 2.60E-02 | 1 | | 3.00E-02 | | 4 | | 3.00E-02 | 125 | 104 | 5.00E-03 | 3000 | 102 | 92 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1 | | | | | | | | | | | 1.00E-02 | 3000 | 126 | | 1.00E-02 | 125 | 104 | 3.50E-02 | 3000 | 126 | 4,44 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | | | | | | | | | | | | 2.00E-02 | 1000 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 1000 | 1 | 4,44 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1 | | | | | | | | | | | 1.00E-01 | 1000 | 1 | | 1.00E-01 | 125 | 104 | 1.00E+00 | 300 | 1 | |
| VOC | 2-Hexanone | 591-78-6 | | | | | | | | | | | | | 4.00E-02 | 10000 | 40 | | 4.00E-02 | 125 | 104 | 5.00E-03 | 10000 | 108 | |
| VOC | Methyl Acetate | 79-20-9 | | | | | | | | | | | | | 1.00E+00 | 1000 | 2 | | 1.00E+00 | 125 | 104 | 3.50E+00 | 1000 | 2 | 4,44 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | | | 3.30E-03 | 4 | | 3.30E-03 | 125 | 104 | 1.00E-04 | 4 | 45 | | | | | | | | 3.00E+00 | 100 | 1 | |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1 | | | | | | | | | | | | | 1 | 90 | | | | 3.00E+00 | 300 | 1 | |
| VOC | Methylcyclohexane | 108-87-2 | | | | | | | | | | | | | | | | | | | | 3.00E+00 | 100 | 2 | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1 | | 7.50E-03 | 1 | | 7.50E-03 | 125 | 104 | 4.70E-04 | 1 | | 6.00E-02 | 100 | 1 | | 6.00E-02 | 125 | 104 | 3.00E+00 | 100 | 2 | |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 77 | | 5.20E-02 | 77 | | 5.20E-02 | 125 | 104 | 3.06E-03 | 77 | | 1.00E-02 | 1000 | 1 | | 1.00E-02 | 125 | 104 | 4.00E-01 | 300 | 109 | 94 |
| VOC | Toluene | 108-88-3 | D | 1 | | | | | | | | | | | 2.00E-01 | 1000 | 1 | | 2.00E-01 | 125 | 104 | 4.00E-01 | 300 | 1 | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1 | | | | | | | | | | | 1.00E-02 | 1000 | 1 | | 1.00E-02 | 125 | 104 | 2.00E-01 | 1000 | 2 | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1 | | | | | | | | | | | 2.80E-01 | 90 | 72 | | 2.80E-01 | 125 | 104 | 2.20E+00 | 90 | 126 | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 49 | 18 | 1.10E-02 | 49 | | 1.10E-02 | 125 | 104 | 1.70E-03 | 49 | | 6.00E-03 | 3000 | 46 | 6, 97 | 6.00E-03 | 125 | 104 | | | | |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | | | | | | | | | | | | 3.00E+01 | 10 | 1 | | 3.00E+01 | 125 | 104 | 3.00E+01 | 100 | 2 | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1 | | 1.40E+00 | 1 | 78 | 1.40E+00 | 125 | 104 | 8.80E-03 | 1 | 79 | 3.00E-03 | 30 | 1 | | 3.00E-03 | 125 | 104 | 1.00E-01 | 30 | 1 | |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1 | | | | | | | | | | | 2.00E-01 | 1000 | 1 | | 2.00E-01 | 125 | 104 | 1.00E-01 | 300 | 1 | |
| SVOC | Acenaphthene | 83-32-9 | | | | | | | | | | | | | 6.00E-02 | 3000 | 1 | | 6.00E-02 | 125 | 104 | 2.10E-01 | 3000 | 1 | 4,44 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1 | | | | | | | | | | | 3.00E-02 | 3000 | 1 | 20 | 3.00E-02 | 125 | 104 | 1.05E-01 | 3000 | 1 | 20,4,44 |
| SVOC | Acetophenone | 98-86-2 | D | 1 | | | | | | | | | | | 1.00E-01 | 3000 | 1 | | 1.00E-01 | 125 | 104 | 3.50E-01 | 3000 | 1 | 4,44 |
| SVOC | Anthracene | 120-12-7 | D | 1 | | | | | | | | | | | 3.00E-01 | 3000 | 1 | | 3.00E-01 | 125 | 104 | | | 2 | 90 |
| SVOC | Benzaldehyde | 100-52-7 | | | | | | | | | | | | | 1.00E-01 | 1000 | 1 | | 1.00E-01 | 125 | 104 | 3.50E-01 | 1000 | 1 | 4,44 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1 | | 7.30E-01 | 4 | | 7.30E-01 | 125 | 104 | 2.09E-01 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1 | | 7.30E+00 | 1 | | 7.30E+00 | 125 | 104 | 8.86E-01 | 3 | 45 | | | | | | | | | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1 | | 7.30E-01 | 4 | | 7.30E-01 | 125 | 104 | 2.09E-01 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1 | | | | | | | | | | | 3.00E-02 | 3000 | 1 | 20 | 3.00E-02 | 125 | 104 | 1.05E-01 | 3000 | 1 | 20,4,44 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1 | | 7.30E-02 | 4 | | 7.30E-02 | 125 | 104 | 2.09E-02 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1 | | | | | | | | | | | 5.00E-02 | 1000 | 1 | | 5.00E-02 | 125 | 104 | 1.75E-01 | 1000 | 1 | 4,44 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1 | | 1.40E-02 | 1 | | 1.40E-02 | 125 | 104 | 4.00E-03 | 3 | 45 | 2.00E-02 | 1000 | 1 | | 2.00E-02 | 125 | 104 | | | | |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1 | | | | | | | | | | | 2.00E-01 | 1000 | 1 | | 2.00E-01 | 125 | 104 | 7.00E-01 | 1000 | 1 | 4,44 |
| SVOC | Caprolactam | 105-60-2 | | | | | | | | | | | | | 5.00E-01 | 100 | 1 | | 5.00E-01 | 125 | 104 | 1.75E+00 | 100 | 1 | 4,44 |
| SVOC | Carbazole | 86-74-8 | B2 | 2 | | 2.00E-02 | 2 | | 2.00E-02 | 125 | 104 | 5.71E-03 | 2 | 4,45 | | | | | | | | | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | | | | | | | | | | | | 4.00E-03 | 3000 | 1 | | 4.00E-03 | 125 | 104 | 1.40E-02 | 3000 | 1 | 4,44 |
| SVOC | Chrysene | 218-01-9 | B2 | 1 | | 7.30E-03 | 4 | | 7.30E-03 | 125 | 104 | 2.09E-03 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1 | | 7.30E+00 | 4 | | 7.30E+00 | 125 | 104 | 2.09E+00 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1 | | | | | | | | | | | 4.00E-03 | | 4 | | 4.00E-03 | 125 | 104 | 1.40E-02 | | 4 | 4,44 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1 | | | | | | | | | | | 8.00E-01 | 1000 | 1 | | 8.00E-01 | 125 | 104 | 2.80E+00 | 1000 | 1 | 4,44 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | | | | | | | | | | | | 2.00E-02 | 3000 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 3000 | 1 | 4,44 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1 | | | | | | | | | | | 1.00E-01 | 1000 | 1 | 6 | 1.00E-01 | 125 | 104 | | | 1 | 90 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1 | 28 | 6.80E-01 | 1 | 28 | 6.80E-01 | 125 | 104 | 1.94E-01 | 1 | 28,4,45 | 1.00E-03 | 3000 | 2 | 6 | 1.00E-03 | 125 | 104 | 3.50E-03 | 3000 | 2 | 6,4,44 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | | | | | | | | | | | | 4.00E-02 | 1000 | 126 | | 4.00E-02 | 125 | 104 | | | 126 | 90 |
| SVOC | Fluoranthene | 206-44-0 | D | 1 | | | | | | | | | | | 4.00E-02 | 3000 | 1 | | 4.00E-02 | 125 | 104 | 1.40E-01 | 3000 | 1 | 4,44 |
| SVOC | Fluorene | 86-73-7 | D | 1 | | | | | | | | | | | 4.00E-02 | 3000 | 1 | | 4.00E-02 | 125 | 104 | 1.40E-01 | 3000 | 1 | 4,44 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1 | | 1.60E+00 | 1 | | 1.60E+00 | 125 | 104 | 4.60E-01 | 1 | | 8.00E-04 | 100 | 1 | | 8.00E-04 | 125 | 104 | | | 1 | 90 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1 | | 7.80E-02 | 1 | | 7.80E-02 | 125 | 104 | 2.20E-02 | 1 | | 3.00E-04 | | 4 | | 3.00E-04 | 125 | 104 | | | | |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1 | | 7.30E-01 | 4 | | 7.30E-01 | 125 | 104 | 2.09E-01 | 4 | 4,45 | | | | | | | | | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1 | | | | | | | | | | | 4.00E-03 | 1000 | 1 | | 4.00E-03 | 125 | 104 | 3.00E-03 | 3000 | 1 | 61 |
| SVOC | Methylphenol (total) | 1319-77-3 | | | | | | | | | | | | | 5.00E-02 | | 1 | 99 | 5.00E-02 | 125 | 104 | 1.75E-01 | | 1 | 99,4,44 |
| SVOC | Naphthalene | 91-20-3 | C | 1 | | | | | | | | | | | 2.00E-02 | 3000 | 1 | | 2.00E-02 | 125 | 104 | 3.00E-03 | 3000 | 1 | |

## Attachment 0: Toxicity Values
## Bedford, Indiana

| Chem Group | Chemical | CASRN | Cancer Classification | | | $SF_{oral}$ $(mg/kg/d)^{-1}$ | | | $SF_{dermal}$ $(mg/kg/d)^{-1}$ | | | URF $(mg/m^3)^{-1}$ | | | $RfD_{oral}$ (mg/kg/d) | | | | $RfD_{dermal}$ (mg/kg/d) | | | RfC $(mg/m^3)$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Group | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | UF | Ref | Notes | Value | Ref | Notes | Value | UF | Ref | Notes |
| SVOC | Phenanthrene | 85-01-8 | D | 1 | | | | | | | | | | | 3.00E-02 | 3000 | 1 | 20 | 3.00E-02 | 125 | 104 | 1.05E-01 | 3000 | 1 | 20,4,44 |
| SVOC | Phenol | 108-95-2 | ID | 1 | | | | | | | | | | | 3.00E-01 | 300 | 1 | | 3.00E-01 | 125 | 104 | | | 1 | 90,98 |
| SVOC | Pyrene | 129-00-0 | D | 1 | | | | | | | | | | | 3.00E-02 | 3000 | 1 | | 3.00E-02 | 125 | 104 | 1.05E-01 | 3000 | 1 | 4,44 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1 | | 2.00E+00 | 1 | 30,32 | 2.00E+00 | 125 | 104 | 5.71E-01 | 1 | 30,32,45 | 2.00E-05 | 300 | 1 | 72 | 2.00E-05 | 125 | 104 | | | | |
| INORG | Aluminum | 7429-90-5 | D | 90 | | | 90 | 90 | | | | | 90 | 90 | 1.00E+00 | 100 | 85 | | 1.00E+00 | 125 | 104 | 5.00E-03 | 300 | 84 | |
| INORG | Antimony | 7440-36-0 | | | | | | | | | | | | | 4.00E-04 | 1000 | 1 | | 6.00E-05 | 125 | 104 | 1.40E-03 | 1000 | 1 | 4,44 |
| INORG | Arsenic | 7440-38-2 | A | 1 | | 1.50E+00 | 1 | | 1.50E+00 | 125 | 104 | 4.30E+00 | 1 | | 3.00E-04 | 3 | 1 | | 3.00E-04 | 125 | 104 | | | | |
| INORG | Barium | 7440-39-3 | D | 1 | | | | | | | | | | | 7.00E-02 | 3 | 1 | | 7.00E-02 | 125 | 104 | | | 1 | 90 |
| INORG | Beryllium | 7440-41-7 | B1 | 1 | | | | | | | | 2.40E+00 | 1 | | 2.00E-03 | 300 | 1 | | 1.40E-05 | 125 | 104 | 2.00E-05 | 10 | 1 | |
| INORG | Cadmium | 7440-43-9 | B1 | 1 | | | | | | | | 1.80E+00 | 1 | | 1.00E-03 | 10 | 1 | 95 | 2.50E-05 | 125 | 104 | 2.00E-04 | | 3 | 44 |
| INORG | Chromium (total) | 7440-47-3 | | | | | | | | | | 1.20E+01 | 1 | 8 | 3.00E-03 | 900 | 1 | 8 | 7.50E-05 | 125 | 104 | | | | |
| INORG | Cobalt | 7440-48-4 | B1 | 126 | | | | | | | | 2.80E+00 | 126 | | 2.00E-02 | 10 | 126 | | 2.00E-02 | 125 | 104 | 2.00E-05 | 100 | 126 | |
| INORG | Copper | 7440-50-8 | D | 1 | | | | | | | | | | | 4.00E-02 | 2 | 50 | 49 | 4.00E-02 | 125 | 104 | 1.40E-01 | 2 | 50 | 49,4,44 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1 | | | | | | | | | | | 2.00E-02 | 500 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 500 | 1 | 4,44 |
| INORG | Cyanide (total) | 57-12-5 | D | 1 | | | | | | | | | | | 2.00E-02 | 500 | 1 | | 2.00E-02 | 125 | 104 | 7.00E-02 | 500 | 1 | 4,44 |
| INORG | Iron | 7439-89-6 | D | 91 | | | 91 | 90 | | | | | 91 | 90 | 3.00E-01 | 1 | 87 | | 3.00E-01 | 125 | 104 | | | 92 | 90 |
| INORG | Lead | 7439-92-1 | B2 | 1 | | | | | | | | | | | | | | | | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 1 | | | | | | | | | | | 1.40E-01 | 1 | 1 | | 5.60E-03 | 125 | 104 | 5.00E-05 | 1000 | 1 | |
| INORG | Mercury | 7439-97-6 | D | 1 | | | | | | | | | | | 3.00E-04 | 1000 | 1 | 51 | 2.10E-05 | 125 | 104 | 3.00E-04 | 30 | 1 | |
| INORG | Nickel | 7440-02-0 | A | 1 | | | | | | | | 2.40E-01 | 1 | | 2.00E-02 | 300 | 1 | | 8.00E-04 | 125 | 104 | | | | |
| INORG | Selenium | 7782-49-2 | D | 1 | | | | | | | | | | | 5.00E-03 | 3 | 1 | | 5.00E-03 | 125 | 104 | 1.75E-02 | 3 | 1 | 4,44 |
| INORG | Silver | 7440-22-4 | D | 1 | | | | | | | | | | | 5.00E-03 | 3 | 1 | | 2.00E-04 | 125 | 104 | 1.00E-05 | 1000 | 83 | |
| INORG | Thallium | 7440-28-0 | | | | | | | | | | | | | 7.00E-05 | 3000 | 52 | 49 | 7.00E-05 | 125 | 104 | 2.45E-04 | 3000 | 52 | 49,4,44 |
| INORG | Vanadium | 7440-62-2 | | | | | | | | | | | | | 7.00E-03 | 100 | 2 | 6 | 1.82E-04 | 125 | 104 | 2.45E-02 | 100 | 2 | 6,4,44 |
| INORG | Zinc | 7440-66-6 | D | 1 | | | | | | | | | | | 3.00E-01 | 3 | 1 | | 3.00E-01 | 125 | 104 | 1.05E+00 | 3 | 1 | 4,44 |

## References and Notes for Toxicity Values
## Bedford, Indiana

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|---|---|
| **References:** | |
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| | |
| **Notes:** | |
| 3 | HEAST Alternate Method. |
| 4 | ENVIRON obtained value by route-to-route extrapolation. |
| 6 | Under review, according to IRIS. |
| 8 | ENVIRON used Chromium VI [CASRN 18540-29-9] value from IRIS (reference 1) as a surrogate. |
| 10 | ENVIRON used 1,2-Dichlorobenzene [CASRN 95-50-1] value from the indicated reference as a surrogate. |
| 18 | Not verifiable, according to IRIS. |
| 20 | ENVIRON used Pyrene [CASRN 129-00-0] value from IRIS (reference 1) as a surrogate. |
| 26 | USEPA obtained value by route-to-route extrapolation. |
| 28 | USEPA used 2,4-,2,6-Dinitrotolunene mixture value from IRIS (reference 1) as a surrogate. |
| 30 | Upper-bound slope factor. |
| 32 | High risk & persistence tier for: food chain exposure; sediment/soil ingestion; dust/aerosol inhalation; dermal exposure, if an absorption factor is applied; presence of dioxin-like, tumor-promoting/persistent congeners; and all early life exposures. |
| 44 | ENVIRON derived inhalation RfC from inhalation RfD value presented in the indicated reference, using standard USEPA methodology presented in HEAST. |
| 45 | ENVIRON derived inhalation URF from Inhalation Slope Factor value presented in the indicated reference, using standard USEPA methodology presented in HEAST. |
| 49 | ENVIRON derived oral RfD from adverse health effect level value presented in the indicated reference. |
| 51 | ENVIRON used Mercuric Chloride [CASRN 7487-94-7] value from the indicated reference as a surrogate. |
| 60 | IRIS provides a range of 2.2E-6 to 7.8E-6 (ug/m3)-1 as the inhalation URF for Benzene. |
| 61 | ENVIRON used Naphthalene [CASRN 91-20-3] value from indicated reference as a surrogate. |
| 72 | ENVIRON used Aroclor 1254 [CASRN 11097-69-1] value from the indicated reference as a surrogate for PCBs [CASRN 1336-36-3]. |

| References and Notes for Toxicity Values<br>Bedford, Indiana | |
|---|---|
| 78 | IRIS recommends an oral Slope Factor for Vinyl Chloride of 7.2E-1 (mg/kg/d)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 1.4 (mg/kg/d)-1 is recommended to account for continuous exposure from birth. |
| 79 | IRIS recommends an inhalation URF for Vinyl Chloride of 4.4E-6 (ug/m3)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 8.8E-6 (ug/m3)-1 is recommended to account for continuous exposure from birth. |
| 90 | Inadequate data exist to derive a toxicity value, according to the indicated reference. |
| 94 | Two provisional RfC values are presented in the indicated reference (4E-1 and 6E-1 mg/m3). Personal communication with NCEA indicated that either RfC is acceptable and the RfC should be chosen on a case-by-case basis. |
| 95 | This RfD is for dietary exposure. The RfD for drinking water exposure is 0.0005 mg/kg/day. |
| 97 | ENVIRON used withdrawn source. |
| 98 | Route-to-route extrapolation is not appropriate, according to the indicated reference. |
| 99 | ENVIRON used 3-Methylphenol [CASRN 108-39-4] values from the indicated reference as a surrogate. |
| 104 | Dermal toxicity value is extrapolated from oral toxicity value in accordance with the referenced EPA guidance. |

## Attachment 0: Physical and Chemical Data
## Bedford, Indiana

| Chem Group | Chemical | CASRN | MW (g/mole) | | | $K_{ow}$ (unitless) | | | $K_{oc}$ (L/kg) | | | $K_d$ (L/kg) | | | H (unitless) | | | s (mg/L) | | | VP (mm Hg) | | | $D_{air}$ ($cm^2$/s) | | | $D_{water}$ ($cm^2$/s) | | | $K_p$ (cm/hr) | | | $ABS_d$ (unitless) | | | FA (unitless) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes |
| VOC | Acetone | 67-64-1 | 5.81E+01 | 50 | | 5.75E-01 | 44 | | 5.75E-01 | 44 | | | | | 1.59E-03 | 44 | | 1.00E+06 | 44 | | 2.30E+02 | 50 | 92 | 1.24E-01 | 44 | | 1.14E-05 | 44 | | 5.20E-04 | 44 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Benzene | 71-43-2 | 7.81E+01 | 50 | | 1.35E+02 | 44 | | 5.89E+01 | 44 | | | | | 2.28E-01 | 44 | | 1.75E+03 | 44 | | 9.50E+01 | 50 | 92 | 8.80E-02 | 44 | | 9.80E-06 | 44 | | 1.47E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Bromodichloromethane | 75-27-4 | 1.64E+02 | 50 | | 1.26E+02 | 44 | | 5.50E+01 | 44 | | | | | 6.56E-02 | 44 | | 6.74E+03 | 44 | | 5.00E+01 | 50 | 92 | 2.98E-02 | 44 | | 1.06E-05 | 44 | | 4.66E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Bromomethane | 74-83-9 | 9.49E+01 | 50 | | 1.55E+01 | 44 | | 1.05E+01 | 44 | | | | | 2.56E-01 | 44 | | 1.52E+04 | 44 | | 1.62E+03 | 50 | 92 | 7.28E-02 | 44 | | 1.21E-05 | 44 | | 2.84E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 2-Butanone | 78-93-3 | 7.21E+01 | 50 | | 1.95E+00 | 62 | | 5.20E+00 | 39 | | | | | 2.28E-03 | 50 | 92 | 2.40E+05 | 40 | | 9.53E+01 | 50 | 92 | 9.49E-02 | 36 | 27 | 9.80E-06 | 40 | | 9.72E-04 | 62 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Carbon Disulfide | 75-15-0 | 7.61E+01 | 50 | | 1.00E+02 | 44 | | 4.57E+01 | 44 | | | | | 1.24E+00 | 44 | | 1.19E+03 | 44 | | 3.59E+02 | 50 | 92 | 1.04E-01 | 44 | | 1.00E-05 | 44 | | 1.24E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Chlorobenzene | 108-90-7 | 1.13E+02 | 50 | | 7.24E+02 | 44 | | 2.19E+02 | 44 | | | | | 1.52E-01 | 44 | | 4.72E+02 | 44 | | 1.20E+01 | 50 | 92 | 7.30E-02 | 44 | | 8.70E-06 | 44 | | 2.87E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Chloroethane | 75-00-3 | 6.45E+01 | 50 | | 2.69E+01 | 1 | | 1.49E+01 | 3 | | | | | 3.60E-01 | 50 | 92 | 5.68E+03 | 50 | 92 | 1.01E+03 | 50 | 92 | 1.10E-01 | 36 | 27 | 1.53E-05 | 52 | | 6.06E-03 | 1 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Chloroform | 67-66-3 | 1.19E+02 | 50 | | 8.32E+01 | 44 | | 3.98E+01 | 44 | | | | | 1.50E-01 | 44 | | 7.92E+03 | 44 | | 1.97E+02 | 50 | 92 | 1.04E-01 | 44 | | 1.00E-05 | 44 | | 6.29E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Chloromethane | 74-87-3 | 5.05E+01 | 50 | | 8.13E+00 | 1 | | 7.80E+00 | 40 | | | | | 3.60E-01 | 50 | 92 | 5.33E+03 | 50 | 92 | 4.30E+03 | 50 | 92 | 1.26E-01 | 34 | | 6.50E-06 | 40 | | 3.30E-03 | 1 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Cumene | 98-82-8 | 1.20E+02 | 50 | | 4.57E+03 | 1 | | 3.30E+03 | 40 | | | | | 4.74E+01 | 50 | 92 | 6.13E+01 | 50 | 92 | 4.50E+00 | 50 | 92 | 6.50E-02 | 52 | | 7.83E-06 | 52 | | 8.76E-02 | 1 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Cyclohexane | 110-82-7 | 8.42E+01 | 50 | | 2.75E+03 | 39 | | 6.35E+02 | 39 | 111 | | | | 7.97E+00 | 50 | 92 | 5.50E+01 | 50 | 92 | 9.69E+01 | 50 | 92 | 1.10E-01 | 52 | | 9.14E-06 | 52 | | 9.98E-02 | 39 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Dibromochloromethane | 124-48-1 | 2.08E+02 | 50 | | 1.48E+02 | 44 | | 6.31E+01 | 44 | | | | | 3.21E-02 | 44 | | 2.60E+03 | 44 | | 4.90E+00 | 50 | 92 | 1.96E-02 | 44 | | 1.05E-05 | 44 | | 2.92E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.47E+02 | 50 | | 2.69E+03 | 44 | | 6.17E+02 | 44 | | | | | 7.79E-02 | 44 | | 1.56E+02 | 44 | | 1.36E+00 | 50 | 92 | 6.90E-02 | 44 | | 7.90E-06 | 44 | | 4.37E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.47E+02 | 50 | | 2.40E+03 | 1 | | 1.70E+03 | 2 | | | | | 1.27E-01 | 50 | 92 | 1.33E+02 | 50 | 93 | 2.15E+00 | 50 | 92 | 4.14E-02 | 52 | | 8.85E-06 | 52 | | 4.05E-02 | 1 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.47E+02 | 50 | | 2.63E+03 | 44 | | 6.17E+02 | 44 | | | | | 9.96E-02 | 44 | | 7.38E+01 | 44 | | 1.00E+00 | 50 | 92 | 6.90E-02 | 44 | | 7.90E-06 | 44 | | 4.31E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.21E+02 | 50 | | 1.45E+02 | 1 | | 1.30E+02 | 40 | | | | | 1.40E+01 | 50 | 92 | 2.80E+02 | 50 | 92 | 4.85E+03 | 50 | 92 | 8.00E-02 | 40 | | 8.00E-06 | 40 | | 8.88E-03 | 1 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,1-Dichloroethane | 75-34-3 | 9.90E+01 | 50 | | 6.17E+01 | 44 | | 3.16E+01 | 44 | | | | | 2.30E-01 | 44 | | 5.06E+03 | 44 | | 2.27E+02 | 50 | 92 | 7.42E-02 | 44 | | 1.05E-05 | 44 | | 6.72E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,2-Dichloroethane | 107-06-2 | 9.90E+01 | 50 | | 2.95E+01 | 44 | | 1.74E+01 | 44 | | | | | 4.01E-02 | 44 | | 8.52E+03 | 44 | | 7.89E+01 | 50 | 92 | 1.04E-01 | 44 | | 9.90E-06 | 44 | | 4.13E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 9.69E+01 | 50 | | 7.24E+01 | 44 | | 3.55E+01 | 44 | | | | | 1.67E-01 | 44 | | 3.50E+03 | 44 | | 2.03E+02 | 50 | 92 | 7.36E-02 | 44 | | 1.13E-05 | 44 | | 7.67E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 9.69E+01 | 50 | | 1.17E+02 | 44 | | 5.25E+01 | 44 | | | | | 3.85E-01 | 44 | | 6.30E+03 | 44 | | 3.33E+02 | 50 | 92 | 7.07E-02 | 44 | | 1.19E-05 | 44 | | 1.06E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Ethyl Benzene | 100-41-4 | 1.06E+02 | 50 | | 1.38E+03 | 44 | | 3.63E+02 | 44 | | | | | 3.23E-01 | 44 | | 1.69E+02 | 44 | | 9.60E+00 | 50 | 92 | 7.50E-02 | 44 | | 7.80E-06 | 44 | | 4.76E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 2-Hexanone | 591-78-6 | 1.00E+02 | 50 | | 2.40E+01 | 39 | | 1.48E+01 | 39 | 111 | | | | 7.15E-02 | 1 | | 1.75E+04 | 39 | | 1.16E+01 | 50 | 92 | 1.35E-01 | 52 | | 1.03E-05 | 52 | | 3.55E-03 | 39 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Methyl Acetate | 79-20-9 | 7.41E+01 | 55 | | 1.51E+00 | 39 | | 1.66E+00 | 39 | 111 | | | | 1.15E-04 | 39 | | 2.44E+05 | 39 | | 2.16E+02 | 39 | | 1.23E-01 | 52 | | 1.10E-05 | 52 | | 8.02E-04 | 39 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 8.82E+01 | 1 | | 1.74E+01 | 39 | | 1.15E+01 | 39 | 111 | | | | 2.40E-02 | 69 | | 5.10E+04 | 69 | | 2.50E+02 | 69 | | 8.59E-02 | 69 | | 1.01E-05 | 69 | | 3.35E-03 | 39 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.00E+02 | 50 | | 1.55E+01 | 62 | | 1.90E+01 | 39 | | | | | 5.64E-03 | 50 | 92 | 1.90E+04 | 39 | | 1.99E+01 | 50 | 92 | 7.50E-02 | 40 | | 7.80E-06 | 40 | | 2.66E-03 | 62 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Methylcyclohexane | 108-87-2 | 9.82E+01 | 55 | | 4.07E+03 | 68 | | 8.65E+02 | 68 | 111 | | | | 1.76E+01 | 68 | | 1.40E+01 | 68 | | 4.60E+01 | 68 | | 9.86E-02 | 52 | | 8.52E-06 | 52 | | 1.08E-01 | 68 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Methylene Chloride | 75-09-2 | 8.49E+01 | 50 | | 1.78E+01 | 44 | | 1.17E+01 | 44 | | | | | 8.98E-02 | 44 | | 1.30E+04 | 44 | | 4.33E+02 | 50 | 92 | 1.01E-01 | 44 | | 1.17E-05 | 44 | | 3.54E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Tetrachloroethene | 127-18-4 | 1.66E+02 | 50 | | 4.68E+02 | 44 | | 1.55E+02 | 44 | | | | | 7.54E-01 | 44 | | 2.00E+02 | 44 | | 1.86E+01 | 50 | 92 | 7.20E-02 | 44 | | 8.20E-06 | 44 | | 1.08E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Toluene | 108-88-3 | 9.21E+01 | 50 | | 5.62E+02 | 44 | | 1.82E+02 | 44 | | | | | 2.72E-01 | 44 | | 5.26E+02 | 44 | | 2.84E+01 | 50 | 92 | 8.70E-02 | 44 | | 8.60E-06 | 44 | | 3.16E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.81E+02 | 50 | | 1.02E+04 | 44 | | 1.78E+03 | 44 | | | | | 5.82E-02 | 44 | | 3.00E+02 | 44 | | 4.31E-01 | 50 | 92 | 3.00E-02 | 44 | | 8.23E-06 | 44 | | 6.77E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.33E+02 | 50 | | 3.02E+02 | 44 | | 1.10E+02 | 44 | | | | | 7.05E-01 | 44 | | 1.33E+03 | 44 | | 1.24E+02 | 50 | 92 | 7.80E-02 | 44 | | 8.80E-06 | 44 | | 1.23E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Trichloroethene | 79-01-6 | 1.31E+02 | 50 | | 5.13E+02 | 44 | | 1.66E+02 | 44 | | | | | 4.22E-01 | 44 | | 1.10E+03 | 44 | | 7.35E+01 | 50 | 92 | 7.90E-02 | 44 | | 9.10E-06 | 44 | | 1.79E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.87E+02 | 50 | | 1.40E+03 | 40 | | 1.30E+03 | 40 | | | | | 1.97E+01 | 50 | 92 | 1.70E+02 | 50 | 92 | 3.32E+02 | 50 | 92 | 7.80E-02 | 40 | | 8.20E-06 | 40 | | 1.69E-02 | 40 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| VOC | Vinyl Chloride | 75-01-4 | 6.25E+01 | 50 | | 3.16E+01 | 44 | | 1.86E+01 | 44 | | | | | 1.11E+00 | 44 | | 2.76E+03 | 44 | | 2.98E+03 | 50 | 92 | 1.06E-01 | 44 | | 1.23E-05 | 44 | 113 | 6.92E-03 | 44 | 115 | | 62 | | 1.00E+00 | 62 | |
| VOC | Xylenes (total) | 1330-20-7 | 1.06E+02 | 50 | | 1.47E+03 | 44 | | 3.86E+02 | 44 | | | | | 2.76E-01 | 44 | | 1.75E+02 | 44 | | 7.99E+00 | 50 | 92 | 7.80E-02 | 44 | | 8.75E-06 | 44 | | 4.96E-02 | 44 | 115 | | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Acenaphthene | 83-32-9 | 1.54E+02 | 1 | | 8.32E+03 | 44 | | 7.08E+03 | 44 | | | | | 6.36E-03 | 44 | | 4.24E+00 | 44 | | 2.50E-03 | 50 | 92 | 4.21E-02 | 44 | | 7.69E-06 | 44 | | 8.39E-02 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Acenaphthylene | 208-96-8 | 1.52E+02 | 50 | | 1.17E+04 | 1 | | 4.90E+03 | 34 | | | | | 4.62E-03 | 50 | 92 | 1.61E+01 | 50 | 92 | 9.12E-04 | 50 | 92 | 4.42E-02 | 52 | | 7.44E-06 | 52 | | 1.08E-01 | 1 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Acetophenone | 98-86-2 | 1.20E+02 | 50 | | 3.80E+01 | 1 | | 4.10E+01 | 40 | | | | | 4.37E-04 | 50 | 92 | 6.13E+03 | 50 | 92 | 3.97E-01 | 50 | 92 | 8.00E-02 | 40 | | 8.00E-06 | 40 | | 3.72E-03 | 1 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Anthracene | 120-12-7 | 1.78E+02 | 50 | | 3.55E+04 | 44 | | 2.95E+04 | 44 | | | | | 2.67E-03 | 44 | | 4.34E-02 | 44 | | 2.67E-06 | 50 | 92 | 3.24E-02 | 44 | | 7.74E-06 | 44 | | 1.60E-01 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Benzaldehyde | 100-52-7 | 1.06E+02 | 39 | | 3.02E+01 | 39 | | 2.85E+01 | 39 | 82 | | | | 9.73E-04 | 69 | | 3.00E+03 | 39 | | 9.00E-01 | 69 | | 7.21E-02 | 69 | | 9.07E-06 | 69 | | 3.82E-03 | 39 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 2.28E+02 | 50 | | 5.01E+05 | 44 | | 3.98E+05 | 44 | | | | | 1.37E-04 | 44 | | 9.40E-03 | 44 | | 1.05E-07 | 50 | 92 | 5.10E-02 | 44 | | 9.00E-06 | 44 | | 4.83E-01 | 44 | 115 | 1.30E-01 | 62 | | 9.00E-01 | 62 | 114 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 2.52E+02 | 50 | | 1.29E+06 | 44 | | 1.02E+06 | 44 | | | | | 4.63E-05 | 44 | | 1.62E-03 | 44 | | 5.49E-09 | 50 | 92 | 4.30E-02 | 44 | | 9.00E-06 | 44 | | 6.60E-01 | 44 | 115 | 1.30E-01 | 62 | | 8.00E-01 | 62 | 114 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 2.52E+02 | 50 | | 1.58E+06 | 44 | | 1.23E+06 | 44 | | | | | 4.55E-03 | 44 | | 1.50E-03 | 44 | | 5.00E-07 | 50 | 92 | 2.26E-02 | 44 | | 5.56E-06 | 44 | | 7.57E-01 | 44 | 115 | 1.30E-01 | 62 | | 8.00E-01 | 62 | 114 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 2.76E+02 | 50 | | 1.70E+07 | 1 | | 1.60E+06 | 3 | | | | | 5.76E-06 | 50 | 92 | 2.60E-04 | 50 | 92 | 1.01E-10 | 50 | 92 | 2.03E-02 | 52 | | 5.20E-06 | 52 | | 2.66E+00 | 1 | 115 | 1.30E-01 | 62 | | 7.00E-01 | 62 | 114 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 2.52E+02 | 50 | | 1.58E+06 | 44 | | 1.23E+06 | 44 | | | | | 3.40E-05 | 44 | | 8.00E-04 | 44 | | 2.00E-09 | 50 | 92 | 2.26E-02 | 44 | | 5.56E-06 | 44 | | 7.57E-01 | 44 | 115 | 1.30E-01 | 62 | | 8.00E-01 | 62 | 114 |
| SVOC | Biphenyl | 92-52-4 | 1.54E+02 | 50 | | 1.23E+04 | 39 | | 1.05E+04 | 39 | 82 | | | | 1.23E-02 | 50 | 92 | 6.03E+00 | 50 | 93 | 9.64E-03 | 50 | 92 | 4.04E-02 | 52 | | 8.15E-06 | 52 | | 1.09E-01 | 39 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 3.91E+02 | 50 | | 2.00E+07 | 44 | | 1.51E+07 | 44 | | | | | 4.18E-06 | 44 | | 3.40E-01 | 44 | | 6.45E-06 | 50 | 94 | 3.51E-02 | 44 | | 3.66E-06 | 44 | | 6.77E-01 | 44 | 115 | 1.00E-01 | 62 | | 4.00E-01 | 62 | 114 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 3.12E+02 | 50 | | 6.92E+04 | 44 | | 5.75E+04 | 44 | | | | | 5.17E-05 | 44 | | 2.69E+00 | 44 | | 8.25E-06 | 50 | 92 | 1.74E-02 | 44 | | 4.83E-06 | 44 | | 4.42E-02 | 44 | 115 | 1.00E-01 | 62 | | 9.00E-01 | 62 | 114 |
| SVOC | Caprolactam | 105-60-2 | 1.13E+02 | 39 | | 6.46E-01 | 39 | | 6.51E-01 | 39 | 82 | | | | 1.03E-06 | 68 | | 7.72E+05 | 68 | | 1.60E-03 | 39 | | 6.54E-02 | 52 | | 8.99E-06 | 52 | | 2.76E-04 | 39 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Carbazole | 86-74-8 | 1.67E+02 | 50 | | 3.89E+03 | 44 | | 3.39E+03 | 44 | | | | | 6.26E-07 | 44 | | 7.48E+00 | 44 | | 5.19E-07 | 50 | 90 | 3.90E-02 | 44 | | 7.03E-06 | 44 | | 4.30E-02 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.28E+02 | 50 | | 7.08E+01 | 44 | | 6.61E+01 | 44 | | | | | 1.36E-05 | 44 | | 5.30E+03 | 44 | | 1.23E-02 | 50 | 92 | 4.83E-02 | 44 | | 1.01E-05 | 44 | | 5.09E-03 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Chrysene | 218-01-9 | 2.28E+02 | 50 | | 5.01E+05 | 44 | | 3.98E+05 | 44 | | | | | 3.88E-03 | 44 | | 1.60E-03 | 44 | | 6.23E-09 | 50 | 92 | 2.48E-02 | 44 | | 6.21E-06 | 44 | | 4.83E-01 | 44 | 115 | 1.30E-01 | 62 | | 9.00E-01 | 62 | 114 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 2.78E+02 | 50 | | 4.90E+06 | 44 | | 3.80E+06 | 44 | | | | | 6.03E-07 | 44 | | 2.49E-03 | 44 | | 1.00E-10 | 50 | 92 | 2.02E-02 | 44 | | 5.18E-06 | 44 | | 1.14E+00 | 44 | 115 | 1.30E-01 | 62 | | 7.00E-01 | 62 | 114 |
| SVOC | Dibenzofuran | 132-64-9 | 1.68E+02 | 50 | | 1.32E+04 | 1 | | 1.12E+04 | 1 | 82 | | | | 5.15E-04 | 50 | 92 | 1.00E+01 | 50 | 93 | 1.80E-04 | 50 | 92 | 2.70E-02 | 52 | | 5.93E-06 | 52 | | 9.49E-02 | 1 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Diethylphthalate | 84-66-2 | 2.22E+02 | 50 | | 3.16E+02 | 44 | | 2.88E+02 | 44 | | | | | 1.85E-05 | 44 | | 1.08E+03 | 44 | | 1.65E-03 | 50 | 92 | 2.56E-02 | 44 | | 6.35E-06 | 44 | | 4.03E-03 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.22E+02 | 50 | | 2.29E+02 | 44 | | 2.09E+02 | 44 | | | | | 8.20E-05 | 44 | | 7.87E+03 | 44 | | 9.80E-02 | 50 | 92 | 5.84E-02 | 44 | | 8.69E-06 | 44 | | 1.18E-02 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Di-n-butylphthalate | 84-74-2 | 2.78E+02 | 50 | | 4.07E+04 | 44 | | 3.39E+04 | 44 | | | | | 3.85E-08 | 44 | | 1.12E+01 | 44 | | 7.30E-05 | 50 | 92 | 4.38E-02 | 44 | | 7.86E-06 | 44 | | 4.83E-02 | 44 | 115 | 1.00E-01 | 62 | | 9.00E-01 | 62 | 114 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.82E+02 | 50 | | 7.41E+01 | 44 | | 6.92E+01 | 44 | | | | | 3.06E-05 | 44 | | 1.82E+02 | 44 | | 5.67E-04 | 50 | 92 | 3.27E-02 | 44 | | 7.26E-06 | 44 | | 2.60E-03 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Di-n-octylphthalate | 117-84-0 | 3.91E+02 | 50 | | 1.15E+08 | 44 | | 8.32E+07 | 44 | | | | | 2.74E-03 | 44 | | 2.00E-02 | 44 | | 2.60E-06 | 50 | 92 | 1.51E-02 | 44 | | 3.58E-06 | 44 | | 2.15E+00 | 44 | 115 | 1.00E-01 | 62 | | 3.00E-01 | 62 | 114 |
| SVOC | Fluoranthene | 206-44-0 | 2.02E+02 | 50 | | 1.32E+05 | 44 | | 1.07E+05 | 44 | | | | | 6.60E-04 | 44 | | 2.06E-01 | 44 | | 1.80E-06 | 50 | 94 | 3.02E-02 | 44 | | 6.35E-06 | 44 | | 2.80E-01 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Fluorene | 86-73-7 | 1.66E+02 | 50 | | 1.62E+04 | 44 | | 1.38E+04 | 44 | | | | | 2.61E-03 | 44 | | 1.98E+00 | 44 | | 6.33E-04 | 50 | 92 | 3.63E-02 | 44 | | 7.88E-06 | 44 | | 1.12E-01 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Hexachlorobenzene | 118-74-1 | 2.85E+02 | 50 | | 7.76E+05 | 44 | | 5.50E+04 | 44 | | | | | 5.41E-02 | 44 | | 6.20E+00 | 44 | | 1.80E-05 | 50 | 92 | 5.42E-02 | 44 | | 5.91E-06 | 44 | | 3.11E-01 | 44 | 115 | 1.00E-01 | 62 | | 8.00E-01 | 62 | 114 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 2.61E+02 | 50 | | 6.46E+04 | 44 | | 5.37E+04 | 44 | | | | | 3.34E-01 | 44 | | 3.23E+00 | 44 | | 2.21E-01 | 50 | 92 | 5.61E-02 | 44 | | 6.16E-06 | 44 | | 8.21E-02 | 44 | 115 | 1.00E-01 | 62 | | 9.00E-01 | 62 | 114 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 2.76E+02 | 50 | | 4.47E+06 | 44 | | 3.47E+06 | 44 | | | | | 6.56E-05 | 44 | | 2.20E-05 | 44 | | 1.00E-10 | 50 | 92 | 1.90E-02 | 44 | | 5.66E-06 | 44 | | 1.10E+00 | 44 | 115 | 1.30E-01 | 62 | | 7.00E-01 | 62 | 114 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.42E+02 | 50 | | 7.24E+03 | 1 | | 6.23E+03 | 1 | 82 | | | | 2.12E-02 | 50 | 92 | 2.46E+01 | 50 | 92 | 5.50E-02 | 50 | 92 | 9.86E-02 | 52 | | 7.75E-06 | 52 | | 8.94E-02 | 1 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.08E+02 | 62 | 99 | | | | 8.60E+01 | 40 | 99 | | | | 3.54E-05 | 50 | 92,99 | 2.30E+04 | 40 | 99 | | | | 7.40E-02 | 40 | 99 | 1.00E-05 | 40 | 99 | 7.80E-03 | 62 | 99 | 1.00E-01 | 62 | | 1.00E+00 | 62 | 114 |
| SVOC | Naphthalene | 91-20-3 | 1.28E+02 | 50 | | 2.29E+03 | 44 | | 2.00E+03 | 44 | | | | | 1.98E-02 | 44 | | 3.10E+01 | 44 | | 8.50E-02 | 50 | 92 | 5.90E-02 | 44 | | 7.50E-06 | 44 | | 5.01E-02 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Phenanthrene | 85-01-8 | 1.78E+02 | 50 | | 2.88E+04 | 1 | | 1.40E+04 | 3 | | | | | 9.52E-04 | 50 | 92 | 1.15E+00 | 50 | 92 | 1.12E-04 | 50 | 92 | 3.33E-02 | 52 | | 7.47E-06 | 52 | | 1.40E-01 | 1 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Phenol | 108-95-2 | 9.41E+01 | 50 | | 3.02E+01 | 44 | | 2.88E+01 | 44 | | | | | 1.63E-05 | 44 | | 8.28E+04 | 44 | | 2.76E-01 | 50 | 92 | 8.20E-02 | 44 | | 9.10E-06 | 44 | | 4.46E-03 | 44 | 115 | 1.00E-01 | 62 | | 1.00E+00 | 62 | |
| SVOC | Pyrene | 129-00-0 | 2.02E+02 | 50 | | 1.29E+05 | 44 | | 1.05E+05 | 44 | | | | | 4.51E-04 | 44 | | 1.35E-01 | 44 | | 4.59E-06 | 50 | 92 | 2.72E-02 | 44 | | 7.24E-06 | 44 | | 2.75E-01 | 44 | 115 | 1.30E-01 | 62 | | 1.00E+00 | 62 | 114 |
| P/PCB | PCBs (total) | 1336-36-3 | 3.28E+02 | 64 | 116 | 3.16E+06 | 64 | 116 | 2.45E+06 | 64 | 82 | | | | 8.17E-02 | 64 | 116 | 1.20E-02 | 64 | 116 | 7.71E-05 | 64 | 116 | 8.00E-02 | 40 | | 1.00E-05 | 40 | | 4.50E-01 | 64 | 116, 115 | 1.40E-01 | 62 | | 7.00E-01 | 62 | 114 |
| INORG | Aluminum | 7429-90-5 | 2.70E+01 | 50 | | | | | | | | 1.50E+03 | 35 | | | | | | | | | | | | | | | | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Antimony | 7440-36-0 | 1.22E+02 | 50 | | | 1 | 48 | | | | 4.50E+01 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Arsenic | 7440-38-2 | 7.49E+01 | 50 | | | 1 | 48 | | | | 2.90E+01 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | 3.00E-02 | 62 | | | 62 | 114 |
| INORG | Barium | 7440-39-3 | 1.37E+02 | 50 | | | 1 | 48 | | | | 4.10E+01 | 44 | 43 | | | | | 1 | 60 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Beryllium | 7440-41-7 | 9.01E+00 | 50 | | | 1 | 48 | | | | 7.90E+02 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Cadmium | 7440-43-9 | 1.12E+02 | 50 | | | 1 | 48 | | | | 7.50E+01 | 44 | 43 | | | | | 1 | 61 | | 40 | 48 | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | 1.00E-03 | 62 | | | 62 | 114 |
| INORG | Chromium (total) | 7440-47-3 | 5.20E+01 | 50 | | | 1 | 48 | | | | 1.90E+01 | 44 | 43,45 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |

**Attachment 0: Physical and Chemical Data**
**Bedford, Indiana**

| Chem Group | Chemical | CASRN | MW (g/mole) | | | $K_{ow}$ (unitless) | | | $K_{oc}$ (L/kg) | | | $K_d$ (L/kg) | | | H (unitless) | | | s (mg/L) | | | VP (mm Hg) | | | $D_{air}$ ($cm^2$/s) | | | $D_{water}$ ($cm^2$/s) | | | $K_p$ (cm/hr) | | | $ABS_d$ (unitless) | | | FA (unitless) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes | Value | Ref | Notes |
| INORG | Cobalt | 7440-48-4 | 5.89E+01 | 50 | | | 1 | 48 | | | | 4.50E+01 | 35 | | | | | | 1 | 61 | | | | | | | | | | 4.00E-04 | 62 | | | 62 | | | 62 | 114 |
| INORG | Copper | 7440-50-8 | 6.35E+01 | 50 | | | 1 | 48 | | | | 3.50E+01 | 35 | | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Cyanide (amenable) | 57-12-5A | 2.60E+01 | 1 | | | 1 | 48 | | | | 9.90E+00 | 44 | 43 | | | | | | | | | | | | | | | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Cyanide (total) | 57-12-5 | 2.60E+01 | 1 | | | 1 | 48 | | | | 9.90E+00 | 44 | 43 | | | | | | | | | | | | | | | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Iron | 7439-89-6 | 5.58E+01 | 50 | | | | | | | | 2.50E+01 | 35 | | | | | | | | | | | | | | | | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Lead | 7439-92-1 | 2.07E+02 | 50 | | | 1 | 48 | | | | 9.00E+02 | 35 | | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Manganese | 7439-96-5 | 5.49E+01 | 50 | | | | | | | | 6.50E+01 | 35 | | | | | | | | | | | | | | | | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Mercury | 7439-97-6 | 2.01E+02 | 67 | | | 1 | 48 | | | | 1.00E+03 | 67 | | 2.90E-01 | 67 | | 5.60E-02 | 1 | | 1.96E-03 | 50 | 92 | 3.07E-02 | 44 | | 6.30E-06 | 44 | | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Nickel | 7440-02-0 | 5.87E+01 | 50 | | | 1 | 48 | | | | 6.50E+01 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 2.00E-04 | 62 | | | 62 | | | 62 | 114 |
| INORG | Selenium | 7782-49-2 | 7.90E+01 | 50 | | | 1 | 48 | | | | 5.00E+00 | 44 | 43 | | | | | 40 | 48 | | 40 | 48 | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Silver | 7440-22-4 | 1.08E+02 | 50 | | | 1 | 48 | | | | 8.30E+00 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 6.00E-04 | 62 | | | 62 | | | 62 | 114 |
| INORG | Thallium | 7440-28-0 | 2.04E+02 | 50 | | | 1 | 48 | | | | 7.10E+01 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Vanadium | 7440-62-2 | 5.09E+01 | 50 | | | 1 | 48 | | | | 1.00E+03 | 44 | 43 | | | | | 1 | 61 | | 40 | 48 | | 40 | 48 | | 40 | 48 | 1.00E-03 | 62 | | | 62 | | | 62 | 114 |
| INORG | Zinc | 7440-66-6 | 6.54E+01 | 50 | | | 1 | 48 | | | | 6.20E+01 | 44 | 43 | | | | | 1 | 61 | | | | | 40 | 48 | | 40 | 48 | 6.00E-04 | 62 | | | 62 | | | 62 | 114 |

## References and Notes for Physical and Chemical Data
## Bedford, Indiana

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| 62 | USEPA. 2001. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim -- Review Draft-For Public Comment. September. |
| 64 | Agency for Toxic Substances and Disease Registry (ATSDR). November 2000. Toxicological Profile for Polychlorindated Biphenyls (PCBs). |
| 67 | USEPA. 1997. Mercury Study Report to Congress. EPA's Office of Air Quality Planning and Standards and Office of Research and Development. December |
| 68 | PHYSPROP data base. Syracuse Research Corporation. |
| 69 | USEPA. 2004. WATER9. Version 2.0.0. Office of Air Quality Planning and Standards. July. |
| | |
| **Notes:** | |
| 27 | Diffusivity value at 30 degrees Celcius. |
| 43 | pH associated with value is 6.8. |
| 45 | ENVIRON used the value for Chromium VI [CASRN 18540-29-9] presented in indicated reference as a surrogate. |
| 48 | Not Available or Not Applicable |
| 60 | Hydrolyzes |
| 61 | Insoluble |
| 82 | ENVIRON used Equation (70) from Reference 44 to calculate Koc value using Log Kow value from indicated reference. |
| 90 | Indicated source cites CHEMCALC. |
| 92 | Indicated source cites CHEMFATE. |
| 93 | Indicated source cites FATE. |
| 94 | Indicated source cites LIVECHEM. |
| 99 | ENVIRON used the value for 3-Methylphenol [CASRN 108-39-4] value as a surrogate. |
| 111 | ENVIRON used Equation (71) from Reference 44 to calculate Koc value using Log Kow value from indicated reference. |
| 113 | Personal communication with RCRA, Superfund & EPCRA Hotline on 9/15/2000; indicated reference presents the value which is off by an order of magnitude (1.23E-06 cm2/s). The database has the correct value of 1.23E-05 cm2/s. |
| 114 | ENVIRON calculated FA from Exhibit A-4 from the cited reference. |
| 115 | ENVIRON calculated Kp value using equation 3.8 (p.3-8) in reference 62 with log Kow from the indicated reference and the MW presented in table. |
| 116 | ENVIRON used the value for Aroclor-1254 [CASRN 11097-69-1] from the indicated reference as a surrogate. |

# A T T A C H M E N T  1

## Exposure of Routine Workers to Surface Soil

**Attachment 1: Estimates of Risk and HQ for Routine Worker Exposure to Surface Soil in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Routine Worker Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Routine Worker Noncancer Criteria (HQ=1) (mg/kg) | Cancer Risk | HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 70 | 10 | 1.30E+00 | | | 6.93E+04 | | 1.9E-05 |
| VOC | Benzene | 71-43-2 | A | 70 | 1 | 1.30E-03 | | 1.73E+01 | 1.44E+02 | 7.5E-10 | 9.0E-06 |
| VOC | 2-Butanone | 78-93-3 | ID | 70 | 7 | 2.80E-01 | | | 1.12E+05 | | 2.5E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 70 | 1 | 1.50E-03 | | | 1.37E+03 | | 1.1E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 70 | 2 | 4.00E+00 | | | 6.75E+02 | | 5.9E-03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 70 | 3 | 2.60E+00 | | | 5.21E+03 | | 5.0E-04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 70 | 3 | 1.80E+01 | | | 1.42E+03 | | 1.3E-02 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 70 | 4 | 5.70E+01 | | 1.01E+02 | 1.45E+04 | 5.6E-06 | 3.9E-03 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 70 | 1 | 1.70E-02 | | 7.56E+00 | 3.55E+01 | 2.2E-08 | 4.8E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 70 | 2 | 6.40E-04 | | | 9.39E+03 | | 6.8E-08 |
| VOC | Methyl Acetate | 79-20-9 | | 70 | 12 | 1.40E+01 | | | 2.50E+05 | | 5.6E-05 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 70 | 9 | 1.85E-02 | | 2.57E+02 | 1.21E+04 | 7.2E-10 | 1.5E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 70 | 1 | 1.20E-02 | | 4.00E+01 | 1.67E+03 | 3.0E-09 | 7.2E-06 |
| VOC | Toluene | 108-88-3 | D | 70 | 4 | 8.10E-02 | | | 2.87E+03 | | 2.8E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 70 | 3 | 7.00E-01 | | | 8.92E+03 | | 7.8E-05 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 70 | 3 | 1.80E-01 | | | 1.07E+03 | | 1.7E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 70 | 1 | 5.05E-02 | | | 2.94E+04 | | 1.7E-06 |
| SVOC | Anthracene | 120-12-7 | D | 70 | 4 | 6.38E-02 | | | 2.26E+05 | | 2.8E-07 |
| SVOC | Benzaldehyde | 100-52-7 | | 70 | 1 | 8.00E-02 | | | 1.73E+04 | | 4.6E-06 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 70 | 4 | 2.06E-01 | | 2.85E+01 | | 7.2E-08 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 70 | 6 | 2.37E-01 | | 2.88E+00 | | 8.2E-07 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 70 | 9 | 3.45E-01 | | 2.82E+01 | | 1.2E-07 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 70 | 4 | 1.55E-01 | | | 2.25E+04 | | 6.9E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 70 | 2 | 1.20E-01 | | 2.88E+02 | | 4.2E-09 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 70 | 7 | 2.00E+00 | | 1.76E+03 | 1.76E+04 | 1.1E-08 | 1.1E-04 |
| SVOC | Carbazole | 86-74-8 | B2 | 70 | 2 | 5.08E-02 | | 1.15E+03 | | 4.4E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 70 | 7 | 2.59E-01 | | 2.77E+03 | | 9.3E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 70 | 2 | 4.95E-02 | | 2.88E+00 | | 1.7E-07 | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 70 | 1 | 1.00E-01 | | | 1.13E+04 | | 8.9E-06 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 70 | 3 | 5.30E-01 | | | 8.81E+04 | | 6.0E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 70 | 5 | 6.20E+01 | | | 3.52E+04 | | 1.8E-03 |
| SVOC | Fluoranthene | 206-44-0 | D | 70 | 9 | 5.25E-01 | | | 2.90E+04 | | 1.8E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 70 | 3 | 1.54E-01 | | 2.88E+01 | | 5.3E-08 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 70 | 2 | 4.50E+00 | | | 3.63E+02 | | 1.2E-02 |
| SVOC | Naphthalene | 91-20-3 | C | 70 | 1 | 4.18E-02 | | | 3.01E+02 | | 1.4E-04 |
| SVOC | Phenanthrene | 85-01-8 | D | 70 | 8 | 2.87E-01 | | | 1.99E+04 | | 1.4E-05 |
| SVOC | Phenol | 108-95-2 | ID | 70 | 5 | 1.50E+00 | | | 2.64E+05 | | 5.7E-06 |
| SVOC | Pyrene | 129-00-0 | D | 70 | 9 | 4.30E-01 | | | 2.19E+04 | | 2.0E-05 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 217 | 186 | **2.12E+02** | | 8.85E+00 | 1.44E+01 | 2.4E-04 | 1.5E+01 |
| INORG | Aluminum | 7429-90-5 | D | 70 | 70 | **1.24E+04** | 1.48E+04 | | 1.92E+06 | | |
| INORG | Antimony | 7440-36-0 | | 64 | 7 | 1.60E+00 | 4.40E-01 | | 8.18E+02 | | 1.4E-03 |
| INORG | Arsenic | 7440-38-2 | A | 70 | 70 | 1.15E+01 | 1.13E+01 | 2.73E+01 | 4.39E+02 | 8.9E-08 | 5.5E-04 |
| INORG | Barium | 7440-39-3 | D | 70 | 70 | 5.52E+02 | 8.38E+01 | | 1.43E+05 | | 3.3E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 70 | 46 | 1.40E+00 | 5.70E-01 | 7.29E+04 | 3.96E+03 | 1.1E-10 | 2.1E-04 |
| INORG | Cadmium | 7440-43-9 | B1 | 70 | 37 | 3.30E+00 | 5.52E-01 | 9.72E+04 | 1.34E+03 | 2.8E-10 | 2.1E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 70 | 70 | 4.91E+01 | 2.82E+01 | 1.46E+04 | 6.13E+03 | 1.4E-08 | 3.4E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 70 | 70 | **1.13E+01** | 1.00E+01 | 6.25E+04 | 3.08E+04 | 2.0E-10 | 4.1E-05 |
| INORG | Copper | 7440-50-8 | D | 70 | 70 | 9.36E+02 | 1.89E+01 | | 8.18E+04 | | 1.1E-02 |
| INORG | Cyanide (total) | 57-12-5 | D | 70 | 1 | 2.50E-01 | | | 4.09E+04 | | 6.1E-06 |
| INORG | Iron | 7439-89-6 | D | 70 | 70 | 3.66E+04 | 2.44E+04 | | 6.13E+05 | | 2.0E-02 |
| INORG | Manganese | 7439-96-5 | D | 70 | 70 | **4.83E+02** | 6.76E+02 | | 1.49E+05 | | |
| INORG | Mercury | 7439-97-6 | D | 70 | 58 | 1.60E+00 | 7.05E-02 | | 8.69E+01 | | 1.8E-02 |
| INORG | Nickel | 7440-02-0 | A | 70 | 70 | 1.87E+02 | 1.83E+01 | 7.29E+05 | 4.09E+04 | 2.3E-09 | 4.1E-03 |
| INORG | Selenium | 7782-49-2 | D | 70 | 23 | 1.60E+00 | 3.96E-01 | | 1.02E+04 | | 1.2E-04 |
| INORG | Silver | 7440-22-4 | D | 70 | 5 | 5.50E-01 | | | 8.78E+03 | | 6.3E-05 |
| INORG | Thallium | 7440-28-0 | | 70 | 15 | 1.30E+00 | 8.40E-01 | | 1.43E+02 | | 3.2E-03 |
| INORG | Vanadium | 7440-62-2 | | 70 | 70 | 7.75E+01 | 4.18E+01 | | 1.43E+04 | | 2.5E-03 |
| INORG | Zinc | 7440-66-6 | D | 70 | 70 | 1.09E+03 | 5.48E+01 | | 6.13E+05 | | 1.7E-03 |
| | | | | | | | | | | | |
| **Notes:** | | | | | | | | | **Sum:** | **2.5E-04** | **1.5E+01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

| Attachment 1: High-End Exposure Factors for Routine Worker Contact with Surface Soil<br>GM Powertrain Bedford Facility, Bedford, Indiana | | | | |
|---|---|---|---|---|
| | | | **Routine Worker** | |
| **Soil Ingestion** | | | | |
| Ingestion Rate | mg-soil/day | **IR** | 50 | b |
| Conversion Factor | kg/mg | **CF** | 1E-06 | |
| Fraction Contacted | unitless | **FC** | 1.0 | |
| Exposure Frequency | days/year | **EF** | 250 | b |
| Exposure Duration | years | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |
| **Soil Dermal Contact** | | | | |
| Adherence Factor | mg-soil/$cm^2$ | **AF** | 0.2 | d |
| Skin Surface Area | $cm^2$/day | **SA** | 3,300 | d |
| Conversion Factor | kg/mg | **CF** | 1E-06 | |
| Fraction Contacted | unitless | **FC** | 1.0 | e |
| Exposure Frequency | days/year | **EF** | 250 | b |
| Exposure Duration | years | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |
| **Ambient Air Inhalation** | | | | |
| Fraction Contacted | unitless | **FC** | 1 | |
| Exposure Time | hour/hour | **ET** | 8/8 | |
| Exposure Frequency | days/year | **EF** | 250 | b |
| Exposure Duration | years | **ED** | 25 | b |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |

**Attachment 1: Normalized Vapor Flux from Exposed Soil to Ambient Air and Soil Saturation Concentration**
**(Routine Worker)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | H (unitless) | $D_{air}$ ($cm^2/s$) | $D_G$ ($cm^2/s$) | $D_{water}$ ($cm^2/s$) | $D_L$ ($cm^2/s$) | $D_E$ ($cm^2/s$) | $J_G$ ($mg/m^2$-s per mg/kg) | MW (g/mole) | VP (mm Hg) | v* (mg/L) | s (mg/L) | $C_{sat}$ (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 5.75E-01 | 3.45E-03 | 7.95E-04 | 1.24E-01 | 1.01E-02 | 1.14E-05 | 1.11E-07 | 5.24E-05 | 4.39E-06 | 5.81E+01 | 2.30E+02 | 7.38E+02 | 1.00E+06 | 1.03E+05 |
| VOC | Benzene | 71-43-2 | 5.89E+01 | 3.53E-01 | 1.14E-01 | 8.80E-02 | 7.17E-03 | 9.80E-06 | 9.50E-08 | 1.14E-03 | 2.05E-05 | 7.81E+01 | 9.50E+01 | 4.10E+02 | 1.75E+03 | 8.30E+02 |
| VOC | Bromodichloromethane | 75-27-4 | 5.50E+01 | 3.30E-01 | 3.28E-02 | 2.98E-02 | 2.43E-03 | 1.06E-05 | 1.03E-07 | 1.21E-04 | 6.68E-06 | 1.64E+02 | 5.00E+01 | 4.53E+02 | 6.74E+03 | 2.94E+03 |
| VOC | Bromomethane | 74-83-9 | 1.05E+01 | 6.30E-02 | 1.28E-01 | 7.28E-02 | 5.93E-03 | 1.21E-05 | 1.17E-07 | 2.70E-03 | 3.15E-05 | 9.49E+01 | 1.62E+03 | 8.48E+03 | 1.52E+04 | 2.83E+03 |
| VOC | 2-Butanone | 78-93-3 | 5.20E+00 | 3.12E-02 | 1.14E-03 | 9.49E-02 | 7.72E-03 | 9.80E-06 | 9.50E-08 | 4.52E-05 | 4.08E-06 | 7.21E+01 | 9.53E+01 | 3.80E+02 | 2.40E+05 | 3.14E+04 |
| VOC | Carbon Disulfide | 75-15-0 | 4.57E+01 | 2.74E-01 | 6.20E-01 | 1.04E-01 | 8.47E-03 | 1.00E-05 | 9.70E-08 | 7.09E-03 | 5.11E-05 | 7.61E+01 | 3.59E+02 | 1.51E+03 | 1.19E+03 | 5.83E+02 |
| VOC | Chlorobenzene | 108-90-7 | 2.19E+02 | 1.31E+00 | 7.60E-02 | 7.30E-02 | 5.94E-03 | 8.70E-06 | 8.44E-08 | 2.10E-04 | 8.79E-06 | 1.13E+02 | 1.20E+01 | 7.44E+01 | 4.72E+02 | 6.74E+02 |
| VOC | Chloroethane | 75-00-3 | 1.49E+01 | 8.94E-02 | 1.80E-01 | 1.10E-01 | 8.96E-03 | 1.53E-05 | 1.48E-07 | 4.80E-03 | 4.21E-05 | 6.45E+01 | 1.01E+03 | 3.59E+03 | 5.68E+03 | 1.26E+03 |
| VOC | Chloroform | 67-66-3 | 3.98E+01 | 2.39E-01 | 7.50E-02 | 1.04E-01 | 8.47E-03 | 1.00E-05 | 9.70E-08 | 1.19E-03 | 2.10E-05 | 1.19E+02 | 1.97E+02 | 1.30E+03 | 7.92E+03 | 2.79E+03 |
| VOC | Chloromethane | 74-87-3 | 7.80E+00 | 4.68E-02 | 1.80E-01 | 1.26E-01 | 1.03E-02 | 6.50E-06 | 6.30E-08 | 6.80E-03 | 5.01E-05 | 5.05E+01 | 4.30E+03 | 1.20E+04 | 5.33E+03 | 9.58E+02 |
| VOC | Cumene | 98-82-8 | 3.30E+03 | 1.98E+01 | 2.37E+01 | 6.50E-02 | 5.29E-03 | 7.83E-06 | 7.59E-08 | 3.41E-03 | 3.54E-05 | 1.20E+02 | 4.50E+00 | 2.99E+01 | 6.13E+01 | 1.23E+03 |
| VOC | Cyclohexane | 110-82-7 | 6.35E+02 | 3.81E+00 | 3.98E+00 | 1.10E-01 | 8.96E-03 | 9.14E-06 | 8.86E-08 | 5.07E-03 | 4.32E-05 | 8.42E+01 | 9.69E+01 | 4.50E+02 | 5.50E+01 | 2.56E+02 |
| VOC | Dibromochloromethane | 124-48-1 | 6.31E+01 | 3.79E-01 | 1.61E-02 | 1.96E-02 | 1.60E-03 | 1.05E-05 | 1.02E-07 | 3.54E-05 | 3.61E-06 | 2.08E+02 | 4.90E+00 | 5.64E+01 | 2.60E+03 | 1.25E+03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 6.17E+02 | 3.70E+00 | 3.90E-02 | 6.90E-02 | 5.62E-03 | 7.90E-06 | 7.66E-08 | 3.81E-05 | 3.74E-06 | 1.47E+02 | 1.36E+00 | 1.10E+01 | 1.56E+02 | 5.94E+02 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.70E+03 | 1.02E+01 | 6.33E-02 | 4.14E-02 | 3.37E-03 | 8.85E-06 | 8.58E-08 | 1.37E-05 | 2.25E-06 | 1.47E+02 | 2.15E+00 | 1.75E+01 | 1.33E+02 | 1.37E+03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 6.17E+02 | 3.70E+00 | 4.98E-02 | 6.90E-02 | 5.62E-03 | 7.90E-06 | 7.66E-08 | 4.86E-05 | 4.23E-06 | 1.47E+02 | 1.00E+00 | 8.12E+00 | 7.38E+01 | 2.81E+02 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.30E+02 | 7.80E-01 | 7.01E+00 | 8.00E-02 | 6.51E-03 | 8.00E-06 | 7.76E-08 | 1.38E-02 | 7.12E-05 | 1.21E+02 | 4.85E+03 | 3.24E+04 | 2.80E+02 | 6.15E+02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 3.16E+01 | 1.90E-01 | 1.15E-01 | 7.42E-02 | 6.04E-03 | 1.05E-05 | 1.02E-07 | 1.48E-03 | 2.34E-05 | 9.90E+01 | 2.27E+02 | 1.24E+03 | 5.06E+03 | 1.57E+03 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 1.74E+01 | 1.04E-01 | 2.01E-02 | 1.04E-01 | 8.47E-03 | 9.90E-06 | 9.60E-08 | 5.42E-04 | 1.41E-05 | 9.90E+01 | 7.89E+01 | 4.31E+02 | 8.52E+03 | 1.77E+03 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 3.55E+01 | 2.13E-01 | 8.35E-02 | 7.36E-02 | 5.99E-03 | 1.13E-05 | 1.10E-07 | 1.01E-03 | 1.93E-05 | 9.69E+01 | 2.03E+02 | 1.09E+03 | 3.50E+03 | 1.15E+03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 5.25E+01 | 3.15E-01 | 1.93E-01 | 7.07E-02 | 5.76E-03 | 1.19E-05 | 1.15E-07 | 1.63E-03 | 2.45E-05 | 9.69E+01 | 3.33E+02 | 1.78E+03 | 6.30E+03 | 2.84E+03 |
| VOC | Ethyl Benzene | 100-41-4 | 3.63E+02 | 2.18E+00 | 1.62E-01 | 7.50E-02 | 6.11E-03 | 7.80E-06 | 7.56E-08 | 2.83E-04 | 1.02E-05 | 1.06E+02 | 9.60E+00 | 5.63E+01 | 1.69E+02 | 3.90E+02 |
| VOC | 2-Hexanone | 591-78-6 | 1.48E+01 | 8.90E-02 | 3.58E-02 | 1.35E-01 | 1.10E-02 | 1.03E-05 | 9.99E-08 | 1.33E-03 | 2.22E-05 | 1.00E+02 | 1.16E+01 | 6.43E+01 | 1.75E+04 | 3.31E+03 |
| VOC | Methyl Acetate | 79-20-9 | 1.66E+00 | 9.98E-03 | 5.75E-05 | 1.23E-01 | 9.99E-03 | 1.10E-05 | 1.07E-07 | 4.13E-06 | 1.23E-06 | 7.41E+01 | 2.16E+02 | 8.85E+02 | 2.44E+05 | 2.66E+04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.15E+01 | 6.89E-02 | 1.20E-02 | 8.59E-02 | 7.00E-03 | 1.01E-05 | 9.80E-08 | 3.26E-04 | 1.10E-05 | 8.82E+01 | 2.50E+02 | 1.22E+03 | 5.10E+04 | 8.70E+03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.90E+01 | 1.14E-01 | 2.82E-03 | 7.50E-02 | 6.11E-03 | 7.80E-06 | 7.56E-08 | 5.36E-05 | 4.44E-06 | 1.00E+02 | 1.99E+01 | 1.10E+02 | 1.90E+04 | 4.06E+03 |
| VOC | Methylcyclohexane | 108-87-2 | 8.65E+02 | 5.19E+00 | 8.79E+00 | 9.86E-02 | 8.03E-03 | 8.52E-06 | 8.26E-08 | 6.73E-03 | 4.98E-05 | 9.82E+01 | 4.60E+01 | 2.50E+02 | 1.40E+01 | 9.72E+01 |
| VOC | Methylene Chloride | 75-09-2 | 1.17E+01 | 7.02E-02 | 4.49E-02 | 1.01E-01 | 8.22E-03 | 1.17E-05 | 1.13E-07 | 1.37E-03 | 2.25E-05 | 8.49E+01 | 4.33E+02 | 2.03E+03 | 1.30E+04 | 2.31E+03 |
| VOC | Tetrachloroethene | 127-18-4 | 1.55E+02 | 9.30E-01 | 3.77E-01 | 7.20E-02 | 5.86E-03 | 8.20E-06 | 7.95E-08 | 1.33E-03 | 2.21E-05 | 1.66E+02 | 1.86E+01 | 1.70E+02 | 2.00E+02 | 2.20E+02 |
| VOC | Toluene | 108-88-3 | 1.82E+02 | 1.09E+00 | 1.36E-01 | 8.70E-02 | 7.08E-03 | 8.60E-06 | 8.34E-08 | 5.24E-04 | 1.39E-05 | 9.21E+01 | 2.84E+01 | 1.45E+02 | 5.26E+02 | 6.40E+02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.78E+03 | 1.07E+01 | 2.91E-02 | 3.00E-02 | 2.44E-03 | 8.23E-06 | 7.98E-08 | 4.37E-06 | 1.27E-06 | 1.81E+02 | 4.31E-01 | 4.32E+00 | 3.00E+02 | 3.23E+03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.10E+02 | 6.60E-01 | 3.53E-01 | 7.80E-02 | 6.35E-03 | 8.80E-06 | 8.53E-08 | 1.80E-03 | 2.57E-05 | 1.33E+02 | 1.24E+02 | 9.12E+02 | 1.33E+03 | 1.10E+03 |
| VOC | Trichloroethene | 79-01-6 | 1.66E+02 | 9.96E-01 | 2.11E-01 | 7.90E-02 | 6.43E-03 | 9.10E-06 | 8.83E-08 | 7.92E-04 | 1.71E-05 | 1.31E+02 | 7.35E+01 | 5.33E+02 | 1.10E+03 | 1.25E+03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.30E+03 | 7.80E+00 | 9.83E+00 | 7.80E-02 | 6.35E-03 | 8.20E-06 | 7.95E-08 | 4.24E-03 | 3.95E-05 | 1.87E+02 | 3.32E+02 | 3.43E+03 | 1.70E+02 | 1.66E+03 |
| VOC | Vinyl Chloride | 75-01-4 | 1.86E+01 | 1.12E-01 | 5.55E-01 | 1.06E-01 | 8.63E-03 | 1.23E-05 | 1.19E-07 | 1.01E-02 | 6.09E-05 | 6.25E+01 | 2.98E+03 | 1.03E+04 | 2.76E+03 | 8.70E+02 |
| VOC | Xylenes (total) | 1330-20-7 | 3.86E+02 | 2.32E+00 | 1.38E-01 | 7.80E-02 | 6.35E-03 | 8.75E-06 | 8.48E-08 | 2.37E-04 | 9.35E-06 | 1.06E+02 | 7.99E+00 | 4.69E+01 | 1.75E+02 | 4.27E+02 |
| SVOC | Acenaphthene | 83-32-9 | 7.08E+03 | 4.25E+01 | 3.18E-03 | 4.21E-02 | 3.43E-03 | 7.69E-06 | 7.46E-08 | 1.71E-07 | 2.51E-07 | 1.54E+02 | 2.50E-03 | 2.13E-02 | 4.24E+00 | 1.81E+02 |
| SVOC | Acenaphthylene | 208-96-8 | 4.90E+03 | 2.94E+01 | 2.31E-03 | 4.42E-02 | 3.60E-03 | 7.44E-06 | 7.22E-08 | 1.88E-07 | 2.63E-07 | 1.52E+02 | 9.12E-04 | 7.67E-03 | 1.61E+01 | 4.75E+02 |
| SVOC | Acetophenone | 98-86-2 | 4.10E+01 | 2.46E-01 | 2.19E-04 | 8.00E-02 | 6.51E-03 | 8.00E-06 | 7.76E-08 | 2.88E-06 | 1.03E-06 | 1.20E+02 | 3.97E-01 | 2.64E+00 | 6.13E+03 | 2.12E+03 |
| SVOC | Anthracene | 120-12-7 | 2.95E+04 | 1.77E+02 | 1.34E-03 | 3.24E-02 | 2.64E-03 | 7.74E-06 | 7.51E-08 | 1.34E-08 | 7.04E-08 | 1.78E+02 | 2.67E-06 | 2.63E-05 | 4.34E-02 | 7.69E+00 |
| SVOC | Benzaldehyde | 100-52-7 | 2.85E+01 | 1.71E-01 | 4.86E-04 | 7.21E-02 | 5.87E-03 | 9.07E-06 | 8.80E-08 | 7.20E-06 | 1.63E-06 | 1.06E+02 | 9.00E-01 | 5.28E+00 | 3.00E+03 | 8.12E+02 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 3.98E+05 | 2.39E+03 | 6.85E-05 | 5.10E-02 | 4.15E-03 | 9.00E-06 | 8.73E-08 | 1.03E-10 | 6.16E-09 | 2.28E+02 | 1.05E-07 | 1.32E-06 | 9.40E-03 | 2.24E+01 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 1.02E+06 | 6.12E+03 | 2.32E-05 | 4.30E-02 | 3.50E-03 | 9.00E-06 | 8.73E-08 | 1.82E-11 | 2.59E-09 | 2.52E+02 | 5.49E-09 | 7.65E-08 | 1.62E-03 | 9.91E+00 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 1.23E+06 | 7.38E+03 | 2.28E-03 | 2.26E-02 | 1.84E-03 | 5.56E-06 | 5.39E-08 | 3.80E-10 | 1.18E-08 | 2.52E+02 | 5.00E-07 | 6.97E-06 | 1.50E-03 | 1.11E+01 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 1.60E+06 | 9.60E+03 | 2.88E-06 | 2.03E-02 | 1.65E-03 | 5.20E-06 | 5.04E-08 | 3.81E-12 | 1.18E-09 | 2.76E+02 | 1.01E-10 | 1.54E-09 | 2.60E-04 | 2.50E+00 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.23E+06 | 7.38E+03 | 1.70E-05 | 2.26E-02 | 1.84E-03 | 5.56E-06 | 5.39E-08 | 7.64E-12 | 1.68E-09 | 2.52E+02 | 2.00E-09 | 2.79E-08 | 8.00E-04 | 5.90E+00 |
| SVOC | Biphenyl | 92-52-4 | 1.05E+04 | 6.29E+01 | 6.13E-03 | 4.04E-02 | 3.29E-03 | 8.15E-06 | 7.90E-08 | 2.13E-07 | 2.80E-07 | 1.54E+02 | 9.64E-03 | 8.21E-02 | 6.03E+00 | 3.80E+02 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 1.51E+07 | 9.06E+04 | 2.09E-06 | 3.51E-02 | 2.86E-03 | 3.66E-06 | 3.55E-08 | 3.03E-13 | 3.34E-10 | 3.91E+02 | 6.45E-06 | 1.39E-04 | 3.40E-01 | 3.08E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 5.75E+04 | 3.45E+02 | 2.59E-05 | 1.74E-02 | 1.42E-03 | 4.83E-06 | 4.68E-08 | 1.60E-10 | 7.68E-09 | 3.12E+02 | 8.25E-06 | 1.42E-04 | 2.69E+00 | 9.28E+02 |
| SVOC | Caprolactam | 105-60-2 | 6.51E-01 | 3.91E-03 | 5.17E-07 | 6.54E-02 | 5.33E-03 | 8.99E-06 | 8.72E-08 | 5.77E-07 | 4.61E-07 | 1.13E+02 | 1.60E-03 | 1.00E-02 | 7.72E+05 | 7.97E+04 |
| SVOC | Carbazole | 86-74-8 | 3.39E+03 | 2.03E+01 | 3.13E-07 | 3.90E-02 | 3.18E-03 | 7.03E-06 | 6.82E-08 | 2.24E-09 | 2.87E-08 | 1.67E+02 | 5.19E-07 | 4.79E-06 | 7.48E+00 | 1.53E+02 |
| SVOC | 4-Chloroaniline | 106-47-8 | 6.61E+01 | 3.97E-01 | 6.80E-06 | 4.83E-02 | 3.93E-03 | 1.01E-05 | 9.80E-08 | 1.66E-07 | 2.48E-07 | 1.28E+02 | 1.23E-02 | 8.67E-02 | 5.30E+03 | 2.63E+03 |
| SVOC | Chrysene | 218-01-9 | 3.98E+05 | 2.39E+03 | 1.94E-03 | 2.48E-02 | 2.02E-03 | 6.21E-06 | 6.02E-08 | 1.10E-09 | 2.02E-08 | 2.28E+02 | 6.23E-09 | 7.86E-08 | 1.60E-03 | 3.82E+00 |

**Attachment 1: Normalized Vapor Flux from Exposed Soil to Ambient Air and Soil Saturation Concentration**
**(Routine Worker)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | H (unitless) | $D_{air}$ ($cm^2/s$) | $D_G$ ($cm^2/s$) | $D_{water}$ ($cm^2/s$) | $D_L$ ($cm^2/s$) | $D_E$ ($cm^2/s$) | $J_G$ ($mg/m^2$-s per mg/kg) | MW (g/mole) | VP (mm Hg) | v* (mg/L) | s (mg/L) | $C_{sat}$ (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 3.80E+06 | 2.28E+04 | 3.02E-07 | 2.02E-02 | 1.64E-03 | 5.18E-06 | 5.02E-08 | 1.47E-12 | 7.37E-10 | 2.78E+02 | 1.00E-10 | 1.54E-09 | 2.49E-03 | 5.68E+01 |
| SVOC | Dibenzofuran | 132-64-9 | 1.12E+04 | 6.74E+01 | 2.57E-04 | 2.70E-02 | 2.20E-03 | 5.93E-06 | 5.75E-08 | 6.12E-09 | 4.75E-08 | 1.68E+02 | 1.80E-04 | 1.67E-03 | 1.00E+01 | 6.75E+02 |
| SVOC | Diethylphthalate | 84-66-2 | 2.88E+02 | 1.73E+00 | 9.25E-06 | 2.56E-02 | 2.08E-03 | 6.35E-06 | 6.16E-08 | 2.93E-08 | 1.04E-07 | 2.22E+02 | 1.65E-03 | 2.03E-02 | 1.08E+03 | 1.97E+03 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 2.09E+02 | 1.25E+00 | 4.10E-05 | 5.84E-02 | 4.76E-03 | 8.69E-06 | 8.43E-08 | 1.37E-07 | 2.24E-07 | 1.22E+02 | 9.80E-02 | 6.62E-01 | 7.87E+03 | 1.07E+04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 3.39E+04 | 2.03E+02 | 1.93E-08 | 4.38E-02 | 3.57E-03 | 7.86E-06 | 7.62E-08 | 2.48E-10 | 9.56E-09 | 2.78E+02 | 7.30E-05 | 1.12E-03 | 1.12E+01 | 2.28E+03 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 6.92E+01 | 4.15E-01 | 1.53E-05 | 3.27E-02 | 2.66E-03 | 7.26E-06 | 7.04E-08 | 1.43E-07 | 2.30E-07 | 1.82E+02 | 5.67E-04 | 5.71E-03 | 1.82E+02 | 9.36E+01 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 8.32E+07 | 4.99E+05 | 1.37E-03 | 1.51E-02 | 1.23E-03 | 3.58E-06 | 3.47E-08 | 2.28E-12 | 9.17E-10 | 3.91E+02 | 2.60E-06 | 5.61E-05 | 2.00E-02 | 9.98E+03 |
| SVOC | Fluoranthene | 206-44-0 | 1.07E+05 | 6.42E+02 | 3.30E-04 | 3.02E-02 | 2.46E-03 | 6.35E-06 | 6.16E-08 | 9.00E-10 | 1.82E-08 | 2.02E+02 | 7.80E-06 | 8.72E-05 | 2.06E-01 | 1.32E+02 |
| SVOC | Fluorene | 86-73-7 | 1.38E+04 | 8.28E+01 | 1.31E-03 | 3.63E-02 | 2.96E-03 | 7.88E-06 | 7.64E-08 | 3.14E-08 | 1.08E-07 | 1.66E+02 | 6.33E-04 | 5.81E-03 | 1.98E+00 | 1.64E+02 |
| SVOC | Hexachlorobenzene | 118-74-1 | 5.50E+04 | 3.30E+02 | 2.71E-02 | 5.42E-02 | 4.41E-03 | 5.91E-06 | 5.73E-08 | 2.40E-07 | 2.97E-07 | 2.85E+02 | 1.80E-05 | 2.83E-04 | 6.20E+00 | 2.05E+03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 5.37E+04 | 3.22E+02 | 1.67E-01 | 5.61E-02 | 4.57E-03 | 6.16E-06 | 5.97E-08 | 1.57E-06 | 7.60E-07 | 2.61E+02 | 2.21E-01 | 3.19E+00 | 3.23E+00 | 1.04E+03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 3.47E+06 | 2.08E+04 | 3.28E-05 | 1.90E-02 | 1.55E-03 | 5.66E-06 | 5.49E-08 | 3.36E-12 | 1.11E-09 | 2.76E+02 | 1.00E-10 | 1.53E-09 | 2.20E-05 | 4.58E-01 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 6.23E+03 | 3.74E+01 | 1.06E-02 | 9.86E-02 | 8.03E-03 | 7.75E-06 | 7.52E-08 | 1.50E-06 | 7.44E-07 | 1.42E+02 | 5.50E-02 | 4.32E-01 | 2.46E+01 | 9.22E+02 |
| SVOC | Methylphenol (total) | 1319-77-3 | 8.60E+01 | 5.16E-01 | 1.77E-05 | 7.40E-02 | 6.03E-03 | 1.00E-05 | 9.70E-08 | 2.19E-07 | 2.84E-07 | 1.08E+02 | | | 2.30E+04 | 1.42E+04 |
| SVOC | Naphthalene | 91-20-3 | 2.00E+03 | 1.20E+01 | 9.90E-03 | 5.90E-02 | 4.80E-03 | 7.50E-06 | 7.27E-08 | 2.61E-06 | 9.80E-07 | 1.28E+02 | 8.50E-02 | 6.02E-01 | 3.10E+01 | 3.75E+02 |
| SVOC | Phenanthrene | 85-01-8 | 1.40E+04 | 8.40E+01 | 4.76E-04 | 3.33E-02 | 2.71E-03 | 7.47E-06 | 7.24E-08 | 1.07E-08 | 6.29E-08 | 1.78E+02 | 1.12E-04 | 1.10E-03 | 1.15E+00 | 9.67E+01 |
| SVOC | Phenol | 108-95-2 | 2.88E+01 | 1.73E-01 | 8.15E-06 | 8.20E-02 | 6.68E-03 | 9.10E-06 | 8.83E-08 | 3.47E-07 | 3.58E-07 | 9.41E+01 | 2.76E-01 | 1.44E+00 | 8.28E+04 | 2.25E+04 |
| SVOC | Pyrene | 129-00-0 | 1.05E+05 | 6.30E+02 | 2.26E-04 | 2.72E-02 | 2.21E-03 | 7.24E-06 | 7.02E-08 | 5.99E-10 | 1.49E-08 | 2.02E+02 | 4.59E-06 | 5.13E-05 | 1.35E-01 | 8.51E+01 |
| P/PCB | PCBs (total) | 1336-36-3 | 2.45E+06 | 1.47E+04 | 4.09E-02 | 8.00E-02 | 6.51E-03 | 1.00E-05 | 9.70E-08 | 1.20E-08 | 6.65E-08 | 3.28E+02 | 7.71E-05 | 1.40E-03 | 1.20E-02 | 1.76E+02 |
| INORG | Aluminum | 7429-90-5 | | 1.50E+03 | | | | | | | | 2.70E+01 | | | | |
| INORG | Antimony | 7440-36-0 | | 4.50E+01 | | | | | | | | 1.22E+02 | | | | |
| INORG | Arsenic | 7440-38-2 | | 2.90E+01 | | | | | | | | 7.49E+01 | | | | |
| INORG | Barium | 7440-39-3 | | 4.10E+01 | | | | | | | | 1.37E+02 | | | | |
| INORG | Beryllium | 7440-41-7 | | 7.90E+02 | | | | | | | | 9.01E+00 | | | | |
| INORG | Cadmium | 7440-43-9 | | 7.50E+01 | | | | | | | | 1.12E+02 | | | | |
| INORG | Chromium (total) | 7440-47-3 | | 1.90E+01 | | | | | | | | 5.20E+01 | | | | |
| INORG | Cobalt | 7440-48-4 | | 4.50E+01 | | | | | | | | 5.89E+01 | | | | |
| INORG | Copper | 7440-50-8 | | 3.50E+01 | | | | | | | | 6.35E+01 | | | | |
| INORG | Cyanide (amenable) | 57-12-5A | | 9.90E+00 | | | | | | | | 2.60E+01 | | | | |
| INORG | Cyanide (total) | 57-12-5 | | 9.90E+00 | | | | | | | | 2.60E+01 | | | | |
| INORG | Iron | 7439-89-6 | | 2.50E+01 | | | | | | | | 5.58E+01 | | | | |
| INORG | Lead | 7439-92-1 | | 9.00E+02 | | | | | | | | 2.07E+02 | | | | |
| INORG | Manganese | 7439-96-5 | | 6.50E+01 | | | | | | | | 5.49E+01 | | | | |
| INORG | Mercury | 7439-97-6 | | 1.00E+03 | 1.45E-01 | 3.07E-02 | 2.50E-03 | 6.30E-06 | 6.11E-08 | 2.40E-07 | 2.97E-07 | 2.01E+02 | 1.96E-03 | 2.17E-02 | 5.60E-02 | 5.60E+01 |
| INORG | Nickel | 7440-02-0 | | 6.50E+01 | | | | | | | | 5.87E+01 | | | | |
| INORG | Selenium | 7782-49-2 | | 5.00E+00 | | | | | | | | 7.90E+01 | | | | |
| INORG | Silver | 7440-22-4 | | 8.30E+00 | | | | | | | | 1.08E+02 | | | | |
| INORG | Thallium | 7440-28-0 | | 7.10E+01 | | | | | | | | 2.04E+02 | | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+03 | | | | | | | | 5.09E+01 | | | | |
| INORG | Zinc | 7440-66-6 | | 6.20E+01 | | | | | | | | 6.54E+01 | | | | |

| | | | | |
|---|---|---|---|---|
| **Notes:** | Soil bulk density | kg/L | $\rho_b$ | 1.5E+00 |
| | Soil particle density | kg/L | $\rho_s$ | 2.65E+00 |
| | Soil porosity | L/L-soil | n | 4.30E-01 |
| | Soil water content | L/L-soil | $\theta_w$ | 0.15 |
| | Soil air-filled porosity | L/L-soil | $\theta_a$ | 0.28 |
| | Soil organic carbon fraction | unitless | $f_{oc}$ | 0.006 |
| | Averaging period | year | ED | 25 |
| | | s | ED | 7.88E+08 |
| | Molar Gas Constant | L-mmHg/mole-°K | R | 62.411 |
| | Temperature | °C | T | 10 |
| | | °K | T | 290 |

| Attachment 1: Air Dispersion Factor 'C/Q' for Inhalation of Vapors and Particulates GM Powertrain Bedford Facility, Bedford, Indiana | | |
|---|---|---|
| | | **Routine Worker** |
| **Exposure Area** ($ft^2$) | $ft^2$ | 148' x 148' |
| **C/Q (Vapor)** | kg/m3 per kg/m2-s | 14.53 |
| **C/Q (Particulate)** | kg/m3 per kg/m2-s | 11.01 |

## Attachment 1: Estimated Concentrations in Ambient Air from Soil (Routine Worker)
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| VOC | Acetone | 67-64-1 | 1.00E+00 | 1.00E+00 | 6.38E-05 | 2.34E-10 |
| VOC | Benzene | 71-43-2 | 1.00E+00 | 1.00E+00 | 2.98E-04 | 2.34E-10 |
| VOC | Bromodichloromethane | 75-27-4 | 1.00E+00 | 1.00E+00 | 9.71E-05 | 2.34E-10 |
| VOC | Bromomethane | 74-83-9 | 1.00E+00 | 1.00E+00 | 4.58E-04 | 2.34E-10 |
| VOC | 2-Butanone | 78-93-3 | 1.00E+00 | 1.00E+00 | 5.93E-05 | 2.34E-10 |
| VOC | Carbon Disulfide | 75-15-0 | 1.00E+00 | 1.00E+00 | 7.43E-04 | 2.34E-10 |
| VOC | Chlorobenzene | 108-90-7 | 1.00E+00 | 1.00E+00 | 1.28E-04 | 2.34E-10 |
| VOC | Chloroethane | 75-00-3 | 1.00E+00 | 1.00E+00 | 6.11E-04 | 2.34E-10 |
| VOC | Chloroform | 67-66-3 | 1.00E+00 | 1.00E+00 | 3.05E-04 | 2.34E-10 |
| VOC | Chloromethane | 74-87-3 | 1.00E+00 | 1.00E+00 | 7.28E-04 | 2.34E-10 |
| VOC | Cumene | 98-82-8 | 1.00E+00 | 1.00E+00 | 5.15E-04 | 2.34E-10 |
| VOC | Cyclohexane | 110-82-7 | 1.00E+00 | 1.00E+00 | 6.28E-04 | 2.34E-10 |
| VOC | Dibromochloromethane | 124-48-1 | 1.00E+00 | 1.00E+00 | 5.25E-05 | 2.34E-10 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.00E+00 | 1.00E+00 | 5.44E-05 | 2.34E-10 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.00E+00 | 1.00E+00 | 3.27E-05 | 2.34E-10 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.00E+00 | 1.00E+00 | 6.15E-05 | 2.34E-10 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.00E+00 | 1.00E+00 | 1.03E-03 | 2.34E-10 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 1.00E+00 | 1.00E+00 | 3.40E-04 | 2.34E-10 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 1.00E+00 | 1.00E+00 | 2.05E-04 | 2.34E-10 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 1.00E+00 | 1.00E+00 | 2.80E-04 | 2.34E-10 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 1.00E+00 | 1.00E+00 | 3.56E-04 | 2.34E-10 |
| VOC | Ethyl Benzene | 100-41-4 | 1.00E+00 | 1.00E+00 | 1.48E-04 | 2.34E-10 |
| VOC | 2-Hexanone | 591-78-6 | 1.00E+00 | 1.00E+00 | 3.22E-04 | 2.34E-10 |
| VOC | Methyl Acetate | 79-20-9 | 1.00E+00 | 1.00E+00 | 1.79E-05 | 2.34E-10 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.00E+00 | 1.00E+00 | 1.59E-04 | 2.34E-10 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.00E+00 | 1.00E+00 | 6.46E-05 | 2.34E-10 |
| VOC | Methylcyclohexane | 108-87-2 | 1.00E+00 | 1.00E+00 | 7.24E-04 | 2.34E-10 |
| VOC | Methylene Chloride | 75-09-2 | 1.00E+00 | 1.00E+00 | 3.27E-04 | 2.34E-10 |
| VOC | Tetrachloroethene | 127-18-4 | 1.00E+00 | 1.00E+00 | 3.22E-04 | 2.34E-10 |
| VOC | Toluene | 108-88-3 | 1.00E+00 | 1.00E+00 | 2.02E-04 | 2.34E-10 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.00E+00 | 1.00E+00 | 1.84E-05 | 2.34E-10 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.00E+00 | 1.00E+00 | 3.74E-04 | 2.34E-10 |
| VOC | Trichloroethene | 79-01-6 | 1.00E+00 | 1.00E+00 | 2.48E-04 | 2.34E-10 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.00E+00 | 1.00E+00 | 5.74E-04 | 2.34E-10 |
| VOC | Vinyl Chloride | 75-01-4 | 1.00E+00 | 1.00E+00 | 8.85E-04 | 2.34E-10 |
| VOC | Xylenes (total) | 1330-20-7 | 1.00E+00 | 1.00E+00 | 1.36E-04 | 2.34E-10 |
| SVOC | Acenaphthene | 83-32-9 | 1.00E+00 | 1.00E+00 | 3.64E-06 | 2.34E-10 |
| SVOC | Acenaphthylene | 208-96-8 | 1.00E+00 | 1.00E+00 | 3.83E-06 | 2.34E-10 |
| SVOC | Acetophenone | 98-86-2 | 1.00E+00 | 1.00E+00 | 1.50E-05 | 2.34E-10 |
| SVOC | Anthracene | 120-12-7 | 1.00E+00 | 1.00E+00 | 1.02E-06 | 2.34E-10 |
| SVOC | Benzaldehyde | 100-52-7 | 1.00E+00 | 1.00E+00 | 2.37E-05 | 2.34E-10 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 1.00E+00 | 1.00E+00 | 8.96E-08 | 2.34E-10 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 1.00E+00 | 1.00E+00 | 3.76E-08 | 2.34E-10 |

## Attachment 1: Estimated Concentrations in Ambient Air from Soil (Routine Worker)
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 1.00E+00 | 1.00E+00 | 1.72E-07 | 2.34E-10 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 1.00E+00 | 1.00E+00 | 1.72E-08 | 2.34E-10 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.00E+00 | 1.00E+00 | 2.44E-08 | 2.34E-10 |
| SVOC | Biphenyl | 92-52-4 | 1.00E+00 | 1.00E+00 | 4.07E-06 | 2.34E-10 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 1.00E+00 | 1.00E+00 | 4.86E-09 | 2.34E-10 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 1.00E+00 | 1.00E+00 | 1.12E-07 | 2.34E-10 |
| SVOC | Caprolactam | 105-60-2 | 1.00E+00 | 1.00E+00 | 6.70E-06 | 2.34E-10 |
| SVOC | Carbazole | 86-74-8 | 1.00E+00 | 1.00E+00 | 4.18E-07 | 2.34E-10 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.00E+00 | 1.00E+00 | 3.60E-06 | 2.34E-10 |
| SVOC | Chrysene | 218-01-9 | 1.00E+00 | 1.00E+00 | 2.93E-07 | 2.34E-10 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 1.00E+00 | 1.00E+00 | 1.07E-08 | 2.34E-10 |
| SVOC | Dibenzofuran | 132-64-9 | 1.00E+00 | 1.00E+00 | 6.90E-07 | 2.34E-10 |
| SVOC | Diethylphthalate | 84-66-2 | 1.00E+00 | 1.00E+00 | 1.51E-06 | 2.34E-10 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.00E+00 | 1.00E+00 | 3.26E-06 | 2.34E-10 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 1.00E+00 | 1.00E+00 | 1.39E-07 | 2.34E-10 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.00E+00 | 1.00E+00 | 3.34E-06 | 2.34E-10 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 1.00E+00 | 1.00E+00 | 1.33E-08 | 2.34E-10 |
| SVOC | Fluoranthene | 206-44-0 | 1.00E+00 | 1.00E+00 | 2.65E-07 | 2.34E-10 |
| SVOC | Fluorene | 86-73-7 | 1.00E+00 | 1.00E+00 | 1.56E-06 | 2.34E-10 |
| SVOC | Hexachlorobenzene | 118-74-1 | 1.00E+00 | 1.00E+00 | 4.32E-06 | 2.34E-10 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 1.00E+00 | 1.00E+00 | 1.10E-05 | 2.34E-10 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 1.00E+00 | 4.58E-01 | 7.41E-09 | 2.34E-10 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.00E+00 | 1.00E+00 | 1.08E-05 | 2.34E-10 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.00E+00 | 1.00E+00 | 4.13E-06 | 2.34E-10 |
| SVOC | Naphthalene | 91-20-3 | 1.00E+00 | 1.00E+00 | 1.42E-05 | 2.34E-10 |
| SVOC | Phenanthrene | 85-01-8 | 1.00E+00 | 1.00E+00 | 9.14E-07 | 2.34E-10 |
| SVOC | Phenol | 108-95-2 | 1.00E+00 | 1.00E+00 | 5.20E-06 | 2.34E-10 |
| SVOC | Pyrene | 129-00-0 | 1.00E+00 | 1.00E+00 | 2.16E-07 | 2.34E-10 |
| P/PCB | PCBs (total) | 1336-36-3 | 1.00E+00 | 1.00E+00 | 9.66E-07 | 2.34E-10 |
| INORG | Aluminum | 7429-90-5 | 1.00E+00 | | | 2.34E-10 |
| INORG | Antimony | 7440-36-0 | 1.00E+00 | | | 2.34E-10 |
| INORG | Arsenic | 7440-38-2 | 1.00E+00 | | | 2.34E-10 |
| INORG | Barium | 7440-39-3 | 1.00E+00 | | | 2.34E-10 |
| INORG | Beryllium | 7440-41-7 | 1.00E+00 | | | 2.34E-10 |
| INORG | Cadmium | 7440-43-9 | 1.00E+00 | | | 2.34E-10 |
| INORG | Chromium (total) | 7440-47-3 | 1.00E+00 | | | 2.34E-10 |
| INORG | Cobalt | 7440-48-4 | 1.00E+00 | | | 2.34E-10 |
| INORG | Copper | 7440-50-8 | 1.00E+00 | | | 2.34E-10 |
| INORG | Cyanide (amenable) | 57-12-5A | 1.00E+00 | | | 2.34E-10 |
| INORG | Cyanide (total) | 57-12-5 | 1.00E+00 | | | 2.34E-10 |
| INORG | Iron | 7439-89-6 | 1.00E+00 | | | 2.34E-10 |
| INORG | Lead | 7439-92-1 | 1.00E+00 | | | 2.34E-10 |
| INORG | Manganese | 7439-96-5 | 1.00E+00 | | | 2.34E-10 |

## Attachment 1: Estimated Concentrations in Ambient Air from Soil (Routine Worker)
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| **Chem Group** | **Chemical** | **CASRN** | **$C_{soil}$** (mg/kg) | **$C_{source}$** (mg/kg) | **$C_{air}$** ($mg/m^3$) | **$C_{air}$** ($mg/m^3$) |
| INORG | Mercury | 7439-97-6 | 1.00E+00 | 1.00E+00 | 4.32E-06 | 2.34E-10 |
| INORG | Nickel | 7440-02-0 | 1.00E+00 | | | 2.34E-10 |
| INORG | Selenium | 7782-49-2 | 1.00E+00 | | | 2.34E-10 |
| INORG | Silver | 7440-22-4 | 1.00E+00 | | | 2.34E-10 |
| INORG | Thallium | 7440-28-0 | 1.00E+00 | | | 2.34E-10 |
| INORG | Vanadium | 7440-62-2 | 1.00E+00 | | | 2.34E-10 |
| INORG | Zinc | 7440-66-6 | 1.00E+00 | | | 2.34E-10 |
| | | | | | | |
| **Note:** | | | | | | |
| $C_{source}$ = Minimum of Soil Concentration and Csat | | | | | | |

## Attachment 1: Risk Based Cancer Criteria for Routine Worker Exposure to Soil
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 1.75E-07 | | | | | | | 6.38E-05 | | | 2.34E-10 | | | |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 1.75E-07 | 5.5E-02 | 1.0E+03 | | | 5.5E-02 | | 2.98E-04 | 7.8E-03 | 1.8E+01 | 2.34E-10 | 7.8E-03 | 2.2E+07 | 1.7E+01 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 1.75E-07 | 6.2E-02 | 9.2E+02 | | | 6.2E-02 | | 9.71E-05 | 1.8E-02 | 2.4E+01 | 2.34E-10 | 1.8E-02 | 9.9E+06 | 2.3E+01 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 1.75E-07 | | | | | | | 4.58E-04 | | | 2.34E-10 | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 1.75E-07 | | | | | | | 5.93E-05 | | | 2.34E-10 | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 1.75E-07 | | | | | | | 7.43E-04 | | | 2.34E-10 | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 1.75E-07 | | | | | | | 1.28E-04 | | | 2.34E-10 | | | |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 1.75E-07 | 2.9E-03 | 2.0E+04 | | | 2.9E-03 | | 6.11E-04 | | | 2.34E-10 | | | 2.0E+04 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 1.75E-07 | | | | | | | 3.05E-04 | 2.3E-02 | 5.8E+00 | 2.34E-10 | 2.3E-02 | 7.6E+06 | 5.8E+00 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 1.75E-07 | | | | | | | 7.28E-04 | | | 2.34E-10 | | | |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 1.75E-07 | | | | | | | 5.15E-04 | | | 2.34E-10 | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 1.75E-07 | | | | | | | 6.28E-04 | | | 2.34E-10 | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 1.75E-07 | 8.4E-02 | 6.8E+02 | | | 8.4E-02 | | 5.25E-05 | 2.4E-02 | 3.2E+01 | 2.34E-10 | 2.4E-02 | 7.3E+06 | 3.1E+01 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 1.75E-07 | | | | | | | 5.44E-05 | | | 2.34E-10 | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 1.75E-07 | | | | | | | 3.27E-05 | | | 2.34E-10 | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 1.75E-07 | 2.4E-02 | 2.4E+03 | | | 2.4E-02 | | 6.15E-05 | 6.3E-03 | 1.1E+02 | 2.34E-10 | 6.3E-03 | 2.8E+07 | 1.0E+02 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 1.75E-07 | | | | | | | 1.03E-03 | | | 2.34E-10 | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 1.75E-07 | | | | | | | 3.40E-04 | | | 2.34E-10 | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 1.75E-07 | 9.1E-02 | 6.3E+02 | | | 9.1E-02 | | 2.05E-04 | 2.6E-02 | 7.7E+00 | 2.34E-10 | 2.6E-02 | 6.7E+06 | 7.6E+00 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 1.75E-07 | | | | | | | 2.80E-04 | | | 2.34E-10 | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 1.75E-07 | | | | | | | 3.56E-04 | | | 2.34E-10 | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 1.75E-07 | | | | | | | 1.48E-04 | | | 2.34E-10 | | | |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 1.75E-07 | | | | | | | 3.22E-04 | | | 2.34E-10 | | | |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 1.75E-07 | | | | | | | 1.79E-05 | | | 2.34E-10 | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 1.75E-07 | 3.3E-03 | 1.7E+04 | | | 3.3E-03 | | 1.59E-04 | 1.0E-04 | 2.6E+03 | 2.34E-10 | 1.0E-04 | 1.7E+09 | 2.2E+03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 1.75E-07 | | | | | | | 6.46E-05 | | | 2.34E-10 | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 1.75E-07 | | | | | | | 7.24E-04 | | | 2.34E-10 | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 1.75E-07 | 7.5E-03 | 7.6E+03 | | | 7.5E-03 | | 3.27E-04 | 4.7E-04 | 2.7E+02 | 2.34E-10 | 4.7E-04 | 3.7E+08 | 2.6E+02 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 1.75E-07 | 5.2E-02 | 1.1E+03 | | | 5.2E-02 | | 3.22E-04 | 3.1E-03 | 4.2E+01 | 2.34E-10 | 3.1E-03 | 5.7E+07 | 4.0E+01 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 1.75E-07 | | | | | | | 2.02E-04 | | | 2.34E-10 | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 1.75E-07 | | | | | | | 1.84E-05 | | | 2.34E-10 | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 1.75E-07 | | | | | | | 3.74E-04 | | | 2.34E-10 | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 1.75E-07 | 1.1E-02 | 5.2E+03 | | | 1.1E-02 | | 2.48E-04 | 1.7E-03 | 9.7E+01 | 2.34E-10 | 1.7E-03 | 1.0E+08 | 9.5E+01 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 1.75E-07 | | | | | | | 5.74E-04 | | | 2.34E-10 | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 1.75E-07 | 1.4E+00 | 4.1E+01 | | | 1.4E+00 | | 8.85E-04 | 8.8E-03 | 5.3E+00 | 2.34E-10 | 8.8E-03 | 2.0E+07 | 4.7E+00 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 1.75E-07 | | | | | | | 1.36E-04 | | | 2.34E-10 | | | |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 3.64E-06 | | | 2.34E-10 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 3.83E-06 | | | 2.34E-10 | | | |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.50E-05 | | | 2.34E-10 | | | |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 1.02E-06 | | | 2.34E-10 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 2.37E-05 | | | 2.34E-10 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 1.75E-07 | 7.3E-01 | 7.8E+01 | 1.30E-01 | 3.00E-07 | 7.3E-01 | 4.6E+01 | 8.96E-08 | 2.1E-01 | 2.2E+03 | 2.34E-10 | 2.1E-01 | 8.4E+05 | 2.8E+01 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 1.75E-07 | 7.3E+00 | 7.8E+00 | 1.30E-01 | 3.00E-07 | 7.3E+00 | 4.6E+00 | 3.76E-08 | 8.9E-01 | 1.2E+03 | 2.34E-10 | 8.9E-01 | 2.0E+05 | 2.9E+00 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 1.75E-07 | 7.3E-01 | 7.8E+01 | 1.30E-01 | 3.00E-07 | 7.3E-01 | 4.6E+01 | 1.72E-07 | 2.1E-01 | 1.1E+03 | 2.34E-10 | 2.1E-01 | 8.4E+05 | 2.8E+01 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 1.72E-08 | | | 2.34E-10 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 1.75E-07 | 7.3E-02 | 7.8E+02 | 1.30E-01 | 3.00E-07 | 7.3E-02 | 4.6E+02 | 2.44E-08 | 2.1E-02 | 8.0E+04 | 2.34E-10 | 2.1E-02 | 8.4E+06 | 2.9E+02 |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 4.07E-06 | | | 2.34E-10 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 1.75E-07 | 1.4E-02 | 4.1E+03 | 1.00E-01 | 2.31E-07 | 1.4E-02 | 3.1E+03 | 4.86E-09 | 4.0E-03 | 2.1E+06 | 2.34E-10 | 4.0E-03 | 4.4E+07 | 1.8E+03 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.12E-07 | | | 2.34E-10 | | | |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 6.70E-06 | | | 2.34E-10 | | | |

## Attachment 1: Risk Based Cancer Criteria for Routine Worker Exposure to Soil
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 1.75E-07 | 2.0E-02 | 2.9E+03 | 1.00E-01 | 2.31E-07 | 2.0E-02 | 2.2E+03 | 4.18E-07 | 5.7E-03 | 1.7E+04 | 2.34E-10 | 5.7E-03 | 3.1E+07 | 1.2E+03 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 3.60E-06 | | | 2.34E-10 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 1.75E-07 | 7.3E-03 | 7.8E+03 | 1.30E-01 | 3.00E-07 | 7.3E-03 | 4.6E+03 | 2.93E-07 | 2.1E-03 | 6.7E+04 | 2.34E-10 | 2.1E-03 | 8.4E+07 | 2.8E+03 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 1.75E-07 | 7.3E+00 | 7.8E+00 | 1.30E-01 | 3.00E-07 | 7.3E+00 | 4.6E+00 | 1.07E-08 | 2.1E+00 | 1.8E+03 | 2.34E-10 | 2.1E+00 | 8.4E+04 | 2.9E+00 |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 6.90E-07 | | | 2.34E-10 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.51E-06 | | | 2.34E-10 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 3.26E-06 | | | 2.34E-10 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.39E-07 | | | 2.34E-10 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 1.75E-07 | 6.8E-01 | 8.4E+01 | 1.00E-01 | 2.31E-07 | 6.8E-01 | 6.4E+01 | 3.34E-06 | 1.9E-01 | 6.3E+01 | 2.34E-10 | 1.9E-01 | 9.0E+05 | 2.3E+01 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.33E-08 | | | 2.34E-10 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 2.65E-07 | | | 2.34E-10 | | | |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 1.56E-06 | | | 2.34E-10 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 1.75E-07 | 1.6E+00 | 3.6E+01 | 1.00E-01 | 2.31E-07 | 1.6E+00 | 2.7E+01 | 4.32E-06 | 4.6E-01 | 2.1E+01 | 2.34E-10 | 4.6E-01 | 3.8E+05 | 8.8E+00 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 1.75E-07 | 7.8E-02 | 7.3E+02 | 1.00E-01 | 2.31E-07 | 7.8E-02 | 5.6E+02 | 1.10E-05 | 2.2E-02 | 1.7E+02 | 2.34E-10 | 2.2E-02 | 7.9E+06 | 1.1E+02 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 1.75E-07 | 7.3E-01 | 7.8E+01 | 1.30E-01 | 3.00E-07 | 7.3E-01 | 4.6E+01 | 7.41E-09 | 2.1E-01 | 2.6E+04 | 2.34E-10 | 2.1E-01 | 8.4E+05 | 2.9E+01 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 1.08E-05 | | | 2.34E-10 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 4.13E-06 | | | 2.34E-10 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 1.42E-05 | | | 2.34E-10 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 9.14E-07 | | | 2.34E-10 | | | |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 1.75E-07 | | | 1.00E-01 | 2.31E-07 | | | 5.20E-06 | | | 2.34E-10 | | | |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 1.75E-07 | | | 1.30E-01 | 3.00E-07 | | | 2.16E-07 | | | 2.34E-10 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 1.75E-07 | 2.0E+00 | 2.9E+01 | 1.40E-01 | 3.23E-07 | 2.0E+00 | 1.5E+01 | 9.66E-07 | 5.7E-01 | 7.4E+01 | 2.34E-10 | 5.7E-01 | 3.1E+05 | 8.8E+00 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 1.75E-07 | 1.5E+00 | 3.8E+01 | 3.00E-02 | 6.92E-08 | 1.5E+00 | 9.6E+01 | | 4.3E+00 | | 2.34E-10 | 4.3E+00 | 4.1E+04 | 2.7E+01 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 1.75E-07 | | | | | | | | 2.4E+00 | | 2.34E-10 | 2.4E+00 | 7.3E+04 | 7.3E+04 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 1.75E-07 | | | 1.00E-03 | 2.31E-09 | | | | 1.8E+00 | | 2.34E-10 | 1.8E+00 | 9.7E+04 | 9.7E+04 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 1.75E-07 | | | | | | | | 1.2E+01 | | 2.34E-10 | 1.2E+01 | 1.5E+04 | 1.5E+04 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 1.75E-07 | | | | | | | | 2.8E+00 | | 2.34E-10 | 2.8E+00 | 6.2E+04 | 6.2E+04 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 1.75E-07 | | | | | | | 4.32E-06 | | | 2.34E-10 | | | |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 1.75E-07 | | | | | | | | 2.4E-01 | | 2.34E-10 | 2.4E-01 | 7.3E+05 | 7.3E+05 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 1.75E-07 | | | | | | | | | | 2.34E-10 | | | |

## Attachment 1: Risk Based Noncancer Criteria for Routine Worker Exposure to Soil
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 4.89E-07 | 9.0E-01 | 1.84E+06 | | | 9.0E-01 | | 6.38E-05 | 3.2E+00 | 7.20E+04 | 2.34E-10 | 3.2E+00 | 1.97E+10 | 6.93E+04 |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 4.89E-07 | 4.0E-03 | 8.18E+03 | | | 4.0E-03 | | 2.98E-04 | 3.0E-02 | 1.47E+02 | 2.34E-10 | 3.0E-02 | 1.87E+08 | 1.44E+02 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | 9.71E-05 | 7.0E-02 | 1.05E+03 | 2.34E-10 | 7.0E-02 | 4.37E+08 | 1.03E+03 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 4.89E-07 | 1.4E-03 | 2.86E+03 | | | 1.4E-03 | | 4.58E-04 | 5.0E-03 | 1.59E+01 | 2.34E-10 | 5.0E-03 | 3.12E+07 | 1.58E+01 |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 4.89E-07 | 6.0E-01 | 1.23E+06 | | | 6.0E-01 | | 5.93E-05 | 5.0E+00 | 1.23E+05 | 2.34E-10 | 5.0E+00 | 3.12E+10 | 1.12E+05 |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | | | 1.0E-01 | | 7.43E-04 | 7.0E-01 | 1.38E+03 | 2.34E-10 | 7.0E-01 | 4.37E+09 | 1.37E+03 |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | 1.28E-04 | 6.0E-02 | 6.86E+02 | 2.34E-10 | 6.0E-02 | 3.75E+08 | 6.75E+02 |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 4.89E-07 | 4.0E-01 | 8.18E+05 | | | 4.0E-01 | | 6.11E-04 | 1.0E+01 | 2.39E+04 | 2.34E-10 | 1.0E+01 | 6.25E+10 | 2.32E+04 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 4.89E-07 | 1.0E-02 | 2.04E+04 | | | 1.0E-02 | | 3.05E-04 | 5.0E-02 | 2.39E+02 | 2.34E-10 | 5.0E-02 | 3.12E+08 | 2.37E+02 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 4.89E-07 | | | | | | | 7.28E-04 | 9.0E-02 | 1.81E+02 | 2.34E-10 | 9.0E-02 | 5.62E+08 | 1.81E+02 |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | | | 1.0E-01 | | 5.15E-04 | 4.0E-01 | 1.13E+03 | 2.34E-10 | 4.0E-01 | 2.50E+09 | 1.13E+03 |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 4.89E-07 | | | | | | | 6.28E-04 | 6.0E+00 | 1.39E+04 | 2.34E-10 | 6.0E+00 | 3.75E+10 | 1.39E+04 |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | 5.25E-05 | 7.0E-02 | 1.95E+03 | 2.34E-10 | 7.0E-02 | 4.37E+08 | 1.86E+03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 4.89E-07 | 9.0E-02 | 1.84E+05 | | | 9.0E-02 | | 5.44E-05 | 2.0E-01 | 5.37E+03 | 2.34E-10 | 2.0E-01 | 1.25E+09 | 5.21E+03 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 4.89E-07 | 9.0E-04 | 1.84E+03 | | | 9.0E-04 | | 3.27E-05 | 1.4E-01 | 6.26E+03 | 2.34E-10 | 1.4E-01 | 8.74E+08 | 1.42E+03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | | | 3.0E-02 | | 6.15E-05 | 8.0E-01 | 1.90E+04 | 2.34E-10 | 8.0E-01 | 5.00E+09 | 1.45E+04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 4.89E-07 | 2.0E-01 | 4.09E+05 | | | 2.0E-01 | | 1.03E-03 | 2.0E-01 | 2.82E+02 | 2.34E-10 | 2.0E-01 | 1.25E+09 | 2.82E+02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | | | 1.0E-01 | | 3.40E-04 | 5.0E-01 | 2.15E+03 | 2.34E-10 | 5.0E-01 | 3.12E+09 | 2.13E+03 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | | | 3.0E-02 | | 2.05E-04 | 5.0E-03 | 3.55E+01 | 2.34E-10 | 5.0E-03 | 3.12E+07 | 3.55E+01 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 4.89E-07 | 1.0E-02 | 2.04E+04 | | | 1.0E-02 | | 2.80E-04 | 3.5E-02 | 1.82E+02 | 2.34E-10 | 3.5E-02 | 2.19E+08 | 1.81E+02 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | 3.56E-04 | 7.0E-02 | 2.87E+02 | 2.34E-10 | 7.0E-02 | 4.37E+08 | 2.85E+02 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | | | 1.0E-01 | | 1.48E-04 | 1.0E+00 | 9.84E+03 | 2.34E-10 | 1.0E+00 | 6.25E+09 | 9.39E+03 |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 4.89E-07 | 4.0E-02 | 8.18E+04 | | | 4.0E-02 | | 3.22E-04 | 5.0E-03 | 2.27E+01 | 2.34E-10 | 5.0E-03 | 3.12E+07 | 2.27E+01 |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 4.89E-07 | 1.0E+00 | 2.04E+06 | | | 1.0E+00 | | 1.79E-05 | 3.5E+00 | 2.85E+05 | 2.34E-10 | 3.5E+00 | 2.19E+10 | 2.50E+05 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 4.89E-07 | | | | | | | 1.59E-04 | 3.0E+00 | 2.75E+04 | 2.34E-10 | 3.0E+00 | 1.87E+10 | 2.75E+04 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 4.89E-07 | | | | | | | 6.46E-05 | 3.0E+00 | 6.78E+04 | 2.34E-10 | 3.0E+00 | 1.87E+10 | 6.78E+04 |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 4.89E-07 | | | | | | | 7.24E-04 | 3.0E+00 | 6.05E+03 | 2.34E-10 | 3.0E+00 | 1.87E+10 | 6.05E+03 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 4.89E-07 | 6.0E-02 | 1.23E+05 | | | 6.0E-02 | | 3.27E-04 | 3.0E+00 | 1.34E+04 | 2.34E-10 | 3.0E+00 | 1.87E+10 | 1.21E+04 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 4.89E-07 | 1.0E-02 | 2.04E+04 | | | 1.0E-02 | | 3.22E-04 | 4.0E-01 | 1.82E+03 | 2.34E-10 | 4.0E-01 | 2.50E+09 | 1.67E+03 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 4.89E-07 | 2.0E-01 | 4.09E+05 | | | 2.0E-01 | | 2.02E-04 | 4.0E-01 | 2.89E+03 | 2.34E-10 | 4.0E-01 | 2.50E+09 | 2.87E+03 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 4.89E-07 | 1.0E-02 | 2.04E+04 | | | 1.0E-02 | | 1.84E-05 | 2.0E-01 | 1.58E+04 | 2.34E-10 | 2.0E-01 | 1.25E+09 | 8.92E+03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 4.89E-07 | 2.8E-01 | 5.72E+05 | | | 2.8E-01 | | 3.74E-04 | 2.2E+00 | 8.59E+03 | 2.34E-10 | 2.2E+00 | 1.37E+10 | 8.47E+03 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 4.89E-07 | 6.0E-03 | 1.23E+04 | | | 6.0E-03 | | 2.48E-04 | | | 2.34E-10 | | | 1.23E+04 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 4.89E-07 | 3.0E+01 | 6.13E+07 | | | 3.0E+01 | | 5.74E-04 | 3.0E+01 | 7.63E+04 | 2.34E-10 | 3.0E+01 | 1.87E+11 | 7.62E+04 |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 4.89E-07 | 3.0E-03 | 6.13E+03 | | | 3.0E-03 | | 8.85E-04 | 1.0E-01 | 1.65E+02 | 2.34E-10 | 1.0E-01 | 6.25E+08 | 1.61E+02 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 4.89E-07 | 2.0E-01 | 4.09E+05 | | | 2.0E-01 | | 1.36E-04 | 1.0E-01 | 1.07E+03 | 2.34E-10 | 1.0E-01 | 6.25E+08 | 1.07E+03 |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 4.89E-07 | 6.0E-02 | 1.23E+05 | 1.30E-01 | 8.40E-07 | 6.0E-02 | 7.15E+04 | 3.64E-06 | 2.1E-01 | 8.41E+04 | 2.34E-10 | 2.1E-01 | 1.31E+09 | 2.94E+04 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | 1.30E-01 | 8.40E-07 | 3.0E-02 | 3.57E+04 | 3.83E-06 | 1.1E-01 | 4.01E+04 | 2.34E-10 | 1.1E-01 | 6.56E+08 | 1.44E+04 |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | 1.00E-01 | 6.46E-07 | 1.0E-01 | 1.55E+05 | 1.50E-05 | 3.5E-01 | 3.41E+04 | 2.34E-10 | 3.5E-01 | 2.19E+09 | 2.46E+04 |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 4.89E-07 | 3.0E-01 | 6.13E+05 | 1.30E-01 | 8.40E-07 | 3.0E-01 | 3.57E+05 | 1.02E-06 | | | 2.34E-10 | | | 2.26E+05 |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | 1.00E-01 | 6.46E-07 | 1.0E-01 | 1.55E+05 | 2.37E-05 | 3.5E-01 | 2.16E+04 | 2.34E-10 | 3.5E-01 | 2.19E+09 | 1.73E+04 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 8.96E-08 | | | 2.34E-10 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 3.76E-08 | | | 2.34E-10 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 1.72E-07 | | | 2.34E-10 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | 1.30E-01 | 8.40E-07 | 3.0E-02 | 3.57E+04 | 1.72E-08 | 1.1E-01 | 8.91E+06 | 2.34E-10 | 1.1E-01 | 6.56E+08 | 2.25E+04 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 2.44E-08 | | | 2.34E-10 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 4.89E-07 | 5.0E-02 | 1.02E+05 | 1.00E-01 | 6.46E-07 | 5.0E-02 | 7.74E+04 | 4.07E-06 | 1.8E-01 | 6.28E+04 | 2.34E-10 | 1.8E-01 | 1.09E+09 | 2.59E+04 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | 1.00E-01 | 6.46E-07 | 2.0E-02 | 3.10E+04 | 4.86E-09 | | | 2.34E-10 | | | 1.76E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 4.89E-07 | 2.0E-01 | 4.09E+05 | 1.00E-01 | 6.46E-07 | 2.0E-01 | 3.10E+05 | 1.12E-07 | 7.0E-01 | 9.16E+06 | 2.34E-10 | 7.0E-01 | 4.37E+09 | 1.73E+05 |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 4.89E-07 | 5.0E-01 | 1.02E+06 | 1.00E-01 | 6.46E-07 | 5.0E-01 | 7.74E+05 | 6.70E-06 | 1.8E+00 | 3.81E+05 | 2.34E-10 | 1.8E+00 | 1.09E+10 | 2.04E+05 |

## Attachment 1: Risk Based Noncancer Criteria for Routine Worker Exposure to Soil
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 4.89E-07 | | | 1.00E-01 | 6.46E-07 | | | 4.18E-07 | | | 2.34E-10 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 4.89E-07 | 4.0E-03 | 8.18E+03 | 1.00E-01 | 6.46E-07 | 4.0E-03 | 6.19E+03 | 3.60E-06 | 1.4E-02 | 5.68E+03 | 2.34E-10 | 1.4E-02 | 8.74E+07 | 2.17E+03 |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 2.93E-07 | | | 2.34E-10 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 1.07E-08 | | | 2.34E-10 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 4.89E-07 | 4.0E-03 | 8.18E+03 | 1.00E-01 | 6.46E-07 | 4.0E-03 | 6.19E+03 | 6.90E-07 | 1.4E-02 | 2.96E+04 | 2.34E-10 | 1.4E-02 | 8.74E+07 | 3.15E+03 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 4.89E-07 | 8.0E-01 | 1.64E+06 | 1.00E-01 | 6.46E-07 | 8.0E-01 | 1.24E+06 | 1.51E-06 | 2.8E+00 | 2.71E+06 | 2.34E-10 | 2.8E+00 | 1.75E+10 | 5.59E+05 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | 1.00E-01 | 6.46E-07 | 2.0E-02 | 3.10E+04 | 3.26E-06 | 7.0E-02 | 3.13E+04 | 2.34E-10 | 7.0E-02 | 4.37E+08 | 1.13E+04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 4.89E-07 | 1.0E-01 | 2.04E+05 | 1.00E-01 | 6.46E-07 | 1.0E-01 | 1.55E+05 | 1.39E-07 | | | 2.34E-10 | | | 8.81E+04 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 4.89E-07 | 1.0E-03 | 2.04E+03 | 1.00E-01 | 6.46E-07 | 1.0E-03 | 1.55E+03 | 3.34E-06 | 3.5E-03 | 1.53E+03 | 2.34E-10 | 3.5E-03 | 2.19E+07 | 5.59E+02 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 4.89E-07 | 4.0E-02 | 8.18E+04 | 1.00E-01 | 6.46E-07 | 4.0E-02 | 6.19E+04 | 1.33E-08 | | | 2.34E-10 | | | 3.52E+04 |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 4.89E-07 | 4.0E-02 | 8.18E+04 | 1.30E-01 | 8.40E-07 | 4.0E-02 | 4.76E+04 | 2.65E-07 | 1.4E-01 | 7.72E+05 | 2.34E-10 | 1.4E-01 | 8.74E+08 | 2.90E+04 |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 4.89E-07 | 4.0E-02 | 8.18E+04 | 1.30E-01 | 8.40E-07 | 4.0E-02 | 4.76E+04 | 1.56E-06 | 1.4E-01 | 1.31E+05 | 2.34E-10 | 1.4E-01 | 8.74E+08 | 2.45E+04 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 4.89E-07 | 8.0E-04 | 1.64E+03 | 1.00E-01 | 6.46E-07 | 8.0E-04 | 1.24E+03 | 4.32E-06 | | | 2.34E-10 | | | 7.05E+02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 4.89E-07 | 3.0E-04 | 6.13E+02 | 1.00E-01 | 6.46E-07 | 3.0E-04 | 4.65E+02 | 1.10E-05 | | | 2.34E-10 | | | 2.64E+02 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 4.89E-07 | | | 1.30E-01 | 8.40E-07 | | | 7.41E-09 | | | 2.34E-10 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 4.89E-07 | 4.0E-03 | 8.18E+03 | 1.00E-01 | 6.46E-07 | 4.0E-03 | 6.19E+03 | 1.08E-05 | 3.0E-03 | 4.05E+02 | 2.34E-10 | 3.0E-03 | 1.87E+07 | 3.63E+02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 4.89E-07 | 5.0E-02 | 1.02E+05 | 1.00E-01 | 6.46E-07 | 5.0E-02 | 7.74E+04 | 4.13E-06 | 1.8E-01 | 6.19E+04 | 2.34E-10 | 1.8E-01 | 1.09E+09 | 2.57E+04 |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | 1.30E-01 | 8.40E-07 | 2.0E-02 | 2.38E+04 | 1.42E-05 | 3.0E-03 | 3.08E+02 | 2.34E-10 | 3.0E-03 | 1.87E+07 | 3.01E+02 |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | 1.30E-01 | 8.40E-07 | 3.0E-02 | 3.57E+04 | 9.14E-07 | 1.1E-01 | 1.68E+05 | 2.34E-10 | 1.1E-01 | 6.56E+08 | 1.99E+04 |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 4.89E-07 | 3.0E-01 | 6.13E+05 | 1.00E-01 | 6.46E-07 | 3.0E-01 | 4.65E+05 | 5.20E-06 | | | 2.34E-10 | | | 2.64E+05 |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 4.89E-07 | 3.0E-02 | 6.13E+04 | 1.30E-01 | 8.40E-07 | 3.0E-02 | 3.57E+04 | 2.16E-07 | 1.1E-01 | 7.10E+05 | 2.34E-10 | 1.1E-01 | 6.56E+08 | 2.19E+04 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 4.89E-07 | 2.0E-05 | 4.09E+01 | 1.40E-01 | 9.04E-07 | 2.0E-05 | 2.21E+01 | 9.66E-07 | | | 2.34E-10 | | | 1.44E+01 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 4.89E-07 | 1.0E+00 | 2.04E+06 | | | 1.0E+00 | | | 5.0E-03 | | 2.34E-10 | 5.0E-03 | 3.12E+07 | 1.92E+06 |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 4.89E-07 | 4.0E-04 | 8.18E+02 | | | 6.0E-05 | | | 1.4E-03 | | 2.34E-10 | 1.4E-03 | 8.74E+06 | 8.18E+02 |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 4.89E-07 | 3.0E-04 | 6.13E+02 | 3.00E-02 | 1.94E-07 | 3.0E-04 | 1.55E+03 | | | | 2.34E-10 | | | 4.39E+02 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 4.89E-07 | 7.0E-02 | 1.43E+05 | | | 7.0E-02 | | | | | 2.34E-10 | | | 1.43E+05 |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 4.89E-07 | 2.0E-03 | 4.09E+03 | | | 1.4E-05 | | | 2.0E-05 | | 2.34E-10 | 2.0E-05 | 1.25E+05 | 3.96E+03 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 4.89E-07 | 1.0E-03 | 2.04E+03 | 1.00E-03 | 6.46E-09 | 2.5E-05 | 3.87E+03 | | 2.0E-04 | | 2.34E-10 | 2.0E-04 | 1.25E+06 | 1.34E+03 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 4.89E-07 | 3.0E-03 | 6.13E+03 | | | 7.5E-05 | | | | | 2.34E-10 | | | 6.13E+03 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | | 2.0E-05 | | 2.34E-10 | 2.0E-05 | 1.25E+05 | 3.08E+04 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 4.89E-07 | 4.0E-02 | 8.18E+04 | | | 4.0E-02 | | | 1.4E-01 | | 2.34E-10 | 1.4E-01 | 8.74E+08 | 8.18E+04 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | | 7.0E-02 | | 2.34E-10 | 7.0E-02 | 4.37E+08 | 4.09E+04 |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 2.0E-02 | | | 7.0E-02 | | 2.34E-10 | 7.0E-02 | 4.37E+08 | 4.09E+04 |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 4.89E-07 | 3.0E-01 | 6.13E+05 | | | 3.0E-01 | | | | | 2.34E-10 | | | 6.13E+05 |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 4.89E-07 | | | | | | | | | | 2.34E-10 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 4.89E-07 | 1.4E-01 | 2.86E+05 | | | 5.6E-03 | | | 5.0E-05 | | 2.34E-10 | 5.0E-05 | 3.12E+05 | 1.49E+05 |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 4.89E-07 | 3.0E-04 | 6.13E+02 | | | 2.1E-05 | | 4.32E-06 | 3.0E-04 | 1.01E+02 | 2.34E-10 | 3.0E-04 | 1.87E+06 | 8.69E+01 |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 4.89E-07 | 2.0E-02 | 4.09E+04 | | | 8.0E-04 | | | | | 2.34E-10 | | | 4.09E+04 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 4.89E-07 | 5.0E-03 | 1.02E+04 | | | 5.0E-03 | | | 1.8E-02 | | 2.34E-10 | 1.8E-02 | 1.09E+08 | 1.02E+04 |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 4.89E-07 | 5.0E-03 | 1.02E+04 | | | 2.0E-04 | | | 1.0E-05 | | 2.34E-10 | 1.0E-05 | 6.25E+04 | 8.78E+03 |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 4.89E-07 | 7.0E-05 | 1.43E+02 | | | 7.0E-05 | | | 2.5E-04 | | 2.34E-10 | 2.5E-04 | 1.53E+06 | 1.43E+02 |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 4.89E-07 | 7.0E-03 | 1.43E+04 | | | 1.8E-04 | | | 2.5E-02 | | 2.34E-10 | 2.5E-02 | 1.53E+08 | 1.43E+04 |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 4.89E-07 | 3.0E-01 | 6.13E+05 | | | 3.0E-01 | | | 1.1E+00 | | 2.34E-10 | 1.1E+00 | 6.56E+09 | 6.13E+05 |

# A T T A C H M E N T  2

## Exposure of Construction Workers to Soil in Excavations

**Attachment 2: Estimates of Risk and HQ for Construction Worker Exposure to Soil in 10-ft Excavations in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 92 | 18 | 1.30E+00 | | | 2.7E+06 | | 3.7E+04 | | 4.9E-07 | | 3.5E-05 |
| VOC | Benzene | 71-43-2 | A | 92 | 3 | 3.10E-02 | | 1.7E+03 | 5.8E+03 | 2.3E+02 | 1.5E+02 | 1.8E-10 | 5.3E-06 | 1.4E-09 | 2.1E-04 |
| VOC | Bromomethane | 74-83-9 | D | 91 | 1 | 5.00E-01 | | | 6.6E+02 | | 3.2E+02 | | 7.6E-04 | | 1.6E-03 |
| VOC | 2-Butanone | 78-93-3 | ID | 92 | 24 | 2.80E-01 | | | 3.9E+06 | | 6.3E+04 | | 7.3E-08 | | 4.4E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 92 | 9 | 8.20E-03 | | | 5.6E+04 | | 7.2E+02 | | 1.5E-07 | | 1.1E-05 |
| VOC | Chlorobenzene | 108-90-7 | D | 92 | 9 | 4.00E+00 | | | 2.7E+04 | | 3.6E+02 | | 1.5E-04 | | 1.1E-02 |
| VOC | Cumene | 98-82-8 | D | 92 | 7 | 9.00E-02 | | | 4.7E+04 | | 6.0E+02 | | 1.9E-06 | | 1.5E-04 |
| VOC | Cyclohexane | 110-82-7 | ID | 92 | 2 | 2.00E-03 | | | 5.8E+05 | | 7.4E+03 | | 3.4E-09 | | 2.7E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 92 | 8 | 2.60E+00 | | | 2.0E+05 | | 2.2E+04 | | 1.3E-05 | | 1.2E-04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 92 | 13 | 3.20E+01 | | | 2.1E+04 | | 7.2E+02 | | 1.5E-03 | | 4.4E-02 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 92 | 18 | 8.40E+01 | | 9.6E+03 | 3.9E+05 | 1.3E+03 | 1.6E+04 | 8.7E-08 | 2.2E-04 | 6.3E-07 | 5.4E-03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 92 | 1 | 5.80E-02 | | | 1.2E+04 | | 1.5E+03 | | 4.9E-06 | | 3.9E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 92 | 2 | 1.70E-02 | | 7.7E+02 | 1.5E+03 | 1.0E+02 | 1.9E+01 | 2.2E-10 | 1.1E-05 | 1.7E-09 | 9.0E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 92 | 3 | 9.00E-01 | | | 7.4E+03 | | 9.7E+01 | | 1.2E-04 | | 9.3E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 92 | 1 | 1.10E-01 | | | 1.2E+04 | | 1.5E+02 | | 9.4E-06 | | 7.2E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 92 | 7 | 6.20E-02 | | | 3.5E+05 | | 5.0E+03 | | 1.7E-07 | | 1.2E-05 |
| VOC | Methyl Acetate | 79-20-9 | | 92 | 18 | 1.40E+01 | | | 8.1E+06 | | 1.5E+05 | | 1.7E-06 | | 9.4E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 92 | 5 | 2.90E-02 | | | 2.5E+05 | | 3.2E+03 | | 1.1E-07 | | 9.0E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 92 | 14 | 1.85E-02 | | 2.5E+04 | 4.1E+05 | 3.4E+03 | 6.4E+03 | 7.4E-12 | 4.5E-08 | 5.4E-11 | 2.9E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 92 | 5 | 9.20E-01 | | 3.9E+03 | 5.9E+04 | 5.3E+02 | 9.5E+02 | 2.4E-09 | 1.6E-05 | 1.7E-08 | 9.6E-04 |
| VOC | Toluene | 108-88-3 | D | 92 | 11 | 7.30E-01 | | | 1.2E+05 | | 3.8E+03 | | 6.2E-06 | | 1.9E-04 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 92 | 7 | 7.80E-01 | | | 1.8E+05 | | 9.1E+03 | | 4.2E-06 | | 8.6E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 92 | 2 | 2.80E-01 | | 9.6E+03 | 1.5E+05 | 1.3E+03 | 6.1E+03 | 2.9E-10 | 1.8E-06 | 2.2E-09 | 4.6E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 92 | 1 | 3.20E-01 | | 3.8E+02 | 6.3E+03 | 6.1E+01 | 8.5E+01 | 8.3E-09 | 5.0E-05 | 5.2E-08 | 3.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 92 | 7 | 3.00E-01 | | | 4.5E+04 | | 5.7E+02 | | 6.7E-06 | | 5.3E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 92 | 7 | 5.20E-01 | | | 8.2E+05 | | 4.0E+04 | | 6.4E-07 | | 1.3E-05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 92 | 1 | 8.70E-02 | | | 4.0E+05 | | 1.9E+04 | | 2.2E-07 | | 4.5E-06 |
| SVOC | Anthracene | 120-12-7 | D | 92 | 9 | 2.10E-01 | | | 5.4E+06 | | 2.1E+06 | | 3.9E-08 | | 9.8E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 92 | 4 | 2.70E-01 | | | 6.1E+05 | | 1.0E+04 | | 4.4E-07 | | 2.7E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 92 | 17 | 7.90E-01 | | 1.7E+03 | | 6.7E+02 | | 4.7E-09 | | 1.2E-08 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 92 | 16 | 7.40E-01 | | 1.7E+02 | | 6.8E+01 | | 4.3E-08 | | 1.1E-07 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 92 | 22 | 1.00E+00 | | 1.7E+03 | | 6.5E+02 | | 6.0E-09 | | 1.5E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 92 | 13 | 7.20E-01 | | | 5.3E+05 | | 2.0E+05 | | 1.4E-06 | | 3.6E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 92 | 11 | 4.30E-01 | | 1.7E+04 | | 6.8E+03 | | 2.5E-10 | | 6.3E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 92 | 24 | 4.20E+01 | | 9.5E+04 | 3.8E+05 | 3.8E+04 | 1.5E+04 | 4.4E-09 | 1.1E-04 | 1.1E-08 | 2.7E-03 |
| SVOC | Caprolactam | 105-60-2 | | 92 | 1 | 2.20E-02 | | | 6.0E+06 | | 1.3E+05 | | 3.7E-09 | | 1.7E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 92 | 8 | 4.30E-01 | | 6.4E+04 | | 2.4E+04 | | 6.7E-11 | | 1.8E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 92 | 21 | 1.00E+00 | | 1.7E+05 | | 6.3E+04 | | 6.0E-11 | | 1.6E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 92 | 5 | 1.00E-01 | | 1.7E+02 | | 6.8E+01 | | 5.9E-09 | | 1.5E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 92 | 5 | 2.28E-01 | | | 7.2E+04 | | 2.6E+03 | | 3.2E-06 | | 8.9E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 92 | 1 | 1.80E-01 | | | 1.3E+07 | | 1.2E+06 | | 1.3E-08 | | 1.6E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 92 | 8 | 1.50E+02 | | | 2.9E+05 | | 1.5E+04 | | 5.1E-04 | | 1.0E-02 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 92 | 8 | 4.30E+00 | | | 1.9E+06 | | 7.7E+05 | | 2.2E-06 | | 5.6E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 92 | 14 | 6.30E+01 | | | 7.7E+05 | | 3.1E+05 | | 8.2E-05 | | 2.0E-04 |
| SVOC | Fluoranthene | 206-44-0 | D | 92 | 25 | 1.20E+00 | | | 6.9E+05 | | 1.7E+05 | | 1.7E-06 | | 7.3E-06 |
| SVOC | Fluorene | 86-73-7 | D | 92 | 7 | 3.30E-01 | | | 6.3E+05 | | 5.5E+04 | | 5.3E-07 | | 6.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 92 | 1 | 6.90E-02 | | 6.0E+02 | 1.5E+04 | 1.5E+02 | 6.1E+02 | 1.2E-09 | 4.5E-06 | 4.6E-09 | 1.1E-04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 92 | 11 | 5.10E-01 | | 1.7E+03 | | 6.8E+02 | | 3.0E-09 | | 7.5E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 92 | 16 | 4.50E+00 | | | 1.4E+04 | | 2.0E+02 | | 3.3E-04 | | 2.2E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 92 | 5 | 2.95E-01 | | | 7.0E+05 | | 1.8E+04 | | 4.2E-07 | | 1.7E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 92 | 9 | 9.50E-01 | | | 1.2E+04 | | 1.6E+02 | | 7.7E-05 | | 5.9E-03 |

**Attachment 2: Estimates of Risk and HQ for Construction Worker Exposure to Soil in 10-ft Excavations in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Phenanthrene | 85-01-8 | D | 92 | 22 | 1.04E+00 | | | 4.9E+05 | | 6.2E+04 | | 2.1E-06 | | 1.7E-05 |
| SVOC | Phenol | 108-95-2 | ID | 92 | 17 | 7.50E+00 | | | 5.8E+06 | | 2.3E+05 | | 1.3E-06 | | 3.3E-05 |
| SVOC | Pyrene | 129-00-0 | D | 92 | 26 | 1.20E+00 | | | 5.2E+05 | | 1.3E+05 | | 2.3E-06 | | 9.0E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 241 | 214 | **4.67E+02** | | 5.6E+02 | 3.5E+02 | 2.0E+02 | 3.5E+01 | 8.3E-06 | 1.3E+00 | 2.4E-05 | 1.3E+01 |
| INORG | Aluminum | 7429-90-5 | D | 92 | 92 | **1.32E+04** | 1.48E+04 | | 2.2E+06 | | 2.3E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 84 | 18 | 1.12E+01 | 4.40E-01 | | 1.0E+04 | | 4.0E+02 | | 1.1E-03 | | 2.7E-02 |
| INORG | Arsenic | 7440-38-2 | A | 92 | 92 | 4.42E+01 | 1.13E+01 | 9.5E+02 | 7.0E+03 | 4.2E+02 | 4.6E+03 | 3.5E-07 | 4.7E-03 | 7.9E-07 | 7.1E-03 |
| INORG | Barium | 7440-39-3 | D | 92 | 92 | 5.52E+02 | 8.38E+01 | | 1.8E+06 | | 7.2E+04 | | 2.6E-04 | | 6.5E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 92 | 68 | 7.80E+00 | 5.70E-01 | 1.4E+04 | 8.2E+03 | 1.7E+04 | 7.4E+02 | 5.1E-09 | 8.8E-04 | 4.2E-09 | 9.7E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 92 | 68 | 5.10E+00 | 5.52E-01 | 1.9E+04 | 1.8E+04 | 2.3E+04 | 8.9E+02 | 2.4E-09 | 2.5E-04 | 2.0E-09 | 5.1E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 92 | 92 | **8.80E+01** | 2.82E+01 | 2.8E+03 | 7.7E+04 | 3.4E+03 | 2.0E+04 | 2.1E-07 | 7.8E-04 | 1.8E-07 | 2.9E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 92 | 92 | **5.83E+01** | 1.00E+01 | 1.2E+04 | 9.6E+03 | 1.5E+04 | 1.1E+03 | 4.0E-08 | 5.1E-03 | 3.3E-08 | 4.4E-02 |
| INORG | Copper | 7440-50-8 | D | 92 | 92 | **1.96E+02** | 1.89E+01 | | 1.0E+06 | | 4.1E+04 | | 1.8E-04 | | 4.4E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 91 | 1 | 1.48E-01 | | | 5.0E+05 | | 2.0E+04 | | 2.9E-07 | | 7.3E-06 |
| INORG | Cyanide (total) | 57-12-5 | D | 92 | 7 | 3.90E-01 | | | 5.0E+05 | | 2.0E+04 | | 7.7E-07 | | 1.9E-05 |
| INORG | Iron | 7439-89-6 | D | 92 | 92 | **3.81E+04** | 2.44E+04 | | 7.7E+06 | | 3.1E+05 | | 1.8E-03 | | 4.5E-02 |
| INORG | Manganese | 7439-96-5 | D | 92 | 92 | **6.69E+02** | 6.76E+02 | | 2.4E+04 | | 2.9E+03 | | | | |
| INORG | Mercury | 7439-97-6 | D | 92 | 82 | **6.14E+00** | 7.05E-02 | | 2.7E+03 | | 4.6E+01 | | 2.3E-03 | | 1.3E-01 |
| INORG | Nickel | 7440-02-0 | A | 92 | 92 | **1.63E+02** | 1.83E+01 | 1.4E+05 | 5.1E+05 | 1.7E+05 | 2.0E+04 | 1.0E-08 | 2.8E-04 | 8.5E-09 | 7.1E-03 |
| INORG | Selenium | 7782-49-2 | D | 92 | 34 | 3.70E+00 | 3.96E-01 | | 1.3E+05 | | 5.1E+03 | | 2.6E-05 | | 6.5E-04 |
| INORG | Silver | 7440-22-4 | D | 92 | 16 | 2.90E+00 | | | 4.7E+03 | | 5.2E+02 | | 6.2E-04 | | 5.5E-03 |
| INORG | Thallium | 7440-28-0 | | 92 | 31 | **8.33E-01** | 8.40E-01 | | 1.8E+03 | | 7.1E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 92 | 92 | 7.75E+01 | 4.18E+01 | | 1.8E+05 | | 7.1E+03 | | 2.0E-04 | | 5.0E-03 |
| INORG | Zinc | 7440-66-6 | D | 92 | 92 | 1.09E+03 | 5.48E+01 | | 7.6E+06 | | 3.1E+05 | | 1.4E-04 | | 3.4E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **9.1E-06** | **1.4E+00** | **2.6E-05** | **1.4E+01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

## Attachment 2: High-End Exposure Factors for Construction Worker Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Construction Worker (Small-Scale) | | Construction Worker (Large-Scale) | |
|---|---|---|---|---|---|---|
| **Soil Ingestion** | | | | | | |
| Ingestion Rate | mg-soil/day | **IR** | 200 | e | 200 | e |
| Conversion Factor | kg/mg | **CF** | 1E-06 | | 1E-06 | |
| Fraction Contacted | unitless | **FC** | 1.0 | | 1.0 | |
| Exposure Frequency | days/year | **EF** | 5 | e | 125 | |
| Exposure Duration | years | **ED** | 10 | e | 1 | |
| Body Weight | kg | **BW** | 70 | a | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 3,650 | a | 365 | a |
| **Soil Dermal Contact** | | | | | | |
| Adherence Factor | mg-soil/$cm^2$ | **AF** | 0.2 | d | 0.2 | d |
| Skin Surface Area | $cm^2$/day | **SA** | 3,300 | d | 3,300 | d |
| Conversion Factor | kg/mg | **CF** | 1E-06 | | 1E-06 | |
| Fraction Contacted | unitless | **FC** | 1.0 | | 1.0 | |
| Exposure Frequency | days/year | **EF** | 5 | e | 125 | |
| Exposure Duration | years | **ED** | 10 | e | 1 | |
| Body Weight | kg | **BW** | 70 | a | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 3,650 | a | 365 | a |
| **Ambient Air Inhalation** | | | | | | |
| Fraction Contacted | unitless | **FC** | 1 | | 1 | |
| Exposure Time | hour/hour | **ET** | 8/8 | | 8/8 | |
| Exposure Frequency | days/year | **EF** | 5 | e | 125 | |
| Exposure Duration | years | **ED** | 10 | e | 1 | |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 3,650 | a | 365 | a |

**Attachment 2: Normalized Vapor Flux from Exposed Soil to Ambient Air and Soil Saturation Concentration**
**(Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | H (unitless) | $D_{air}$ ($cm^2/s$) | $D_G$ ($cm^2/s$) | $D_{water}$ ($cm^2/s$) | $D_L$ ($cm^2/s$) | $D_E$ ($cm^2/s$) | $J_G$ ($mg/m^2$-s per mg/kg) | MW (g/mole) | VP (mm Hg) | v* (mg/L) | s (mg/L) | $C_{sat}$ (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 5.75E-01 | 3.45E-03 | 7.95E-04 | 1.24E-01 | 1.01E-02 | 1.14E-05 | 1.11E-07 | 5.24E-05 | 6.94E-06 | 5.81E+01 | 2.30E+02 | 7.38E+02 | 1.00E+06 | 1.03E+05 |
| VOC | Benzene | 71-43-2 | 5.89E+01 | 3.53E-01 | 1.14E-01 | 8.80E-02 | 7.17E-03 | 9.80E-06 | 9.50E-08 | 1.14E-03 | 3.24E-05 | 7.81E+01 | 9.50E+01 | 4.10E+02 | 1.75E+03 | 8.30E+02 |
| VOC | Bromodichloromethane | 75-27-4 | 5.50E+01 | 3.30E-01 | 3.28E-02 | 2.98E-02 | 2.43E-03 | 1.06E-05 | 1.03E-07 | 1.21E-04 | 1.06E-05 | 1.64E+02 | 5.00E+01 | 4.53E+02 | 6.74E+03 | 2.94E+03 |
| VOC | Bromomethane | 74-83-9 | 1.05E+01 | 6.30E-02 | 1.28E-01 | 7.28E-02 | 5.93E-03 | 1.21E-05 | 1.17E-07 | 2.70E-03 | 4.98E-05 | 9.49E+01 | 1.62E+03 | 8.48E+03 | 1.52E+04 | 2.83E+03 |
| VOC | 2-Butanone | 78-93-3 | 5.20E+00 | 3.12E-02 | 1.14E-03 | 9.49E-02 | 7.72E-03 | 9.80E-06 | 9.50E-08 | 4.52E-05 | 6.45E-06 | 7.21E+01 | 9.53E+01 | 3.80E+02 | 2.40E+05 | 3.14E+04 |
| VOC | Carbon Disulfide | 75-15-0 | 4.57E+01 | 2.74E-01 | 6.20E-01 | 1.04E-01 | 8.47E-03 | 1.00E-05 | 9.70E-08 | 7.09E-03 | 8.08E-05 | 7.61E+01 | 3.59E+02 | 1.51E+03 | 1.19E+03 | 5.83E+02 |
| VOC | Chlorobenzene | 108-90-7 | 2.19E+02 | 1.31E+00 | 7.60E-02 | 7.30E-02 | 5.94E-03 | 8.70E-06 | 8.44E-08 | 2.10E-04 | 1.39E-05 | 1.13E+02 | 1.20E+01 | 7.44E+01 | 4.72E+02 | 6.74E+02 |
| VOC | Chloroethane | 75-00-3 | 1.49E+01 | 8.94E-02 | 1.80E-01 | 1.10E-01 | 8.96E-03 | 1.53E-05 | 1.48E-07 | 4.80E-03 | 6.65E-05 | 6.45E+01 | 1.01E+03 | 3.59E+03 | 5.68E+03 | 1.26E+03 |
| VOC | Chloroform | 67-66-3 | 3.98E+01 | 2.39E-01 | 7.50E-02 | 1.04E-01 | 8.47E-03 | 1.00E-05 | 9.70E-08 | 1.19E-03 | 3.32E-05 | 1.19E+02 | 1.97E+02 | 1.30E+03 | 7.92E+03 | 2.79E+03 |
| VOC | Chloromethane | 74-87-3 | 7.80E+00 | 4.68E-02 | 1.80E-01 | 1.26E-01 | 1.03E-02 | 6.50E-06 | 6.30E-08 | 6.80E-03 | 7.92E-05 | 5.05E+01 | 4.30E+03 | 1.20E+04 | 5.33E+03 | 9.58E+02 |
| VOC | Cumene | 98-82-8 | 3.30E+03 | 1.98E+01 | 2.37E+01 | 6.50E-02 | 5.29E-03 | 7.83E-06 | 7.59E-08 | 3.41E-03 | 5.60E-05 | 1.20E+02 | 4.50E+00 | 2.99E+01 | 6.13E+01 | 1.23E+03 |
| VOC | Cyclohexane | 110-82-7 | 6.35E+02 | 3.81E+00 | 3.98E+00 | 1.10E-01 | 8.96E-03 | 9.14E-06 | 8.86E-08 | 5.07E-03 | 6.84E-05 | 8.42E+01 | 9.69E+01 | 4.50E+02 | 5.50E+01 | 2.56E+02 |
| VOC | Dibromochloromethane | 124-48-1 | 6.31E+01 | 3.79E-01 | 1.61E-02 | 1.96E-02 | 1.60E-03 | 1.05E-05 | 1.02E-07 | 3.54E-05 | 5.71E-06 | 2.08E+02 | 4.90E+00 | 5.64E+01 | 2.60E+03 | 1.25E+03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 6.17E+02 | 3.70E+00 | 3.90E-02 | 6.90E-02 | 5.62E-03 | 7.90E-06 | 7.66E-08 | 3.81E-05 | 5.92E-06 | 1.47E+02 | 1.36E+00 | 1.10E+01 | 1.56E+02 | 5.94E+02 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.70E+03 | 1.02E+01 | 6.33E-02 | 4.14E-02 | 3.37E-03 | 8.85E-06 | 8.58E-08 | 1.37E-05 | 3.55E-06 | 1.47E+02 | 2.15E+00 | 1.75E+01 | 1.33E+02 | 1.37E+03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 6.17E+02 | 3.70E+00 | 4.98E-02 | 6.90E-02 | 5.62E-03 | 7.90E-06 | 7.66E-08 | 4.86E-05 | 6.69E-06 | 1.47E+02 | 1.00E+00 | 8.12E+00 | 7.38E+01 | 2.81E+02 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.30E+02 | 7.80E-01 | 7.01E+00 | 8.00E-02 | 6.51E-03 | 8.00E-06 | 7.76E-08 | 1.38E-02 | 1.13E-04 | 1.21E+02 | 4.85E+03 | 3.24E+04 | 2.80E+02 | 6.15E+02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 3.16E+01 | 1.90E-01 | 1.15E-01 | 7.42E-02 | 6.04E-03 | 1.05E-05 | 1.02E-07 | 1.48E-03 | 3.69E-05 | 9.90E+01 | 2.27E+02 | 1.24E+03 | 5.06E+03 | 1.57E+03 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 1.74E+01 | 1.04E-01 | 2.01E-02 | 1.04E-01 | 8.47E-03 | 9.90E-06 | 9.60E-08 | 5.42E-04 | 2.23E-05 | 9.90E+01 | 7.89E+01 | 4.31E+02 | 8.52E+03 | 1.77E+03 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 3.55E+01 | 2.13E-01 | 8.35E-02 | 7.36E-02 | 5.99E-03 | 1.13E-05 | 1.10E-07 | 1.01E-03 | 3.05E-05 | 9.69E+01 | 2.03E+02 | 1.09E+03 | 3.50E+03 | 1.15E+03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 5.25E+01 | 3.15E-01 | 1.93E-01 | 7.07E-02 | 5.76E-03 | 1.19E-05 | 1.15E-07 | 1.63E-03 | 3.87E-05 | 9.69E+01 | 3.33E+02 | 1.78E+03 | 6.30E+03 | 2.84E+03 |
| VOC | Ethyl Benzene | 100-41-4 | 3.63E+02 | 2.18E+00 | 1.62E-01 | 7.50E-02 | 6.11E-03 | 7.80E-06 | 7.56E-08 | 2.83E-04 | 1.61E-05 | 1.06E+02 | 9.60E+00 | 5.63E+01 | 1.69E+02 | 3.90E+02 |
| VOC | 2-Hexanone | 591-78-6 | 1.48E+01 | 8.90E-02 | 3.58E-02 | 1.35E-01 | 1.10E-02 | 1.03E-05 | 9.99E-08 | 1.33E-03 | 3.50E-05 | 1.00E+02 | 1.16E+01 | 6.43E+01 | 1.75E+04 | 3.31E+03 |
| VOC | Methyl Acetate | 79-20-9 | 1.66E+00 | 9.98E-03 | 5.75E-05 | 1.23E-01 | 9.99E-03 | 1.10E-05 | 1.07E-07 | 4.13E-06 | 1.95E-06 | 7.41E+01 | 2.16E+02 | 8.85E+02 | 2.44E+05 | 2.66E+04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.15E+01 | 6.89E-02 | 1.20E-02 | 8.59E-02 | 7.00E-03 | 1.01E-05 | 9.80E-08 | 3.26E-04 | 1.73E-05 | 8.82E+01 | 2.50E+02 | 1.22E+03 | 5.10E+04 | 8.70E+03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.90E+01 | 1.14E-01 | 2.82E-03 | 7.50E-02 | 6.11E-03 | 7.80E-06 | 7.56E-08 | 5.36E-05 | 7.02E-06 | 1.00E+02 | 1.99E+01 | 1.10E+02 | 1.90E+04 | 4.06E+03 |
| VOC | Methylcyclohexane | 108-87-2 | 8.65E+02 | 5.19E+00 | 8.79E+00 | 9.86E-02 | 8.03E-03 | 8.52E-06 | 8.26E-08 | 6.73E-03 | 7.87E-05 | 9.82E+01 | 4.60E+01 | 2.50E+02 | 1.40E+01 | 9.72E+01 |
| VOC | Methylene Chloride | 75-09-2 | 1.17E+01 | 7.02E-02 | 4.49E-02 | 1.01E-01 | 8.22E-03 | 1.17E-05 | 1.13E-07 | 1.37E-03 | 3.56E-05 | 8.49E+01 | 4.33E+02 | 2.03E+03 | 1.30E+04 | 2.31E+03 |
| VOC | Tetrachloroethene | 127-18-4 | 1.55E+02 | 9.30E-01 | 3.77E-01 | 7.20E-02 | 5.86E-03 | 8.20E-06 | 7.95E-08 | 1.33E-03 | 3.50E-05 | 1.66E+02 | 1.86E+01 | 1.70E+02 | 2.00E+02 | 2.20E+02 |
| VOC | Toluene | 108-88-3 | 1.82E+02 | 1.09E+00 | 1.36E-01 | 8.70E-02 | 7.08E-03 | 8.60E-06 | 8.34E-08 | 5.24E-04 | 2.20E-05 | 9.21E+01 | 2.84E+01 | 1.45E+02 | 5.26E+02 | 6.40E+02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.78E+03 | 1.07E+01 | 2.91E-02 | 3.00E-02 | 2.44E-03 | 8.23E-06 | 7.98E-08 | 4.37E-06 | 2.01E-06 | 1.81E+02 | 4.31E-01 | 4.32E+00 | 3.00E+02 | 3.23E+03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.10E+02 | 6.60E-01 | 3.53E-01 | 7.80E-02 | 6.35E-03 | 8.80E-06 | 8.53E-08 | 1.80E-03 | 4.07E-05 | 1.33E+02 | 1.24E+02 | 9.12E+02 | 1.33E+03 | 1.10E+03 |
| VOC | Trichloroethene | 79-01-6 | 1.66E+02 | 9.96E-01 | 2.11E-01 | 7.90E-02 | 6.43E-03 | 9.10E-06 | 8.83E-08 | 7.92E-04 | 2.70E-05 | 1.31E+02 | 7.35E+01 | 5.33E+02 | 1.10E+03 | 1.25E+03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.30E+03 | 7.80E+00 | 9.83E+00 | 7.80E-02 | 6.35E-03 | 8.20E-06 | 7.95E-08 | 4.24E-03 | 6.25E-05 | 1.87E+02 | 3.32E+02 | 3.43E+03 | 1.70E+02 | 1.66E+03 |
| VOC | Vinyl Chloride | 75-01-4 | 1.86E+01 | 1.12E-01 | 5.55E-01 | 1.06E-01 | 8.63E-03 | 1.23E-05 | 1.19E-07 | 1.01E-02 | 9.63E-05 | 6.25E+01 | 2.98E+03 | 1.03E+04 | 2.76E+03 | 8.70E+02 |
| VOC | Xylenes (total) | 1330-20-7 | 3.86E+02 | 2.32E+00 | 1.38E-01 | 7.80E-02 | 6.35E-03 | 8.75E-06 | 8.48E-08 | 2.37E-04 | 1.48E-05 | 1.06E+02 | 7.99E+00 | 4.69E+01 | 1.75E+02 | 4.27E+02 |
| SVOC | Acenaphthene | 83-32-9 | 7.08E+03 | 4.25E+01 | 3.18E-03 | 4.21E-02 | 3.43E-03 | 7.69E-06 | 7.46E-08 | 1.71E-07 | 3.96E-07 | 1.54E+02 | 2.50E-03 | 2.13E-02 | 4.24E+00 | 1.81E+02 |
| SVOC | Acenaphthylene | 208-96-8 | 4.90E+03 | 2.94E+01 | 2.31E-03 | 4.42E-02 | 3.60E-03 | 7.44E-06 | 7.22E-08 | 1.88E-07 | 4.16E-07 | 1.52E+02 | 9.12E-04 | 7.67E-03 | 1.61E+01 | 4.75E+02 |
| SVOC | Acetophenone | 98-86-2 | 4.10E+01 | 2.46E-01 | 2.19E-04 | 8.00E-02 | 6.51E-03 | 8.00E-06 | 7.76E-08 | 2.88E-06 | 1.63E-06 | 1.20E+02 | 3.97E-01 | 2.64E+00 | 6.13E+03 | 2.12E+03 |
| SVOC | Anthracene | 120-12-7 | 2.95E+04 | 1.77E+02 | 1.34E-03 | 3.24E-02 | 2.64E-03 | 7.74E-06 | 7.51E-08 | 1.34E-08 | 1.11E-07 | 1.78E+02 | 2.67E-06 | 2.63E-05 | 4.34E-02 | 7.69E+00 |
| SVOC | Benzaldehyde | 100-52-7 | 2.85E+01 | 1.71E-01 | 4.86E-04 | 7.21E-02 | 5.87E-03 | 9.07E-06 | 8.80E-08 | 7.20E-06 | 2.58E-06 | 1.06E+02 | 9.00E-01 | 5.28E+00 | 3.00E+03 | 8.12E+02 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 3.98E+05 | 2.39E+03 | 6.85E-05 | 5.10E-02 | 4.15E-03 | 9.00E-06 | 8.73E-08 | 1.03E-10 | 9.74E-09 | 2.28E+02 | 1.05E-07 | 1.32E-06 | 9.40E-03 | 2.24E+01 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 1.02E+06 | 6.12E+03 | 2.32E-05 | 4.30E-02 | 3.50E-03 | 9.00E-06 | 8.73E-08 | 1.82E-11 | 4.10E-09 | 2.52E+02 | 5.49E-09 | 7.65E-08 | 1.62E-03 | 9.91E+00 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 1.23E+06 | 7.38E+03 | 2.28E-03 | 2.26E-02 | 1.84E-03 | 5.56E-06 | 5.39E-08 | 3.80E-10 | 1.87E-08 | 2.52E+02 | 5.00E-07 | 6.97E-06 | 1.50E-03 | 1.11E+01 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 1.60E+06 | 9.60E+03 | 2.88E-06 | 2.03E-02 | 1.65E-03 | 5.20E-06 | 5.04E-08 | 3.81E-12 | 1.87E-09 | 2.76E+02 | 1.01E-10 | 1.54E-09 | 2.60E-04 | 2.50E+00 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.23E+06 | 7.38E+03 | 1.70E-05 | 2.26E-02 | 1.84E-03 | 5.56E-06 | 5.39E-08 | 7.64E-12 | 2.65E-09 | 2.52E+02 | 2.00E-09 | 2.79E-08 | 8.00E-04 | 5.90E+00 |
| SVOC | Biphenyl | 92-52-4 | 1.05E+04 | 6.29E+01 | 6.13E-03 | 4.04E-02 | 3.29E-03 | 8.15E-06 | 7.90E-08 | 2.13E-07 | 4.43E-07 | 1.54E+02 | 9.64E-03 | 8.21E-02 | 6.03E+00 | 3.80E+02 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 1.51E+07 | 9.06E+04 | 2.09E-06 | 3.51E-02 | 2.86E-03 | 3.66E-06 | 3.55E-08 | 3.03E-13 | 5.28E-10 | 3.91E+02 | 6.45E-06 | 1.39E-04 | 3.40E-01 | 3.08E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 5.75E+04 | 3.45E+02 | 2.59E-05 | 1.74E-02 | 1.42E-03 | 4.83E-06 | 4.68E-08 | 1.60E-10 | 1.21E-08 | 3.12E+02 | 8.25E-06 | 1.42E-04 | 2.69E+00 | 9.28E+02 |
| SVOC | Caprolactam | 105-60-2 | 6.51E-01 | 3.91E-03 | 5.17E-07 | 6.54E-02 | 5.33E-03 | 8.99E-06 | 8.72E-08 | 5.77E-07 | 7.29E-07 | 1.13E+02 | 1.60E-03 | 1.00E-02 | 7.72E+05 | 7.97E+04 |
| SVOC | Carbazole | 86-74-8 | 3.39E+03 | 2.03E+01 | 3.13E-07 | 3.90E-02 | 3.18E-03 | 7.03E-06 | 6.82E-08 | 2.24E-09 | 4.54E-08 | 1.67E+02 | 5.19E-07 | 4.79E-06 | 7.48E+00 | 1.53E+02 |
| SVOC | 4-Chloroaniline | 106-47-8 | 6.61E+01 | 3.97E-01 | 6.80E-06 | 4.83E-02 | 3.93E-03 | 1.01E-05 | 9.80E-08 | 1.66E-07 | 3.92E-07 | 1.28E+02 | 1.23E-02 | 8.67E-02 | 5.30E+03 | 2.63E+03 |
| SVOC | Chrysene | 218-01-9 | 3.98E+05 | 2.39E+03 | 1.94E-03 | 2.48E-02 | 2.02E-03 | 6.21E-06 | 6.02E-08 | 1.10E-09 | 3.19E-08 | 2.28E+02 | 6.23E-09 | 7.86E-08 | 1.60E-03 | 3.82E+00 |

**Attachment 2: Normalized Vapor Flux from Exposed Soil to Ambient Air and Soil Saturation Concentration**
**(Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | H (unitless) | $D_{air}$ ($cm^2/s$) | $D_G$ ($cm^2/s$) | $D_{water}$ ($cm^2/s$) | $D_L$ ($cm^2/s$) | $D_E$ ($cm^2/s$) | $J_G$ ($mg/m^2$-s per mg/kg) | MW (g/mole) | VP (mm Hg) | v* (mg/L) | s (mg/L) | $C_{sat}$ (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 3.80E+06 | 2.28E+04 | 3.02E-07 | 2.02E-02 | 1.64E-03 | 5.18E-06 | 5.02E-08 | 1.47E-12 | 1.16E-09 | 2.78E+02 | 1.00E-10 | 1.54E-09 | 2.49E-03 | 5.68E+01 |
| SVOC | Dibenzofuran | 132-64-9 | 1.12E+04 | 6.74E+01 | 2.57E-04 | 2.70E-02 | 2.20E-03 | 5.93E-06 | 5.75E-08 | 6.12E-09 | 7.51E-08 | 1.68E+02 | 1.80E-04 | 1.67E-03 | 1.00E+01 | 6.75E+02 |
| SVOC | Diethylphthalate | 84-66-2 | 2.88E+02 | 1.73E+00 | 9.25E-06 | 2.56E-02 | 2.08E-03 | 6.35E-06 | 6.16E-08 | 2.93E-08 | 1.64E-07 | 2.22E+02 | 1.65E-03 | 2.03E-02 | 1.08E+03 | 1.97E+03 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 2.09E+02 | 1.25E+00 | 4.10E-05 | 5.84E-02 | 4.76E-03 | 8.69E-06 | 8.43E-08 | 1.37E-07 | 3.55E-07 | 1.22E+02 | 9.80E-02 | 6.62E-01 | 7.87E+03 | 1.07E+04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 3.39E+04 | 2.03E+02 | 1.93E-08 | 4.38E-02 | 3.57E-03 | 7.86E-06 | 7.62E-08 | 2.48E-10 | 1.51E-08 | 2.78E+02 | 7.30E-05 | 1.12E-03 | 1.12E+01 | 2.28E+03 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 6.92E+01 | 4.15E-01 | 1.53E-05 | 3.27E-02 | 2.66E-03 | 7.26E-06 | 7.04E-08 | 1.43E-07 | 3.63E-07 | 1.82E+02 | 5.67E-04 | 5.71E-03 | 1.82E+02 | 9.36E+01 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 8.32E+07 | 4.99E+05 | 1.37E-03 | 1.51E-02 | 1.23E-03 | 3.58E-06 | 3.47E-08 | 2.28E-12 | 1.45E-09 | 3.91E+02 | 2.60E-06 | 5.61E-05 | 2.00E-02 | 9.98E+03 |
| SVOC | Fluoranthene | 206-44-0 | 1.07E+05 | 6.42E+02 | 3.30E-04 | 3.02E-02 | 2.46E-03 | 6.35E-06 | 6.16E-08 | 9.00E-10 | 2.88E-08 | 2.02E+02 | 7.80E-06 | 8.72E-05 | 2.06E-01 | 1.32E+02 |
| SVOC | Fluorene | 86-73-7 | 1.38E+04 | 8.28E+01 | 1.31E-03 | 3.63E-02 | 2.96E-03 | 7.88E-06 | 7.64E-08 | 3.14E-08 | 1.70E-07 | 1.66E+02 | 6.33E-04 | 5.81E-03 | 1.98E+00 | 1.64E+02 |
| SVOC | Hexachlorobenzene | 118-74-1 | 5.50E+04 | 3.30E+02 | 2.71E-02 | 5.42E-02 | 4.41E-03 | 5.91E-06 | 5.73E-08 | 2.40E-07 | 4.70E-07 | 2.85E+02 | 1.80E-05 | 2.83E-04 | 6.20E+00 | 2.05E+03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 5.37E+04 | 3.22E+02 | 1.67E-01 | 5.61E-02 | 4.57E-03 | 6.16E-06 | 5.97E-08 | 1.57E-06 | 1.20E-06 | 2.61E+02 | 2.21E-01 | 3.19E+00 | 3.23E+00 | 1.04E+03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 3.47E+06 | 2.08E+04 | 3.28E-05 | 1.90E-02 | 1.55E-03 | 5.66E-06 | 5.49E-08 | 3.36E-12 | 1.76E-09 | 2.76E+02 | 1.00E-10 | 1.53E-09 | 2.20E-05 | 4.58E-01 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 6.23E+03 | 3.74E+01 | 1.06E-02 | 9.86E-02 | 8.03E-03 | 7.75E-06 | 7.52E-08 | 1.50E-06 | 1.18E-06 | 1.42E+02 | 5.50E-02 | 4.32E-01 | 2.46E+01 | 9.22E+02 |
| SVOC | Methylphenol (total) | 1319-77-3 | 8.60E+01 | 5.16E-01 | 1.77E-05 | 7.40E-02 | 6.03E-03 | 1.00E-05 | 9.70E-08 | 2.19E-07 | 4.49E-07 | 1.08E+02 | | | 2.30E+04 | 1.42E+04 |
| SVOC | Naphthalene | 91-20-3 | 2.00E+03 | 1.20E+01 | 9.90E-03 | 5.90E-02 | 4.80E-03 | 7.50E-06 | 7.27E-08 | 2.61E-06 | 1.55E-06 | 1.28E+02 | 8.50E-02 | 6.02E-01 | 3.10E+01 | 3.75E+02 |
| SVOC | Phenanthrene | 85-01-8 | 1.40E+04 | 8.40E+01 | 4.76E-04 | 3.33E-02 | 2.71E-03 | 7.47E-06 | 7.24E-08 | 1.07E-08 | 9.94E-08 | 1.78E+02 | 1.12E-04 | 1.10E-03 | 1.15E+00 | 9.67E+01 |
| SVOC | Phenol | 108-95-2 | 2.88E+01 | 1.73E-01 | 8.15E-06 | 8.20E-02 | 6.68E-03 | 9.10E-06 | 8.83E-08 | 3.47E-07 | 5.65E-07 | 9.41E+01 | 2.76E-01 | 1.44E+00 | 8.28E+04 | 2.25E+04 |
| SVOC | Pyrene | 129-00-0 | 1.05E+05 | 6.30E+02 | 2.26E-04 | 2.72E-02 | 2.21E-03 | 7.24E-06 | 7.02E-08 | 5.99E-10 | 2.35E-08 | 2.02E+02 | 4.59E-06 | 5.13E-05 | 1.35E-01 | 8.51E+01 |
| P/PCB | PCBs (total) | 1336-36-3 | 2.45E+06 | 1.47E+04 | 4.09E-02 | 8.00E-02 | 6.51E-03 | 1.00E-05 | 9.70E-08 | 1.20E-08 | 1.05E-07 | 3.28E+02 | 7.71E-05 | 1.40E-03 | 1.20E-02 | 1.76E+02 |
| INORG | Aluminum | 7429-90-5 | | 1.50E+03 | | | | | | | | 2.70E+01 | | | | |
| INORG | Antimony | 7440-36-0 | | 4.50E+01 | | | | | | | | 1.22E+02 | | | | |
| INORG | Arsenic | 7440-38-2 | | 2.90E+01 | | | | | | | | 7.49E+01 | | | | |
| INORG | Barium | 7440-39-3 | | 4.10E+01 | | | | | | | | 1.37E+02 | | | | |
| INORG | Beryllium | 7440-41-7 | | 7.90E+02 | | | | | | | | 9.01E+00 | | | | |
| INORG | Cadmium | 7440-43-9 | | 7.50E+01 | | | | | | | | 1.12E+02 | | | | |
| INORG | Chromium (total) | 7440-47-3 | | 1.90E+01 | | | | | | | | 5.20E+01 | | | | |
| INORG | Cobalt | 7440-48-4 | | 4.50E+01 | | | | | | | | 5.89E+01 | | | | |
| INORG | Copper | 7440-50-8 | | 3.50E+01 | | | | | | | | 6.35E+01 | | | | |
| INORG | Cyanide (amenable) | 57-12-5A | | 9.90E+00 | | | | | | | | 2.60E+01 | | | | |
| INORG | Cyanide (total) | 57-12-5 | | 9.90E+00 | | | | | | | | 2.60E+01 | | | | |
| INORG | Iron | 7439-89-6 | | 2.50E+01 | | | | | | | | 5.58E+01 | | | | |
| INORG | Lead | 7439-92-1 | | 9.00E+02 | | | | | | | | 2.07E+02 | | | | |
| INORG | Manganese | 7439-96-5 | | 6.50E+01 | | | | | | | | 5.49E+01 | | | | |
| INORG | Mercury | 7439-97-6 | | 1.00E+03 | 1.45E-01 | 3.07E-02 | 2.50E-03 | 6.30E-06 | 6.11E-08 | 2.40E-07 | 4.70E-07 | 2.01E+02 | 1.96E-03 | 2.17E-02 | 5.60E-02 | 5.60E+01 |
| INORG | Nickel | 7440-02-0 | | 6.50E+01 | | | | | | | | 5.87E+01 | | | | |
| INORG | Selenium | 7782-49-2 | | 5.00E+00 | | | | | | | | 7.90E+01 | | | | |
| INORG | Silver | 7440-22-4 | | 8.30E+00 | | | | | | | | 1.08E+02 | | | | |
| INORG | Thallium | 7440-28-0 | | 7.10E+01 | | | | | | | | 2.04E+02 | | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+03 | | | | | | | | 5.09E+01 | | | | |
| INORG | Zinc | 7440-66-6 | | 6.20E+01 | | | | | | | | 6.54E+01 | | | | |
| | | | | | | | | | | | | | | | | |
| **Notes:** | Soil bulk density | kg/L | $\rho_b$ | 1.5E+00 | | | | | | | | | | | | |
| | Soil particle density | kg/L | $\rho_s$ | 2.65E+00 | | | | | | | | | | | | |
| | Soil porosity | L/L-soil | n | 4.30E-01 | | | | | | | | | | | | |
| | Soil water content | L/L-soil | $\theta_w$ | 0.15 | | | | | | | | | | | | |
| | Soil air-filled porosity | L/L-soil | $\theta_a$ | 0.28 | | | | | | | | | | | | |
| | Soil organic carbon fraction | unitless | $f_{oc}$ | 0.006 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Averaging period | year | **ED** | 10 | | | | | | | | | | | | |
| | | s | **ED** | 3.15E+08 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Molar Gas Constant | L-mmHg/mole-°K | **R** | 62.411 | | | | | | | | | | | | |
| | Temperature | °C | **T** | 10 | | | | | | | | | | | | |
| | | °K | **T** | 290 | | | | | | | | | | | | |

| Attachment 2: Air Dispersion Factor 'C/Q' for Inhalation of Vapors and Particulates GM Powertrain Bedford Facility, Bedford, Indiana | | |
|---|---|---|
| | | **Construction Worker** |
| **Exposure Area** ($ft^2$) | $ft^2$ | 15' x 15' |
| **C/Q (Vapor)** | kg/m3 per kg/m2-s | 10.96 |
| **C/Q (Particulate)** | kg/m3 per kg/m2-s | NA |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| VOC | Acetone | 67-64-1 | 1.00E+00 | 1.00E+00 | 7.61E-05 | 1.50E-07 |
| VOC | Benzene | 71-43-2 | 1.00E+00 | 1.00E+00 | 3.55E-04 | 1.50E-07 |
| VOC | Bromodichloromethane | 75-27-4 | 1.00E+00 | 1.00E+00 | 1.16E-04 | 1.50E-07 |
| VOC | Bromomethane | 74-83-9 | 1.00E+00 | 1.00E+00 | 5.46E-04 | 1.50E-07 |
| VOC | 2-Butanone | 78-93-3 | 1.00E+00 | 1.00E+00 | 7.07E-05 | 1.50E-07 |
| VOC | Carbon Disulfide | 75-15-0 | 1.00E+00 | 1.00E+00 | 8.86E-04 | 1.50E-07 |
| VOC | Chlorobenzene | 108-90-7 | 1.00E+00 | 1.00E+00 | 1.52E-04 | 1.50E-07 |
| VOC | Chloroethane | 75-00-3 | 1.00E+00 | 1.00E+00 | 7.29E-04 | 1.50E-07 |
| VOC | Chloroform | 67-66-3 | 1.00E+00 | 1.00E+00 | 3.63E-04 | 1.50E-07 |
| VOC | Chloromethane | 74-87-3 | 1.00E+00 | 1.00E+00 | 8.68E-04 | 1.50E-07 |
| VOC | Cumene | 98-82-8 | 1.00E+00 | 1.00E+00 | 6.14E-04 | 1.50E-07 |
| VOC | Cyclohexane | 110-82-7 | 1.00E+00 | 1.00E+00 | 7.49E-04 | 1.50E-07 |
| VOC | Dibromochloromethane | 124-48-1 | 1.00E+00 | 1.00E+00 | 6.26E-05 | 1.50E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.00E+00 | 1.00E+00 | 6.49E-05 | 1.50E-07 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.00E+00 | 1.00E+00 | 3.90E-05 | 1.50E-07 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.00E+00 | 1.00E+00 | 7.34E-05 | 1.50E-07 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.00E+00 | 1.00E+00 | 1.23E-03 | 1.50E-07 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 1.00E+00 | 1.00E+00 | 4.05E-04 | 1.50E-07 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 1.00E+00 | 1.00E+00 | 2.45E-04 | 1.50E-07 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 1.00E+00 | 1.00E+00 | 3.34E-04 | 1.50E-07 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 1.00E+00 | 1.00E+00 | 4.25E-04 | 1.50E-07 |
| VOC | Ethyl Benzene | 100-41-4 | 1.00E+00 | 1.00E+00 | 1.77E-04 | 1.50E-07 |
| VOC | 2-Hexanone | 591-78-6 | 1.00E+00 | 1.00E+00 | 3.84E-04 | 1.50E-07 |
| VOC | Methyl Acetate | 79-20-9 | 1.00E+00 | 1.00E+00 | 2.14E-05 | 1.50E-07 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.00E+00 | 1.00E+00 | 1.90E-04 | 1.50E-07 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.00E+00 | 1.00E+00 | 7.70E-05 | 1.50E-07 |
| VOC | Methylcyclohexane | 108-87-2 | 1.00E+00 | 1.00E+00 | 8.63E-04 | 1.50E-07 |
| VOC | Methylene Chloride | 75-09-2 | 1.00E+00 | 1.00E+00 | 3.90E-04 | 1.50E-07 |
| VOC | Tetrachloroethene | 127-18-4 | 1.00E+00 | 1.00E+00 | 3.84E-04 | 1.50E-07 |
| VOC | Toluene | 108-88-3 | 1.00E+00 | 1.00E+00 | 2.41E-04 | 1.50E-07 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.00E+00 | 1.00E+00 | 2.20E-05 | 1.50E-07 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.00E+00 | 1.00E+00 | 4.46E-04 | 1.50E-07 |
| VOC | Trichloroethene | 79-01-6 | 1.00E+00 | 1.00E+00 | 2.96E-04 | 1.50E-07 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.00E+00 | 1.00E+00 | 6.85E-04 | 1.50E-07 |
| VOC | Vinyl Chloride | 75-01-4 | 1.00E+00 | 1.00E+00 | 1.06E-03 | 1.50E-07 |
| VOC | Xylenes (total) | 1330-20-7 | 1.00E+00 | 1.00E+00 | 1.62E-04 | 1.50E-07 |
| SVOC | Acenaphthene | 83-32-9 | 1.00E+00 | 1.00E+00 | 4.35E-06 | 1.50E-07 |
| SVOC | Acenaphthylene | 208-96-8 | 1.00E+00 | 1.00E+00 | 4.56E-06 | 1.50E-07 |
| SVOC | Acetophenone | 98-86-2 | 1.00E+00 | 1.00E+00 | 1.78E-05 | 1.50E-07 |
| SVOC | Anthracene | 120-12-7 | 1.00E+00 | 1.00E+00 | 1.22E-06 | 1.50E-07 |
| SVOC | Benzaldehyde | 100-52-7 | 1.00E+00 | 1.00E+00 | 2.82E-05 | 1.50E-07 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 1.00E+00 | 1.00E+00 | 1.07E-07 | 1.50E-07 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 1.00E+00 | 1.00E+00 | 4.49E-08 | 1.50E-07 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 1.00E+00 | 1.00E+00 | 2.05E-07 | 1.50E-07 |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 1.00E+00 | 1.00E+00 | 2.05E-08 | 1.50E-07 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.00E+00 | 1.00E+00 | 2.91E-08 | 1.50E-07 |
| SVOC | Biphenyl | 92-52-4 | 1.00E+00 | 1.00E+00 | 4.85E-06 | 1.50E-07 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 1.00E+00 | 1.00E+00 | 5.79E-09 | 1.50E-07 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 1.00E+00 | 1.00E+00 | 1.33E-07 | 1.50E-07 |
| SVOC | Caprolactam | 105-60-2 | 1.00E+00 | 1.00E+00 | 7.99E-06 | 1.50E-07 |
| SVOC | Carbazole | 86-74-8 | 1.00E+00 | 1.00E+00 | 4.98E-07 | 1.50E-07 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.00E+00 | 1.00E+00 | 4.29E-06 | 1.50E-07 |
| SVOC | Chrysene | 218-01-9 | 1.00E+00 | 1.00E+00 | 3.49E-07 | 1.50E-07 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 1.00E+00 | 1.00E+00 | 1.28E-08 | 1.50E-07 |
| SVOC | Dibenzofuran | 132-64-9 | 1.00E+00 | 1.00E+00 | 8.23E-07 | 1.50E-07 |
| SVOC | Diethylphthalate | 84-66-2 | 1.00E+00 | 1.00E+00 | 1.80E-06 | 1.50E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.00E+00 | 1.00E+00 | 3.89E-06 | 1.50E-07 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 1.00E+00 | 1.00E+00 | 1.66E-07 | 1.50E-07 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.00E+00 | 1.00E+00 | 3.98E-06 | 1.50E-07 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 1.00E+00 | 1.00E+00 | 1.59E-08 | 1.50E-07 |
| SVOC | Fluoranthene | 206-44-0 | 1.00E+00 | 1.00E+00 | 3.16E-07 | 1.50E-07 |
| SVOC | Fluorene | 86-73-7 | 1.00E+00 | 1.00E+00 | 1.86E-06 | 1.50E-07 |
| SVOC | Hexachlorobenzene | 118-74-1 | 1.00E+00 | 1.00E+00 | 5.15E-06 | 1.50E-07 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 1.00E+00 | 1.00E+00 | 1.32E-05 | 1.50E-07 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 1.00E+00 | 4.58E-01 | 8.83E-09 | 1.50E-07 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.00E+00 | 1.00E+00 | 1.29E-05 | 1.50E-07 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.00E+00 | 1.00E+00 | 4.92E-06 | 1.50E-07 |
| SVOC | Naphthalene | 91-20-3 | 1.00E+00 | 1.00E+00 | 1.70E-05 | 1.50E-07 |
| SVOC | Phenanthrene | 85-01-8 | 1.00E+00 | 1.00E+00 | 1.09E-06 | 1.50E-07 |
| SVOC | Phenol | 108-95-2 | 1.00E+00 | 1.00E+00 | 6.20E-06 | 1.50E-07 |
| SVOC | Pyrene | 129-00-0 | 1.00E+00 | 1.00E+00 | 2.57E-07 | 1.50E-07 |
| P/PCB | PCBs (total) | 1336-36-3 | 1.00E+00 | 1.00E+00 | 1.15E-06 | 1.50E-07 |
| INORG | Aluminum | 7429-90-5 | 1.00E+00 | | | 1.50E-07 |
| INORG | Antimony | 7440-36-0 | 1.00E+00 | | | 1.50E-07 |
| INORG | Arsenic | 7440-38-2 | 1.00E+00 | | | 1.50E-07 |
| INORG | Barium | 7440-39-3 | 1.00E+00 | | | 1.50E-07 |
| INORG | Beryllium | 7440-41-7 | 1.00E+00 | | | 1.50E-07 |
| INORG | Cadmium | 7440-43-9 | 1.00E+00 | | | 1.50E-07 |
| INORG | Chromium (total) | 7440-47-3 | 1.00E+00 | | | 1.50E-07 |
| INORG | Cobalt | 7440-48-4 | 1.00E+00 | | | 1.50E-07 |
| INORG | Copper | 7440-50-8 | 1.00E+00 | | | 1.50E-07 |
| INORG | Cyanide (amenable) | 57-12-5A | 1.00E+00 | | | 1.50E-07 |
| INORG | Cyanide (total) | 57-12-5 | 1.00E+00 | | | 1.50E-07 |
| INORG | Iron | 7439-89-6 | 1.00E+00 | | | 1.50E-07 |
| INORG | Lead | 7439-92-1 | 1.00E+00 | | | 1.50E-07 |
| INORG | Manganese | 7439-96-5 | 1.00E+00 | | | 1.50E-07 |
| INORG | Mercury | 7439-97-6 | 1.00E+00 | 1.00E+00 | 5.15E-06 | 1.50E-07 |
| INORG | Nickel | 7440-02-0 | 1.00E+00 | | | 1.50E-07 |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| **Chem Group** | **Chemical** | **CASRN** | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| INORG | Selenium | 7782-49-2 | 1.00E+00 | | | 1.50E-07 |
| INORG | Silver | 7440-22-4 | 1.00E+00 | | | 1.50E-07 |
| INORG | Thallium | 7440-28-0 | 1.00E+00 | | | 1.50E-07 |
| INORG | Vanadium | 7440-62-2 | 1.00E+00 | | | 1.50E-07 |
| INORG | Zinc | 7440-66-6 | 1.00E+00 | | | 1.50E-07 |
| | | | | | | |
| **Note:** | | | | | | |
| $C_{source}$ = Minimum of Soil Concentration and Csat | | | | | | |

## Attachment 2: Risk Based Cancer Criteria for Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 5.59E-09 | | | | | | | 7.61E-05 | | | 1.50E-07 | | | |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 5.59E-09 | 5.5E-02 | 3.3E+04 | | | 5.5E-02 | | 3.55E-04 | 7.8E-03 | 1.8E+03 | 1.50E-07 | 7.8E-03 | 4.4E+06 | 1.7E+03 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 5.59E-09 | 6.2E-02 | 2.9E+04 | | | 6.2E-02 | | 1.16E-04 | 1.8E-02 | 2.5E+03 | 1.50E-07 | 1.8E-02 | 1.9E+06 | 2.3E+03 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 5.59E-09 | | | | | | | 5.46E-04 | | | 1.50E-07 | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 5.59E-09 | | | | | | | 7.07E-05 | | | 1.50E-07 | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 5.59E-09 | | | | | | | 8.86E-04 | | | 1.50E-07 | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 5.59E-09 | | | | | | | 1.52E-04 | | | 1.50E-07 | | | |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 5.59E-09 | 2.9E-03 | 6.2E+05 | | | 2.9E-03 | | 7.29E-04 | | | 1.50E-07 | | | 6.2E+05 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 5.59E-09 | | | | | | | 3.63E-04 | 2.3E-02 | 6.1E+02 | 1.50E-07 | 2.3E-02 | 1.5E+06 | 6.1E+02 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 5.59E-09 | | | | | | | 8.68E-04 | | | 1.50E-07 | | | |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 5.59E-09 | | | | | | | 6.14E-04 | | | 1.50E-07 | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 5.59E-09 | | | | | | | 7.49E-04 | | | 1.50E-07 | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 5.59E-09 | 8.4E-02 | 2.1E+04 | | | 8.4E-02 | | 6.26E-05 | 2.4E-02 | 3.4E+03 | 1.50E-07 | 2.4E-02 | 1.4E+06 | 2.9E+03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 5.59E-09 | | | | | | | 6.49E-05 | | | 1.50E-07 | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 5.59E-09 | | | | | | | 3.90E-05 | | | 1.50E-07 | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 5.59E-09 | 2.4E-02 | 7.5E+04 | | | 2.4E-02 | | 7.34E-05 | 6.3E-03 | 1.1E+04 | 1.50E-07 | 6.3E-03 | 5.4E+06 | 9.6E+03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 5.59E-09 | | | | | | | 1.23E-03 | | | 1.50E-07 | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 5.59E-09 | | | | | | | 4.05E-04 | | | 1.50E-07 | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 5.59E-09 | 9.1E-02 | 2.0E+04 | | | 9.1E-02 | | 2.45E-04 | 2.6E-02 | 8.0E+02 | 1.50E-07 | 2.6E-02 | 1.3E+06 | 7.7E+02 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 5.59E-09 | | | | | | | 3.34E-04 | | | 1.50E-07 | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 5.59E-09 | | | | | | | 4.25E-04 | | | 1.50E-07 | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 5.59E-09 | | | | | | | 1.77E-04 | | | 1.50E-07 | | | |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 5.59E-09 | | | | | | | 3.84E-04 | | | 1.50E-07 | | | |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 5.59E-09 | | | | | | | 2.14E-05 | | | 1.50E-07 | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 5.59E-09 | 3.3E-03 | 5.4E+05 | | | 3.3E-03 | | 1.90E-04 | 1.0E-04 | 2.7E+05 | 1.50E-07 | 1.0E-04 | 3.4E+08 | 1.8E+05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 5.59E-09 | | | | | | | 7.70E-05 | | | 1.50E-07 | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 5.59E-09 | | | | | | | 8.63E-04 | | | 1.50E-07 | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 5.59E-09 | 7.5E-03 | 2.4E+05 | | | 7.5E-03 | | 3.90E-04 | 4.7E-04 | 2.8E+04 | 1.50E-07 | 4.7E-04 | 7.2E+07 | 2.5E+04 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 5.59E-09 | 5.2E-02 | 3.4E+04 | | | 5.2E-02 | | 3.84E-04 | 3.1E-03 | 4.4E+03 | 1.50E-07 | 3.1E-03 | 1.1E+07 | 3.9E+03 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 5.59E-09 | | | | | | | 2.41E-04 | | | 1.50E-07 | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 5.59E-09 | | | | | | | 2.20E-05 | | | 1.50E-07 | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 5.59E-09 | | | | | | | 4.46E-04 | | | 1.50E-07 | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 5.59E-09 | 1.1E-02 | 1.6E+05 | | | 1.1E-02 | | 2.96E-04 | 1.7E-03 | 1.0E+04 | 1.50E-07 | 1.7E-03 | 2.0E+07 | 9.6E+03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 5.59E-09 | | | | | | | 6.85E-04 | | | 1.50E-07 | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 5.59E-09 | 1.4E+00 | 1.3E+03 | | | 1.4E+00 | | 1.06E-03 | 8.8E-03 | 5.5E+02 | 1.50E-07 | 8.8E-03 | 3.9E+06 | 3.8E+02 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 5.59E-09 | | | | | | | 1.62E-04 | | | 1.50E-07 | | | |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 4.35E-06 | | | 1.50E-07 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 4.56E-06 | | | 1.50E-07 | | | |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.78E-05 | | | 1.50E-07 | | | |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 1.22E-06 | | | 1.50E-07 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 2.82E-05 | | | 1.50E-07 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 5.59E-09 | 7.3E-01 | 2.5E+03 | 1.30E-01 | 2.40E-09 | 7.3E-01 | 5.7E+03 | 1.07E-07 | 2.1E-01 | 2.3E+05 | 1.50E-07 | 2.1E-01 | 1.6E+05 | 1.7E+03 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 5.59E-09 | 7.3E+00 | 2.5E+02 | 1.30E-01 | 2.40E-09 | 7.3E+00 | 5.7E+02 | 4.49E-08 | 8.9E-01 | 1.3E+05 | 1.50E-07 | 8.9E-01 | 3.8E+04 | 1.7E+02 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 5.59E-09 | 7.3E-01 | 2.5E+03 | 1.30E-01 | 2.40E-09 | 7.3E-01 | 5.7E+03 | 2.05E-07 | 2.1E-01 | 1.2E+05 | 1.50E-07 | 2.1E-01 | 1.6E+05 | 1.7E+03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 2.05E-08 | | | 1.50E-07 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 5.59E-09 | 7.3E-02 | 2.5E+04 | 1.30E-01 | 2.40E-09 | 7.3E-02 | 5.7E+04 | 2.91E-08 | 2.1E-02 | 8.4E+06 | 1.50E-07 | 2.1E-02 | 1.6E+06 | 1.7E+04 |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 4.85E-06 | | | 1.50E-07 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 5.59E-09 | 1.4E-02 | 1.3E+05 | 1.00E-01 | 1.85E-09 | 1.4E-02 | 3.9E+05 | 5.79E-09 | 4.0E-03 | 2.2E+08 | 1.50E-07 | 4.0E-03 | 8.5E+06 | 9.5E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.33E-07 | | | 1.50E-07 | | | |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 7.99E-06 | | | 1.50E-07 | | | |

## Attachment 2: Risk Based Cancer Criteria for Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 5.59E-09 | 2.0E-02 | 8.9E+04 | 1.00E-01 | 1.85E-09 | 2.0E-02 | 2.7E+05 | 4.98E-07 | 5.7E-03 | 1.8E+06 | 1.50E-07 | 5.7E-03 | 6.0E+06 | 6.4E+04 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 4.29E-06 | | | 1.50E-07 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 5.59E-09 | 7.3E-03 | 2.5E+05 | 1.30E-01 | 2.40E-09 | 7.3E-03 | 5.7E+05 | 3.49E-07 | 2.1E-03 | 7.0E+06 | 1.50E-07 | 2.1E-03 | 1.6E+07 | 1.7E+05 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 5.59E-09 | 7.3E+00 | 2.5E+02 | 1.30E-01 | 2.40E-09 | 7.3E+00 | 5.7E+02 | 1.28E-08 | 2.1E+00 | 1.9E+05 | 1.50E-07 | 2.1E+00 | 1.6E+04 | 1.7E+02 |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 8.23E-07 | | | 1.50E-07 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.80E-06 | | | 1.50E-07 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 3.89E-06 | | | 1.50E-07 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.66E-07 | | | 1.50E-07 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 5.59E-09 | 6.8E-01 | 2.6E+03 | 1.00E-01 | 1.85E-09 | 6.8E-01 | 8.0E+03 | 3.98E-06 | 1.9E-01 | 6.6E+03 | 1.50E-07 | 1.9E-01 | 1.8E+05 | 1.5E+03 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.59E-08 | | | 1.50E-07 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 3.16E-07 | | | 1.50E-07 | | | |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 1.86E-06 | | | 1.50E-07 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 5.59E-09 | 1.6E+00 | 1.1E+03 | 1.00E-01 | 1.85E-09 | 1.6E+00 | 3.4E+03 | 5.15E-06 | 4.6E-01 | 2.2E+03 | 1.50E-07 | 4.6E-01 | 7.4E+04 | 6.0E+02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 5.59E-09 | 7.8E-02 | 2.3E+04 | 1.00E-01 | 1.85E-09 | 7.8E-02 | 6.9E+04 | 1.32E-05 | 2.2E-02 | 1.8E+04 | 1.50E-07 | 2.2E-02 | 1.5E+06 | 8.7E+03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 5.59E-09 | 7.3E-01 | 2.5E+03 | 1.30E-01 | 2.40E-09 | 7.3E-01 | 5.7E+03 | 8.83E-09 | 2.1E-01 | 2.8E+06 | 1.50E-07 | 2.1E-01 | 1.6E+05 | 1.7E+03 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 1.29E-05 | | | 1.50E-07 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 4.92E-06 | | | 1.50E-07 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 1.70E-05 | | | 1.50E-07 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 1.09E-06 | | | 1.50E-07 | | | |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 5.59E-09 | | | 1.00E-01 | 1.85E-09 | | | 6.20E-06 | | | 1.50E-07 | | | |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 5.59E-09 | | | 1.30E-01 | 2.40E-09 | | | 2.57E-07 | | | 1.50E-07 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 5.59E-09 | 2.0E+00 | 8.9E+02 | 1.40E-01 | 2.58E-09 | 2.0E+00 | 1.9E+03 | 1.15E-06 | 5.7E-01 | 7.8E+03 | 1.50E-07 | 5.7E-01 | 6.0E+04 | 5.6E+02 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 5.59E-09 | 1.5E+00 | 1.2E+03 | 3.00E-02 | 5.54E-10 | 1.5E+00 | 1.2E+04 | | 4.3E+00 | | 1.50E-07 | 4.3E+00 | 7.9E+03 | 9.5E+02 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 5.59E-09 | | | | | | | | 2.4E+00 | | 1.50E-07 | 2.4E+00 | 1.4E+04 | 1.4E+04 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 5.59E-09 | | | 1.00E-03 | 1.85E-11 | | | | 1.8E+00 | | 1.50E-07 | 1.8E+00 | 1.9E+04 | 1.9E+04 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 5.59E-09 | | | | | | | | 1.2E+01 | | 1.50E-07 | 1.2E+01 | 2.8E+03 | 2.8E+03 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 5.59E-09 | | | | | | | | 2.8E+00 | | 1.50E-07 | 2.8E+00 | 1.2E+04 | 1.2E+04 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 5.59E-09 | | | | | | | 5.15E-06 | | | 1.50E-07 | | | |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 5.59E-09 | | | | | | | | 2.4E-01 | | 1.50E-07 | 2.4E-01 | 1.4E+05 | 1.4E+05 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 5.59E-09 | | | | | | | | | | 1.50E-07 | | | |

## Attachment 2: Risk Based Noncancer Criteria for Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 3.91E-08 | 9.0E-01 | 2.30E+07 | | | 9.0E-01 | | 7.61E-05 | 3.2E+00 | 3.02E+06 | 1.50E-07 | 3.2E+00 | 1.53E+09 | 2.67E+06 |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 3.91E-08 | 4.0E-03 | 1.02E+05 | | | 4.0E-03 | | 3.55E-04 | 3.0E-02 | 6.16E+03 | 1.50E-07 | 3.0E-02 | 1.46E+07 | 5.81E+03 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | 1.16E-04 | 7.0E-02 | 4.41E+04 | 1.50E-07 | 7.0E-02 | 3.41E+07 | 4.06E+04 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 3.91E-08 | 1.4E-03 | 3.58E+04 | | | 1.4E-03 | | 5.46E-04 | 5.0E-03 | 6.68E+02 | 1.50E-07 | 5.0E-03 | 2.43E+06 | 6.56E+02 |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 3.91E-08 | 6.0E-01 | 1.53E+07 | | | 6.0E-01 | | 7.07E-05 | 5.0E+00 | 5.16E+06 | 1.50E-07 | 5.0E+00 | 2.43E+09 | 3.86E+06 |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | | | 1.0E-01 | | 8.86E-04 | 7.0E-01 | 5.77E+04 | 1.50E-07 | 7.0E-01 | 3.41E+08 | 5.64E+04 |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | 1.52E-04 | 6.0E-02 | 2.88E+04 | 1.50E-07 | 6.0E-02 | 2.92E+07 | 2.72E+04 |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 3.91E-08 | 4.0E-01 | 1.02E+07 | | | 4.0E-01 | | 7.29E-04 | 1.0E+01 | 1.00E+06 | 1.50E-07 | 1.0E+01 | 4.87E+09 | 9.12E+05 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 3.91E-08 | 1.0E-02 | 2.56E+05 | | | 1.0E-02 | | 3.63E-04 | 5.0E-02 | 1.00E+04 | 1.50E-07 | 5.0E-02 | 2.43E+07 | 9.66E+03 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 3.91E-08 | | | | | | | 8.68E-04 | 9.0E-02 | 7.57E+03 | 1.50E-07 | 9.0E-02 | 4.38E+07 | 7.57E+03 |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | | | 1.0E-01 | | 6.14E-04 | 4.0E-01 | 4.75E+04 | 1.50E-07 | 4.0E-01 | 1.95E+08 | 4.67E+04 |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 3.91E-08 | | | | | | | 7.49E-04 | 6.0E+00 | 5.84E+05 | 1.50E-07 | 6.0E+00 | 2.92E+09 | 5.84E+05 |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | 6.26E-05 | 7.0E-02 | 8.16E+04 | 1.50E-07 | 7.0E-02 | 3.41E+07 | 7.02E+04 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 3.91E-08 | 9.0E-02 | 2.30E+06 | | | 9.0E-02 | | 6.49E-05 | 2.0E-01 | 2.25E+05 | 1.50E-07 | 2.0E-01 | 9.73E+07 | 2.05E+05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 3.91E-08 | 9.0E-04 | 2.30E+04 | | | 9.0E-04 | | 3.90E-05 | 1.4E-01 | 2.62E+05 | 1.50E-07 | 1.4E-01 | 6.81E+07 | 2.11E+04 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | | | 3.0E-02 | | 7.34E-05 | 8.0E-01 | 7.96E+05 | 1.50E-07 | 8.0E-01 | 3.89E+08 | 3.90E+05 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 3.91E-08 | 2.0E-01 | 5.11E+06 | | | 2.0E-01 | | 1.23E-03 | 2.0E-01 | 1.18E+04 | 1.50E-07 | 2.0E-01 | 9.73E+07 | 1.18E+04 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | | | 1.0E-01 | | 4.05E-04 | 5.0E-01 | 9.01E+04 | 1.50E-07 | 5.0E-01 | 2.43E+08 | 8.70E+04 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | | | 3.0E-02 | | 2.45E-04 | 5.0E-03 | 1.49E+03 | 1.50E-07 | 5.0E-03 | 2.43E+06 | 1.49E+03 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 3.91E-08 | 1.0E-02 | 2.56E+05 | | | 1.0E-02 | | 3.34E-04 | 3.5E-02 | 7.64E+03 | 1.50E-07 | 3.5E-02 | 1.70E+07 | 7.42E+03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | 4.25E-04 | 7.0E-02 | 1.20E+04 | 1.50E-07 | 7.0E-02 | 3.41E+07 | 1.18E+04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | | | 1.0E-01 | | 1.77E-04 | 1.0E+00 | 4.13E+05 | 1.50E-07 | 1.0E+00 | 4.87E+08 | 3.55E+05 |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 3.91E-08 | 4.0E-02 | 1.02E+06 | | | 4.0E-02 | | 3.84E-04 | 5.0E-03 | 9.51E+02 | 1.50E-07 | 5.0E-03 | 2.43E+06 | 9.49E+02 |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 3.91E-08 | 1.0E+00 | 2.56E+07 | | | 1.0E+00 | | 2.14E-05 | 3.5E+00 | 1.20E+07 | 1.50E-07 | 3.5E+00 | 1.70E+09 | 8.11E+06 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 3.91E-08 | | | | | | | 1.90E-04 | 3.0E+00 | 1.15E+06 | 1.50E-07 | 3.0E+00 | 1.46E+09 | 1.15E+06 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 3.91E-08 | | | | | | | 7.70E-05 | 3.0E+00 | 2.84E+06 | 1.50E-07 | 3.0E+00 | 1.46E+09 | 2.84E+06 |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 3.91E-08 | | | | | | | 8.63E-04 | 3.0E+00 | 2.54E+05 | 1.50E-07 | 3.0E+00 | 1.46E+09 | 2.54E+05 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 3.91E-08 | 6.0E-02 | 1.53E+06 | | | 6.0E-02 | | 3.90E-04 | 3.0E+00 | 5.62E+05 | 1.50E-07 | 3.0E+00 | 1.46E+09 | 4.11E+05 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 3.91E-08 | 1.0E-02 | 2.56E+05 | | | 1.0E-02 | | 3.84E-04 | 4.0E-01 | 7.61E+04 | 1.50E-07 | 4.0E-01 | 1.95E+08 | 5.86E+04 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 3.91E-08 | 2.0E-01 | 5.11E+06 | | | 2.0E-01 | | 2.41E-04 | 4.0E-01 | 1.21E+05 | 1.50E-07 | 4.0E-01 | 1.95E+08 | 1.18E+05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 3.91E-08 | 1.0E-02 | 2.56E+05 | | | 1.0E-02 | | 2.20E-05 | 2.0E-01 | 6.64E+05 | 1.50E-07 | 2.0E-01 | 9.73E+07 | 1.84E+05 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 3.91E-08 | 2.8E-01 | 7.15E+06 | | | 2.8E-01 | | 4.46E-04 | 2.2E+00 | 3.60E+05 | 1.50E-07 | 2.2E+00 | 1.07E+09 | 3.43E+05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 3.91E-08 | 6.0E-03 | 1.53E+05 | | | 6.0E-03 | | 2.96E-04 | | | 1.50E-07 | | | 1.53E+05 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 3.91E-08 | 3.0E+01 | 7.67E+08 | | | 3.0E+01 | | 6.85E-04 | 3.0E+01 | 3.20E+06 | 1.50E-07 | 3.0E+01 | 1.46E+10 | 3.18E+06 |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 3.91E-08 | 3.0E-03 | 7.67E+04 | | | 3.0E-03 | | 1.06E-03 | 1.0E-01 | 6.92E+03 | 1.50E-07 | 1.0E-01 | 4.87E+07 | 6.35E+03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 3.91E-08 | 2.0E-01 | 5.11E+06 | | | 2.0E-01 | | 1.62E-04 | 1.0E-01 | 4.50E+04 | 1.50E-07 | 1.0E-01 | 4.87E+07 | 4.46E+04 |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 3.91E-08 | 6.0E-02 | 1.53E+06 | 1.30E-01 | 1.68E-08 | 6.0E-02 | 3.57E+06 | 4.35E-06 | 2.1E-01 | 3.53E+06 | 1.50E-07 | 2.1E-01 | 1.02E+08 | 8.16E+05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | 1.30E-01 | 1.68E-08 | 3.0E-02 | 1.79E+06 | 4.56E-06 | 1.1E-01 | 1.68E+06 | 1.50E-07 | 1.1E-01 | 5.11E+07 | 4.03E+05 |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | 1.00E-01 | 1.29E-08 | 1.0E-01 | 7.74E+06 | 1.78E-05 | 3.5E-01 | 1.43E+06 | 1.50E-07 | 3.5E-01 | 1.70E+08 | 8.16E+05 |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 3.91E-08 | 3.0E-01 | 7.67E+06 | 1.30E-01 | 1.68E-08 | 3.0E-01 | 1.79E+07 | 1.22E-06 | | | 1.50E-07 | | | 5.36E+06 |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | 1.00E-01 | 1.29E-08 | 1.0E-01 | 7.74E+06 | 2.82E-05 | 3.5E-01 | 9.05E+05 | 1.50E-07 | 3.5E-01 | 1.70E+08 | 6.13E+05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 1.07E-07 | | | 1.50E-07 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 4.49E-08 | | | 1.50E-07 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 2.05E-07 | | | 1.50E-07 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | 1.30E-01 | 1.68E-08 | 3.0E-02 | 1.79E+06 | 2.05E-08 | 1.1E-01 | 3.73E+08 | 1.50E-07 | 1.1E-01 | 5.11E+07 | 5.30E+05 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 2.91E-08 | | | 1.50E-07 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 3.91E-08 | 5.0E-02 | 1.28E+06 | 1.00E-01 | 1.29E-08 | 5.0E-02 | 3.87E+06 | 4.85E-06 | 1.8E-01 | 2.63E+06 | 1.50E-07 | 1.8E-01 | 8.52E+07 | 6.98E+05 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | 1.00E-01 | 1.29E-08 | 2.0E-02 | 1.55E+06 | 5.79E-09 | | | 1.50E-07 | | | 3.84E+05 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 3.91E-08 | 2.0E-01 | 5.11E+06 | 1.00E-01 | 1.29E-08 | 2.0E-01 | 1.55E+07 | 1.33E-07 | 7.0E-01 | 3.84E+08 | 1.50E-07 | 7.0E-01 | 3.41E+08 | 3.76E+06 |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 3.91E-08 | 5.0E-01 | 1.28E+07 | 1.00E-01 | 1.29E-08 | 5.0E-01 | 3.87E+07 | 7.99E-06 | 1.8E+00 | 1.60E+07 | 1.50E-07 | 1.8E+00 | 8.52E+08 | 5.96E+06 |

## Attachment 2: Risk Based Noncancer Criteria for Construction Worker (Small-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 3.91E-08 | | | 1.00E-01 | 1.29E-08 | | | 4.98E-07 | | | 1.50E-07 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 3.91E-08 | 4.0E-03 | 1.02E+05 | 1.00E-01 | 1.29E-08 | 4.0E-03 | 3.10E+05 | 4.29E-06 | 1.4E-02 | 2.38E+05 | 1.50E-07 | 1.4E-02 | 6.81E+06 | 5.76E+04 |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 3.49E-07 | | | 1.50E-07 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 1.28E-08 | | | 1.50E-07 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 3.91E-08 | 4.0E-03 | 1.02E+05 | 1.00E-01 | 1.29E-08 | 4.0E-03 | 3.10E+05 | 8.23E-07 | 1.4E-02 | 1.24E+06 | 1.50E-07 | 1.4E-02 | 6.81E+06 | 7.16E+04 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 3.91E-08 | 8.0E-01 | 2.04E+07 | 1.00E-01 | 1.29E-08 | 8.0E-01 | 6.19E+07 | 1.80E-06 | 2.8E+00 | 1.14E+08 | 1.50E-07 | 2.8E+00 | 1.36E+09 | 1.34E+07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | 1.00E-01 | 1.29E-08 | 2.0E-02 | 1.55E+06 | 3.89E-06 | 7.0E-02 | 1.31E+06 | 1.50E-07 | 7.0E-02 | 3.41E+07 | 2.95E+05 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 3.91E-08 | 1.0E-01 | 2.56E+06 | 1.00E-01 | 1.29E-08 | 1.0E-01 | 7.74E+06 | 1.66E-07 | | | 1.50E-07 | | | 1.92E+06 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 3.91E-08 | 1.0E-03 | 2.56E+04 | 1.00E-01 | 1.29E-08 | 1.0E-03 | 7.74E+04 | 3.98E-06 | 3.5E-03 | 6.42E+04 | 1.50E-07 | 3.5E-03 | 1.70E+06 | 1.47E+04 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 3.91E-08 | 4.0E-02 | 1.02E+06 | 1.00E-01 | 1.29E-08 | 4.0E-02 | 3.10E+06 | 1.59E-08 | | | 1.50E-07 | | | 7.68E+05 |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 3.91E-08 | 4.0E-02 | 1.02E+06 | 1.30E-01 | 1.68E-08 | 4.0E-02 | 2.38E+06 | 3.16E-07 | 1.4E-01 | 3.24E+07 | 1.50E-07 | 1.4E-01 | 6.81E+07 | 6.93E+05 |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 3.91E-08 | 4.0E-02 | 1.02E+06 | 1.30E-01 | 1.68E-08 | 4.0E-02 | 2.38E+06 | 1.86E-06 | 1.4E-01 | 5.48E+06 | 1.50E-07 | 1.4E-01 | 6.81E+07 | 6.27E+05 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 3.91E-08 | 8.0E-04 | 2.04E+04 | 1.00E-01 | 1.29E-08 | 8.0E-04 | 6.19E+04 | 5.15E-06 | | | 1.50E-07 | | | 1.54E+04 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 3.91E-08 | 3.0E-04 | 7.67E+03 | 1.00E-01 | 1.29E-08 | 3.0E-04 | 2.32E+04 | 1.32E-05 | | | 1.50E-07 | | | 5.76E+03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 3.91E-08 | | | 1.30E-01 | 1.68E-08 | | | 8.83E-09 | | | 1.50E-07 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 3.91E-08 | 4.0E-03 | 1.02E+05 | 1.00E-01 | 1.29E-08 | 4.0E-03 | 3.10E+05 | 1.29E-05 | 3.0E-03 | 1.70E+04 | 1.50E-07 | 3.0E-03 | 1.46E+06 | 1.38E+04 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 3.91E-08 | 5.0E-02 | 1.28E+06 | 1.00E-01 | 1.29E-08 | 5.0E-02 | 3.87E+06 | 4.92E-06 | 1.8E-01 | 2.59E+06 | 1.50E-07 | 1.8E-01 | 8.52E+07 | 6.95E+05 |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | 1.30E-01 | 1.68E-08 | 2.0E-02 | 1.19E+06 | 1.70E-05 | 3.0E-03 | 1.29E+04 | 1.50E-07 | 3.0E-03 | 1.46E+06 | 1.23E+04 |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | 1.30E-01 | 1.68E-08 | 3.0E-02 | 1.79E+06 | 1.09E-06 | 1.1E-01 | 7.03E+06 | 1.50E-07 | 1.1E-01 | 5.11E+07 | 4.94E+05 |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 3.91E-08 | 3.0E-01 | 7.67E+06 | 1.00E-01 | 1.29E-08 | 3.0E-01 | 2.32E+07 | 6.20E-06 | | | 1.50E-07 | | | 5.76E+06 |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 3.91E-08 | 3.0E-02 | 7.67E+05 | 1.30E-01 | 1.68E-08 | 3.0E-02 | 1.79E+06 | 2.57E-07 | 1.1E-01 | 2.98E+07 | 1.50E-07 | 1.1E-01 | 5.11E+07 | 5.22E+05 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 3.91E-08 | 2.0E-05 | 5.11E+02 | 1.40E-01 | 1.81E-08 | 2.0E-05 | 1.11E+03 | 1.15E-06 | | | 1.50E-07 | | | 3.50E+02 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 3.91E-08 | 1.0E+00 | 2.56E+07 | | | 1.0E+00 | | | 5.0E-03 | | 1.50E-07 | 5.0E-03 | 2.43E+06 | 2.22E+06 |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 3.91E-08 | 4.0E-04 | 1.02E+04 | | | 6.0E-05 | | | 1.4E-03 | | 1.50E-07 | 1.4E-03 | 6.81E+05 | 1.01E+04 |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 3.91E-08 | 3.0E-04 | 7.67E+03 | 3.00E-02 | 3.87E-09 | 3.0E-04 | 7.74E+04 | | | | 1.50E-07 | | | 6.97E+03 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 3.91E-08 | 7.0E-02 | 1.79E+06 | | | 7.0E-02 | | | | | 1.50E-07 | | | 1.79E+06 |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 3.91E-08 | 2.0E-03 | 5.11E+04 | | | 1.4E-05 | | | 2.0E-05 | | 1.50E-07 | 2.0E-05 | 9.73E+03 | 8.18E+03 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 3.91E-08 | 1.0E-03 | 2.56E+04 | 1.00E-03 | 1.29E-10 | 2.5E-05 | 1.94E+05 | | 2.0E-04 | | 1.50E-07 | 2.0E-04 | 9.71E+04 | 1.83E+04 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 3.91E-08 | 3.0E-03 | 7.67E+04 | | | 7.5E-05 | | | | | 1.50E-07 | | | 7.67E+04 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | | 2.0E-05 | | 1.50E-07 | 2.0E-05 | 9.73E+03 | 9.55E+03 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 3.91E-08 | 4.0E-02 | 1.02E+06 | | | 4.0E-02 | | | 1.4E-01 | | 1.50E-07 | 1.4E-01 | 6.81E+07 | 1.01E+06 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | | 7.0E-02 | | 1.50E-07 | 7.0E-02 | 3.41E+07 | 5.03E+05 |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 2.0E-02 | | | 7.0E-02 | | 1.50E-07 | 7.0E-02 | 3.41E+07 | 5.03E+05 |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 3.91E-08 | 3.0E-01 | 7.67E+06 | | | 3.0E-01 | | | | | 1.50E-07 | | | 7.67E+06 |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 3.91E-08 | | | | | | | | | | 1.50E-07 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 3.91E-08 | 1.4E-01 | 3.58E+06 | | | 5.6E-03 | | | 5.0E-05 | | 1.50E-07 | 5.0E-05 | 2.43E+04 | 2.42E+04 |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 3.91E-08 | 3.0E-04 | 7.67E+03 | | | 2.1E-05 | | 5.15E-06 | 3.0E-04 | 4.25E+03 | 1.50E-07 | 3.0E-04 | 1.46E+05 | 2.68E+03 |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 3.91E-08 | 2.0E-02 | 5.11E+05 | | | 8.0E-04 | | | | | 1.50E-07 | | | 5.11E+05 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 3.91E-08 | 5.0E-03 | 1.28E+05 | | | 5.0E-03 | | | 1.8E-02 | | 1.50E-07 | 1.8E-02 | 8.52E+06 | 1.26E+05 |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 3.91E-08 | 5.0E-03 | 1.28E+05 | | | 2.0E-04 | | | 1.0E-05 | | 1.50E-07 | 1.0E-05 | 4.87E+03 | 4.69E+03 |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 3.91E-08 | 7.0E-05 | 1.79E+03 | | | 7.0E-05 | | | 2.5E-04 | | 1.50E-07 | 2.5E-04 | 1.19E+05 | 1.76E+03 |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 3.91E-08 | 7.0E-03 | 1.79E+05 | | | 1.8E-04 | | | 2.5E-02 | | 1.50E-07 | 2.5E-02 | 1.19E+07 | 1.76E+05 |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 3.91E-08 | 3.0E-01 | 7.67E+06 | | | 3.0E-01 | | | 1.1E+00 | | 1.50E-07 | 1.1E+00 | 5.11E+08 | 7.55E+06 |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| VOC | Acetone | 67-64-1 | 1.00E+00 | 1.00E+00 | 2.41E-04 | 5.00E-08 |
| VOC | Benzene | 71-43-2 | 1.00E+00 | 1.00E+00 | 1.12E-03 | 5.00E-08 |
| VOC | Bromodichloromethane | 75-27-4 | 1.00E+00 | 1.00E+00 | 3.66E-04 | 5.00E-08 |
| VOC | Bromomethane | 74-83-9 | 1.00E+00 | 1.00E+00 | 1.73E-03 | 5.00E-08 |
| VOC | 2-Butanone | 78-93-3 | 1.00E+00 | 1.00E+00 | 2.24E-04 | 5.00E-08 |
| VOC | Carbon Disulfide | 75-15-0 | 1.00E+00 | 1.00E+00 | 2.80E-03 | 5.00E-08 |
| VOC | Chlorobenzene | 108-90-7 | 1.00E+00 | 1.00E+00 | 4.82E-04 | 5.00E-08 |
| VOC | Chloroethane | 75-00-3 | 1.00E+00 | 1.00E+00 | 2.31E-03 | 5.00E-08 |
| VOC | Chloroform | 67-66-3 | 1.00E+00 | 1.00E+00 | 1.15E-03 | 5.00E-08 |
| VOC | Chloromethane | 74-87-3 | 1.00E+00 | 1.00E+00 | 2.74E-03 | 5.00E-08 |
| VOC | Cumene | 98-82-8 | 1.00E+00 | 1.00E+00 | 1.94E-03 | 5.00E-08 |
| VOC | Cyclohexane | 110-82-7 | 1.00E+00 | 1.00E+00 | 2.37E-03 | 5.00E-08 |
| VOC | Dibromochloromethane | 124-48-1 | 1.00E+00 | 1.00E+00 | 1.98E-04 | 5.00E-08 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.00E+00 | 1.00E+00 | 2.05E-04 | 5.00E-08 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.00E+00 | 1.00E+00 | 1.23E-04 | 5.00E-08 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.00E+00 | 1.00E+00 | 2.32E-04 | 5.00E-08 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.00E+00 | 1.00E+00 | 3.90E-03 | 5.00E-08 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 1.00E+00 | 1.00E+00 | 1.28E-03 | 5.00E-08 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 1.00E+00 | 1.00E+00 | 7.75E-04 | 5.00E-08 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 1.00E+00 | 1.00E+00 | 1.06E-03 | 5.00E-08 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 1.00E+00 | 1.00E+00 | 1.34E-03 | 5.00E-08 |
| VOC | Ethyl Benzene | 100-41-4 | 1.00E+00 | 1.00E+00 | 5.60E-04 | 5.00E-08 |
| VOC | 2-Hexanone | 591-78-6 | 1.00E+00 | 1.00E+00 | 1.21E-03 | 5.00E-08 |
| VOC | Methyl Acetate | 79-20-9 | 1.00E+00 | 1.00E+00 | 6.76E-05 | 5.00E-08 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.00E+00 | 1.00E+00 | 6.01E-04 | 5.00E-08 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.00E+00 | 1.00E+00 | 2.43E-04 | 5.00E-08 |
| VOC | Methylcyclohexane | 108-87-2 | 1.00E+00 | 1.00E+00 | 2.73E-03 | 5.00E-08 |
| VOC | Methylene Chloride | 75-09-2 | 1.00E+00 | 1.00E+00 | 1.23E-03 | 5.00E-08 |
| VOC | Tetrachloroethene | 127-18-4 | 1.00E+00 | 1.00E+00 | 1.21E-03 | 5.00E-08 |
| VOC | Toluene | 108-88-3 | 1.00E+00 | 1.00E+00 | 7.62E-04 | 5.00E-08 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.00E+00 | 1.00E+00 | 6.95E-05 | 5.00E-08 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.00E+00 | 1.00E+00 | 1.41E-03 | 5.00E-08 |
| VOC | Trichloroethene | 79-01-6 | 1.00E+00 | 1.00E+00 | 9.36E-04 | 5.00E-08 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.00E+00 | 1.00E+00 | 2.17E-03 | 5.00E-08 |
| VOC | Vinyl Chloride | 75-01-4 | 1.00E+00 | 1.00E+00 | 3.34E-03 | 5.00E-08 |
| VOC | Xylenes (total) | 1330-20-7 | 1.00E+00 | 1.00E+00 | 5.13E-04 | 5.00E-08 |
| SVOC | Acenaphthene | 83-32-9 | 1.00E+00 | 1.00E+00 | 1.37E-05 | 5.00E-08 |
| SVOC | Acenaphthylene | 208-96-8 | 1.00E+00 | 1.00E+00 | 1.44E-05 | 5.00E-08 |
| SVOC | Acetophenone | 98-86-2 | 1.00E+00 | 1.00E+00 | 5.64E-05 | 5.00E-08 |
| SVOC | Anthracene | 120-12-7 | 1.00E+00 | 1.00E+00 | 3.86E-06 | 5.00E-08 |
| SVOC | Benzaldehyde | 100-52-7 | 1.00E+00 | 1.00E+00 | 8.93E-05 | 5.00E-08 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 1.00E+00 | 1.00E+00 | 3.38E-07 | 5.00E-08 |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| Chem Group | Chemical | CASRN | $C_{soil}$ (mg/kg) | $C_{source}$ (mg/kg) | $C_{air}$ ($mg/m^3$) | $C_{air}$ ($mg/m^3$) |
| SVOC | Benzo(a)pyrene | 50-32-8 | 1.00E+00 | 1.00E+00 | 1.42E-07 | 5.00E-08 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 1.00E+00 | 1.00E+00 | 6.49E-07 | 5.00E-08 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 1.00E+00 | 1.00E+00 | 6.49E-08 | 5.00E-08 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.00E+00 | 1.00E+00 | 9.20E-08 | 5.00E-08 |
| SVOC | Biphenyl | 92-52-4 | 1.00E+00 | 1.00E+00 | 1.53E-05 | 5.00E-08 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 1.00E+00 | 1.00E+00 | 1.83E-08 | 5.00E-08 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 1.00E+00 | 1.00E+00 | 4.21E-07 | 5.00E-08 |
| SVOC | Caprolactam | 105-60-2 | 1.00E+00 | 1.00E+00 | 2.53E-05 | 5.00E-08 |
| SVOC | Carbazole | 86-74-8 | 1.00E+00 | 1.00E+00 | 1.57E-06 | 5.00E-08 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.00E+00 | 1.00E+00 | 1.36E-05 | 5.00E-08 |
| SVOC | Chrysene | 218-01-9 | 1.00E+00 | 1.00E+00 | 1.10E-06 | 5.00E-08 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 1.00E+00 | 1.00E+00 | 4.04E-08 | 5.00E-08 |
| SVOC | Dibenzofuran | 132-64-9 | 1.00E+00 | 1.00E+00 | 2.60E-06 | 5.00E-08 |
| SVOC | Diethylphthalate | 84-66-2 | 1.00E+00 | 1.00E+00 | 5.69E-06 | 5.00E-08 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.00E+00 | 1.00E+00 | 1.23E-05 | 5.00E-08 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 1.00E+00 | 1.00E+00 | 5.24E-07 | 5.00E-08 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.00E+00 | 1.00E+00 | 1.26E-05 | 5.00E-08 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 1.00E+00 | 1.00E+00 | 5.02E-08 | 5.00E-08 |
| SVOC | Fluoranthene | 206-44-0 | 1.00E+00 | 1.00E+00 | 9.98E-07 | 5.00E-08 |
| SVOC | Fluorene | 86-73-7 | 1.00E+00 | 1.00E+00 | 5.90E-06 | 5.00E-08 |
| SVOC | Hexachlorobenzene | 118-74-1 | 1.00E+00 | 1.00E+00 | 1.63E-05 | 5.00E-08 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 1.00E+00 | 1.00E+00 | 4.16E-05 | 5.00E-08 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 1.00E+00 | 4.58E-01 | 2.79E-08 | 5.00E-08 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.00E+00 | 1.00E+00 | 4.08E-05 | 5.00E-08 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.00E+00 | 1.00E+00 | 1.56E-05 | 5.00E-08 |
| SVOC | Naphthalene | 91-20-3 | 1.00E+00 | 1.00E+00 | 5.37E-05 | 5.00E-08 |
| SVOC | Phenanthrene | 85-01-8 | 1.00E+00 | 1.00E+00 | 3.45E-06 | 5.00E-08 |
| SVOC | Phenol | 108-95-2 | 1.00E+00 | 1.00E+00 | 1.96E-05 | 5.00E-08 |
| SVOC | Pyrene | 129-00-0 | 1.00E+00 | 1.00E+00 | 8.14E-07 | 5.00E-08 |
| P/PCB | PCBs (total) | 1336-36-3 | 1.00E+00 | 1.00E+00 | 3.64E-06 | 5.00E-08 |
| INORG | Aluminum | 7429-90-5 | 1.00E+00 | | | 5.00E-08 |
| INORG | Antimony | 7440-36-0 | 1.00E+00 | | | 5.00E-08 |
| INORG | Arsenic | 7440-38-2 | 1.00E+00 | | | 5.00E-08 |
| INORG | Barium | 7440-39-3 | 1.00E+00 | | | 5.00E-08 |
| INORG | Beryllium | 7440-41-7 | 1.00E+00 | | | 5.00E-08 |
| INORG | Cadmium | 7440-43-9 | 1.00E+00 | | | 5.00E-08 |
| INORG | Chromium (total) | 7440-47-3 | 1.00E+00 | | | 5.00E-08 |
| INORG | Cobalt | 7440-48-4 | 1.00E+00 | | | 5.00E-08 |
| INORG | Copper | 7440-50-8 | 1.00E+00 | | | 5.00E-08 |
| INORG | Cyanide (amenable) | 57-12-5A | 1.00E+00 | | | 5.00E-08 |
| INORG | Cyanide (total) | 57-12-5 | 1.00E+00 | | | 5.00E-08 |
| INORG | Iron | 7439-89-6 | 1.00E+00 | | | 5.00E-08 |

## Attachment 2: Estimated Concentrations in Ambient Air from Soil (Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations) GM Powertrain Bedford Facility, Bedford, Indiana

| | | | $C_{air}$ Used | | | |
|---|---|---|---|---|---|---|
| | | | | | Vapor | $PM_{10}$ |
| **Chem Group** | **Chemical** | **CASRN** | **$C_{soil}$** (mg/kg) | **$C_{source}$** (mg/kg) | **$C_{air}$** ($mg/m^3$) | **$C_{air}$** ($mg/m^3$) |
| INORG | Lead | 7439-92-1 | 1.00E+00 | | | 5.00E-08 |
| INORG | Manganese | 7439-96-5 | 1.00E+00 | | | 5.00E-08 |
| INORG | Mercury | 7439-97-6 | 1.00E+00 | 1.00E+00 | 1.63E-05 | 5.00E-08 |
| INORG | Nickel | 7440-02-0 | 1.00E+00 | | | 5.00E-08 |
| INORG | Selenium | 7782-49-2 | 1.00E+00 | | | 5.00E-08 |
| INORG | Silver | 7440-22-4 | 1.00E+00 | | | 5.00E-08 |
| INORG | Thallium | 7440-28-0 | 1.00E+00 | | | 5.00E-08 |
| INORG | Vanadium | 7440-62-2 | 1.00E+00 | | | 5.00E-08 |
| INORG | Zinc | 7440-66-6 | 1.00E+00 | | | 5.00E-08 |
| | | | | | | |
| **Note:** | | | | | | |
| $C_{source}$ = Minimum of Soil Concentration and Csat | | | | | | |

## Attachment 2: Risk Based Cancer Criteria for Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 1.40E-08 | | | | | | | 2.41E-04 | | | 5.00E-08 | | | |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 1.40E-08 | 5.5E-02 | 1.3E+04 | | | 5.5E-02 | | 1.12E-03 | 7.8E-03 | 2.3E+02 | 5.00E-08 | 7.8E-03 | 5.2E+06 | 2.3E+02 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 1.40E-08 | 6.2E-02 | 1.2E+04 | | | 6.2E-02 | | 3.66E-04 | 1.8E-02 | 3.2E+02 | 5.00E-08 | 1.8E-02 | 2.3E+06 | 3.1E+02 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.73E-03 | | | 5.00E-08 | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 1.40E-08 | | | | | | | 2.24E-04 | | | 5.00E-08 | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 1.40E-08 | | | | | | | 2.80E-03 | | | 5.00E-08 | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 1.40E-08 | | | | | | | 4.82E-04 | | | 5.00E-08 | | | |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 1.40E-08 | 2.9E-03 | 2.5E+05 | | | 2.9E-03 | | 2.31E-03 | | | 5.00E-08 | | | 2.5E+05 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 1.40E-08 | | | | | | | 1.15E-03 | 2.3E-02 | 7.7E+01 | 5.00E-08 | 2.3E-02 | 1.8E+06 | 7.7E+01 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 1.40E-08 | | | | | | | 2.74E-03 | | | 5.00E-08 | | | |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.94E-03 | | | 5.00E-08 | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 1.40E-08 | | | | | | | 2.37E-03 | | | 5.00E-08 | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 1.40E-08 | 8.4E-02 | 8.5E+03 | | | 8.4E-02 | | 1.98E-04 | 2.4E-02 | 4.3E+02 | 5.00E-08 | 2.4E-02 | 1.7E+06 | 4.1E+02 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 1.40E-08 | | | | | | | 2.05E-04 | | | 5.00E-08 | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.23E-04 | | | 5.00E-08 | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 1.40E-08 | 2.4E-02 | 3.0E+04 | | | 2.4E-02 | | 2.32E-04 | 6.3E-03 | 1.4E+03 | 5.00E-08 | 6.3E-03 | 6.5E+06 | 1.3E+03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 1.40E-08 | | | | | | | 3.90E-03 | | | 5.00E-08 | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 1.40E-08 | | | | | | | 1.28E-03 | | | 5.00E-08 | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 1.40E-08 | 9.1E-02 | 7.9E+03 | | | 9.1E-02 | | 7.75E-04 | 2.6E-02 | 1.0E+02 | 5.00E-08 | 2.6E-02 | 1.6E+06 | 1.0E+02 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.06E-03 | | | 5.00E-08 | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 1.40E-08 | | | | | | | 1.34E-03 | | | 5.00E-08 | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 1.40E-08 | | | | | | | 5.60E-04 | | | 5.00E-08 | | | |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 1.40E-08 | | | | | | | 1.21E-03 | | | 5.00E-08 | | | |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 1.40E-08 | | | | | | | 6.76E-05 | | | 5.00E-08 | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 1.40E-08 | 3.3E-03 | 2.2E+05 | | | 3.3E-03 | | 6.01E-04 | 1.0E-04 | 3.4E+04 | 5.00E-08 | 1.0E-04 | 4.1E+08 | 2.9E+04 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 1.40E-08 | | | | | | | 2.43E-04 | | | 5.00E-08 | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 1.40E-08 | | | | | | | 2.73E-03 | | | 5.00E-08 | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 1.40E-08 | 7.5E-03 | 9.5E+04 | | | 7.5E-03 | | 1.23E-03 | 4.7E-04 | 3.5E+03 | 5.00E-08 | 4.7E-04 | 8.7E+07 | 3.4E+03 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 1.40E-08 | 5.2E-02 | 1.4E+04 | | | 5.2E-02 | | 1.21E-03 | 3.1E-03 | 5.5E+02 | 5.00E-08 | 3.1E-03 | 1.3E+07 | 5.3E+02 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 1.40E-08 | | | | | | | 7.62E-04 | | | 5.00E-08 | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 1.40E-08 | | | | | | | 6.95E-05 | | | 5.00E-08 | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.41E-03 | | | 5.00E-08 | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 1.40E-08 | 1.1E-02 | 6.5E+04 | | | 1.1E-02 | | 9.36E-04 | 1.7E-03 | 1.3E+03 | 5.00E-08 | 1.7E-03 | 2.4E+07 | 1.3E+03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 1.40E-08 | | | | | | | 2.17E-03 | | | 5.00E-08 | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 1.40E-08 | 1.4E+00 | 5.1E+02 | | | 1.4E+00 | | 3.34E-03 | 8.8E-03 | 7.0E+01 | 5.00E-08 | 8.8E-03 | 4.6E+06 | 6.1E+01 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 1.40E-08 | | | | | | | 5.13E-04 | | | 5.00E-08 | | | |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 1.37E-05 | | | 5.00E-08 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 1.44E-05 | | | 5.00E-08 | | | |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 5.64E-05 | | | 5.00E-08 | | | |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 3.86E-06 | | | 5.00E-08 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 8.93E-05 | | | 5.00E-08 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 1.40E-08 | 7.3E-01 | 9.8E+02 | 1.30E-01 | 6.00E-09 | 7.3E-01 | 2.3E+03 | 3.38E-07 | 2.1E-01 | 2.9E+04 | 5.00E-08 | 2.1E-01 | 2.0E+05 | 6.7E+02 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 1.40E-08 | 7.3E+00 | 9.8E+01 | 1.30E-01 | 6.00E-09 | 7.3E+00 | 2.3E+02 | 1.42E-07 | 8.9E-01 | 1.6E+04 | 5.00E-08 | 8.9E-01 | 4.6E+04 | 6.8E+01 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 1.40E-08 | 7.3E-01 | 9.8E+02 | 1.30E-01 | 6.00E-09 | 7.3E-01 | 2.3E+03 | 6.49E-07 | 2.1E-01 | 1.5E+04 | 5.00E-08 | 2.1E-01 | 2.0E+05 | 6.5E+02 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 6.49E-08 | | | 5.00E-08 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 1.40E-08 | 7.3E-02 | 9.8E+03 | 1.30E-01 | 6.00E-09 | 7.3E-02 | 2.3E+04 | 9.20E-08 | 2.1E-02 | 1.1E+06 | 5.00E-08 | 2.1E-02 | 2.0E+06 | 6.8E+03 |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 1.53E-05 | | | 5.00E-08 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 1.40E-08 | 1.4E-02 | 5.1E+04 | 1.00E-01 | 4.61E-09 | 1.4E-02 | 1.5E+05 | 1.83E-08 | 4.0E-03 | 2.8E+07 | 5.00E-08 | 4.0E-03 | 1.0E+07 | 3.8E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 4.21E-07 | | | 5.00E-08 | | | |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 2.53E-05 | | | 5.00E-08 | | | |

## Attachment 2: Risk Based Cancer Criteria for Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $ABS_d$ | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | $C_{air}$ $(mg/m^3)$ | URF $(m^3/mg)$ | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 1.40E-08 | 2.0E-02 | 3.6E+04 | 1.00E-01 | 4.61E-09 | 2.0E-02 | 1.1E+05 | 1.57E-06 | 5.7E-03 | 2.3E+05 | 5.00E-08 | 5.7E-03 | 7.2E+06 | 2.4E+04 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 1.36E-05 | | | 5.00E-08 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 1.40E-08 | 7.3E-03 | 9.8E+04 | 1.30E-01 | 6.00E-09 | 7.3E-03 | 2.3E+05 | 1.10E-06 | 2.1E-03 | 8.9E+05 | 5.00E-08 | 2.1E-03 | 2.0E+07 | 6.3E+04 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 1.40E-08 | 7.3E+00 | 9.8E+01 | 1.30E-01 | 6.00E-09 | 7.3E+00 | 2.3E+02 | 4.04E-08 | 2.1E+00 | 2.4E+04 | 5.00E-08 | 2.1E+00 | 2.0E+04 | 6.8E+01 |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 2.60E-06 | | | 5.00E-08 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 5.69E-06 | | | 5.00E-08 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 1.23E-05 | | | 5.00E-08 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 5.24E-07 | | | 5.00E-08 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 1.40E-08 | 6.8E-01 | 1.1E+03 | 1.00E-01 | 4.61E-09 | 6.8E-01 | 3.2E+03 | 1.26E-05 | 1.9E-01 | 8.4E+02 | 5.00E-08 | 1.9E-01 | 2.1E+05 | 4.1E+02 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 5.02E-08 | | | 5.00E-08 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 9.98E-07 | | | 5.00E-08 | | | |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 5.90E-06 | | | 5.00E-08 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 1.40E-08 | 1.6E+00 | 4.5E+02 | 1.00E-01 | 4.61E-09 | 1.6E+00 | 1.4E+03 | 1.63E-05 | 4.6E-01 | 2.7E+02 | 5.00E-08 | 4.6E-01 | 8.9E+04 | 1.5E+02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 1.40E-08 | 7.8E-02 | 9.2E+03 | 1.00E-01 | 4.61E-09 | 7.8E-02 | 2.8E+04 | 4.16E-05 | 2.2E-02 | 2.2E+03 | 5.00E-08 | 2.2E-02 | 1.9E+06 | 1.7E+03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 1.40E-08 | 7.3E-01 | 9.8E+02 | 1.30E-01 | 6.00E-09 | 7.3E-01 | 2.3E+03 | 2.79E-08 | 2.1E-01 | 3.5E+05 | 5.00E-08 | 2.1E-01 | 2.0E+05 | 6.8E+02 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 4.08E-05 | | | 5.00E-08 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 1.56E-05 | | | 5.00E-08 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 5.37E-05 | | | 5.00E-08 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 3.45E-06 | | | 5.00E-08 | | | |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 1.40E-08 | | | 1.00E-01 | 4.61E-09 | | | 1.96E-05 | | | 5.00E-08 | | | |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 1.40E-08 | | | 1.30E-01 | 6.00E-09 | | | 8.14E-07 | | | 5.00E-08 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 1.40E-08 | 2.0E+00 | 3.6E+02 | 1.40E-01 | 6.46E-09 | 2.0E+00 | 7.7E+02 | 3.64E-06 | 5.7E-01 | 9.8E+02 | 5.00E-08 | 5.7E-01 | 7.2E+04 | 2.0E+02 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 1.40E-08 | 1.5E+00 | 4.8E+02 | 3.00E-02 | 1.38E-09 | 1.5E+00 | 4.8E+03 | | 4.3E+00 | | 5.00E-08 | 4.3E+00 | 9.5E+03 | 4.2E+02 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 1.40E-08 | | | | | | | | 2.4E+00 | | 5.00E-08 | 2.4E+00 | 1.7E+04 | 1.7E+04 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 1.40E-08 | | | 1.00E-03 | 4.61E-11 | | | | 1.8E+00 | | 5.00E-08 | 1.8E+00 | 2.3E+04 | 2.3E+04 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 1.40E-08 | | | | | | | | 1.2E+01 | | 5.00E-08 | 1.2E+01 | 3.4E+03 | 3.4E+03 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 1.40E-08 | | | | | | | | 2.8E+00 | | 5.00E-08 | 2.8E+00 | 1.5E+04 | 1.5E+04 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 1.40E-08 | | | | | | | 1.63E-05 | | | 5.00E-08 | | | |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 1.40E-08 | | | | | | | | 2.4E-01 | | 5.00E-08 | 2.4E-01 | 1.7E+05 | 1.7E+05 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 1.40E-08 | | | | | | | | | | 5.00E-08 | | | |

## Attachment 2: Risk Based Noncancer Criteria for Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 9.78E-07 | 1.0E+00 | 1.02E+06 | | | 1.0E+00 | | 2.41E-04 | 3.2E+00 | 3.82E+04 | 5.00E-08 | 3.2E+00 | 1.84E+08 | 3.68E+04 |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 9.78E-07 | 3.0E-03 | 3.07E+03 | | | 3.0E-03 | | 1.12E-03 | 6.0E-02 | 1.56E+02 | 5.00E-08 | 6.0E-02 | 3.50E+06 | 1.48E+02 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 2.0E-02 | | 3.66E-04 | 7.0E-02 | 5.58E+02 | 5.00E-08 | 7.0E-02 | 4.09E+06 | 5.43E+02 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 9.78E-07 | 5.0E-03 | 5.11E+03 | | | 5.0E-03 | | 1.73E-03 | 2.0E-01 | 3.38E+02 | 5.00E-08 | 2.0E-01 | 1.17E+07 | 3.17E+02 |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 9.78E-07 | 2.0E+00 | 2.04E+06 | | | 2.0E+00 | | 2.24E-04 | 5.0E+00 | 6.53E+04 | 5.00E-08 | 5.0E+00 | 2.92E+08 | 6.33E+04 |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 9.78E-07 | 1.0E-01 | 1.02E+05 | | | 1.0E-01 | | 2.80E-03 | 7.0E-01 | 7.30E+02 | 5.00E-08 | 7.0E-01 | 4.09E+07 | 7.24E+02 |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 2.0E-02 | | 4.82E-04 | 6.0E-02 | 3.64E+02 | 5.00E-08 | 6.0E-02 | 3.50E+06 | 3.57E+02 |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | | | 4.0E-01 | | 2.31E-03 | 1.0E+01 | 1.27E+04 | 5.00E-08 | 1.0E+01 | 5.84E+08 | 1.23E+04 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 9.78E-07 | 1.0E-02 | 1.02E+04 | | | 1.0E-02 | | 1.15E-03 | 5.0E-02 | 1.27E+02 | 5.00E-08 | 5.0E-02 | 2.92E+06 | 1.25E+02 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 9.78E-07 | | | | | | | 2.74E-03 | 9.0E-02 | 9.58E+01 | 5.00E-08 | 9.0E-02 | 5.26E+06 | 9.58E+01 |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | | | 4.0E-01 | | 1.94E-03 | 4.0E-01 | 6.01E+02 | 5.00E-08 | 4.0E-01 | 2.34E+07 | 6.00E+02 |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 9.78E-07 | | | | | | | 2.37E-03 | 6.0E+00 | 7.39E+03 | 5.00E-08 | 6.0E+00 | 3.50E+08 | 7.39E+03 |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 9.78E-07 | 2.0E-01 | 2.04E+05 | | | 2.0E-01 | | 1.98E-04 | 7.0E-02 | 1.03E+03 | 5.00E-08 | 7.0E-02 | 4.09E+06 | 1.03E+03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 9.78E-07 | 9.0E-02 | 9.20E+04 | | | 9.0E-02 | | 2.05E-04 | 2.0E+00 | 2.85E+04 | 5.00E-08 | 2.0E+00 | 1.17E+08 | 2.17E+04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 9.78E-07 | 9.0E-04 | 9.20E+02 | | | 9.0E-04 | | 1.23E-04 | 1.4E-01 | 3.32E+03 | 5.00E-08 | 1.4E-01 | 8.18E+06 | 7.20E+02 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 9.78E-07 | 3.0E-02 | 3.07E+04 | | | 3.0E-02 | | 2.32E-04 | 2.5E+00 | 3.15E+04 | 5.00E-08 | 2.5E+00 | 1.46E+08 | 1.55E+04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 9.78E-07 | 9.0E-01 | 9.20E+05 | | | 9.0E-01 | | 3.90E-03 | 2.0E+00 | 1.50E+03 | 5.00E-08 | 2.0E+00 | 1.17E+08 | 1.49E+03 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 9.78E-07 | 1.0E+00 | 1.02E+06 | | | 1.0E+00 | | 1.28E-03 | 5.0E+00 | 1.14E+04 | 5.00E-08 | 5.0E+00 | 2.92E+08 | 1.13E+04 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 9.78E-07 | 3.0E-02 | 3.07E+04 | | | 3.0E-02 | | 7.75E-04 | 5.0E-03 | 1.89E+01 | 5.00E-08 | 5.0E-03 | 2.92E+05 | 1.88E+01 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 9.78E-07 | 1.0E-01 | 1.02E+05 | | | 1.0E-01 | | 1.06E-03 | 3.5E-02 | 9.67E+01 | 5.00E-08 | 3.5E-02 | 2.04E+06 | 9.66E+01 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 9.78E-07 | 2.0E-01 | 2.04E+05 | | | 2.0E-01 | | 1.34E-03 | 7.0E-02 | 1.52E+02 | 5.00E-08 | 7.0E-02 | 4.09E+06 | 1.52E+02 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 9.78E-07 | 1.0E-01 | 1.02E+05 | | | 1.0E-01 | | 5.60E-04 | 1.0E+00 | 5.22E+03 | 5.00E-08 | 1.0E+00 | 5.84E+07 | 4.96E+03 |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 9.78E-07 | 4.0E-02 | 4.09E+04 | | | 4.0E-02 | | 1.21E-03 | 5.0E-03 | 1.20E+01 | 5.00E-08 | 5.0E-03 | 2.92E+05 | 1.20E+01 |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 9.78E-07 | 1.0E+01 | 1.02E+07 | | | 1.0E+01 | | 6.76E-05 | 3.5E+00 | 1.51E+05 | 5.00E-08 | 3.5E+00 | 2.04E+08 | 1.49E+05 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 9.78E-07 | | | | | | | 6.01E-04 | 3.0E+00 | 1.46E+04 | 5.00E-08 | 3.0E+00 | 1.75E+08 | 1.46E+04 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 9.78E-07 | | | | | | | 2.43E-04 | 3.0E+00 | 3.60E+04 | 5.00E-08 | 3.0E+00 | 1.75E+08 | 3.60E+04 |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 9.78E-07 | | | | | | | 2.73E-03 | 3.0E+00 | 3.21E+03 | 5.00E-08 | 3.0E+00 | 1.75E+08 | 3.21E+03 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 9.78E-07 | 6.0E-02 | 6.13E+04 | | | 6.0E-02 | | 1.23E-03 | 3.0E+00 | 7.10E+03 | 5.00E-08 | 3.0E+00 | 1.75E+08 | 6.37E+03 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 9.78E-07 | 1.0E-01 | 1.02E+05 | | | 1.0E-01 | | 1.21E-03 | 4.0E-01 | 9.63E+02 | 5.00E-08 | 4.0E-01 | 2.34E+07 | 9.54E+02 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 9.78E-07 | 2.0E+00 | 2.04E+06 | | | 2.0E+00 | | 7.62E-04 | 1.0E+00 | 3.83E+03 | 5.00E-08 | 1.0E+00 | 5.84E+07 | 3.83E+03 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 9.78E-07 | 1.0E-02 | 1.02E+04 | | | 1.0E-02 | | 6.95E-05 | 2.0E+00 | 8.40E+04 | 5.00E-08 | 2.0E+00 | 1.17E+08 | 9.11E+03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 9.78E-07 | 2.8E+00 | 2.86E+06 | | | 2.8E+00 | | 1.41E-03 | 2.2E+01 | 4.56E+04 | 5.00E-08 | 2.2E+01 | 1.28E+09 | 4.49E+04 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 9.78E-07 | 6.0E-03 | 6.13E+03 | | | 6.0E-03 | | 9.36E-04 | | | 5.00E-08 | | | 6.13E+03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 9.78E-07 | 3.0E+01 | 3.07E+07 | | | 3.0E+01 | | 2.17E-03 | 3.0E+01 | 4.04E+04 | 5.00E-08 | 3.0E+01 | 1.75E+09 | 4.04E+04 |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 9.78E-07 | 3.0E-03 | 3.07E+03 | | | 3.0E-03 | | 3.34E-03 | 1.0E-01 | 8.75E+01 | 5.00E-08 | 1.0E-01 | 5.84E+06 | 8.51E+01 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | | | 4.0E-01 | | 5.13E-04 | 1.0E-01 | 5.70E+02 | 5.00E-08 | 1.0E-01 | 5.84E+06 | 5.69E+02 |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 9.78E-07 | 6.0E-01 | 6.13E+05 | 1.30E-01 | 4.20E-07 | 6.0E-01 | 1.43E+06 | 1.37E-05 | 2.1E-01 | 4.46E+04 | 5.00E-08 | 2.1E-01 | 1.23E+07 | 4.03E+04 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | 1.30E-01 | 4.20E-07 | 3.0E-01 | 7.15E+05 | 1.44E-05 | 1.1E-01 | 2.12E+04 | 5.00E-08 | 1.1E-01 | 6.13E+06 | 1.93E+04 |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 9.78E-07 | 1.0E+00 | 1.02E+06 | 1.00E-01 | 3.23E-07 | 1.0E+00 | 3.10E+06 | 5.64E-05 | 3.5E-01 | 1.81E+04 | 5.00E-08 | 3.5E-01 | 2.04E+07 | 1.77E+04 |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 9.78E-07 | 3.0E+00 | 3.07E+06 | 1.30E-01 | 4.20E-07 | 3.0E+00 | 7.15E+06 | 3.86E-06 | | | 5.00E-08 | | | 2.15E+06 |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 9.78E-07 | 1.0E-01 | 1.02E+05 | 1.00E-01 | 3.23E-07 | 1.0E-01 | 3.10E+05 | 8.93E-05 | 3.5E-01 | 1.14E+04 | 5.00E-08 | 3.5E-01 | 2.04E+07 | 9.96E+03 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 3.38E-07 | | | 5.00E-08 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 1.42E-07 | | | 5.00E-08 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 6.49E-07 | | | 5.00E-08 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | 1.30E-01 | 4.20E-07 | 3.0E-01 | 7.15E+05 | 6.49E-08 | 1.1E-01 | 4.72E+06 | 5.00E-08 | 1.1E-01 | 6.13E+06 | 1.99E+05 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 9.20E-08 | | | 5.00E-08 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 9.78E-07 | 5.0E-02 | 5.11E+04 | 1.00E-01 | 3.23E-07 | 5.0E-02 | 1.55E+05 | 1.53E-05 | 1.8E-01 | 3.33E+04 | 5.00E-08 | 1.8E-01 | 1.02E+07 | 1.78E+04 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | 1.00E-01 | 3.23E-07 | 2.0E-02 | 6.19E+04 | 1.83E-08 | 2.0E-01 | 3.19E+07 | 5.00E-08 | 2.0E-01 | 1.17E+07 | 1.53E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 9.78E-07 | 2.0E+00 | 2.04E+06 | 1.00E-01 | 3.23E-07 | 2.0E+00 | 6.19E+06 | 4.21E-07 | 7.0E-01 | 4.86E+06 | 5.00E-08 | 7.0E-01 | 4.09E+07 | 1.13E+06 |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 9.78E-07 | 5.0E-01 | 5.11E+05 | 1.00E-01 | 3.23E-07 | 5.0E-01 | 1.55E+06 | 2.53E-05 | 1.8E+00 | 2.02E+05 | 5.00E-08 | 1.8E+00 | 1.02E+08 | 1.32E+05 |

## Attachment 2: Risk Based Noncancer Criteria for Construction Worker (Large-Scale Scenario) Exposure to Soil in 10-ft Excavations
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Soil Ingestion | | | | Soil Dermal Contact | | | | Soil Vapor Inhalation | | | Soil Particulate Inhalation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/kg) | Combined RBC (mg/kg) |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 9.78E-07 | | | 1.00E-01 | 3.23E-07 | | | 1.57E-06 | | | 5.00E-08 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 9.78E-07 | 4.0E-03 | 4.09E+03 | 1.00E-01 | 3.23E-07 | 4.0E-03 | 1.24E+04 | 1.36E-05 | 1.4E-02 | 3.01E+03 | 5.00E-08 | 1.4E-02 | 8.18E+05 | 1.52E+03 |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 1.10E-06 | | | 5.00E-08 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 4.04E-08 | | | 5.00E-08 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 9.78E-07 | 4.0E-03 | 4.09E+03 | 1.00E-01 | 3.23E-07 | 4.0E-03 | 1.24E+04 | 2.60E-06 | 1.4E-02 | 1.57E+04 | 5.00E-08 | 1.4E-02 | 8.18E+05 | 2.56E+03 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 9.78E-07 | 8.0E+00 | 8.18E+06 | 1.00E-01 | 3.23E-07 | 8.0E+00 | 2.48E+07 | 5.69E-06 | 2.8E+00 | 1.44E+06 | 5.00E-08 | 2.8E+00 | 1.64E+08 | 1.16E+06 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 9.78E-07 | 2.0E-01 | 2.04E+05 | 1.00E-01 | 3.23E-07 | 2.0E-01 | 6.19E+05 | 1.23E-05 | 7.0E-02 | 1.66E+04 | 5.00E-08 | 7.0E-02 | 4.09E+06 | 1.49E+04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 9.78E-07 | 1.0E+00 | 1.02E+06 | 1.00E-01 | 3.23E-07 | 1.0E+00 | 3.10E+06 | 5.24E-07 | | | 5.00E-08 | | | 7.68E+05 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 9.78E-07 | 1.0E-02 | 1.02E+04 | 1.00E-01 | 3.23E-07 | 1.0E-02 | 3.10E+04 | 1.26E-05 | 3.5E-03 | 8.12E+02 | 5.00E-08 | 3.5E-03 | 2.04E+05 | 7.32E+02 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | 1.00E-01 | 3.23E-07 | 4.0E-01 | 1.24E+06 | 5.02E-08 | | | 5.00E-08 | | | 3.07E+05 |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | 1.30E-01 | 4.20E-07 | 4.0E-01 | 9.53E+05 | 9.98E-07 | 1.4E-01 | 4.10E+05 | 5.00E-08 | 1.4E-01 | 8.18E+06 | 1.65E+05 |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 9.78E-07 | 4.0E-01 | 4.09E+05 | 1.30E-01 | 4.20E-07 | 4.0E-01 | 9.53E+05 | 5.90E-06 | 1.4E-01 | 6.93E+04 | 5.00E-08 | 1.4E-01 | 8.18E+06 | 5.54E+04 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 9.78E-07 | 8.0E-04 | 8.18E+02 | 1.00E-01 | 3.23E-07 | 8.0E-04 | 2.48E+03 | 1.63E-05 | | | 5.00E-08 | | | 6.15E+02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 9.78E-07 | 7.0E-04 | 7.15E+02 | 1.00E-01 | 3.23E-07 | 7.0E-04 | 2.17E+03 | 4.16E-05 | | | 5.00E-08 | | | 5.38E+02 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 9.78E-07 | | | 1.30E-01 | 4.20E-07 | | | 2.79E-08 | | | 5.00E-08 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 9.78E-07 | 4.0E-03 | 4.09E+03 | 1.00E-01 | 3.23E-07 | 4.0E-03 | 1.24E+04 | 4.08E-05 | 3.0E-03 | 2.15E+02 | 5.00E-08 | 3.0E-03 | 1.75E+05 | 2.01E+02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 9.78E-07 | 5.0E-02 | 5.11E+04 | 1.00E-01 | 3.23E-07 | 5.0E-02 | 1.55E+05 | 1.56E-05 | 1.8E-01 | 3.28E+04 | 5.00E-08 | 1.8E-01 | 1.02E+07 | 1.77E+04 |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | 1.30E-01 | 4.20E-07 | 2.0E-02 | 4.76E+04 | 5.37E-05 | 3.0E-03 | 1.63E+02 | 5.00E-08 | 3.0E-03 | 1.75E+05 | 1.61E+02 |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | 1.30E-01 | 4.20E-07 | 3.0E-01 | 7.15E+05 | 3.45E-06 | 1.1E-01 | 8.90E+04 | 5.00E-08 | 1.1E-01 | 6.13E+06 | 6.22E+04 |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | 1.00E-01 | 3.23E-07 | 3.0E-01 | 9.29E+05 | 1.96E-05 | | | 5.00E-08 | | | 2.31E+05 |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | 1.30E-01 | 4.20E-07 | 3.0E-01 | 7.15E+05 | 8.14E-07 | 1.1E-01 | 3.77E+05 | 5.00E-08 | 1.1E-01 | 6.13E+06 | 1.34E+05 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 9.78E-07 | 5.0E-05 | 5.11E+01 | 1.40E-01 | 4.52E-07 | 5.0E-05 | 1.11E+02 | 3.64E-06 | | | 5.00E-08 | | | 3.50E+01 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 9.78E-07 | 1.0E+00 | 1.02E+06 | | | 1.0E+00 | | | 5.0E-03 | | 5.00E-08 | 5.0E-03 | 2.92E+05 | 2.27E+05 |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 9.78E-07 | 4.0E-04 | 4.09E+02 | | | 6.0E-05 | | | 4.0E-04 | | 5.00E-08 | 4.0E-04 | 2.34E+04 | 4.02E+02 |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 9.78E-07 | 5.0E-03 | 5.11E+03 | 3.00E-02 | 9.69E-08 | 5.0E-03 | 5.16E+04 | | | | 5.00E-08 | | | 4.65E+03 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 9.78E-07 | 7.0E-02 | 7.15E+04 | | | 7.0E-02 | | | | | 5.00E-08 | | | 7.15E+04 |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 9.78E-07 | 2.0E-03 | 2.04E+03 | | | 1.4E-05 | | | 2.0E-05 | | 5.00E-08 | 2.0E-05 | 1.17E+03 | 7.43E+02 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 9.78E-07 | 1.0E-03 | 1.02E+03 | 1.00E-03 | 3.23E-09 | 2.5E-05 | 7.74E+03 | | 9.0E-04 | | 5.00E-08 | 9.0E-04 | 5.26E+04 | 8.88E+02 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 5.0E-04 | | | | | 5.00E-08 | | | 2.04E+04 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 2.0E-02 | | | 2.0E-05 | | 5.00E-08 | 2.0E-05 | 1.17E+03 | 1.10E+03 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 9.78E-07 | 4.0E-02 | 4.09E+04 | | | 4.0E-02 | | | 1.4E-01 | | 5.00E-08 | 1.4E-01 | 8.18E+06 | 4.07E+04 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 2.0E-02 | | | 7.0E-02 | | 5.00E-08 | 7.0E-02 | 4.09E+06 | 2.03E+04 |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 2.0E-02 | | | 7.0E-02 | | 5.00E-08 | 7.0E-02 | 4.09E+06 | 2.03E+04 |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | | | 3.0E-01 | | | | | 5.00E-08 | | | 3.07E+05 |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 9.78E-07 | | | | | | | | | | 5.00E-08 | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 9.78E-07 | 1.4E-01 | 1.43E+05 | | | 5.6E-03 | | | 5.0E-05 | | 5.00E-08 | 5.0E-05 | 2.92E+03 | 2.86E+03 |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 9.78E-07 | 3.0E-04 | 3.07E+02 | | | 2.1E-05 | | 1.63E-05 | 3.0E-04 | 5.37E+01 | 5.00E-08 | 3.0E-04 | 1.75E+04 | 4.56E+01 |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 9.78E-07 | 2.0E-02 | 2.04E+04 | | | 8.0E-04 | | | | | 5.00E-08 | | | 2.04E+04 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 9.78E-07 | 5.0E-03 | 5.11E+03 | | | 5.0E-03 | | | 1.8E-02 | | 5.00E-08 | 1.8E-02 | 1.02E+06 | 5.08E+03 |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 9.78E-07 | 5.0E-03 | 5.11E+03 | | | 2.0E-04 | | | 1.0E-05 | | 5.00E-08 | 1.0E-05 | 5.84E+02 | 5.24E+02 |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 9.78E-07 | 7.0E-05 | 7.15E+01 | | | 7.0E-05 | | | 2.5E-04 | | 5.00E-08 | 2.5E-04 | 1.43E+04 | 7.12E+01 |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 9.78E-07 | 7.0E-03 | 7.15E+03 | | | 1.8E-04 | | | 2.5E-02 | | 5.00E-08 | 2.5E-02 | 1.43E+06 | 7.12E+03 |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 9.78E-07 | 3.0E-01 | 3.07E+05 | | | 3.0E-01 | | | 1.1E+00 | | 5.00E-08 | 1.1E+00 | 6.13E+07 | 3.05E+05 |

# A T T A C H M E N T  3

## Exposure of Construction Workers to Groundwater in Excavations

**Attachment 3: Estimates of Risk and HQ for Construction Worker Exposure to Groundwater in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Max Conc (mg/L) | Site-Specific Construction Worker Cancer Criteria ($TR=10^{-5}$) (mg/L) | Site-Specific Construction Worker Noncancer Criteria (HQ=1) (mg/L) | Cancer Risk | HQ |
|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 21 | 2 | 3.20E-03 | | 6.22E+03 | | 5.1E-07 |
| VOC | Benzene | 71-43-2 | A | 21 | 2 | 1.55E-03 | 4.50E+00 | 1.50E+01 | 3.4E-09 | 1.0E-04 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 21 | 2 | 2.20E-03 | 3.18E+00 | 5.64E+01 | 6.9E-09 | 3.9E-05 |
| VOC | 2-Butanone | 78-93-3 | ID | 21 | 3 | 4.80E-03 | | 7.99E+03 | | 6.0E-07 |
| VOC | Carbon Disulfide | 75-15-0 | | 21 | 1 | 2.40E-04 | | 3.46E+02 | | 6.9E-07 |
| VOC | Chlorobenzene | 108-90-7 | D | 21 | 4 | 1.45E-01 | | 3.62E+01 | | 4.0E-03 |
| VOC | Chloroform | 67-66-3 | B2 | 21 | 2 | 1.00E-02 | 2.10E+00 | 3.29E+01 | 4.8E-08 | 3.0E-04 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 21 | 3 | 3.70E-03 | | 1.34E+02 | | 2.8E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 21 | 3 | 2.70E-03 | | 9.21E+00 | | 2.9E-04 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 21 | 3 | 5.75E-03 | 6.74E+00 | 2.10E+02 | 8.5E-09 | 2.7E-05 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 21 | 1 | 7.35E-04 | | 2.98E+02 | | 2.5E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 21 | 1 | 1.40E-03 | | 6.53E+04 | | 2.1E-08 |
| VOC | Toluene | 108-88-3 | D | 21 | 11 | 1.60E-02 | | 2.24E+02 | | 7.1E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 21 | 1 | 5.30E-03 | 1.94E+00 | 4.02E+01 | 2.7E-08 | 1.3E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 21 | 1 | 1.90E-03 | | 1.45E+02 | | 1.3E-05 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 21 | 4 | 1.55E-02 | 1.82E+00 | 7.26E+00 | 8.5E-08 | 2.1E-03 |
| SVOC | Caprolactam | 105-60-2 | | 21 | 1 | 9.20E-02 | | 1.95E+05 | | 4.7E-07 |
| SVOC | Diethylphthalate | 84-66-2 | D | 21 | 6 | 1.90E-03 | | 4.66E+04 | | 4.1E-08 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 21 | 1 | 1.35E-03 | | 6.25E+02 | | 2.2E-06 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 21 | 4 | 1.60E-03 | | 4.63E+02 | | 3.5E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 21 | 1 | 1.80E-02 | | 1.31E+01 | | 1.4E-03 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 21 | 1 | 1.60E-03 | | 2.57E+03 | | 6.2E-07 |
| SVOC | Phenol | 108-95-2 | ID | 21 | 4 | 1.54E-02 | | 3.09E+04 | | 5.0E-07 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 27 | 13 | 5.81E+00 | 1.47E-02 | 9.35E-03 | 4.0E-03 | 6.2E+02 |
| INORG | Aluminum | 7429-90-5 | D | 21 | 3 | 3.89E-01 | | 3.08E+05 | | 1.3E-06 |
| INORG | Arsenic | 7440-38-2 | A | 21 | 4 | 7.10E-03 | 1.44E+01 | 9.23E+01 | 4.9E-09 | 7.7E-05 |
| INORG | Barium | 7440-39-3 | D | 21 | 20 | 4.00E-01 | | 2.15E+04 | | 1.9E-05 |
| INORG | Cadmium | 7440-43-9 | B1 | 21 | 1 | 3.20E-04 | | 1.80E+01 | | 1.8E-05 |
| INORG | Chromium (total) | 7440-47-3 | | 21 | 5 | 1.30E-01 | | 5.59E+01 | | 2.3E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 21 | 4 | 2.00E-03 | | 8.09E+03 | | 2.5E-07 |
| INORG | Copper | 7440-50-8 | D | 21 | 2 | 1.50E-02 | | 1.23E+04 | | 1.2E-06 |
| INORG | Iron | 7439-89-6 | D | 21 | 18 | 1.63E+01 | | 9.23E+04 | | 1.8E-04 |
| INORG | Manganese | 7439-96-5 | D | 21 | 20 | 2.00E+00 | | 4.09E+03 | | 4.9E-04 |
| INORG | Mercury | 7439-97-6 | D | 21 | 2 | 1.45E-04 | | 2.59E-01 | | 5.6E-04 |
| INORG | Nickel | 7440-02-0 | A | 21 | 10 | 1.60E-02 | | 2.38E+03 | | 6.7E-06 |
| INORG | Silver | 7440-22-4 | D | 21 | 1 | 9.80E-04 | | 2.34E+02 | | 4.2E-06 |
| INORG | Thallium | 7440-28-0 | | 21 | 1 | 5.50E-03 | | 2.15E+01 | | 2.6E-04 |
| INORG | Vanadium | 7440-62-2 | | 21 | 1 | 9.90E-04 | | 1.36E+02 | | 7.3E-06 |
| INORG | Zinc | 7440-66-6 | D | 21 | 9 | 1.10E-01 | | 1.10E+05 | | 1.0E-06 |
| | | | | | | | | | | |
| **Notes:** | | | | | | | | **Sum:** | **4.0E-03** | **6.2E+02** |
| 1. Only constituents detected in the East Plant Area are shown. | | | | | | | | | | |
| 2. Carc class - EPA Weight-of-Evidence Cancer Classification. | | | | | | | | | | |

## Attachment 3: High-End Exposure Factors for Construction Worker Contact with Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Construction Worker | |
|---|---|---|---|---|
| **Incidental Groundwater Ingestion** | | | | |
| Drinking Rate | L-water/hr | **DR** | 0.005 | e |
| Events per Day | 1/d | **EV** | 1 | |
| Exposure Time | hours | **ET** | 2 | e |
| Exposure Frequency | days/year | **EF** | 5 | e |
| Expoure Duration | years | **ED** | 10 | e |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 3,650 | a |
| **Dermal Contact with Groundwater** | | | | |
| Event Time | hr | **t** | 2 | e |
| Skin Surface Area | $cm^2$ | **SA** | 3,300 | d |
| Events per Day | 1/d | **EV** | 1 | |
| Exposure Frequency | d/yr | **EF** | 5 | e |
| Exposure Duration | yr | **ED** | 10 | e |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, carc | d | **$AT_c$** | 25,550 | a |
| Averaging Time, noncarc | d | **$AT_{nc}$** | 3,650 | a |
| **Ambient Air Inhalation** | | | | |
| Fraction Contacted | unitless | **FC** | 1 | |
| Exposure Time | hour/hour | **ET** | 8/8 | |
| Exposure Frequency | days/year | **EF** | 5 | e |
| Exposure Duration | years | **ED** | 10 | e |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 3,650 | a |

## Attachment 3: Nonsteady State Dermal Absorption of Chemicals from Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | MW (g/mole) | Log $K_{ow}$ (unitless) | $K_p$ (cm/hr) | B (unitless) | $\tau$ (hr) | c | b | ts (hr) | FA (unitless) | DA ($L/cm^2$-event) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 5.8E+01 | -2.4E-01 | 5.2E-04 | 1.5E-03 | 2.2E-01 | 3.3E-01 | 3.0E-01 | 5.3E-01 | 1.0E+00 | 1.27E-06 |
| VOC | Benzene | 71-43-2 | 7.8E+01 | 2.1E+00 | 1.5E-02 | 5.0E-02 | 2.9E-01 | 3.7E-01 | 3.3E-01 | 6.9E-01 | 1.0E+00 | 3.70E-05 |
| VOC | Bromodichloromethane | 75-27-4 | 1.6E+02 | 2.1E+00 | 4.7E-03 | 2.3E-02 | 8.7E-01 | 3.5E-01 | 3.2E-01 | 2.1E+00 | 1.0E+00 | 1.70E-05 |
| VOC | Bromomethane | 74-83-9 | 9.5E+01 | 1.2E+00 | 2.8E-03 | 1.1E-02 | 3.6E-01 | 3.4E-01 | 3.1E-01 | 8.6E-01 | 1.0E+00 | 7.68E-06 |
| VOC | 2-Butanone | 78-93-3 | 7.2E+01 | 2.9E-01 | 9.7E-04 | 3.2E-03 | 2.7E-01 | 3.4E-01 | 3.1E-01 | 6.4E-01 | 1.0E+00 | 2.46E-06 |
| VOC | Carbon Disulfide | 75-15-0 | 7.6E+01 | 2.0E+00 | 1.2E-02 | 4.2E-02 | 2.8E-01 | 3.6E-01 | 3.3E-01 | 6.7E-01 | 1.0E+00 | 3.11E-05 |
| VOC | Chlorobenzene | 108-90-7 | 1.1E+02 | 2.9E+00 | 2.9E-02 | 1.2E-01 | 4.5E-01 | 4.2E-01 | 3.8E-01 | 1.1E+00 | 1.0E+00 | 8.00E-05 |
| VOC | Chloroethane | 75-00-3 | 6.5E+01 | 1.4E+00 | 6.1E-03 | 1.9E-02 | 2.4E-01 | 3.5E-01 | 3.1E-01 | 5.8E-01 | 1.0E+00 | 1.49E-05 |
| VOC | Chloroform | 67-66-3 | 1.2E+02 | 1.9E+00 | 6.3E-03 | 2.6E-02 | 4.9E-01 | 3.5E-01 | 3.2E-01 | 1.2E+00 | 1.0E+00 | 1.86E-05 |
| VOC | Chloromethane | 74-87-3 | 5.0E+01 | 9.1E-01 | 3.3E-03 | 9.0E-03 | 2.0E-01 | 3.4E-01 | 3.1E-01 | 4.8E-01 | 1.0E+00 | 7.87E-06 |
| VOC | Cumene | 98-82-8 | 1.2E+02 | 3.7E+00 | 8.8E-02 | 3.7E-01 | 5.0E-01 | 6.1E-01 | 5.8E-01 | 1.2E+00 | 1.0E+00 | 2.44E-04 |
| VOC | Cyclohexane | 110-82-7 | 8.4E+01 | 3.4E+00 | 1.0E-01 | 3.5E-01 | 3.1E-01 | 6.0E-01 | 5.7E-01 | 7.5E-01 | 1.0E+00 | 2.30E-04 |
| VOC | Dibromochloromethane | 124-48-1 | 2.1E+02 | 2.2E+00 | 2.9E-03 | 1.6E-02 | 1.5E+00 | 3.4E-01 | 3.1E-01 | 3.7E+00 | 1.0E+00 | 1.42E-05 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.5E+02 | 3.4E+00 | 4.4E-02 | 2.0E-01 | 7.0E-01 | 4.8E-01 | 4.4E-01 | 1.7E+00 | 1.0E+00 | 1.46E-04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.5E+02 | 3.4E+00 | 4.1E-02 | 1.9E-01 | 7.0E-01 | 4.7E-01 | 4.3E-01 | 1.7E+00 | 1.0E+00 | 1.35E-04 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.5E+02 | 3.4E+00 | 4.3E-02 | 2.0E-01 | 7.0E-01 | 4.8E-01 | 4.4E-01 | 1.7E+00 | 1.0E+00 | 1.44E-04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.2E+02 | 2.2E+00 | 8.9E-03 | 3.8E-02 | 5.0E-01 | 3.6E-01 | 3.3E-01 | 1.2E+00 | 1.0E+00 | 2.63E-05 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 9.9E+01 | 1.8E+00 | 6.7E-03 | 2.6E-02 | 3.8E-01 | 3.5E-01 | 3.2E-01 | 9.0E-01 | 1.0E+00 | 1.83E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 9.9E+01 | 1.5E+00 | 4.1E-03 | 1.6E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.0E-01 | 1.0E+00 | 1.13E-05 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 9.7E+01 | 1.9E+00 | 7.7E-03 | 2.9E-02 | 3.7E-01 | 3.5E-01 | 3.2E-01 | 8.8E-01 | 1.0E+00 | 2.07E-05 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 9.7E+01 | 2.1E+00 | 1.1E-02 | 4.0E-02 | 3.7E-01 | 3.6E-01 | 3.3E-01 | 8.8E-01 | 1.0E+00 | 2.83E-05 |
| VOC | Ethyl Benzene | 100-41-4 | 1.1E+02 | 3.1E+00 | 4.8E-02 | 1.9E-01 | 4.1E-01 | 4.7E-01 | 4.3E-01 | 9.9E-01 | 1.0E+00 | 1.27E-04 |
| VOC | 2-Hexanone | 591-78-6 | 1.0E+02 | 1.4E+00 | 3.5E-03 | 1.4E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.2E-01 | 1.0E+00 | 9.75E-06 |
| VOC | Methyl Acetate | 79-20-9 | 7.4E+01 | 1.8E-01 | 8.0E-04 | 2.7E-03 | 2.7E-01 | 3.4E-01 | 3.0E-01 | 6.6E-01 | 1.0E+00 | 2.04E-06 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 8.8E+01 | 1.2E+00 | 3.3E-03 | 1.2E-02 | 3.3E-01 | 3.4E-01 | 3.1E-01 | 7.9E-01 | 1.0E+00 | 8.84E-06 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.0E+02 | 1.2E+00 | 2.7E-03 | 1.0E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.2E-01 | 1.0E+00 | 7.32E-06 |
| VOC | Methylcyclohexane | 108-87-2 | 9.8E+01 | 3.6E+00 | 1.1E-01 | 4.1E-01 | 3.7E-01 | 6.5E-01 | 6.2E-01 | 9.0E-01 | 1.0E+00 | 2.64E-04 |
| VOC | Methylene Chloride | 75-09-2 | 8.5E+01 | 1.3E+00 | 3.5E-03 | 1.3E-02 | 3.1E-01 | 3.4E-01 | 3.1E-01 | 7.5E-01 | 1.0E+00 | 9.25E-06 |
| VOC | Tetrachloroethene | 127-18-4 | 1.7E+02 | 2.7E+00 | 1.1E-02 | 5.4E-02 | 8.9E-01 | 3.7E-01 | 3.4E-01 | 2.1E+00 | 1.0E+00 | 3.99E-05 |
| VOC | Toluene | 108-88-3 | 9.2E+01 | 2.8E+00 | 3.2E-02 | 1.2E-01 | 3.5E-01 | 4.2E-01 | 3.8E-01 | 8.3E-01 | 1.0E+00 | 8.08E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.8E+02 | 4.0E+00 | 6.8E-02 | 3.5E-01 | 1.1E+00 | 6.0E-01 | 5.6E-01 | 2.6E+00 | 1.0E+00 | 2.76E-04 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.3E+02 | 2.5E+00 | 1.2E-02 | 5.5E-02 | 5.9E-01 | 3.7E-01 | 3.4E-01 | 1.4E+00 | 1.0E+00 | 3.85E-05 |
| VOC | Trichloroethene | 79-01-6 | 1.3E+02 | 2.7E+00 | 1.8E-02 | 7.9E-02 | 5.7E-01 | 3.9E-01 | 3.5E-01 | 1.4E+00 | 1.0E+00 | 5.53E-05 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.9E+02 | 3.1E+00 | 1.7E-02 | 8.9E-02 | 1.2E+00 | 3.9E-01 | 3.6E-01 | 2.8E+00 | 1.0E+00 | 7.16E-05 |
| VOC | Vinyl Chloride | 75-01-4 | 6.3E+01 | 1.5E+00 | 6.9E-03 | 2.1E-02 | 2.4E-01 | 3.5E-01 | 3.2E-01 | 5.7E-01 | 1.0E+00 | 1.69E-05 |
| VOC | Xylenes (total) | 1330-20-7 | 1.1E+02 | 3.2E+00 | 5.0E-02 | 2.0E-01 | 4.1E-01 | 4.8E-01 | 4.4E-01 | 9.9E-01 | 1.0E+00 | 1.32E-04 |
| SVOC | Acenaphthene | 83-32-9 | 1.5E+02 | 3.9E+00 | 8.4E-02 | 4.0E-01 | 7.7E-01 | 6.4E-01 | 6.1E-01 | 1.8E+00 | 1.0E+00 | 2.96E-04 |
| SVOC | Acenaphthylene | 208-96-8 | 1.5E+02 | 4.1E+00 | 1.1E-01 | 5.1E-01 | 7.5E-01 | 7.3E-01 | 7.2E-01 | 1.8E+00 | 1.0E+00 | 3.78E-04 |
| SVOC | Acetophenone | 98-86-2 | 1.2E+02 | 1.6E+00 | 3.7E-03 | 1.6E-02 | 5.0E-01 | 3.4E-01 | 3.1E-01 | 1.2E+00 | 1.0E+00 | 1.11E-05 |
| SVOC | Anthracene | 120-12-7 | 1.8E+02 | 4.6E+00 | 1.6E-01 | 8.2E-01 | 1.0E+00 | 1.0E+00 | 1.1E+00 | 4.0E+00 | 1.0E+00 | 6.41E-04 |
| SVOC | Benzaldehyde | 100-52-7 | 1.1E+02 | 1.5E+00 | 3.8E-03 | 1.5E-02 | 4.1E-01 | 3.4E-01 | 3.1E-01 | 9.9E-01 | 1.0E+00 | 1.07E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 2.3E+02 | 5.7E+00 | 4.8E-01 | 2.8E+00 | 2.0E+00 | 2.9E+00 | 6.3E+00 | 8.4E+00 | 9.0E-01 | 2.40E-03 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 2.5E+02 | 6.1E+00 | 6.6E-01 | 4.0E+00 | 2.7E+00 | 4.1E+00 | 1.2E+01 | 1.2E+01 | 8.0E-01 | 3.41E-03 |

## Attachment 3: Nonsteady State Dermal Absorption of Chemicals from Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | MW (g/mole) | Log $K_{ow}$ (unitless) | $K_p$ (cm/hr) | B (unitless) | $\tau$ (hr) | c | b | ts (hr) | FA (unitless) | DA ($L/cm^2$-event) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 2.5E+02 | 6.2E+00 | 7.6E-01 | 4.6E+00 | 2.7E+00 | 4.7E+00 | 1.5E+01 | 1.2E+01 | 8.0E-01 | 3.90E-03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 2.8E+02 | 7.2E+00 | 1.0E+00 | 6.4E+00 | 3.7E+00 | 6.4E+00 | 2.8E+01 | 1.6E+01 | 7.0E-01 | 5.27E-03 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 2.5E+02 | 6.2E+00 | 7.6E-01 | 4.6E+00 | 2.7E+00 | 4.7E+00 | 1.5E+01 | 1.2E+01 | 8.0E-01 | 3.90E-03 |
| SVOC | Biphenyl | 92-52-4 | 1.5E+02 | 4.1E+00 | 1.1E-01 | 5.2E-01 | 7.7E-01 | 7.4E-01 | 7.3E-01 | 1.8E+00 | 1.0E+00 | 3.86E-04 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 3.9E+02 | 7.3E+00 | 6.8E-01 | 5.1E+00 | 1.6E+01 | 5.2E+00 | 1.9E+01 | 7.1E+01 | 4.0E-01 | 4.26E-03 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 3.1E+02 | 4.8E+00 | 4.4E-02 | 3.0E-01 | 5.9E+00 | 5.6E-01 | 5.2E-01 | 1.4E+01 | 9.0E-01 | 3.78E-04 |
| SVOC | Caprolactam | 105-60-2 | 1.1E+02 | -1.9E-01 | 2.8E-04 | 1.1E-03 | 4.5E-01 | 3.3E-01 | 3.0E-01 | 1.1E+00 | 1.0E+00 | 8.01E-07 |
| SVOC | Carbazole | 86-74-8 | 1.7E+02 | 3.6E+00 | 4.3E-02 | 2.1E-01 | 9.1E-01 | 4.9E-01 | 4.5E-01 | 2.2E+00 | 1.0E+00 | 1.60E-04 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.3E+02 | 1.9E+00 | 5.1E-03 | 2.2E-02 | 5.4E-01 | 3.5E-01 | 3.2E-01 | 1.3E+00 | 1.0E+00 | 1.56E-05 |
| SVOC | Chrysene | 218-01-9 | 2.3E+02 | 5.7E+00 | 4.8E-01 | 2.8E+00 | 2.0E+00 | 2.9E+00 | 6.3E+00 | 8.4E+00 | 9.0E-01 | 2.40E-03 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 2.8E+02 | 6.7E+00 | 1.0E+00 | 6.4E+00 | 3.8E+00 | 6.5E+00 | 2.9E+01 | 1.7E+01 | 7.0E-01 | 5.34E-03 |
| SVOC | Dibenzofuran | 132-64-9 | 1.7E+02 | 4.1E+00 | 9.5E-02 | 4.7E-01 | 9.2E-01 | 7.0E-01 | 6.8E-01 | 2.2E+00 | 1.0E+00 | 3.56E-04 |
| SVOC | Diethylphthalate | 84-66-2 | 2.2E+02 | 2.5E+00 | 4.0E-03 | 2.3E-02 | 1.8E+00 | 3.5E-01 | 3.2E-01 | 4.4E+00 | 1.0E+00 | 2.14E-05 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.2E+02 | 2.4E+00 | 1.2E-02 | 5.0E-02 | 5.1E-01 | 3.7E-01 | 3.3E-01 | 1.2E+00 | 1.0E+00 | 3.52E-05 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 2.8E+02 | 4.6E+00 | 4.8E-02 | 3.1E-01 | 3.8E+00 | 5.6E-01 | 5.3E-01 | 9.1E+00 | 9.0E-01 | 3.31E-04 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.8E+02 | 1.9E+00 | 2.6E-03 | 1.3E-02 | 1.1E+00 | 3.4E-01 | 3.1E-01 | 2.6E+00 | 1.0E+00 | 1.06E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 3.9E+02 | 8.1E+00 | 1.0E+00 | 7.6E+00 | 1.6E+01 | 7.6E+00 | 3.9E+01 | 7.2E+01 | 3.0E-01 | 4.72E-03 |
| SVOC | Fluoranthene | 206-44-0 | 2.0E+02 | 5.1E+00 | 2.8E-01 | 1.5E+00 | 1.4E+00 | 1.7E+00 | 2.4E+00 | 5.7E+00 | 1.0E+00 | 1.31E-03 |
| SVOC | Fluorene | 86-73-7 | 1.7E+02 | 4.2E+00 | 1.1E-01 | 5.5E-01 | 9.0E-01 | 7.7E-01 | 7.7E-01 | 2.2E+00 | 1.0E+00 | 4.13E-04 |
| SVOC | Hexachlorobenzene | 118-74-1 | 2.8E+02 | 5.9E+00 | 3.1E-01 | 2.0E+00 | 4.1E+00 | 2.1E+00 | 3.7E+00 | 1.7E+01 | 8.0E-01 | 1.98E-03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 2.6E+02 | 4.8E+00 | 8.2E-02 | 5.1E-01 | 3.0E+00 | 7.3E-01 | 7.2E-01 | 7.3E+00 | 9.0E-01 | 5.03E-04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 2.8E+02 | 6.7E+00 | 1.0E+00 | 6.4E+00 | 3.7E+00 | 6.4E+00 | 2.8E+01 | 1.6E+01 | 7.0E-01 | 5.27E-03 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.4E+02 | 3.9E+00 | 8.9E-02 | 4.1E-01 | 6.6E-01 | 6.5E-01 | 6.2E-01 | 1.6E+00 | 1.0E+00 | 2.89E-04 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.1E+02 | | 7.8E-03 | 3.1E-02 | 4.2E-01 | 3.5E-01 | 3.2E-01 | 1.0E+00 | 1.0E+00 | 2.19E-05 |
| SVOC | Naphthalene | 91-20-3 | 1.3E+02 | 3.4E+00 | 5.0E-02 | 2.2E-01 | 5.5E-01 | 4.9E-01 | 4.5E-01 | 1.3E+00 | 1.0E+00 | 1.49E-04 |
| SVOC | Phenanthrene | 85-01-8 | 1.8E+02 | 4.5E+00 | 1.4E-01 | 7.2E-01 | 1.0E+00 | 9.1E-01 | 9.7E-01 | 4.1E+00 | 1.0E+00 | 5.59E-04 |
| SVOC | Phenol | 108-95-2 | 9.4E+01 | 1.5E+00 | 4.5E-03 | 1.7E-02 | 3.5E-01 | 3.4E-01 | 3.1E-01 | 8.5E-01 | 1.0E+00 | 1.20E-05 |
| SVOC | Pyrene | 129-00-0 | 2.0E+02 | 5.1E+00 | 2.8E-01 | 1.5E+00 | 1.4E+00 | 1.6E+00 | 2.4E+00 | 5.7E+00 | 1.0E+00 | 1.29E-03 |
| P/PCB | PCBs (total) | 1336-36-3 | 3.3E+02 | 6.5E+00 | 4.5E-01 | 3.1E+00 | 7.2E+00 | 3.2E+00 | 7.7E+00 | 3.1E+01 | 7.0E-01 | 3.31E-03 |
| INORG | Aluminum | 7429-90-5 | 2.7E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Antimony | 7440-36-0 | 1.2E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Arsenic | 7440-38-2 | 7.5E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Barium | 7440-39-3 | 1.4E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Beryllium | 7440-41-7 | 9.0E+00 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Cadmium | 7440-43-9 | 1.1E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Chromium (total) | 7440-47-3 | 5.2E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Cobalt | 7440-48-4 | 5.9E+01 | | 4.0E-04 | | | | | | | 8.00E-07 |
| INORG | Copper | 7440-50-8 | 6.4E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Cyanide (amenable) | 57-12-5A | 2.6E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Cyanide (total) | 57-12-5 | 2.6E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Iron | 7439-89-6 | 5.6E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Lead | 7439-92-1 | 2.1E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Manganese | 7439-96-5 | 5.5E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |

| Attachment 3: Nonsteady State Dermal Absorption of Chemicals from Groundwater<br>GM Powertrain Bedford Facility, Bedford, Indiana | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **MW** (g/mole) | **Log $K_{ow}$** (unitless) | **$K_p$** (cm/hr) | **B** (unitless) | **$\tau$** (hr) | **c** | **b** | **ts** (hr) | **FA** (unitless) | **DA** ($L/cm^2$-event) |
| INORG | Mercury | 7439-97-6 | 2.0E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Nickel | 7440-02-0 | 5.9E+01 | | 2.0E-04 | | | | | | | 4.00E-07 |
| INORG | Selenium | 7782-49-2 | 7.9E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Silver | 7440-22-4 | 1.1E+02 | | 6.0E-04 | | | | | | | 1.20E-06 |
| INORG | Thallium | 7440-28-0 | 2.0E+02 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Vanadium | 7440-62-2 | 5.1E+01 | | 1.0E-03 | | | | | | | 2.00E-06 |
| INORG | Zinc | 7440-66-6 | 6.5E+01 | | 6.0E-04 | | | | | | | 1.20E-06 |
| | | | | | | | | | | | | |
| **Note:** | Event Time (Construction Worker) | hours | **t** | 2 | | | | | | | | |

## Attachment 3: Normalized Vapor Flux to Ambient Air from Exposed Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 8.0E-04 | 5.8E+01 | 5.42E-01 | 1.43E-03 | 3.31E-04 | 3.31E-03 |
| VOC | Benzene | 71-43-2 | 1.1E-01 | 7.8E+01 | 4.91E-01 | 1.23E-03 | 1.21E-03 | 1.21E-02 |
| VOC | Bromodichloromethane | 75-27-4 | 3.3E-02 | 1.6E+02 | 3.83E-01 | 8.51E-04 | 7.97E-04 | 7.97E-03 |
| VOC | Bromomethane | 74-83-9 | 1.3E-01 | 9.5E+01 | 4.60E-01 | 1.12E-03 | 1.10E-03 | 1.10E-02 |
| VOC | 2-Butanone | 78-93-3 | 1.1E-03 | 7.2E+01 | 5.04E-01 | 1.28E-03 | 3.97E-04 | 3.97E-03 |
| VOC | Carbon Disulfide | 75-15-0 | 6.2E-01 | 7.6E+01 | 4.95E-01 | 1.25E-03 | 1.24E-03 | 1.24E-02 |
| VOC | Chlorobenzene | 108-90-7 | 7.6E-02 | 1.1E+02 | 4.34E-01 | 1.03E-03 | 9.96E-04 | 9.96E-03 |
| VOC | Chloroethane | 75-00-3 | 1.8E-01 | 6.5E+01 | 5.23E-01 | 1.36E-03 | 1.34E-03 | 1.34E-02 |
| VOC | Chloroform | 67-66-3 | 7.5E-02 | 1.2E+02 | 4.26E-01 | 9.97E-04 | 9.67E-04 | 9.67E-03 |
| VOC | Chloromethane | 74-87-3 | 1.8E-01 | 5.0E+01 | 5.68E-01 | 1.53E-03 | 1.51E-03 | 1.51E-02 |
| VOC | Cumene | 98-82-8 | 2.4E+01 | 1.2E+02 | 4.25E-01 | 9.94E-04 | 9.94E-04 | 9.94E-03 |
| VOC | Cyclohexane | 110-82-7 | 4.0E+00 | 8.4E+01 | 4.78E-01 | 1.19E-03 | 1.19E-03 | 1.19E-02 |
| VOC | Dibromochloromethane | 124-48-1 | 1.6E-02 | 2.1E+02 | 3.53E-01 | 7.55E-04 | 6.66E-04 | 6.66E-03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 3.9E-02 | 1.5E+02 | 3.97E-01 | 8.99E-04 | 8.49E-04 | 8.49E-03 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 6.3E-02 | 1.5E+02 | 3.97E-01 | 8.99E-04 | 8.68E-04 | 8.68E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 5.0E-02 | 1.5E+02 | 3.97E-01 | 8.99E-04 | 8.60E-04 | 8.60E-03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 7.0E+00 | 1.2E+02 | 4.24E-01 | 9.91E-04 | 9.91E-04 | 9.91E-03 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 1.2E-01 | 9.9E+01 | 4.53E-01 | 1.10E-03 | 1.07E-03 | 1.07E-02 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 2.0E-02 | 9.9E+01 | 4.53E-01 | 1.10E-03 | 9.77E-04 | 9.77E-03 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 8.4E-02 | 9.7E+01 | 4.56E-01 | 1.11E-03 | 1.08E-03 | 1.08E-02 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 1.9E-01 | 9.7E+01 | 4.56E-01 | 1.11E-03 | 1.09E-03 | 1.09E-02 |
| VOC | Ethyl Benzene | 100-41-4 | 1.6E-01 | 1.1E+02 | 4.43E-01 | 1.06E-03 | 1.04E-03 | 1.04E-02 |
| VOC | 2-Hexanone | 591-78-6 | 3.6E-02 | 1.0E+02 | 4.51E-01 | 1.09E-03 | 1.02E-03 | 1.02E-02 |
| VOC | Methyl Acetate | 79-20-9 | 5.8E-05 | 7.4E+01 | 4.99E-01 | 1.27E-03 | 2.81E-05 | 2.81E-04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.2E-02 | 8.8E+01 | 4.71E-01 | 1.16E-03 | 9.63E-04 | 9.63E-03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 2.8E-03 | 1.0E+02 | 4.51E-01 | 1.09E-03 | 5.87E-04 | 5.87E-03 |
| VOC | Methylcyclohexane | 108-87-2 | 8.8E+00 | 9.8E+01 | 4.54E-01 | 1.10E-03 | 1.10E-03 | 1.10E-02 |
| VOC | Methylene Chloride | 75-09-2 | 4.5E-02 | 8.5E+01 | 4.77E-01 | 1.18E-03 | 1.12E-03 | 1.12E-02 |
| VOC | Tetrachloroethene | 127-18-4 | 3.8E-01 | 1.7E+02 | 3.81E-01 | 8.46E-04 | 8.41E-04 | 8.41E-03 |
| VOC | Toluene | 108-88-3 | 1.4E-01 | 9.2E+01 | 4.64E-01 | 1.14E-03 | 1.12E-03 | 1.12E-02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 2.9E-02 | 1.8E+02 | 3.70E-01 | 8.09E-04 | 7.52E-04 | 7.52E-03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 3.5E-01 | 1.3E+02 | 4.10E-01 | 9.43E-04 | 9.37E-04 | 9.37E-03 |
| VOC | Trichloroethene | 79-01-6 | 2.1E-01 | 1.3E+02 | 4.12E-01 | 9.51E-04 | 9.40E-04 | 9.40E-03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 9.8E+00 | 1.9E+02 | 3.66E-01 | 7.96E-04 | 7.96E-04 | 7.96E-03 |

## Attachment 3: Normalized Vapor Flux to Ambient Air from Exposed Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| VOC | Vinyl Chloride | 75-01-4 | 5.6E-01 | 6.3E+01 | 5.29E-01 | 1.38E-03 | 1.37E-03 | 1.37E-02 |
| VOC | Xylenes (total) | 1330-20-7 | 1.4E-01 | 1.1E+02 | 4.43E-01 | 1.06E-03 | 1.04E-03 | 1.04E-02 |
| SVOC | Acenaphthene | 83-32-9 | 3.2E-03 | 1.5E+02 | 3.91E-01 | 8.77E-04 | 5.14E-04 | 5.14E-03 |
| SVOC | Acenaphthylene | 208-96-8 | 2.3E-03 | 1.5E+02 | 3.92E-01 | 8.83E-04 | 4.47E-04 | 4.47E-03 |
| SVOC | Acetophenone | 98-86-2 | 2.2E-04 | 1.2E+02 | 4.25E-01 | 9.94E-04 | 8.49E-05 | 8.49E-04 |
| SVOC | Anthracene | 120-12-7 | 1.3E-03 | 1.8E+02 | 3.72E-01 | 8.16E-04 | 3.09E-04 | 3.09E-03 |
| SVOC | Benzaldehyde | 100-52-7 | 4.9E-04 | 1.1E+02 | 4.43E-01 | 1.06E-03 | 1.79E-04 | 1.79E-03 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 6.9E-05 | 2.3E+02 | 3.42E-01 | 7.21E-04 | 2.27E-05 | 2.27E-04 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 2.3E-05 | 2.5E+02 | 3.31E-01 | 6.86E-04 | 7.58E-06 | 7.58E-05 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 2.3E-03 | 2.5E+02 | 3.31E-01 | 6.86E-04 | 3.59E-04 | 3.59E-03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 2.9E-06 | 2.8E+02 | 3.21E-01 | 6.55E-04 | 9.24E-07 | 9.24E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.7E-05 | 2.5E+02 | 3.31E-01 | 6.86E-04 | 5.58E-06 | 5.58E-05 |
| SVOC | Biphenyl | 92-52-4 | 6.1E-03 | 1.5E+02 | 3.91E-01 | 8.77E-04 | 6.42E-04 | 6.42E-03 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 2.1E-06 | 3.9E+02 | 2.86E-01 | 5.51E-04 | 5.97E-07 | 5.97E-06 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 2.6E-05 | 3.1E+02 | 3.08E-01 | 6.17E-04 | 7.87E-06 | 7.87E-05 |
| SVOC | Caprolactam | 105-60-2 | 5.2E-07 | 1.1E+02 | 4.33E-01 | 1.02E-03 | 2.24E-07 | 2.24E-06 |
| SVOC | Carbazole | 86-74-8 | 3.1E-07 | 1.7E+02 | 3.80E-01 | 8.43E-04 | 1.19E-07 | 1.19E-06 |
| SVOC | 4-Chloroaniline | 106-47-8 | 6.8E-06 | 1.3E+02 | 4.16E-01 | 9.65E-04 | 2.82E-06 | 2.82E-05 |
| SVOC | Chrysene | 218-01-9 | 1.9E-03 | 2.3E+02 | 3.42E-01 | 7.21E-04 | 3.46E-04 | 3.46E-03 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 3.0E-07 | 2.8E+02 | 3.20E-01 | 6.53E-04 | 9.66E-08 | 9.66E-07 |
| SVOC | Dibenzofuran | 132-64-9 | 2.6E-04 | 1.7E+02 | 3.79E-01 | 8.40E-04 | 8.75E-05 | 8.75E-04 |
| SVOC | Diethylphthalate | 84-66-2 | 9.3E-06 | 2.2E+02 | 3.46E-01 | 7.31E-04 | 3.18E-06 | 3.18E-05 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 4.1E-05 | 1.2E+02 | 4.22E-01 | 9.86E-04 | 1.70E-05 | 1.70E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 1.9E-08 | 2.8E+02 | 3.20E-01 | 6.53E-04 | 6.17E-09 | 6.17E-08 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.5E-05 | 1.8E+02 | 3.69E-01 | 8.07E-04 | 5.61E-06 | 5.61E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 1.4E-03 | 3.9E+02 | 2.86E-01 | 5.51E-04 | 2.29E-04 | 2.29E-03 |
| SVOC | Fluoranthene | 206-44-0 | 3.3E-04 | 2.0E+02 | 3.57E-01 | 7.66E-04 | 1.02E-04 | 1.02E-03 |
| SVOC | Fluorene | 86-73-7 | 1.3E-03 | 1.7E+02 | 3.81E-01 | 8.45E-04 | 3.13E-04 | 3.13E-03 |
| SVOC | Hexachlorobenzene | 118-74-1 | 2.7E-02 | 2.8E+02 | 3.18E-01 | 6.46E-04 | 6.01E-04 | 6.01E-03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 1.7E-01 | 2.6E+02 | 3.28E-01 | 6.75E-04 | 6.67E-04 | 6.67E-03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 3.3E-05 | 2.8E+02 | 3.21E-01 | 6.55E-04 | 1.04E-05 | 1.04E-04 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.1E-02 | 1.4E+02 | 4.01E-01 | 9.14E-04 | 7.52E-04 | 7.52E-03 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.8E-05 | 1.1E+02 | 4.40E-01 | 1.05E-03 | 7.73E-06 | 7.73E-05 |
| SVOC | Naphthalene | 91-20-3 | 9.9E-03 | 1.3E+02 | 4.16E-01 | 9.62E-04 | 7.80E-04 | 7.80E-03 |

## Attachment 3: Normalized Vapor Flux to Ambient Air from Exposed Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| SVOC | Phenanthrene | 85-01-8 | 4.8E-04 | 1.8E+02 | 3.72E-01 | 8.16E-04 | 1.46E-04 | 1.46E-03 |
| SVOC | Phenol | 108-95-2 | 8.2E-06 | 9.4E+01 | 4.61E-01 | 1.12E-03 | 3.74E-06 | 3.74E-05 |
| SVOC | Pyrene | 129-00-0 | 2.3E-04 | 2.0E+02 | 3.57E-01 | 7.66E-04 | 7.28E-05 | 7.28E-04 |
| P/PCB | PCBs (total) | 1336-36-3 | 4.1E-02 | 3.3E+02 | 3.03E-01 | 6.02E-04 | 5.74E-04 | 5.74E-03 |
| INORG | Aluminum | 7429-90-5 | | 2.7E+01 | 7.00E-01 | 2.10E-03 | | |
| INORG | Antimony | 7440-36-0 | | 1.2E+02 | 4.23E-01 | 9.87E-04 | | |
| INORG | Arsenic | 7440-38-2 | | 7.5E+01 | 4.97E-01 | 1.26E-03 | | |
| INORG | Barium | 7440-39-3 | | 1.4E+02 | 4.06E-01 | 9.30E-04 | | |
| INORG | Beryllium | 7440-41-7 | | 9.0E+00 | 1.01E+00 | 3.63E-03 | | |
| INORG | Cadmium | 7440-43-9 | | 1.1E+02 | 4.34E-01 | 1.03E-03 | | |
| INORG | Chromium (total) | 7440-47-3 | | 5.2E+01 | 5.62E-01 | 1.51E-03 | | |
| INORG | Cobalt | 7440-48-4 | | 5.9E+01 | 5.39E-01 | 1.42E-03 | | |
| INORG | Copper | 7440-50-8 | | 6.4E+01 | 5.26E-01 | 1.37E-03 | | |
| INORG | Cyanide (amenable) | 57-12-5A | | 2.6E+01 | 7.09E-01 | 2.14E-03 | | |
| INORG | Cyanide (total) | 57-12-5 | | 2.6E+01 | 7.09E-01 | 2.14E-03 | | |
| INORG | Iron | 7439-89-6 | | 5.6E+01 | 5.49E-01 | 1.46E-03 | | |
| INORG | Lead | 7439-92-1 | | 2.1E+02 | 3.54E-01 | 7.57E-04 | | |
| INORG | Manganese | 7439-96-5 | | 5.5E+01 | 5.52E-01 | 1.47E-03 | | |
| INORG | Mercury | 7439-97-6 | 1.5E-01 | 2.0E+02 | 3.57E-01 | 7.69E-04 | 7.57E-04 | 7.57E-03 |
| INORG | Nickel | 7440-02-0 | | 5.9E+01 | 5.40E-01 | 1.42E-03 | | |
| INORG | Selenium | 7782-49-2 | | 7.9E+01 | 4.89E-01 | 1.23E-03 | | |
| INORG | Silver | 7440-22-4 | | 1.1E+02 | 4.40E-01 | 1.05E-03 | | |
| INORG | Thallium | 7440-28-0 | | 2.0E+02 | 3.55E-01 | 7.62E-04 | | |
| INORG | Vanadium | 7440-62-2 | | 5.1E+01 | 5.66E-01 | 1.53E-03 | | |
| INORG | Zinc | 7440-66-6 | | 6.5E+01 | 5.21E-01 | 1.35E-03 | | |
| | | | | | | | | |
| | molecular weight of oxygen | g/mol | **$MW_{02}$** | 32 | | | | |
| | molecular weight of water | g/mol | **$MW_{H20}$** | 18 | | | | |
| | absolute temperature | K | **T** | 287 | | | | |
| | liquid-phase mass transfer coefficient for oxygen | cm/s | **$k_{L,02}$** | 0.002 | | | | |
| | gas-phase mass transfer coefficient for water vapor at 25 C | cm/s | **$K_{G,H20}$** | 0.833 | | | | |

## Attachment 3: Risk Based Cancer Criteria for Exposure of Construction Workers to Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Pathway: | Incidental Ingestion of Water | | | Dermal Contact with Water | | | | Inhalation of Vapor from Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{gw}$ (mg/L) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | DA ($L/cm^2$-event) | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | URF $(mg/m^3)^{-1}$ | RBC (mg/L) | Combined RBC (mg/L) |
| VOC | Acetone | 67-64-1 | ID | 1.0E+00 | 2.8E-07 | | | 1.3E-06 | 1.2E-07 | | | 3.6E-02 | | | |
| VOC | Benzene | 71-43-2 | A | 1.0E+00 | 2.8E-07 | 5.5E-02 | 6.5E+02 | 3.7E-05 | 3.4E-06 | 5.5E-02 | 5.3E+01 | 1.3E-01 | 7.8E-03 | 5.0E+00 | 4.5E+00 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.0E+00 | 2.8E-07 | 6.2E-02 | 5.8E+02 | 1.7E-05 | 1.6E-06 | 6.2E-02 | 1.0E+02 | 8.7E-02 | 1.8E-02 | 3.3E+00 | 3.2E+00 |
| VOC | Bromomethane | 74-83-9 | D | 1.0E+00 | 2.8E-07 | | | 7.7E-06 | 7.1E-07 | | | 1.2E-01 | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 1.0E+00 | 2.8E-07 | | | 2.5E-06 | 2.3E-07 | | | 4.4E-02 | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 1.0E+00 | 2.8E-07 | | | 3.1E-05 | 2.9E-06 | | | 1.4E-01 | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 1.0E+00 | 2.8E-07 | | | 8.0E-05 | 7.4E-06 | | | 1.1E-01 | | | |
| VOC | Chloroethane | 75-00-3 | | 1.0E+00 | 2.8E-07 | 2.9E-03 | 1.2E+04 | 1.5E-05 | 1.4E-06 | 2.9E-03 | 2.5E+03 | 1.5E-01 | | | 2.1E+03 |
| VOC | Chloroform | 67-66-3 | B2 | 1.0E+00 | 2.8E-07 | | | 1.9E-05 | 1.7E-06 | | | 1.1E-01 | 2.3E-02 | 2.1E+00 | 2.1E+00 |
| VOC | Chloromethane | 74-87-3 | D | 1.0E+00 | 2.8E-07 | | | 7.9E-06 | 7.3E-07 | | | 1.7E-01 | | | |
| VOC | Cumene | 98-82-8 | D | 1.0E+00 | 2.8E-07 | | | 2.4E-04 | 2.3E-05 | | | 1.1E-01 | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 1.0E+00 | 2.8E-07 | | | 2.3E-04 | 2.1E-05 | | | 1.3E-01 | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.0E+00 | 2.8E-07 | 8.4E-02 | 4.3E+02 | 1.4E-05 | 1.3E-06 | 8.4E-02 | 9.1E+01 | 7.3E-02 | 2.4E-02 | 2.9E+00 | 2.8E+00 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.0E+00 | 2.8E-07 | | | 1.5E-04 | 1.3E-05 | | | 9.3E-02 | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.0E+00 | 2.8E-07 | | | 1.4E-04 | 1.2E-05 | | | 9.5E-02 | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.0E+00 | 2.8E-07 | 2.4E-02 | 1.5E+03 | 1.4E-04 | 1.3E-05 | 2.4E-02 | 3.1E+01 | 9.4E-02 | 6.3E-03 | 8.6E+00 | 6.7E+00 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.0E+00 | 2.8E-07 | | | 2.6E-05 | 2.4E-06 | | | 1.1E-01 | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.0E+00 | 2.8E-07 | | | 1.8E-05 | 1.7E-06 | | | 1.2E-01 | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.0E+00 | 2.8E-07 | 9.1E-02 | 3.9E+02 | 1.1E-05 | 1.0E-06 | 9.1E-02 | 1.1E+02 | 1.1E-01 | 2.6E-02 | 1.8E+00 | 1.8E+00 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.0E+00 | 2.8E-07 | | | 2.1E-05 | 1.9E-06 | | | 1.2E-01 | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.0E+00 | 2.8E-07 | | | 2.8E-05 | 2.6E-06 | | | 1.2E-01 | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.0E+00 | 2.8E-07 | | | 1.3E-04 | 1.2E-05 | | | 1.1E-01 | | | |
| VOC | 2-Hexanone | 591-78-6 | | 1.0E+00 | 2.8E-07 | | | 9.8E-06 | 9.0E-07 | | | 1.1E-01 | | | |
| VOC | Methyl Acetate | 79-20-9 | | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.9E-07 | | | 3.1E-03 | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.0E+00 | 2.8E-07 | 3.3E-03 | 1.1E+04 | 8.8E-06 | 8.2E-07 | 3.3E-03 | 3.7E+03 | 1.1E-01 | 1.0E-04 | 4.8E+02 | 4.1E+02 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.0E+00 | 2.8E-07 | | | 7.3E-06 | 6.7E-07 | | | 6.4E-02 | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.0E+00 | 2.8E-07 | | | 2.6E-04 | 2.4E-05 | | | 1.2E-01 | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.0E+00 | 2.8E-07 | 7.5E-03 | 4.8E+03 | 9.3E-06 | 8.5E-07 | 7.5E-03 | 1.6E+03 | 1.2E-01 | 4.7E-04 | 8.9E+01 | 8.2E+01 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.0E+00 | 2.8E-07 | 5.2E-02 | 6.9E+02 | 4.0E-05 | 3.7E-06 | 5.2E-02 | 5.2E+01 | 9.2E-02 | 3.1E-03 | 1.8E+01 | 1.3E+01 |
| VOC | Toluene | 108-88-3 | D | 1.0E+00 | 2.8E-07 | | | 8.1E-05 | 7.5E-06 | | | 1.2E-01 | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.0E+00 | 2.8E-07 | | | 2.8E-04 | 2.5E-05 | | | 8.2E-02 | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.0E+00 | 2.8E-07 | | | 3.9E-05 | 3.6E-06 | | | 1.0E-01 | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.0E+00 | 2.8E-07 | 1.1E-02 | 3.3E+03 | 5.5E-05 | 5.1E-06 | 1.1E-02 | 1.8E+02 | 1.0E-01 | 1.7E-03 | 2.9E+01 | 2.5E+01 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.0E+00 | 2.8E-07 | | | 7.2E-05 | 6.6E-06 | | | 8.7E-02 | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.0E+00 | 2.8E-07 | 1.4E+00 | 2.6E+01 | 1.7E-05 | 1.6E-06 | 1.4E+00 | 4.6E+00 | 1.5E-01 | 8.8E-03 | 3.9E+00 | 1.9E+00 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.0E+00 | 2.8E-07 | | | 1.3E-04 | 1.2E-05 | | | 1.1E-01 | | | |
| SVOC | Acenaphthene | 83-32-9 | | 1.0E+00 | 2.8E-07 | | | 3.0E-04 | 2.7E-05 | | | 5.6E-02 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.0E+00 | 2.8E-07 | | | 3.8E-04 | 3.5E-05 | | | 4.9E-02 | | | |
| SVOC | Acetophenone | 98-86-2 | D | 1.0E+00 | 2.8E-07 | | | 1.1E-05 | 1.0E-06 | | | 9.3E-03 | | | |
| SVOC | Anthracene | 120-12-7 | D | 1.0E+00 | 2.8E-07 | | | 6.4E-04 | 5.9E-05 | | | 3.4E-02 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 1.0E+00 | 2.8E-07 | | | 1.1E-05 | 9.9E-07 | | | 2.0E-02 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.0E+00 | 2.8E-07 | 7.3E-01 | 4.9E+01 | 2.4E-03 | 2.2E-04 | 7.3E-01 | 6.2E-02 | 2.5E-03 | 2.1E-01 | 9.8E+00 | 6.1E-02 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.0E+00 | 2.8E-07 | 7.3E+00 | 4.9E+00 | 3.4E-03 | 3.1E-04 | 7.3E+00 | 4.4E-03 | 8.3E-04 | 8.9E-01 | 6.9E+00 | 4.4E-03 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.0E+00 | 2.8E-07 | 7.3E-01 | 4.9E+01 | 3.9E-03 | 3.6E-04 | 7.3E-01 | 3.8E-02 | 3.9E-02 | 2.1E-01 | 6.2E-01 | 3.6E-02 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.0E+00 | 2.8E-07 | | | 5.3E-03 | 4.9E-04 | | | 1.0E-04 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.0E+00 | 2.8E-07 | 7.3E-02 | 4.9E+02 | 3.9E-03 | 3.6E-04 | 7.3E-02 | 3.8E-01 | 6.1E-04 | 2.1E-02 | 4.0E+02 | 3.8E-01 |

## Attachment 3: Risk Based Cancer Criteria for Exposure of Construction Workers to Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Pathway: | Incidental Ingestion of Water | | | Dermal Contact with Water | | | | Inhalation of Vapor from Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{gw}$ (mg/L) | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | DA ($L/cm^2$-event) | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | URF $(mg/m^3)^{-1}$ | RBC (mg/L) | Combined RBC (mg/L) |
| SVOC | Biphenyl | 92-52-4 | D | 1.0E+00 | 2.8E-07 | | | 3.9E-04 | 3.6E-05 | | | 7.0E-02 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.0E+00 | 2.8E-07 | 1.4E-02 | 2.6E+03 | 4.3E-03 | 3.9E-04 | 1.4E-02 | 1.8E+00 | 6.5E-05 | 4.0E-03 | 2.0E+04 | 1.8E+00 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.0E+00 | 2.8E-07 | | | 3.8E-04 | 3.5E-05 | | | 8.6E-04 | | | |
| SVOC | Caprolactam | 105-60-2 | | 1.0E+00 | 2.8E-07 | | | 8.0E-07 | 7.4E-08 | | | 2.5E-05 | | | |
| SVOC | Carbazole | 86-74-8 | B2 | 1.0E+00 | 2.8E-07 | 2.0E-02 | 1.8E+03 | 1.6E-04 | 1.5E-05 | 2.0E-02 | 3.4E+01 | 1.3E-05 | 5.7E-03 | 6.9E+04 | 3.3E+01 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.0E+00 | 2.8E-07 | | | 1.6E-05 | 1.4E-06 | | | 3.1E-04 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 1.0E+00 | 2.8E-07 | 7.3E-03 | 4.9E+03 | 2.4E-03 | 2.2E-04 | 7.3E-03 | 6.2E+00 | 3.8E-02 | 2.1E-03 | 6.5E+01 | 5.6E+00 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.0E+00 | 2.8E-07 | 7.3E+00 | 4.9E+00 | 5.3E-03 | 4.9E-04 | 7.3E+00 | 2.8E-03 | 1.1E-05 | 2.1E+00 | 2.3E+02 | 2.8E-03 |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.0E+00 | 2.8E-07 | | | 3.6E-04 | 3.3E-05 | | | 9.6E-03 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.0E+00 | 2.8E-07 | | | 2.1E-05 | 2.0E-06 | | | 3.5E-04 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.0E+00 | 2.8E-07 | | | 3.5E-05 | 3.2E-06 | | | 1.9E-03 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.0E+00 | 2.8E-07 | | | 3.3E-04 | 3.1E-05 | | | 6.8E-07 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.0E+00 | 2.8E-07 | 6.8E-01 | 5.3E+01 | 1.1E-05 | 9.8E-07 | 6.8E-01 | 1.5E+01 | 6.2E-04 | 1.9E-01 | 4.3E+01 | 9.2E+00 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.0E+00 | 2.8E-07 | | | 4.7E-03 | 4.4E-04 | | | 2.5E-02 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 1.0E+00 | 2.8E-07 | | | 1.3E-03 | 1.2E-04 | | | 1.1E-02 | | | |
| SVOC | Fluorene | 86-73-7 | D | 1.0E+00 | 2.8E-07 | | | 4.1E-04 | 3.8E-05 | | | 3.4E-02 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.0E+00 | 2.8E-07 | 1.6E+00 | 2.2E+01 | 2.0E-03 | 1.8E-04 | 1.6E+00 | 3.4E-02 | 6.6E-02 | 4.6E-01 | 1.7E-01 | 2.8E-02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.0E+00 | 2.8E-07 | 7.8E-02 | 4.6E+02 | 5.0E-04 | 4.6E-05 | 7.8E-02 | 2.8E+00 | 7.3E-02 | 2.2E-02 | 3.2E+00 | 1.5E+00 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.0E+00 | 2.8E-07 | 7.3E-01 | 4.9E+01 | 5.3E-03 | 4.9E-04 | 7.3E-01 | 2.8E-02 | 1.1E-03 | 2.1E-01 | 2.2E+01 | 2.8E-02 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.0E+00 | 2.8E-07 | | | 2.9E-04 | 2.7E-05 | | | 8.2E-02 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.0E+00 | 2.8E-07 | | | 2.2E-05 | 2.0E-06 | | | 8.5E-04 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 1.0E+00 | 2.8E-07 | | | 1.5E-04 | 1.4E-05 | | | 8.5E-02 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 1.0E+00 | 2.8E-07 | | | 5.6E-04 | 5.2E-05 | | | 1.6E-02 | | | |
| SVOC | Phenol | 108-95-2 | ID | 1.0E+00 | 2.8E-07 | | | 1.2E-05 | 1.1E-06 | | | 4.1E-04 | | | |
| SVOC | Pyrene | 129-00-0 | D | 1.0E+00 | 2.8E-07 | | | 1.3E-03 | 1.2E-04 | | | 8.0E-03 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.0E+00 | 2.8E-07 | 2.0E+00 | 1.8E+01 | 3.3E-03 | 3.1E-04 | 2.0E+00 | 1.6E-02 | 6.3E-02 | 5.7E-01 | 1.4E-01 | 1.5E-02 |
| INORG | Aluminum | 7429-90-5 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Antimony | 7440-36-0 | | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Arsenic | 7440-38-2 | A | 1.0E+00 | 2.8E-07 | 1.5E+00 | 2.4E+01 | 2.0E-06 | 1.8E-07 | 1.5E+00 | 3.6E+01 | | 4.3E+00 | | 1.4E+01 |
| INORG | Barium | 7440-39-3 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Beryllium | 7440-41-7 | B1 | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | 2.4E+00 | | |
| INORG | Cadmium | 7440-43-9 | B1 | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | 1.8E+00 | | |
| INORG | Chromium (total) | 7440-47-3 | | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | 1.2E+01 | | |
| INORG | Cobalt | 7440-48-4 | B1 | 1.0E+00 | 2.8E-07 | | | 8.0E-07 | 7.4E-08 | | | | 2.8E+00 | | |
| INORG | Copper | 7440-50-8 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Iron | 7439-89-6 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Lead | 7439-92-1 | B2 | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Mercury | 7439-97-6 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | 8.3E-02 | | | |
| INORG | Nickel | 7440-02-0 | A | 1.0E+00 | 2.8E-07 | | | 4.0E-07 | 3.7E-08 | | | | 2.4E-01 | | |
| INORG | Selenium | 7782-49-2 | D | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Silver | 7440-22-4 | D | 1.0E+00 | 2.8E-07 | | | 1.2E-06 | 1.1E-07 | | | | | | |
| INORG | Thallium | 7440-28-0 | | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Vanadium | 7440-62-2 | | 1.0E+00 | 2.8E-07 | | | 2.0E-06 | 1.8E-07 | | | | | | |
| INORG | Zinc | 7440-66-6 | D | 1.0E+00 | 2.8E-07 | | | 1.2E-06 | 1.1E-07 | | | | | | |

## Attachment 3: Risk Based Noncancer Criteria for Exposure of Construction Workers to Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Pathway: | | Incidental Ingestion of Water | | | Dermal Contact with Water | | | | Inhalation of Vapor from Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{gw}$** (mg/L) | **ADD** (mg/kg/d) | **$RfD_{oral}$** (mg/kg/d) | **RBC** (mg/L) | **DA** ($L/cm^2$-event) | **ADD** (mg/kg/d) | **$RfD_{derm}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/L) | **$C_{air}$** ($mg/m^3$) | **RfC** ($mg/m^3$) | **RBC** (mg/L) | **Combined RBC** (mg/L) |
| VOC | Acetone | 67-64-1 | ID | 1.0E+00 | 2.0E-06 | 9.0E-01 | 4.6E+05 | 1.3E-06 | 8.2E-07 | 9.0E-01 | 1.1E+06 | 3.6E-02 | 3.2E+00 | 6.3E+03 | 6.2E+03 |
| VOC | Benzene | 71-43-2 | A | 1.0E+00 | 2.0E-06 | 4.0E-03 | 2.0E+03 | 3.7E-05 | 2.4E-05 | 4.0E-03 | 1.7E+02 | 1.3E-01 | 3.0E-02 | 1.7E+01 | 1.5E+01 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 1.7E-05 | 1.1E-05 | 2.0E-02 | 1.8E+03 | 8.7E-02 | 7.0E-02 | 5.8E+01 | 5.6E+01 |
| VOC | Bromomethane | 74-83-9 | D | 1.0E+00 | 2.0E-06 | 1.4E-03 | 7.2E+02 | 7.7E-06 | 5.0E-06 | 1.4E-03 | 2.8E+02 | 1.2E-01 | 5.0E-03 | 3.0E+00 | 3.0E+00 |
| VOC | 2-Butanone | 78-93-3 | ID | 1.0E+00 | 2.0E-06 | 6.0E-01 | 3.1E+05 | 2.5E-06 | 1.6E-06 | 6.0E-01 | 3.8E+05 | 4.4E-02 | 5.0E+00 | 8.4E+03 | 8.0E+03 |
| VOC | Carbon Disulfide | 75-15-0 | | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 3.1E-05 | 2.0E-05 | 1.0E-01 | 5.0E+03 | 1.4E-01 | 7.0E-01 | 3.7E+02 | 3.5E+02 |
| VOC | Chlorobenzene | 108-90-7 | D | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 8.0E-05 | 5.2E-05 | 2.0E-02 | 3.9E+02 | 1.1E-01 | 6.0E-02 | 4.0E+01 | 3.6E+01 |
| VOC | Chloroethane | 75-00-3 | | 1.0E+00 | 2.0E-06 | 4.0E-01 | 2.0E+05 | 1.5E-05 | 9.6E-06 | 4.0E-01 | 4.2E+04 | 1.5E-01 | 1.0E+01 | 5.0E+03 | 4.4E+03 |
| VOC | Chloroform | 67-66-3 | B2 | 1.0E+00 | 2.0E-06 | 1.0E-02 | 5.1E+03 | 1.9E-05 | 1.2E-05 | 1.0E-02 | 8.3E+02 | 1.1E-01 | 5.0E-02 | 3.4E+01 | 3.3E+01 |
| VOC | Chloromethane | 74-87-3 | D | 1.0E+00 | 2.0E-06 | | | 7.9E-06 | 5.1E-06 | | | 1.7E-01 | 9.0E-02 | 4.0E+01 | 4.0E+01 |
| VOC | Cumene | 98-82-8 | D | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 2.4E-04 | 1.6E-04 | 1.0E-01 | 6.3E+02 | 1.1E-01 | 4.0E-01 | 2.7E+02 | 1.9E+02 |
| VOC | Cyclohexane | 110-82-7 | ID | 1.0E+00 | 2.0E-06 | | | 2.3E-04 | 1.5E-04 | | | 1.3E-01 | 6.0E+00 | 3.4E+03 | 3.4E+03 |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 1.4E-05 | 9.2E-06 | 2.0E-02 | 2.2E+03 | 7.3E-02 | 7.0E-02 | 7.0E+01 | 6.7E+01 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.0E+00 | 2.0E-06 | 9.0E-02 | 4.6E+04 | 1.5E-04 | 9.4E-05 | 9.0E-02 | 9.6E+02 | 9.3E-02 | 2.0E-01 | 1.6E+02 | 1.3E+02 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.0E+00 | 2.0E-06 | 9.0E-04 | 4.6E+02 | 1.4E-04 | 8.7E-05 | 9.0E-04 | 1.0E+01 | 9.5E-02 | 1.4E-01 | 1.1E+02 | 9.2E+00 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 1.4E-04 | 9.3E-05 | 3.0E-02 | 3.2E+02 | 9.4E-02 | 8.0E-01 | 6.2E+02 | 2.1E+02 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.0E+00 | 2.0E-06 | 2.0E-01 | 1.0E+05 | 2.6E-05 | 1.7E-05 | 2.0E-01 | 1.2E+04 | 1.1E-01 | 2.0E-01 | 1.3E+02 | 1.3E+02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 1.8E-05 | 1.2E-05 | 1.0E-01 | 8.5E+03 | 1.2E-01 | 5.0E-01 | 3.1E+02 | 3.0E+02 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 1.1E-05 | 7.3E-06 | 3.0E-02 | 4.1E+03 | 1.1E-01 | 5.0E-03 | 3.4E+00 | 3.4E+00 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.0E+00 | 2.0E-06 | 1.0E-02 | 5.1E+03 | 2.1E-05 | 1.3E-05 | 1.0E-02 | 7.5E+02 | 1.2E-01 | 3.5E-02 | 2.2E+01 | 2.1E+01 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 2.8E-05 | 1.8E-05 | 2.0E-02 | 1.1E+03 | 1.2E-01 | 7.0E-02 | 4.3E+01 | 4.1E+01 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 1.3E-04 | 8.2E-05 | 1.0E-01 | 1.2E+03 | 1.1E-01 | 1.0E+00 | 6.4E+02 | 4.2E+02 |
| VOC | 2-Hexanone | 591-78-6 | | 1.0E+00 | 2.0E-06 | 4.0E-02 | 2.0E+04 | 9.8E-06 | 6.3E-06 | 4.0E-02 | 6.4E+03 | 1.1E-01 | 5.0E-03 | 3.3E+00 | 3.3E+00 |
| VOC | Methyl Acetate | 79-20-9 | | 1.0E+00 | 2.0E-06 | 1.0E+00 | 5.1E+05 | 2.0E-06 | 1.3E-06 | 1.0E+00 | 7.6E+05 | 3.1E-03 | 3.5E+00 | 8.3E+04 | 6.5E+04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.0E+00 | 2.0E-06 | | | 8.8E-06 | 5.7E-06 | | | 1.1E-01 | 3.0E+00 | 2.1E+03 | 2.1E+03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.0E+00 | 2.0E-06 | | | 7.3E-06 | 4.7E-06 | | | 6.4E-02 | 3.0E+00 | 3.4E+03 | 3.4E+03 |
| VOC | Methylcyclohexane | 108-87-2 | | 1.0E+00 | 2.0E-06 | | | 2.6E-04 | 1.7E-04 | | | 1.2E-01 | 3.0E+00 | 1.8E+03 | 1.8E+03 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.0E+00 | 2.0E-06 | 6.0E-02 | 3.1E+04 | 9.3E-06 | 6.0E-06 | 6.0E-02 | 1.0E+04 | 1.2E-01 | 3.0E+00 | 1.8E+03 | 1.4E+03 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.0E+00 | 2.0E-06 | 1.0E-02 | 5.1E+03 | 4.0E-05 | 2.6E-05 | 1.0E-02 | 3.9E+02 | 9.2E-02 | 4.0E-01 | 3.2E+02 | 1.7E+02 |
| VOC | Toluene | 108-88-3 | D | 1.0E+00 | 2.0E-06 | 2.0E-01 | 1.0E+05 | 8.1E-05 | 5.2E-05 | 2.0E-01 | 3.8E+03 | 1.2E-01 | 4.0E-01 | 2.4E+02 | 2.2E+02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.0E+00 | 2.0E-06 | 1.0E-02 | 5.1E+03 | 2.8E-04 | 1.8E-04 | 1.0E-02 | 5.6E+01 | 8.2E-02 | 2.0E-01 | 1.8E+02 | 4.2E+01 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.0E+00 | 2.0E-06 | 2.8E-01 | 1.4E+05 | 3.9E-05 | 2.5E-05 | 2.8E-01 | 1.1E+04 | 1.0E-01 | 2.2E+00 | 1.6E+03 | 1.4E+03 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.0E+00 | 2.0E-06 | 6.0E-03 | 3.1E+03 | 5.5E-05 | 3.6E-05 | 6.0E-03 | 1.7E+02 | 1.0E-01 | | | 1.6E+02 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.0E+00 | 2.0E-06 | 3.0E+01 | 1.5E+07 | 7.2E-05 | 4.6E-05 | 3.0E+01 | 6.5E+05 | 8.7E-02 | 3.0E+01 | 2.5E+04 | 2.4E+04 |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.0E+00 | 2.0E-06 | 3.0E-03 | 1.5E+03 | 1.7E-05 | 1.1E-05 | 3.0E-03 | 2.8E+02 | 1.5E-01 | 1.0E-01 | 4.9E+01 | 4.0E+01 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.0E+00 | 2.0E-06 | 2.0E-01 | 1.0E+05 | 1.3E-04 | 8.5E-05 | 2.0E-01 | 2.4E+03 | 1.1E-01 | 1.0E-01 | 6.4E+01 | 6.2E+01 |
| SVOC | Acenaphthene | 83-32-9 | | 1.0E+00 | 2.0E-06 | 6.0E-02 | 3.1E+04 | 3.0E-04 | 1.9E-04 | 6.0E-02 | 3.1E+02 | 5.6E-02 | 2.1E-01 | 2.7E+02 | 1.5E+02 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 3.8E-04 | 2.4E-04 | 3.0E-02 | 1.2E+02 | 4.9E-02 | 1.1E-01 | 1.6E+02 | 6.8E+01 |
| SVOC | Acetophenone | 98-86-2 | D | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 1.1E-05 | 7.1E-06 | 1.0E-01 | 1.4E+04 | 9.3E-03 | 3.5E-01 | 2.7E+03 | 2.2E+03 |
| SVOC | Anthracene | 120-12-7 | D | 1.0E+00 | 2.0E-06 | 3.0E-01 | 1.5E+05 | 6.4E-04 | 4.1E-04 | 3.0E-01 | 7.2E+02 | 3.4E-02 | | | 7.2E+02 |
| SVOC | Benzaldehyde | 100-52-7 | | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 1.1E-05 | 6.9E-06 | 1.0E-01 | 1.4E+04 | 2.0E-02 | 3.5E-01 | 1.3E+03 | 1.2E+03 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.0E+00 | 2.0E-06 | | | 2.4E-03 | 1.5E-03 | | | 2.5E-03 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.0E+00 | 2.0E-06 | | | 3.4E-03 | 2.2E-03 | | | 8.3E-04 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.0E+00 | 2.0E-06 | | | 3.9E-03 | 2.5E-03 | | | 3.9E-02 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 5.3E-03 | 3.4E-03 | 3.0E-02 | 8.8E+00 | 1.0E-04 | 1.1E-01 | 7.6E+04 | 8.8E+00 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.0E+00 | 2.0E-06 | | | 3.9E-03 | 2.5E-03 | | | 6.1E-04 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1.0E+00 | 2.0E-06 | 5.0E-02 | 2.6E+04 | 3.9E-04 | 2.5E-04 | 5.0E-02 | 2.0E+02 | 7.0E-02 | 1.8E-01 | 1.8E+02 | 9.5E+01 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 4.3E-03 | 2.8E-03 | 2.0E-02 | 7.3E+00 | 6.5E-05 | | | 7.3E+00 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.0E+00 | 2.0E-06 | 2.0E-01 | 1.0E+05 | 3.8E-04 | 2.4E-04 | 2.0E-01 | 8.2E+02 | 8.6E-04 | 7.0E-01 | 5.9E+04 | 8.0E+02 |

## Attachment 3: Risk Based Noncancer Criteria for Exposure of Construction Workers to Groundwater
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Pathway: | | Incidental Ingestion of Water | | | Dermal Contact with Water | | | | Inhalation of Vapor from Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{gw}$** (mg/L) | **ADD** (mg/kg/d) | **$RfD_{oral}$** (mg/kg/d) | **RBC** (mg/L) | **DA** ($L/cm^2$-event) | **ADD** (mg/kg/d) | **$RfD_{derm}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/L) | **$C_{air}$** ($mg/m^3$) | **RfC** ($mg/m^3$) | **RBC** (mg/L) | **Combined RBC** (mg/L) |
| SVOC | Caprolactam | 105-60-2 | | 1.0E+00 | 2.0E-06 | 5.0E-01 | 2.6E+05 | 8.0E-07 | 5.2E-07 | 5.0E-01 | 9.7E+05 | 2.5E-05 | 1.8E+00 | 5.2E+06 | 1.9E+05 |
| SVOC | Carbazole | 86-74-8 | B2 | 1.0E+00 | 2.0E-06 | | | 1.6E-04 | 1.0E-04 | | | 1.3E-05 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.0E+00 | 2.0E-06 | 4.0E-03 | 2.0E+03 | 1.6E-05 | 1.0E-05 | 4.0E-03 | 4.0E+02 | 3.1E-04 | 1.4E-02 | 3.3E+03 | 3.0E+02 |
| SVOC | Chrysene | 218-01-9 | B2 | 1.0E+00 | 2.0E-06 | | | 2.4E-03 | 1.5E-03 | | | 3.8E-02 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.0E+00 | 2.0E-06 | | | 5.3E-03 | 3.4E-03 | | | 1.1E-05 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.0E+00 | 2.0E-06 | 4.0E-03 | 2.0E+03 | 3.6E-04 | 2.3E-04 | 4.0E-03 | 1.7E+01 | 9.6E-03 | 1.4E-02 | 1.1E+02 | 1.5E+01 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.0E+00 | 2.0E-06 | 8.0E-01 | 4.1E+05 | 2.1E-05 | 1.4E-05 | 8.0E-01 | 5.8E+04 | 3.5E-04 | 2.8E+00 | 5.9E+05 | 4.7E+04 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 3.5E-05 | 2.3E-05 | 2.0E-02 | 8.8E+02 | 1.9E-03 | 7.0E-02 | 2.7E+03 | 6.3E+02 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.0E+00 | 2.0E-06 | 1.0E-01 | 5.1E+04 | 3.3E-04 | 2.1E-04 | 1.0E-01 | 4.7E+02 | 6.8E-07 | | | 4.6E+02 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.0E+00 | 2.0E-06 | 1.0E-03 | 5.1E+02 | 1.1E-05 | 6.9E-06 | 1.0E-03 | 1.5E+02 | 6.2E-04 | 3.5E-03 | 4.2E+02 | 8.9E+01 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.0E+00 | 2.0E-06 | 4.0E-02 | 2.0E+04 | 4.7E-03 | 3.0E-03 | 4.0E-02 | 1.3E+01 | 2.5E-02 | | | 1.3E+01 |
| SVOC | Fluoranthene | 206-44-0 | D | 1.0E+00 | 2.0E-06 | 4.0E-02 | 2.0E+04 | 1.3E-03 | 8.4E-04 | 4.0E-02 | 4.7E+01 | 1.1E-02 | 1.4E-01 | 9.1E+02 | 4.5E+01 |
| SVOC | Fluorene | 86-73-7 | D | 1.0E+00 | 2.0E-06 | 4.0E-02 | 2.0E+04 | 4.1E-04 | 2.7E-04 | 4.0E-02 | 1.5E+02 | 3.4E-02 | 1.4E-01 | 3.0E+02 | 9.9E+01 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.0E+00 | 2.0E-06 | 8.0E-04 | 4.1E+02 | 2.0E-03 | 1.3E-03 | 8.0E-04 | 6.3E-01 | 6.6E-02 | | | 6.3E-01 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.0E+00 | 2.0E-06 | 3.0E-04 | 1.5E+02 | 5.0E-04 | 3.2E-04 | 3.0E-04 | 9.2E-01 | 7.3E-02 | | | 9.2E-01 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.0E+00 | 2.0E-06 | | | 5.3E-03 | 3.4E-03 | | | 1.1E-03 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.0E+00 | 2.0E-06 | 4.0E-03 | 2.0E+03 | 2.9E-04 | 1.9E-04 | 4.0E-03 | 2.1E+01 | 8.2E-02 | 3.0E-03 | 2.7E+00 | 2.4E+00 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.0E+00 | 2.0E-06 | 5.0E-02 | 2.6E+04 | 2.2E-05 | 1.4E-05 | 5.0E-02 | 3.5E+03 | 8.5E-04 | 1.8E-01 | 1.5E+04 | 2.6E+03 |
| SVOC | Naphthalene | 91-20-3 | C | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 1.5E-04 | 9.6E-05 | 2.0E-02 | 2.1E+02 | 8.5E-02 | 3.0E-03 | 2.6E+00 | 2.5E+00 |
| SVOC | Phenanthrene | 85-01-8 | D | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 5.6E-04 | 3.6E-04 | 3.0E-02 | 8.3E+01 | 1.6E-02 | 1.1E-01 | 4.8E+02 | 7.1E+01 |
| SVOC | Phenol | 108-95-2 | ID | 1.0E+00 | 2.0E-06 | 3.0E-01 | 1.5E+05 | 1.2E-05 | 7.7E-06 | 3.0E-01 | 3.9E+04 | 4.1E-04 | | | 3.1E+04 |
| SVOC | Pyrene | 129-00-0 | D | 1.0E+00 | 2.0E-06 | 3.0E-02 | 1.5E+04 | 1.3E-03 | 8.3E-04 | 3.0E-02 | 3.6E+01 | 8.0E-03 | 1.1E-01 | 9.6E+02 | 3.5E+01 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.0E+00 | 2.0E-06 | 2.0E-05 | 1.0E+01 | 3.3E-03 | 2.1E-03 | 2.0E-05 | 9.4E-03 | 6.3E-02 | | | 9.4E-03 |
| INORG | Aluminum | 7429-90-5 | D | 1.0E+00 | 2.0E-06 | 1.0E+00 | 5.1E+05 | 2.0E-06 | 1.3E-06 | 1.0E+00 | 7.7E+05 | | 5.0E-03 | | 3.1E+05 |
| INORG | Antimony | 7440-36-0 | | 1.0E+00 | 2.0E-06 | 4.0E-04 | 2.0E+02 | 2.0E-06 | 1.3E-06 | 6.0E-05 | 4.6E+01 | | 1.4E-03 | | 3.8E+01 |
| INORG | Arsenic | 7440-38-2 | A | 1.0E+00 | 2.0E-06 | 3.0E-04 | 1.5E+02 | 2.0E-06 | 1.3E-06 | 3.0E-04 | 2.3E+02 | | | | 9.2E+01 |
| INORG | Barium | 7440-39-3 | D | 1.0E+00 | 2.0E-06 | 7.0E-02 | 3.6E+04 | 2.0E-06 | 1.3E-06 | 7.0E-02 | 5.4E+04 | | | | 2.2E+04 |
| INORG | Beryllium | 7440-41-7 | B1 | 1.0E+00 | 2.0E-06 | 2.0E-03 | 1.0E+03 | 2.0E-06 | 1.3E-06 | 1.4E-05 | 1.1E+01 | | 2.0E-05 | | 1.1E+01 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.0E+00 | 2.0E-06 | 5.0E-04 | 2.6E+02 | 2.0E-06 | 1.3E-06 | 2.5E-05 | 1.9E+01 | | 2.0E-04 | | 1.8E+01 |
| INORG | Chromium (total) | 7440-47-3 | | 1.0E+00 | 2.0E-06 | 3.0E-03 | 1.5E+03 | 2.0E-06 | 1.3E-06 | 7.5E-05 | 5.8E+01 | | | | 5.6E+01 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 8.0E-07 | 5.2E-07 | 2.0E-02 | 3.9E+04 | | 2.0E-05 | | 8.1E+03 |
| INORG | Copper | 7440-50-8 | D | 1.0E+00 | 2.0E-06 | 4.0E-02 | 2.0E+04 | 2.0E-06 | 1.3E-06 | 4.0E-02 | 3.1E+04 | | 1.4E-01 | | 1.2E+04 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 2.0E-06 | 1.3E-06 | 2.0E-02 | 1.5E+04 | | 7.0E-02 | | 6.2E+03 |
| INORG | Cyanide (total) | 57-12-5 | D | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 2.0E-06 | 1.3E-06 | 2.0E-02 | 1.5E+04 | | 7.0E-02 | | 6.2E+03 |
| INORG | Iron | 7439-89-6 | D | 1.0E+00 | 2.0E-06 | 3.0E-01 | 1.5E+05 | 2.0E-06 | 1.3E-06 | 3.0E-01 | 2.3E+05 | | | | 9.2E+04 |
| INORG | Lead | 7439-92-1 | B2 | 1.0E+00 | 2.0E-06 | | | 2.0E-06 | 1.3E-06 | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 1.0E+00 | 2.0E-06 | 1.4E-01 | 7.2E+04 | 2.0E-06 | 1.3E-06 | 5.6E-03 | 4.3E+03 | | 5.0E-05 | | 4.1E+03 |
| INORG | Mercury | 7439-97-6 | D | 1.0E+00 | 2.0E-06 | 3.0E-04 | 1.5E+02 | 2.0E-06 | 1.3E-06 | 2.1E-05 | 1.6E+01 | 8.3E-02 | 3.0E-04 | 2.6E-01 | 2.6E-01 |
| INORG | Nickel | 7440-02-0 | A | 1.0E+00 | 2.0E-06 | 2.0E-02 | 1.0E+04 | 4.0E-07 | 2.6E-07 | 8.0E-04 | 3.1E+03 | | | | 2.4E+03 |
| INORG | Selenium | 7782-49-2 | D | 1.0E+00 | 2.0E-06 | 5.0E-03 | 2.6E+03 | 2.0E-06 | 1.3E-06 | 5.0E-03 | 3.9E+03 | | 1.8E-02 | | 1.5E+03 |
| INORG | Silver | 7440-22-4 | D | 1.0E+00 | 2.0E-06 | 5.0E-03 | 2.6E+03 | 1.2E-06 | 7.7E-07 | 2.0E-04 | 2.6E+02 | | 1.0E-05 | | 2.3E+02 |
| INORG | Thallium | 7440-28-0 | | 1.0E+00 | 2.0E-06 | 7.0E-05 | 3.6E+01 | 2.0E-06 | 1.3E-06 | 7.0E-05 | 5.4E+01 | | 2.5E-04 | | 2.2E+01 |
| INORG | Vanadium | 7440-62-2 | | 1.0E+00 | 2.0E-06 | 7.0E-03 | 3.6E+03 | 2.0E-06 | 1.3E-06 | 1.8E-04 | 1.4E+02 | | 2.5E-02 | | 1.4E+02 |
| INORG | Zinc | 7440-66-6 | D | 1.0E+00 | 2.0E-06 | 3.0E-01 | 1.5E+05 | 1.2E-06 | 7.7E-07 | 3.0E-01 | 3.9E+05 | | 1.1E+00 | | 1.1E+05 |

# A T T A C H M E N T  4

## Exposure of Maintenance Workers to Sediment

**Attachment 4: Estimates of Risk and HQ for Maintenance Worker Exposure to Sediment in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Max Conc (mg/kg) | Site-Specific Maintenance Worker Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Maintenance Worker Noncancer Criteria (HQ=1) (mg/kg) | Cancer Risk | HQ |
|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 3 | 1 | 1.33E-02 | | 7.67E+07 | | 1.7E-10 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 3 | 1 | 3.10E-03 | | 7.67E+04 | | 4.0E-08 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 3 | 1 | 5.50E-03 | 9.94E+04 | 2.56E+06 | 5.5E-13 | 2.2E-09 |
| VOC | Methyl Acetate | 79-20-9 | | 3 | 3 | 4.10E-02 | | 8.52E+07 | | 4.8E-10 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 3 | 3 | 2.17E+01 | 4.19E+02 | 5.98E+02 | 5.2E-07 | 3.6E-02 |
| INORG | Aluminum | 7429-90-5 | D | 3 | 3 | 7.90E+03 | | 8.52E+07 | | 9.3E-05 |
| INORG | Arsenic | 7440-38-2 | A | 3 | 3 | 1.16E+01 | 1.14E+03 | 1.83E+04 | 1.0E-07 | 6.3E-04 |
| INORG | Barium | 7440-39-3 | D | 3 | 3 | 1.12E+02 | | 5.96E+06 | | 1.9E-05 |
| INORG | Beryllium | 7440-41-7 | B1 | 3 | 1 | 5.20E-01 | | 1.70E+05 | | 3.1E-06 |
| INORG | Cadmium | 7440-43-9 | B1 | 3 | 2 | 1.50E+00 | | 5.57E+04 | | 2.7E-05 |
| INORG | Chromium (total) | 7440-47-3 | | 3 | 3 | 1.57E+01 | | 2.56E+05 | | 6.1E-05 |
| INORG | Cobalt | 7440-48-4 | B1 | 3 | 3 | 2.66E+01 | | 1.70E+06 | | 1.6E-05 |
| INORG | Copper | 7440-50-8 | D | 3 | 3 | 9.31E+01 | | 3.41E+06 | | 2.7E-05 |
| INORG | Iron | 7439-89-6 | D | 3 | 3 | 3.96E+04 | | 2.56E+07 | | 1.5E-03 |
| INORG | Manganese | 7439-96-5 | D | 3 | 3 | 6.84E+03 | | 1.19E+07 | | 5.7E-04 |
| INORG | Mercury | 7439-97-6 | D | 3 | 1 | 1.50E-01 | | 2.56E+04 | | 5.9E-06 |
| INORG | Nickel | 7440-02-0 | A | 3 | 3 | 3.08E+01 | | 1.70E+06 | | 1.8E-05 |
| INORG | Selenium | 7782-49-2 | D | 3 | 1 | 3.85E-01 | | 4.26E+05 | | 9.0E-07 |
| INORG | Silver | 7440-22-4 | D | 3 | 2 | 1.00E+00 | | 4.26E+05 | | 2.3E-06 |
| INORG | Thallium | 7440-28-0 | | 3 | 1 | 6.48E-01 | | 5.96E+03 | | 1.1E-04 |
| INORG | Vanadium | 7440-62-2 | | 3 | 3 | 2.28E+01 | | 5.96E+05 | | 3.8E-05 |
| INORG | Zinc | 7440-66-6 | D | 3 | 3 | 1.51E+02 | | 2.56E+07 | | 5.9E-06 |
| | | | | | | | | | | |
| **Notes:** | | | | | | | | **Sum:** | **6.2E-07** | **3.9E-02** |
| 1. Only constituents detected in the East Plant Area are shown. | | | | | | | | | | |
| 2. Carc class - EPA Weight-of-Evidence Cancer Classification. | | | | | | | | | | |

## Attachment 4: High-End Exposure Factors for Maintenance Worker Contact with Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Maintenance Worker | |
|---|---|---|---|---|
| **Sediment Ingestion** | | | | |
| Ingestion Rate | mg-soil/day | **IR** | 50 | b |
| Conversion Factor | kg/mg | **CF** | 1E-06 | |
| Fraction Contacted | unitless | **FC** | 0.5 | |
| Exposure Frequency | days/year | **EF** | 12 | e |
| Exposure Duration | years | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |
| **Sediment Dermal Contact** | | | | |
| Adherence Factor | mg-soil/$cm^2$ | **AF** | 0.2 | d |
| Skin Surface Area | $cm^2$/day | **SA** | 3,300 | d |
| Conversion Factor | kg/mg | **CF** | 1E-06 | |
| Absorption Fraction | unitless | **ABS** | 1 | |
| Fraction Contacted | unitless | **FC** | 0.5 | |
| Exposure Frequency | days/year | **EF** | 12 | e |
| Exposure Duration | years | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |
| **Ambient Air Inhalation** | | | | |
| Fraction Contacted | unitless | **FC** | 0.5 | |
| Exposure Time | hour/hour | **ET** | 8/8 | |
| Exposure Frequency | days/year | **EF** | 12 | e |
| Exposure Duration | years | **ED** | 25 | b |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |

## Attachment 4: Cancer Risk Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{sed}$** (mg/kg) | **LADD** (mg/kg/d) | **$SF_{oral}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **$ABS_d$** | **LADD** (mg/kg/d) | **$SF_{derm}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **Combined RBC** (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 4.19E-09 | 5.5E-02 | 4.3E+04 | | | 5.5E-02 | | 4.3E+04 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 4.19E-09 | 6.2E-02 | 3.8E+04 | | | 6.2E-02 | | 3.8E+04 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 4.19E-09 | 2.9E-03 | 8.2E+05 | | | 2.9E-03 | | 8.2E+05 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 4.19E-09 | 8.4E-02 | 2.8E+04 | | | 8.4E-02 | | 2.8E+04 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 4.19E-09 | 2.4E-02 | 9.9E+04 | | | 2.4E-02 | | 9.9E+04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 4.19E-09 | 9.1E-02 | 2.6E+04 | | | 9.1E-02 | | 2.6E+04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 4.19E-09 | 3.3E-03 | 7.2E+05 | | | 3.3E-03 | | 7.2E+05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 4.19E-09 | 7.5E-03 | 3.2E+05 | | | 7.5E-03 | | 3.2E+05 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 4.19E-09 | 5.2E-02 | 4.6E+04 | | | 5.2E-02 | | 4.6E+04 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 4.19E-09 | 1.1E-02 | 2.2E+05 | | | 1.1E-02 | | 2.2E+05 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 4.19E-09 | 1.4E+00 | 1.7E+03 | | | 1.4E+00 | | 1.7E+03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 4.19E-09 | | | | | | | |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |

## Attachment 4: Cancer Risk Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{sed}$** (mg/kg) | **LADD** (mg/kg/d) | **$SF_{oral}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **$ABS_d$** | **LADD** (mg/kg/d) | **$SF_{derm}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **Combined RBC** (mg/kg) |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 4.19E-09 | 7.3E-01 | 3.3E+03 | 1.30E-01 | 7.20E-09 | 7.3E-01 | 1.9E+03 | 1.2E+03 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 4.19E-09 | 7.3E+00 | 3.3E+02 | 1.30E-01 | 7.20E-09 | 7.3E+00 | 1.9E+02 | 1.2E+02 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 4.19E-09 | 7.3E-01 | 3.3E+03 | 1.30E-01 | 7.20E-09 | 7.3E-01 | 1.9E+03 | 1.2E+03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 4.19E-09 | 7.3E-02 | 3.3E+04 | 1.30E-01 | 7.20E-09 | 7.3E-02 | 1.9E+04 | 1.2E+04 |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 4.19E-09 | 1.4E-02 | 1.7E+05 | 1.00E-01 | 5.54E-09 | 1.4E-02 | 1.3E+05 | 7.3E+04 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 4.19E-09 | 2.0E-02 | 1.2E+05 | 1.00E-01 | 5.54E-09 | 2.0E-02 | 9.0E+04 | 5.1E+04 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 4.19E-09 | 7.3E-03 | 3.3E+05 | 1.30E-01 | 7.20E-09 | 7.3E-03 | 1.9E+05 | 1.2E+05 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 4.19E-09 | 7.3E+00 | 3.3E+02 | 1.30E-01 | 7.20E-09 | 7.3E+00 | 1.9E+02 | 1.2E+02 |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 4.19E-09 | 6.8E-01 | 3.5E+03 | 1.00E-01 | 5.54E-09 | 6.8E-01 | 2.7E+03 | 1.5E+03 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 4.19E-09 | 1.6E+00 | 1.5E+03 | 1.00E-01 | 5.54E-09 | 1.6E+00 | 1.1E+03 | 6.4E+02 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 4.19E-09 | 7.8E-02 | 3.1E+04 | 1.00E-01 | 5.54E-09 | 7.8E-02 | 2.3E+04 | 1.3E+04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 4.19E-09 | 7.3E-01 | 3.3E+03 | 1.30E-01 | 7.20E-09 | 7.3E-01 | 1.9E+03 | 1.2E+03 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 4.19E-09 | | | 1.00E-01 | 5.54E-09 | | | |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 4.19E-09 | | | 1.30E-01 | 7.20E-09 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 4.19E-09 | 2.0E+00 | 1.2E+03 | 1.40E-01 | 7.75E-09 | 2.0E+00 | 6.5E+02 | 4.2E+02 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 4.19E-09 | 1.5E+00 | 1.6E+03 | 3.00E-02 | 1.66E-09 | 1.5E+00 | 4.0E+03 | 1.1E+03 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 4.19E-09 | | | | | | | |

## Attachment 4: Cancer Risk Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{sed}$** (mg/kg) | **LADD** (mg/kg/d) | **$SF_{oral}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **$ABS_d$** | **LADD** (mg/kg/d) | **$SF_{derm}$** $(mg/kg/d)^{-1}$ | **RBC** (mg/kg) | **Combined RBC** (mg/kg) |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 4.19E-09 | | | 1.00E-03 | 5.54E-11 | | | |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 4.19E-09 | | | | | | | |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 4.19E-09 | | | | | | | |

## Attachment 4: Hazard Index Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Acetone | 67-64-1 | ID | 1.00E+00 | 1.17E-08 | 9.0E-01 | 7.67E+07 | | | 9.0E-01 | | 7.67E+07 |
| VOC | Benzene | 71-43-2 | A | 1.00E+00 | 1.17E-08 | 4.0E-03 | 3.41E+05 | | | 4.0E-03 | | 3.41E+05 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| VOC | Bromomethane | 74-83-9 | D | 1.00E+00 | 1.17E-08 | 1.4E-03 | 1.19E+05 | | | 1.4E-03 | | 1.19E+05 |
| VOC | 2-Butanone | 78-93-3 | ID | 1.00E+00 | 1.17E-08 | 6.0E-01 | 5.11E+07 | | | 6.0E-01 | | 5.11E+07 |
| VOC | Carbon Disulfide | 75-15-0 | | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | | | 1.0E-01 | | 8.52E+06 |
| VOC | Chlorobenzene | 108-90-7 | D | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| VOC | Chloroethane | 75-00-3 | | 1.00E+00 | 1.17E-08 | 4.0E-01 | 3.41E+07 | | | 4.0E-01 | | 3.41E+07 |
| VOC | Chloroform | 67-66-3 | B2 | 1.00E+00 | 1.17E-08 | 1.0E-02 | 8.52E+05 | | | 1.0E-02 | | 8.52E+05 |
| VOC | Chloromethane | 74-87-3 | D | 1.00E+00 | 1.17E-08 | | | | | | | |
| VOC | Cumene | 98-82-8 | D | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | | | 1.0E-01 | | 8.52E+06 |
| VOC | Cyclohexane | 110-82-7 | ID | 1.00E+00 | 1.17E-08 | | | | | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 1.00E+00 | 1.17E-08 | 9.0E-02 | 7.67E+06 | | | 9.0E-02 | | 7.67E+06 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 1.00E+00 | 1.17E-08 | 9.0E-04 | 7.67E+04 | | | 9.0E-04 | | 7.67E+04 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | | | 3.0E-02 | | 2.56E+06 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 1.00E+00 | 1.17E-08 | 2.0E-01 | 1.70E+07 | | | 2.0E-01 | | 1.70E+07 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | | | 1.0E-01 | | 8.52E+06 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | | | 3.0E-02 | | 2.56E+06 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 1.00E+00 | 1.17E-08 | 1.0E-02 | 8.52E+05 | | | 1.0E-02 | | 8.52E+05 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| VOC | Ethyl Benzene | 100-41-4 | D | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | | | 1.0E-01 | | 8.52E+06 |
| VOC | 2-Hexanone | 591-78-6 | | 1.00E+00 | 1.17E-08 | 4.0E-02 | 3.41E+06 | | | 4.0E-02 | | 3.41E+06 |
| VOC | Methyl Acetate | 79-20-9 | | 1.00E+00 | 1.17E-08 | 1.0E+00 | 8.52E+07 | | | 1.0E+00 | | 8.52E+07 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 1.00E+00 | 1.17E-08 | | | | | | | |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 1.00E+00 | 1.17E-08 | | | | | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 1.00E+00 | 1.17E-08 | | | | | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 1.00E+00 | 1.17E-08 | 6.0E-02 | 5.11E+06 | | | 6.0E-02 | | 5.11E+06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 1.00E+00 | 1.17E-08 | 1.0E-02 | 8.52E+05 | | | 1.0E-02 | | 8.52E+05 |
| VOC | Toluene | 108-88-3 | D | 1.00E+00 | 1.17E-08 | 2.0E-01 | 1.70E+07 | | | 2.0E-01 | | 1.70E+07 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 1.00E+00 | 1.17E-08 | 1.0E-02 | 8.52E+05 | | | 1.0E-02 | | 8.52E+05 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 1.00E+00 | 1.17E-08 | 2.8E-01 | 2.38E+07 | | | 2.8E-01 | | 2.38E+07 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 1.00E+00 | 1.17E-08 | 6.0E-03 | 5.11E+05 | | | 6.0E-03 | | 5.11E+05 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoro | 76-13-1 | | 1.00E+00 | 1.17E-08 | 3.0E+01 | 2.56E+09 | | | 3.0E+01 | | 2.56E+09 |

## Attachment 4: Hazard Index Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | $C_{soil}$ (mg/kg) | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/kg) | $ABS_d$ | ADD (mg/kg/d) | $RfD_{derm}$ (mg/kg/d) | RBC (mg/kg) | Combined RBC (mg/kg) |
| VOC | Vinyl Chloride | 75-01-4 | A | 1.00E+00 | 1.17E-08 | 3.0E-03 | 2.56E+05 | | | 3.0E-03 | | 2.56E+05 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 1.00E+00 | 1.17E-08 | 2.0E-01 | 1.70E+07 | | | 2.0E-01 | | 1.70E+07 |
| SVOC | Acenaphthene | 83-32-9 | | 1.00E+00 | 1.17E-08 | 6.0E-02 | 5.11E+06 | 1.30E-01 | 2.01E-08 | 6.0E-02 | 2.98E+06 | 1.88E+06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | 1.30E-01 | 2.01E-08 | 3.0E-02 | 1.49E+06 | 9.41E+05 |
| SVOC | Acetophenone | 98-86-2 | D | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | 1.00E-01 | 1.55E-08 | 1.0E-01 | 6.45E+06 | 3.67E+06 |
| SVOC | Anthracene | 120-12-7 | D | 1.00E+00 | 1.17E-08 | 3.0E-01 | 2.56E+07 | 1.30E-01 | 2.01E-08 | 3.0E-01 | 1.49E+07 | 9.41E+06 |
| SVOC | Benzaldehyde | 100-52-7 | | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | 1.00E-01 | 1.55E-08 | 1.0E-01 | 6.45E+06 | 3.67E+06 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | 1.30E-01 | 2.01E-08 | 3.0E-02 | 1.49E+06 | 9.41E+05 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 1.00E+00 | 1.17E-08 | 5.0E-02 | 4.26E+06 | 1.00E-01 | 1.55E-08 | 5.0E-02 | 3.23E+06 | 1.84E+06 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | 1.00E-01 | 1.55E-08 | 2.0E-02 | 1.29E+06 | 7.34E+05 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 1.00E+00 | 1.17E-08 | 2.0E-01 | 1.70E+07 | 1.00E-01 | 1.55E-08 | 2.0E-01 | 1.29E+07 | 7.34E+06 |
| SVOC | Caprolactam | 105-60-2 | | 1.00E+00 | 1.17E-08 | 5.0E-01 | 4.26E+07 | 1.00E-01 | 1.55E-08 | 5.0E-01 | 3.23E+07 | 1.84E+07 |
| SVOC | Carbazole | 86-74-8 | B2 | 1.00E+00 | 1.17E-08 | | | 1.00E-01 | 1.55E-08 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 1.00E+00 | 1.17E-08 | 4.0E-03 | 3.41E+05 | 1.00E-01 | 1.55E-08 | 4.0E-03 | 2.58E+05 | 1.47E+05 |
| SVOC | Chrysene | 218-01-9 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 1.00E+00 | 1.17E-08 | 4.0E-03 | 3.41E+05 | 1.00E-01 | 1.55E-08 | 4.0E-03 | 2.58E+05 | 1.47E+05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 1.00E+00 | 1.17E-08 | 8.0E-01 | 6.81E+07 | 1.00E-01 | 1.55E-08 | 8.0E-01 | 5.16E+07 | 2.94E+07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | 1.00E-01 | 1.55E-08 | 2.0E-02 | 1.29E+06 | 7.34E+05 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 1.00E+00 | 1.17E-08 | 1.0E-01 | 8.52E+06 | 1.00E-01 | 1.55E-08 | 1.0E-01 | 6.45E+06 | 3.67E+06 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 1.00E+00 | 1.17E-08 | 1.0E-03 | 8.52E+04 | 1.00E-01 | 1.55E-08 | 1.0E-03 | 6.45E+04 | 3.67E+04 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 1.00E+00 | 1.17E-08 | 4.0E-02 | 3.41E+06 | 1.00E-01 | 1.55E-08 | 4.0E-02 | 2.58E+06 | 1.47E+06 |
| SVOC | Fluoranthene | 206-44-0 | D | 1.00E+00 | 1.17E-08 | 4.0E-02 | 3.41E+06 | 1.30E-01 | 2.01E-08 | 4.0E-02 | 1.99E+06 | 1.25E+06 |
| SVOC | Fluorene | 86-73-7 | D | 1.00E+00 | 1.17E-08 | 4.0E-02 | 3.41E+06 | 1.30E-01 | 2.01E-08 | 4.0E-02 | 1.99E+06 | 1.25E+06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 1.00E+00 | 1.17E-08 | 8.0E-04 | 6.81E+04 | 1.00E-01 | 1.55E-08 | 8.0E-04 | 5.16E+04 | 2.94E+04 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 1.00E+00 | 1.17E-08 | 3.0E-04 | 2.56E+04 | 1.00E-01 | 1.55E-08 | 3.0E-04 | 1.94E+04 | 1.10E+04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 1.00E+00 | 1.17E-08 | | | 1.30E-01 | 2.01E-08 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 1.00E+00 | 1.17E-08 | 4.0E-03 | 3.41E+05 | 1.00E-01 | 1.55E-08 | 4.0E-03 | 2.58E+05 | 1.47E+05 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 1.00E+00 | 1.17E-08 | 5.0E-02 | 4.26E+06 | 1.00E-01 | 1.55E-08 | 5.0E-02 | 3.23E+06 | 1.84E+06 |
| SVOC | Naphthalene | 91-20-3 | C | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | 1.30E-01 | 2.01E-08 | 2.0E-02 | 9.93E+05 | 6.27E+05 |

## Attachment 4: Hazard Index Calculations for Maintenance Worker Exposure to Sediment
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | | Sediment Ingestion | | | | Sediment Dermal Contact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **Carc Class** | **$C_{soil}$** (mg/kg) | **ADD** (mg/kg/d) | **$RfD_{oral}$** (mg/kg/d) | **RBC** (mg/kg) | **$ABS_d$** | **ADD** (mg/kg/d) | **$RfD_{derm}$** (mg/kg/d) | **RBC** (mg/kg) | **Combined RBC** (mg/kg) |
| SVOC | Phenanthrene | 85-01-8 | D | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | 1.30E-01 | 2.01E-08 | 3.0E-02 | 1.49E+06 | 9.41E+05 |
| SVOC | Phenol | 108-95-2 | ID | 1.00E+00 | 1.17E-08 | 3.0E-01 | 2.56E+07 | 1.00E-01 | 1.55E-08 | 3.0E-01 | 1.94E+07 | 1.10E+07 |
| SVOC | Pyrene | 129-00-0 | D | 1.00E+00 | 1.17E-08 | 3.0E-02 | 2.56E+06 | 1.30E-01 | 2.01E-08 | 3.0E-02 | 1.49E+06 | 9.41E+05 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 1.00E+00 | 1.17E-08 | 2.0E-05 | 1.70E+03 | 1.40E-01 | 2.17E-08 | 2.0E-05 | 9.22E+02 | 5.98E+02 |
| INORG | Aluminum | 7429-90-5 | D | 1.00E+00 | 1.17E-08 | 1.0E+00 | 8.52E+07 | | | 1.0E+00 | | 8.52E+07 |
| INORG | Antimony | 7440-36-0 | | 1.00E+00 | 1.17E-08 | 4.0E-04 | 3.41E+04 | | | 6.0E-05 | | 3.41E+04 |
| INORG | Arsenic | 7440-38-2 | A | 1.00E+00 | 1.17E-08 | 3.0E-04 | 2.56E+04 | 3.00E-02 | 4.65E-09 | 3.0E-04 | 6.45E+04 | 1.83E+04 |
| INORG | Barium | 7440-39-3 | D | 1.00E+00 | 1.17E-08 | 7.0E-02 | 5.96E+06 | | | 7.0E-02 | | 5.96E+06 |
| INORG | Beryllium | 7440-41-7 | B1 | 1.00E+00 | 1.17E-08 | 2.0E-03 | 1.70E+05 | | | 1.4E-05 | | 1.70E+05 |
| INORG | Cadmium | 7440-43-9 | B1 | 1.00E+00 | 1.17E-08 | 1.0E-03 | 8.52E+04 | 1.00E-03 | 1.55E-10 | 2.5E-05 | 1.61E+05 | 5.57E+04 |
| INORG | Chromium (total) | 7440-47-3 | | 1.00E+00 | 1.17E-08 | 3.0E-03 | 2.56E+05 | | | 7.5E-05 | | 2.56E+05 |
| INORG | Cobalt | 7440-48-4 | B1 | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| INORG | Copper | 7440-50-8 | D | 1.00E+00 | 1.17E-08 | 4.0E-02 | 3.41E+06 | | | 4.0E-02 | | 3.41E+06 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| INORG | Cyanide (total) | 57-12-5 | D | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 2.0E-02 | | 1.70E+06 |
| INORG | Iron | 7439-89-6 | D | 1.00E+00 | 1.17E-08 | 3.0E-01 | 2.56E+07 | | | 3.0E-01 | | 2.56E+07 |
| INORG | Lead | 7439-92-1 | B2 | 1.00E+00 | 1.17E-08 | | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 1.00E+00 | 1.17E-08 | 1.4E-01 | 1.19E+07 | | | 5.6E-03 | | 1.19E+07 |
| INORG | Mercury | 7439-97-6 | D | 1.00E+00 | 1.17E-08 | 3.0E-04 | 2.56E+04 | | | 2.1E-05 | | 2.56E+04 |
| INORG | Nickel | 7440-02-0 | A | 1.00E+00 | 1.17E-08 | 2.0E-02 | 1.70E+06 | | | 8.0E-04 | | 1.70E+06 |
| INORG | Selenium | 7782-49-2 | D | 1.00E+00 | 1.17E-08 | 5.0E-03 | 4.26E+05 | | | 5.0E-03 | | 4.26E+05 |
| INORG | Silver | 7440-22-4 | D | 1.00E+00 | 1.17E-08 | 5.0E-03 | 4.26E+05 | | | 2.0E-04 | | 4.26E+05 |
| INORG | Thallium | 7440-28-0 | | 1.00E+00 | 1.17E-08 | 7.0E-05 | 5.96E+03 | | | 7.0E-05 | | 5.96E+03 |
| INORG | Vanadium | 7440-62-2 | | 1.00E+00 | 1.17E-08 | 7.0E-03 | 5.96E+05 | | | 1.8E-04 | | 5.96E+05 |
| INORG | Zinc | 7440-66-6 | D | 1.00E+00 | 1.17E-08 | 3.0E-01 | 2.56E+07 | | | 3.0E-01 | | 2.56E+07 |

# A T T A C H M E N T  5

## Exposure of Maintenance Worker to Surface Water and Spring Water

## Attachment 5: Estimates of Risk and HQ for Maintenance Worker Exposure to Surface Water in the East Plant Area
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | Analyzed | Detected | Max Conc (mg/L) | Site-Specific Maintenance Worker Cancer Criteria ($TR=10^{-5}$) (mg/L) | Site-Specific Maintenance Worker Noncancer Criteria (HQ=1) (mg/L) | Cancer Risk | HQ |
|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 4 | 1 | 5.10E-04 | | 4.86E+03 | | 1.0E-07 |
| VOC | Carbon Disulfide | 75-15-0 | 4 | 1 | 3.50E-04 | | 2.39E+02 | | 1.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | 4 | 1 | 3.40E-04 | | 2.45E+01 | | 1.4E-05 |
| VOC | Chloroform | 67-66-3 | 4 | 1 | 3.10E-04 | 6.92E-01 | 2.44E+01 | 4.5E-09 | 1.3E-05 |
| VOC | Chloromethane | 74-87-3 | 4 | 1 | 3.50E-04 | | 3.27E+01 | | 1.1E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 4 | 1 | 2.10E-04 | | 2.69E+00 | | 7.8E-05 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 4 | 1 | 5.10E-04 | 1.55E+00 | 7.46E+01 | 3.3E-09 | 6.8E-06 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 4 | 1 | 9.40E-04 | | 1.36E+02 | | 6.9E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | 6 | 6 | 2.48E-03 | 1.85E-03 | 2.75E-03 | 1.3E-05 | 9.0E-01 |
| INORG | Aluminum | 7429-90-5 | 4 | 3 | 1.68E+01 | | 6.41E+04 | | 2.6E-04 |
| INORG | Antimony | 7440-36-0 | 4 | 1 | 4.20E-03 | | 7.89E+00 | | 5.3E-04 |
| INORG | Arsenic | 7440-38-2 | 4 | 1 | 2.70E-01 | 1.20E+00 | 1.92E+01 | 2.3E-06 | 1.4E-02 |
| INORG | Barium | 7440-39-3 | 4 | 4 | 6.60E-01 | | 4.49E+03 | | 1.5E-04 |
| INORG | Beryllium | 7440-41-7 | 4 | 1 | 9.70E-04 | | 2.23E+00 | | 4.3E-04 |
| INORG | Cadmium | 7440-43-9 | 4 | 1 | 2.30E-03 | | 3.75E+00 | | 6.1E-04 |
| INORG | Chromium (total) | 7440-47-3 | 4 | 1 | 2.20E-02 | | 1.17E+01 | | 1.9E-03 |
| INORG | Cobalt | 7440-48-4 | 4 | 1 | 4.40E-02 | | 1.68E+03 | | 2.6E-05 |
| INORG | Copper | 7440-50-8 | 4 | 1 | 3.70E-01 | | 2.57E+03 | | 1.4E-04 |
| INORG | Iron | 7439-89-6 | 4 | 4 | 5.38E+02 | | 1.92E+04 | | 2.8E-02 |
| INORG | Manganese | 7439-96-5 | 4 | 4 | 2.94E+01 | | 8.52E+02 | | 3.5E-02 |
| INORG | Mercury | 7439-97-6 | 4 | 2 | 4.90E-04 | | 2.03E-01 | | 2.4E-03 |
| INORG | Nickel | 7440-02-0 | 4 | 2 | 4.80E-02 | | 4.95E+02 | | 9.7E-05 |
| INORG | Vanadium | 7440-62-2 | 4 | 2 | 1.90E-02 | | 2.82E+01 | | 6.7E-04 |
| INORG | Zinc | 7440-66-6 | 4 | 2 | 2.60E-01 | | 2.29E+04 | | 1.1E-05 |
| | | | | | | | | | |
| **Note:** | | | | | | | **Sum:** | **1.6E-05** | **9.8E-01** |
| Only constituents detected in the East Plant Area are shown. | | | | | | | | | |

**Attachment 5: Estimates of Risk and HQ for Maintenance Worker Exposure to Spring Water in the East Plant Area**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Analyzed | Detected | Max Conc (mg/L) | Site-Specific Maintenance Worker Cancer Criteria ($TR=10^{-5}$) (mg/L) | Site-Specific Maintenance Worker Noncancer Criteria (HQ=1) (mg/L) | Cancer Risk | HQ |
|---|---|---|---|---|---|---|---|---|---|
| VOC | Carbon Disulfide | 75-15-0 | 2 | 1 | 3.70E-04 | | 2.39E+02 | | 1.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | 2 | 2 | 2.90E-04 | | 2.45E+01 | | 1.2E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 2 | 1 | 1.50E-04 | | 2.69E+00 | | 5.6E-05 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 2 | 2 | 2.90E-04 | 1.55E+00 | 7.46E+01 | 1.9E-09 | 3.9E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | 2 | 2 | 4.71E-03 | 1.85E-03 | 2.75E-03 | 2.5E-05 | 1.7E+00 |
| INORG | Aluminum | 7429-90-5 | 2 | 2 | 5.62E+01 | | 6.41E+04 | | 8.8E-04 |
| INORG | Antimony | 7440-36-0 | 2 | 1 | 4.30E-03 | | 7.89E+00 | | 5.5E-04 |
| INORG | Arsenic | 7440-38-2 | 2 | 2 | 8.10E-02 | 1.20E+00 | 1.92E+01 | 6.8E-07 | 4.2E-03 |
| INORG | Barium | 7440-39-3 | 2 | 2 | 8.90E-01 | | 4.49E+03 | | 2.0E-04 |
| INORG | Beryllium | 7440-41-7 | 2 | 1 | 1.40E-03 | | 2.23E+00 | | 6.3E-04 |
| INORG | Chromium (total) | 7440-47-3 | 2 | 2 | 8.70E-02 | | 1.17E+01 | | 7.5E-03 |
| INORG | Cobalt | 7440-48-4 | 2 | 2 | 1.20E-01 | | 1.68E+03 | | 7.1E-05 |
| INORG | Copper | 7440-50-8 | 2 | 2 | 3.80E-01 | | 2.57E+03 | | 1.5E-04 |
| INORG | Iron | 7439-89-6 | 2 | 2 | 3.06E+02 | | 1.92E+04 | | 1.6E-02 |
| INORG | Manganese | 7439-96-5 | 2 | 2 | 5.74E+01 | | 8.52E+02 | | 6.7E-02 |
| INORG | Mercury | 7439-97-6 | 2 | 2 | 1.00E-03 | | 2.03E-01 | | 4.9E-03 |
| INORG | Nickel | 7440-02-0 | 2 | 2 | 1.50E-01 | | 4.95E+02 | | 3.0E-04 |
| INORG | Silver | 7440-22-4 | 2 | 1 | 3.10E-03 | | 4.88E+01 | | 6.3E-05 |
| INORG | Thallium | 7440-28-0 | 2 | 1 | 9.80E-03 | | 4.49E+00 | | 2.2E-03 |
| INORG | Vanadium | 7440-62-2 | 2 | 2 | 9.60E-02 | | 2.82E+01 | | 3.4E-03 |
| INORG | Zinc | 7440-66-6 | 2 | 2 | 4.20E-01 | | 2.29E+04 | | 1.8E-05 |
| | | | | | | | | | |
| **Note:** | | | | | | | **Sum:** | **2.6E-05** | **1.8E+00** |
| Only constituents detected in the East Plant Area are shown. | | | | | | | | | |

## Attachment 5: High-End Exposure Factors for Maintenance Worker Contact with Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Maintenance Worker | |
|---|---|---|---|---|
| **Incidental Surface/Spring Water Ingestion** | | | | |
| Drinking Rate | L-water/hr | **DR** | 0.005 | e |
| Events per Day | 1/d | **EV** | 1 | |
| Exposure Time | hours | **ET** | 4 | e |
| Exposure Frequency | days/year | **EF** | 12 | e |
| Expoure Duration | years | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |
| **Dermal Contact with Surface/Spring Water** | | | | |
| Event Time | hr | **t** | 4 | e |
| Skin Surface Area | $cm^2$ | **SA** | 3,300 | d |
| Events per Day | 1/d | **EV** | 1 | |
| Exposure Frequency | d/yr | **EF** | 12 | e |
| Exposure Duration | yr | **ED** | 25 | b |
| Body Weight | kg | **BW** | 70 | a |
| Averaging Time, carc | d | **$AT_c$** | 25,550 | a |
| Averaging Time, noncarc | d | **$AT_{nc}$** | 9,125 | a |
| **Ambient Air Inhalation** | | | | |
| Fraction Contacted | unitless | **FC** | 0.5 | |
| Exposure Time | hour/hour | **ET** | 8/8 | |
| Exposure Frequency | days/year | **EF** | 12 | e |
| Exposure Duration | years | **ED** | 25 | b |
| Averaging Time, cancer | days | **$AT_c$** | 25,550 | a |
| Averaging Time, noncancer | days | **$AT_{nc}$** | 9,125 | a |

## Attachment 5: Nonsteady State Dermal Absorption of Chemicals from Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | MW (g/mole) | Log $K_{ow}$ (unitless) | $K_p$ (cm/hr) | B (unitless) | $\tau$ (hr) | c | b | ts (hr) | FA (unitless) | DA ($L/cm^2$-event) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 5.8E+01 | -2.4E-01 | 5.2E-04 | 1.5E-03 | 2.2E-01 | 3.3E-01 | 3.0E-01 | 5.3E-01 | 1.0E+00 | 2.31E-06 |
| VOC | Benzene | 71-43-2 | 7.8E+01 | 2.1E+00 | 1.5E-02 | 5.0E-02 | 2.9E-01 | 3.7E-01 | 3.3E-01 | 6.9E-01 | 1.0E+00 | 6.50E-05 |
| VOC | Bromodichloromethane | 75-27-4 | 1.6E+02 | 2.1E+00 | 4.7E-03 | 2.3E-02 | 8.7E-01 | 3.5E-01 | 3.2E-01 | 2.1E+00 | 1.0E+00 | 2.65E-05 |
| VOC | Bromomethane | 74-83-9 | 9.5E+01 | 1.2E+00 | 2.8E-03 | 1.1E-02 | 3.6E-01 | 3.4E-01 | 3.1E-01 | 8.6E-01 | 1.0E+00 | 1.33E-05 |
| VOC | 2-Butanone | 78-93-3 | 7.2E+01 | 2.9E-01 | 9.7E-04 | 3.2E-03 | 2.7E-01 | 3.4E-01 | 3.1E-01 | 6.4E-01 | 1.0E+00 | 4.39E-06 |
| VOC | Carbon Disulfide | 75-15-0 | 7.6E+01 | 2.0E+00 | 1.2E-02 | 4.2E-02 | 2.8E-01 | 3.6E-01 | 3.3E-01 | 6.7E-01 | 1.0E+00 | 5.49E-05 |
| VOC | Chlorobenzene | 108-90-7 | 1.1E+02 | 2.9E+00 | 2.9E-02 | 1.2E-01 | 4.5E-01 | 4.2E-01 | 3.8E-01 | 1.1E+00 | 1.0E+00 | 1.31E-04 |
| VOC | Chloroethane | 75-00-3 | 6.5E+01 | 1.4E+00 | 6.1E-03 | 1.9E-02 | 2.4E-01 | 3.5E-01 | 3.1E-01 | 5.8E-01 | 1.0E+00 | 2.68E-05 |
| VOC | Chloroform | 67-66-3 | 1.2E+02 | 1.9E+00 | 6.3E-03 | 2.6E-02 | 4.9E-01 | 3.5E-01 | 3.2E-01 | 1.2E+00 | 1.0E+00 | 3.08E-05 |
| VOC | Chloromethane | 74-87-3 | 5.0E+01 | 9.1E-01 | 3.3E-03 | 9.0E-03 | 2.0E-01 | 3.4E-01 | 3.1E-01 | 4.8E-01 | 1.0E+00 | 1.44E-05 |
| VOC | Cumene | 98-82-8 | 1.2E+02 | 3.7E+00 | 8.8E-02 | 3.7E-01 | 5.0E-01 | 6.1E-01 | 5.8E-01 | 1.2E+00 | 1.0E+00 | 3.72E-04 |
| VOC | Cyclohexane | 110-82-7 | 8.4E+01 | 3.4E+00 | 1.0E-01 | 3.5E-01 | 3.1E-01 | 6.0E-01 | 5.7E-01 | 7.5E-01 | 1.0E+00 | 3.78E-04 |
| VOC | Dibromochloromethane | 124-48-1 | 2.1E+02 | 2.2E+00 | 2.9E-03 | 1.6E-02 | 1.5E+00 | 3.4E-01 | 3.1E-01 | 3.7E+00 | 1.0E+00 | 2.07E-05 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 1.5E+02 | 3.4E+00 | 4.4E-02 | 2.0E-01 | 7.0E-01 | 4.8E-01 | 4.4E-01 | 1.7E+00 | 1.0E+00 | 2.19E-04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 1.5E+02 | 3.4E+00 | 4.1E-02 | 1.9E-01 | 7.0E-01 | 4.7E-01 | 4.3E-01 | 1.7E+00 | 1.0E+00 | 2.03E-04 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 1.5E+02 | 3.4E+00 | 4.3E-02 | 2.0E-01 | 7.0E-01 | 4.8E-01 | 4.4E-01 | 1.7E+00 | 1.0E+00 | 2.15E-04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 1.2E+02 | 2.2E+00 | 8.9E-03 | 3.8E-02 | 5.0E-01 | 3.6E-01 | 3.3E-01 | 1.2E+00 | 1.0E+00 | 4.35E-05 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 9.9E+01 | 1.8E+00 | 6.7E-03 | 2.6E-02 | 3.8E-01 | 3.5E-01 | 3.2E-01 | 9.0E-01 | 1.0E+00 | 3.14E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 9.9E+01 | 1.5E+00 | 4.1E-03 | 1.6E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.0E-01 | 1.0E+00 | 1.94E-05 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 9.7E+01 | 1.9E+00 | 7.7E-03 | 2.9E-02 | 3.7E-01 | 3.5E-01 | 3.2E-01 | 8.8E-01 | 1.0E+00 | 3.56E-05 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 9.7E+01 | 2.1E+00 | 1.1E-02 | 4.0E-02 | 3.7E-01 | 3.6E-01 | 3.3E-01 | 8.8E-01 | 1.0E+00 | 4.86E-05 |
| VOC | Ethyl Benzene | 100-41-4 | 1.1E+02 | 3.1E+00 | 4.8E-02 | 1.9E-01 | 4.1E-01 | 4.7E-01 | 4.3E-01 | 9.9E-01 | 1.0E+00 | 2.07E-04 |
| VOC | 2-Hexanone | 591-78-6 | 1.0E+02 | 1.4E+00 | 3.5E-03 | 1.4E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.2E-01 | 1.0E+00 | 1.67E-05 |
| VOC | Methyl Acetate | 79-20-9 | 7.4E+01 | 1.8E-01 | 8.0E-04 | 2.7E-03 | 2.7E-01 | 3.4E-01 | 3.0E-01 | 6.6E-01 | 1.0E+00 | 3.64E-06 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 8.8E+01 | 1.2E+00 | 3.3E-03 | 1.2E-02 | 3.3E-01 | 3.4E-01 | 3.1E-01 | 7.9E-01 | 1.0E+00 | 1.55E-05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 1.0E+02 | 1.2E+00 | 2.7E-03 | 1.0E-02 | 3.8E-01 | 3.4E-01 | 3.1E-01 | 9.2E-01 | 1.0E+00 | 1.26E-05 |
| VOC | Methylcyclohexane | 108-87-2 | 9.8E+01 | 3.6E+00 | 1.1E-01 | 4.1E-01 | 3.7E-01 | 6.5E-01 | 6.2E-01 | 9.0E-01 | 1.0E+00 | 4.16E-04 |
| VOC | Methylene Chloride | 75-09-2 | 8.5E+01 | 1.3E+00 | 3.5E-03 | 1.3E-02 | 3.1E-01 | 3.4E-01 | 3.1E-01 | 7.5E-01 | 1.0E+00 | 1.63E-05 |
| VOC | Tetrachloroethene | 127-18-4 | 1.7E+02 | 2.7E+00 | 1.1E-02 | 5.4E-02 | 8.9E-01 | 3.7E-01 | 3.4E-01 | 2.1E+00 | 1.0E+00 | 6.13E-05 |
| VOC | Toluene | 108-88-3 | 9.2E+01 | 2.8E+00 | 3.2E-02 | 1.2E-01 | 3.5E-01 | 4.2E-01 | 3.8E-01 | 8.3E-01 | 1.0E+00 | 1.37E-04 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 1.8E+02 | 4.0E+00 | 6.8E-02 | 3.5E-01 | 1.1E+00 | 6.0E-01 | 5.6E-01 | 2.6E+00 | 1.0E+00 | 3.96E-04 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 1.3E+02 | 2.5E+00 | 1.2E-02 | 5.5E-02 | 5.9E-01 | 3.7E-01 | 3.4E-01 | 1.4E+00 | 1.0E+00 | 6.19E-05 |
| VOC | Trichloroethene | 79-01-6 | 1.3E+02 | 2.7E+00 | 1.8E-02 | 7.9E-02 | 5.7E-01 | 3.9E-01 | 3.5E-01 | 1.4E+00 | 1.0E+00 | 8.85E-05 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 1.9E+02 | 3.1E+00 | 1.7E-02 | 8.9E-02 | 1.2E+00 | 3.9E-01 | 3.6E-01 | 2.8E+00 | 1.0E+00 | 1.05E-04 |
| VOC | Vinyl Chloride | 75-01-4 | 6.3E+01 | 1.5E+00 | 6.9E-03 | 2.1E-02 | 2.4E-01 | 3.5E-01 | 3.2E-01 | 5.7E-01 | 1.0E+00 | 3.04E-05 |
| VOC | Xylenes (total) | 1330-20-7 | 1.1E+02 | 3.2E+00 | 5.0E-02 | 2.0E-01 | 4.1E-01 | 4.8E-01 | 4.4E-01 | 9.9E-01 | 1.0E+00 | 2.15E-04 |
| SVOC | Acenaphthene | 83-32-9 | 1.5E+02 | 3.9E+00 | 8.4E-02 | 4.0E-01 | 7.7E-01 | 6.4E-01 | 6.1E-01 | 1.8E+00 | 1.0E+00 | 4.16E-04 |
| SVOC | Acenaphthylene | 208-96-8 | 1.5E+02 | 4.1E+00 | 1.1E-01 | 5.1E-01 | 7.5E-01 | 7.3E-01 | 7.2E-01 | 1.8E+00 | 1.0E+00 | 5.21E-04 |
| SVOC | Acetophenone | 98-86-2 | 1.2E+02 | 1.6E+00 | 3.7E-03 | 1.6E-02 | 5.0E-01 | 3.4E-01 | 3.1E-01 | 1.2E+00 | 1.0E+00 | 1.84E-05 |
| SVOC | Anthracene | 120-12-7 | 1.8E+02 | 4.6E+00 | 1.6E-01 | 8.2E-01 | 1.0E+00 | 1.0E+00 | 1.1E+00 | 4.0E+00 | 1.0E+00 | 9.07E-04 |
| SVOC | Benzaldehyde | 100-52-7 | 1.1E+02 | 1.5E+00 | 3.8E-03 | 1.5E-02 | 4.1E-01 | 3.4E-01 | 3.1E-01 | 9.9E-01 | 1.0E+00 | 1.83E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 2.3E+02 | 5.7E+00 | 4.8E-01 | 2.8E+00 | 2.0E+00 | 2.9E+00 | 6.3E+00 | 8.4E+00 | 9.0E-01 | 3.39E-03 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 2.5E+02 | 6.1E+00 | 6.6E-01 | 4.0E+00 | 2.7E+00 | 4.1E+00 | 1.2E+01 | 1.2E+01 | 8.0E-01 | 4.82E-03 |

| Attachment 5: Nonsteady State Dermal Absorption of Chemicals from Surface/Spring Water<br>GM Powertrain Bedford Facility, Bedford, Indiana | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **MW** (g/mole) | **Log $K_{ow}$** (unitless) | **$K_p$** (cm/hr) | **B** (unitless) | **$\tau$** (hr) | **c** | **b** | **ts** (hr) | **FA** (unitless) | **DA** ($L/cm^2$-event) |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 2.5E+02 | 6.2E+00 | 7.6E-01 | 4.6E+00 | 2.7E+00 | 4.7E+00 | 1.5E+01 | 1.2E+01 | 8.0E-01 | 5.52E-03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 2.8E+02 | 7.2E+00 | 1.0E+00 | 6.4E+00 | 3.7E+00 | 6.4E+00 | 2.8E+01 | 1.6E+01 | 7.0E-01 | 7.45E-03 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 2.5E+02 | 6.2E+00 | 7.6E-01 | 4.6E+00 | 2.7E+00 | 4.7E+00 | 1.5E+01 | 1.2E+01 | 8.0E-01 | 5.52E-03 |
| SVOC | Biphenyl | 92-52-4 | 1.5E+02 | 4.1E+00 | 1.1E-01 | 5.2E-01 | 7.7E-01 | 7.4E-01 | 7.3E-01 | 1.8E+00 | 1.0E+00 | 5.29E-04 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 3.9E+02 | 7.3E+00 | 6.8E-01 | 5.1E+00 | 1.6E+01 | 5.2E+00 | 1.9E+01 | 7.1E+01 | 4.0E-01 | 6.03E-03 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 3.1E+02 | 4.8E+00 | 4.4E-02 | 3.0E-01 | 5.9E+00 | 5.6E-01 | 5.2E-01 | 1.4E+01 | 9.0E-01 | 5.34E-04 |
| SVOC | Caprolactam | 105-60-2 | 1.1E+02 | -1.9E-01 | 2.8E-04 | 1.1E-03 | 4.5E-01 | 3.3E-01 | 3.0E-01 | 1.1E+00 | 1.0E+00 | 1.35E-06 |
| SVOC | Carbazole | 86-74-8 | 1.7E+02 | 3.6E+00 | 4.3E-02 | 2.1E-01 | 9.1E-01 | 4.9E-01 | 4.5E-01 | 2.2E+00 | 1.0E+00 | 2.36E-04 |
| SVOC | 4-Chloroaniline | 106-47-8 | 1.3E+02 | 1.9E+00 | 5.1E-03 | 2.2E-02 | 5.4E-01 | 3.5E-01 | 3.2E-01 | 1.3E+00 | 1.0E+00 | 2.56E-05 |
| SVOC | Chrysene | 218-01-9 | 2.3E+02 | 5.7E+00 | 4.8E-01 | 2.8E+00 | 2.0E+00 | 2.9E+00 | 6.3E+00 | 8.4E+00 | 9.0E-01 | 3.39E-03 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 2.8E+02 | 6.7E+00 | 1.0E+00 | 6.4E+00 | 3.8E+00 | 6.5E+00 | 2.9E+01 | 1.7E+01 | 7.0E-01 | 7.55E-03 |
| SVOC | Dibenzofuran | 132-64-9 | 1.7E+02 | 4.1E+00 | 9.5E-02 | 4.7E-01 | 9.2E-01 | 7.0E-01 | 6.8E-01 | 2.2E+00 | 1.0E+00 | 5.06E-04 |
| SVOC | Diethylphthalate | 84-66-2 | 2.2E+02 | 2.5E+00 | 4.0E-03 | 2.3E-02 | 1.8E+00 | 3.5E-01 | 3.2E-01 | 4.4E+00 | 1.0E+00 | 3.03E-05 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 1.2E+02 | 2.4E+00 | 1.2E-02 | 5.0E-02 | 5.1E-01 | 3.7E-01 | 3.3E-01 | 1.2E+00 | 1.0E+00 | 5.77E-05 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 2.8E+02 | 4.6E+00 | 4.8E-02 | 3.1E-01 | 3.8E+00 | 5.6E-01 | 5.3E-01 | 9.1E+00 | 9.0E-01 | 4.69E-04 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.8E+02 | 1.9E+00 | 2.6E-03 | 1.3E-02 | 1.1E+00 | 3.4E-01 | 3.1E-01 | 2.6E+00 | 1.0E+00 | 1.60E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 3.9E+02 | 8.1E+00 | 1.0E+00 | 7.6E+00 | 1.6E+01 | 7.6E+00 | 3.9E+01 | 7.2E+01 | 3.0E-01 | 6.67E-03 |
| SVOC | Fluoranthene | 206-44-0 | 2.0E+02 | 5.1E+00 | 2.8E-01 | 1.5E+00 | 1.4E+00 | 1.7E+00 | 2.4E+00 | 5.7E+00 | 1.0E+00 | 1.85E-03 |
| SVOC | Fluorene | 86-73-7 | 1.7E+02 | 4.2E+00 | 1.1E-01 | 5.5E-01 | 9.0E-01 | 7.7E-01 | 7.7E-01 | 2.2E+00 | 1.0E+00 | 5.84E-04 |
| SVOC | Hexachlorobenzene | 118-74-1 | 2.8E+02 | 5.9E+00 | 3.1E-01 | 2.0E+00 | 4.1E+00 | 2.1E+00 | 3.7E+00 | 1.7E+01 | 8.0E-01 | 2.80E-03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 2.6E+02 | 4.8E+00 | 8.2E-02 | 5.1E-01 | 3.0E+00 | 7.3E-01 | 7.2E-01 | 7.3E+00 | 9.0E-01 | 7.12E-04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 2.8E+02 | 6.7E+00 | 1.0E+00 | 6.4E+00 | 3.7E+00 | 6.4E+00 | 2.8E+01 | 1.6E+01 | 7.0E-01 | 7.45E-03 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.4E+02 | 3.9E+00 | 8.9E-02 | 4.1E-01 | 6.6E-01 | 6.5E-01 | 6.2E-01 | 1.6E+00 | 1.0E+00 | 4.15E-04 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.1E+02 | | 7.8E-03 | 3.1E-02 | 4.2E-01 | 3.5E-01 | 3.2E-01 | 1.0E+00 | 1.0E+00 | 3.71E-05 |
| SVOC | Naphthalene | 91-20-3 | 1.3E+02 | 3.4E+00 | 5.0E-02 | 2.2E-01 | 5.5E-01 | 4.9E-01 | 4.5E-01 | 1.3E+00 | 1.0E+00 | 2.31E-04 |
| SVOC | Phenanthrene | 85-01-8 | 1.8E+02 | 4.5E+00 | 1.4E-01 | 7.2E-01 | 1.0E+00 | 9.1E-01 | 9.7E-01 | 4.1E+00 | 1.0E+00 | 7.91E-04 |
| SVOC | Phenol | 108-95-2 | 9.4E+01 | 1.5E+00 | 4.5E-03 | 1.7E-02 | 3.5E-01 | 3.4E-01 | 3.1E-01 | 8.5E-01 | 1.0E+00 | 2.08E-05 |
| SVOC | Pyrene | 129-00-0 | 2.0E+02 | 5.1E+00 | 2.8E-01 | 1.5E+00 | 1.4E+00 | 1.6E+00 | 2.4E+00 | 5.7E+00 | 1.0E+00 | 1.82E-03 |
| P/PCB | PCBs (total) | 1336-36-3 | 3.3E+02 | 6.5E+00 | 4.5E-01 | 3.1E+00 | 7.2E+00 | 3.2E+00 | 7.7E+00 | 3.1E+01 | 7.0E-01 | 4.68E-03 |
| INORG | Aluminum | 7429-90-5 | 2.7E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Antimony | 7440-36-0 | 1.2E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Arsenic | 7440-38-2 | 7.5E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Barium | 7440-39-3 | 1.4E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Beryllium | 7440-41-7 | 9.0E+00 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Cadmium | 7440-43-9 | 1.1E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Chromium (total) | 7440-47-3 | 5.2E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Cobalt | 7440-48-4 | 5.9E+01 | | 4.0E-04 | | | | | | | 1.60E-06 |
| INORG | Copper | 7440-50-8 | 6.4E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Cyanide (amenable) | 57-12-5A | 2.6E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Cyanide (total) | 57-12-5 | 2.6E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Iron | 7439-89-6 | 5.6E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Lead | 7439-92-1 | 2.1E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Manganese | 7439-96-5 | 5.5E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |

| Attachment 5: Nonsteady State Dermal Absorption of Chemicals from Surface/Spring Water<br>GM Powertrain Bedford Facility, Bedford, Indiana | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chem Group** | **Chemical** | **CASRN** | **MW** (g/mole) | **Log $K_{ow}$** (unitless) | **$K_p$** (cm/hr) | **B** (unitless) | **$\tau$** (hr) | **c** | **b** | **ts** (hr) | **FA** (unitless) | **DA** ($L/cm^2$-event) |
| INORG | Mercury | 7439-97-6 | 2.0E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Nickel | 7440-02-0 | 5.9E+01 | | 2.0E-04 | | | | | | | 8.00E-07 |
| INORG | Selenium | 7782-49-2 | 7.9E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Silver | 7440-22-4 | 1.1E+02 | | 6.0E-04 | | | | | | | 2.40E-06 |
| INORG | Thallium | 7440-28-0 | 2.0E+02 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Vanadium | 7440-62-2 | 5.1E+01 | | 1.0E-03 | | | | | | | 4.00E-06 |
| INORG | Zinc | 7440-66-6 | 6.5E+01 | | 6.0E-04 | | | | | | | 2.40E-06 |
| | | | | | | | | | | | | |
| **Note:** | Event Time (Maintenance Worker) | hours | **t** | 4 | | | | | | | | |

## Attachment 5: Normalized Vapor Flux to Ambient Air from Exposed Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | 8.0E-04 | 5.8E+01 | 5.47E-01 | 1.44E-03 | 3.34E-04 | 3.34E-03 |
| VOC | Benzene | 71-43-2 | 1.1E-01 | 7.8E+01 | 4.96E-01 | 1.25E-03 | 1.22E-03 | 1.22E-02 |
| VOC | Bromodichloromethane | 75-27-4 | 3.3E-02 | 1.6E+02 | 3.87E-01 | 8.60E-04 | 8.06E-04 | 8.06E-03 |
| VOC | Bromomethane | 74-83-9 | 1.3E-01 | 9.5E+01 | 4.64E-01 | 1.13E-03 | 1.11E-03 | 1.11E-02 |
| VOC | 2-Butanone | 78-93-3 | 1.1E-03 | 7.2E+01 | 5.09E-01 | 1.30E-03 | 4.02E-04 | 4.02E-03 |
| VOC | Carbon Disulfide | 75-15-0 | 6.2E-01 | 7.6E+01 | 5.00E-01 | 1.26E-03 | 1.26E-03 | 1.26E-02 |
| VOC | Chlorobenzene | 108-90-7 | 7.6E-02 | 1.1E+02 | 4.39E-01 | 1.04E-03 | 1.01E-03 | 1.01E-02 |
| VOC | Chloroethane | 75-00-3 | 1.8E-01 | 6.5E+01 | 5.29E-01 | 1.37E-03 | 1.35E-03 | 1.35E-02 |
| VOC | Chloroform | 67-66-3 | 7.5E-02 | 1.2E+02 | 4.30E-01 | 1.01E-03 | 9.77E-04 | 9.77E-03 |
| VOC | Chloromethane | 74-87-3 | 1.8E-01 | 5.0E+01 | 5.74E-01 | 1.55E-03 | 1.53E-03 | 1.53E-02 |
| VOC | Cumene | 98-82-8 | 2.4E+01 | 1.2E+02 | 4.29E-01 | 1.00E-03 | 1.00E-03 | 1.00E-02 |
| VOC | Cyclohexane | 110-82-7 | 4.0E+00 | 8.4E+01 | 4.83E-01 | 1.20E-03 | 1.20E-03 | 1.20E-02 |
| VOC | Dibromochloromethane | 124-48-1 | 1.6E-02 | 2.1E+02 | 3.57E-01 | 7.63E-04 | 6.73E-04 | 6.73E-03 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | 3.9E-02 | 1.5E+02 | 4.01E-01 | 9.08E-04 | 8.58E-04 | 8.58E-03 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | 6.3E-02 | 1.5E+02 | 4.01E-01 | 9.08E-04 | 8.77E-04 | 8.77E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | 5.0E-02 | 1.5E+02 | 4.01E-01 | 9.08E-04 | 8.69E-04 | 8.69E-03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | 7.0E+00 | 1.2E+02 | 4.28E-01 | 1.00E-03 | 1.00E-03 | 1.00E-02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | 1.2E-01 | 9.9E+01 | 4.58E-01 | 1.11E-03 | 1.08E-03 | 1.08E-02 |
| VOC | 1,2-Dichloroethane | 107-06-2 | 2.0E-02 | 9.9E+01 | 4.58E-01 | 1.11E-03 | 9.88E-04 | 9.88E-03 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | 8.4E-02 | 9.7E+01 | 4.61E-01 | 1.12E-03 | 1.09E-03 | 1.09E-02 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | 1.9E-01 | 9.7E+01 | 4.61E-01 | 1.12E-03 | 1.10E-03 | 1.10E-02 |
| VOC | Ethyl Benzene | 100-41-4 | 1.6E-01 | 1.1E+02 | 4.47E-01 | 1.07E-03 | 1.05E-03 | 1.05E-02 |
| VOC | 2-Hexanone | 591-78-6 | 3.6E-02 | 1.0E+02 | 4.56E-01 | 1.10E-03 | 1.03E-03 | 1.03E-02 |
| VOC | Methyl Acetate | 79-20-9 | 5.8E-05 | 7.4E+01 | 5.05E-01 | 1.28E-03 | 2.84E-05 | 2.84E-04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | 1.2E-02 | 8.8E+01 | 4.76E-01 | 1.17E-03 | 9.73E-04 | 9.73E-03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | 2.8E-03 | 1.0E+02 | 4.56E-01 | 1.10E-03 | 5.93E-04 | 5.93E-03 |
| VOC | Methylcyclohexane | 108-87-2 | 8.8E+00 | 9.8E+01 | 4.59E-01 | 1.11E-03 | 1.11E-03 | 1.11E-02 |
| VOC | Methylene Chloride | 75-09-2 | 4.5E-02 | 8.5E+01 | 4.82E-01 | 1.19E-03 | 1.13E-03 | 1.13E-02 |
| VOC | Tetrachloroethene | 127-18-4 | 3.8E-01 | 1.7E+02 | 3.85E-01 | 8.55E-04 | 8.50E-04 | 8.50E-03 |
| VOC | Toluene | 108-88-3 | 1.4E-01 | 9.2E+01 | 4.69E-01 | 1.15E-03 | 1.13E-03 | 1.13E-02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | 2.9E-02 | 1.8E+02 | 3.74E-01 | 8.17E-04 | 7.60E-04 | 7.60E-03 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | 3.5E-01 | 1.3E+02 | 4.14E-01 | 9.53E-04 | 9.47E-04 | 9.47E-03 |
| VOC | Trichloroethene | 79-01-6 | 2.1E-01 | 1.3E+02 | 4.16E-01 | 9.61E-04 | 9.50E-04 | 9.50E-03 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 9.8E+00 | 1.9E+02 | 3.70E-01 | 8.04E-04 | 8.04E-04 | 8.04E-03 |

## Attachment 5: Normalized Vapor Flux to Ambient Air from Exposed Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| VOC | Vinyl Chloride | 75-01-4 | 5.6E-01 | 6.3E+01 | 5.34E-01 | 1.39E-03 | 1.39E-03 | 1.39E-02 |
| VOC | Xylenes (total) | 1330-20-7 | 1.4E-01 | 1.1E+02 | 4.47E-01 | 1.07E-03 | 1.05E-03 | 1.05E-02 |
| SVOC | Acenaphthene | 83-32-9 | 3.2E-03 | 1.5E+02 | 3.95E-01 | 8.87E-04 | 5.20E-04 | 5.20E-03 |
| SVOC | Acenaphthylene | 208-96-8 | 2.3E-03 | 1.5E+02 | 3.96E-01 | 8.92E-04 | 4.52E-04 | 4.52E-03 |
| SVOC | Acetophenone | 98-86-2 | 2.2E-04 | 1.2E+02 | 4.29E-01 | 1.00E-03 | 8.58E-05 | 8.58E-04 |
| SVOC | Anthracene | 120-12-7 | 1.3E-03 | 1.8E+02 | 3.76E-01 | 8.25E-04 | 3.12E-04 | 3.12E-03 |
| SVOC | Benzaldehyde | 100-52-7 | 4.9E-04 | 1.1E+02 | 4.47E-01 | 1.07E-03 | 1.81E-04 | 1.81E-03 |
| SVOC | Benzo(a)anthracene | 56-55-3 | 6.9E-05 | 2.3E+02 | 3.46E-01 | 7.29E-04 | 2.30E-05 | 2.30E-04 |
| SVOC | Benzo(a)pyrene | 50-32-8 | 2.3E-05 | 2.5E+02 | 3.35E-01 | 6.93E-04 | 7.66E-06 | 7.66E-05 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | 2.3E-03 | 2.5E+02 | 3.35E-01 | 6.93E-04 | 3.63E-04 | 3.63E-03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | 2.9E-06 | 2.8E+02 | 3.25E-01 | 6.62E-04 | 9.34E-07 | 9.34E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | 1.7E-05 | 2.5E+02 | 3.35E-01 | 6.93E-04 | 5.64E-06 | 5.64E-05 |
| SVOC | Biphenyl | 92-52-4 | 6.1E-03 | 1.5E+02 | 3.95E-01 | 8.87E-04 | 6.49E-04 | 6.49E-03 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | 2.1E-06 | 3.9E+02 | 2.89E-01 | 5.57E-04 | 6.04E-07 | 6.04E-06 |
| SVOC | Butylbenzylphthalate | 85-68-7 | 2.6E-05 | 3.1E+02 | 3.12E-01 | 6.23E-04 | 7.95E-06 | 7.95E-05 |
| SVOC | Caprolactam | 105-60-2 | 5.2E-07 | 1.1E+02 | 4.38E-01 | 1.03E-03 | 2.26E-07 | 2.26E-06 |
| SVOC | Carbazole | 86-74-8 | 3.1E-07 | 1.7E+02 | 3.84E-01 | 8.51E-04 | 1.20E-07 | 1.20E-06 |
| SVOC | 4-Chloroaniline | 106-47-8 | 6.8E-06 | 1.3E+02 | 4.21E-01 | 9.75E-04 | 2.85E-06 | 2.85E-05 |
| SVOC | Chrysene | 218-01-9 | 1.9E-03 | 2.3E+02 | 3.46E-01 | 7.29E-04 | 3.49E-04 | 3.49E-03 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | 3.0E-07 | 2.8E+02 | 3.24E-01 | 6.60E-04 | 9.76E-08 | 9.76E-07 |
| SVOC | Dibenzofuran | 132-64-9 | 2.6E-04 | 1.7E+02 | 3.83E-01 | 8.49E-04 | 8.84E-05 | 8.84E-04 |
| SVOC | Diethylphthalate | 84-66-2 | 9.3E-06 | 2.2E+02 | 3.49E-01 | 7.39E-04 | 3.22E-06 | 3.22E-05 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | 4.1E-05 | 1.2E+02 | 4.27E-01 | 9.96E-04 | 1.72E-05 | 1.72E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | 1.9E-08 | 2.8E+02 | 3.24E-01 | 6.60E-04 | 6.23E-09 | 6.23E-08 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | 1.5E-05 | 1.8E+02 | 3.73E-01 | 8.16E-04 | 5.67E-06 | 5.67E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | 1.4E-03 | 3.9E+02 | 2.89E-01 | 5.57E-04 | 2.31E-04 | 2.31E-03 |
| SVOC | Fluoranthene | 206-44-0 | 3.3E-04 | 2.0E+02 | 3.60E-01 | 7.74E-04 | 1.03E-04 | 1.03E-03 |
| SVOC | Fluorene | 86-73-7 | 1.3E-03 | 1.7E+02 | 3.85E-01 | 8.54E-04 | 3.16E-04 | 3.16E-03 |
| SVOC | Hexachlorobenzene | 118-74-1 | 2.7E-02 | 2.8E+02 | 3.21E-01 | 6.52E-04 | 6.07E-04 | 6.07E-03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | 1.7E-01 | 2.6E+02 | 3.31E-01 | 6.82E-04 | 6.74E-04 | 6.74E-03 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | 3.3E-05 | 2.8E+02 | 3.25E-01 | 6.62E-04 | 1.05E-05 | 1.05E-04 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | 1.1E-02 | 1.4E+02 | 4.06E-01 | 9.23E-04 | 7.60E-04 | 7.60E-03 |
| SVOC | Methylphenol (total) | 1319-77-3 | 1.8E-05 | 1.1E+02 | 4.45E-01 | 1.06E-03 | 7.81E-06 | 7.81E-05 |
| SVOC | Naphthalene | 91-20-3 | 9.9E-03 | 1.3E+02 | 4.20E-01 | 9.73E-04 | 7.88E-04 | 7.88E-03 |

## Attachment 5: Normalized Vapor Flux to Ambient Air from Exposed Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| Chem Group | Chemical | CASRN | H (unitless) | MW (g/mol) | $k_G$ (cm/s) | $k_L$ (cm/s) | $K_L$ (cm/s) | $J_L$ ($mg/m^2$-s per mg/L) |
|---|---|---|---|---|---|---|---|---|
| SVOC | Phenanthrene | 85-01-8 | 4.8E-04 | 1.8E+02 | 3.76E-01 | 8.25E-04 | 1.47E-04 | 1.47E-03 |
| SVOC | Phenol | 108-95-2 | 8.2E-06 | 9.4E+01 | 4.66E-01 | 1.13E-03 | 3.78E-06 | 3.78E-05 |
| SVOC | Pyrene | 129-00-0 | 2.3E-04 | 2.0E+02 | 3.60E-01 | 7.74E-04 | 7.36E-05 | 7.36E-04 |
| P/PCB | PCBs (total) | 1336-36-3 | 4.1E-02 | 3.3E+02 | 3.07E-01 | 6.08E-04 | 5.80E-04 | 5.80E-03 |
| INORG | Aluminum | 7429-90-5 | | 2.7E+01 | 7.08E-01 | 2.12E-03 | | |
| INORG | Antimony | 7440-36-0 | | 1.2E+02 | 4.27E-01 | 9.98E-04 | | |
| INORG | Arsenic | 7440-38-2 | | 7.5E+01 | 5.03E-01 | 1.27E-03 | | |
| INORG | Barium | 7440-39-3 | | 1.4E+02 | 4.10E-01 | 9.40E-04 | | |
| INORG | Beryllium | 7440-41-7 | | 9.0E+00 | 1.02E+00 | 3.67E-03 | | |
| INORG | Cadmium | 7440-43-9 | | 1.1E+02 | 4.39E-01 | 1.04E-03 | | |
| INORG | Chromium (total) | 7440-47-3 | | 5.2E+01 | 5.68E-01 | 1.53E-03 | | |
| INORG | Cobalt | 7440-48-4 | | 5.9E+01 | 5.45E-01 | 1.43E-03 | | |
| INORG | Copper | 7440-50-8 | | 6.4E+01 | 5.31E-01 | 1.38E-03 | | |
| INORG | Cyanide (amenable) | 57-12-5A | | 2.6E+01 | 7.16E-01 | 2.16E-03 | | |
| INORG | Cyanide (total) | 57-12-5 | | 2.6E+01 | 7.16E-01 | 2.16E-03 | | |
| INORG | Iron | 7439-89-6 | | 5.6E+01 | 5.55E-01 | 1.47E-03 | | |
| INORG | Lead | 7439-92-1 | | 2.1E+02 | 3.58E-01 | 7.65E-04 | | |
| INORG | Manganese | 7439-96-5 | | 5.5E+01 | 5.58E-01 | 1.49E-03 | | |
| INORG | Mercury | 7439-97-6 | 1.5E-01 | 2.0E+02 | 3.61E-01 | 7.77E-04 | 7.65E-04 | 7.65E-03 |
| INORG | Nickel | 7440-02-0 | | 5.9E+01 | 5.46E-01 | 1.44E-03 | | |
| INORG | Selenium | 7782-49-2 | | 7.9E+01 | 4.94E-01 | 1.24E-03 | | |
| INORG | Silver | 7440-22-4 | | 1.1E+02 | 4.45E-01 | 1.06E-03 | | |
| INORG | Thallium | 7440-28-0 | | 2.0E+02 | 3.59E-01 | 7.70E-04 | | |
| INORG | Vanadium | 7440-62-2 | | 5.1E+01 | 5.72E-01 | 1.54E-03 | | |
| INORG | Zinc | 7440-66-6 | | 6.5E+01 | 5.26E-01 | 1.36E-03 | | |
| | | | | | | | | |
| | molecular weight of oxygen | g/mol | **$MW_{02}$** | 32 | | | | |
| | molecular weight of water | g/mol | **$MW_{H20}$** | 18 | | | | |
| | absolute temperature | K | **T** | 290 | | | | |
| | liquid-phase mass transfer coefficient for oxygen | cm/s | **$k_{L,02}$** | 0.002 | | | | |
| | gas-phase mass transfer coefficient for water vapor at 25 C | cm/s | **$K_{G,H20}$** | 0.833 | | | | |

## Attachment 5: Risk Based Cancer Criteria for Exposure of Maintenance Workers to Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | | Pathway: | Incidental Ingestion of Surface/Spring Water | | | Dermal Contact with Surface/Spring Water | | | | Inhalation of Vapor from Surface/Spring Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | DA ($L/cm^2$-event) | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | URF $(mg/m^3)^{-1}$ | RBC (mg/L) | Combined RBC (mg/L) |
| VOC | Acetone | 67-64-1 | ID | 3.4E-06 | | | 2.3E-06 | 1.3E-06 | | | 3.7E-02 | | | |
| VOC | Benzene | 71-43-2 | A | 3.4E-06 | 5.5E-02 | 5.4E+01 | 6.5E-05 | 3.6E-05 | 5.5E-02 | 5.1E+00 | 1.3E-01 | 7.8E-03 | 1.6E+00 | 1.2E+00 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 3.4E-06 | 6.2E-02 | 4.8E+01 | 2.7E-05 | 1.5E-05 | 6.2E-02 | 1.1E+01 | 8.8E-02 | 1.8E-02 | 1.1E+00 | 9.7E-01 |
| VOC | Bromomethane | 74-83-9 | D | 3.4E-06 | | | 1.3E-05 | 7.4E-06 | | | 1.2E-01 | | | |
| VOC | 2-Butanone | 78-93-3 | ID | 3.4E-06 | | | 4.4E-06 | 2.4E-06 | | | 4.4E-02 | | | |
| VOC | Carbon Disulfide | 75-15-0 | | 3.4E-06 | | | 5.5E-05 | 3.0E-05 | | | 1.4E-01 | | | |
| VOC | Chlorobenzene | 108-90-7 | D | 3.4E-06 | | | 1.3E-04 | 7.3E-05 | | | 1.1E-01 | | | |
| VOC | Chloroethane | 75-00-3 | | 3.4E-06 | 2.9E-03 | 1.0E+03 | 2.7E-05 | 1.5E-05 | 2.9E-03 | 2.3E+02 | 1.5E-01 | | | 1.9E+02 |
| VOC | Chloroform | 67-66-3 | B2 | 3.4E-06 | | | 3.1E-05 | 1.7E-05 | | | 1.1E-01 | 2.3E-02 | 6.9E-01 | 6.9E-01 |
| VOC | Chloromethane | 74-87-3 | D | 3.4E-06 | | | 1.4E-05 | 8.0E-06 | | | 1.7E-01 | | | |
| VOC | Cumene | 98-82-8 | D | 3.4E-06 | | | 3.7E-04 | 2.1E-04 | | | 1.1E-01 | | | |
| VOC | Cyclohexane | 110-82-7 | ID | 3.4E-06 | | | 3.8E-04 | 2.1E-04 | | | 1.3E-01 | | | |
| VOC | Dibromochloromethane | 124-48-1 | C | 3.4E-06 | 8.4E-02 | 3.5E+01 | 2.1E-05 | 1.1E-05 | 8.4E-02 | 1.0E+01 | 7.4E-02 | 2.4E-02 | 9.6E-01 | 8.6E-01 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 3.4E-06 | | | 2.2E-04 | 1.2E-04 | | | 9.4E-02 | | | |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 3.4E-06 | | | 2.0E-04 | 1.1E-04 | | | 9.6E-02 | | | |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 3.4E-06 | 2.4E-02 | 1.2E+02 | 2.2E-04 | 1.2E-04 | 2.4E-02 | 3.5E+00 | 9.5E-02 | 6.3E-03 | 2.8E+00 | 1.5E+00 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 3.4E-06 | | | 4.3E-05 | 2.4E-05 | | | 1.1E-01 | | | |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 3.4E-06 | | | 3.1E-05 | 1.7E-05 | | | 1.2E-01 | | | |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 3.4E-06 | 9.1E-02 | 3.3E+01 | 1.9E-05 | 1.1E-05 | 9.1E-02 | 1.0E+01 | 1.1E-01 | 2.6E-02 | 6.1E-01 | 5.6E-01 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 3.4E-06 | | | 3.6E-05 | 2.0E-05 | | | 1.2E-01 | | | |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 3.4E-06 | | | 4.9E-05 | 2.7E-05 | | | 1.2E-01 | | | |
| VOC | Ethyl Benzene | 100-41-4 | D | 3.4E-06 | | | 2.1E-04 | 1.1E-04 | | | 1.2E-01 | | | |
| VOC | 2-Hexanone | 591-78-6 | | 3.4E-06 | | | 1.7E-05 | 9.3E-06 | | | 1.1E-01 | | | |
| VOC | Methyl Acetate | 79-20-9 | | 3.4E-06 | | | 3.6E-06 | 2.0E-06 | | | 3.1E-03 | | | |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 3.4E-06 | 3.3E-03 | 9.0E+02 | 1.5E-05 | 8.6E-06 | 3.3E-03 | 3.5E+02 | 1.1E-01 | 1.0E-04 | 1.6E+02 | 9.8E+01 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 3.4E-06 | | | 1.3E-05 | 7.0E-06 | | | 6.5E-02 | | | |
| VOC | Methylcyclohexane | 108-87-2 | | 3.4E-06 | | | 4.2E-04 | 2.3E-04 | | | 1.2E-01 | | | |
| VOC | Methylene Chloride | 75-09-2 | B2 | 3.4E-06 | 7.5E-03 | 4.0E+02 | 1.6E-05 | 9.0E-06 | 7.5E-03 | 1.5E+02 | 1.2E-01 | 4.7E-04 | 2.9E+01 | 2.3E+01 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 3.4E-06 | 5.2E-02 | 5.7E+01 | 6.1E-05 | 3.4E-05 | 5.2E-02 | 5.7E+00 | 9.3E-02 | 3.1E-03 | 6.0E+00 | 2.8E+00 |
| VOC | Toluene | 108-88-3 | D | 3.4E-06 | | | 1.4E-04 | 7.6E-05 | | | 1.2E-01 | | | |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 3.4E-06 | | | 4.0E-04 | 2.2E-04 | | | 8.3E-02 | | | |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 3.4E-06 | | | 6.2E-05 | 3.4E-05 | | | 1.0E-01 | | | |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 3.4E-06 | 1.1E-02 | 2.7E+02 | 8.8E-05 | 4.9E-05 | 1.1E-02 | 1.9E+01 | 1.0E-01 | 1.7E-03 | 9.6E+00 | 6.2E+00 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 3.4E-06 | | | 1.1E-04 | 5.8E-05 | | | 8.8E-02 | | | |
| VOC | Vinyl Chloride | 75-01-4 | A | 3.4E-06 | 1.4E+00 | 2.1E+00 | 3.0E-05 | 1.7E-05 | 1.4E+00 | 4.2E-01 | 1.5E-01 | 8.8E-03 | 1.3E+00 | 2.8E-01 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 3.4E-06 | | | 2.1E-04 | 1.2E-04 | | | 1.2E-01 | | | |
| SVOC | Acenaphthene | 83-32-9 | | 3.4E-06 | | | 4.2E-04 | 2.3E-04 | | | 5.7E-02 | | | |
| SVOC | Acenaphthylene | 208-96-8 | D | 3.4E-06 | | | 5.2E-04 | 2.9E-04 | | | 5.0E-02 | | | |
| SVOC | Acetophenone | 98-86-2 | D | 3.4E-06 | | | 1.8E-05 | 1.0E-05 | | | 9.4E-03 | | | |
| SVOC | Anthracene | 120-12-7 | D | 3.4E-06 | | | 9.1E-04 | 5.0E-04 | | | 3.4E-02 | | | |
| SVOC | Benzaldehyde | 100-52-7 | | 3.4E-06 | | | 1.8E-05 | 1.0E-05 | | | 2.0E-02 | | | |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 3.4E-06 | 7.3E-01 | 4.1E+00 | 3.4E-03 | 1.9E-03 | 7.3E-01 | 7.3E-03 | 2.5E-03 | 2.1E-01 | 3.2E+00 | 7.3E-03 |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 3.4E-06 | 7.3E+00 | 4.1E-01 | 4.8E-03 | 2.7E-03 | 7.3E+00 | 5.1E-04 | 8.4E-04 | 8.9E-01 | 2.3E+00 | 5.1E-04 |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 3.4E-06 | 7.3E-01 | 4.1E+00 | 5.5E-03 | 3.1E-03 | 7.3E-01 | 4.5E-03 | 4.0E-02 | 2.1E-01 | 2.1E-01 | 4.4E-03 |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 3.4E-06 | | | 7.5E-03 | 4.1E-03 | | | 1.0E-04 | | | |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 3.4E-06 | 7.3E-02 | 4.1E+01 | 5.5E-03 | 3.1E-03 | 7.3E-02 | 4.5E-02 | 6.2E-04 | 2.1E-02 | 1.3E+02 | 4.5E-02 |
| SVOC | Biphenyl | 92-52-4 | D | 3.4E-06 | | | 5.3E-04 | 2.9E-04 | | | 7.1E-02 | | | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 3.4E-06 | 1.4E-02 | 2.1E+02 | 6.0E-03 | 3.3E-03 | 1.4E-02 | 2.1E-01 | 6.6E-05 | 4.0E-03 | 6.4E+03 | 2.1E-01 |

## Attachment 5: Risk Based Cancer Criteria for Exposure of Maintenance Workers to Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | Pathway: | | Incidental Ingestion of Surface/Spring Water | | | Dermal Contact with Surface/Spring Water | | | | Inhalation of Vapor from Surface/Spring Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | LADD (mg/kg/d) | $SF_{oral}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | DA ($L/cm^2$-event) | LADD (mg/kg/d) | $SF_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | URF $(mg/m^3)^{-1}$ | RBC (mg/L) | Combined RBC (mg/L) |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 3.4E-06 | | | 5.3E-04 | 3.0E-04 | | | 8.7E-04 | | | |
| SVOC | Caprolactam | 105-60-2 | | 3.4E-06 | | | 1.4E-06 | 7.5E-07 | | | 2.5E-05 | | | |
| SVOC | Carbazole | 86-74-8 | B2 | 3.4E-06 | 2.0E-02 | 1.5E+02 | 2.4E-04 | 1.3E-04 | 2.0E-02 | 3.8E+00 | 1.3E-05 | 5.7E-03 | 2.3E+04 | 3.7E+00 |
| SVOC | 4-Chloroaniline | 106-47-8 | | 3.4E-06 | | | 2.6E-05 | 1.4E-05 | | | 3.1E-04 | | | |
| SVOC | Chrysene | 218-01-9 | B2 | 3.4E-06 | 7.3E-03 | 4.1E+02 | 3.4E-03 | 1.9E-03 | 7.3E-03 | 7.3E-01 | 3.8E-02 | 2.1E-03 | 2.1E+01 | 7.0E-01 |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 3.4E-06 | 7.3E+00 | 4.1E-01 | 7.6E-03 | 4.2E-03 | 7.3E+00 | 3.3E-04 | 1.1E-05 | 2.1E+00 | 7.6E+01 | 3.3E-04 |
| SVOC | Dibenzofuran | 132-64-9 | D | 3.4E-06 | | | 5.1E-04 | 2.8E-04 | | | 9.7E-03 | | | |
| SVOC | Diethylphthalate | 84-66-2 | D | 3.4E-06 | | | 3.0E-05 | 1.7E-05 | | | 3.5E-04 | | | |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 3.4E-06 | | | 5.8E-05 | 3.2E-05 | | | 1.9E-03 | | | |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 3.4E-06 | | | 4.7E-04 | 2.6E-04 | | | 6.8E-07 | | | |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 3.4E-06 | 6.8E-01 | 4.4E+00 | 1.6E-05 | 8.9E-06 | 6.8E-01 | 1.7E+00 | 6.2E-04 | 1.9E-01 | 1.4E+01 | 1.1E+00 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 3.4E-06 | | | 6.7E-03 | 3.7E-03 | | | 2.5E-02 | | | |
| SVOC | Fluoranthene | 206-44-0 | D | 3.4E-06 | | | 1.8E-03 | 1.0E-03 | | | 1.1E-02 | | | |
| SVOC | Fluorene | 86-73-7 | D | 3.4E-06 | | | 5.8E-04 | 3.2E-04 | | | 3.5E-02 | | | |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 3.4E-06 | 1.6E+00 | 1.9E+00 | 2.8E-03 | 1.5E-03 | 1.6E+00 | 4.0E-03 | 6.7E-02 | 4.6E-01 | 5.6E-02 | 3.8E-03 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 3.4E-06 | 7.8E-02 | 3.8E+01 | 7.1E-04 | 3.9E-04 | 7.8E-02 | 3.3E-01 | 7.4E-02 | 2.2E-02 | 1.0E+00 | 2.5E-01 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 3.4E-06 | 7.3E-01 | 4.1E+00 | 7.5E-03 | 4.1E-03 | 7.3E-01 | 3.3E-03 | 1.1E-03 | 2.1E-01 | 7.1E+00 | 3.3E-03 |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 3.4E-06 | | | 4.2E-04 | 2.3E-04 | | | 8.3E-02 | | | |
| SVOC | Methylphenol (total) | 1319-77-3 | | 3.4E-06 | | | 3.7E-05 | 2.1E-05 | | | 8.6E-04 | | | |
| SVOC | Naphthalene | 91-20-3 | C | 3.4E-06 | | | 2.3E-04 | 1.3E-04 | | | 8.6E-02 | | | |
| SVOC | Phenanthrene | 85-01-8 | D | 3.4E-06 | | | 7.9E-04 | 4.4E-04 | | | 1.6E-02 | | | |
| SVOC | Phenol | 108-95-2 | ID | 3.4E-06 | | | 2.1E-05 | 1.2E-05 | | | 4.1E-04 | | | |
| SVOC | Pyrene | 129-00-0 | D | 3.4E-06 | | | 1.8E-03 | 1.0E-03 | | | 8.1E-03 | | | |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 3.4E-06 | 2.0E+00 | 1.5E+00 | 4.7E-03 | 2.6E-03 | 2.0E+00 | 1.9E-03 | 6.4E-02 | 5.7E-01 | 4.7E-02 | 1.9E-03 |
| INORG | Aluminum | 7429-90-5 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Antimony | 7440-36-0 | | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Arsenic | 7440-38-2 | A | 3.4E-06 | 1.5E+00 | 2.0E+00 | 4.0E-06 | 2.2E-06 | 1.5E+00 | 3.0E+00 | | 4.3E+00 | | 1.2E+00 |
| INORG | Barium | 7440-39-3 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Beryllium | 7440-41-7 | B1 | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | 2.4E+00 | | |
| INORG | Cadmium | 7440-43-9 | B1 | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | 1.8E+00 | | |
| INORG | Chromium (total) | 7440-47-3 | | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | 1.2E+01 | | |
| INORG | Cobalt | 7440-48-4 | B1 | 3.4E-06 | | | 1.6E-06 | 8.9E-07 | | | | 2.8E+00 | | |
| INORG | Copper | 7440-50-8 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Cyanide (amenable) | 57-12-5A | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Iron | 7439-89-6 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Lead | 7439-92-1 | B2 | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Mercury | 7439-97-6 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | 8.4E-02 | | | |
| INORG | Nickel | 7440-02-0 | A | 3.4E-06 | | | 8.0E-07 | 4.4E-07 | | | | 2.4E-01 | | |
| INORG | Selenium | 7782-49-2 | D | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Silver | 7440-22-4 | D | 3.4E-06 | | | 2.4E-06 | 1.3E-06 | | | | | | |
| INORG | Thallium | 7440-28-0 | | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Vanadium | 7440-62-2 | | 3.4E-06 | | | 4.0E-06 | 2.2E-06 | | | | | | |
| INORG | Zinc | 7440-66-6 | D | 3.4E-06 | | | 2.4E-06 | 1.3E-06 | | | | | | |

## Attachment 5: Risk Based Noncancer Criteria for Exposure of Maintenance Workers to Surface/Spring Water
## GM Powertrain Bedford Facility, Bedford, Indiana

| | | Pathway: | | Incidental Ingestion of Surface/Spring Water | | | Dermal Contact with Surface/Spring Water | | | | Inhalation of Vapor from Surface/Spring Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/L) | DA ($L/cm^2$-event) | ADD (mg/kg/d) | $RfD_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/L) | Combined RBC (mg/L) |
| VOC | Acetone | 67-64-1 | ID | 9.4E-06 | 9.0E-01 | 9.6E+04 | 2.3E-06 | 3.6E-06 | 9.0E-01 | 2.5E+05 | 3.7E-02 | 3.2E+00 | 5.2E+03 | 4.9E+03 |
| VOC | Benzene | 71-43-2 | A | 9.4E-06 | 4.0E-03 | 4.3E+02 | 6.5E-05 | 1.0E-04 | 4.0E-03 | 4.0E+01 | 1.3E-01 | 3.0E-02 | 1.4E+01 | 9.9E+00 |
| VOC | Bromodichloromethane | 75-27-4 | B2 | 9.4E-06 | 2.0E-02 | 2.1E+03 | 2.7E-05 | 4.1E-05 | 2.0E-02 | 4.9E+02 | 8.8E-02 | 7.0E-02 | 4.8E+01 | 4.3E+01 |
| VOC | Bromomethane | 74-83-9 | D | 9.4E-06 | 1.4E-03 | 1.5E+02 | 1.3E-05 | 2.1E-05 | 1.4E-03 | 6.8E+01 | 1.2E-01 | 5.0E-03 | 2.5E+00 | 2.4E+00 |
| VOC | 2-Butanone | 78-93-3 | ID | 9.4E-06 | 6.0E-01 | 6.4E+04 | 4.4E-06 | 6.8E-06 | 6.0E-01 | 8.8E+04 | 4.4E-02 | 5.0E+00 | 6.9E+03 | 5.8E+03 |
| VOC | Carbon Disulfide | 75-15-0 | | 9.4E-06 | 1.0E-01 | 1.1E+04 | 5.5E-05 | 8.5E-05 | 1.0E-01 | 1.2E+03 | 1.4E-01 | 7.0E-01 | 3.1E+02 | 2.4E+02 |
| VOC | Chlorobenzene | 108-90-7 | D | 9.4E-06 | 2.0E-02 | 2.1E+03 | 1.3E-04 | 2.0E-04 | 2.0E-02 | 9.8E+01 | 1.1E-01 | 6.0E-02 | 3.3E+01 | 2.4E+01 |
| VOC | Chloroethane | 75-00-3 | | 9.4E-06 | 4.0E-01 | 4.3E+04 | 2.7E-05 | 4.2E-05 | 4.0E-01 | 9.6E+03 | 1.5E-01 | 1.0E+01 | 4.1E+03 | 2.7E+03 |
| VOC | Chloroform | 67-66-3 | B2 | 9.4E-06 | 1.0E-02 | 1.1E+03 | 3.1E-05 | 4.8E-05 | 1.0E-02 | 2.1E+02 | 1.1E-01 | 5.0E-02 | 2.8E+01 | 2.4E+01 |
| VOC | Chloromethane | 74-87-3 | D | 9.4E-06 | | | 1.4E-05 | 2.2E-05 | | | 1.7E-01 | 9.0E-02 | 3.3E+01 | 3.3E+01 |
| VOC | Cumene | 98-82-8 | D | 9.4E-06 | 1.0E-01 | 1.1E+04 | 3.7E-04 | 5.8E-04 | 1.0E-01 | 1.7E+02 | 1.1E-01 | 4.0E-01 | 2.2E+02 | 9.6E+01 |
| VOC | Cyclohexane | 110-82-7 | ID | 9.4E-06 | | | 3.8E-04 | 5.9E-04 | | | 1.3E-01 | 6.0E+00 | 2.8E+03 | 2.8E+03 |
| VOC | Dibromochloromethane | 124-48-1 | C | 9.4E-06 | 2.0E-02 | 2.1E+03 | 2.1E-05 | 3.2E-05 | 2.0E-02 | 6.2E+02 | 7.4E-02 | 7.0E-02 | 5.8E+01 | 5.2E+01 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 9.4E-06 | 9.0E-02 | 9.6E+03 | 2.2E-04 | 3.4E-04 | 9.0E-02 | 2.7E+02 | 9.4E-02 | 2.0E-01 | 1.3E+02 | 8.6E+01 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 9.4E-06 | 9.0E-04 | 9.6E+01 | 2.0E-04 | 3.2E-04 | 9.0E-04 | 2.9E+00 | 9.6E-02 | 1.4E-01 | 8.9E+01 | 2.7E+00 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 9.4E-06 | 3.0E-02 | 3.2E+03 | 2.2E-04 | 3.3E-04 | 3.0E-02 | 9.0E+01 | 9.5E-02 | 8.0E-01 | 5.1E+02 | 7.5E+01 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 9.4E-06 | 2.0E-01 | 2.1E+04 | 4.3E-05 | 6.7E-05 | 2.0E-01 | 3.0E+03 | 1.1E-01 | 2.0E-01 | 1.1E+02 | 1.1E+02 |
| VOC | 1,1-Dichloroethane | 75-34-3 | C | 9.4E-06 | 1.0E-01 | 1.1E+04 | 3.1E-05 | 4.9E-05 | 1.0E-01 | 2.1E+03 | 1.2E-01 | 5.0E-01 | 2.6E+02 | 2.2E+02 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 9.4E-06 | 3.0E-02 | 3.2E+03 | 1.9E-05 | 3.0E-05 | 3.0E-02 | 1.0E+03 | 1.1E-01 | 5.0E-03 | 2.8E+00 | 2.8E+00 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 9.4E-06 | 1.0E-02 | 1.1E+03 | 3.6E-05 | 5.5E-05 | 1.0E-02 | 1.8E+02 | 1.2E-01 | 3.5E-02 | 1.8E+01 | 1.6E+01 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 9.4E-06 | 2.0E-02 | 2.1E+03 | 4.9E-05 | 7.5E-05 | 2.0E-02 | 2.7E+02 | 1.2E-01 | 7.0E-02 | 3.5E+01 | 3.1E+01 |
| VOC | Ethyl Benzene | 100-41-4 | D | 9.4E-06 | 1.0E-01 | 1.1E+04 | 2.1E-04 | 3.2E-04 | 1.0E-01 | 3.1E+02 | 1.2E-01 | 1.0E+00 | 5.3E+02 | 1.9E+02 |
| VOC | 2-Hexanone | 591-78-6 | | 9.4E-06 | 4.0E-02 | 4.3E+03 | 1.7E-05 | 2.6E-05 | 4.0E-02 | 1.5E+03 | 1.1E-01 | 5.0E-03 | 2.7E+00 | 2.7E+00 |
| VOC | Methyl Acetate | 79-20-9 | | 9.4E-06 | 1.0E+00 | 1.1E+05 | 3.6E-06 | 5.6E-06 | 1.0E+00 | 1.8E+05 | 3.1E-03 | 3.5E+00 | 6.8E+04 | 3.4E+04 |
| VOC | Methyl tert-butyl ether | 1634-04-4 | | 9.4E-06 | | | 1.5E-05 | 2.4E-05 | | | 1.1E-01 | 3.0E+00 | 1.7E+03 | 1.7E+03 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 9.4E-06 | | | 1.3E-05 | 1.9E-05 | | | 6.5E-02 | 3.0E+00 | 2.8E+03 | 2.8E+03 |
| VOC | Methylcyclohexane | 108-87-2 | | 9.4E-06 | | | 4.2E-04 | 6.5E-04 | | | 1.2E-01 | 3.0E+00 | 1.5E+03 | 1.5E+03 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 9.4E-06 | 6.0E-02 | 6.4E+03 | 1.6E-05 | 2.5E-05 | 6.0E-02 | 2.4E+03 | 1.2E-01 | 3.0E+00 | 1.5E+03 | 8.0E+02 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 9.4E-06 | 1.0E-02 | 1.1E+03 | 6.1E-05 | 9.5E-05 | 1.0E-02 | 1.1E+02 | 9.3E-02 | 4.0E-01 | 2.6E+02 | 7.0E+01 |
| VOC | Toluene | 108-88-3 | D | 9.4E-06 | 2.0E-01 | 2.1E+04 | 1.4E-04 | 2.1E-04 | 2.0E-01 | 9.4E+02 | 1.2E-01 | 4.0E-01 | 2.0E+02 | 1.6E+02 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 9.4E-06 | 1.0E-02 | 1.1E+03 | 4.0E-04 | 6.1E-04 | 1.0E-02 | 1.6E+01 | 8.3E-02 | 2.0E-01 | 1.5E+02 | 1.4E+01 |
| VOC | 1,1,1-Trichloroethane | 71-55-6 | D | 9.4E-06 | 2.8E-01 | 3.0E+04 | 6.2E-05 | 9.6E-05 | 2.8E-01 | 2.9E+03 | 1.0E-01 | 2.2E+00 | 1.3E+03 | 8.7E+02 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 9.4E-06 | 6.0E-03 | 6.4E+02 | 8.8E-05 | 1.4E-04 | 6.0E-03 | 4.4E+01 | 1.0E-01 | | | 4.1E+01 |
| VOC | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | | 9.4E-06 | 3.0E+01 | 3.2E+06 | 1.1E-04 | 1.6E-04 | 3.0E+01 | 1.8E+05 | 8.8E-02 | 3.0E+01 | 2.1E+04 | 1.9E+04 |
| VOC | Vinyl Chloride | 75-01-4 | A | 9.4E-06 | 3.0E-03 | 3.2E+02 | 3.0E-05 | 4.7E-05 | 3.0E-03 | 6.4E+01 | 1.5E-01 | 1.0E-01 | 4.0E+01 | 2.3E+01 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 9.4E-06 | 2.0E-01 | 2.1E+04 | 2.1E-04 | 3.3E-04 | 2.0E-01 | 6.0E+02 | 1.2E-01 | 1.0E-01 | 5.3E+01 | 4.8E+01 |
| SVOC | Acenaphthene | 83-32-9 | | 9.4E-06 | 6.0E-02 | 6.4E+03 | 4.2E-04 | 6.4E-04 | 6.0E-02 | 9.3E+01 | 5.7E-02 | 2.1E-01 | 2.2E+02 | 6.5E+01 |
| SVOC | Acenaphthylene | 208-96-8 | D | 9.4E-06 | 3.0E-02 | 3.2E+03 | 5.2E-04 | 8.1E-04 | 3.0E-02 | 3.7E+01 | 5.0E-02 | 1.1E-01 | 1.3E+02 | 2.9E+01 |
| SVOC | Acetophenone | 98-86-2 | D | 9.4E-06 | 1.0E-01 | 1.1E+04 | 1.8E-05 | 2.8E-05 | 1.0E-01 | 3.5E+03 | 9.4E-03 | 3.5E-01 | 2.3E+03 | 1.2E+03 |
| SVOC | Anthracene | 120-12-7 | D | 9.4E-06 | 3.0E-01 | 3.2E+04 | 9.1E-04 | 1.4E-03 | 3.0E-01 | 2.1E+02 | 3.4E-02 | | | 2.1E+02 |
| SVOC | Benzaldehyde | 100-52-7 | | 9.4E-06 | 1.0E-01 | 1.1E+04 | 1.8E-05 | 2.8E-05 | 1.0E-01 | 3.5E+03 | 2.0E-02 | 3.5E-01 | 1.1E+03 | 7.6E+02 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 9.4E-06 | | | 3.4E-03 | 5.3E-03 | | | 2.5E-03 | | | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 9.4E-06 | | | 4.8E-03 | 7.5E-03 | | | 8.4E-04 | | | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 9.4E-06 | | | 5.5E-03 | 8.6E-03 | | | 4.0E-02 | | | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 9.4E-06 | 3.0E-02 | 3.2E+03 | 7.5E-03 | 1.2E-02 | 3.0E-02 | 2.6E+00 | 1.0E-04 | 1.1E-01 | 6.2E+04 | 2.6E+00 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 9.4E-06 | | | 5.5E-03 | 8.6E-03 | | | 6.2E-04 | | | |
| SVOC | Biphenyl | 92-52-4 | D | 9.4E-06 | 5.0E-02 | 5.3E+03 | 5.3E-04 | 8.2E-04 | 5.0E-02 | 6.1E+01 | 7.1E-02 | 1.8E-01 | 1.5E+02 | 4.3E+01 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 9.4E-06 | 2.0E-02 | 2.1E+03 | 6.0E-03 | 9.3E-03 | 2.0E-02 | 2.1E+00 | 6.6E-05 | | | 2.1E+00 |

## Attachment 5: Risk Based Noncancer Criteria for Exposure of Maintenance Workers to Surface/Spring Water

### GM Powertrain Bedford Facility, Bedford, Indiana

| Pathway: | | | | Incidental Ingestion of Surface/Spring Water | | | Dermal Contact with Surface/Spring Water | | | | Inhalation of Vapor from Surface/Spring Water | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chem Group | Chemical | CASRN | Carc Class | ADD (mg/kg/d) | $RfD_{oral}$ (mg/kg/d) | RBC (mg/L) | DA ($L/cm^2$-event) | ADD (mg/kg/d) | $RfD_{derm}$ $(mg/kg/d)^{-1}$ | RBC (mg/L) | $C_{air}$ ($mg/m^3$) | RfC ($mg/m^3$) | RBC (mg/L) | Combined RBC (mg/L) |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 9.4E-06 | 2.0E-01 | 2.1E+04 | 5.3E-04 | 8.3E-04 | 2.0E-01 | 2.4E+02 | 8.7E-04 | 7.0E-01 | 4.9E+04 | 2.4E+02 |
| SVOC | Caprolactam | 105-60-2 | | 9.4E-06 | 5.0E-01 | 5.3E+04 | 1.4E-06 | 2.1E-06 | 5.0E-01 | 2.4E+05 | 2.5E-05 | 1.8E+00 | 4.3E+06 | 4.3E+04 |
| SVOC | Carbazole | 86-74-8 | B2 | 9.4E-06 | | | 2.4E-04 | 3.7E-04 | | | 1.3E-05 | | | |
| SVOC | 4-Chloroaniline | 106-47-8 | | 9.4E-06 | 4.0E-03 | 4.3E+02 | 2.6E-05 | 4.0E-05 | 4.0E-03 | 1.0E+02 | 3.1E-04 | 1.4E-02 | 2.7E+03 | 7.9E+01 |
| SVOC | Chrysene | 218-01-9 | B2 | 9.4E-06 | | | 3.4E-03 | 5.3E-03 | | | 3.8E-02 | | | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 9.4E-06 | | | 7.6E-03 | 1.2E-02 | | | 1.1E-05 | | | |
| SVOC | Dibenzofuran | 132-64-9 | D | 9.4E-06 | 4.0E-03 | 4.3E+02 | 5.1E-04 | 7.8E-04 | 4.0E-03 | 5.1E+00 | 9.7E-03 | 1.4E-02 | 8.8E+01 | 4.8E+00 |
| SVOC | Diethylphthalate | 84-66-2 | D | 9.4E-06 | 8.0E-01 | 8.5E+04 | 3.0E-05 | 4.7E-05 | 8.0E-01 | 1.7E+04 | 3.5E-04 | 2.8E+00 | 4.8E+05 | 1.4E+04 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 9.4E-06 | 2.0E-02 | 2.1E+03 | 5.8E-05 | 8.9E-05 | 2.0E-02 | 2.2E+02 | 1.9E-03 | 7.0E-02 | 2.3E+03 | 1.9E+02 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 9.4E-06 | 1.0E-01 | 1.1E+04 | 4.7E-04 | 7.3E-04 | 1.0E-01 | 1.4E+02 | 6.8E-07 | | | 1.4E+02 |
| SVOC | 2,6-Dinitrotoluene | 606-20-2 | B2 | 9.4E-06 | 1.0E-03 | 1.1E+02 | 1.6E-05 | 2.5E-05 | 1.0E-03 | 4.0E+01 | 6.2E-04 | 3.5E-03 | 3.4E+02 | 2.7E+01 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 9.4E-06 | 4.0E-02 | 4.3E+03 | 6.7E-03 | 1.0E-02 | 4.0E-02 | 3.9E+00 | 2.5E-02 | | | 3.9E+00 |
| SVOC | Fluoranthene | 206-44-0 | D | 9.4E-06 | 4.0E-02 | 4.3E+03 | 1.8E-03 | 2.9E-03 | 4.0E-02 | 1.4E+01 | 1.1E-02 | 1.4E-01 | 7.5E+02 | 1.4E+01 |
| SVOC | Fluorene | 86-73-7 | D | 9.4E-06 | 4.0E-02 | 4.3E+03 | 5.8E-04 | 9.1E-04 | 4.0E-02 | 4.4E+01 | 3.5E-02 | 1.4E-01 | 2.5E+02 | 3.7E+01 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 9.4E-06 | 8.0E-04 | 8.5E+01 | 2.8E-03 | 4.3E-03 | 8.0E-04 | 1.8E-01 | 6.7E-02 | | | 1.8E-01 |
| SVOC | Hexachlorobutadiene | 87-68-3 | C | 9.4E-06 | 3.0E-04 | 3.2E+01 | 7.1E-04 | 1.1E-03 | 3.0E-04 | 2.7E-01 | 7.4E-02 | | | 2.7E-01 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 9.4E-06 | | | 7.5E-03 | 1.2E-02 | | | 1.1E-03 | | | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 9.4E-06 | 4.0E-03 | 4.3E+02 | 4.2E-04 | 6.4E-04 | 4.0E-03 | 6.2E+00 | 8.3E-02 | 3.0E-03 | 2.2E+00 | 1.6E+00 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 9.4E-06 | 5.0E-02 | 5.3E+03 | 3.7E-05 | 5.7E-05 | 5.0E-02 | 8.7E+02 | 8.6E-04 | 1.8E-01 | 1.2E+04 | 7.1E+02 |
| SVOC | Naphthalene | 91-20-3 | C | 9.4E-06 | 2.0E-02 | 2.1E+03 | 2.3E-04 | 3.6E-04 | 2.0E-02 | 5.6E+01 | 8.6E-02 | 3.0E-03 | 2.1E+00 | 2.0E+00 |
| SVOC | Phenanthrene | 85-01-8 | D | 9.4E-06 | 3.0E-02 | 3.2E+03 | 7.9E-04 | 1.2E-03 | 3.0E-02 | 2.4E+01 | 1.6E-02 | 1.1E-01 | 4.0E+02 | 2.3E+01 |
| SVOC | Phenol | 108-95-2 | ID | 9.4E-06 | 3.0E-01 | 3.2E+04 | 2.1E-05 | 3.2E-05 | 3.0E-01 | 9.3E+03 | 4.1E-04 | | | 7.2E+03 |
| SVOC | Pyrene | 129-00-0 | D | 9.4E-06 | 3.0E-02 | 3.2E+03 | 1.8E-03 | 2.8E-03 | 3.0E-02 | 1.1E+01 | 8.1E-03 | 1.1E-01 | 7.9E+02 | 1.0E+01 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 9.4E-06 | 2.0E-05 | 2.1E+00 | 4.7E-03 | 7.3E-03 | 2.0E-05 | 2.8E-03 | 6.4E-02 | | | 2.8E-03 |
| INORG | Aluminum | 7429-90-5 | D | 9.4E-06 | 1.0E+00 | 1.1E+05 | 4.0E-06 | 6.2E-06 | 1.0E+00 | 1.6E+05 | | 5.0E-03 | | 6.4E+04 |
| INORG | Antimony | 7440-36-0 | | 9.4E-06 | 4.0E-04 | 4.3E+01 | 4.0E-06 | 6.2E-06 | 6.0E-05 | 9.7E+00 | | 1.4E-03 | | 7.9E+00 |
| INORG | Arsenic | 7440-38-2 | A | 9.4E-06 | 3.0E-04 | 3.2E+01 | 4.0E-06 | 6.2E-06 | 3.0E-04 | 4.8E+01 | | | | 1.9E+01 |
| INORG | Barium | 7440-39-3 | D | 9.4E-06 | 7.0E-02 | 7.5E+03 | 4.0E-06 | 6.2E-06 | 7.0E-02 | 1.1E+04 | | | | 4.5E+03 |
| INORG | Beryllium | 7440-41-7 | B1 | 9.4E-06 | 2.0E-03 | 2.1E+02 | 4.0E-06 | 6.2E-06 | 1.4E-05 | 2.3E+00 | | 2.0E-05 | | 2.2E+00 |
| INORG | Cadmium | 7440-43-9 | B1 | 9.4E-06 | 5.0E-04 | 5.3E+01 | 4.0E-06 | 6.2E-06 | 2.5E-05 | 4.0E+00 | | 2.0E-04 | | 3.7E+00 |
| INORG | Chromium (total) | 7440-47-3 | | 9.4E-06 | 3.0E-03 | 3.2E+02 | 4.0E-06 | 6.2E-06 | 7.5E-05 | 1.2E+01 | | | | 1.2E+01 |
| INORG | Cobalt | 7440-48-4 | B1 | 9.4E-06 | 2.0E-02 | 2.1E+03 | 1.6E-06 | 2.5E-06 | 2.0E-02 | 8.1E+03 | | 2.0E-05 | | 1.7E+03 |
| INORG | Copper | 7440-50-8 | D | 9.4E-06 | 4.0E-02 | 4.3E+03 | 4.0E-06 | 6.2E-06 | 4.0E-02 | 6.5E+03 | | 1.4E-01 | | 2.6E+03 |
| INORG | Cyanide (amenable) | 57-12-5A | D | 9.4E-06 | 2.0E-02 | 2.1E+03 | 4.0E-06 | 6.2E-06 | 2.0E-02 | 3.2E+03 | | 7.0E-02 | | 1.3E+03 |
| INORG | Cyanide (total) | 57-12-5 | D | 9.4E-06 | 2.0E-02 | 2.1E+03 | 4.0E-06 | 6.2E-06 | 2.0E-02 | 3.2E+03 | | 7.0E-02 | | 1.3E+03 |
| INORG | Iron | 7439-89-6 | D | 9.4E-06 | 3.0E-01 | 3.2E+04 | 4.0E-06 | 6.2E-06 | 3.0E-01 | 4.8E+04 | | | | 1.9E+04 |
| INORG | Lead | 7439-92-1 | B2 | 9.4E-06 | | | 4.0E-06 | 6.2E-06 | | | | | | |
| INORG | Manganese | 7439-96-5 | D | 9.4E-06 | 1.4E-01 | 1.5E+04 | 4.0E-06 | 6.2E-06 | 5.6E-03 | 9.0E+02 | | 5.0E-05 | | 8.5E+02 |
| INORG | Mercury | 7439-97-6 | D | 9.4E-06 | 3.0E-04 | 3.2E+01 | 4.0E-06 | 6.2E-06 | 2.1E-05 | 3.4E+00 | 8.4E-02 | 3.0E-04 | 2.2E-01 | 2.0E-01 |
| INORG | Nickel | 7440-02-0 | A | 9.4E-06 | 2.0E-02 | 2.1E+03 | 8.0E-07 | 1.2E-06 | 8.0E-04 | 6.5E+02 | | | | 5.0E+02 |
| INORG | Selenium | 7782-49-2 | D | 9.4E-06 | 5.0E-03 | 5.3E+02 | 4.0E-06 | 6.2E-06 | 5.0E-03 | 8.1E+02 | | 1.8E-02 | | 3.2E+02 |
| INORG | Silver | 7440-22-4 | D | 9.4E-06 | 5.0E-03 | 5.3E+02 | 2.4E-06 | 3.7E-06 | 2.0E-04 | 5.4E+01 | | 1.0E-05 | | 4.9E+01 |
| INORG | Thallium | 7440-28-0 | | 9.4E-06 | 7.0E-05 | 7.5E+00 | 4.0E-06 | 6.2E-06 | 7.0E-05 | 1.1E+01 | | 2.5E-04 | | 4.5E+00 |
| INORG | Vanadium | 7440-62-2 | | 9.4E-06 | 7.0E-03 | 7.5E+02 | 4.0E-06 | 6.2E-06 | 1.8E-04 | 2.9E+01 | | 2.5E-02 | | 2.8E+01 |
| INORG | Zinc | 7440-66-6 | D | 9.4E-06 | 3.0E-01 | 3.2E+04 | 2.4E-06 | 3.7E-06 | 3.0E-01 | 8.1E+04 | | 1.1E+00 | | 2.3E+04 |
| | | | | | | | | | | | | | | |

# A T T A C H M E N T  6

## Post-Remedy Risk Estimates for Construction Scenarios

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(No Soil Removal)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 89 | 15 | 1.30E+00 | | | 2.75E+06 | | 4.91E+04 | | 4.7E-07 | | 2.6E-05 |
| VOC | Benzene | 71-43-2 | A | 89 | 2 | 3.10E-02 | | 1.77E+04 | 5.89E+03 | 3.05E+02 | 1.98E+02 | 1.8E-11 | 5.3E-06 | 1.0E-09 | 1.6E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 89 | 20 | 2.80E-01 | | | 4.11E+06 | | 8.44E+04 | | 6.8E-08 | | 3.3E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 89 | 6 | 8.20E-03 | | | 5.67E+04 | | 9.66E+02 | | 1.4E-07 | | 8.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 89 | 7 | 4.00E+00 | | | 2.76E+04 | | 4.77E+02 | | 1.5E-04 | | 8.4E-03 |
| VOC | Cumene | 98-82-8 | D | 89 | 6 | 9.00E-02 | | | 4.69E+04 | | 8.00E+02 | | 1.9E-06 | | 1.1E-04 |
| VOC | Cyclohexane | 110-82-7 | ID | 89 | 2 | 2.00E-03 | | | 5.84E+05 | | 9.86E+03 | | 3.4E-09 | | 2.0E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 89 | 7 | 2.60E+00 | | | 2.09E+05 | | 2.90E+04 | | 1.2E-05 | | 9.0E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 89 | 9 | 1.80E+01 | | | 2.74E+04 | | 9.60E+02 | | 6.6E-04 | | 1.9E-02 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 89 | 14 | 5.70E+01 | | 9.95E+04 | 4.47E+05 | 1.78E+03 | 2.07E+04 | 5.7E-09 | 1.3E-04 | 3.2E-07 | 2.8E-03 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 89 | 1 | 1.70E-02 | | 7.78E+03 | 1.49E+03 | 1.34E+02 | 2.51E+01 | 2.2E-11 | 1.1E-05 | 1.3E-09 | 6.8E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 89 | 2 | 9.00E-01 | | | 7.47E+03 | | 1.29E+02 | | 1.2E-04 | | 7.0E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 89 | 1 | 1.10E-01 | | | 1.18E+04 | | 2.03E+02 | | 9.3E-06 | | 5.4E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 89 | 6 | 6.20E-02 | | | 3.68E+05 | | 6.62E+03 | | 1.7E-07 | | 9.4E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 89 | 17 | 1.40E+01 | | | 8.80E+06 | | 1.99E+05 | | 1.6E-06 | | 7.1E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 89 | 5 | 2.90E-02 | | | 2.54E+05 | | 4.28E+03 | | 1.1E-07 | | 6.8E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 89 | 14 | 1.85E-02 | | 2.56E+05 | 4.40E+05 | 4.53E+03 | 8.49E+03 | 7.2E-13 | 4.2E-08 | 4.1E-11 | 2.2E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 89 | 5 | 9.20E-01 | | 3.97E+04 | 6.22E+04 | 7.06E+02 | 1.27E+03 | 2.3E-10 | 1.5E-05 | 1.3E-08 | 7.2E-04 |
| VOC | Toluene | 108-88-3 | D | 89 | 11 | 2.20E-01 | | | 1.19E+05 | | 5.10E+03 | | 1.8E-06 | | 4.3E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 89 | 6 | 7.80E-01 | | | 2.25E+05 | | 1.21E+04 | | 3.5E-06 | | 6.4E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 89 | 2 | 2.80E-01 | | 9.70E+04 | 2.04E+05 | 1.68E+03 | 8.18E+03 | 2.9E-11 | 1.4E-06 | 1.7E-09 | 3.4E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 89 | 1 | 3.20E-01 | | 4.16E+03 | 6.48E+03 | 8.17E+01 | 1.13E+02 | 7.7E-10 | 4.9E-05 | 3.9E-08 | 2.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 89 | 6 | 1.90E-01 | | | 4.47E+04 | | 7.58E+02 | | 4.3E-06 | | 2.5E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 89 | 6 | 5.20E-01 | | | 1.01E+06 | | 5.37E+04 | | 5.2E-07 | | 9.7E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 89 | 1 | 8.70E-02 | | | 4.97E+05 | | 2.57E+04 | | 1.8E-07 | | 3.4E-06 |
| SVOC | Anthracene | 120-12-7 | D | 89 | 8 | 1.70E-01 | | | 7.15E+06 | | 2.86E+06 | | 2.4E-08 | | 5.9E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 89 | 4 | 2.70E-01 | | | 6.66E+05 | | 1.33E+04 | | 4.1E-07 | | 2.0E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 89 | 12 | 3.90E-01 | | 2.23E+04 | | 8.90E+02 | | 1.7E-10 | | 4.4E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 89 | 11 | 6.40E-01 | | 2.27E+03 | | 9.09E+01 | | 2.8E-09 | | 7.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 89 | 17 | 1.00E+00 | | 2.21E+04 | | 8.72E+02 | | 4.5E-10 | | 1.1E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 89 | 9 | 7.20E-01 | | | 7.04E+05 | | 2.65E+05 | | 1.0E-06 | | 2.7E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 89 | 6 | 3.60E-01 | | 2.25E+05 | | 9.05E+03 | | 1.6E-11 | | 4.0E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 89 | 18 | 4.50E+00 | | 1.26E+06 | 5.12E+05 | 5.10E+04 | 2.05E+04 | 3.6E-11 | 8.8E-06 | 8.8E-10 | 2.2E-04 |
| SVOC | Caprolactam | 105-60-2 | | 89 | 1 | 2.20E-02 | | | 7.05E+06 | | 1.76E+05 | | 3.1E-09 | | 1.2E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 89 | 6 | 1.10E-01 | | 8.42E+05 | | 3.20E+04 | | 1.3E-12 | | 3.4E-11 | |
| SVOC | Chrysene | 218-01-9 | B2 | 89 | 16 | 5.20E-01 | | 2.18E+06 | | 8.46E+04 | | 2.4E-12 | | 6.1E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 89 | 5 | 1.00E-01 | | 2.25E+03 | | 9.09E+01 | | 4.4E-10 | | 1.1E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 89 | 4 | 1.30E-01 | | | 9.34E+04 | | 3.42E+03 | | 1.4E-06 | | 3.8E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 89 | 1 | 1.80E-01 | | | 1.71E+07 | | 1.54E+06 | | 1.1E-08 | | 1.2E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 89 | 6 | 1.50E+02 | | | 3.65E+05 | | 1.99E+04 | | 4.1E-04 | | 7.5E-03 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 89 | 7 | 2.90E+00 | | | 2.56E+06 | | 1.02E+06 | | 1.1E-06 | | 2.8E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 89 | 10 | 6.20E+01 | | | 1.02E+06 | | 4.10E+05 | | 6.1E-05 | | 1.5E-04 |
| SVOC | Fluoranthene | 206-44-0 | D | 89 | 22 | 8.70E-01 | | | 9.14E+05 | | 2.20E+05 | | 9.5E-07 | | 4.0E-06 |
| SVOC | Fluorene | 86-73-7 | D | 89 | 5 | 1.50E-01 | | | 8.03E+05 | | 7.39E+04 | | 1.9E-07 | | 2.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 89 | 1 | 6.90E-02 | | 7.30E+03 | 2.05E+04 | 2.01E+02 | 8.20E+02 | 9.4E-11 | 3.4E-06 | 3.4E-09 | 8.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 89 | 7 | 5.10E-01 | | 2.25E+04 | | 9.09E+02 | | 2.3E-10 | | 5.6E-09 | |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(No Soil Removal)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 89 | 12 | 4.50E+00 | | | 1.44E+04 | | 2.67E+02 | | 3.1E-04 | | 1.7E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 89 | 4 | 2.95E-01 | | | 8.49E+05 | | 2.36E+04 | | 3.5E-07 | | 1.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 89 | 7 | 7.60E-01 | | | 1.24E+04 | | 2.15E+02 | | 6.1E-05 | | 3.5E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 89 | 19 | 5.70E-01 | | | 6.41E+05 | | 8.30E+04 | | 8.9E-07 | | 6.9E-06 |
| SVOC | Phenol | 108-95-2 | ID | 89 | 13 | 7.50E+00 | | | 7.68E+06 | | 3.07E+05 | | 9.8E-07 | | 2.4E-05 |
| SVOC | Pyrene | 129-00-0 | D | 89 | 22 | 7.90E-01 | | | 6.89E+05 | | 1.78E+05 | | 1.1E-06 | | 4.4E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 238 | 210 | **2.88E+02** | | 7.29E+03 | 4.66E+02 | 2.60E+02 | 4.66E+01 | 4.0E-07 | 6.2E-01 | 1.1E-05 | 6.2E+00 |
| INORG | Aluminum | 7429-90-5 | D | 89 | 89 | **1.32E+04** | 1.48E+04 | | 2.27E+06 | | 3.03E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 82 | 16 | 1.08E+01 | 4.40E-01 | | 1.34E+04 | | 5.36E+02 | | 7.8E-04 | | 1.9E-02 |
| INORG | Arsenic | 7440-38-2 | A | 89 | 89 | 2.78E+01 | 1.13E+01 | 1.22E+04 | 9.30E+03 | 5.53E+02 | 6.20E+03 | 1.4E-08 | 1.8E-03 | 3.0E-07 | 2.7E-03 |
| INORG | Barium | 7440-39-3 | D | 89 | 89 | 5.52E+02 | 8.38E+01 | | 2.38E+06 | | 9.54E+04 | | 2.0E-04 | | 4.9E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 89 | 66 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.52E+03 | 2.27E+04 | 9.91E+02 | 5.1E-10 | 8.5E-04 | 3.2E-09 | 7.3E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 89 | 63 | 5.10E+00 | 5.52E-01 | 1.89E+05 | 2.30E+04 | 3.03E+04 | 1.18E+03 | 2.4E-10 | 2.0E-04 | 1.5E-09 | 3.8E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 89 | 89 | **5.39E+01** | 2.82E+01 | 2.84E+04 | 1.02E+05 | 4.54E+03 | 2.73E+04 | 9.1E-09 | 2.5E-04 | 5.7E-08 | 9.5E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 89 | 89 | **5.72E+01** | 1.00E+01 | 1.22E+05 | 9.60E+03 | 1.95E+04 | 1.47E+03 | 3.9E-09 | 4.9E-03 | 2.4E-08 | 3.2E-02 |
| INORG | Copper | 7440-50-8 | D | 89 | 89 | **1.55E+02** | 1.89E+01 | | 1.34E+06 | | 5.42E+04 | | 1.0E-04 | | 2.5E-03 |
| INORG | Cyanide (total) | 57-12-5 | D | 89 | 4 | 3.90E-01 | | | 6.68E+05 | | 2.71E+04 | | 5.8E-07 | | 1.4E-05 |
| INORG | Iron | 7439-89-6 | D | 89 | 89 | **2.64E+04** | 2.44E+04 | | 1.02E+07 | | 4.09E+05 | | 2.0E-04 | | 4.9E-03 |
| INORG | Manganese | 7439-96-5 | D | 89 | 89 | **6.42E+02** | 6.76E+02 | | 2.42E+04 | | 3.82E+03 | | | | |
| INORG | Mercury | 7439-97-6 | D | 89 | 79 | **6.29E+00** | 7.05E-02 | | 2.94E+03 | | 6.08E+01 | | 2.1E-03 | | 1.0E-01 |
| INORG | Nickel | 7440-02-0 | A | 89 | 89 | **1.20E+02** | 1.83E+01 | 1.42E+06 | 6.81E+05 | 2.27E+05 | 2.73E+04 | 7.2E-10 | 1.5E-04 | 4.5E-09 | 3.7E-03 |
| INORG | Selenium | 7782-49-2 | D | 89 | 33 | 1.60E+00 | 3.96E-01 | | 1.67E+05 | | 6.78E+03 | | 7.2E-06 | | 1.8E-04 |
| INORG | Silver | 7440-22-4 | D | 89 | 13 | 2.90E+00 | | | 4.73E+03 | | 6.99E+02 | | 6.1E-04 | | 4.1E-03 |
| INORG | Thallium | 7440-28-0 | | 89 | 28 | **7.64E-01** | 8.40E-01 | | 2.34E+03 | | 9.49E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 89 | 89 | 7.75E+01 | 4.18E+01 | | 2.34E+05 | | 9.49E+03 | | 1.5E-04 | | 3.8E-03 |
| INORG | Zinc | 7440-66-6 | D | 89 | 89 | 1.09E+03 | 5.48E+01 | | 1.00E+07 | | 4.07E+05 | | 1.0E-04 | | 2.5E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **4.3E-07** | **6.3E-01** | **1.2E-05** | **6.4E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 89 | 14 | 1.30E+00 | | | 2.7E+06 | | 4.9E+04 | | 4.7E-07 | | 2.6E-05 |
| VOC | Benzene | 71-43-2 | A | 89 | 1 | 3.10E-02 | | 1.8E+04 | 5.9E+03 | 3.1E+02 | 2.0E+02 | 1.8E-11 | 5.3E-06 | 1.0E-09 | 1.6E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 89 | 18 | 2.80E-01 | | | 4.1E+06 | | 8.4E+04 | | 6.8E-08 | | 3.3E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 89 | 5 | 8.20E-03 | | | 5.7E+04 | | 9.7E+02 | | 1.4E-07 | | 8.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 89 | 4 | 2.50E-01 | | | 2.8E+04 | | 4.8E+02 | | 9.1E-06 | | 5.2E-04 |
| VOC | Cumene | 98-82-8 | D | 89 | 5 | 9.00E-02 | | | 4.7E+04 | | 8.0E+02 | | 1.9E-06 | | 1.1E-04 |
| VOC | Cyclohexane | 110-82-7 | ID | 89 | 2 | 2.00E-03 | | | 5.8E+05 | | 9.9E+03 | | 3.4E-09 | | 2.0E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 89 | 4 | 2.70E-01 | | | 2.1E+05 | | 2.9E+04 | | 1.3E-06 | | 9.3E-06 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 89 | 6 | 2.90E+00 | | | 2.7E+04 | | 9.6E+02 | | 1.1E-04 | | 3.0E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 89 | 11 | 6.20E+00 | | 1.0E+05 | 4.5E+05 | 1.8E+03 | 2.1E+04 | 6.2E-10 | 1.4E-05 | 3.5E-08 | 3.0E-04 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 89 | 1 | 1.70E-02 | | 7.8E+03 | 1.5E+03 | 1.3E+02 | 2.5E+01 | 2.2E-11 | 1.1E-05 | 1.3E-09 | 6.8E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 89 | 2 | 9.00E-01 | | | 7.5E+03 | | 1.3E+02 | | 1.2E-04 | | 7.0E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 89 | 1 | 1.10E-01 | | | 1.2E+04 | | 2.0E+02 | | 9.3E-06 | | 5.4E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 89 | 5 | 6.20E-02 | | | 3.7E+05 | | 6.6E+03 | | 1.7E-07 | | 9.4E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 89 | 16 | 1.40E+01 | | | 8.8E+06 | | 2.0E+05 | | 1.6E-06 | | 7.1E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 89 | 5 | 2.90E-02 | | | 2.5E+05 | | 4.3E+03 | | 1.1E-07 | | 6.8E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 89 | 14 | 1.85E-02 | | 2.6E+05 | 4.4E+05 | 4.5E+03 | 8.5E+03 | 7.2E-13 | 4.2E-08 | 4.1E-11 | 2.2E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 89 | 5 | 9.20E-01 | | 4.0E+04 | 6.2E+04 | 7.1E+02 | 1.3E+03 | 2.3E-10 | 1.5E-05 | 1.3E-08 | 7.2E-04 |
| VOC | Toluene | 108-88-3 | D | 89 | 9 | 2.20E-01 | | | 1.2E+05 | | 5.1E+03 | | 1.8E-06 | | 4.3E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 89 | 4 | 7.00E-01 | | | 2.2E+05 | | 1.2E+04 | | 3.1E-06 | | 5.8E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 89 | 2 | 2.80E-01 | | 9.7E+04 | 2.0E+05 | 1.7E+03 | 8.2E+03 | 2.9E-11 | 1.4E-06 | 1.7E-09 | 3.4E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 89 | 1 | 3.20E-01 | | 4.2E+03 | 6.5E+03 | 8.2E+01 | 1.1E+02 | 7.7E-10 | 4.9E-05 | 3.9E-08 | 2.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 89 | 5 | 1.80E-01 | | | 4.5E+04 | | 7.6E+02 | | 4.0E-06 | | 2.4E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 89 | 6 | 5.20E-01 | | | 1.0E+06 | | 5.4E+04 | | 5.2E-07 | | 9.7E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 89 | 1 | 8.70E-02 | | | 5.0E+05 | | 2.6E+04 | | 1.8E-07 | | 3.4E-06 |
| SVOC | Anthracene | 120-12-7 | D | 89 | 8 | 1.70E-01 | | | 7.2E+06 | | 2.9E+06 | | 2.4E-08 | | 5.9E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 89 | 4 | 2.70E-01 | | | 6.7E+05 | | 1.3E+04 | | 4.1E-07 | | 2.0E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 89 | 12 | 3.90E-01 | | 2.2E+04 | | 8.9E+02 | | 1.7E-10 | | 4.4E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 89 | 11 | 6.40E-01 | | 2.3E+03 | | 9.1E+01 | | 2.8E-09 | | 7.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 89 | 17 | 1.00E+00 | | 2.2E+04 | | 8.7E+02 | | 4.5E-10 | | 1.1E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 89 | 9 | 7.20E-01 | | | 7.0E+05 | | 2.6E+05 | | 1.0E-06 | | 2.7E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 89 | 6 | 3.60E-01 | | 2.2E+05 | | 9.1E+03 | | 1.6E-11 | | 4.0E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 89 | 17 | 2.00E+00 | | 1.3E+06 | 5.1E+05 | 5.1E+04 | 2.0E+04 | 1.6E-11 | 3.9E-06 | 3.9E-10 | 9.8E-05 |
| SVOC | Caprolactam | 105-60-2 | | 89 | 1 | 2.20E-02 | | | 7.1E+06 | | 1.8E+05 | | 3.1E-09 | | 1.2E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 89 | 6 | 1.10E-01 | | 8.4E+05 | | 3.2E+04 | | 1.3E-12 | | 3.4E-11 | |
| SVOC | Chrysene | 218-01-9 | B2 | 89 | 16 | 5.20E-01 | | 2.2E+06 | | 8.5E+04 | | 2.4E-12 | | 6.1E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 89 | 5 | 1.00E-01 | | 2.3E+03 | | 9.1E+01 | | 4.4E-10 | | 1.1E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 89 | 4 | 1.30E-01 | | | 9.3E+04 | | 3.4E+03 | | 1.4E-06 | | 3.8E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 89 | 1 | 1.80E-01 | | | 1.7E+07 | | 1.5E+06 | | 1.1E-08 | | 1.2E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 89 | 5 | 1.30E+01 | | | 3.6E+05 | | 2.0E+04 | | 3.6E-05 | | 6.5E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 89 | 7 | 2.90E+00 | | | 2.6E+06 | | 1.0E+06 | | 1.1E-06 | | 2.8E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 89 | 8 | 4.70E+00 | | | 1.0E+06 | | 4.1E+05 | | 4.6E-06 | | 1.1E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 89 | 22 | 8.70E-01 | | | 9.1E+05 | | 2.2E+05 | | 9.5E-07 | | 4.0E-06 |
| SVOC | Fluorene | 86-73-7 | D | 89 | 5 | 1.50E-01 | | | 8.0E+05 | | 7.4E+04 | | 1.9E-07 | | 2.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 89 | 1 | 6.90E-02 | | 7.3E+03 | 2.0E+04 | 2.0E+02 | 8.2E+02 | 9.4E-11 | 3.4E-06 | 3.4E-09 | 8.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 89 | 7 | 5.10E-01 | | 2.3E+04 | | 9.1E+02 | | 2.3E-10 | | 5.6E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 89 | 11 | 4.50E+00 | | | 1.4E+04 | | 2.7E+02 | | 3.1E-04 | | 1.7E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 89 | 4 | 2.95E-01 | | | 8.5E+05 | | 2.4E+04 | | 3.5E-07 | | 1.3E-05 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Naphthalene | 91-20-3 | C | 89 | 6 | 2.90E-01 | | | 1.2E+04 | | 2.1E+02 | | 2.3E-05 | | 1.3E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 89 | 19 | 5.70E-01 | | | 6.4E+05 | | 8.3E+04 | | 8.9E-07 | | 6.9E-06 |
| SVOC | Phenol | 108-95-2 | ID | 89 | 13 | 7.50E+00 | | | 7.7E+06 | | 3.1E+05 | | 9.8E-07 | | 2.4E-05 |
| SVOC | Pyrene | 129-00-0 | D | 89 | 22 | 7.90E-01 | | | 6.9E+05 | | 1.8E+05 | | 1.1E-06 | | 4.4E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 238 | 210 | **5.64E+01** | | 7.3E+03 | 4.7E+02 | 2.6E+02 | 4.7E+01 | 7.7E-08 | 1.2E-01 | 2.2E-06 | 1.2E+00 |
| INORG | Aluminum | 7429-90-5 | D | 89 | 89 | **1.33E+04** | 1.48E+04 | | 2.3E+06 | | 3.0E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 82 | 18 | 1.08E+01 | 4.40E-01 | | 1.3E+04 | | 5.4E+02 | | 7.8E-04 | | 1.9E-02 |
| INORG | Arsenic | 7440-38-2 | A | 89 | 89 | 2.78E+01 | 1.13E+01 | 1.2E+04 | 9.3E+03 | 5.5E+02 | 6.2E+03 | 1.4E-08 | 1.8E-03 | 3.0E-07 | 2.7E-03 |
| INORG | Barium | 7440-39-3 | D | 89 | 89 | 5.52E+02 | 8.38E+01 | | 2.4E+06 | | 9.5E+04 | | 2.0E-04 | | 4.9E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 89 | 68 | 7.80E+00 | 5.70E-01 | 1.4E+05 | 8.5E+03 | 2.3E+04 | 9.9E+02 | 5.1E-10 | 8.5E-04 | 3.2E-09 | 7.3E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 89 | 64 | 5.10E+00 | 5.52E-01 | 1.9E+05 | 2.3E+04 | 3.0E+04 | 1.2E+03 | 2.4E-10 | 2.0E-04 | 1.5E-09 | 3.8E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 89 | 89 | **5.35E+01** | 2.82E+01 | 2.8E+04 | 1.0E+05 | 4.5E+03 | 2.7E+04 | 8.9E-09 | 2.5E-04 | 5.6E-08 | 9.3E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 89 | 89 | **5.84E+01** | 1.00E+01 | 1.2E+05 | 9.6E+03 | 1.9E+04 | 1.5E+03 | 4.0E-09 | 5.0E-03 | 2.5E-08 | 3.3E-02 |
| INORG | Copper | 7440-50-8 | D | 89 | 89 | **1.46E+02** | 1.89E+01 | | 1.3E+06 | | 5.4E+04 | | 9.5E-05 | | 2.4E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 88 | 4 | | | | 6.7E+05 | | 2.7E+04 | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 89 | 8 | 3.90E-01 | | | 6.7E+05 | | 2.7E+04 | | 5.8E-07 | | 1.4E-05 |
| INORG | Iron | 7439-89-6 | D | 89 | 89 | **2.65E+04** | 2.44E+04 | | 1.0E+07 | | 4.1E+05 | | 2.1E-04 | | 5.3E-03 |
| INORG | Manganese | 7439-96-5 | D | 89 | 89 | **6.60E+02** | 6.76E+02 | | 2.4E+04 | | 3.8E+03 | | | | |
| INORG | Mercury | 7439-97-6 | D | 89 | 80 | **6.30E+00** | 7.05E-02 | | 2.9E+03 | | 6.1E+01 | | 2.1E-03 | | 1.0E-01 |
| INORG | Nickel | 7440-02-0 | A | 89 | 89 | **1.22E+02** | 1.83E+01 | 1.4E+06 | 6.8E+05 | 2.3E+05 | 2.7E+04 | 7.3E-10 | 1.5E-04 | 4.5E-09 | 3.8E-03 |
| INORG | Selenium | 7782-49-2 | D | 89 | 36 | 1.60E+00 | 3.96E-01 | | 1.7E+05 | | 6.8E+03 | | 7.2E-06 | | 1.8E-04 |
| INORG | Silver | 7440-22-4 | D | 89 | 15 | 2.90E+00 | | | 4.7E+03 | | 7.0E+02 | | 6.1E-04 | | 4.1E-03 |
| INORG | Thallium | 7440-28-0 | | 89 | 30 | **7.70E-01** | 8.40E-01 | | 2.3E+03 | | 9.5E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 89 | 89 | 7.75E+01 | 4.18E+01 | | 2.3E+05 | | 9.5E+03 | | 1.5E-04 | | 3.8E-03 |
| INORG | Zinc | 7440-66-6 | D | 89 | 89 | 8.29E+02 | 5.48E+01 | | 1.0E+07 | | 4.1E+05 | | 7.7E-05 | | 1.9E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **1.1E-07** | **1.3E-01** | **2.8E-06** | **1.4E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 89 | 14 | 1.30E+00 | | | 2.7E+06 | | 4.9E+04 | | 4.7E-07 | | 2.6E-05 |
| VOC | Benzene | 71-43-2 | A | 89 | 1 | 3.10E-02 | | 1.8E+04 | 5.9E+03 | 3.1E+02 | 2.0E+02 | 1.8E-11 | 5.3E-06 | 1.0E-09 | 1.6E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 89 | 17 | 2.80E-01 | | | 4.1E+06 | | 8.4E+04 | | 6.8E-08 | | 3.3E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 89 | 5 | 8.20E-03 | | | 5.7E+04 | | 9.7E+02 | | 1.4E-07 | | 8.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 89 | 3 | 2.50E-01 | | | 2.8E+04 | | 4.8E+02 | | 9.1E-06 | | 5.2E-04 |
| VOC | Cumene | 98-82-8 | D | 89 | 3 | 7.80E-03 | | | 4.7E+04 | | 8.0E+02 | | 1.7E-07 | | 9.7E-06 |
| VOC | Cyclohexane | 110-82-7 | ID | 89 | 2 | 2.00E-03 | | | 5.8E+05 | | 9.9E+03 | | 3.4E-09 | | 2.0E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 89 | 2 | 1.80E-01 | | | 2.1E+05 | | 2.9E+04 | | 8.6E-07 | | 6.2E-06 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 89 | 4 | 1.70E+00 | | | 2.7E+04 | | 9.6E+02 | | 6.2E-05 | | 1.8E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 89 | 9 | 5.00E+00 | | 1.0E+05 | 4.5E+05 | 1.8E+03 | 2.1E+04 | 5.0E-10 | 1.1E-05 | 2.8E-08 | 2.4E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 89 | 2 | 9.00E-01 | | | 7.5E+03 | | 1.3E+02 | | 1.2E-04 | | 7.0E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 89 | 1 | 1.10E-01 | | | 1.2E+04 | | 2.0E+02 | | 9.3E-06 | | 5.4E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 89 | 4 | 1.90E-02 | | | 3.7E+05 | | 6.6E+03 | | 5.2E-08 | | 2.9E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 89 | 14 | 1.40E+01 | | | 8.8E+06 | | 2.0E+05 | | 1.6E-06 | | 7.1E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 89 | 5 | 2.90E-02 | | | 2.5E+05 | | 4.3E+03 | | 1.1E-07 | | 6.8E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 89 | 14 | 1.85E-02 | | 2.6E+05 | 4.4E+05 | 4.5E+03 | 8.5E+03 | 7.2E-13 | 4.2E-08 | 4.1E-11 | 2.2E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 89 | 5 | 9.20E-01 | | 4.0E+04 | 6.2E+04 | 7.1E+02 | 1.3E+03 | 2.3E-10 | 1.5E-05 | 1.3E-08 | 7.2E-04 |
| VOC | Toluene | 108-88-3 | D | 89 | 9 | 2.20E-01 | | | 1.2E+05 | | 5.1E+03 | | 1.8E-06 | | 4.3E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 89 | 1 | 9.80E-02 | | | 2.2E+05 | | 1.2E+04 | | 4.4E-07 | | 8.1E-06 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 89 | 2 | 2.80E-01 | | 9.7E+04 | 2.0E+05 | 1.7E+03 | 8.2E+03 | 2.9E-11 | 1.4E-06 | 1.7E-09 | 3.4E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 89 | 1 | 3.20E-01 | | 4.2E+03 | 6.5E+03 | 8.2E+01 | 1.1E+02 | 7.7E-10 | 4.9E-05 | 3.9E-08 | 2.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 89 | 5 | 1.80E-01 | | | 4.5E+04 | | 7.6E+02 | | 4.0E-06 | | 2.4E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 89 | 6 | 5.20E-01 | | | 1.0E+06 | | 5.4E+04 | | 5.2E-07 | | 9.7E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 89 | 1 | 8.70E-02 | | | 5.0E+05 | | 2.6E+04 | | 1.8E-07 | | 3.4E-06 |
| SVOC | Anthracene | 120-12-7 | D | 89 | 8 | 1.70E-01 | | | 7.2E+06 | | 2.9E+06 | | 2.4E-08 | | 5.9E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 89 | 4 | 2.70E-01 | | | 6.7E+05 | | 1.3E+04 | | 4.1E-07 | | 2.0E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 89 | 12 | 3.90E-01 | | 2.2E+04 | | 8.9E+02 | | 1.7E-10 | | 4.4E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 89 | 11 | 6.40E-01 | | 2.3E+03 | | 9.1E+01 | | 2.8E-09 | | 7.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 89 | 16 | 1.00E+00 | | 2.2E+04 | | 8.7E+02 | | 4.5E-10 | | 1.1E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 89 | 9 | 7.20E-01 | | | 7.0E+05 | | 2.6E+05 | | 1.0E-06 | | 2.7E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 89 | 6 | 3.60E-01 | | 2.2E+05 | | 9.1E+03 | | 1.6E-11 | | 4.0E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 89 | 16 | 1.50E+00 | | 1.3E+06 | 5.1E+05 | 5.1E+04 | 2.0E+04 | 1.2E-11 | 2.9E-06 | 2.9E-10 | 7.3E-05 |
| SVOC | Caprolactam | 105-60-2 | | 89 | 1 | 2.20E-02 | | | 7.1E+06 | | 1.8E+05 | | 3.1E-09 | | 1.2E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 89 | 6 | 1.10E-01 | | 8.4E+05 | | 3.2E+04 | | 1.3E-12 | | 3.4E-11 | |
| SVOC | Chrysene | 218-01-9 | B2 | 89 | 15 | 5.20E-01 | | 2.2E+06 | | 8.5E+04 | | 2.4E-12 | | 6.1E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 89 | 5 | 1.00E-01 | | 2.3E+03 | | 9.1E+01 | | 4.4E-10 | | 1.1E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 89 | 4 | 1.30E-01 | | | 9.3E+04 | | 3.4E+03 | | 1.4E-06 | | 3.8E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 89 | 1 | 1.80E-01 | | | 1.7E+07 | | 1.5E+06 | | 1.1E-08 | | 1.2E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 89 | 5 | 1.30E+01 | | | 3.6E+05 | | 2.0E+04 | | 3.6E-05 | | 6.5E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 89 | 7 | 2.90E+00 | | | 2.6E+06 | | 1.0E+06 | | 1.1E-06 | | 2.8E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 89 | 6 | 3.90E+00 | | | 1.0E+06 | | 4.1E+05 | | 3.8E-06 | | 9.5E-06 |
| SVOC | Fluoranthene | 206-44-0 | D | 89 | 21 | 8.70E-01 | | | 9.1E+05 | | 2.2E+05 | | 9.5E-07 | | 4.0E-06 |
| SVOC | Fluorene | 86-73-7 | D | 89 | 5 | 1.50E-01 | | | 8.0E+05 | | 7.4E+04 | | 1.9E-07 | | 2.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 89 | 1 | 6.90E-02 | | 7.3E+03 | 2.0E+04 | 2.0E+02 | 8.2E+02 | 9.4E-11 | 3.4E-06 | 3.4E-09 | 8.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 89 | 7 | 5.10E-01 | | 2.3E+04 | | 9.1E+02 | | 2.3E-10 | | 5.6E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 89 | 11 | 4.50E+00 | | | 1.4E+04 | | 2.7E+02 | | 3.1E-04 | | 1.7E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 89 | 4 | 2.95E-01 | | | 8.5E+05 | | 2.4E+04 | | 3.5E-07 | | 1.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 89 | 6 | 2.90E-01 | | | 1.2E+04 | | 2.1E+02 | | 2.3E-05 | | 1.3E-03 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria (TR=$10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria (TR=$10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Phenanthrene | 85-01-8 | D | 89 | 19 | 5.70E-01 | | | 6.4E+05 | | 8.3E+04 | | 8.9E-07 | | 6.9E-06 |
| SVOC | Phenol | 108-95-2 | ID | 89 | 13 | 7.50E+00 | | | 7.7E+06 | | 3.1E+05 | | 9.8E-07 | | 2.4E-05 |
| SVOC | Pyrene | 129-00-0 | D | 89 | 21 | 7.90E-01 | | | 6.9E+05 | | 1.8E+05 | | 1.1E-06 | | 4.4E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 238 | 210 | **2.44E+01** | | 7.3E+03 | 4.7E+02 | 2.6E+02 | 4.7E+01 | 3.4E-08 | 5.2E-02 | 9.4E-07 | 5.2E-01 |
| INORG | Aluminum | 7429-90-5 | D | 89 | 89 | **1.34E+04** | 1.48E+04 | | 2.3E+06 | | 3.0E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 82 | 19 | 1.08E+01 | 4.40E-01 | | 1.3E+04 | | 5.4E+02 | | 7.8E-04 | | 1.9E-02 |
| INORG | Arsenic | 7440-38-2 | A | 89 | 89 | 2.78E+01 | 1.13E+01 | 1.2E+04 | 9.3E+03 | 5.5E+02 | 6.2E+03 | 1.4E-08 | 1.8E-03 | 3.0E-07 | 2.7E-03 |
| INORG | Barium | 7440-39-3 | D | 89 | 89 | 5.52E+02 | 8.38E+01 | | 2.4E+06 | | 9.5E+04 | | 2.0E-04 | | 4.9E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 89 | 69 | 7.80E+00 | 5.70E-01 | 1.4E+05 | 8.5E+03 | 2.3E+04 | 9.9E+02 | 5.1E-10 | 8.5E-04 | 3.2E-09 | 7.3E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 89 | 65 | 5.10E+00 | 5.52E-01 | 1.9E+05 | 2.3E+04 | 3.0E+04 | 1.2E+03 | 2.4E-10 | 2.0E-04 | 1.5E-09 | 3.8E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 89 | 89 | **5.39E+01** | 2.82E+01 | 2.8E+04 | 1.0E+05 | 4.5E+03 | 2.7E+04 | 9.1E-09 | 2.5E-04 | 5.7E-08 | 9.4E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 89 | 89 | **5.61E+01** | 1.00E+01 | 1.2E+05 | 9.6E+03 | 1.9E+04 | 1.5E+03 | 3.8E-09 | 4.8E-03 | 2.4E-08 | 3.1E-02 |
| INORG | Copper | 7440-50-8 | D | 89 | 89 | **1.50E+02** | 1.89E+01 | | 1.3E+06 | | 5.4E+04 | | 9.8E-05 | | 2.4E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 88 | 8 | | | | 6.7E+05 | | 2.7E+04 | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 89 | 12 | 3.90E-01 | | | 6.7E+05 | | 2.7E+04 | | 5.8E-07 | | 1.4E-05 |
| INORG | Iron | 7439-89-6 | D | 89 | 89 | **2.66E+04** | 2.44E+04 | | 1.0E+07 | | 4.1E+05 | | 2.1E-04 | | 5.4E-03 |
| INORG | Manganese | 7439-96-5 | D | 89 | 89 | **6.79E+02** | 6.76E+02 | | 2.4E+04 | | 3.8E+03 | | 9.4E-05 | | 5.9E-04 |
| INORG | Mercury | 7439-97-6 | D | 89 | 80 | **6.13E+00** | 7.05E-02 | | 2.9E+03 | | 6.1E+01 | | 2.1E-03 | | 1.0E-01 |
| INORG | Nickel | 7440-02-0 | A | 89 | 89 | **1.20E+02** | 1.83E+01 | 1.4E+06 | 6.8E+05 | 2.3E+05 | 2.7E+04 | 7.2E-10 | 1.5E-04 | 4.5E-09 | 3.7E-03 |
| INORG | Selenium | 7782-49-2 | D | 89 | 38 | 1.60E+00 | 3.96E-01 | | 1.7E+05 | | 6.8E+03 | | 7.2E-06 | | 1.8E-04 |
| INORG | Silver | 7440-22-4 | D | 89 | 18 | 2.90E+00 | | | 4.7E+03 | | 7.0E+02 | | 6.1E-04 | | 4.1E-03 |
| INORG | Thallium | 7440-28-0 | | 89 | 32 | **7.98E-01** | 8.40E-01 | | 2.3E+03 | | 9.5E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 89 | 89 | 7.75E+01 | 4.18E+01 | | 2.3E+05 | | 9.5E+03 | | 1.5E-04 | | 3.8E-03 |
| INORG | Zinc | 7440-66-6 | D | 89 | 89 | 8.29E+02 | 5.48E+01 | | 1.0E+07 | | 4.1E+05 | | 7.7E-05 | | 1.9E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **6.7E-08** | **6.5E-02** | **1.5E-06** | **7.5E-01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 89 | 11 | 1.30E+00 | | | 2.75E+06 | | 4.91E+04 | | 4.7E-07 | | 2.6E-05 |
| VOC | Benzene | 71-43-2 | A | 89 | 1 | 3.10E-02 | | 1.77E+04 | 5.89E+03 | 3.05E+02 | 1.98E+02 | 1.8E-11 | 5.3E-06 | 1.0E-09 | 1.6E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 89 | 13 | 2.80E-01 | | | 4.11E+06 | | 8.44E+04 | | 6.8E-08 | | 3.3E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 89 | 3 | 5.30E-03 | | | 5.67E+04 | | 9.66E+02 | | 9.3E-08 | | 5.5E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 89 | 1 | 2.70E-02 | | | 2.76E+04 | | 4.77E+02 | | 9.8E-07 | | 5.7E-05 |
| VOC | Cumene | 98-82-8 | D | 89 | 1 | 1.30E-03 | | | 4.69E+04 | | 8.00E+02 | | 2.8E-08 | | 1.6E-06 |
| VOC | Cyclohexane | 110-82-7 | ID | 89 | 1 | 2.00E-03 | | | 5.84E+05 | | 9.86E+03 | | 3.4E-09 | | 2.0E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 89 | 1 | 1.40E-02 | | | 2.09E+05 | | 2.90E+04 | | 6.7E-08 | | 4.8E-07 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 89 | 2 | 8.20E-03 | | | 2.74E+04 | | 9.60E+02 | | 3.0E-07 | | 8.5E-06 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 89 | 5 | 2.30E-02 | | 9.95E+04 | 4.47E+05 | 1.78E+03 | 2.07E+04 | 2.3E-12 | 5.1E-08 | 1.3E-10 | 1.1E-06 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 89 | 2 | 9.00E-01 | | | 7.47E+03 | | 1.29E+02 | | 1.2E-04 | | 7.0E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 89 | 1 | 1.10E-01 | | | 1.18E+04 | | 2.03E+02 | | 9.3E-06 | | 5.4E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 89 | 3 | 1.90E-02 | | | 3.68E+05 | | 6.62E+03 | | 5.2E-08 | | 2.9E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 89 | 12 | 1.40E+01 | | | 8.80E+06 | | 1.99E+05 | | 1.6E-06 | | 7.1E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 89 | 3 | 3.80E-03 | | | 2.54E+05 | | 4.28E+03 | | 1.5E-08 | | 8.9E-07 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 89 | 14 | 1.85E-02 | | 2.56E+05 | 4.40E+05 | 4.53E+03 | 8.49E+03 | 7.2E-13 | 4.2E-08 | 4.1E-11 | 2.2E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 89 | 5 | 9.20E-01 | | 3.97E+04 | 6.22E+04 | 7.06E+02 | 1.27E+03 | 2.3E-10 | 1.5E-05 | 1.3E-08 | 7.2E-04 |
| VOC | Toluene | 108-88-3 | D | 89 | 8 | 2.20E-01 | | | 1.19E+05 | | 5.10E+03 | | 1.8E-06 | | 4.3E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 89 | 1 | 9.80E-02 | | | 2.25E+05 | | 1.21E+04 | | 4.4E-07 | | 8.1E-06 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 89 | 2 | 2.80E-01 | | 9.70E+04 | 2.04E+05 | 1.68E+03 | 8.18E+03 | 2.9E-11 | 1.4E-06 | 1.7E-09 | 3.4E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 89 | 1 | 3.20E-01 | | 4.16E+03 | 6.48E+03 | 8.17E+01 | 1.13E+02 | 7.7E-10 | 4.9E-05 | 3.9E-08 | 2.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 89 | 4 | 1.80E-01 | | | 4.47E+04 | | 7.58E+02 | | 4.0E-06 | | 2.4E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 89 | 4 | 1.50E-01 | | | 1.01E+06 | | 5.37E+04 | | 1.5E-07 | | 2.8E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 89 | 1 | 8.70E-02 | | | 4.97E+05 | | 2.57E+04 | | 1.8E-07 | | 3.4E-06 |
| SVOC | Anthracene | 120-12-7 | D | 89 | 7 | 1.70E-01 | | | 7.15E+06 | | 2.86E+06 | | 2.4E-08 | | 5.9E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 89 | 2 | 8.00E-02 | | | 6.66E+05 | | 1.33E+04 | | 1.2E-07 | | 6.0E-06 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 89 | 10 | 3.70E-01 | | 2.23E+04 | | 8.90E+02 | | 1.7E-10 | | 4.2E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 89 | 9 | 6.40E-01 | | 2.27E+03 | | 9.09E+01 | | 2.8E-09 | | 7.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 89 | 13 | 7.20E-01 | | 2.21E+04 | | 8.72E+02 | | 3.3E-10 | | 8.3E-09 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 89 | 7 | 7.20E-01 | | | 7.04E+05 | | 2.65E+05 | | 1.0E-06 | | 2.7E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 89 | 5 | 3.60E-01 | | 2.25E+05 | | 9.05E+03 | | 1.6E-11 | | 4.0E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 89 | 12 | 1.40E+00 | | 1.26E+06 | 5.12E+05 | 5.10E+04 | 2.05E+04 | 1.1E-11 | 2.7E-06 | 2.7E-10 | 6.8E-05 |
| SVOC | Caprolactam | 105-60-2 | | 89 | 1 | 2.20E-02 | | | 7.05E+06 | | 1.76E+05 | | 3.1E-09 | | 1.2E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 89 | 6 | 1.10E-01 | | 8.42E+05 | | 3.20E+04 | | 1.3E-12 | | 3.4E-11 | |
| SVOC | Chrysene | 218-01-9 | B2 | 89 | 13 | 4.00E-01 | | 2.18E+06 | | 8.46E+04 | | 1.8E-12 | | 4.7E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 89 | 5 | 1.00E-01 | | 2.25E+03 | | 9.09E+01 | | 4.4E-10 | | 1.1E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 89 | 4 | 1.30E-01 | | | 9.34E+04 | | 3.42E+03 | | 1.4E-06 | | 3.8E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 89 | 1 | 1.80E-01 | | | 1.71E+07 | | 1.54E+06 | | 1.1E-08 | | 1.2E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 89 | 3 | 1.30E+01 | | | 3.65E+05 | | 1.99E+04 | | 3.6E-05 | | 6.5E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 89 | 6 | 9.40E-01 | | | 2.56E+06 | | 1.02E+06 | | 3.7E-07 | | 9.2E-07 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 89 | 2 | 3.90E+00 | | | 1.02E+06 | | 4.10E+05 | | 3.8E-06 | | 9.5E-06 |
| SVOC | Fluoranthene | 206-44-0 | D | 89 | 18 | 6.80E-01 | | | 9.14E+05 | | 2.20E+05 | | 7.4E-07 | | 3.1E-06 |
| SVOC | Fluorene | 86-73-7 | D | 89 | 4 | 1.50E-01 | | | 8.03E+05 | | 7.39E+04 | | 1.9E-07 | | 2.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 89 | 1 | 6.90E-02 | | 7.30E+03 | 2.05E+04 | 2.01E+02 | 8.20E+02 | 9.4E-11 | 3.4E-06 | 3.4E-09 | 8.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 89 | 6 | 5.10E-01 | | 2.25E+04 | | 9.09E+02 | | 2.3E-10 | | 5.6E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 89 | 8 | 4.50E+00 | | | 1.44E+04 | | 2.67E+02 | | 3.1E-04 | | 1.7E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 89 | 2 | 2.70E-01 | | | 8.49E+05 | | 2.36E+04 | | 3.2E-07 | | 1.1E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 89 | 5 | 2.90E-01 | | | 1.24E+04 | | 2.15E+02 | | 2.3E-05 | | 1.3E-03 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Phenanthrene | 85-01-8 | D | 89 | 16 | 4.40E-01 | | | 6.41E+05 | | 8.30E+04 | | 6.9E-07 | | 5.3E-06 |
| SVOC | Phenol | 108-95-2 | ID | 89 | 12 | 7.50E+00 | | | 7.68E+06 | | 3.07E+05 | | 9.8E-07 | | 2.4E-05 |
| SVOC | Pyrene | 129-00-0 | D | 89 | 18 | 7.90E-01 | | | 6.89E+05 | | 1.78E+05 | | 1.1E-06 | | 4.4E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 238 | 210 | **5.29E+00** | | 7.29E+03 | 4.66E+02 | 2.60E+02 | 4.66E+01 | 7.3E-09 | 1.1E-02 | 2.0E-07 | 1.1E-01 |
| INORG | Aluminum | 7429-90-5 | D | 89 | 89 | **1.38E+04** | 1.48E+04 | | 2.27E+06 | | 3.03E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 82 | 26 | 1.08E+01 | 4.40E-01 | | 1.34E+04 | | 5.36E+02 | | 7.8E-04 | | 1.9E-02 |
| INORG | Arsenic | 7440-38-2 | A | 89 | 89 | 2.78E+01 | 1.13E+01 | 1.22E+04 | 9.30E+03 | 5.53E+02 | 6.20E+03 | 1.4E-08 | 1.8E-03 | 3.0E-07 | 2.7E-03 |
| INORG | Barium | 7440-39-3 | D | 89 | 89 | 5.52E+02 | 8.38E+01 | | 2.38E+06 | | 9.54E+04 | | 2.0E-04 | | 4.9E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 89 | 73 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.52E+03 | 2.27E+04 | 9.91E+02 | 5.1E-10 | 8.5E-04 | 3.2E-09 | 7.3E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 89 | 67 | 5.10E+00 | 5.52E-01 | 1.89E+05 | 2.30E+04 | 3.03E+04 | 1.18E+03 | 2.4E-10 | 2.0E-04 | 1.5E-09 | 3.8E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 89 | 89 | **3.60E+01** | 2.82E+01 | 2.84E+04 | 1.02E+05 | 4.54E+03 | 2.73E+04 | 2.8E-09 | 7.6E-05 | 1.7E-08 | 2.9E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 89 | 89 | **2.91E+01** | 1.00E+01 | 1.22E+05 | 9.60E+03 | 1.95E+04 | 1.47E+03 | 1.6E-09 | 2.0E-03 | 9.8E-09 | 1.3E-02 |
| INORG | Copper | 7440-50-8 | D | 89 | 89 | **1.36E+02** | 1.89E+01 | | 1.34E+06 | | 5.42E+04 | | 8.8E-05 | | 2.2E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 88 | 18 | | | | 6.68E+05 | | 2.71E+04 | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 89 | 21 | 3.90E-01 | | | 6.68E+05 | | 2.71E+04 | | 5.8E-07 | | 1.4E-05 |
| INORG | Iron | 7439-89-6 | D | 89 | 89 | **2.67E+04** | 2.44E+04 | | 1.02E+07 | | 4.09E+05 | | 2.3E-04 | | 5.6E-03 |
| INORG | Manganese | 7439-96-5 | D | 89 | 89 | **7.00E+02** | 6.76E+02 | | 2.42E+04 | | 3.82E+03 | | 9.6E-04 | | 6.1E-03 |
| INORG | Mercury | 7439-97-6 | D | 89 | 80 | **1.82E+00** | 7.05E-02 | | 2.94E+03 | | 6.08E+01 | | 6.0E-04 | | 2.9E-02 |
| INORG | Nickel | 7440-02-0 | A | 89 | 89 | **9.47E+01** | 1.83E+01 | 1.42E+06 | 6.81E+05 | 2.27E+05 | 2.73E+04 | 5.4E-10 | 1.1E-04 | 3.4E-09 | 2.8E-03 |
| INORG | Selenium | 7782-49-2 | D | 89 | 46 | 1.60E+00 | 3.96E-01 | | 1.67E+05 | | 6.78E+03 | | 7.2E-06 | | 1.8E-04 |
| INORG | Silver | 7440-22-4 | D | 89 | 25 | 4.80E-01 | | | 4.73E+03 | | 6.99E+02 | | 1.0E-04 | | 6.9E-04 |
| INORG | Thallium | 7440-28-0 | | 89 | 38 | **8.15E-01** | 8.40E-01 | | 2.34E+03 | | 9.49E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 89 | 89 | 7.75E+01 | 4.18E+01 | | 2.34E+05 | | 9.49E+03 | | 1.5E-04 | | 3.8E-03 |
| INORG | Zinc | 7440-66-6 | D | 89 | 89 | 8.29E+02 | 5.48E+01 | | 1.00E+07 | | 4.07E+05 | | 7.7E-05 | | 1.9E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **3.2E-08** | **2.0E-02** | **7.0E-07** | **2.5E-01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(No Soil Removal)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 109 | 27 | 1.30E+00 | | | 2.72E+06 | | 4.42E+04 | | 4.8E-07 | | 2.9E-05 |
| VOC | Benzene | 71-43-2 | A | 109 | 5 | 3.10E-02 | | 1.76E+04 | 5.87E+03 | 2.75E+02 | 1.78E+02 | 1.8E-11 | 5.3E-06 | 1.1E-09 | 1.7E-04 |
| VOC | Bromomethane | 74-83-9 | D | 108 | 1 | 5.00E-01 | | | 6.58E+02 | | 3.81E+02 | | 7.6E-04 | | 1.3E-03 |
| VOC | 2-Butanone | 78-93-3 | ID | 109 | 35 | 2.80E-01 | | | 4.02E+06 | | 7.59E+04 | | 7.0E-08 | | 3.7E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 109 | 13 | 8.20E-03 | | | 5.66E+04 | | 8.69E+02 | | 1.4E-07 | | 9.4E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 109 | 14 | 9.00E+00 | | | 2.74E+04 | | 4.29E+02 | | 3.3E-04 | | 2.1E-02 |
| VOC | Cumene | 98-82-8 | D | 109 | 13 | 7.80E-01 | | | 4.68E+04 | | 7.20E+02 | | 1.7E-05 | | 1.1E-03 |
| VOC | Cyclohexane | 110-82-7 | ID | 109 | 2 | 2.00E-03 | | | 5.84E+05 | | 8.87E+03 | | 3.4E-09 | | 2.3E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 109 | 16 | 3.60E+00 | | | 2.08E+05 | | 2.61E+04 | | 1.7E-05 | | 1.4E-04 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 109 | 22 | 3.20E+01 | | | 2.50E+04 | | 8.64E+02 | | 1.3E-03 | | 3.7E-02 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 109 | 27 | 8.40E+01 | | 9.84E+04 | 4.26E+05 | 1.61E+03 | 1.86E+04 | 8.5E-09 | 2.0E-04 | 5.2E-07 | 4.5E-03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 109 | 1 | 5.80E-02 | | | 1.18E+04 | | 1.79E+03 | | 4.9E-06 | | 3.2E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 109 | 2 | 1.70E-02 | | 7.76E+03 | 1.49E+03 | 1.20E+02 | 2.26E+01 | 2.2E-11 | 1.1E-05 | 1.4E-09 | 7.5E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 109 | 5 | 9.00E-01 | | | 7.45E+03 | | 1.16E+02 | | 1.2E-04 | | 7.8E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 109 | 1 | 1.10E-01 | | | 1.18E+04 | | 1.83E+02 | | 9.3E-06 | | 6.0E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 109 | 10 | 6.20E-02 | | | 3.63E+05 | | 5.96E+03 | | 1.7E-07 | | 1.0E-05 |
| VOC | Methyl Acetate | 79-20-9 | | 109 | 18 | 1.40E+01 | | | 8.56E+06 | | 1.79E+05 | | 1.6E-06 | | 7.8E-05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 109 | 1 | 5.20E-03 | | | 2.84E+06 | | 4.32E+04 | | 1.8E-09 | | 1.2E-07 |
| VOC | Methylcyclohexane | 108-87-2 | | 109 | 8 | 1.20E-01 | | | 2.54E+05 | | 3.85E+03 | | 4.7E-07 | | 3.1E-05 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 109 | 16 | 2.10E-02 | | 2.54E+05 | 4.30E+05 | 4.08E+03 | 7.64E+03 | 8.3E-13 | 4.9E-08 | 5.1E-11 | 2.7E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 109 | 7 | 9.20E-01 | | 3.94E+04 | 6.10E+04 | 6.35E+02 | 1.14E+03 | 2.3E-10 | 1.5E-05 | 1.4E-08 | 8.0E-04 |
| VOC | Toluene | 108-88-3 | D | 109 | 15 | 7.30E-01 | | | 1.19E+05 | | 4.59E+03 | | 6.1E-06 | | 1.6E-04 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 109 | 11 | 7.80E-01 | | | 2.09E+05 | | 1.09E+04 | | 3.7E-06 | | 7.1E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 109 | 4 | 2.80E-01 | | 9.65E+04 | 1.84E+05 | 1.51E+03 | 7.36E+03 | 2.9E-11 | 1.5E-06 | 1.9E-09 | 3.8E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 109 | 1 | 3.20E-01 | | 4.05E+03 | 6.43E+03 | 7.35E+01 | 1.02E+02 | 7.9E-10 | 5.0E-05 | 4.4E-08 | 3.1E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 109 | 9 | 3.00E-01 | | | 4.47E+04 | | 6.83E+02 | | 6.7E-06 | | 4.4E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 109 | 13 | 9.70E+00 | | | 9.35E+05 | | 4.83E+04 | | 1.0E-05 | | 2.0E-04 |
| SVOC | Acenaphthylene | 208-96-8 | D | 109 | 1 | 8.70E-02 | | | 4.61E+05 | | 2.31E+04 | | 1.9E-07 | | 3.8E-06 |
| SVOC | Anthracene | 120-12-7 | D | 109 | 12 | 8.20E-01 | | | 6.44E+06 | | 2.57E+06 | | 1.3E-07 | | 3.2E-07 |
| SVOC | Benzaldehyde | 100-52-7 | | 109 | 7 | 2.70E-01 | | | 6.47E+05 | | 1.19E+04 | | 4.2E-07 | | 2.3E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 109 | 21 | 7.90E-01 | | 2.01E+04 | | 8.01E+02 | | 3.9E-10 | | 9.9E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 109 | 20 | 7.40E-01 | | 2.04E+03 | | 8.18E+01 | | 3.6E-09 | | 9.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 109 | 27 | 1.00E+00 | | 2.00E+04 | | 7.85E+02 | | 5.0E-10 | | 1.3E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 109 | 17 | 7.20E-01 | | | 6.35E+05 | | 2.38E+05 | | 1.1E-06 | | 3.0E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 109 | 12 | 4.30E-01 | | 2.03E+05 | | 8.15E+03 | | 2.1E-11 | | 5.3E-10 | |
| SVOC | Biphenyl | 92-52-4 | D | 109 | 1 | 2.00E-02 | | | 7.94E+05 | | 2.14E+04 | | 2.5E-08 | | 9.4E-07 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 109 | 38 | 1.50E+02 | | 1.14E+06 | 4.61E+05 | 4.59E+04 | 1.84E+04 | 1.3E-09 | 3.3E-04 | 3.3E-08 | 8.1E-03 |
| SVOC | Butylbenzylphthalate | 85-68-7 | C | 109 | 1 | 4.70E+00 | | | 4.50E+06 | | 1.36E+06 | | 1.0E-06 | | 3.5E-06 |
| SVOC | Caprolactam | 105-60-2 | | 109 | 6 | 2.70E-01 | | | 6.65E+06 | | 1.59E+05 | | 4.1E-08 | | 1.7E-06 |
| SVOC | Carbazole | 86-74-8 | B2 | 109 | 11 | 4.30E-01 | | 7.62E+05 | | 2.88E+04 | | 5.6E-12 | | 1.5E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 109 | 26 | 1.00E+00 | | 1.97E+06 | | 7.61E+04 | | 5.1E-12 | | 1.3E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 109 | 5 | 1.00E-01 | | 2.03E+03 | | 8.18E+01 | | 4.9E-10 | | 1.2E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 109 | 7 | 2.28E-01 | | | 8.48E+04 | | 3.08E+03 | | 2.7E-06 | | 7.4E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 109 | 1 | 1.80E-01 | | | 1.57E+07 | | 1.39E+06 | | 1.1E-08 | | 1.3E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 109 | 13 | 1.50E+02 | | | 3.38E+05 | | 1.79E+04 | | 4.4E-04 | | 8.4E-03 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 109 | 10 | 5.10E+01 | | | 2.31E+06 | | 9.22E+05 | | 2.2E-05 | | 5.5E-05 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(No Soil Removal)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Di-n-octylphthalate | 117-84-0 | | 109 | 21 | 1.70E+02 | | | 9.22E+05 | | 3.69E+05 | | 1.8E-04 | | 4.6E-04 |
| SVOC | Fluoranthene | 206-44-0 | D | 109 | 33 | 4.40E+00 | | | 8.26E+05 | | 1.98E+05 | | 5.3E-06 | | 2.2E-05 |
| SVOC | Fluorene | 86-73-7 | D | 109 | 10 | 3.30E-01 | | | 7.34E+05 | | 6.65E+04 | | 4.5E-07 | | 5.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 109 | 1 | 6.90E-02 | | 6.81E+03 | 1.84E+04 | 1.80E+02 | 7.38E+02 | 1.0E-10 | 3.7E-06 | 3.8E-09 | 9.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 109 | 15 | 5.10E-01 | | 2.03E+04 | | 8.19E+02 | | 2.5E-10 | | 6.2E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 109 | 20 | 4.50E+00 | | | 1.42E+04 | | 2.41E+02 | | 3.2E-04 | | 1.9E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 109 | 5 | 4.95E-01 | | | 7.91E+05 | | 2.12E+04 | | 6.3E-07 | | 2.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 109 | 13 | 2.10E+00 | | | 1.24E+04 | | 1.93E+02 | | 1.7E-04 | | 1.1E-02 |
| SVOC | 4-Nitroaniline | 100-01-6 | C | 109 | 1 | 3.50E-01 | | 7.68E+05 | 3.10E+04 | 3.07E+04 | 6.64E+02 | 4.6E-12 | 1.1E-05 | 1.1E-10 | 5.3E-04 |
| SVOC | Phenanthrene | 85-01-8 | D | 109 | 29 | 4.20E+00 | | | 5.83E+05 | | 7.47E+04 | | 7.2E-06 | | 5.6E-05 |
| SVOC | Phenol | 108-95-2 | ID | 109 | 22 | 1.85E+01 | | | 6.92E+06 | | 2.77E+05 | | 2.7E-06 | | 6.7E-05 |
| SVOC | Pyrene | 129-00-0 | D | 109 | 34 | 1.20E+00 | | | 6.22E+05 | | 1.60E+05 | | 1.9E-06 | | 7.5E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 259 | 234 | **6.02E+02** | | 6.63E+03 | 4.19E+02 | 2.34E+02 | 4.19E+01 | 9.1E-07 | 1.4E+00 | 2.6E-05 | 1.4E+01 |
| INORG | Aluminum | 7429-90-5 | D | 109 | 109 | **1.54E+04** | 1.48E+04 | | 2.25E+06 | | 2.73E+05 | | 2.5E-04 | | 2.1E-03 |
| INORG | Antimony | 7440-36-0 | | 98 | 27 | 1.12E+01 | 4.40E-01 | | 1.20E+04 | | 4.82E+02 | | 8.9E-04 | | 2.2E-02 |
| INORG | Arsenic | 7440-38-2 | A | 109 | 109 | 4.42E+01 | 1.13E+01 | 1.12E+04 | 8.37E+03 | 4.98E+02 | 5.58E+03 | 2.9E-08 | 3.9E-03 | 6.6E-07 | 5.9E-03 |
| INORG | Barium | 7440-39-3 | D | 109 | 109 | 5.52E+02 | 8.38E+01 | | 2.15E+06 | | 8.59E+04 | | 2.2E-04 | | 5.4E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 109 | 79 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.40E+03 | 2.04E+04 | 8.92E+02 | 5.1E-10 | 8.6E-04 | 3.5E-09 | 8.1E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 109 | 81 | 1.54E+01 | 5.52E-01 | 1.89E+05 | 2.12E+04 | 2.73E+04 | 1.07E+03 | 7.8E-10 | 7.0E-04 | 5.4E-09 | 1.4E-02 |
| INORG | Chromium (total) | 7440-47-3 | | 109 | 109 | **8.83E+01** | 2.82E+01 | 2.84E+04 | 9.20E+04 | 4.09E+03 | 2.45E+04 | 2.1E-08 | 6.5E-04 | 1.5E-07 | 2.5E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 109 | 109 | **1.01E+02** | 1.00E+01 | 1.22E+05 | 9.58E+03 | 1.75E+04 | 1.33E+03 | 7.5E-09 | 9.5E-03 | 5.2E-08 | 6.9E-02 |
| INORG | Copper | 7440-50-8 | D | 109 | 109 | **2.65E+02** | 1.89E+01 | | 1.20E+06 | | 4.88E+04 | | 2.0E-04 | | 5.0E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 108 | 2 | 3.30E-01 | | | 6.02E+05 | | 2.44E+04 | | 5.5E-07 | | 1.4E-05 |
| INORG | Cyanide (total) | 57-12-5 | D | 109 | 10 | 7.90E-01 | | | 6.02E+05 | | 2.44E+04 | | 1.3E-06 | | 3.2E-05 |
| INORG | Iron | 7439-89-6 | D | 109 | 109 | **3.56E+04** | 2.44E+04 | | 9.20E+06 | | 3.68E+05 | | 1.2E-03 | | 3.1E-02 |
| INORG | Manganese | 7439-96-5 | D | 109 | 109 | **6.76E+02** | 6.76E+02 | | 2.42E+04 | | 3.43E+03 | | | | |
| INORG | Mercury | 7439-97-6 | D | 109 | 99 | **7.92E+00** | 7.05E-02 | | 2.85E+03 | | 5.47E+01 | | 2.8E-03 | | 1.4E-01 |
| INORG | Nickel | 7440-02-0 | A | 109 | 109 | **1.59E+02** | 1.83E+01 | 1.42E+06 | 6.13E+05 | 2.04E+05 | 2.45E+04 | 9.9E-10 | 2.3E-04 | 6.9E-09 | 5.7E-03 |
| INORG | Selenium | 7782-49-2 | D | 109 | 36 | 3.70E+00 | 3.96E-01 | | 1.51E+05 | | 6.10E+03 | | 2.2E-05 | | 5.4E-04 |
| INORG | Silver | 7440-22-4 | D | 109 | 23 | 2.90E+00 | | | 4.72E+03 | | 6.29E+02 | | 6.1E-04 | | 4.6E-03 |
| INORG | Thallium | 7440-28-0 | | 109 | 45 | **9.07E-01** | 8.40E-01 | | 2.11E+03 | | 8.54E+01 | | 3.2E-05 | | 7.8E-04 |
| INORG | Vanadium | 7440-62-2 | | 109 | 109 | 7.75E+01 | 4.18E+01 | | 2.11E+05 | | 8.54E+03 | | 1.7E-04 | | 4.2E-03 |
| INORG | Zinc | 7440-66-6 | D | 109 | 109 | 1.09E+03 | 5.48E+01 | | 9.04E+06 | | 3.66E+05 | | 1.1E-04 | | 2.8E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **9.8E-07** | **1.5E+00** | **2.7E-05** | **1.5E+01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 109 | 26 | 1.30E+00 | | | 2.72E+06 | | 4.42E+04 | | 4.8E-07 | | 2.9E-05 |
| VOC | Benzene | 71-43-2 | A | 109 | 4 | 3.10E-02 | | 1.76E+04 | 5.87E+03 | 2.75E+02 | 1.78E+02 | 1.8E-11 | 5.3E-06 | 1.1E-09 | 1.7E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 109 | 33 | 2.80E-01 | | | 4.02E+06 | | 7.59E+04 | | 7.0E-08 | | 3.7E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 109 | 12 | 8.20E-03 | | | 5.66E+04 | | 8.69E+02 | | 1.4E-07 | | 9.4E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 109 | 11 | 9.00E+00 | | | 2.74E+04 | | 4.29E+02 | | 3.3E-04 | | 2.1E-02 |
| VOC | Cumene | 98-82-8 | D | 109 | 12 | 7.80E-01 | | | 4.68E+04 | | 7.20E+02 | | 1.7E-05 | | 1.1E-03 |
| VOC | Cyclohexane | 110-82-7 | ID | 109 | 2 | 2.00E-03 | | | 5.84E+05 | | 8.87E+03 | | 3.4E-09 | | 2.3E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 109 | 12 | 7.90E-01 | | | 2.08E+05 | | 2.61E+04 | | 3.8E-06 | | 3.0E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 109 | 19 | 6.50E+00 | | | 2.50E+04 | | 8.64E+02 | | 2.6E-04 | | 7.5E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 109 | 24 | 3.40E+01 | | 9.84E+04 | 4.26E+05 | 1.61E+03 | 1.86E+04 | 3.5E-09 | 8.0E-05 | 2.1E-07 | 1.8E-03 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 109 | 1 | 5.80E-02 | | | 1.18E+04 | | 1.79E+03 | | 4.9E-06 | | 3.2E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 109 | 2 | 1.70E-02 | | 7.76E+03 | 1.49E+03 | 1.20E+02 | 2.26E+01 | 2.2E-11 | 1.1E-05 | 1.4E-09 | 7.5E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 109 | 5 | 9.00E-01 | | | 7.45E+03 | | 1.16E+02 | | 1.2E-04 | | 7.8E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 109 | 1 | 1.10E-01 | | | 1.18E+04 | | 1.83E+02 | | 9.3E-06 | | 6.0E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 109 | 9 | 6.20E-02 | | | 3.63E+05 | | 5.96E+03 | | 1.7E-07 | | 1.0E-05 |
| VOC | Methyl Acetate | 79-20-9 | | 109 | 17 | 1.40E+01 | | | 8.56E+06 | | 1.79E+05 | | 1.6E-06 | | 7.8E-05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 109 | 1 | 5.20E-03 | | | 2.84E+06 | | 4.32E+04 | | 1.8E-09 | | 1.2E-07 |
| VOC | Methylcyclohexane | 108-87-2 | | 109 | 8 | 1.20E-01 | | | 2.54E+05 | | 3.85E+03 | | 4.7E-07 | | 3.1E-05 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 109 | 15 | 2.10E-02 | | 2.54E+05 | 4.30E+05 | 4.08E+03 | 7.64E+03 | 8.3E-13 | 4.9E-08 | 5.1E-11 | 2.7E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 109 | 7 | 9.20E-01 | | 3.94E+04 | 6.10E+04 | 6.35E+02 | 1.14E+03 | 2.3E-10 | 1.5E-05 | 1.4E-08 | 8.0E-04 |
| VOC | Toluene | 108-88-3 | D | 109 | 13 | 3.40E-01 | | | 1.19E+05 | | 4.59E+03 | | 2.9E-06 | | 7.4E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 109 | 9 | 7.00E-01 | | | 2.09E+05 | | 1.09E+04 | | 3.3E-06 | | 6.4E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 109 | 4 | 2.80E-01 | | 9.65E+04 | 1.84E+05 | 1.51E+03 | 7.36E+03 | 2.9E-11 | 1.5E-06 | 1.9E-09 | 3.8E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 109 | 1 | 3.20E-01 | | 4.05E+03 | 6.43E+03 | 7.35E+01 | 1.02E+02 | 7.9E-10 | 5.0E-05 | 4.4E-08 | 3.1E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 109 | 7 | 2.60E-01 | | | 4.47E+04 | | 6.83E+02 | | 5.8E-06 | | 3.8E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 109 | 12 | 5.20E-01 | | | 9.35E+05 | | 4.83E+04 | | 5.6E-07 | | 1.1E-05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 109 | 1 | 8.70E-02 | | | 4.61E+05 | | 2.31E+04 | | 1.9E-07 | | 3.8E-06 |
| SVOC | Anthracene | 120-12-7 | D | 109 | 12 | 8.20E-01 | | | 6.44E+06 | | 2.57E+06 | | 1.3E-07 | | 3.2E-07 |
| SVOC | Benzaldehyde | 100-52-7 | | 109 | 7 | 2.70E-01 | | | 6.47E+05 | | 1.19E+04 | | 4.2E-07 | | 2.3E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 109 | 21 | 7.90E-01 | | 2.01E+04 | | 8.01E+02 | | 3.9E-10 | | 9.9E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 109 | 20 | 7.40E-01 | | 2.04E+03 | | 8.18E+01 | | 3.6E-09 | | 9.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 109 | 27 | 1.00E+00 | | 2.00E+04 | | 7.85E+02 | | 5.0E-10 | | 1.3E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 109 | 17 | 7.20E-01 | | | 6.35E+05 | | 2.38E+05 | | 1.1E-06 | | 3.0E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 109 | 12 | 4.30E-01 | | 2.03E+05 | | 8.15E+03 | | 2.1E-11 | | 5.3E-10 | |
| SVOC | Biphenyl | 92-52-4 | D | 109 | 1 | 2.00E-02 | | | 7.94E+05 | | 2.14E+04 | | 2.5E-08 | | 9.4E-07 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 109 | 36 | 1.50E+01 | | 1.14E+06 | 4.61E+05 | 4.59E+04 | 1.84E+04 | 1.3E-10 | 3.3E-05 | 3.3E-09 | 8.1E-04 |
| SVOC | Caprolactam | 105-60-2 | | 109 | 6 | 2.70E-01 | | | 6.65E+06 | | 1.59E+05 | | 4.1E-08 | | 1.7E-06 |
| SVOC | Carbazole | 86-74-8 | B2 | 109 | 11 | 4.30E-01 | | 7.62E+05 | | 2.88E+04 | | 5.6E-12 | | 1.5E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 109 | 26 | 1.00E+00 | | 1.97E+06 | | 7.61E+04 | | 5.1E-12 | | 1.3E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 109 | 5 | 1.00E-01 | | 2.03E+03 | | 8.18E+01 | | 4.9E-10 | | 1.2E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 109 | 7 | 2.28E-01 | | | 8.48E+04 | | 3.08E+03 | | 2.7E-06 | | 7.4E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 109 | 1 | 1.80E-01 | | | 1.57E+07 | | 1.39E+06 | | 1.1E-08 | | 1.3E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 109 | 10 | 1.30E+01 | | | 3.38E+05 | | 1.79E+04 | | 3.8E-05 | | 7.2E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 109 | 10 | 5.10E+01 | | | 2.31E+06 | | 9.22E+05 | | 2.2E-05 | | 5.5E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 109 | 18 | 1.80E+01 | | | 9.22E+05 | | 3.69E+05 | | 2.0E-05 | | 4.9E-05 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Fluoranthene | 206-44-0 | D | 109 | 33 | 4.40E+00 | | | 8.26E+05 | | 1.98E+05 | | 5.3E-06 | | 2.2E-05 |
| SVOC | Fluorene | 86-73-7 | D | 109 | 10 | 3.30E-01 | | | 7.34E+05 | | 6.65E+04 | | 4.5E-07 | | 5.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 109 | 1 | 6.90E-02 | | 6.81E+03 | 1.84E+04 | 1.80E+02 | 7.38E+02 | 1.0E-10 | 3.7E-06 | 3.8E-09 | 9.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 109 | 15 | 5.10E-01 | | 2.03E+04 | | 8.19E+02 | | 2.5E-10 | | 6.2E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 109 | 18 | 4.50E+00 | | | 1.42E+04 | | 2.41E+02 | | 3.2E-04 | | 1.9E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 109 | 5 | 4.95E-01 | | | 7.91E+05 | | 2.12E+04 | | 6.3E-07 | | 2.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 109 | 11 | 9.50E-01 | | | 1.24E+04 | | 1.93E+02 | | 7.7E-05 | | 4.9E-03 |
| SVOC | 4-Nitroaniline | 100-01-6 | C | 109 | 1 | 3.50E-01 | | 7.68E+05 | 3.10E+04 | 3.07E+04 | 6.64E+02 | 4.6E-12 | 1.1E-05 | 1.1E-10 | 5.3E-04 |
| SVOC | Phenanthrene | 85-01-8 | D | 109 | 29 | 4.20E+00 | | | 5.83E+05 | | 7.47E+04 | | 7.2E-06 | | 5.6E-05 |
| SVOC | Phenol | 108-95-2 | ID | 109 | 21 | 1.85E+01 | | | 6.92E+06 | | 2.77E+05 | | 2.7E-06 | | 6.7E-05 |
| SVOC | Pyrene | 129-00-0 | D | 109 | 34 | 1.20E+00 | | | 6.22E+05 | | 1.60E+05 | | 1.9E-06 | | 7.5E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 259 | 234 | **7.54E+01** | | 6.63E+03 | 4.19E+02 | 2.34E+02 | 4.19E+01 | 1.1E-07 | 1.8E-01 | 3.2E-06 | 1.8E+00 |
| INORG | Aluminum | 7429-90-5 | D | 109 | 109 | **1.54E+04** | 1.48E+04 | | 2.25E+06 | | 2.73E+05 | | 2.4E-04 | | 2.0E-03 |
| INORG | Antimony | 7440-36-0 | | 98 | 29 | 1.12E+01 | 4.40E-01 | | 1.20E+04 | | 4.82E+02 | | 8.9E-04 | | 2.2E-02 |
| INORG | Arsenic | 7440-38-2 | A | 109 | 109 | 4.42E+01 | 1.13E+01 | 1.12E+04 | 8.37E+03 | 4.98E+02 | 5.58E+03 | 2.9E-08 | 3.9E-03 | 6.6E-07 | 5.9E-03 |
| INORG | Barium | 7440-39-3 | D | 109 | 109 | 5.52E+02 | 8.38E+01 | | 2.15E+06 | | 8.59E+04 | | 2.2E-04 | | 5.4E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 109 | 81 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.40E+03 | 2.04E+04 | 8.92E+02 | 5.1E-10 | 8.6E-04 | 3.5E-09 | 8.1E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 109 | 82 | 1.54E+01 | 5.52E-01 | 1.89E+05 | 2.12E+04 | 2.73E+04 | 1.07E+03 | 7.8E-10 | 7.0E-04 | 5.4E-09 | 1.4E-02 |
| INORG | Chromium (total) | 7440-47-3 | | 109 | 109 | **8.96E+01** | 2.82E+01 | 2.84E+04 | 9.20E+04 | 4.09E+03 | 2.45E+04 | 2.2E-08 | 6.7E-04 | 1.5E-07 | 2.5E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 109 | 109 | **9.88E+01** | 1.00E+01 | 1.22E+05 | 9.58E+03 | 1.75E+04 | 1.33E+03 | 7.3E-09 | 9.3E-03 | 5.1E-08 | 6.7E-02 |
| INORG | Copper | 7440-50-8 | D | 109 | 109 | **2.60E+02** | 1.89E+01 | | 1.20E+06 | | 4.88E+04 | | 2.0E-04 | | 4.9E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 108 | 7 | 3.30E-01 | | | 6.02E+05 | | 2.44E+04 | | 5.5E-07 | | 1.4E-05 |
| INORG | Cyanide (total) | 57-12-5 | D | 109 | 14 | 7.90E-01 | | | 6.02E+05 | | 2.44E+04 | | 1.3E-06 | | 3.2E-05 |
| INORG | Iron | 7439-89-6 | D | 109 | 109 | **3.61E+04** | 2.44E+04 | | 9.20E+06 | | 3.68E+05 | | 1.3E-03 | | 3.2E-02 |
| INORG | Manganese | 7439-96-5 | D | 109 | 109 | **6.86E+02** | 6.76E+02 | | 2.42E+04 | | 3.43E+03 | | 3.9E-04 | | 2.8E-03 |
| INORG | Mercury | 7439-97-6 | D | 109 | 100 | **8.12E+00** | 7.05E-02 | | 2.85E+03 | | 5.47E+01 | | 2.8E-03 | | 1.5E-01 |
| INORG | Nickel | 7440-02-0 | A | 109 | 109 | **1.62E+02** | 1.83E+01 | 1.42E+06 | 6.13E+05 | 2.04E+05 | 2.45E+04 | 1.0E-09 | 2.3E-04 | 7.0E-09 | 5.8E-03 |
| INORG | Selenium | 7782-49-2 | D | 109 | 40 | 3.70E+00 | 3.96E-01 | | 1.51E+05 | | 6.10E+03 | | 2.2E-05 | | 5.4E-04 |
| INORG | Silver | 7440-22-4 | D | 109 | 24 | 2.90E+00 | | | 4.72E+03 | | 6.29E+02 | | 6.1E-04 | | 4.6E-03 |
| INORG | Thallium | 7440-28-0 | | 109 | 46 | **9.23E-01** | 8.40E-01 | | 2.11E+03 | | 8.54E+01 | | 3.9E-05 | | 9.7E-04 |
| INORG | Vanadium | 7440-62-2 | | 109 | 109 | 7.75E+01 | 4.18E+01 | | 2.11E+05 | | 8.54E+03 | | 1.7E-04 | | 4.2E-03 |
| INORG | Zinc | 7440-66-6 | D | 109 | 109 | 8.29E+02 | 5.48E+01 | | 9.04E+06 | | 3.66E+05 | | 8.6E-05 | | 2.1E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **1.8E-07** | **2.0E-01** | **4.5E-06** | **2.2E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 109 | 26 | 1.30E+00 | | | 2.72E+06 | | 4.42E+04 | | 4.8E-07 | | 2.9E-05 |
| VOC | Benzene | 71-43-2 | A | 109 | 4 | 3.10E-02 | | 1.76E+04 | 5.87E+03 | 2.75E+02 | 1.78E+02 | 1.8E-11 | 5.3E-06 | 1.1E-09 | 1.7E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 109 | 30 | 2.80E-01 | | | 4.02E+06 | | 7.59E+04 | | 7.0E-08 | | 3.7E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 109 | 12 | 8.20E-03 | | | 5.66E+04 | | 8.69E+02 | | 1.4E-07 | | 9.4E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 109 | 8 | 2.50E-01 | | | 2.74E+04 | | 4.29E+02 | | 9.1E-06 | | 5.8E-04 |
| VOC | Cumene | 98-82-8 | D | 109 | 10 | 2.00E-01 | | | 4.68E+04 | | 7.20E+02 | | 4.3E-06 | | 2.8E-04 |
| VOC | Cyclohexane | 110-82-7 | ID | 109 | 2 | 2.00E-03 | | | 5.84E+05 | | 8.87E+03 | | 3.4E-09 | | 2.3E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 109 | 9 | 1.80E-01 | | | 2.08E+05 | | 2.61E+04 | | 8.7E-07 | | 6.9E-06 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 109 | 15 | 1.70E+00 | | | 2.50E+04 | | 8.64E+02 | | 6.8E-05 | | 2.0E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 109 | 20 | 5.00E+00 | | 9.84E+04 | 4.26E+05 | 1.61E+03 | 1.86E+04 | 5.1E-10 | 1.2E-05 | 3.1E-08 | 2.7E-04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 109 | 1 | 5.80E-02 | | | 1.18E+04 | | 1.79E+03 | | 4.9E-06 | | 3.2E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 109 | 1 | 1.30E-02 | | 7.76E+03 | 1.49E+03 | 1.20E+02 | 2.26E+01 | 1.7E-11 | 8.7E-06 | 1.1E-09 | 5.8E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 109 | 5 | 9.00E-01 | | | 7.45E+03 | | 1.16E+02 | | 1.2E-04 | | 7.8E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 109 | 1 | 1.10E-01 | | | 1.18E+04 | | 1.83E+02 | | 9.3E-06 | | 6.0E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 109 | 7 | 1.90E-02 | | | 3.63E+05 | | 5.96E+03 | | 5.2E-08 | | 3.2E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 109 | 15 | 1.40E+01 | | | 8.56E+06 | | 1.79E+05 | | 1.6E-06 | | 7.8E-05 |
| VOC | 4-Methyl-2-pentanone | 108-10-1 | ID | 109 | 1 | 5.20E-03 | | | 2.84E+06 | | 4.32E+04 | | 1.8E-09 | | 1.2E-07 |
| VOC | Methylcyclohexane | 108-87-2 | | 109 | 7 | 2.90E-02 | | | 2.54E+05 | | 3.85E+03 | | 1.1E-07 | | 7.5E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 109 | 15 | 2.10E-02 | | 2.54E+05 | 4.30E+05 | 4.08E+03 | 7.64E+03 | 8.3E-13 | 4.9E-08 | 5.1E-11 | 2.7E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 109 | 7 | 9.20E-01 | | 3.94E+04 | 6.10E+04 | 6.35E+02 | 1.14E+03 | 2.3E-10 | 1.5E-05 | 1.4E-08 | 8.0E-04 |
| VOC | Toluene | 108-88-3 | D | 109 | 13 | 2.20E-01 | | | 1.19E+05 | | 4.59E+03 | | 1.9E-06 | | 4.8E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 109 | 6 | 9.80E-02 | | | 2.09E+05 | | 1.09E+04 | | 4.7E-07 | | 9.0E-06 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 109 | 4 | 2.80E-01 | | 9.65E+04 | 1.84E+05 | 1.51E+03 | 7.36E+03 | 2.9E-11 | 1.5E-06 | 1.9E-09 | 3.8E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 109 | 1 | 3.20E-01 | | 4.05E+03 | 6.43E+03 | 7.35E+01 | 1.02E+02 | 7.9E-10 | 5.0E-05 | 4.4E-08 | 3.1E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 109 | 7 | 1.80E-01 | | | 4.47E+04 | | 6.83E+02 | | 4.0E-06 | | 2.6E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 109 | 11 | 5.20E-01 | | | 9.35E+05 | | 4.83E+04 | | 5.6E-07 | | 1.1E-05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 109 | 1 | 8.70E-02 | | | 4.61E+05 | | 2.31E+04 | | 1.9E-07 | | 3.8E-06 |
| SVOC | Anthracene | 120-12-7 | D | 109 | 12 | 8.20E-01 | | | 6.44E+06 | | 2.57E+06 | | 1.3E-07 | | 3.2E-07 |
| SVOC | Benzaldehyde | 100-52-7 | | 109 | 7 | 2.70E-01 | | | 6.47E+05 | | 1.19E+04 | | 4.2E-07 | | 2.3E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 109 | 21 | 7.90E-01 | | 2.01E+04 | | 8.01E+02 | | 3.9E-10 | | 9.9E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 109 | 20 | 7.40E-01 | | 2.04E+03 | | 8.18E+01 | | 3.6E-09 | | 9.0E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 109 | 27 | 1.00E+00 | | 2.00E+04 | | 7.85E+02 | | 5.0E-10 | | 1.3E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 109 | 17 | 7.20E-01 | | | 6.35E+05 | | 2.38E+05 | | 1.1E-06 | | 3.0E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 109 | 12 | 4.30E-01 | | 2.03E+05 | | 8.15E+03 | | 2.1E-11 | | 5.3E-10 | |
| SVOC | Biphenyl | 92-52-4 | D | 109 | 1 | 2.00E-02 | | | 7.94E+05 | | 2.14E+04 | | 2.5E-08 | | 9.4E-07 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 109 | 33 | 1.50E+01 | | 1.14E+06 | 4.61E+05 | 4.59E+04 | 1.84E+04 | 1.3E-10 | 3.3E-05 | 3.3E-09 | 8.1E-04 |
| SVOC | Caprolactam | 105-60-2 | | 109 | 6 | 2.70E-01 | | | 6.65E+06 | | 1.59E+05 | | 4.1E-08 | | 1.7E-06 |
| SVOC | Carbazole | 86-74-8 | B2 | 109 | 11 | 4.30E-01 | | 7.62E+05 | | 2.88E+04 | | 5.6E-12 | | 1.5E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 109 | 26 | 1.00E+00 | | 1.97E+06 | | 7.61E+04 | | 5.1E-12 | | 1.3E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 109 | 5 | 1.00E-01 | | 2.03E+03 | | 8.18E+01 | | 4.9E-10 | | 1.2E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 109 | 7 | 2.28E-01 | | | 8.48E+04 | | 3.08E+03 | | 2.7E-06 | | 7.4E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 109 | 1 | 1.80E-01 | | | 1.57E+07 | | 1.39E+06 | | 1.1E-08 | | 1.3E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 109 | 10 | 1.30E+01 | | | 3.38E+05 | | 1.79E+04 | | 3.8E-05 | | 7.2E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 109 | 10 | 5.10E+01 | | | 2.31E+06 | | 9.22E+05 | | 2.2E-05 | | 5.5E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 109 | 14 | 5.80E+00 | | | 9.22E+05 | | 3.69E+05 | | 6.3E-06 | | 1.6E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 109 | 33 | 4.40E+00 | | | 8.26E+05 | | 1.98E+05 | | 5.3E-06 | | 2.2E-05 |
| SVOC | Fluorene | 86-73-7 | D | 109 | 10 | 3.30E-01 | | | 7.34E+05 | | 6.65E+04 | | 4.5E-07 | | 5.0E-06 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 109 | 1 | 6.90E-02 | | 6.81E+03 | 1.84E+04 | 1.80E+02 | 7.38E+02 | 1.0E-10 | 3.7E-06 | 3.8E-09 | 9.4E-05 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 109 | 15 | 5.10E-01 | | 2.03E+04 | | 8.19E+02 | | 2.5E-10 | | 6.2E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 109 | 18 | 4.50E+00 | | | 1.42E+04 | | 2.41E+02 | | 3.2E-04 | | 1.9E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 109 | 5 | 4.95E-01 | | | 7.91E+05 | | 2.12E+04 | | 6.3E-07 | | 2.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 109 | 11 | 9.50E-01 | | | 1.24E+04 | | 1.93E+02 | | 7.7E-05 | | 4.9E-03 |
| SVOC | 4-Nitroaniline | 100-01-6 | C | 109 | 1 | 3.50E-01 | | 7.68E+05 | 3.10E+04 | 3.07E+04 | 6.64E+02 | 4.6E-12 | 1.1E-05 | 1.1E-10 | 5.3E-04 |
| SVOC | Phenanthrene | 85-01-8 | D | 109 | 29 | 4.20E+00 | | | 5.83E+05 | | 7.47E+04 | | 7.2E-06 | | 5.6E-05 |
| SVOC | Phenol | 108-95-2 | ID | 109 | 20 | 1.85E+01 | | | 6.92E+06 | | 2.77E+05 | | 2.7E-06 | | 6.7E-05 |
| SVOC | Pyrene | 129-00-0 | D | 109 | 34 | 1.20E+00 | | | 6.22E+05 | | 1.60E+05 | | 1.9E-06 | | 7.5E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 259 | 234 | **3.81E+01** | | 6.63E+03 | 4.19E+02 | 2.34E+02 | 4.19E+01 | 5.7E-08 | 9.1E-02 | 1.6E-06 | 9.1E-01 |
| INORG | Aluminum | 7429-90-5 | D | 109 | 109 | **1.55E+04** | 1.48E+04 | | 2.25E+06 | | 2.73E+05 | | 3.3E-04 | | 2.7E-03 |
| INORG | Antimony | 7440-36-0 | | 98 | 33 | 5.90E+00 | 4.40E-01 | | 1.20E+04 | | 4.82E+02 | | 4.5E-04 | | 1.1E-02 |
| INORG | Arsenic | 7440-38-2 | A | 109 | 109 | 3.70E+01 | 1.13E+01 | 1.12E+04 | 8.37E+03 | 4.98E+02 | 5.58E+03 | 2.3E-08 | 3.1E-03 | 5.2E-07 | 4.6E-03 |
| INORG | Barium | 7440-39-3 | D | 109 | 109 | 5.52E+02 | 8.38E+01 | | 2.15E+06 | | 8.59E+04 | | 2.2E-04 | | 5.4E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 109 | 83 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.40E+03 | 2.04E+04 | 8.92E+02 | 5.1E-10 | 8.6E-04 | 3.5E-09 | 8.1E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 109 | 83 | 1.54E+01 | 5.52E-01 | 1.89E+05 | 2.12E+04 | 2.73E+04 | 1.07E+03 | 7.8E-10 | 7.0E-04 | 5.4E-09 | 1.4E-02 |
| INORG | Chromium (total) | 7440-47-3 | | 109 | 109 | **6.22E+01** | 2.82E+01 | 2.84E+04 | 9.20E+04 | 4.09E+03 | 2.45E+04 | 1.2E-08 | 3.7E-04 | 8.3E-08 | 1.4E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 109 | 109 | **1.00E+02** | 1.00E+01 | 1.22E+05 | 9.58E+03 | 1.75E+04 | 1.33E+03 | 7.4E-09 | 9.4E-03 | 5.1E-08 | 6.8E-02 |
| INORG | Copper | 7440-50-8 | D | 109 | 109 | **2.37E+02** | 1.89E+01 | | 1.20E+06 | | 4.88E+04 | | 1.8E-04 | | 4.5E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 108 | 15 | 3.30E-01 | | | 6.02E+05 | | 2.44E+04 | | 5.5E-07 | | 1.4E-05 |
| INORG | Cyanide (total) | 57-12-5 | D | 109 | 20 | 7.90E-01 | | | 6.02E+05 | | 2.44E+04 | | 1.3E-06 | | 3.2E-05 |
| INORG | Iron | 7439-89-6 | D | 109 | 109 | **2.57E+04** | 2.44E+04 | | 9.20E+06 | | 3.68E+05 | | 1.5E-04 | | 3.6E-03 |
| INORG | Manganese | 7439-96-5 | D | 109 | 109 | **6.82E+02** | 6.76E+02 | | 2.42E+04 | | 3.43E+03 | | 2.4E-04 | | 1.7E-03 |
| INORG | Mercury | 7439-97-6 | D | 109 | 101 | **7.91E+00** | 7.05E-02 | | 2.85E+03 | | 5.47E+01 | | 2.8E-03 | | 1.4E-01 |
| INORG | Nickel | 7440-02-0 | A | 109 | 109 | **1.23E+02** | 1.83E+01 | 1.42E+06 | 6.13E+05 | 2.04E+05 | 2.45E+04 | 7.4E-10 | 1.7E-04 | 5.1E-09 | 4.3E-03 |
| INORG | Selenium | 7782-49-2 | D | 109 | 44 | 1.60E+00 | 3.96E-01 | | 1.51E+05 | | 6.10E+03 | | 8.0E-06 | | 2.0E-04 |
| INORG | Silver | 7440-22-4 | D | 109 | 29 | 2.90E+00 | | | 4.72E+03 | | 6.29E+02 | | 6.1E-04 | | 4.6E-03 |
| INORG | Thallium | 7440-28-0 | | 109 | 49 | **9.30E-01** | 8.40E-01 | | 2.11E+03 | | 8.54E+01 | | 4.2E-05 | | 1.0E-03 |
| INORG | Vanadium | 7440-62-2 | | 109 | 109 | 7.75E+01 | 4.18E+01 | | 2.11E+05 | | 8.54E+03 | | 1.7E-04 | | 4.2E-03 |
| INORG | Zinc | 7440-66-6 | D | 109 | 109 | 8.29E+02 | 5.48E+01 | | 9.04E+06 | | 3.66E+05 | | 8.6E-05 | | 2.1E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **1.1E-07** | **1.1E-01** | **2.5E-06** | **1.2E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 109 | 16 | 1.30E+00 | | | 2.72E+06 | | 4.42E+04 | | 4.8E-07 | | 2.9E-05 |
| VOC | Benzene | 71-43-2 | A | 109 | 1 | 3.10E-02 | | 1.76E+04 | 5.87E+03 | 2.75E+02 | 1.78E+02 | 1.8E-11 | 5.3E-06 | 1.1E-09 | 1.7E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 109 | 17 | 2.80E-01 | | | 4.02E+06 | | 7.59E+04 | | 7.0E-08 | | 3.7E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 109 | 4 | 5.30E-03 | | | 5.66E+04 | | 8.69E+02 | | 9.4E-08 | | 6.1E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 109 | 2 | 2.70E-02 | | | 2.74E+04 | | 4.29E+02 | | 9.8E-07 | | 6.3E-05 |
| VOC | Cumene | 98-82-8 | D | 109 | 1 | 1.30E-03 | | | 4.68E+04 | | 7.20E+02 | | 2.8E-08 | | 1.8E-06 |
| VOC | Cyclohexane | 110-82-7 | ID | 109 | 1 | 2.00E-03 | | | 5.84E+05 | | 8.87E+03 | | 3.4E-09 | | 2.3E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 109 | 1 | 1.40E-02 | | | 2.08E+05 | | 2.61E+04 | | 6.7E-08 | | 5.4E-07 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 109 | 3 | 8.20E-03 | | | 2.50E+04 | | 8.64E+02 | | 3.3E-07 | | 9.5E-06 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 109 | 6 | 2.30E-02 | | 9.84E+04 | 4.26E+05 | 1.61E+03 | 1.86E+04 | 2.3E-12 | 5.4E-08 | 1.4E-10 | 1.2E-06 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 109 | 5 | 9.00E-01 | | | 7.45E+03 | | 1.16E+02 | | 1.2E-04 | | 7.8E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 109 | 1 | 1.10E-01 | | | 1.18E+04 | | 1.83E+02 | | 9.3E-06 | | 6.0E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 109 | 3 | 1.90E-02 | | | 3.63E+05 | | 5.96E+03 | | 5.2E-08 | | 3.2E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 109 | 12 | 1.40E+01 | | | 8.56E+06 | | 1.79E+05 | | 1.6E-06 | | 7.8E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 109 | 3 | 3.80E-03 | | | 2.54E+05 | | 3.85E+03 | | 1.5E-08 | | 9.9E-07 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 109 | 15 | 2.10E-02 | | 2.54E+05 | 4.30E+05 | 4.08E+03 | 7.64E+03 | 8.3E-13 | 4.9E-08 | 5.1E-11 | 2.7E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 109 | 6 | 9.20E-01 | | 3.94E+04 | 6.10E+04 | 6.35E+02 | 1.14E+03 | 2.3E-10 | 1.5E-05 | 1.4E-08 | 8.0E-04 |
| VOC | Toluene | 108-88-3 | D | 109 | 8 | 2.20E-01 | | | 1.19E+05 | | 4.59E+03 | | 1.9E-06 | | 4.8E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 109 | 1 | 9.80E-02 | | | 2.09E+05 | | 1.09E+04 | | 4.7E-07 | | 9.0E-06 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 109 | 4 | 2.80E-01 | | 9.65E+04 | 1.84E+05 | 1.51E+03 | 7.36E+03 | 2.9E-11 | 1.5E-06 | 1.9E-09 | 3.8E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 109 | 1 | 3.20E-01 | | 4.05E+03 | 6.43E+03 | 7.35E+01 | 1.02E+02 | 7.9E-10 | 5.0E-05 | 4.4E-08 | 3.1E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 109 | 4 | 1.80E-01 | | | 4.47E+04 | | 6.83E+02 | | 4.0E-06 | | 2.6E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 109 | 6 | 1.50E-01 | | | 9.35E+05 | | 4.83E+04 | | 1.6E-07 | | 3.1E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 109 | 1 | 8.70E-02 | | | 4.61E+05 | | 2.31E+04 | | 1.9E-07 | | 3.8E-06 |
| SVOC | Anthracene | 120-12-7 | D | 109 | 8 | 1.70E-01 | | | 6.44E+06 | | 2.57E+06 | | 2.6E-08 | | 6.6E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 109 | 5 | 8.00E-02 | | | 6.47E+05 | | 1.19E+04 | | 1.2E-07 | | 6.7E-06 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 109 | 12 | 4.10E-01 | | 2.01E+04 | | 8.01E+02 | | 2.0E-10 | | 5.1E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 109 | 11 | 6.40E-01 | | 2.04E+03 | | 8.18E+01 | | 3.1E-09 | | 7.8E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 109 | 16 | 7.20E-01 | | 2.00E+04 | | 7.85E+02 | | 3.6E-10 | | 9.2E-09 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 109 | 10 | 7.20E-01 | | | 6.35E+05 | | 2.38E+05 | | 1.1E-06 | | 3.0E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 109 | 6 | 3.60E-01 | | 2.03E+05 | | 8.15E+03 | | 1.8E-11 | | 4.4E-10 | |
| SVOC | Biphenyl | 92-52-4 | D | 109 | 1 | 2.00E-02 | | | 7.94E+05 | | 2.14E+04 | | 2.5E-08 | | 9.4E-07 |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 109 | 19 | 1.40E+00 | | 1.14E+06 | 4.61E+05 | 4.59E+04 | 1.84E+04 | 1.2E-11 | 3.0E-06 | 3.1E-10 | 7.6E-05 |
| SVOC | Caprolactam | 105-60-2 | | 109 | 4 | 2.50E-02 | | | 6.65E+06 | | 1.59E+05 | | 3.8E-09 | | 1.6E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 109 | 8 | 4.30E-01 | | 7.62E+05 | | 2.88E+04 | | 5.6E-12 | | 1.5E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 109 | 16 | 6.80E-01 | | 1.97E+06 | | 7.61E+04 | | 3.4E-12 | | 8.9E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 109 | 5 | 1.00E-01 | | 2.03E+03 | | 8.18E+01 | | 4.9E-10 | | 1.2E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 109 | 5 | 1.30E-01 | | | 8.48E+04 | | 3.08E+03 | | 1.5E-06 | | 4.2E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 109 | 1 | 1.80E-01 | | | 1.57E+07 | | 1.39E+06 | | 1.1E-08 | | 1.3E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 109 | 4 | 1.30E+01 | | | 3.38E+05 | | 1.79E+04 | | 3.8E-05 | | 7.2E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 109 | 7 | 5.10E+01 | | | 2.31E+06 | | 9.22E+05 | | 2.2E-05 | | 5.5E-05 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 109 | 4 | 3.90E+00 | | | 9.22E+05 | | 3.69E+05 | | 4.2E-06 | | 1.1E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 109 | 22 | 1.10E+00 | | | 8.26E+05 | | 1.98E+05 | | 1.3E-06 | | 5.6E-06 |
| SVOC | Fluorene | 86-73-7 | D | 109 | 5 | 1.50E-01 | | | 7.34E+05 | | 6.65E+04 | | 2.0E-07 | | 2.3E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 109 | 1 | 6.90E-02 | | 6.81E+03 | 1.84E+04 | 1.80E+02 | 7.38E+02 | 1.0E-10 | 3.7E-06 | 3.8E-09 | 9.4E-05 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 15-ft Excavation with Soil Cover in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria (TR=$10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria (TR=$10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 109 | 9 | 5.10E-01 | | 2.03E+04 | | 8.19E+02 | | 2.5E-10 | | 6.2E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 109 | 11 | 4.50E+00 | | | 1.42E+04 | | 2.41E+02 | | 3.2E-04 | | 1.9E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 109 | 3 | 4.95E-01 | | | 7.91E+05 | | 2.12E+04 | | 6.3E-07 | | 2.3E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 109 | 8 | 2.90E-01 | | | 1.24E+04 | | 1.93E+02 | | 2.3E-05 | | 1.5E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 109 | 20 | 6.70E-01 | | | 5.83E+05 | | 7.47E+04 | | 1.1E-06 | | 9.0E-06 |
| SVOC | Phenol | 108-95-2 | ID | 109 | 14 | 1.85E+01 | | | 6.92E+06 | | 2.77E+05 | | 2.7E-06 | | 6.7E-05 |
| SVOC | Pyrene | 129-00-0 | D | 109 | 23 | 9.10E-01 | | | 6.22E+05 | | 1.60E+05 | | 1.5E-06 | | 5.7E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 259 | 234 | **5.48E+00** | | 6.63E+03 | 4.19E+02 | 2.34E+02 | 4.19E+01 | 8.3E-09 | 1.3E-02 | 2.3E-07 | 1.3E-01 |
| INORG | Aluminum | 7429-90-5 | D | 109 | 109 | **1.38E+04** | 1.48E+04 | | 2.25E+06 | | 2.73E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 98 | 41 | 1.60E+00 | 4.40E-01 | | 1.20E+04 | | 4.82E+02 | | 9.6E-05 | | 2.4E-03 |
| INORG | Arsenic | 7440-38-2 | A | 109 | 109 | 3.70E+01 | 1.13E+01 | 1.12E+04 | 8.37E+03 | 4.98E+02 | 5.58E+03 | 2.3E-08 | 3.1E-03 | 5.2E-07 | 4.6E-03 |
| INORG | Barium | 7440-39-3 | D | 109 | 109 | 5.52E+02 | 8.38E+01 | | 2.15E+06 | | 8.59E+04 | | 2.2E-04 | | 5.4E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 109 | 92 | 7.80E+00 | 5.70E-01 | 1.42E+05 | 8.40E+03 | 2.04E+04 | 8.92E+02 | 5.1E-10 | 8.6E-04 | 3.5E-09 | 8.1E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 109 | 86 | 1.54E+01 | 5.52E-01 | 1.89E+05 | 2.12E+04 | 2.73E+04 | 1.07E+03 | 7.8E-10 | 7.0E-04 | 5.4E-09 | 1.4E-02 |
| INORG | Chromium (total) | 7440-47-3 | | 109 | 109 | **4.42E+01** | 2.82E+01 | 2.84E+04 | 9.20E+04 | 4.09E+03 | 2.45E+04 | 5.7E-09 | 1.7E-04 | 3.9E-08 | 6.5E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 109 | 109 | **3.85E+01** | 1.00E+01 | 1.22E+05 | 9.58E+03 | 1.75E+04 | 1.33E+03 | 2.3E-09 | 3.0E-03 | 1.6E-08 | 2.1E-02 |
| INORG | Copper | 7440-50-8 | D | 109 | 109 | **7.73E+01** | 1.89E+01 | | 1.20E+06 | | 4.88E+04 | | 4.8E-05 | | 1.2E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 108 | 31 | | | | 6.02E+05 | | 2.44E+04 | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 109 | 34 | 3.90E-01 | | | 6.02E+05 | | 2.44E+04 | | 6.5E-07 | | 1.6E-05 |
| INORG | Iron | 7439-89-6 | D | 109 | 109 | **2.60E+04** | 2.44E+04 | | 9.20E+06 | | 3.68E+05 | | 1.8E-04 | | 4.5E-03 |
| INORG | Manganese | 7439-96-5 | D | 109 | 109 | **7.24E+02** | 6.76E+02 | | 2.42E+04 | | 3.43E+03 | | 2.0E-03 | | 1.4E-02 |
| INORG | Mercury | 7439-97-6 | D | 109 | 101 | **1.83E+00** | 7.05E-02 | | 2.85E+03 | | 5.47E+01 | | 6.2E-04 | | 3.2E-02 |
| INORG | Nickel | 7440-02-0 | A | 109 | 109 | **8.89E+01** | 1.83E+01 | 1.42E+06 | 6.13E+05 | 2.04E+05 | 2.45E+04 | 5.0E-10 | 1.2E-04 | 3.5E-09 | 2.9E-03 |
| INORG | Selenium | 7782-49-2 | D | 109 | 59 | 1.60E+00 | 3.96E-01 | | 1.51E+05 | | 6.10E+03 | | 8.0E-06 | | 2.0E-04 |
| INORG | Silver | 7440-22-4 | D | 109 | 40 | 5.70E-01 | | | 4.72E+03 | | 6.29E+02 | | 1.2E-04 | | 9.1E-04 |
| INORG | Thallium | 7440-28-0 | | 109 | 59 | **9.16E-01** | 8.40E-01 | | 2.11E+03 | | 8.54E+01 | | 3.6E-05 | | 8.8E-04 |
| INORG | Vanadium | 7440-62-2 | | 109 | 109 | 7.75E+01 | 4.18E+01 | | 2.11E+05 | | 8.54E+03 | | 1.7E-04 | | 4.2E-03 |
| INORG | Zinc | 7440-66-6 | D | 109 | 109 | 3.75E+02 | 5.48E+01 | | 9.04E+06 | | 3.66E+05 | | 3.5E-05 | | 8.7E-04 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **4.7E-08** | **2.5E-02** | **1.0E-06** | **2.8E-01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 92 | 17 | 1.30E+00 | | | 2.7E+06 | | 3.7E+04 | | 4.9E-07 | | 3.5E-05 |
| VOC | Benzene | 71-43-2 | A | 92 | 2 | 3.10E-02 | | 1.7E+03 | 5.8E+03 | 2.3E+02 | 1.5E+02 | 1.8E-10 | 5.3E-06 | 1.4E-09 | 2.1E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 92 | 22 | 2.80E-01 | | | 3.9E+06 | | 6.3E+04 | | 7.3E-08 | | 4.4E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 92 | 8 | 8.20E-03 | | | 5.6E+04 | | 7.2E+02 | | 1.5E-07 | | 1.1E-05 |
| VOC | Chlorobenzene | 108-90-7 | D | 92 | 6 | 2.50E-01 | | | 2.7E+04 | | 3.6E+02 | | 9.2E-06 | | 7.0E-04 |
| VOC | Cumene | 98-82-8 | D | 92 | 6 | 9.00E-02 | | | 4.7E+04 | | 6.0E+02 | | 1.9E-06 | | 1.5E-04 |
| VOC | Cyclohexane | 110-82-7 | ID | 92 | 2 | 2.00E-03 | | | 5.8E+05 | | 7.4E+03 | | 3.4E-09 | | 2.7E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 92 | 5 | 2.70E-01 | | | 2.0E+05 | | 2.2E+04 | | 1.3E-06 | | 1.2E-05 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 92 | 10 | 2.90E+00 | | | 2.1E+04 | | 7.2E+02 | | 1.4E-04 | | 4.0E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 92 | 15 | 6.20E+00 | | 9.6E+03 | 3.9E+05 | 1.3E+03 | 1.6E+04 | 6.4E-09 | 1.6E-05 | 4.6E-08 | 4.0E-04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 92 | 1 | 5.80E-02 | | | 1.2E+04 | | 1.5E+03 | | 4.9E-06 | | 3.9E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 92 | 2 | 1.70E-02 | | 7.7E+02 | 1.5E+03 | 1.0E+02 | 1.9E+01 | 2.2E-10 | 1.1E-05 | 1.7E-09 | 9.0E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 92 | 3 | 9.00E-01 | | | 7.4E+03 | | 9.7E+01 | | 1.2E-04 | | 9.3E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 92 | 1 | 1.10E-01 | | | 1.2E+04 | | 1.5E+02 | | 9.4E-06 | | 7.2E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 92 | 6 | 6.20E-02 | | | 3.5E+05 | | 5.0E+03 | | 1.7E-07 | | 1.2E-05 |
| VOC | Methyl Acetate | 79-20-9 | | 92 | 17 | 1.40E+01 | | | 8.1E+06 | | 1.5E+05 | | 1.7E-06 | | 9.4E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 92 | 5 | 2.90E-02 | | | 2.5E+05 | | 3.2E+03 | | 1.1E-07 | | 9.0E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 92 | 14 | 1.85E-02 | | 2.5E+04 | 4.1E+05 | 3.4E+03 | 6.4E+03 | 7.4E-12 | 4.5E-08 | 5.4E-11 | 2.9E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 92 | 5 | 9.20E-01 | | 3.9E+03 | 5.9E+04 | 5.3E+02 | 9.5E+02 | 2.4E-09 | 1.6E-05 | 1.7E-08 | 9.6E-04 |
| VOC | Toluene | 108-88-3 | D | 92 | 9 | 2.20E-01 | | | 1.2E+05 | | 3.8E+03 | | 1.9E-06 | | 5.7E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 92 | 5 | 7.00E-01 | | | 1.8E+05 | | 9.1E+03 | | 3.8E-06 | | 7.7E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 92 | 2 | 2.80E-01 | | 9.6E+03 | 1.5E+05 | 1.3E+03 | 6.1E+03 | 2.9E-10 | 1.8E-06 | 2.2E-09 | 4.6E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 92 | 1 | 3.20E-01 | | 3.8E+02 | 6.3E+03 | 6.1E+01 | 8.5E+01 | 8.3E-09 | 5.0E-05 | 5.2E-08 | 3.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 92 | 5 | 1.80E-01 | | | 4.5E+04 | | 5.7E+02 | | 4.0E-06 | | 3.2E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 92 | 7 | 5.20E-01 | | | 8.2E+05 | | 4.0E+04 | | 6.4E-07 | | 1.3E-05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 92 | 1 | 8.70E-02 | | | 4.0E+05 | | 1.9E+04 | | 2.2E-07 | | 4.5E-06 |
| SVOC | Anthracene | 120-12-7 | D | 92 | 9 | 2.10E-01 | | | 5.4E+06 | | 2.1E+06 | | 3.9E-08 | | 9.8E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 92 | 4 | 2.70E-01 | | | 6.1E+05 | | 1.0E+04 | | 4.4E-07 | | 2.7E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 92 | 17 | 7.90E-01 | | 1.7E+03 | | 6.7E+02 | | 4.7E-09 | | 1.2E-08 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 92 | 16 | 7.40E-01 | | 1.7E+02 | | 6.8E+01 | | 4.3E-08 | | 1.1E-07 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 92 | 22 | 1.00E+00 | | 1.7E+03 | | 6.5E+02 | | 6.0E-09 | | 1.5E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 92 | 13 | 7.20E-01 | | | 5.3E+05 | | 2.0E+05 | | 1.4E-06 | | 3.6E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 92 | 11 | 4.30E-01 | | 1.7E+04 | | 6.8E+03 | | 2.5E-10 | | 6.3E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 92 | 23 | 5.10E+00 | | 9.5E+04 | 3.8E+05 | 3.8E+04 | 1.5E+04 | 5.4E-10 | 1.3E-05 | 1.3E-09 | 3.3E-04 |
| SVOC | Caprolactam | 105-60-2 | | 92 | 1 | 2.20E-02 | | | 6.0E+06 | | 1.3E+05 | | 3.7E-09 | | 1.7E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 92 | 8 | 4.30E-01 | | 6.4E+04 | | 2.4E+04 | | 6.7E-11 | | 1.8E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 92 | 21 | 1.00E+00 | | 1.7E+05 | | 6.3E+04 | | 6.0E-11 | | 1.6E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 92 | 5 | 1.00E-01 | | 1.7E+02 | | 6.8E+01 | | 5.9E-09 | | 1.5E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 92 | 5 | 2.28E-01 | | | 7.2E+04 | | 2.6E+03 | | 3.2E-06 | | 8.9E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 92 | 1 | 1.80E-01 | | | 1.3E+07 | | 1.2E+06 | | 1.3E-08 | | 1.6E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 92 | 7 | 1.30E+01 | | | 2.9E+05 | | 1.5E+04 | | 4.4E-05 | | 8.7E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 92 | 8 | 4.30E+00 | | | 1.9E+06 | | 7.7E+05 | | 2.2E-06 | | 5.6E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 92 | 12 | 6.00E+00 | | | 7.7E+05 | | 3.1E+05 | | 7.8E-06 | | 2.0E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 92 | 25 | 1.20E+00 | | | 6.9E+05 | | 1.7E+05 | | 1.7E-06 | | 7.3E-06 |
| SVOC | Fluorene | 86-73-7 | D | 92 | 7 | 3.30E-01 | | | 6.3E+05 | | 5.5E+04 | | 5.3E-07 | | 6.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 92 | 1 | 6.90E-02 | | 6.0E+02 | 1.5E+04 | 1.5E+02 | 6.1E+02 | 1.2E-09 | 4.5E-06 | 4.6E-09 | 1.1E-04 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 1500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 92 | 11 | 5.10E-01 | | 1.7E+03 | | 6.8E+02 | | 3.0E-09 | | 7.5E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 92 | 15 | 4.50E+00 | | | 1.4E+04 | | 2.0E+02 | | 3.3E-04 | | 2.2E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 92 | 5 | 2.95E-01 | | | 7.0E+05 | | 1.8E+04 | | 4.2E-07 | | 1.7E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 92 | 8 | 9.50E-01 | | | 1.2E+04 | | 1.6E+02 | | 7.7E-05 | | 5.9E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 92 | 22 | 1.04E+00 | | | 4.9E+05 | | 6.2E+04 | | 2.1E-06 | | 1.7E-05 |
| SVOC | Phenol | 108-95-2 | ID | 92 | 17 | 7.50E+00 | | | 5.8E+06 | | 2.3E+05 | | 1.3E-06 | | 3.3E-05 |
| SVOC | Pyrene | 129-00-0 | D | 92 | 26 | 1.20E+00 | | | 5.2E+05 | | 1.3E+05 | | 2.3E-06 | | 9.0E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 241 | 214 | **5.86E+01** | | 5.6E+02 | 3.5E+02 | 2.0E+02 | 3.5E+01 | 1.0E-06 | 1.7E-01 | 3.0E-06 | 1.7E+00 |
| INORG | Aluminum | 7429-90-5 | D | 92 | 92 | **1.33E+04** | 1.48E+04 | | 2.2E+06 | | 2.3E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 84 | 20 | 1.12E+01 | 4.40E-01 | | 1.0E+04 | | 4.0E+02 | | 1.1E-03 | | 2.7E-02 |
| INORG | Arsenic | 7440-38-2 | A | 92 | 92 | 4.42E+01 | 1.13E+01 | 9.5E+02 | 7.0E+03 | 4.2E+02 | 4.6E+03 | 3.5E-07 | 4.7E-03 | 7.9E-07 | 7.1E-03 |
| INORG | Barium | 7440-39-3 | D | 92 | 92 | 5.52E+02 | 8.38E+01 | | 1.8E+06 | | 7.2E+04 | | 2.6E-04 | | 6.5E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 92 | 70 | 7.80E+00 | 5.70E-01 | 1.4E+04 | 8.2E+03 | 1.7E+04 | 7.4E+02 | 5.1E-09 | 8.8E-04 | 4.2E-09 | 9.7E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 92 | 69 | 5.10E+00 | 5.52E-01 | 1.9E+04 | 1.8E+04 | 2.3E+04 | 8.9E+02 | 2.4E-09 | 2.5E-04 | 2.0E-09 | 5.1E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 92 | 92 | **8.95E+01** | 2.82E+01 | 2.8E+03 | 7.7E+04 | 3.4E+03 | 2.0E+04 | 2.2E-07 | 8.0E-04 | 1.8E-07 | 3.0E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 92 | 92 | **5.71E+01** | 1.00E+01 | 1.2E+04 | 9.6E+03 | 1.5E+04 | 1.1E+03 | 3.9E-08 | 4.9E-03 | 3.2E-08 | 4.3E-02 |
| INORG | Copper | 7440-50-8 | D | 92 | 92 | **1.83E+02** | 1.89E+01 | | 1.0E+06 | | 4.1E+04 | | 1.6E-04 | | 4.0E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 91 | 5 | 1.48E-01 | | | 5.0E+05 | | 2.0E+04 | | 2.9E-07 | | 7.3E-06 |
| INORG | Cyanide (total) | 57-12-5 | D | 92 | 10 | 3.90E-01 | | | 5.0E+05 | | 2.0E+04 | | 7.7E-07 | | 1.9E-05 |
| INORG | Iron | 7439-89-6 | D | 92 | 92 | **3.91E+04** | 2.44E+04 | | 7.7E+06 | | 3.1E+05 | | 1.9E-03 | | 4.8E-02 |
| INORG | Manganese | 7439-96-5 | D | 92 | 92 | **6.80E+02** | 6.76E+02 | | 2.4E+04 | | 2.9E+03 | | 1.6E-04 | | 1.3E-03 |
| INORG | Mercury | 7439-97-6 | D | 92 | 83 | **6.24E+00** | 7.05E-02 | | 2.7E+03 | | 4.6E+01 | | 2.3E-03 | | 1.4E-01 |
| INORG | Nickel | 7440-02-0 | A | 92 | 92 | **1.60E+02** | 1.83E+01 | 1.4E+05 | 5.1E+05 | 1.7E+05 | 2.0E+04 | 1.0E-08 | 2.8E-04 | 8.3E-09 | 6.9E-03 |
| INORG | Selenium | 7782-49-2 | D | 92 | 37 | 3.70E+00 | 3.96E-01 | | 1.3E+05 | | 5.1E+03 | | 2.6E-05 | | 6.5E-04 |
| INORG | Silver | 7440-22-4 | D | 92 | 17 | 2.90E+00 | | | 4.7E+03 | | 5.2E+02 | | 6.2E-04 | | 5.5E-03 |
| INORG | Thallium | 7440-28-0 | | 92 | 33 | **8.44E-01** | 8.40E-01 | | 1.8E+03 | | 7.1E+01 | | 2.1E-06 | | 5.1E-05 |
| INORG | Vanadium | 7440-62-2 | | 92 | 92 | 7.75E+01 | 4.18E+01 | | 1.8E+05 | | 7.1E+03 | | 2.0E-04 | | 5.0E-03 |
| INORG | Zinc | 7440-66-6 | D | 92 | 92 | 8.29E+02 | 5.48E+01 | | 7.6E+06 | | 3.1E+05 | | 1.0E-04 | | 2.5E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **1.7E-06** | **1.9E-01** | **4.3E-06** | **2.0E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 92 | 17 | 1.30E+00 | | | 2.7E+06 | | 3.7E+04 | | 4.9E-07 | | 3.5E-05 |
| VOC | Benzene | 71-43-2 | A | 92 | 2 | 3.10E-02 | | 1.7E+03 | 5.8E+03 | 2.3E+02 | 1.5E+02 | 1.8E-10 | 5.3E-06 | 1.4E-09 | 2.1E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 92 | 20 | 2.80E-01 | | | 3.9E+06 | | 6.3E+04 | | 7.3E-08 | | 4.4E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 92 | 8 | 8.20E-03 | | | 5.6E+04 | | 7.2E+02 | | 1.5E-07 | | 1.1E-05 |
| VOC | Chlorobenzene | 108-90-7 | D | 92 | 4 | 2.50E-01 | | | 2.7E+04 | | 3.6E+02 | | 9.2E-06 | | 7.0E-04 |
| VOC | Cumene | 98-82-8 | D | 92 | 4 | 7.80E-03 | | | 4.7E+04 | | 6.0E+02 | | 1.7E-07 | | 1.3E-05 |
| VOC | Cyclohexane | 110-82-7 | ID | 92 | 2 | 2.00E-03 | | | 5.8E+05 | | 7.4E+03 | | 3.4E-09 | | 2.7E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 92 | 3 | 1.80E-01 | | | 2.0E+05 | | 2.2E+04 | | 8.8E-07 | | 8.3E-06 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 92 | 7 | 1.70E+00 | | | 2.1E+04 | | 7.2E+02 | | 8.0E-05 | | 2.4E-03 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 92 | 12 | 5.00E+00 | | 9.6E+03 | 3.9E+05 | 1.3E+03 | 1.6E+04 | 5.2E-09 | 1.3E-05 | 3.7E-08 | 3.2E-04 |
| VOC | Dichlorodifluoromethane | 75-71-8 | | 92 | 1 | 5.80E-02 | | | 1.2E+04 | | 1.5E+03 | | 4.9E-06 | | 3.9E-05 |
| VOC | 1,2-Dichloroethane | 107-06-2 | B2 | 92 | 1 | 1.30E-02 | | 7.7E+02 | 1.5E+03 | 1.0E+02 | 1.9E+01 | 1.7E-10 | 8.7E-06 | 1.3E-09 | 6.9E-04 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 92 | 3 | 9.00E-01 | | | 7.4E+03 | | 9.7E+01 | | 1.2E-04 | | 9.3E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 92 | 1 | 1.10E-01 | | | 1.2E+04 | | 1.5E+02 | | 9.4E-06 | | 7.2E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 92 | 5 | 1.90E-02 | | | 3.5E+05 | | 5.0E+03 | | 5.4E-08 | | 3.8E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 92 | 15 | 1.40E+01 | | | 8.1E+06 | | 1.5E+05 | | 1.7E-06 | | 9.4E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 92 | 5 | 2.90E-02 | | | 2.5E+05 | | 3.2E+03 | | 1.1E-07 | | 9.0E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 92 | 14 | 1.85E-02 | | 2.5E+04 | 4.1E+05 | 3.4E+03 | 6.4E+03 | 7.4E-12 | 4.5E-08 | 5.4E-11 | 2.9E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 92 | 5 | 9.20E-01 | | 3.9E+03 | 5.9E+04 | 5.3E+02 | 9.5E+02 | 2.4E-09 | 1.6E-05 | 1.7E-08 | 9.6E-04 |
| VOC | Toluene | 108-88-3 | D | 92 | 9 | 2.20E-01 | | | 1.2E+05 | | 3.8E+03 | | 1.9E-06 | | 5.7E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 92 | 2 | 9.80E-02 | | | 1.8E+05 | | 9.1E+03 | | 5.3E-07 | | 1.1E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 92 | 2 | 2.80E-01 | | 9.6E+03 | 1.5E+05 | 1.3E+03 | 6.1E+03 | 2.9E-10 | 1.8E-06 | 2.2E-09 | 4.6E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 92 | 1 | 3.20E-01 | | 3.8E+02 | 6.3E+03 | 6.1E+01 | 8.5E+01 | 8.3E-09 | 5.0E-05 | 5.2E-08 | 3.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 92 | 5 | 1.80E-01 | | | 4.5E+04 | | 5.7E+02 | | 4.0E-06 | | 3.2E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 92 | 7 | 5.20E-01 | | | 8.2E+05 | | 4.0E+04 | | 6.4E-07 | | 1.3E-05 |
| SVOC | Acenaphthylene | 208-96-8 | D | 92 | 1 | 8.70E-02 | | | 4.0E+05 | | 1.9E+04 | | 2.2E-07 | | 4.5E-06 |
| SVOC | Anthracene | 120-12-7 | D | 92 | 9 | 2.10E-01 | | | 5.4E+06 | | 2.1E+06 | | 3.9E-08 | | 9.8E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 92 | 4 | 2.70E-01 | | | 6.1E+05 | | 1.0E+04 | | 4.4E-07 | | 2.7E-05 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 92 | 17 | 7.90E-01 | | 1.7E+03 | | 6.7E+02 | | 4.7E-09 | | 1.2E-08 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 92 | 16 | 7.40E-01 | | 1.7E+02 | | 6.8E+01 | | 4.3E-08 | | 1.1E-07 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 92 | 22 | 1.00E+00 | | 1.7E+03 | | 6.5E+02 | | 6.0E-09 | | 1.5E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 92 | 13 | 7.20E-01 | | | 5.3E+05 | | 2.0E+05 | | 1.4E-06 | | 3.6E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 92 | 11 | 4.30E-01 | | 1.7E+04 | | 6.8E+03 | | 2.5E-10 | | 6.3E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 92 | 21 | 2.00E+00 | | 9.5E+04 | 3.8E+05 | 3.8E+04 | 1.5E+04 | 2.1E-10 | 5.2E-06 | 5.2E-10 | 1.3E-04 |
| SVOC | Caprolactam | 105-60-2 | | 92 | 1 | 2.20E-02 | | | 6.0E+06 | | 1.3E+05 | | 3.7E-09 | | 1.7E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 92 | 8 | 4.30E-01 | | 6.4E+04 | | 2.4E+04 | | 6.7E-11 | | 1.8E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 92 | 21 | 1.00E+00 | | 1.7E+05 | | 6.3E+04 | | 6.0E-11 | | 1.6E-10 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 92 | 5 | 1.00E-01 | | 1.7E+02 | | 6.8E+01 | | 5.9E-09 | | 1.5E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 92 | 5 | 2.28E-01 | | | 7.2E+04 | | 2.6E+03 | | 3.2E-06 | | 8.9E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 92 | 1 | 1.80E-01 | | | 1.3E+07 | | 1.2E+06 | | 1.3E-08 | | 1.6E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 92 | 7 | 1.30E+01 | | | 2.9E+05 | | 1.5E+04 | | 4.4E-05 | | 8.7E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 92 | 8 | 4.30E+00 | | | 1.9E+06 | | 7.7E+05 | | 2.2E-06 | | 5.6E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 92 | 9 | 3.90E+00 | | | 7.7E+05 | | 3.1E+05 | | 5.1E-06 | | 1.3E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 92 | 25 | 1.20E+00 | | | 6.9E+05 | | 1.7E+05 | | 1.7E-06 | | 7.3E-06 |
| SVOC | Fluorene | 86-73-7 | D | 92 | 7 | 3.30E-01 | | | 6.3E+05 | | 5.5E+04 | | 5.3E-07 | | 6.0E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 92 | 1 | 6.90E-02 | | 6.0E+02 | 1.5E+04 | 1.5E+02 | 6.1E+02 | 1.2E-09 | 4.5E-06 | 4.6E-09 | 1.1E-04 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 500 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 92 | 11 | 5.10E-01 | | 1.7E+03 | | 6.8E+02 | | 3.0E-09 | | 7.5E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 92 | 15 | 4.50E+00 | | | 1.4E+04 | | 2.0E+02 | | 3.3E-04 | | 2.2E-02 |
| SVOC | Methylphenol (total) | 1319-77-3 | | 92 | 5 | 2.95E-01 | | | 7.0E+05 | | 1.8E+04 | | 4.2E-07 | | 1.7E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 92 | 8 | 9.50E-01 | | | 1.2E+04 | | 1.6E+02 | | 7.7E-05 | | 5.9E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 92 | 22 | 1.04E+00 | | | 4.9E+05 | | 6.2E+04 | | 2.1E-06 | | 1.7E-05 |
| SVOC | Phenol | 108-95-2 | ID | 92 | 16 | 7.50E+00 | | | 5.8E+06 | | 2.3E+05 | | 1.3E-06 | | 3.3E-05 |
| SVOC | Pyrene | 129-00-0 | D | 92 | 26 | 1.20E+00 | | | 5.2E+05 | | 1.3E+05 | | 2.3E-06 | | 9.0E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 241 | 214 | **2.90E+01** | | 5.6E+02 | 3.5E+02 | 2.0E+02 | 3.5E+01 | 5.2E-07 | 8.3E-02 | 1.5E-06 | 8.3E-01 |
| INORG | Aluminum | 7429-90-5 | D | 92 | 92 | **1.33E+04** | 1.48E+04 | | 2.2E+06 | | 2.3E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 84 | 21 | 2.80E+00 | 4.40E-01 | | 1.0E+04 | | 4.0E+02 | | 2.3E-04 | | 5.9E-03 |
| INORG | Arsenic | 7440-38-2 | A | 92 | 92 | 3.70E+01 | 1.13E+01 | 9.5E+02 | 7.0E+03 | 4.2E+02 | 4.6E+03 | 2.7E-07 | 3.7E-03 | 6.2E-07 | 5.5E-03 |
| INORG | Barium | 7440-39-3 | D | 92 | 92 | 5.52E+02 | 8.38E+01 | | 1.8E+06 | | 7.2E+04 | | 2.6E-04 | | 6.5E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 92 | 71 | 7.80E+00 | 5.70E-01 | 1.4E+04 | 8.2E+03 | 1.7E+04 | 7.4E+02 | 5.1E-09 | 8.8E-04 | 4.2E-09 | 9.7E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 92 | 70 | 5.10E+00 | 5.52E-01 | 1.9E+04 | 1.8E+04 | 2.3E+04 | 8.9E+02 | 2.4E-09 | 2.5E-04 | 2.0E-09 | 5.1E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 92 | 92 | **5.35E+01** | 2.82E+01 | 2.8E+03 | 7.7E+04 | 3.4E+03 | 2.0E+04 | 8.9E-08 | 3.3E-04 | 7.4E-08 | 1.2E-03 |
| INORG | Cobalt | 7440-48-4 | B1 | 92 | 92 | **5.69E+01** | 1.00E+01 | 1.2E+04 | 9.6E+03 | 1.5E+04 | 1.1E+03 | 3.9E-08 | 4.9E-03 | 3.2E-08 | 4.2E-02 |
| INORG | Copper | 7440-50-8 | D | 92 | 92 | **1.51E+02** | 1.89E+01 | | 1.0E+06 | | 4.1E+04 | | 1.3E-04 | | 3.3E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 91 | 10 | 1.48E-01 | | | 5.0E+05 | | 2.0E+04 | | 2.9E-07 | | 7.3E-06 |
| INORG | Cyanide (total) | 57-12-5 | D | 92 | 14 | 3.90E-01 | | | 5.0E+05 | | 2.0E+04 | | 7.7E-07 | | 1.9E-05 |
| INORG | Iron | 7439-89-6 | D | 92 | 92 | **2.59E+04** | 2.44E+04 | | 7.7E+06 | | 3.1E+05 | | 2.1E-04 | | 5.1E-03 |
| INORG | Manganese | 7439-96-5 | D | 92 | 92 | **6.62E+02** | 6.76E+02 | | 2.4E+04 | | 2.9E+03 | | | | |
| INORG | Mercury | 7439-97-6 | D | 92 | 83 | **6.49E+00** | 7.05E-02 | | 2.7E+03 | | 4.6E+01 | | 2.4E-03 | | 1.4E-01 |
| INORG | Nickel | 7440-02-0 | A | 92 | 92 | **1.14E+02** | 1.83E+01 | 1.4E+05 | 5.1E+05 | 1.7E+05 | 2.0E+04 | 6.7E-09 | 1.9E-04 | 5.6E-09 | 4.7E-03 |
| INORG | Selenium | 7782-49-2 | D | 92 | 38 | 1.60E+00 | 3.96E-01 | | 1.3E+05 | | 5.1E+03 | | 9.6E-06 | | 2.4E-04 |
| INORG | Silver | 7440-22-4 | D | 92 | 20 | 2.90E+00 | | | 4.7E+03 | | 5.2E+02 | | 6.2E-04 | | 5.5E-03 |
| INORG | Thallium | 7440-28-0 | | 92 | 35 | **8.38E-01** | 8.40E-01 | | 1.8E+03 | | 7.1E+01 | | | | |
| INORG | Vanadium | 7440-62-2 | | 92 | 92 | 7.75E+01 | 4.18E+01 | | 1.8E+05 | | 7.1E+03 | | 2.0E-04 | | 5.0E-03 |
| INORG | Zinc | 7440-66-6 | D | 92 | 92 | 8.29E+02 | 5.48E+01 | | 7.6E+06 | | 3.1E+05 | | 1.0E-04 | | 2.5E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **1.0E-06** | **9.8E-02** | **2.5E-06** | **1.1E+00** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOC | Acetone | 67-64-1 | ID | 92 | 12 | 1.30E+00 | | | 2.67E+06 | | 3.68E+04 | | 4.9E-07 | | 3.5E-05 |
| VOC | Benzene | 71-43-2 | A | 92 | 1 | 3.10E-02 | | 1.74E+03 | 5.81E+03 | 2.29E+02 | 1.48E+02 | 1.8E-10 | 5.3E-06 | 1.4E-09 | 2.1E-04 |
| VOC | 2-Butanone | 78-93-3 | ID | 92 | 12 | 2.80E-01 | | | 3.86E+06 | | 6.33E+04 | | 7.3E-08 | | 4.4E-06 |
| VOC | Carbon Disulfide | 75-15-0 | | 92 | 3 | 5.30E-03 | | | 5.64E+04 | | 7.24E+02 | | 9.4E-08 | | 7.3E-06 |
| VOC | Chlorobenzene | 108-90-7 | D | 92 | 1 | 2.70E-02 | | | 2.72E+04 | | 3.57E+02 | | 9.9E-07 | | 7.6E-05 |
| VOC | Cumene | 98-82-8 | D | 92 | 1 | 1.30E-03 | | | 4.67E+04 | | 6.00E+02 | | 2.8E-08 | | 2.2E-06 |
| VOC | Cyclohexane | 110-82-7 | ID | 92 | 1 | 2.00E-03 | | | 5.84E+05 | | 7.39E+03 | | 3.4E-09 | | 2.7E-07 |
| VOC | 1,2-Dichlorobenzene | 95-50-1 | D | 92 | 1 | 1.40E-02 | | | 2.05E+05 | | 2.17E+04 | | 6.8E-08 | | 6.4E-07 |
| VOC | 1,3-Dichlorobenzene | 541-73-1 | D | 92 | 2 | 8.20E-03 | | | 2.11E+04 | | 7.20E+02 | | 3.9E-07 | | 1.1E-05 |
| VOC | 1,4-Dichlorobenzene | 106-46-7 | C | 92 | 5 | 2.30E-02 | | 9.63E+03 | 3.90E+05 | 1.34E+03 | 1.55E+04 | 2.4E-11 | 5.9E-08 | 1.7E-10 | 1.5E-06 |
| VOC | cis-1,2-Dichloroethene | 156-59-2 | D | 92 | 3 | 9.00E-01 | | | 7.42E+03 | | 9.66E+01 | | 1.2E-04 | | 9.3E-03 |
| VOC | trans-1,2-Dichloroethene | 156-60-5 | | 92 | 1 | 1.10E-01 | | | 1.18E+04 | | 1.52E+02 | | 9.4E-06 | | 7.2E-04 |
| VOC | Ethyl Benzene | 100-41-4 | D | 92 | 3 | 1.90E-02 | | | 3.55E+05 | | 4.96E+03 | | 5.4E-08 | | 3.8E-06 |
| VOC | Methyl Acetate | 79-20-9 | | 92 | 12 | 1.40E+01 | | | 8.11E+06 | | 1.49E+05 | | 1.7E-06 | | 9.4E-05 |
| VOC | Methylcyclohexane | 108-87-2 | | 92 | 3 | 3.80E-03 | | | 2.54E+05 | | 3.21E+03 | | 1.5E-08 | | 1.2E-06 |
| VOC | Methylene Chloride | 75-09-2 | B2 | 92 | 14 | 1.85E-02 | | 2.50E+04 | 4.11E+05 | 3.40E+03 | 6.37E+03 | 7.4E-12 | 4.5E-08 | 5.4E-11 | 2.9E-06 |
| VOC | Tetrachloroethene | 127-18-4 | C-B2 | 92 | 4 | 9.20E-01 | | 3.86E+03 | 5.86E+04 | 5.29E+02 | 9.54E+02 | 2.4E-09 | 1.6E-05 | 1.7E-08 | 9.6E-04 |
| VOC | Toluene | 108-88-3 | D | 92 | 8 | 2.20E-01 | | | 1.18E+05 | | 3.83E+03 | | 1.9E-06 | | 5.7E-05 |
| VOC | 1,2,4-Trichlorobenzene | 120-82-1 | D | 92 | 1 | 9.80E-02 | | | 1.84E+05 | | 9.11E+03 | | 5.3E-07 | | 1.1E-05 |
| VOC | Trichloroethene | 79-01-6 | C-B2 | 92 | 2 | 2.80E-01 | | 9.55E+03 | 1.53E+05 | 1.26E+03 | 6.13E+03 | 2.9E-10 | 1.8E-06 | 2.2E-09 | 4.6E-05 |
| VOC | Vinyl Chloride | 75-01-4 | A | 92 | 1 | 3.20E-01 | | 3.85E+02 | 6.35E+03 | 6.13E+01 | 8.51E+01 | 8.3E-09 | 5.0E-05 | 5.2E-08 | 3.8E-03 |
| VOC | Xylenes (total) | 1330-20-7 | ID | 92 | 4 | 1.80E-01 | | | 4.46E+04 | | 5.69E+02 | | 4.0E-06 | | 3.2E-04 |
| SVOC | Acenaphthene | 83-32-9 | | 92 | 4 | 1.50E-01 | | | 8.16E+05 | | 4.03E+04 | | 1.8E-07 | | 3.7E-06 |
| SVOC | Acenaphthylene | 208-96-8 | D | 92 | 1 | 8.70E-02 | | | 4.03E+05 | | 1.93E+04 | | 2.2E-07 | | 4.5E-06 |
| SVOC | Anthracene | 120-12-7 | D | 92 | 7 | 1.70E-01 | | | 5.36E+06 | | 2.15E+06 | | 3.2E-08 | | 7.9E-08 |
| SVOC | Benzaldehyde | 100-52-7 | | 92 | 2 | 8.00E-02 | | | 6.13E+05 | | 9.96E+03 | | 1.3E-07 | | 8.0E-06 |
| SVOC | Benzo(a)anthracene | 56-55-3 | B2 | 92 | 11 | 3.70E-01 | | 1.68E+03 | | 6.68E+02 | | 2.2E-09 | | 5.5E-09 | |
| SVOC | Benzo(a)pyrene | 50-32-8 | B2 | 92 | 10 | 6.40E-01 | | 1.70E+02 | | 6.82E+01 | | 3.8E-08 | | 9.4E-08 | |
| SVOC | Benzo(b)fluoranthene | 205-99-2 | B2 | 92 | 14 | 7.20E-01 | | 1.67E+03 | | 6.54E+02 | | 4.3E-09 | | 1.1E-08 | |
| SVOC | Benzo(g,h,i)perylene | 191-24-2 | D | 92 | 8 | 7.20E-01 | | | 5.30E+05 | | 1.99E+05 | | 1.4E-06 | | 3.6E-06 |
| SVOC | Benzo(k)fluoranthene | 207-08-9 | B2 | 92 | 6 | 3.60E-01 | | 1.69E+04 | | 6.79E+03 | | 2.1E-10 | | 5.3E-10 | |
| SVOC | bis(2-Ethylhexyl)phthalate | 117-81-7 | B2 | 92 | 14 | 1.40E+00 | | 9.49E+04 | 3.84E+05 | 3.82E+04 | 1.53E+04 | 1.5E-10 | 3.6E-06 | 3.7E-10 | 9.1E-05 |
| SVOC | Caprolactam | 105-60-2 | | 92 | 1 | 2.20E-02 | | | 5.96E+06 | | 1.32E+05 | | 3.7E-09 | | 1.7E-07 |
| SVOC | Carbazole | 86-74-8 | B2 | 92 | 7 | 4.30E-01 | | 6.41E+04 | | 2.40E+04 | | 6.7E-11 | | 1.8E-10 | |
| SVOC | Chrysene | 218-01-9 | B2 | 92 | 14 | 4.00E-01 | | 1.66E+05 | | 6.35E+04 | | 2.4E-11 | | 6.3E-11 | |
| SVOC | Dibenz(a,h)anthracene | 53-70-3 | B2 | 92 | 5 | 1.00E-01 | | 1.70E+02 | | 6.81E+01 | | 5.9E-09 | | 1.5E-08 | |
| SVOC | Dibenzofuran | 132-64-9 | D | 92 | 4 | 1.30E-01 | | | 7.16E+04 | | 2.56E+03 | | 1.8E-06 | | 5.1E-05 |
| SVOC | Diethylphthalate | 84-66-2 | D | 92 | 1 | 1.80E-01 | | | 1.34E+07 | | 1.16E+06 | | 1.3E-08 | | 1.6E-07 |
| SVOC | 2,4-Dimethylphenol | 105-67-9 | | 92 | 3 | 1.30E+01 | | | 2.95E+05 | | 1.49E+04 | | 4.4E-05 | | 8.7E-04 |
| SVOC | Di-n-butylphthalate | 84-74-2 | D | 92 | 5 | 4.30E+00 | | | 1.92E+06 | | 7.68E+05 | | 2.2E-06 | | 5.6E-06 |
| SVOC | Di-n-octylphthalate | 117-84-0 | | 92 | 2 | 3.90E+00 | | | 7.68E+05 | | 3.07E+05 | | 5.1E-06 | | 1.3E-05 |
| SVOC | Fluoranthene | 206-44-0 | D | 92 | 18 | 6.80E-01 | | | 6.93E+05 | | 1.65E+05 | | 9.8E-07 | | 4.1E-06 |
| SVOC | Fluorene | 86-73-7 | D | 92 | 4 | 1.50E-01 | | | 6.27E+05 | | 5.54E+04 | | 2.4E-07 | | 2.7E-06 |
| SVOC | Hexachlorobenzene | 118-74-1 | B2 | 92 | 1 | 6.90E-02 | | 6.00E+02 | 1.54E+04 | 1.50E+02 | 6.15E+02 | 1.2E-09 | 4.5E-06 | 4.6E-09 | 1.1E-04 |
| SVOC | Indeno(1,2,3-cd)pyrene | 193-39-5 | B2 | 92 | 7 | 5.10E-01 | | 1.70E+03 | | 6.82E+02 | | 3.0E-09 | | 7.5E-09 | |
| SVOC | 2-Methylnaphthalene | 91-57-6 | ID | 92 | 9 | 4.50E+00 | | | 1.38E+04 | | 2.01E+02 | | 3.3E-04 | | 2.2E-02 |

**Attachment 6: Estimates of Risk and HQ for Construction Scenarios for 10-ft Excavation with 0-ft Cover Thickness in the East Plant Area**
**(Soil Removal to 50 mg/kg)**
**GM Powertrain Bedford Facility, Bedford, Indiana**

| Chem Group | Chemical | CASRN | Carc Class | Analyzed | Detected | Conc (mg/kg) | Site Specific Background (mg/kg) | Site-Specific Construction Worker (Small-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Small-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Cancer Criteria ($TR=10^{-5}$) (mg/kg) | Site-Specific Construction Worker (Large-Scale) Noncancer Criteria (HQ=1) (mg/kg) | Construction Worker (Small-Scale) Cancer Risk | Construction Worker (Small-Scale) HQ | Construction Worker (Large-Scale) Cancer Risk | Construction Worker (Large-Scale) HQ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SVOC | Methylphenol (total) | 1319-77-3 | | 92 | 3 | 2.81E-01 | | | 6.95E+05 | | 1.77E+04 | | 4.0E-07 | | 1.6E-05 |
| SVOC | Naphthalene | 91-20-3 | C | 92 | 5 | 2.90E-01 | | | 1.23E+04 | | 1.61E+02 | | 2.3E-05 | | 1.8E-03 |
| SVOC | Phenanthrene | 85-01-8 | D | 92 | 16 | 4.40E-01 | | | 4.94E+05 | | 6.22E+04 | | 8.9E-07 | | 7.1E-06 |
| SVOC | Phenol | 108-95-2 | ID | 92 | 12 | 7.50E+00 | | | 5.76E+06 | | 2.31E+05 | | 1.3E-06 | | 3.3E-05 |
| SVOC | Pyrene | 129-00-0 | D | 92 | 18 | 7.90E-01 | | | 5.22E+05 | | 1.34E+05 | | 1.5E-06 | | 5.9E-06 |
| P/PCB | PCBs (total) | 1336-36-3 | B2 | 241 | 214 | **5.29E+00** | | 5.62E+02 | 3.50E+02 | 1.95E+02 | 3.50E+01 | 9.4E-08 | 1.5E-02 | 2.7E-07 | 1.5E-01 |
| INORG | Aluminum | 7429-90-5 | D | 92 | 92 | **1.38E+04** | 1.48E+04 | | 2.22E+06 | | 2.27E+05 | | | | |
| INORG | Antimony | 7440-36-0 | | 84 | 30 | 1.60E+00 | 4.40E-01 | | 1.01E+04 | | 4.02E+02 | | 1.2E-04 | | 2.9E-03 |
| INORG | Arsenic | 7440-38-2 | A | 92 | 92 | 3.70E+01 | 1.13E+01 | 9.54E+02 | 6.97E+03 | 4.15E+02 | 4.65E+03 | 2.7E-07 | 3.7E-03 | 6.2E-07 | 5.5E-03 |
| INORG | Barium | 7440-39-3 | D | 92 | 92 | 5.52E+02 | 8.38E+01 | | 1.79E+06 | | 7.15E+04 | | 2.6E-04 | | 6.5E-03 |
| INORG | Beryllium | 7440-41-7 | B1 | 92 | 77 | 7.80E+00 | 5.70E-01 | 1.42E+04 | 8.18E+03 | 1.70E+04 | 7.43E+02 | 5.1E-09 | 8.8E-04 | 4.2E-09 | 9.7E-03 |
| INORG | Cadmium | 7440-43-9 | B1 | 92 | 72 | 5.10E+00 | 5.52E-01 | 1.89E+04 | 1.83E+04 | 2.27E+04 | 8.88E+02 | 2.4E-09 | 2.5E-04 | 2.0E-09 | 5.1E-03 |
| INORG | Chromium (total) | 7440-47-3 | | 92 | 92 | **3.18E+01** | 2.82E+01 | 2.84E+03 | 7.67E+04 | 3.41E+03 | 2.04E+04 | 1.3E-08 | 4.7E-05 | 1.1E-08 | 1.8E-04 |
| INORG | Cobalt | 7440-48-4 | B1 | 92 | 92 | **2.95E+01** | 1.00E+01 | 1.22E+04 | 9.55E+03 | 1.46E+04 | 1.10E+03 | 1.6E-08 | 2.0E-03 | 1.3E-08 | 1.8E-02 |
| INORG | Copper | 7440-50-8 | D | 92 | 92 | **8.17E+01** | 1.89E+01 | | 1.01E+06 | | 4.07E+04 | | 6.2E-05 | | 1.5E-03 |
| INORG | Cyanide (amenable) | 57-12-5A | | 91 | 22 | | | | 5.03E+05 | | 2.03E+04 | | | | |
| INORG | Cyanide (total) | 57-12-5 | D | 92 | 25 | 3.90E-01 | | | 5.03E+05 | | 2.03E+04 | | 7.7E-07 | | 1.9E-05 |
| INORG | Iron | 7439-89-6 | D | 92 | 92 | **2.60E+04** | 2.44E+04 | | 7.67E+06 | | 3.07E+05 | | 2.1E-04 | | 5.4E-03 |
| INORG | Manganese | 7439-96-5 | D | 92 | 92 | **6.96E+02** | 6.76E+02 | | 2.42E+04 | | 2.86E+03 | | 7.9E-04 | | 6.7E-03 |
| INORG | Mercury | 7439-97-6 | D | 92 | 83 | **1.73E+00** | 7.05E-02 | | 2.68E+03 | | 4.56E+01 | | 6.2E-04 | | 3.6E-02 |
| INORG | Nickel | 7440-02-0 | A | 92 | 92 | **8.84E+01** | 1.83E+01 | 1.42E+05 | 5.11E+05 | 1.70E+05 | 2.04E+04 | 4.9E-09 | 1.4E-04 | 4.1E-09 | 3.4E-03 |
| INORG | Selenium | 7782-49-2 | D | 92 | 49 | 1.60E+00 | 3.96E-01 | | 1.26E+05 | | 5.08E+03 | | 9.6E-06 | | 2.4E-04 |
| INORG | Silver | 7440-22-4 | D | 92 | 28 | 4.80E-01 | | | 4.69E+03 | | 5.24E+02 | | 1.0E-04 | | 9.2E-04 |
| INORG | Thallium | 7440-28-0 | | 92 | 43 | **8.88E-01** | 8.40E-01 | | 1.76E+03 | | 7.12E+01 | | 2.7E-05 | | 6.7E-04 |
| INORG | Vanadium | 7440-62-2 | | 92 | 92 | 7.75E+01 | 4.18E+01 | | 1.76E+05 | | 7.12E+03 | | 2.0E-04 | | 5.0E-03 |
| INORG | Zinc | 7440-66-6 | D | 92 | 92 | 3.75E+02 | 5.48E+01 | | 7.55E+06 | | 3.05E+05 | | 4.2E-05 | | 1.0E-03 |
| | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | **Sum:** | **4.7E-07** | **2.5E-02** | **1.1E-06** | **3.0E-01** |

1. Only constituents detected in the East Plant Area are shown.
2. Cancer risk and HQ are calculated using site-related concentrations, which are those in excess of site-specfic background concentrations for inorganics.
3. Carc class - EPA Weight-of-Evidence Cancer Classification
4. Concentrations in bold are 95% UCLs.

# APPENDIX D

## HELP MODELS

| | |
|---|---|
| APPENDIX D.1 | EXISTING CONDITION (BASELINE) |
| APPENDIX D.2 | TSCA SELF IMPLEMENTING COVER |
| APPENDIX D.3 | GCL COVER APPROACH |
| APPENDIX D.4 | FML COVER APPROACH |

# APPENDIX D.1

# EXISTING CONDITION (BASELINE)

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*******************************************************************************
*******************************************************************************
**                                                                           **
**                                                                           **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                    USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                           **
**                                                                           **
*******************************************************************************
*******************************************************************************



PRECIPITATION DATA FILE:    C:\help3\jen\13968JS.D4
TEMPERATURE DATA FILE:      C:\help3\jen\13968JS.D7
SOLAR RADIATION DATA FILE:  c:\help3\jen\13968JS.D13
EVAPOTRANSPIRATION DATA:    c:\help3\jen\13968JS.D11
SOIL AND DESIGN DATA FILE:  c:\help3\jen\13968JS.D10
OUTPUT DATA FILE:           c:\help3\jen\13968JS.OUT



TIME:   9: 3     DATE:   1/26/2005



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     TITLE:  MODEL D.1   EXISTING CONDITIONS (BASELINE)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.



                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER   6
          THICKNESS                    =      2.50   INCHES
          POROSITY                     =      0.4530 VOL/VOL
          FIELD CAPACITY               =      0.1900 VOL/VOL
          WILTING POINT                =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.1840 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.20
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

| | | | |
|---|---|---|---|
| THICKNESS | = | 55.00 | INCHES |
| POROSITY | = | 0.4640 | VOL/VOL |
| FIELD CAPACITY | = | 0.3100 | VOL/VOL |
| WILTING POINT | = | 0.1870 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.3541 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.639999998000E-04 | CM/SEC |

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

| | | | |
|---|---|---|---|
| THICKNESS | = | 185.00 | INCHES |
| POROSITY | = | 0.4170 | VOL/VOL |
| FIELD CAPACITY | = | 0.0450 | VOL/VOL |
| WILTING POINT | = | 0.0180 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.0755 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.999999978000E-02 | CM/SEC |

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE # 6 WITH A
FAIR STAND OF GRASS, A SURFACE SLOPE OF 12.%
AND A SLOPE LENGTH OF 400. FEET.

| | | | |
|---|---|---|---|
| SCS RUNOFF CURVE NUMBER | = | 70.20 | |
| FRACTION OF AREA ALLOWING RUNOFF | = | 100.0 | PERCENT |
| AREA PROJECTED ON HORIZONTAL PLANE | = | 43.870 | ACRES |
| EVAPORATIVE ZONE DEPTH | = | 21.0 | INCHES |
| INITIAL WATER IN EVAPORATIVE ZONE | = | 6.510 | INCHES |
| UPPER LIMIT OF EVAPORATIVE STORAGE | = | 9.716 | INCHES |
| LOWER LIMIT OF EVAPORATIVE STORAGE | = | 3.672 | INCHES |
| INITIAL SNOW WATER | = | 0.000 | INCHES |
| INITIAL WATER IN LAYER MATERIALS | = | 33.900 | INCHES |
| TOTAL INITIAL WATER | = | 33.900 | INCHES |

TOTAL SUBSURFACE INFLOW = 0.00 INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
EVANSVILLE INDIANA

| | | |
|---|---|---|
| STATION LATITUDE | = | 38.03 DEGREES |
| MAXIMUM LEAF AREA INDEX | = | 3.00 |
| START OF GROWING SEASON (JULIAN DATE) | = | 96 |
| END OF GROWING SEASON (JULIAN DATE) | = | 300 |
| EVAPORATIVE ZONE DEPTH | = | 21.0 INCHES |
| AVERAGE ANNUAL WIND SPEED | = | 8.20 MPH |
| AVERAGE 1ST QUARTER RELATIVE HUMIDITY | = | 70.00 % |
| AVERAGE 2ND QUARTER RELATIVE HUMIDITY | = | 67.00 % |
| AVERAGE 3RD QUARTER RELATIVE HUMIDITY | = | 72.00 % |
| AVERAGE 4TH QUARTER RELATIVE HUMIDITY | = | 54.00 % |

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 2.99 | 3.02 | 4.58 | 4.08 | 4.37 | 3.50 |
| 3.98 | 3.07 | 2.67 | 2.48 | 3.36 | 3.45 |

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 30.80 | 34.90 | 44.60 | 56.50 | 65.60 | 74.60 |
| 78.10 | 76.20 | 69.40 | 57.30 | 45.10 | 35.60 |

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA
AND STATION LATITUDE = 38.03 DEGREES

**********

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

| | JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|---|
| **PRECIPITATION** | | | | | | |
| TOTALS | 2.79 | 2.91 | 4.68 | 3.96 | 4.09 | 3.67 |
| | 4.07 | 3.47 | 2.88 | 1.95 | 2.93 | 3.71 |
| STD. DEVIATIONS | 1.78 | 1.31 | 2.01 | 1.71 | 1.66 | 1.58 |
| | 1.88 | 2.42 | 1.55 | 1.05 | 2.07 | 2.17 |
| **RUNOFF** | | | | | | |
| TOTALS | 0.636 | 1.108 | 0.506 | 0.003 | 0.001 | 0.001 |
| | 0.010 | 0.031 | 0.000 | 0.001 | 0.022 | 0.064 |
| STD. DEVIATIONS | 0.994 | 1.223 | 0.986 | 0.010 | 0.004 | 0.005 |
| | 0.052 | 0.132 | 0.001 | 0.004 | 0.099 | 0.134 |
| **EVAPOTRANSPIRATION** | | | | | | |
| TOTALS | 0.647 | 0.747 | 2.320 | 3.552 | 4.575 | 4.214 |
| | 3.952 | 3.119 | 2.519 | 1.204 | 1.207 | 1.065 |
| STD. DEVIATIONS | 0.253 | 0.504 | 0.410 | 0.619 | 0.738 | 1.524 |
| | 1.773 | 1.545 | 0.818 | 0.410 | 0.376 | 0.270 |
| **PERCOLATION/LEAKAGE THROUGH LAYER 3** | | | | | | |
| TOTALS | 0.5612 | 0.5853 | 0.6578 | 0.9180 | 1.4291 | 1.1685 |
| | 0.9902 | 0.8029 | 0.7153 | 0.6097 | 0.5015 | 0.4777 |
| STD. DEVIATIONS | 0.7474 | 0.7586 | 0.6890 | 1.1081 | 1.0157 | 0.6410 |
| | 0.4203 | 0.2499 | 0.1483 | 0.1675 | 0.1090 | 0.1508 |

**********

**********

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

| | INCHES | | CU. FEET | PERCENT |
|---|---|---|---|---|
| PRECIPITATION | 41.09 | ( 5.495) | 6543760.0 | 100.00 |
| RUNOFF | 2.384 | ( 2.1493) | 379577.81 | 5.801 |
| EVAPOTRANSPIRATION | 29.122 | ( 2.9241) | 4637664.50 | 70.872 |
| PERCOLATION/LEAKAGE THROUGH LAYER 3 | 9.41723 | ( 4.21278) | 1499675.750 | 22.91765 |

| | | | | |
|---|---|---|---|---|
| CHANGE IN WATER STORAGE | 0.169 | ( 4.1487) | 26841.62 | 0.410 |

≈ 30,735 GPF

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

| | (INCHES) | (CU. FT.) |
|---|---|---|
| PRECIPITATION | 5.00 | 796240.500 |
| RUNOFF | 2.465 | 392572.7500 |
| PERCOLATION/LEAKAGE THROUGH LAYER 3 | 0.198817 | 31661.17380 |
| SNOW WATER | 2.92 | 465063.2190 |

| | |
|---|---|
| MAXIMUM VEG. SOIL WATER (VOL/VOL) | 0.4404 |
| MINIMUM VEG. SOIL WATER (VOL/VOL) | 0.1749 |

FINAL WATER STORAGE AT END OF YEAR 25

| LAYER | (INCHES) | (VOL/VOL) |
|---|---|---|
| 1 | 0.9380 | 0.3752 |
| 2 | 18.3278 | 0.3332 |
| 3 | 18.8479 | 0.1019 |
| SNOW WATER | 0.000 | |

# APPENDIX D.2

# TSCA SELF IMPLEMENTING COVER

```
*******************************************************************************
*******************************************************************************
**                                                                           **
**                                                                           **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                    USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                           **
**                                                                           **
*******************************************************************************
*******************************************************************************



PRECIPITATION DATA FILE:    C:\help3\jen\13968JS.D4
TEMPERATURE DATA FILE:      C:\help3\jen\13968JS.D7
SOLAR RADIATION DATA FILE:  c:\help3\jen\13968JS.D13
EVAPOTRANSPIRATION DATA:    c:\help3\jen\13968JS.D11
SOIL AND DESIGN DATA FILE:  c:\help3\jen\TSCA.D10
OUTPUT DATA FILE:           c:\help3\jen\TSCA.OUT


TIME:   9:21     DATE:   1/26/2005



*******************************************************************************

     TITLE:  MODEL D.2              TSCA SELF IMPLEMENTING COVER

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.



                                  LAYER  1
                                  --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4630 VOL/VOL
          FIELD CAPACITY               =      0.2320 VOL/VOL
          WILTING POINT                =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3985 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.20
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

| | | |
|---|---|---|
| THICKNESS | = 10.00 | INCHES |
| POROSITY | = 0.4270 | VOL/VOL |
| FIELD CAPACITY | = 0.4180 | VOL/VOL |
| WILTING POINT | = 0.3670 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.4270 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.100000001000E-06 | CM/SEC |

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

| | | |
|---|---|---|
| THICKNESS | = 55.00 | INCHES |
| POROSITY | = 0.4640 | VOL/VOL |
| FIELD CAPACITY | = 0.3100 | VOL/VOL |
| WILTING POINT | = 0.1870 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.3159 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.639999998000E-04 | CM/SEC |

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

| | | |
|---|---|---|
| THICKNESS | = 185.00 | INCHES |
| POROSITY | = 0.4170 | VOL/VOL |
| FIELD CAPACITY | = 0.0450 | VOL/VOL |
| WILTING POINT | = 0.0180 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.0490 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.999999978000E-02 | CM/SEC |

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 12.% AND A SLOPE LENGTH OF 400. FEET.

| | | | |
|---|---|---|---|
| SCS RUNOFF CURVE NUMBER | = | 79.90 | |
| FRACTION OF AREA ALLOWING RUNOFF | = | 100.0 | PERCENT |
| AREA PROJECTED ON HORIZONTAL PLANE | = | 43.870 | ACRES |
| EVAPORATIVE ZONE DEPTH | = | 6.0 | INCHES |
| INITIAL WATER IN EVAPORATIVE ZONE | = | 2.391 | INCHES |
| UPPER LIMIT OF EVAPORATIVE STORAGE | = | 2.778 | INCHES |
| LOWER LIMIT OF EVAPORATIVE STORAGE | = | 0.696 | INCHES |
| INITIAL SNOW WATER | = | 0.000 | INCHES |
| INITIAL WATER IN LAYER MATERIALS | = | 33.109 | INCHES |
| TOTAL INITIAL WATER | = | 33.109 | INCHES |
| TOTAL SUBSURFACE INFLOW | = | 0.00 | INCHES/YEAR |

## EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM EVANSVILLE INDIANA

| | | | |
|---|---|---|---|
| STATION LATITUDE | = | 38.03 | DEGREES |
| MAXIMUM LEAF AREA INDEX | = | 3.00 | |
| START OF GROWING SEASON (JULIAN DATE) | = | 96 | |
| END OF GROWING SEASON (JULIAN DATE) | = | 300 | |
| EVAPORATIVE ZONE DEPTH | = | 6.0 | INCHES |
| AVERAGE ANNUAL WIND SPEED | = | 8.20 | MPH |
| AVERAGE 1ST QUARTER RELATIVE HUMIDITY | = | 70.00 | % |
| AVERAGE 2ND QUARTER RELATIVE HUMIDITY | = | 67.00 | % |
| AVERAGE 3RD QUARTER RELATIVE HUMIDITY | = | 72.00 | % |
| AVERAGE 4TH QUARTER RELATIVE HUMIDITY | = | 54.00 | % |

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 2.99 | 3.02 | 4.58 | 4.08 | 4.37 | 3.50 |
| 3.98 | 3.07 | 2.67 | 2.48 | 3.36 | 3.45 |

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 30.80 | 34.90 | 44.60 | 56.50 | 65.60 | 74.60 |
| 78.10 | 76.20 | 69.40 | 57.30 | 45.10 | 35.60 |

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA
AND STATION LATITUDE = 38.03 DEGREES

**********

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

| | JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|---|
| PRECIPITATION | | | | | | |
| TOTALS | 2.79 | 2.91 | 4.68 | 3.96 | 4.09 | 3.67 |
| | 4.07 | 3.47 | 2.88 | 1.95 | 2.93 | 3.71 |
| STD. DEVIATIONS | 1.78 | 1.31 | 2.01 | 1.71 | 1.66 | 1.58 |
| | 1.88 | 2.42 | 1.55 | 1.05 | 2.07 | 2.17 |
| RUNOFF | | | | | | |
| TOTALS | 1.969 | 2.085 | 2.723 | 0.793 | 0.331 | 0.207 |
| | 0.202 | 0.395 | 0.202 | 0.138 | 0.969 | 1.672 |
| STD. DEVIATIONS | 1.784 | 1.456 | 1.935 | 0.958 | 0.687 | 0.351 |
| | 0.651 | 0.872 | 0.669 | 0.360 | 1.857 | 1.698 |
| EVAPOTRANSPIRATION | | | | | | |
| TOTALS | 0.665 | 0.755 | 2.416 | 3.637 | 3.979 | 3.629 |
| | 3.797 | 3.015 | 2.461 | 1.313 | 1.430 | 1.171 |
| STD. DEVIATIONS | 0.261 | 0.520 | 0.422 | 0.675 | 0.879 | 1.285 |
| | 1.526 | 1.478 | 0.806 | 0.560 | 0.424 | 0.228 |
| PERCOLATION/LEAKAGE THROUGH LAYER 2 | | | | | | |
| TOTALS | 0.1362 | 0.1168 | 0.1479 | 0.1318 | 0.0888 | 0.0365 |
| | 0.0387 | 0.0388 | 0.0567 | 0.0797 | 0.1064 | 0.1459 |
| STD. DEVIATIONS | 0.0184 | 0.0170 | 0.0112 | 0.0123 | 0.0263 | 0.0277 |
| | 0.0344 | 0.0311 | 0.0362 | 0.0552 | 0.0531 | 0.0202 |

PERCOLATION/LEAKAGE THROUGH LAYER 4

| | | | | | | |
|---|---|---|---|---|---|---|
| TOTALS | 0.0892 | 0.0886 | 0.1039 | 0.0982 | 0.0813 | 0.0632 |
| | 0.0727 | 0.0724 | 0.0438 | 0.0282 | 0.0270 | 0.0681 |
| STD. DEVIATIONS | 0.0606 | 0.0569 | 0.0622 | 0.0580 | 0.0467 | 0.0393 |
| | 0.0461 | 0.0437 | 0.0266 | 0.0253 | 0.0287 | 0.0488 |

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

| | | | | | | |
|---|---|---|---|---|---|---|
| AVERAGES | 2.9144 | 2.1545 | 4.0613 | 2.9991 | 1.3877 | 0.6771 |
| | 0.5771 | 0.6752 | 1.0570 | 1.7600 | 2.8214 | 4.0961 |
| STD. DEVIATIONS | 1.7437 | 1.7443 | 0.9779 | 0.9521 | 0.8560 | 0.7180 |
| | 0.6829 | 0.6403 | 0.8860 | 1.5328 | 1.7912 | 1.3758 |

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

| | INCHES | | CU. FEET | PERCENT |
|---|---|---|---|---|
| PRECIPITATION | 41.09 | ( 5.495) | 6543760.0 | 100.00 |
| RUNOFF | 11.687 | ( 4.3661) | 1861108.75 | 28.441 |
| EVAPOTRANSPIRATION | 28.270 | ( 2.6305) | 4501959.50 | 68.798 |
| PERCOLATION/LEAKAGE THROUGH LAYER 2 | 1.12414 | ( 0.13097) | 179017.437 | 2.73570 |
| AVERAGE HEAD ON TOP OF LAYER 2 | 2.098 | ( 0.384) | | |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.83667 | ( 0.47284) | 133238.078 | 2.03611 |
| CHANGE IN WATER STORAGE | 0.298 | ( 1.3903) | 47452.75 | 0.725 |

≈ 3,669 GPD

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

| | (INCHES) | (CU. FT.) |
|---|---|---|

| | | |
|---|---|---|
| PRECIPITATION | 5.00 | 796240.500 |
| RUNOFF | 3.568 | 568124.4370 |
| PERCOLATION/LEAKAGE THROUGH LAYER 2 | 0.005442 | 866.70349 |
| AVERAGE HEAD ON TOP OF LAYER 2 | 6.000 | |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.007857 | 1251.17651 |
| SNOW WATER | 2.92 | 465063.2190 |

| | |
|---|---|
| MAXIMUM VEG. SOIL WATER (VOL/VOL) | 0.4630 |
| MINIMUM VEG. SOIL WATER (VOL/VOL) | 0.1160 |

**********

**********

FINAL WATER STORAGE AT END OF YEAR 25

| LAYER | (INCHES) | (VOL/VOL) |
|---|---|---|
| 1 | 2.6537 | 0.4423 |
| 2 | 4.2700 | 0.4270 |
| 3 | 17.3289 | 0.3151 |
| 4 | 16.3054 | 0.0881 |
| SNOW WATER | 0.000 | |

**********
**********

# APPENDIX D.3

# GCL COVER APPROACH

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    C:\help3\jen\13968JS.D4
TEMPERATURE DATA FILE:      C:\help3\jen\13968JS.D7
SOLAR RADIATION DATA FILE:  c:\help3\jen\13968JS.D13
EVAPOTRANSPIRATION DATA:    c:\help3\jen\13968JS.D11
SOIL AND DESIGN DATA FILE:  c:\help3\jen\GCL.D10
OUTPUT DATA FILE:           c:\help3\jen\GCL.OUT


TIME:  11:27     DATE:   1/27/2005


******************************************************************************

     TITLE:  MODEL D.3                GCL COVER APPROACH

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4630 VOL/VOL
          FIELD CAPACITY               =      0.2320 VOL/VOL
          WILTING POINT                =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.2052 VOL/VOL
```

```
  EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
         FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 6

| | | | |
|---|---|---|---|
| THICKNESS | = | 12.00 | INCHES |
| POROSITY | = | 0.4530 | VOL/VOL |
| FIELD CAPACITY | = | 0.1900 | VOL/VOL |
| WILTING POINT | = | 0.0850 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.2103 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.720000011000E-03 | CM/SEC |

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

| | | | |
|---|---|---|---|
| THICKNESS | = | 0.30 | INCHES |
| POROSITY | = | 0.8500 | VOL/VOL |
| FIELD CAPACITY | = | 0.0100 | VOL/VOL |
| WILTING POINT | = | 0.0050 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.1723 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 11.8000002000 | CM/SEC |
| SLOPE | = | 12.50 | PERCENT |
| DRAINAGE LENGTH | = | 400.0 | FEET |

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

| | | | |
|---|---|---|---|
| THICKNESS | = | 0.01 | INCHES |
| POROSITY | = | 0.7500 | VOL/VOL |
| FIELD CAPACITY | = | 0.7470 | VOL/VOL |
| WILTING POINT | = | 0.4000 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.7500 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.300000003000E-08 | CM/SEC |

LAYER 5

--------

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 16

| | | |
|---|---|---|
| THICKNESS | = 12.00 | INCHES |
| POROSITY | = 0.4270 | VOL/VOL |
| FIELD CAPACITY | = 0.4180 | VOL/VOL |
| WILTING POINT | = 0.3670 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.4106 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.1000000001000E-06 | CM/SEC |

LAYER 6
--------

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

| | | |
|---|---|---|
| THICKNESS | = 55.00 | INCHES |
| POROSITY | = 0.4640 | VOL/VOL |
| FIELD CAPACITY | = 0.3100 | VOL/VOL |
| WILTING POINT | = 0.1870 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.3100 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.639999998000E-04 | CM/SEC |

LAYER 7
--------

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

| | | |
|---|---|---|
| THICKNESS | = 185.00 | INCHES |
| POROSITY | = 0.4170 | VOL/VOL |
| FIELD CAPACITY | = 0.0450 | VOL/VOL |
| WILTING POINT | = 0.0180 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = 0.0458 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = 0.999999978000E-02 | CM/SEC |

GENERAL DESIGN AND EVAPORATIVE ZONE DATA
---

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 12.% AND A SLOPE LENGTH OF 400. FEET.

| | | |
|---|---|---|
| SCS RUNOFF CURVE NUMBER | = 79.90 | |
| FRACTION OF AREA ALLOWING RUNOFF | = 100.0 | PERCENT |

| | | | |
|---|---|---|---|
| AREA PROJECTED ON HORIZONTAL PLANE | = | 43.870 | ACRES |
| EVAPORATIVE ZONE DEPTH | = | 18.3 | INCHES |
| INITIAL WATER IN EVAPORATIVE ZONE | = | 3.807 | INCHES |
| UPPER LIMIT OF EVAPORATIVE STORAGE | = | 8.469 | INCHES |
| LOWER LIMIT OF EVAPORATIVE STORAGE | = | 1.718 | INCHES |
| INITIAL SNOW WATER | = | 0.000 | INCHES |
| INITIAL WATER IN LAYER MATERIALS | = | 34.260 | INCHES |
| TOTAL INITIAL WATER | = | 34.260 | INCHES |
| TOTAL SUBSURFACE INFLOW | = | 0.00 | INCHES/YEAR |

## EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
EVANSVILLE INDIANA

| | | | |
|---|---|---|---|
| STATION LATITUDE | = | 38.03 | DEGREES |
| MAXIMUM LEAF AREA INDEX | = | 3.00 | |
| START OF GROWING SEASON (JULIAN DATE) | = | 96 | |
| END OF GROWING SEASON (JULIAN DATE) | = | 300 | |
| EVAPORATIVE ZONE DEPTH | = | 18.3 | INCHES |
| AVERAGE ANNUAL WIND SPEED | = | 8.20 | MPH |
| AVERAGE 1ST QUARTER RELATIVE HUMIDITY | = | 70.00 | % |
| AVERAGE 2ND QUARTER RELATIVE HUMIDITY | = | 67.00 | % |
| AVERAGE 3RD QUARTER RELATIVE HUMIDITY | = | 72.00 | % |
| AVERAGE 4TH QUARTER RELATIVE HUMIDITY | = | 54.00 | % |

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 2.99 | 3.02 | 4.58 | 4.08 | 4.37 | 3.50 |
| 3.98 | 3.07 | 2.67 | 2.48 | 3.36 | 3.45 |

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 30.80 | 34.90 | 44.60 | 56.50 | 65.60 | 74.60 |
| 78.10 | 76.20 | 69.40 | 57.30 | 45.10 | 35.60 |

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA
AND STATION LATITUDE = 38.03 DEGREES

**********

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

| | JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|---|
| PRECIPITATION | | | | | | |
| TOTALS | 2.79 | 2.91 | 4.68 | 3.96 | 4.09 | 3.67 |
| | 4.07 | 3.47 | 2.88 | 1.95 | 2.93 | 3.71 |
| STD. DEVIATIONS | 1.78 | 1.31 | 2.01 | 1.71 | 1.66 | 1.58 |
| | 1.88 | 2.42 | 1.55 | 1.05 | 2.07 | 2.17 |
| RUNOFF | | | | | | |
| TOTALS | 0.577 | 1.016 | 0.540 | 0.034 | 0.024 | 0.030 |
| | 0.051 | 0.122 | 0.015 | 0.010 | 0.089 | 0.132 |
| STD. DEVIATIONS | 0.905 | 1.138 | 0.976 | 0.065 | 0.046 | 0.072 |
| | 0.162 | 0.303 | 0.041 | 0.032 | 0.294 | 0.229 |
| EVAPOTRANSPIRATION | | | | | | |
| TOTALS | 0.652 | 0.754 | 2.349 | 3.591 | 4.355 | 3.844 |
| | 3.897 | 3.070 | 2.470 | 1.226 | 1.289 | 1.105 |
| STD. DEVIATIONS | 0.259 | 0.514 | 0.421 | 0.628 | 0.784 | 1.383 |
| | 1.690 | 1.521 | 0.757 | 0.459 | 0.383 | 0.260 |
| LATERAL DRAINAGE COLLECTED FROM LAYER 3 | | | | | | |
| TOTALS | 1.1409 | 0.8639 | 3.0976 | 0.9532 | 0.3722 | 0.1412 |
| | 0.1498 | 0.1003 | 0.1642 | 0.2363 | 0.9772 | 1.5710 |
| STD. DEVIATIONS | 1.5222 | 1.1688 | 1.6099 | 0.8982 | 0.7567 | 0.2819 |
| | 0.4771 | 0.3582 | 0.3085 | 0.5249 | 1.5910 | 1.5026 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | | | | | | |
| TOTALS | 0.0073 | 0.0055 | 0.0185 | 0.0067 | 0.0026 | 0.0010 |
| | 0.0009 | 0.0006 | 0.0011 | 0.0018 | 0.0063 | 0.0103 |
| STD. DEVIATIONS | 0.0085 | 0.0070 | 0.0085 | 0.0053 | 0.0045 | 0.0020 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 0.0029 | 0.0019 | 0.0019 | 0.0037 | 0.0089 | 0.0081 |

PERCOLATION/LEAKAGE THROUGH LAYER 7

| | | | | | | |
|---|---|---|---|---|---|---|
| TOTALS | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0002 | 0.0004 |
| | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0003 | 0.0002 |
| STD. DEVIATIONS | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0002 | 0.0002 |
| | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

| | | | | | | |
|---|---|---|---|---|---|---|
| AVERAGES | 0.0182 | 0.0154 | 0.0497 | 0.0157 | 0.0059 | 0.0023 |
| | 0.0024 | 0.0016 | 0.0027 | 0.0038 | 0.0161 | 0.0250 |
| STD. DEVIATIONS | 0.0242 | 0.0209 | 0.0257 | 0.0148 | 0.0121 | 0.0046 |
| | 0.0076 | 0.0057 | 0.0051 | 0.0084 | 0.0262 | 0.0239 |

**********

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

| | INCHES | | CU. FEET | PERCENT |
|---|---|---|---|---|
| PRECIPITATION | 41.09 | ( 5.495) | 6543760.0 | 100.00 |
| RUNOFF | 2.640 | ( 2.1011) | 420473.03 | 6.426 |
| EVAPOTRANSPIRATION | 28.604 | ( 2.8364) | 4555054.50 | 69.609 |
| LATERAL DRAINAGE COLLECTED FROM LAYER 3 | 9.76784 | ( 3.53290) | 1555509.500 | 23.77088 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.06268 | ( 0.01950) | 9981.453 | 0.15253 |
| AVERAGE HEAD ON TOP OF LAYER 4 | 0.013 | ( 0.005) | | |
| PERCOLATION/LEAKAGE THROUGH LAYER 7 | 0.00351 | ( 0.00106) | 559.458 | 0.00855 |
| CHANGE IN WATER STORAGE | 0.076 | ( 1.3335) | 12162.25 | 0.186 |

**********

≈ 205 GPD

**********

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

| | (INCHES) | (CU. FT.) |
|---|---|---|
| PRECIPITATION | 5.00 | 796240.500 |
| RUNOFF | 2.384 | 379589.6870 |
| DRAINAGE COLLECTED FROM LAYER 3 | 2.27835 | 362822.31200 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.013863 | 2207.63452 |
| AVERAGE HEAD ON TOP OF LAYER 4 | 1.322 | |
| MAXIMUM HEAD ON TOP OF LAYER 4 | 2.212 | |
| LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN) | 0.6 FEET | |
| PERCOLATION/LEAKAGE THROUGH LAYER 7 | 0.000025 | 3.92092 |
| SNOW WATER | 2.92 | 465063.2190 |

| | |
|---|---|
| MAXIMUM VEG. SOIL WATER (VOL/VOL) | 0.3925 |
| MINIMUM VEG. SOIL WATER (VOL/VOL) | 0.0939 |

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

| LAYER | (INCHES) | (VOL/VOL) |
|---|---|---|
| 1 | 1.9310 | 0.3218 |
| 2 | 2.2542 | 0.1879 |
| 3 | 0.0517 | 0.1723 |
| 4 | 0.0075 | 0.7500 |
| 5 | 4.9125 | 0.4094 |
| 6 | 17.0500 | 0.3100 |
| 7 | 9.9627 | 0.0539 |
| SNOW WATER | 0.000 | |

**********
**********

# APPENDIX D.4

# FML COVER APPROACH

```
**********************************************************************
**********************************************************************
**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
**********************************************************************
**********************************************************************



PRECIPITATION DATA FILE:    C:\help3\jen\13968JS.D4
TEMPERATURE DATA FILE:      C:\help3\jen\13968JS.D7
SOLAR RADIATION DATA FILE:  c:\help3\jen\13968JS.D13
EVAPOTRANSPIRATION DATA:    c:\help3\jen\13968JS.D11
SOIL AND DESIGN DATA FILE:  c:\help3\jen\FML.D10
OUTPUT DATA FILE:           c:\help3\jen\FML.OUT


TIME:  11:18     DATE:   1/27/2005



**********************************************************************

     TITLE:  MODEL D.4             FML COVER APPROACH

**********************************************************************



     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.



                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4630 VOL/VOL
          FIELD CAPACITY               =      0.2320 VOL/VOL
          WILTING POINT                =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.2030 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.20
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 6

| | | | |
|---|---|---|---|
| THICKNESS | = | 18.00 | INCHES |
| POROSITY | = | 0.4530 | VOL/VOL |
| FIELD CAPACITY | = | 0.1900 | VOL/VOL |
| WILTING POINT | = | 0.0850 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.2279 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.720000011000E-03 | CM/SEC |

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

| | | | |
|---|---|---|---|
| THICKNESS | = | 0.20 | INCHES |
| POROSITY | = | 0.8500 | VOL/VOL |
| FIELD CAPACITY | = | 0.0100 | VOL/VOL |
| WILTING POINT | = | 0.0050 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.0210 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 10.0000000000 | CM/SEC |
| SLOPE | = | 12.50 | PERCENT |
| DRAINAGE LENGTH | = | 400.0 | FEET |

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 37

| | | | |
|---|---|---|---|
| THICKNESS | = | 0.01 | INCHES |
| POROSITY | = | 0.0000 | VOL/VOL |
| FIELD CAPACITY | = | 0.0000 | VOL/VOL |
| WILTING POINT | = | 0.0000 | VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.0000 | VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.199999999000E-10 | CM/SEC |
| FML PINHOLE DENSITY | = | 1.00 | HOLES/ACRE |
| FML INSTALLATION DEFECTS | = | 2.00 | HOLES/ACRE |
| FML PLACEMENT QUALITY | = | 3 - GOOD | |

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 16

| | | |
|---|---|---|
| THICKNESS | = | 24.00 INCHES |
| POROSITY | = | 0.4270 VOL/VOL |
| FIELD CAPACITY | = | 0.4180 VOL/VOL |
| WILTING POINT | = | 0.3670 VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.4094 VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.100000001000E-06 CM/SEC |

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

| | | |
|---|---|---|
| THICKNESS | = | 55.00 INCHES |
| POROSITY | = | 0.4640 VOL/VOL |
| FIELD CAPACITY | = | 0.3100 VOL/VOL |
| WILTING POINT | = | 0.1870 VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.3100 VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.639999998000E-04 CM/SEC |

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

| | | |
|---|---|---|
| THICKNESS | = | 185.00 INCHES |
| POROSITY | = | 0.4170 VOL/VOL |
| FIELD CAPACITY | = | 0.0450 VOL/VOL |
| WILTING POINT | = | 0.0180 VOL/VOL |
| INITIAL SOIL WATER CONTENT | = | 0.0461 VOL/VOL |
| EFFECTIVE SAT. HYD. COND. | = | 0.999999978000E-02 CM/SEC |

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 12.% AND A SLOPE LENGTH OF 400. FEET.

| | | | |
|---|---|---|---|
| SCS RUNOFF CURVE NUMBER | = | 79.90 | |
| FRACTION OF AREA ALLOWING RUNOFF | = | 100.0 | PERCENT |
| AREA PROJECTED ON HORIZONTAL PLANE | = | 43.870 | ACRES |
| EVAPORATIVE ZONE DEPTH | = | 21.0 | INCHES |
| INITIAL WATER IN EVAPORATIVE ZONE | = | 4.577 | INCHES |
| UPPER LIMIT OF EVAPORATIVE STORAGE | = | 9.573 | INCHES |
| LOWER LIMIT OF EVAPORATIVE STORAGE | = | 1.971 | INCHES |
| INITIAL SNOW WATER | = | 0.000 | INCHES |
| INITIAL WATER IN LAYER MATERIALS | = | 40.729 | INCHES |
| TOTAL INITIAL WATER | = | 40.729 | INCHES |
| TOTAL SUBSURFACE INFLOW | = | 0.00 | INCHES/YEAR |

## EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
EVANSVILLE INDIANA

| | | |
|---|---|---|
| STATION LATITUDE | = | 38.03 DEGREES |
| MAXIMUM LEAF AREA INDEX | = | 3.00 |
| START OF GROWING SEASON (JULIAN DATE) | = | 96 |
| END OF GROWING SEASON (JULIAN DATE) | = | 300 |
| EVAPORATIVE ZONE DEPTH | = | 21.0 INCHES |
| AVERAGE ANNUAL WIND SPEED | = | 8.20 MPH |
| AVERAGE 1ST QUARTER RELATIVE HUMIDITY | = | 70.00 % |
| AVERAGE 2ND QUARTER RELATIVE HUMIDITY | = | 67.00 % |
| AVERAGE 3RD QUARTER RELATIVE HUMIDITY | = | 72.00 % |
| AVERAGE 4TH QUARTER RELATIVE HUMIDITY | = | 54.00 % |

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 2.99 | 3.02 | 4.58 | 4.08 | 4.37 | 3.50 |
| 3.98 | 3.07 | 2.67 | 2.48 | 3.36 | 3.45 |

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|
| 30.80 | 34.90 | 44.60 | 56.50 | 65.60 | 74.60 |
| 78.10 | 76.20 | 69.40 | 57.30 | 45.10 | 35.60 |

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EVANSVILLE INDIANA
AND STATION LATITUDE = 38.03 DEGREES

**********

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

| | JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---|---|---|---|---|---|---|
| PRECIPITATION | | | | | | |
| TOTALS | 2.79 | 2.91 | 4.68 | 3.96 | 4.09 | 3.67 |
| | 4.07 | 3.47 | 2.88 | 1.95 | 2.93 | 3.71 |
| STD. DEVIATIONS | 1.78 | 1.31 | 2.01 | 1.71 | 1.66 | 1.58 |
| | 1.88 | 2.42 | 1.55 | 1.05 | 2.07 | 2.17 |
| RUNOFF | | | | | | |
| TOTALS | 0.557 | 0.981 | 0.530 | 0.034 | 0.024 | 0.029 |
| | 0.050 | 0.122 | 0.014 | 0.010 | 0.089 | 0.132 |
| STD. DEVIATIONS | 0.866 | 1.113 | 0.958 | 0.064 | 0.047 | 0.070 |
| | 0.159 | 0.305 | 0.040 | 0.031 | 0.293 | 0.225 |
| EVAPOTRANSPIRATION | | | | | | |
| TOTALS | 0.649 | 0.748 | 2.330 | 3.571 | 4.538 | 4.044 |
| | 3.927 | 3.088 | 2.496 | 1.213 | 1.223 | 1.076 |
| STD. DEVIATIONS | 0.256 | 0.506 | 0.416 | 0.622 | 0.739 | 1.459 |
| | 1.740 | 1.522 | 0.793 | 0.425 | 0.386 | 0.273 |
| LATERAL DRAINAGE COLLECTED FROM LAYER 3 | | | | | | |
| TOTALS | 1.2320 | 0.8710 | 3.0778 | 1.1448 | 0.5392 | 0.1848 |
| | 0.1099 | 0.0368 | 0.0828 | 0.2089 | 0.7416 | 1.3781 |
| STD. DEVIATIONS | 1.5117 | 1.1438 | 1.5393 | 0.9455 | 0.8637 | 0.3590 |
| | 0.4159 | 0.1051 | 0.3233 | 0.5983 | 1.3939 | 1.4113 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | | | | | | |
| TOTALS | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| STD. DEVIATIONS | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **PERCOLATION/LEAKAGE THROUGH LAYER 7** | | | | | | |
| TOTALS | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| STD. DEVIATIONS | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

| | | | | | | |
|---|---|---|---|---|---|---|
| **DAILY AVERAGE HEAD ON TOP OF LAYER 4** | | | | | | |
| AVERAGES | 0.0023 | 0.0040 | 0.0091 | 0.0022 | 0.0010 | 0.0004 |
| | 0.0002 | 0.0001 | 0.0002 | 0.0004 | 0.0014 | 0.0025 |
| STD. DEVIATIONS | 0.0028 | 0.0121 | 0.0117 | 0.0018 | 0.0016 | 0.0007 |
| | 0.0008 | 0.0002 | 0.0006 | 0.0011 | 0.0027 | 0.0026 |

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

| | INCHES | | CU. FEET | PERCENT |
|---|---|---|---|---|
| PRECIPITATION | 41.09 | ( 5.495) | 6543760.0 | 100.00 |
| RUNOFF | 2.572 | ( 2.0536) | 409630.19 | 6.260 |
| EVAPOTRANSPIRATION | 28.903 | ( 2.8603) | 4602813.50 | 70.339 |
| LATERAL DRAINAGE COLLECTED FROM LAYER 3 | 9.60763 | ( 3.58717) | 1529996.750 | 23.38100 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.00014 | ( 0.00003) | 21.562 | 0.00033 |
| AVERAGE HEAD ON TOP OF LAYER 4 | 0.002 | ( 0.001) | | |
| PERCOLATION/LEAKAGE THROUGH LAYER 7 | 0.00207 | ( 0.00213) | 329.168 | 0.00503 |
| CHANGE IN WATER STORAGE | 0.006 | ( 1.4466) | 989.08 | 0.015 |

**********

≈ 0.5 GPD

**********

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

| | (INCHES) | (CU. FT.) |
|---|---|---|
| PRECIPITATION | 5.00 | 796240.500 |
| RUNOFF | 2.338 | 372245.2810 |
| DRAINAGE COLLECTED FROM LAYER 3 | 1.79679 | 286135.56200 |
| PERCOLATION/LEAKAGE THROUGH LAYER 4 | 0.000125 | 19.84023 |
| AVERAGE HEAD ON TOP OF LAYER 4 | 1.796 | |
| MAXIMUM HEAD ON TOP OF LAYER 4 | 1.822 | |
| LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN) | 0.0 FEET | |
| PERCOLATION/LEAKAGE THROUGH LAYER 7 | 0.000028 | 4.51801 |
| SNOW WATER | 2.92 | 465063.2190 |

| | |
|---|---|
| MAXIMUM VEG. SOIL WATER (VOL/VOL) | 0.3933 |
| MINIMUM VEG. SOIL WATER (VOL/VOL) | 0.0939 |

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

| LAYER | (INCHES) | (VOL/VOL) |
|---|---|---|
| 1 | 1.9080 | 0.3180 |
| 2 | 3.6170 | 0.2009 |
| 3 | 0.0022 | 0.0112 |
| 4 | 0.0000 | 0.0000 |
| 5 | 9.8250 | 0.4094 |
| 6 | 17.0500 | 0.3100 |
| 7 | 8.4824 | 0.0459 |
| SNOW WATER | 0.000 | |

**********
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# APPENDIX E

# SOIL EXCAVATION IMPLEMENTABILITY ASSESSMENT

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FIGURE E.2 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (5 – 10 FEET BGS, ≥ 50 mg/kg PCBs)

FIGURE E.3 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (10 – 15 FEET BGS, ≥ 50 mg/kg PCBs)

FIGURE E.4 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (15 – 20 FEET BGS, ≥ 50 mg/kg PCBs)

FIGURE E.5 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (20 – 25 FEET BGS, ≥ 50 mg/kg PCBs)

FIGURE E.6 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (25 – 40 FEET BGS, ≥ 50 mg/kg PCBs)

FIGURE E.7 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (0 – 5 FEET BGS, ≥ 500 mg/kg PCBs)

FIGURE E.8 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (5 – 10 FEET BGS, ≥ 500 mg/kg PCBs)

FIGURE E.9 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (10 – 15 FEET BGS, ≥ 500 mg/kg PCBs)

FIGURE E.10 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (15 – 20 FEET BGS, ≥ 500 mg/kg PCBs)

FIGURE E.11 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (20 – 25 FEET BGS, ≥ 500 mg/kg PCBs)

FIGURE E.12 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (0 – 5 FEET BGS, ≥ 1500 mg/kg PCBs)

FIGURE E.13 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (5 – 10 FEET BGS, ≥ 1500 mg/kg PCBs)

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FIGURE E.14 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (10 – 15 FEET BGS, ≥ 1500 mg/kg PCBs)

FIGURE E.15 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (15 – 20 FEET BGS, ≥ 1500 mg/kg PCBs)

FIGURE E.16 SCENARIO 1 – IMPLEMENTABILITY ASSESSMENT (20 – 25 FEET BGS, ≥ 1500 mg/kg PCBs)

FIGURE E.17 SCENARIO 2 – IMPLEMENTABILITY ASSESSMENT (0 – 2 FEET BGS, ≥ 50 mg/kg PCBs)

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ATTACHMENT E.1 CALCULATIONS OF VOLUMES CORRECTIONS

ATTACHMENT E.2 DIAGRAM OF VOLUME CORRECTIONS

# LIST OF ACRONYMS

| | |
|---|---|
| bgs | below ground surface |
| CRA | Conestoga-Rovers & Associates, Inc. |
| ft | foot/feet |
| IM | Interim Measures |
| mg/kg | milligrams per kilogram |
| PCB | Polychlorinated Biphenyl |
| PCB Volume Assessment | Assessment of Volumes of PCB-Impacted Media – East Plant Area |
| RA | Removal Action |
| S/S | solidification/stabilization |

# 1.0 VOLUME ASSESSMENT OF PCB-IMPACTED MEDIA

## 1.1 PCB-IMPACTED VOLUME ESTIMATE SCENARIOS

Conestoga-Rovers & Associates, Inc. (CRA) previously prepared the Assessment of Volumes of Polychlorinated Biphenyl (PCB)-Impacted Media – East Plant Area (PCB Volume Assessment), as presented in Appendix A of the Interim Measures (IM) Alteranatives Review Report (CRA, April 2005), in which PCB-impacted volume estimates were developed in for the following scenarios:

Scenario 1: 0 feet (ft) to the top of bedrock;

Scenario 2: 0-2 ft depth (below ground surface (bgs));

Scenario 3: 0-10 ft in depth (bgs); and

Scenario 4: 0-15 ft in depth (bgs).

PCB-impacted volume estimates were developed for PCB concentrations of 1.8 milligrams per kilogram (mg/kg), 5.3 mg/kg, 7.4 mg/kg, 25 mg/kg, 50 mg/kg, 100 mg/kg, 500 mg/kg, and 1,500 mg/kg.

The current project database was queried for all data within the East Plant Area. The data utilized to compute the volume of PCB-impacted media is summarized in the PCB Volume Assessment (Appendix A). Further details concerning the development of the PCB isoconcentration contours are presented in the PCB Volume Assessment (Appendix A).

## 1.2 EXCAVATION VOLUME ASSESSMENT

The purpose of this Soil Excavation Implementability Assessment is to evaluate the overall volume of excavation required (overburden vs impacted media) to remove the calculated volume of PCB-impacted media based on the PCB Volume Assessment (Appendix A).

Several (IM alternatives discussed in Section 6.0 of the IM Alternative Review Report (CRA , April 2005) refer to the potential excavation and/or solidification/stabilization (S/S) of PCBs exceeding the following concentration levels:

- 50 mg/kg PCBs;
- 500 mg/kg PCBs; and
- 1,500 mg/kg PCBs.

This evaluation determines the overall volume of soil that requires excavation to remove the estimated volume of PCB-impacted materials, as well as the associated volumes of un-impacted or low-level PCB-impacted material ("Clean Soil") that have to be excavated, stockpiled, re-placed, compacted, and regraded following excavation of material exceeding the specified PCB concentration. This evaluation assumes traditional open cut excavations. It should be noted that alternative means to support impacted soil excavation may be required in areas close to structures, utilities, or the Stormwater Lagoon.

The excavation requirements for the three potential PCB concentrations discussed in the IM Alternatives Review Report (CRA, April 2005) are organized by the following scenarios:

Scenario 1: 0 ft to the top of bedrock;

Scenario 2: 0-2 ft depth (below ground surface (bgs));

Scenario 3: 0-10 ft in depth (bgs); and

Scenario 4: 0-15 ft in depth (bgs).

# 2.0 EVALUATION OF EXCAVATION VOLUMES

## 2.1 CALCULATION METHODOLOGY

Figures E.1 through E.19 present the total area by PCB isoconcentration for each associated 5 ft bgs depth layer (except for Scenario 2 that used a 2 ft layer). These areas are assumed to be the horizontal boundary for the entire elevation interval.

As stated in Appendix B of the IM Alternatives Review Report (CRA, April 2005) the required side slopes is 3 horizontal to 1 vertical (3:1). This slope requirement is necessary to maintain slope stability, otherwise engineer-designed shoring (or alternative construction means) will be necessary.

Considering the 3:1 slope requirements, the various depths were evaluated to calculate the volumes of soil required to be excavated to access the PCB-impacted media as part of the soil excavation and/or S/S activities.

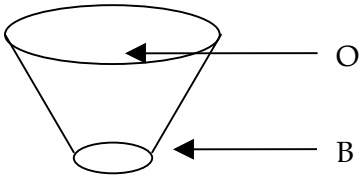
For each depth interval the actual PCB-impacted isoconcentration contours developed in the PCB Volume Assessment (Appendix A) were used as the bottom area or base area. These base areas are enclosed in offset areas which represent the excavation limits at ground surface accounting for appropriate sloping of excavation sides (3:1) based on anticipated soil conditions and associated depths. To calculate the volume of media to be removed, the trapezoidal rule was implemented using both the offset area and the base area, then multiplied by the depth.

$$A = \frac{(O + B)}{2}$$

Where:
A = area

O = offset area at ground surface (0 bgs)

B = base area at depth




O = Offset Area

B = Base Area

To account for overlapping areas of excavation, the calculated volumes of deeper excavations were reduced by the volume of material which overlapped from shallower

excavations, eliminating double counting. The volume corrections to eliminate double counting of excavation volumes are included in Attachment E.1. The calculations are presented in the following form:

V(deeper excavation) = A(deeper excavation)d(depth) –A(shallower overlapping areas)d(depth).

The volume of the desired excavation at the desired depth was calculated by multiplying the trapezoidal area by the depth. By overlapping the PCB isoconcentration figures, the percentage to which the excavation areas overlapped was estimated visually. The volume was calculated by multiplying the percentage of overlapped areas by their associated depths. In the case where two excavations at higher depth intervals overlapped each other in addition to the desired base area, the percentage of the area at the highest elevation was considered the portion that overlapped only the desired base area, as presented in Attachment E.2.

These volumes are added up by PCB isoconcentration to determine the total volumes to be removed within the East Plant Area.

## 2.2 REMOVAL ACTION SCENARIOS

### 2.2.1 SCENARIO 1: 0 FEET TO TOP OF BEDROCK

The PCB data for the ground surface to top of bedrock depth interval for the PCB concentrations of 50 mg/kg, 500 mg/kg, and 1,500 mg/kg are presented and contoured on Figures E.1 through E.16. The following presents a summary of the PCB-impacted media between ground surface and the top of bedrock depth interval. Table E.1 presents the calculation of areas, volumes, and volume conversions of media for excavation within the East Plant Area. Table E.2 presents a summary of volumes and tonnage ranges, as well as the volumes of PCB-impacted media and the amount of clean soil that would be removed.

The following presents a summary of PCB-impacted media for Scenario 1 within the East Plant Area.

| | PCB-Impacted Soil (1) | | Excavation Required (2) | | Clean Soil (3) | |
|---|---|---|---|---|---|---|
| PCB Concentration | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) |
| 50 mg/kg | 129,415 | 181,181 | 228,624 | 320,074 | 99,209 | 138,893 |
| 500 mg/kg | 37,274 | 52,184 | 87,325 | 122,255 | 50,051 | 70,071 |
| 1,500 mg/kg | 9,772 | 13,681 | 35,030 | 49,042 | 25,258 | 35,361 |

Notes:

(1) Based on calculations in the PCB Volume Assessment (Appendix A).

(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and temporary relocation to support removal of PCB-impacted soils.

### 2.2.2 SCENARIO 2: 0-2 FOOT DEPTH (BGS)

The PCB data for the 0-2 ft depth interval for the PCB concentrations of 50 mg/kg, 500 mg/kg, and 1,500 mg/kg are presented and contoured on Figures E.17, E.18, and E.19, respectively. The following presents a summary of the PCB-impacted media within the 0-2 ft depth interval. Table E.3 presents the calculation of areas, volumes, and associated conversions. Table E.4 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 2 within the East Plant Area.

| | PCB-Impacted Soil (1) | | Excavation Required (2) | | Clean Soil (3) | |
|---|---|---|---|---|---|---|
| PCB Concentration | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) |
| 50 mg/kg | 8,061 | 11,285 | 8,963 | 12,548 | 902 | 1,263 |
| 500 mg/kg | 2,345 | 3,283 | 2,673 | 3,742 | 328 | 459 |
| 1,500 mg/kg | 618 | 865 | 759 | 1,063 | 141 | 197 |

Notes:

(1) Based on calculations the PCB Volume Assessment (Appendix A).

(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and temporary relocation to support removal of PCB-impacted soils.

### 2.2.3 SCENARIO 3: 0-10 FOOT DEPTH (BGS)

The PCB data for the 0-10 ft depth interval is presented as part of Scenario 1 and consists of Figures E.1, E.2, E.7, E.8, E.12, and E.13. The following presents a summary of the PCB-impacted media within the 0-10 ft depth interval. Table E.5 presents the calculation of areas, volumes, and associated conversions. Table E.6 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 3 within the East Plant Area.

| | PCB-Impacted Soil (1) | | Excavation Required (2) | | Clean Soil (3) | |
|---|---|---|---|---|---|---|
| PCB Concentration | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) |
| 50 mg/kg | 46,821 | 65,549 | 89,096 | 124,734 | 42,275 | 59,185 |
| 500 mg/kg | 14,379 | 20,130 | 28,764 | 40,270 | 14,385 | 20,140 |
| 1,500 mg/kg | 4,955 | 6,936 | 12,265 | 17,172 | 7,311 | 10,235 |

Notes:

(1) Based on calculations in PCB Volume Assessment (Appendix A).

(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and temporary relocation to support removal of PCB-impacted soils.

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### 2.2.4 SCENARIO 4: 0-15 FOOT DEPTH (BGS)

The PCB data for the 0-15 ft depth interval is presented as part of Scenario 1 and consists of Figures E.1, E.2, E.3, E.7, E.8, E.9, E.12, E.13, and E.14. The following presents a summary of the PCB-impacted media within the 0-15 ft depth interval. Table E.7 presents the calculation of areas, volumes, and associated conversions. Table E.8 presents a summary of volumes and tonnage ranges.

The following presents a summary of PCB-impacted media for Scenario 4 within the East Plant Area.

| | PCB-Impacted Soil (1) | | Excavation Required (2) | | Clean Soil (3) | |
|---|---|---|---|---|---|---|
| PCB Concentration | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) | Volume (cubic yards) | Tonnage (tons) |
| 50 mg/kg | 58,096 | 81,335 | 130,489 | 182,685 | 72,393 | 101,350 |
| 500 mg/kg | 17,308 | 24,231 | 44,775 | 62,685 | 27,467 | 38,454 |
| 1,500 mg/kg | 5,064 | 7,090 | 15,498 | 21,698 | 10,434 | 14,608 |

Notes:

(1) Based on calculations in PCB Volume Assessment (Appendix A).

(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and temporary relocation to support removal of PCB-impacted soils.

## 3.0 PCB-IMPACTED MEDIA SUMMARY

Table E.9 presents a summary of the four scenarios and the volumes of PCB-impacted media, volumes of excavation required, and volumes of clean soil to be removed in the process.

The following presents a summary (by tons) of the four scenarios.

| | *PCB-Impacted Soil* [1] | *Excavation Required* [2] | *Clean Soil* [3] |
|---|---|---|---|
| **Scenario 1 (Any Depth)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 181,181 | 320,074 | 138,893 |
| 500 mg/kg | 52,184 | 122,255 | 70,071 |
| 1,500 mg/kg | 13,681 | 49,042 | 35,361 |
| **Scenario 2 (0-2 ft)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 11,285 | 12,548 | 1,263 |
| 500 mg/kg | 3,283 | 3,742 | 459 |
| 1,500 mg/kg | 865 | 1,063 | 197 |
| **Scenario 3 (0-10 ft)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 65,549 | 124,734 | 59,185 |
| 500 mg/kg | 20,130 | 40,270 | 20,140 |
| 1,500 mg/kg | 6,936 | 17,172 | 10,235 |
| **Scenario 4 (0-15 ft)** | | | |
| PCB Concentration | Tonnage (tons) | Tonnage (tons) | Tonnage (tons) |
| 50 mg/kg | 81,335 | 182,685 | 101,350 |
| 500 mg/kg | 24,231 | 62,685 | 38,454 |
| 1,500 mg/kg | 7,090 | 21,698 | 14,608 |

Notes:

(1) Based on calculations in PCB Volume Assessment (Appendix A).

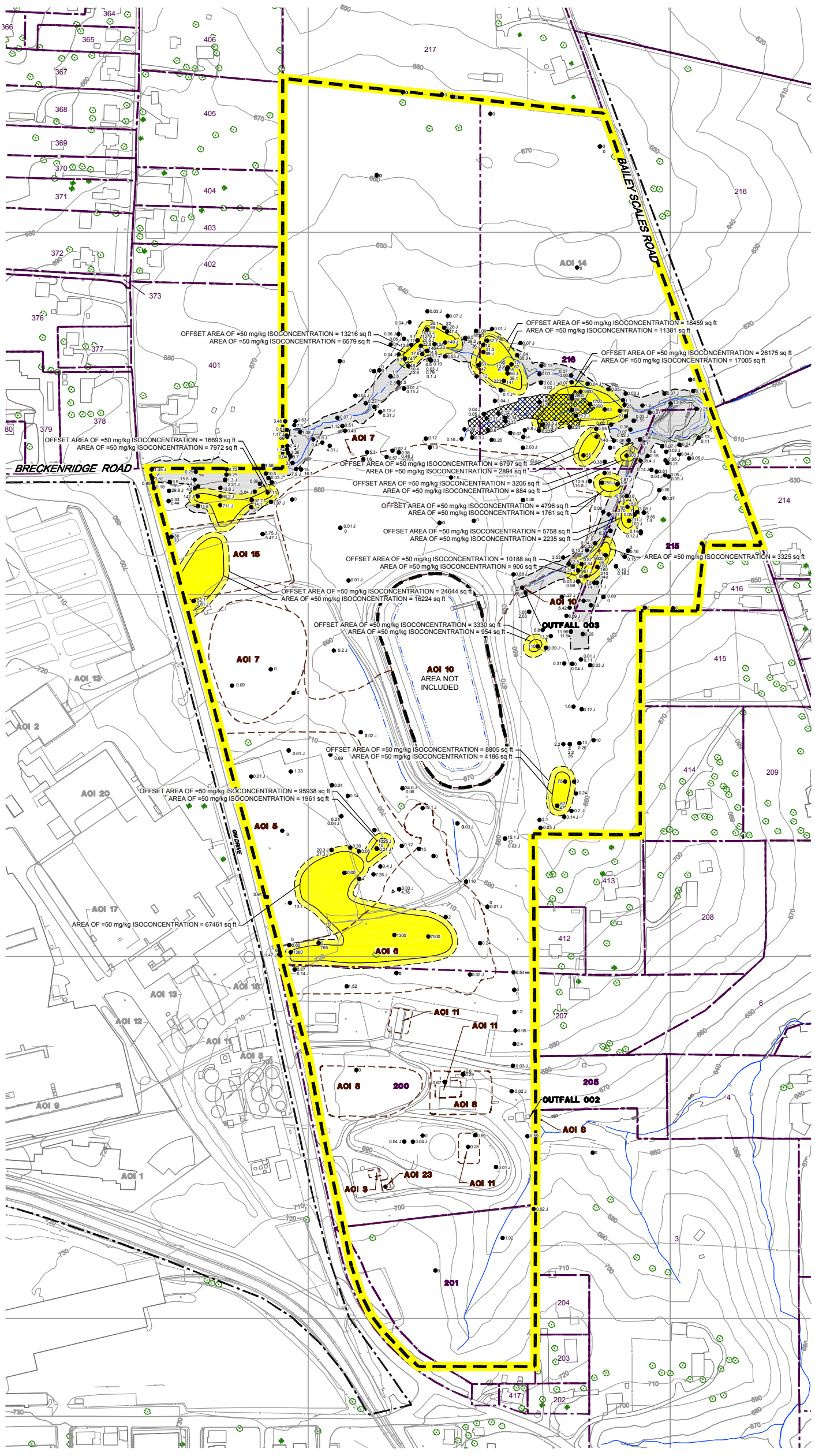
(2) Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.

(3) Volume of low/non-PCB-impacted soil requiring excavation and temporary relocation to support removal of PCB-impacted soils.

## REFERENCES

CRA, Upstream Parcels Removal Action Work Plan, 13968(30), July 2003.

CRA, Interim Measures Alternatives Review Report, 13968(151), April, 2005.




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =50 mg/kg ISOCONCENTRATION
- OFFSET OF =50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF =50 mg/kg ISOCONCENTRATION = 238005 sq ft
   TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 145727 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

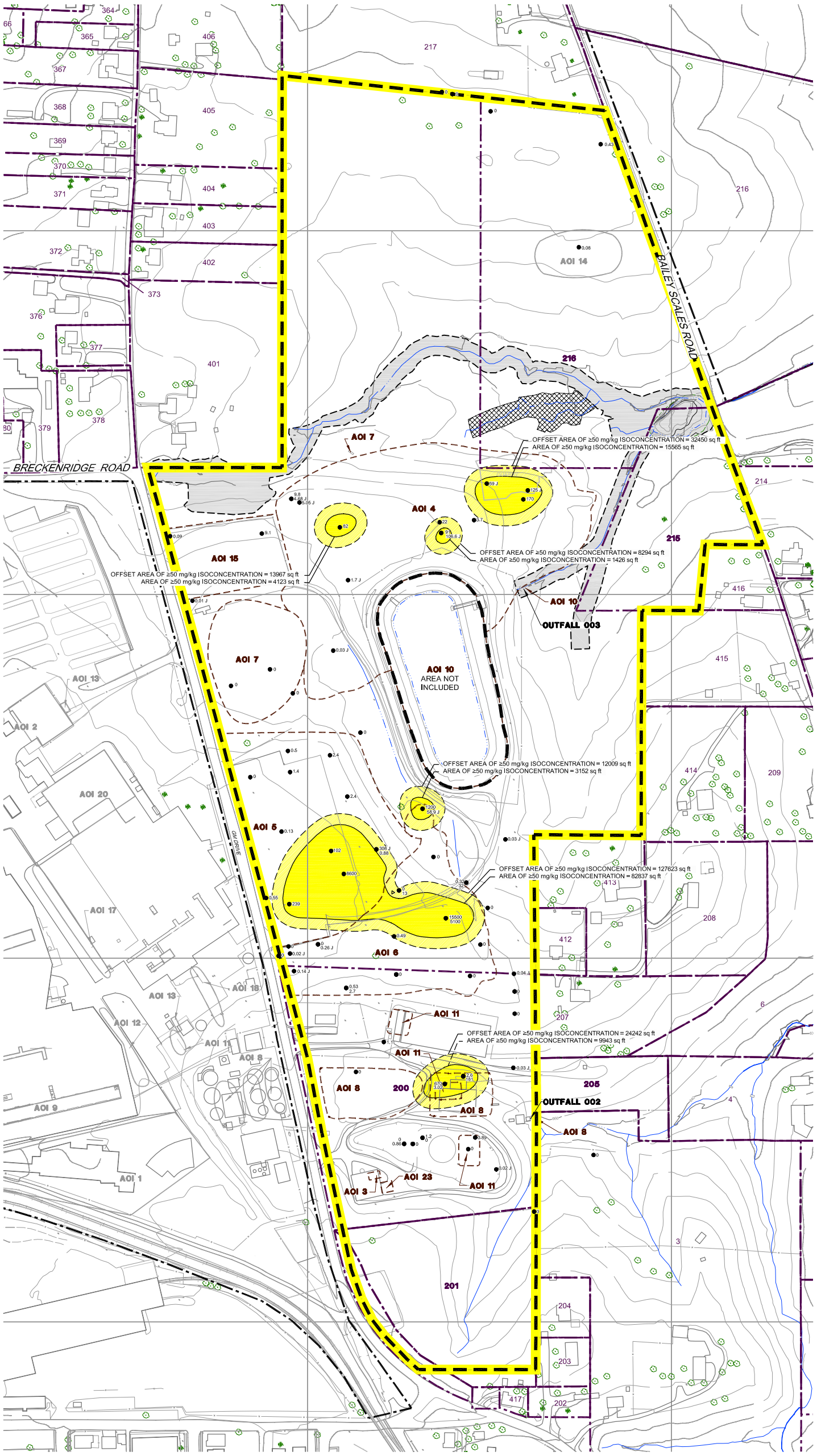
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(0-5 FEET BGS, =50 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.1 |

13968-00(151)GN-WA057 APR 06/2005




NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥50 mg/kg ISOCONCENTRATION = 218586 sq ft
   TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 117046 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

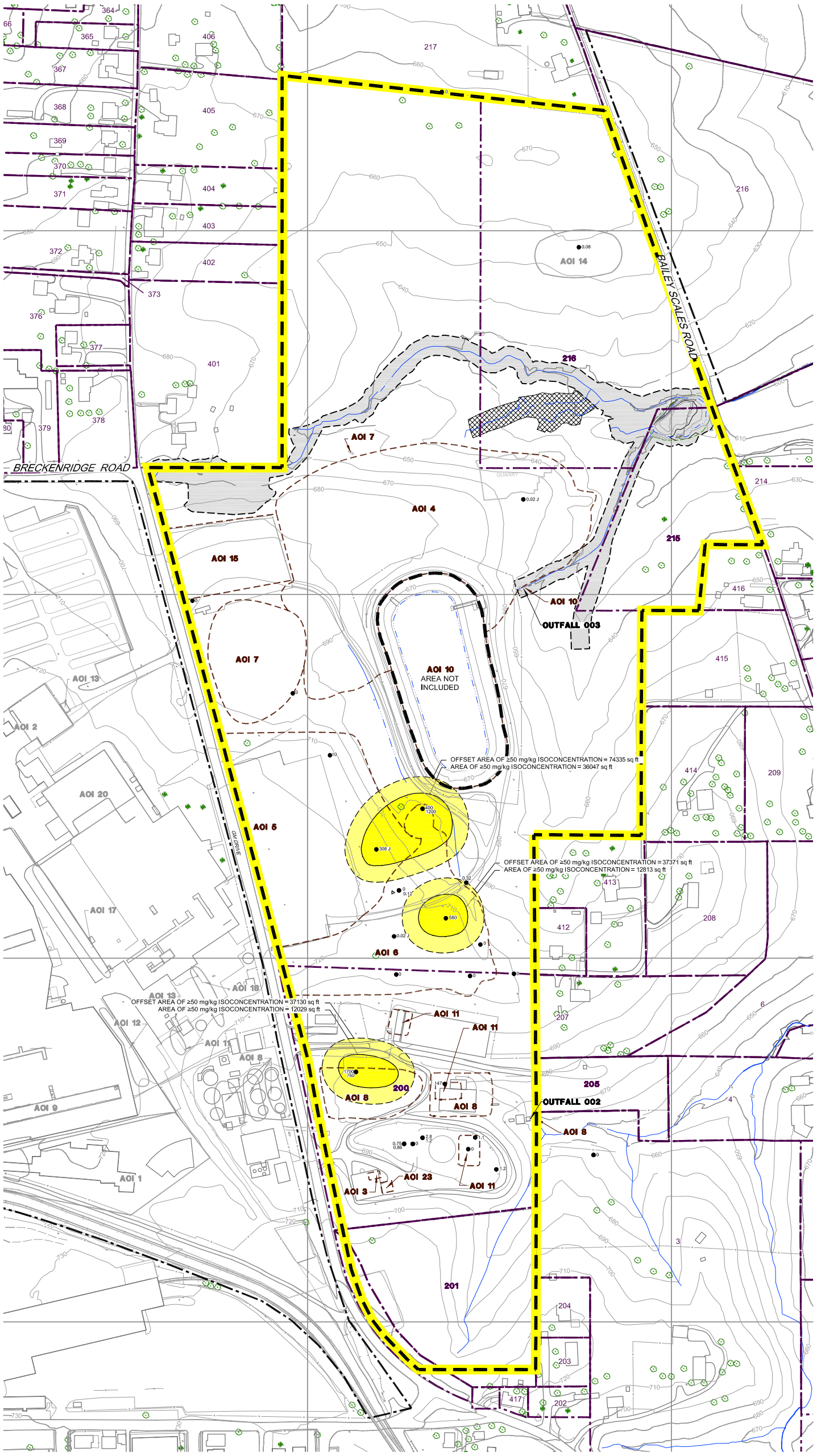
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(5-10 FEET BGS, ≥50 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No: 13968-00 | Report No: 151 | Drawing No: figure E.2 |

13968-00(151)GN-WA058 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- OFFSET OF ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥50 mg/kg ISOCONCENTRATION = 148836 sq ft
   TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 60889 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

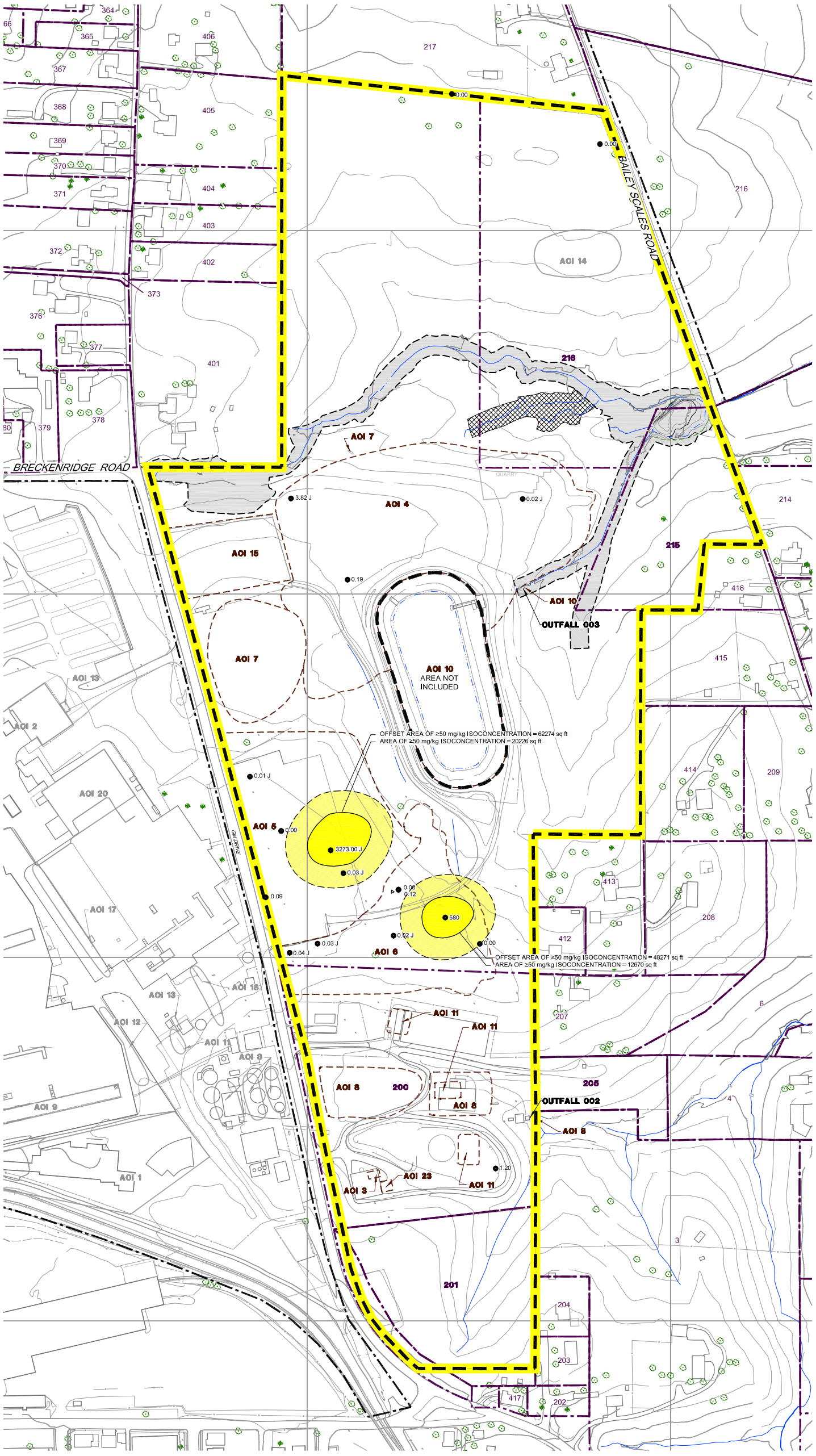
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (10-15 FEET BGS, ≥50 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No: 13968-00 | Report No: 151 | Drawing No: figure E.3 |

13968-00(151)GN-WA059 APR 06/2005




NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥50 mg/kg ISOCONCENTRATION = 110545 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 32896 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

## IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

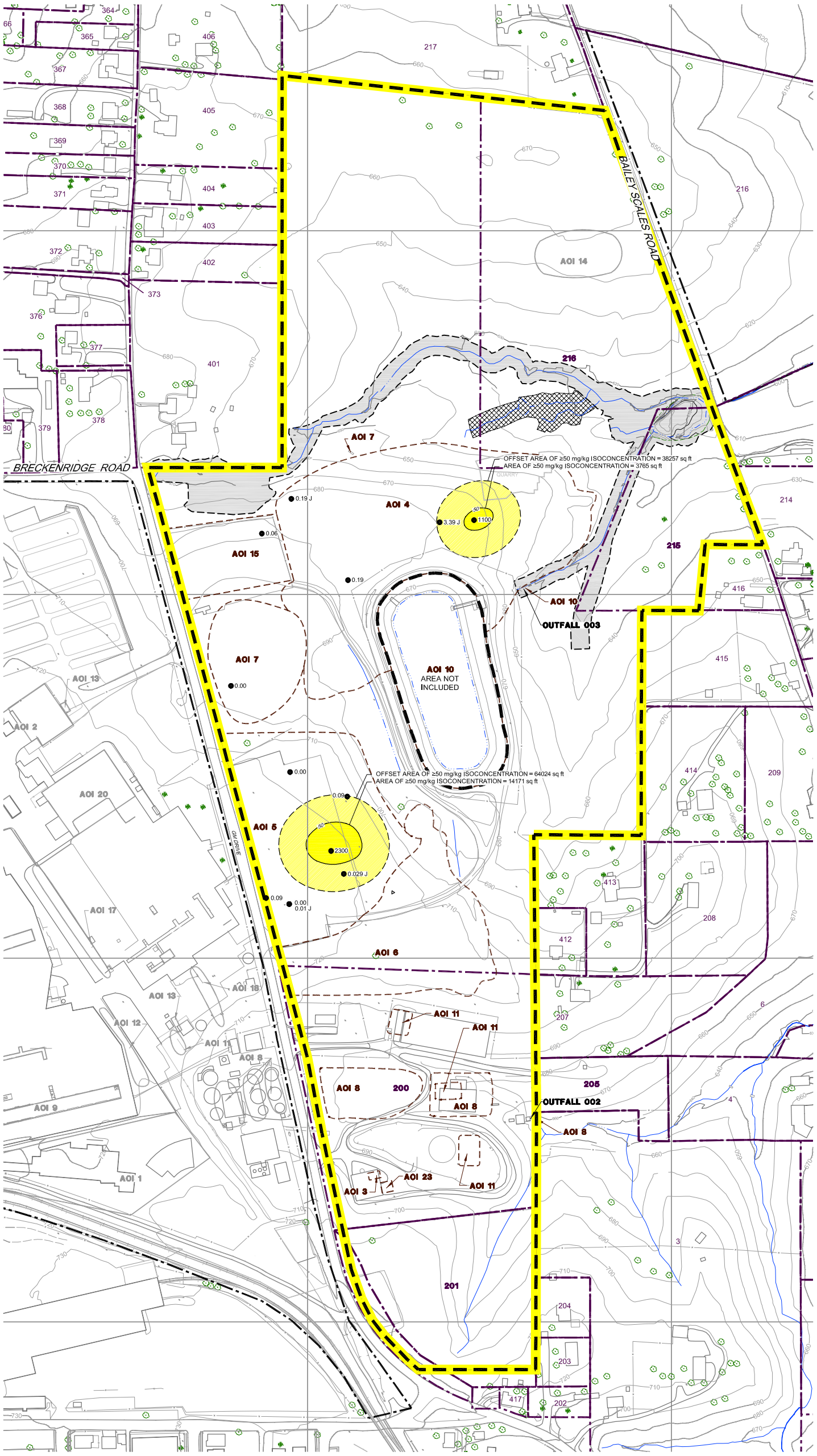
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (15-20 FEET BGS, ≥50 mg/kg PCBs)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure E.4 |

13968-00(151)GN-WA060 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- OFFSET OF ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥50 mg/kg ISOCONCENTRATION = 102281 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 17936 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

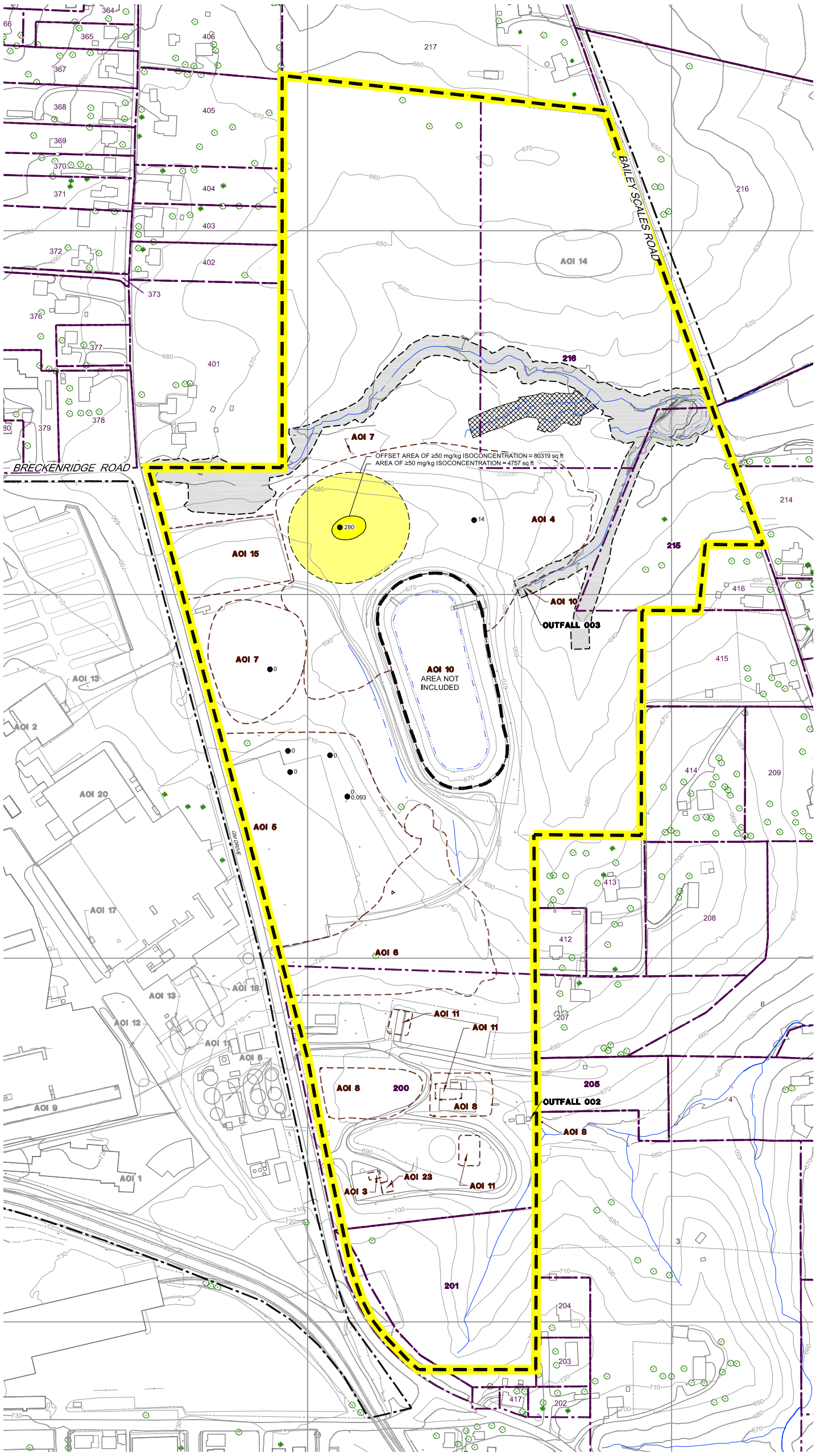
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (20-25 FEET BGS, ≥50 mg/kg PCBs)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure E.5 |

13968-00(151)GN-WA061 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- OFFSET OF ≥50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥50 mg/kg ISOCONCENTRATION = 80319 sq ft
TOTAL AREA OF ≥50 mg/kg ISOCONCENTRATION = 4757 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

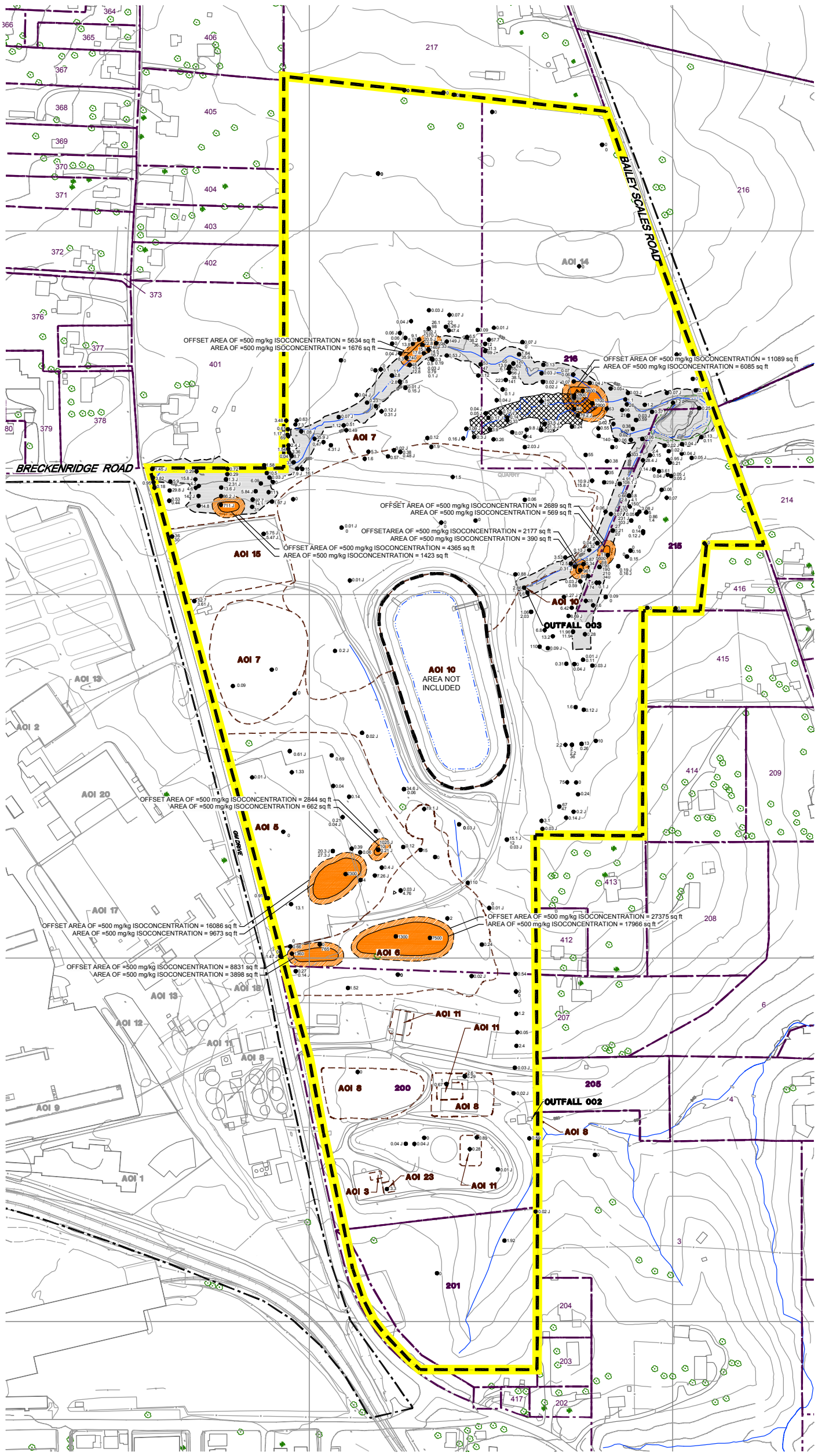
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(25-40 FEET BGS, ≥50 mg/kg PCBs)

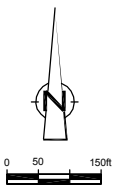
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.6 |

13968-00(151)GN-WA062 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =500 mg/kg ISOCONCENTRATION
- OFFSET OF =500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF =500 mg/kg ISOCONCENTRATION = 81089 sq ft
   TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 42342 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

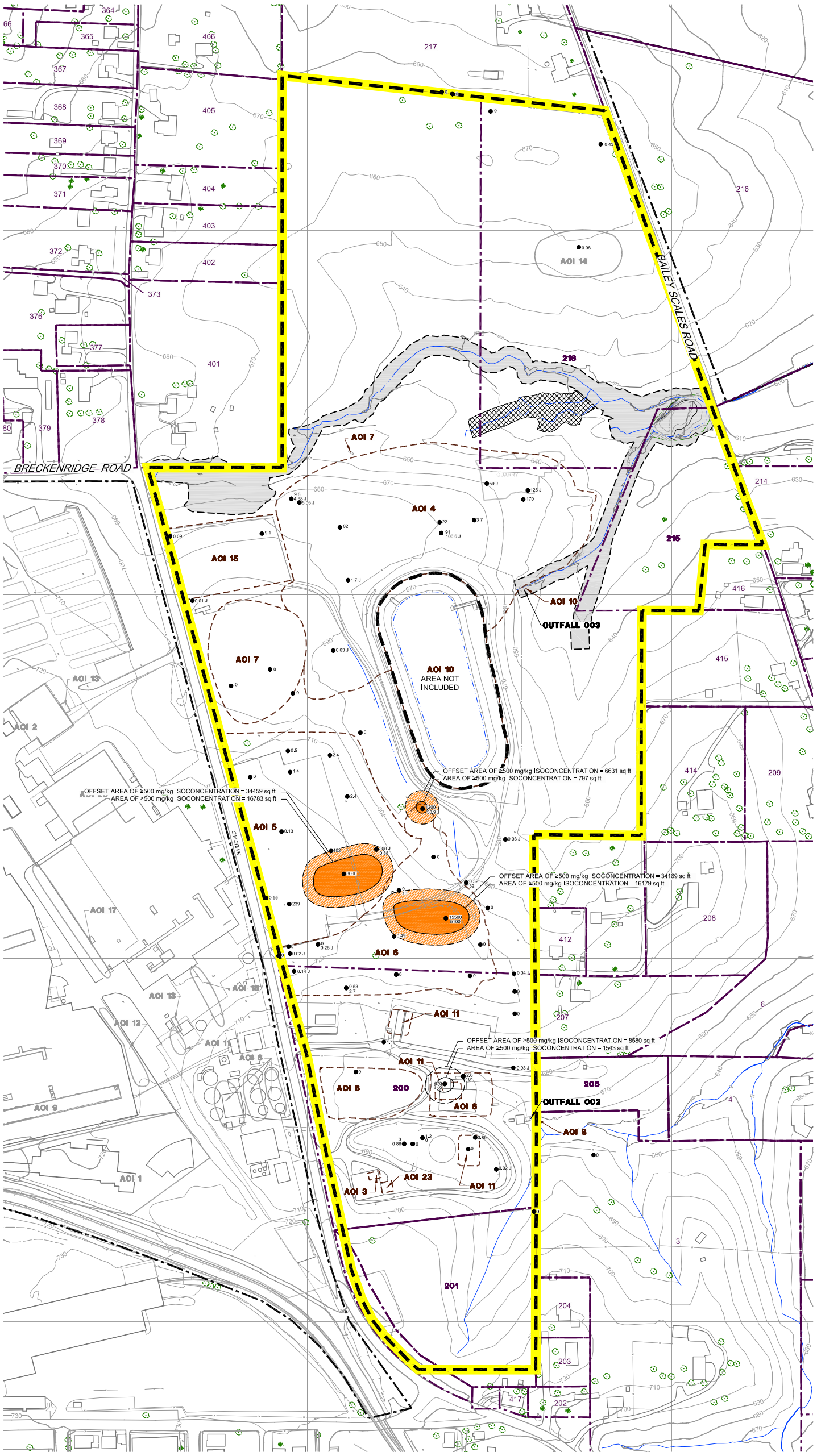
# SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (0-5 FEET BGS, =500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.7 |

13968-00(151)GN-WA063 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥500 mg/kg ISOCONCENTRATION = 83838 sq ft
   TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 35302 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

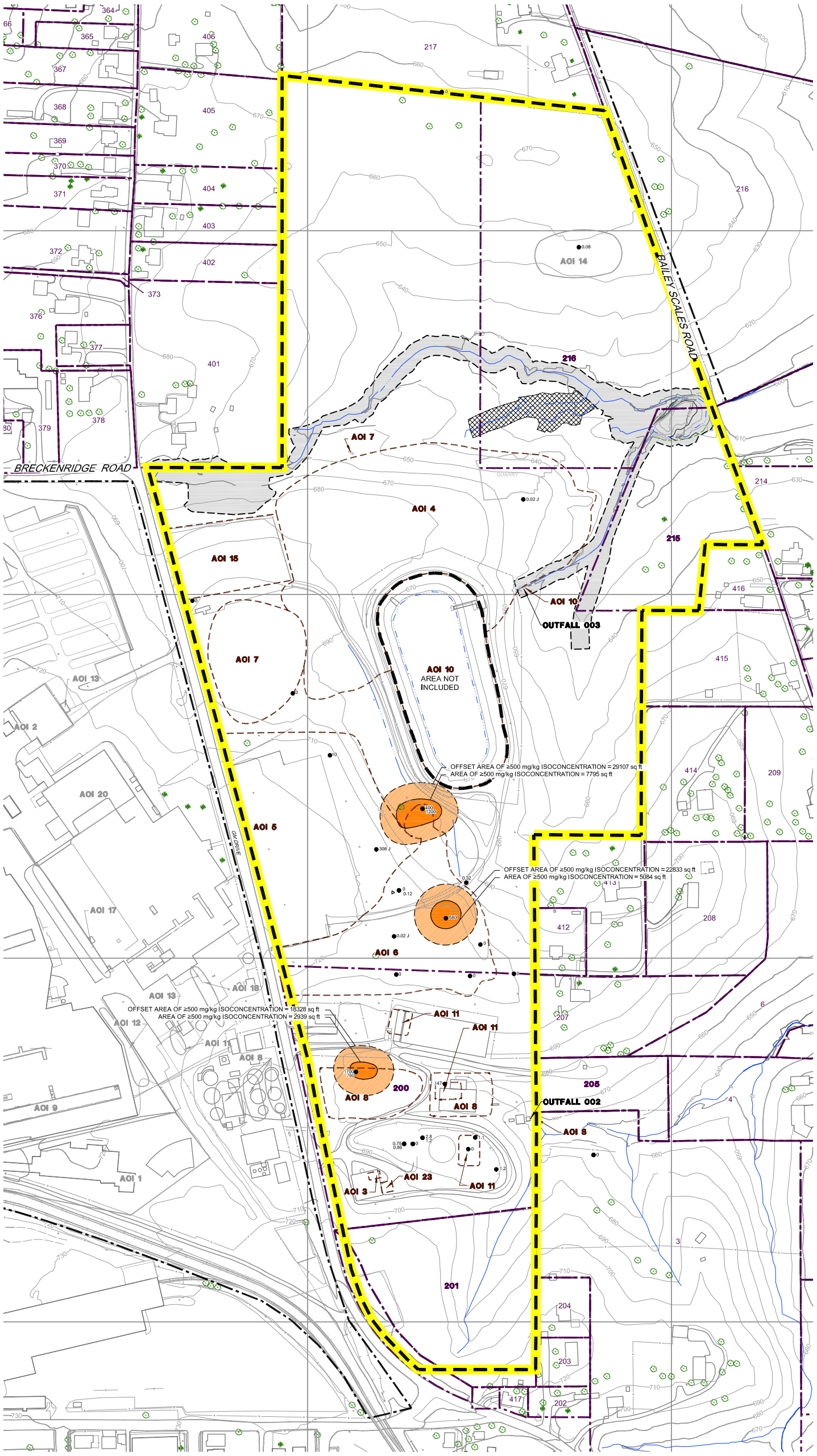
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (5-10 FEET BGS, ≥500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.8 |

13968-00(151)GN-WA064 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥500 mg/kg ISOCONCENTRATION = 70268 sq ft
   TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 15818 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

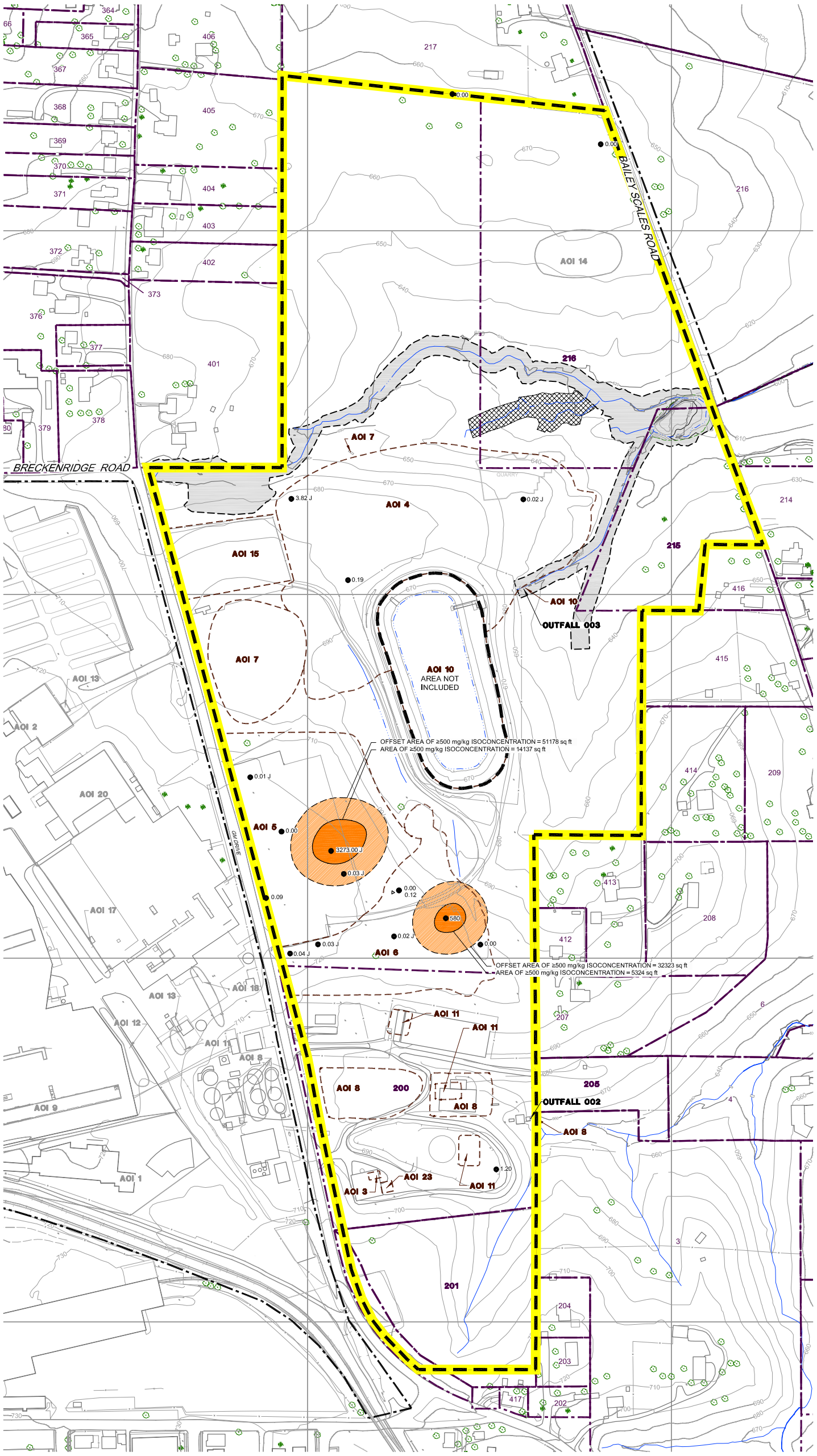
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (10-15 FEET BGS, ≥500 mg/kg PCBs)

**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure E.9 |

13968-00(151)GN-WA065 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥500 mg/kg ISOCONCENTRATION = 83501 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 19461 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

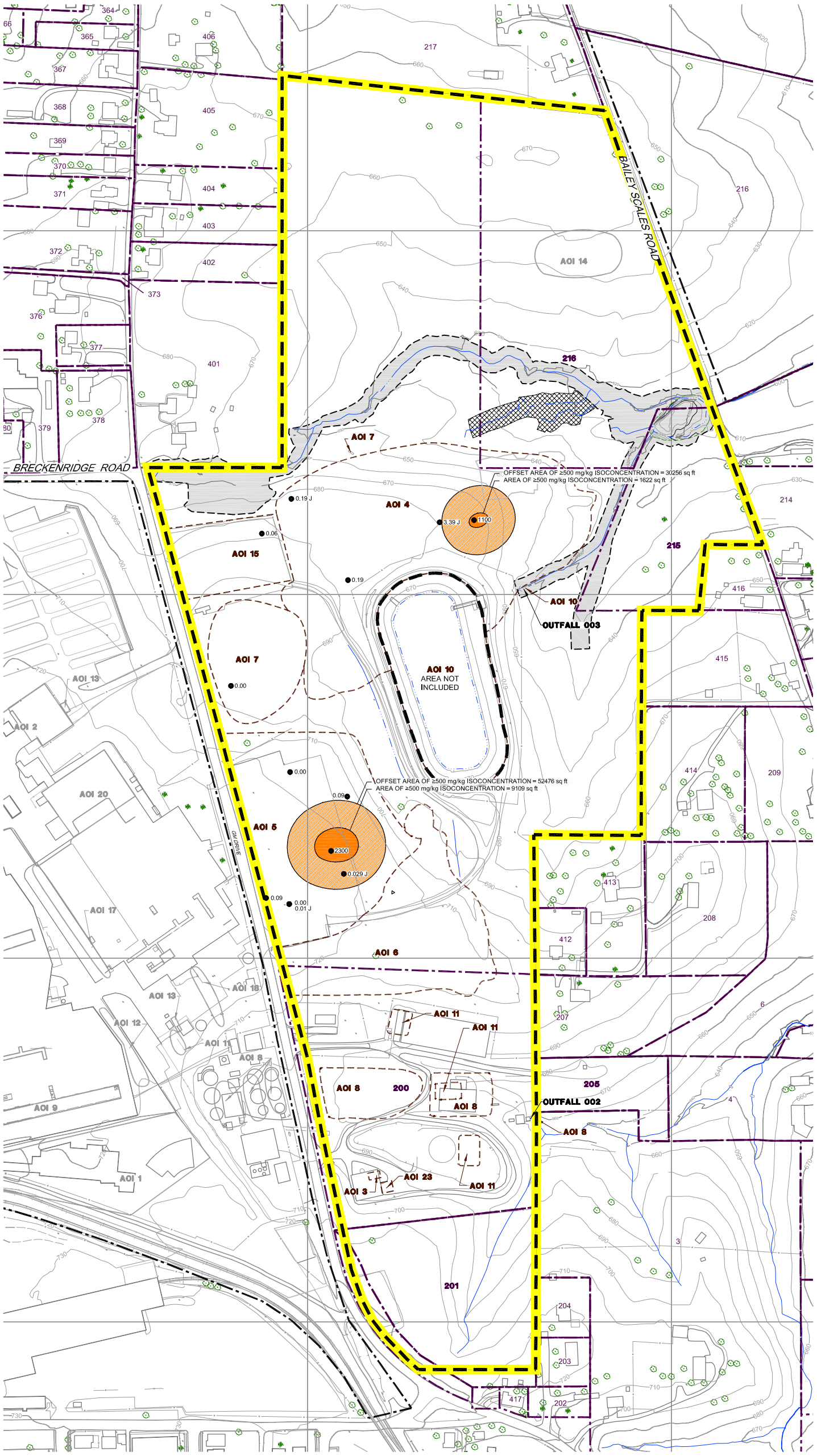
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(15-20 FEET BGS, ≥500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.10 |

13968-00(151)GN-WA066 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥500 mg/kg ISOCONCENTRATION = 82732 sq ft
TOTAL AREA OF ≥500 mg/kg ISOCONCENTRATION = 10731 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

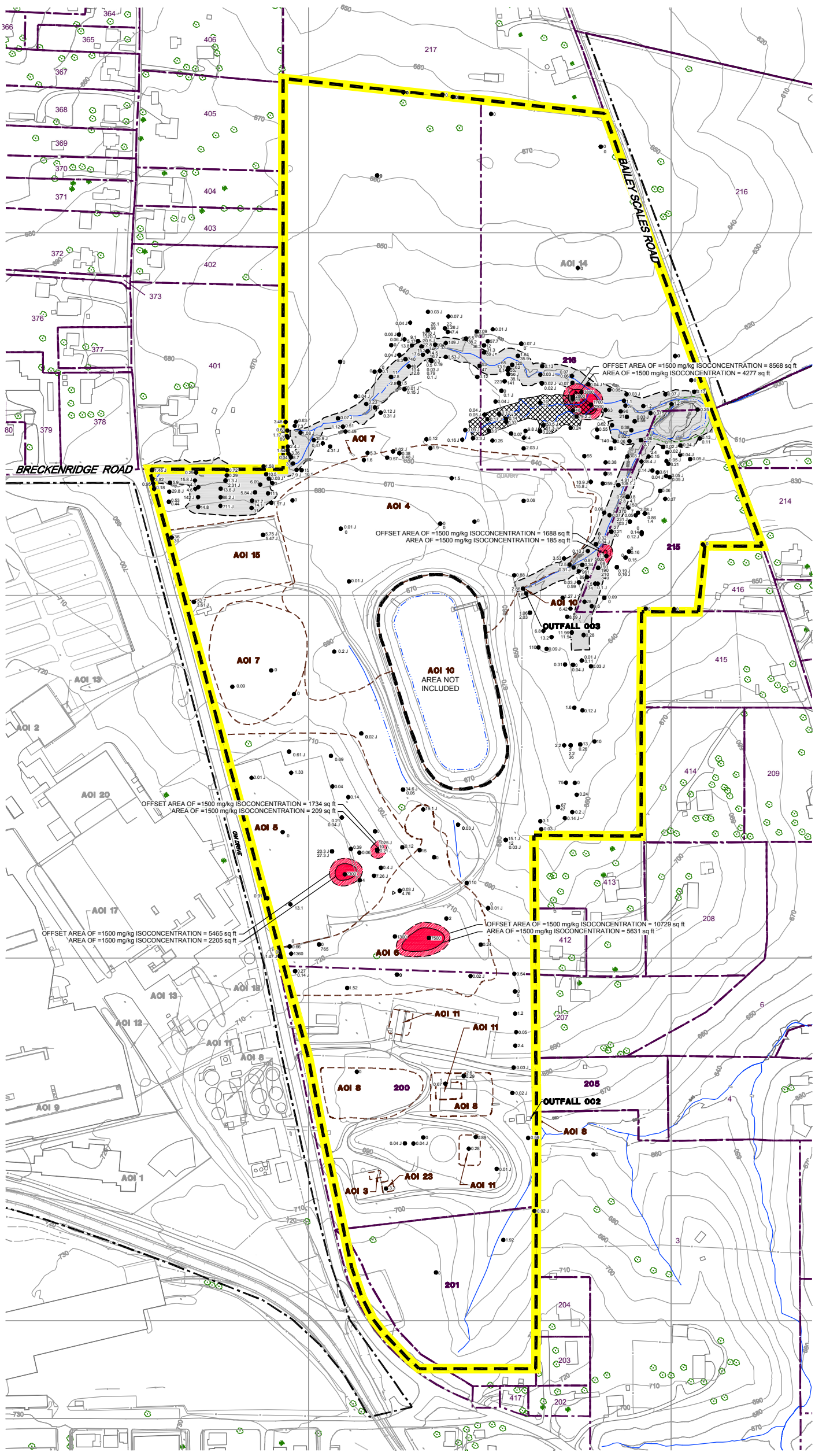
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(20-25 FEET BGS, ≥500 mg/kgPCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.11 |

13968-00(151)GN-WA067 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1500 mg/kg ISOCONCENTRATION
- OFFSET OF =1 500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF =1500 mg/kg ISOCONCENTRATION = 28185 sq ft
   TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 12507 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

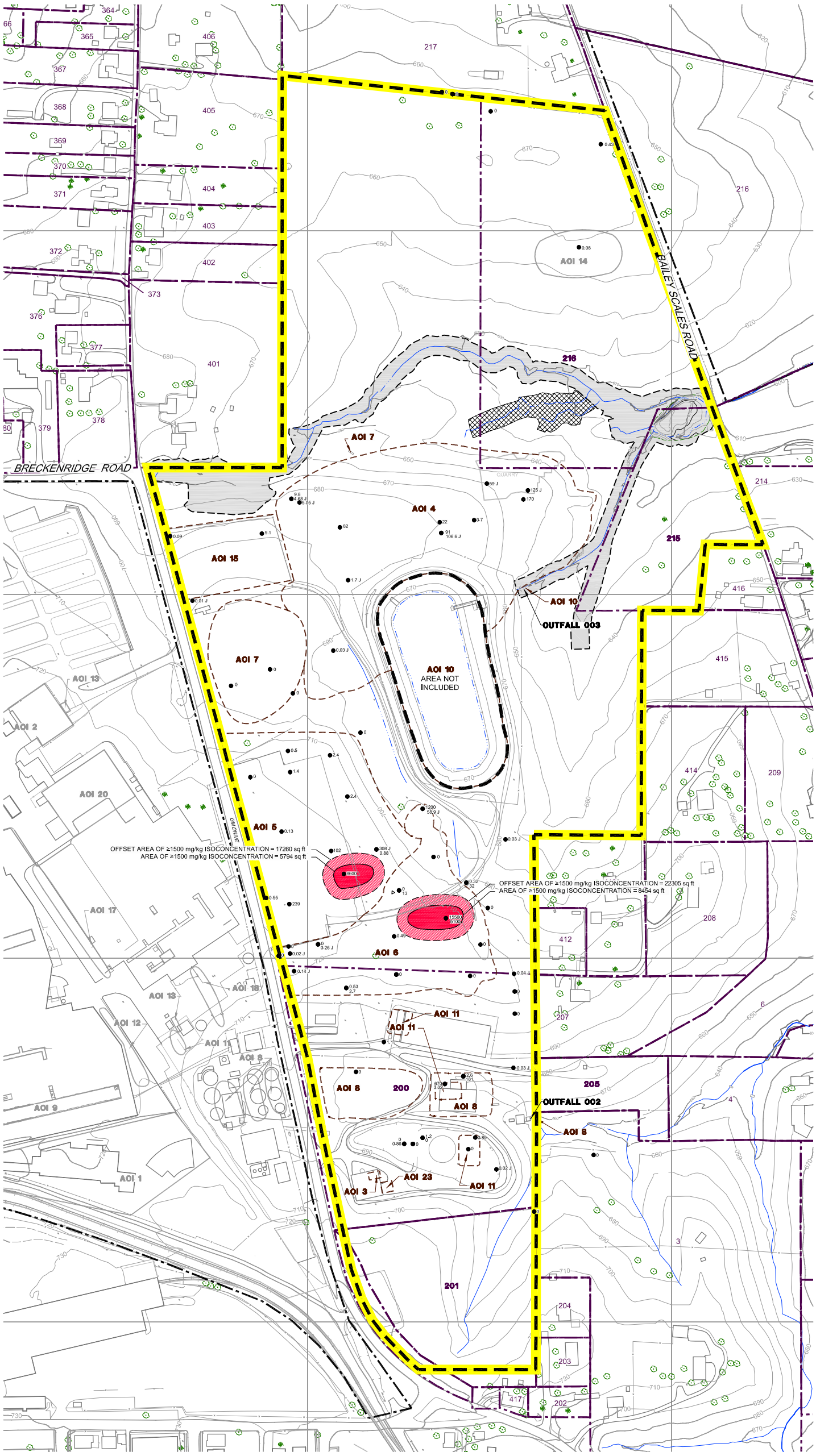
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(0-5 FEET BGS, =1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.12 |

13968-00(151)GN-WA068 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥1500 mg/kg ISOCONCENTRATION = 39565 sq ft
   TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 14248 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 3
4) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| No | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

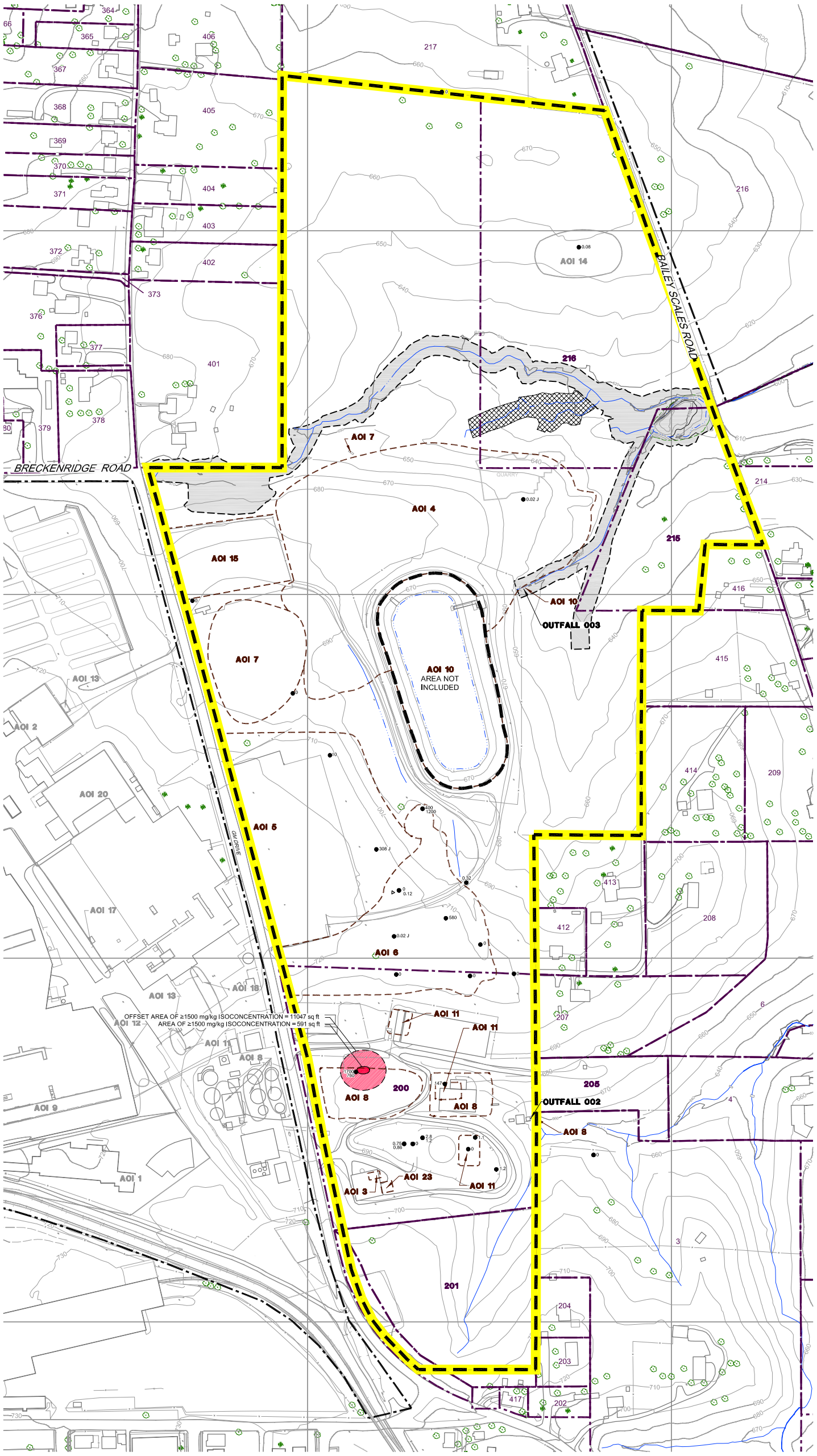
## SCENARIO 1 - IMPLEMENTABILITY ASSESSMENT (5-10 FEET BGS, ≥1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project No: 13968-00 | Report No: 151 | Drawing No: figure E.13 |

13968-00(151)GN-WA069 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥1500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2) TOTAL OFFSET AREA OF ≥1500 mg/kg ISOCONCENTRATION = 11047 sq ft
   TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 591 sq ft
3) THIS FIGURE IS INCLUDED AS PART OF SCENARIO 4

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

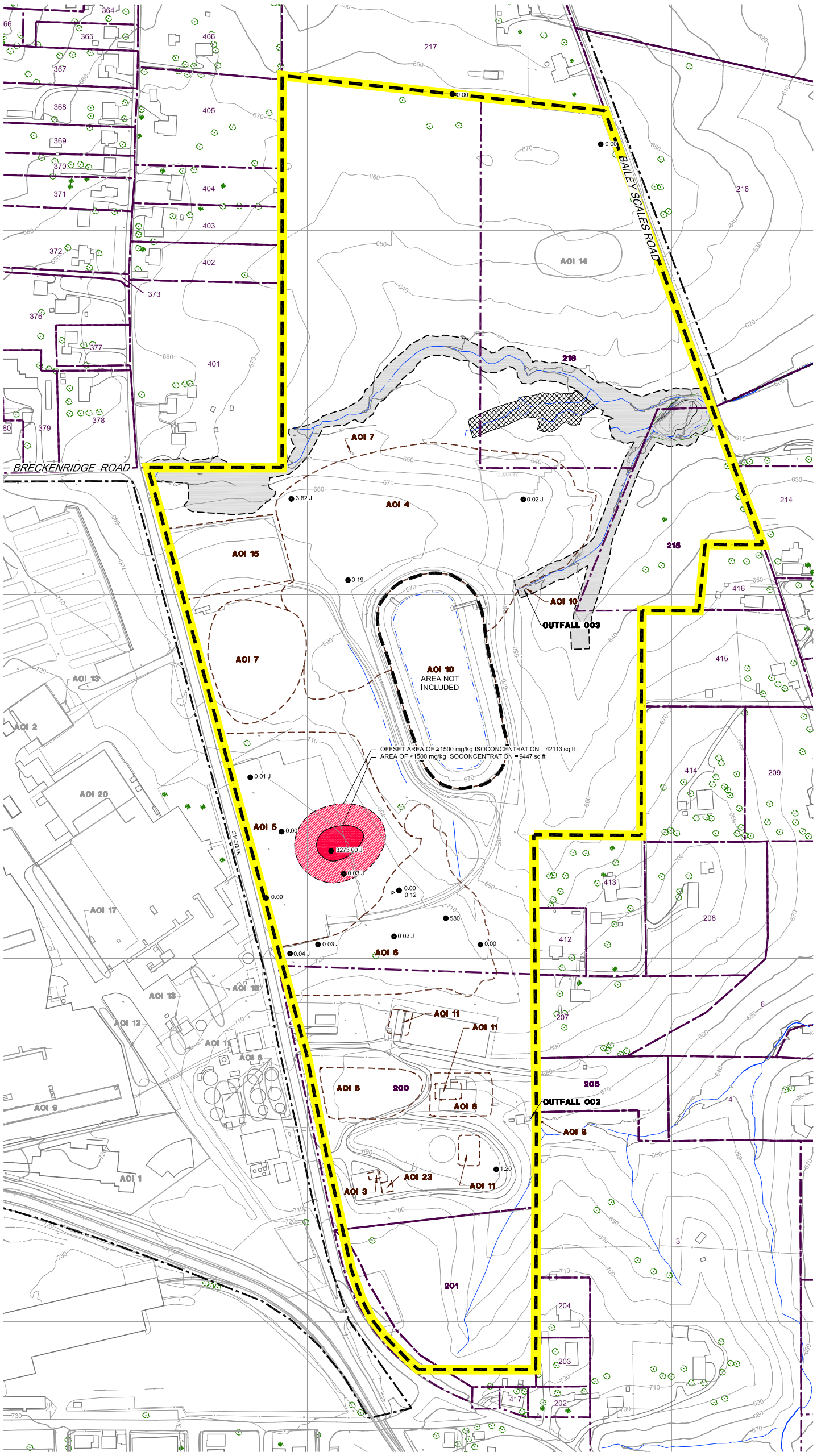
SCENARIO 1 -
IMPLEMENTABILITY ASSESSMENT
(10-15 FEET BGS, ≥1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure E.14 |

13968-00(151)GN-WA070 APR 06/2005




N

0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥1 500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥1500 mg/kg ISOCONCENTRATION = 42113 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 9447 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

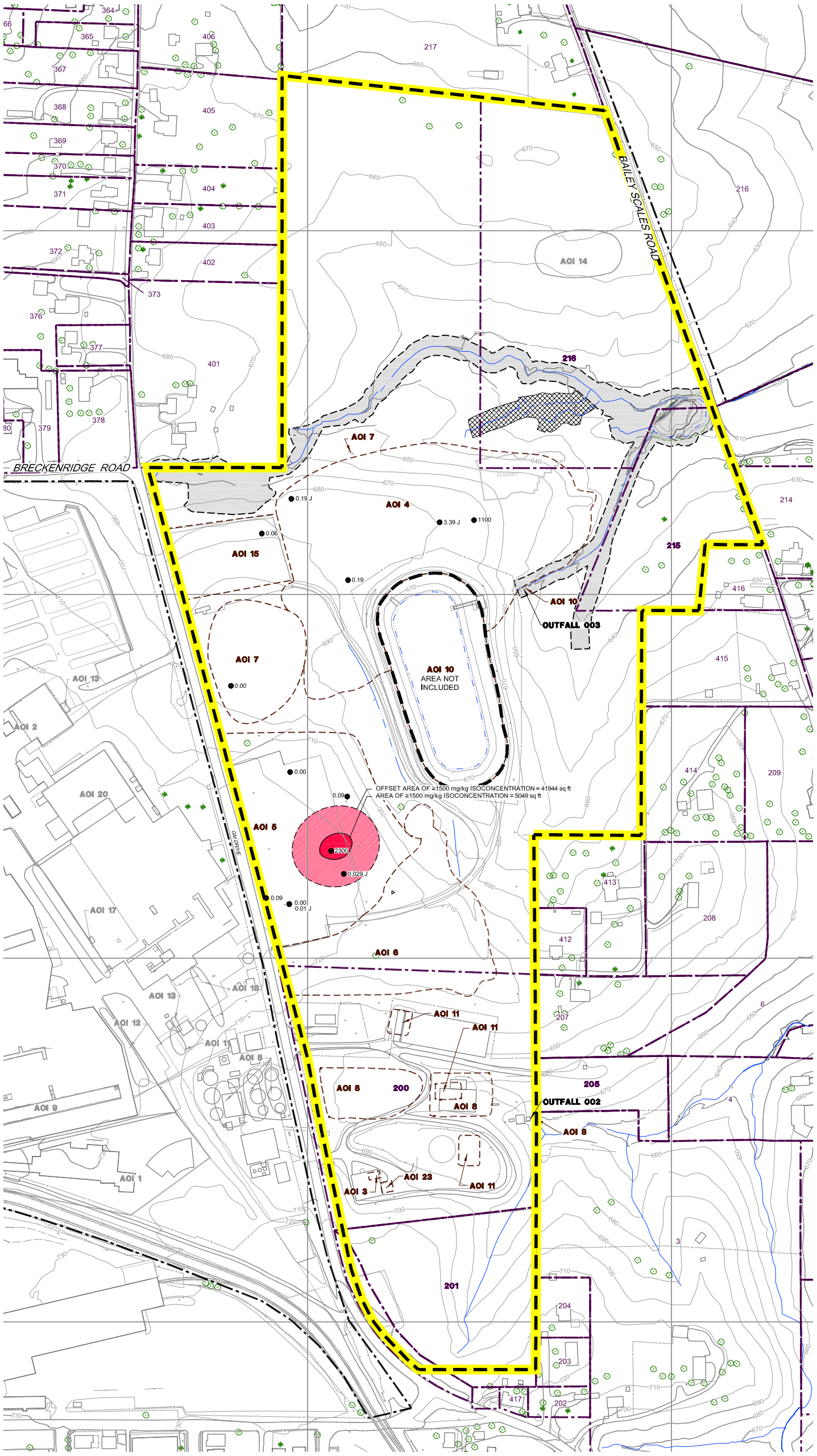
## SCENARIO 1
## IMPLEMENTABILITY ASSESSMENT
## (15-20 FEET BGS, ≥1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: | Project Nº: | Report Nº: | Drawing Nº: |
| AS SHOWN | 13968-00 | 151 | figure E.15 |

13968-00(151)GN-WA071 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥1500 mg/kg ISOCONCENTRATION
- OFFSET OF ≥1 500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF ≥1500 mg/kg ISOCONCENTRATION = 41944 sq ft
TOTAL AREA OF ≥1500 mg/kg ISOCONCENTRATION = 5049 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

# GM POWERTRAIN BEDFORD FACILITY
# BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

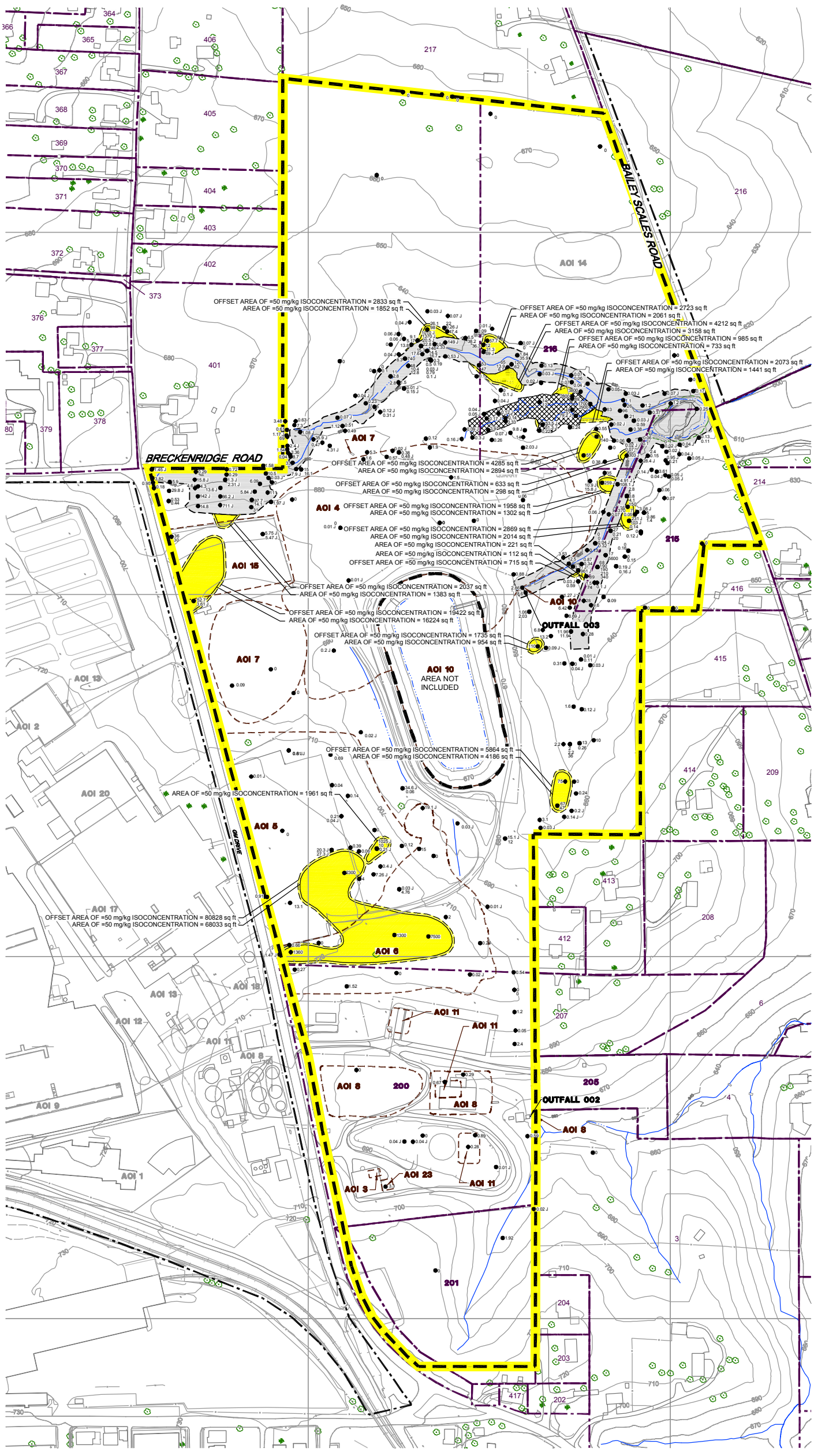
## SCENARIO 1
## IMPLEMENTABILITY ASSESSMENT
## (20-25 FEET BGS, ≥1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: | Project Nº: | Report Nº: | Drawing Nº: |
| AS SHOWN | 13968-00 | 151 | figure E.16 |

13968-00(151)GN-WA072 APR 06/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =50 mg/kg ISOCONCENTRATION
- OFFSET OF =50 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF =50 mg/kg ISOCONCENTRATION = 133172 sq ft
TOTAL AREA OF =50 mg/kg ISOCONCENTRATION = 108829 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

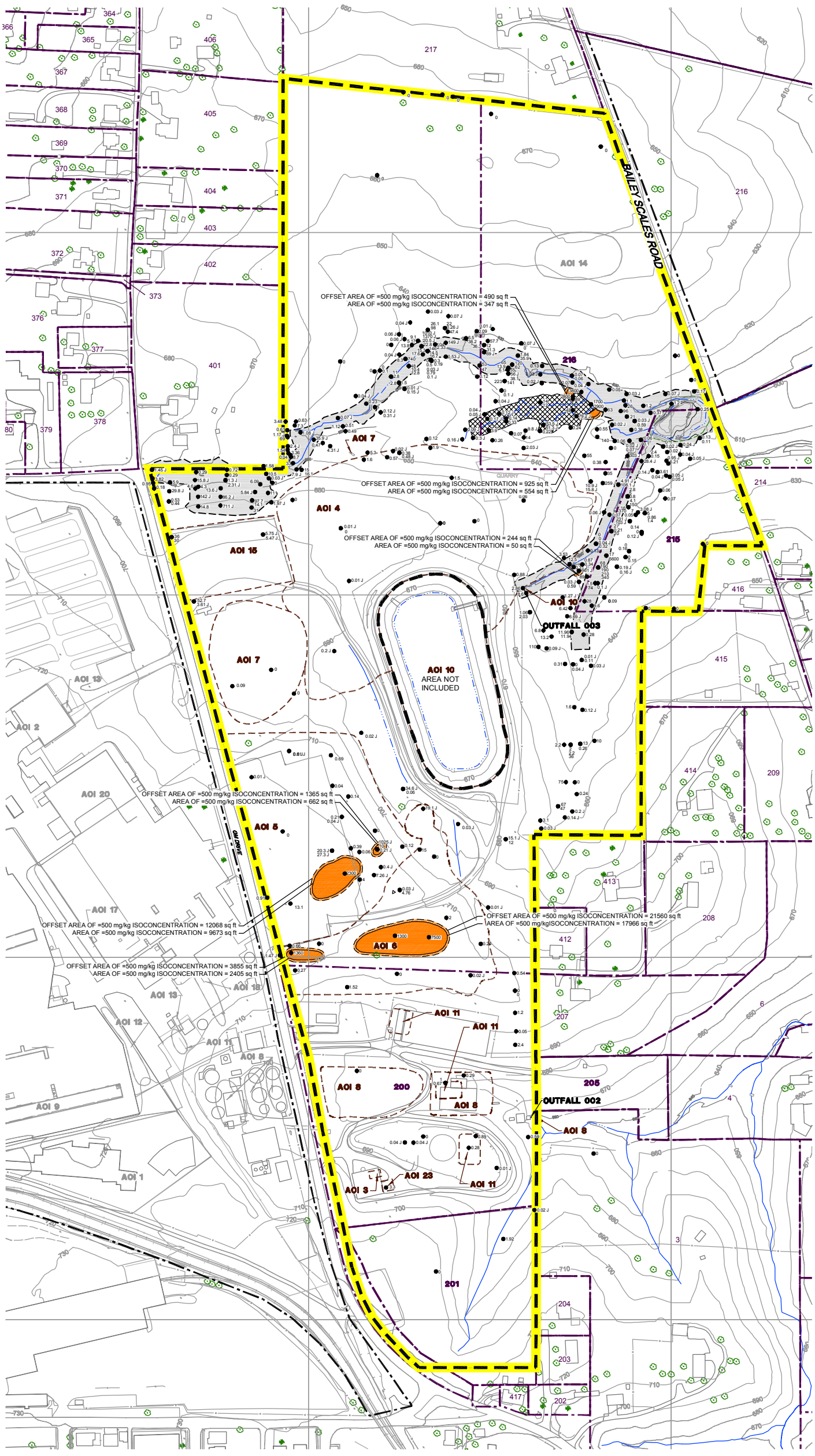
SCENARIO 2 -
IMPLEMENTABILITY ASSESSMENT
(0-2 FEET BGS, =50 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.17 |

13968-00(151)GN-WA073 APR 06/2005




N

0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =500 mg/kg ISOCONCENTRATION
- OFFSET OF =500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF =500 mg/kg ISOCONCENTRATION = 40508 sq ft
TOTAL AREA OF =500 mg/kg ISOCONCENTRATION = 31657 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

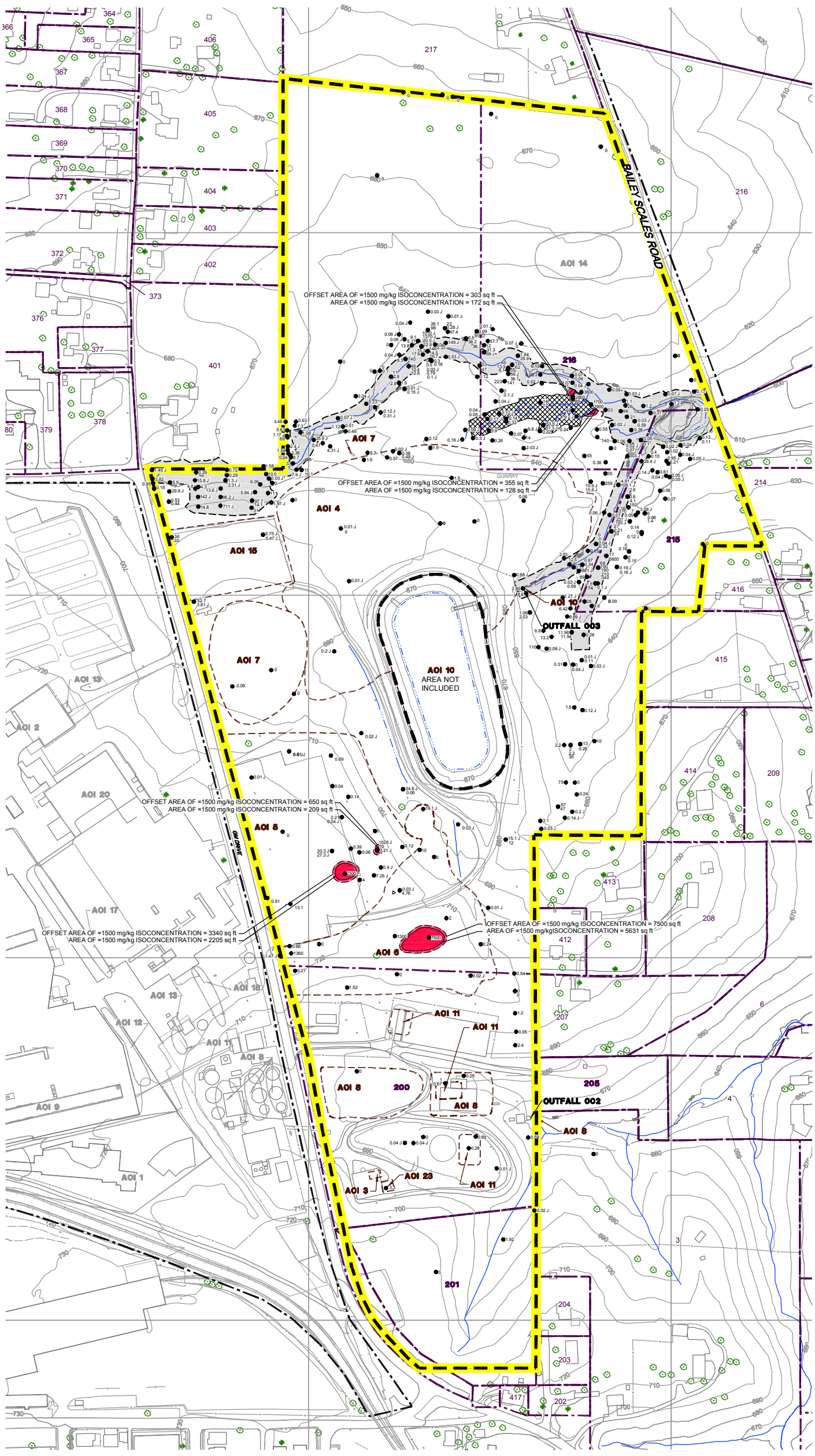
SCENARIO 2 -
IMPLEMENTABILITY ASSESSMENT
(0-2 FEET BGS, =500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.18 |

13968-00(151)GN-WA074 APR 06/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- =1500 mg/kg ISOCONCENTRATION
- OFFSET OF =1 500 mg/kg ISOCONCENTRATION

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

2) TOTAL OFFSET AREA OF =1500 mg/kg ISOCONCENTRATION = 12148 sq ft
TOTAL AREA OF =1500 mg/kg ISOCONCENTRATION = 8345 sq ft

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA

SCENARIO 2 -
IMPLEMENTABILITY ASSESSMENT
(0-2 FEET BGS, =1500 mg/kg PCBs)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | D.C. | APRIL 2005 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure E.19 |

13968-00(151)GN-WA075 APR 06/2005

**TABLE E.1**

**SCENARIO 1: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0 FEET - TOP OF BEDROCK)**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| | | *Volume Calculations* | | | | | |
|---|---|---|---|---|---|---|---|
| | *Depth Range (ft bgs)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
| | 0 - 5 | | | | | | |
| Off-set Area (sq ft) | | 238,005 | 81,089 | 28,185 | | | |
| Area (sq ft) | | 145,727 | 42,342 | 12,507 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***959,330*** | ***308,578*** | ***101,730*** |
| Volume Correction (cu ft) | | | | | 0 | 0 | 0 |
| ***Total Volumes (cu ft)*** | | | | | ***959,330*** | ***308,578*** | ***101,730*** |
| | 5 - 10 | | | | | | |
| Off-set Area (sq ft) | | 218,586 | 83,838 | 39,565 | | | |
| Area (sq ft) | | 117,046 | 35,302 | 14,248 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***1,678,160*** | ***595,700*** | ***269,065*** |
| Correction Off-set Area (sq ft) | 0 - 5 | 57,563 | 31,907 | 10,830 | | | |
| Correction Area (sq ft) | | 35,201 | 19,153 | 5,021 | 231,910 | 127,648 | 39,625 |
| ***Volume Correction (cu ft)*** | | | | | (231,910) | (127,648) | (39,625) |
| ***Total Volumes (cu ft)*** | | | | | ***1,446,250*** | ***468,053*** | ***229,440*** |
| | 10 - 15 | | | | | | |
| Off-set Area (sq ft) | | 148,836 | 70,268 | 11,047 | | | |
| Area (sq ft) | | 60,889 | 15,818 | 591 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***1,572,938*** | ***645,645*** | ***87,285*** |
| Correction Off-set Area (sq ft) | 5 - 10 | 63,058 | 30,549 | 0 | | | |
| Correction Area (sq ft) | | 30,764 | 12,122 | 0 | 469,113 | 213,358 | 0 |
| ***Volume Correction (cu ft)*** | | | | | (469,113) | (213,358) | 0 |
| ***Total Volumes (cu ft)*** | | | | | ***1,103,825*** | ***432,287*** | ***87,285*** |
| | 15 - 20 | | | | | | |
| Off-set Area (sq ft) | | 110,545 | 83,501 | 42,113 | | | |
| Area (sq ft) | | 32,896 | 19,461 | 9,447 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***1,434,410*** | ***1,029,620*** | ***515,600*** |
| Correction Off-set Area (sq ft) | 10 - 15 | 62,149 | 22,833 | 0 | | | |
| Correction Area (sq ft) | | 24,829 | 5,084 | 0 | 652,335 | 209,378 | 0 |
| Correction Off-set Area (sq ft) | 5 - 10 | 31,906 | 22,973 | 8,630 | | | |
| Correction Area (sq ft) | | 20,709 | 11,189 | 2,897 | 263,075 | 170,807 | 57,635 |
| Correction Off-set Area (sq ft) | 0 - 5 | 0 | 4,160 | 867 | | | |
| Correction Area (sq ft) | | 0 | 2,128 | 105 | 0 | 15,718 | 2,429 |
| ***Volume Correction (cu ft)*** | | | | | (915,410) | (395,902) | (60,064) |
| ***Total Volumes (cu ft)*** | | | | | ***519,000*** | ***633,718*** | ***455,536*** |

**TABLE E.1**

**SCENARIO 1: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0 FEET - TOP OF BEDROCK)**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

*Volume Calculations*

| | *Depth Range (ft bgs)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
|---|---|---|---|---|---|---|---|
| | 20 - 25 | | | | | | |
| Off-set Area (sq ft) | | 102,281 | 82,732 | 41,944 | | | |
| Area (sq ft) | | 17,936 | 10,731 | 5,049 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***1,502,713*** | ***1,168,288*** | ***587,413*** |
| Correction Off-set Area (sq ft) | 15 - 20 | 62,274 | 51,178 | 42,113 | | | |
| Correction Area (sq ft) | | 20,226 | 14,137 | 9,447 | 825,000 | 653,150 | 515,600 |
| Correction Off-set Area (sq ft) | 5 - 10 | 20,372 | 0 | 0 | | | |
| Correction Area (sq ft) | | 8,496 | 0 | 0 | 144,338 | 0 | 0 |
| ***Volume Correction (cu ft)*** | | | | | (969,338) | (653,150) | (515,600) |
| ***Total Volumes (cu ft)*** | | | | | ***533,375*** | ***515,138*** | ***71,813*** |
| | 25 - 40 | | | | | | |
| Off-set Area (sq ft) | | 80,319 | 0 | 0 | | | |
| Area (sq ft) | | 4,757 | 0 | 0 | | | |
| ***Raw Volume (cu ft)*** | | | | | ***1,701,520*** | ***0*** | ***0*** |
| Correction Off-set Area (sq ft) | 5 - 10 | 13,967 | 0 | 0 | | | |
| Correction Area (sq ft) | | 4,123 | 0 | 0 | 90,450 | 0 | 0 |
| ***Volume Correction (cu ft)*** | | | | | (90,450) | 0 | 0 |
| ***Total Volumes (cu ft)*** | | | | | ***1,611,070*** | ***0*** | ***0*** |
| **Overall Volume** | | | | | *6,172,850* | *2,357,773* | *945,804* |

*Volume Conversions*

| | *Depth Range (ft bgs)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
|---|---|---|---|---|---|---|---|
| **Total Volume to be Excavated** | | | | | | | |
| | 0 - 5 | 35,531 | 11,429 | 3,768 | 49,743 | 16,000 | 5,275 |
| | 5 - 10 | 53,565 | 17,335 | 8,498 | 74,991 | 24,269 | 11,897 |
| | 10 - 15 | 40,882 | 16,011 | 3,233 | 57,235 | 22,415 | 4,526 |
| | 15 - 20 | 19,222 | 23,471 | 16,872 | 26,911 | 32,859 | 23,620 |
| | 20 - 15 | 19,755 | 19,079 | 2,660 | 27,656 | 26,711 | 3,724 |
| | 25 - 40 | 59,669 | 0 | 0 | 83,537 | 0 | 0 |
| **Total Volumes** | | *228,624* | *87,325* | *35,030* | *320,074* | *122,255* | *49,042* |

**Notes:**
mg/kg - milligrams per kilogram
sq ft - square feet
cu ft - cubic feet
bgs - below ground surface
cu yd - cubic yard
ft - feet
PCB - Polychlorinated Biphenyl
tons - short tons (2,000 pounds)

**TABLE E.2**

**SCENARIO 1: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0 FEET - TOP OF BEDROCK)**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Excavation Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 228,624 | 320,074 |
| ***500*** | 87,325 | 122,255 |
| ***1,500*** | 35,030 | 49,042 |

PCB-Impacted Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 129,415 | 181,181 |
| ***500*** | 37,274 | 52,184 |
| ***1,500*** | 9,772 | 13,681 |

Volume of Clean Soil

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 99,209 | 138,893 |
| ***500*** | 50,051 | 70,071 |
| ***1,500*** | 25,258 | 35,361 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)

**TABLE E.3**

**SCENARIO 2: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-2 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

*Volume Calculations*

| | *Depth Range (ft bgs)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
|---|---|---|---|---|---|---|---|
| **Area to be Excavated** | 0 - 2 | | | | | | |
| Off-set Area (sq ft) | | 133,172 | 40,508 | 12,148 | | | |
| Area (sq ft) | | 108,829 | 31,657 | 8,345 | | | |
| ***Raw Volume (cu ft)*** | | | | | 242,001 | 72,165 | 20,493 |
| ***Volume Correction (cu ft)*** | | | | | 0 | 0 | 0 |
| ***Total Volumes (cu ft)*** | | | | | 242,001 | 72,165 | 20,493 |
| **Overall Volume** | | | | | *242,001* | *72,165* | *20,493* |

*Volume Conversions*

| | *Depth Range (ft bgs)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
|---|---|---|---|---|---|---|---|
| **Total Volume to be Excavated** | | | | | | | |
| | 0 - 2 | 8,963 | 2,673 | 759 | 12,548 | 3,742 | 1,063 |
| **Total Volumes** | | *8,963* | *2,673* | *759* | *12,548* | *3,742* | *1,063* |

**Notes:**
mg/kg - milligrams per kilogram
sq ft - square feet
cu ft - cubic feet
bgs - below ground surface
cu yd - cubic yard
ft - feet
PCB - Polychlorinated Biphenyl
tons - short tons (2,000 pounds)

**TABLE E.4**

**SCENARIO 2: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-2 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Excavation Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 8,963 | 12,548 |
| ***500*** | 2,673 | 3,742 |
| ***1,500*** | 759 | 1,063 |

PCB-Impacted Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 8,061 | 11,285 |
| ***500*** | 2,345 | 3,283 |
| ***1,500*** | 618 | 865 |

Volume of Clean Soil

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 902 | 1,263 |
| ***500*** | 328 | 459 |
| ***1,500*** | 141 | 197 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)

**TABLE E.5**

**SCENARIO 3: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-10 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

*Volume Calculations*

| | *Depth Range (ft bgs)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
|---|---|---|---|---|---|---|---|
| **Area to be Excavated** | 0 - 5 | | | | | | |
| Off-set Area (sq ft) | | 238,005 | 81,089 | 28,185 | | | |
| Area (sq ft) | | 145,727 | 42,342 | 12,507 | | | |
| ***Raw Volume (cu ft)*** | | | | | 959,330 | 308,578 | 101,730 |
| ***Volume Correction (cu ft)*** | | | | | 0 | 0 | 0 |
| ***Total Volumes (cu ft)*** | | | | | 959,330 | 308,578 | 101,730 |
| **Area to be Excavated** | 5 - 10 | | | | | | |
| Off-set Area (sq ft) | | 218,586 | 83,838 | 39,565 | | | |
| Area (sq ft) | | 117,046 | 35,302 | 14,248 | | | |
| ***Raw Volume (cu ft)*** | | | | | 1,678,160 | 595,700 | 269,065 |
| Correction Off-set Area (sq ft) | | 57,563 | 31,907 | 10,830 | | | |
| Correction Area (sq ft) | | 35,201 | 19,153 | 5,021 | | | |
| ***Volume Correction (cu ft)*** | | | | | (231,910) | (127,650) | (39,628) |
| ***Total Volumes (cu ft)*** | | | | | 1,446,250 | 468,050 | 229,438 |
| **Overall Volume** | | | | | *2,405,580* | *776,628* | *331,168* |

*Volume Conversions*

| | *Depth Range (ft bgs)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
|---|---|---|---|---|---|---|---|
| **Total Volume to be Excavated** | | | | | | | |
| | 0 - 5 | 35,531 | 11,429 | 3,768 | 49,743 | 16,000 | 5,275 |
| | 5 - 10 | 53,565 | 17,335 | 8,498 | 74,991 | 24,269 | 11,897 |
| **Total Volumes** | | *89,096* | *28,764* | *12,265* | *124,734* | *40,270* | *17,172* |

**Notes:**
mg/kg - milligrams per kilogram
sq ft - square feet
cu ft - cubic feet
bgs - below ground surface
cu yd - cubic yard
ft - feet
PCB - Polychlorinated Biphenyl
tons - short tons (2,000 pounds)

**TABLE E.6**

**SCENARIO 3: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-10 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Excavation Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 89,096 | 124,734 |
| ***500*** | 28,764 | 40,270 |
| ***1,500*** | 12,265 | 17,172 |

PCB-Impacted Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 46,821 | 65,549 |
| ***500*** | 14,379 | 20,130 |
| ***1,500*** | 4,955 | 6,936 |

Volume of Clean Soil

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 42,275 | 59,185 |
| ***500*** | 14,385 | 20,140 |
| ***1,500*** | 7,311 | 10,235 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)

**TABLE E.7**

**SCENARIO 4: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-15 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

*Volume Calculations*

| | *Depth Range (ft bgs)* | *50 mg/kg Area (sq ft)* | *500 mg/kg Area (sq ft)* | *1,500 mg/kg Area (sq ft)* | *50 mg/kg Volume (cu ft)* | *500 mg/kg Volume (cu ft)* | *1,500 mg/kg Volume (cu ft)* |
|---|---|---|---|---|---|---|---|
| **Area to be Excavated** | 0 - 5 | | | | | | |
| Off-set Area (sq ft) | | 238,005 | 81,089 | 28,185 | | | |
| Area (sq ft) | | 145,727 | 42,342 | 12,507 | | | |
| ***Raw Volume (cu ft)*** | | | | | 959,330 | 308,578 | 101,730 |
| ***Volume Correction (cu ft)*** | | | | | 0 | 0 | 0 |
| ***Total Volumes (cu ft)*** | | | | | 959,330 | 308,578 | 101,730 |
| **Area to be Excavated** | 5 - 10 | | | | | | |
| Off-set Area (sq ft) | | 218,586 | 83,838 | 39,565 | | | |
| Area (sq ft) | | 117,046 | 35,302 | 14,248 | | | |
| ***Raw Volume (cu ft)*** | | | | | 1,678,160 | 595,700 | 269,065 |
| Correction Off-set Area (sq ft) | | 57,563 | 31,907 | 10,830 | | | |
| Correction Area (sq ft) | | 35,201 | 19,153 | 5,021 | | | |
| ***Volume Correction (cu ft)*** | | | | | (231,910) | (127,650) | (39,625) |
| ***Total Volumes (cu ft)*** | | | | | 1,446,250 | 468,050 | 229,440 |
| **Area to be Excavated** | 10 - 15 | | | | | | |
| Off-set Area (sq ft) | | 148,836 | 70,268 | 11,047 | | | |
| Area (sq ft) | | 60,889 | 15,818 | 591 | | | |
| ***Raw Volume (cu ft)*** | | | | | 1,572,938 | 645,645 | 87,285 |
| Correction Off-set Area (sq ft) | | 63,058 | 30,549 | 0 | | | |
| Correction Area (sq ft) | | 28,003 | 12,122 | 0 | | | |
| ***Volume Correction (cu ft)*** | | | | | (455,306) | (213,355) | 0 |
| ***Total Volumes (cu ft)*** | | | | | 1,117,632 | 432,290 | 87,285 |
| **Overall Volume** | | | | | *2,405,580* | *776,628* | *331,170* |

*Volume Conversions*

| | *Depth Range (ft bgs)* | *50 mg/kg Volume (cu yd)* | *500 mg/kg Volume (cu yd)* | *1,500 mg/kg Volume (cu yd)* | *50 mg/kg Volume (tons)* | *500 mg/kg Volume (tons)* | *1,500 mg/kg Volume (tons)* |
|---|---|---|---|---|---|---|---|
| **Total Volume to be Excavated** | | | | | | | |
| | 0 - 5 | 35,531 | 11,429 | 3,768 | 49,743 | 16,000 | 5,275 |
| | 5 - 10 | 53,565 | 17,335 | 8,498 | 74,991 | 24,269 | 11,897 |
| | 10 - 15 | 41,394 | 16,011 | 3,233 | 57,951 | 22,415 | 4,526 |
| **Total Volumes** | | *130,489* | *44,775* | *15,498* | *182,685* | *62,685* | *21,698* |

**Notes:**
mg/kg - milligrams per kilogram
sq ft - square feet
cu ft - cubic feet
bgs - below ground surface
cu yd - cubic yard
ft - feet
PCB - Polychlorinated Biphenyl
tons - short tons (2,000 pounds)

**TABLE E.8**

**SCENARIO 4: REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT (0-15 FOOT DEPTH (BGS))**
**VOLUME CALCULATIONS AND CONVERSIONS**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

Excavation Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 130,489 | 182,685 |
| ***500*** | 44,775 | 62,685 |
| ***1,500*** | 15,498 | 21,698 |

PCB-Impacted Volume

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 58,096 | 81,335 |
| ***500*** | 17,308 | 24,231 |
| ***1,500*** | 5,064 | 7,090 |

Volume of Clean Soil

| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Mass (tons)* |
|---|---|---|
| ***50*** | 72,393 | 101,350 |
| ***500*** | 27,467 | 38,454 |
| ***1,500*** | 10,434 | 14,608 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)

**TABLE E.9**

**SUMMARY OF REMOVAL ACTION IMPLEMENTABILITY ASSESSMENT**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENEARL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

**Scenario 1: 0 feet - Top of Bedrock**

| | *PCB-Impacted Soil* [1] | | *Excavation Required* [2] | | *Clean Soil* [3] | |
|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***50*** | 129,415 | 181,181 | 228,624 | 320,074 | 99,209 | 138,893 |
| ***500*** | 37,274 | 52,184 | 87,325 | 122,255 | 50,051 | 70,071 |
| ***1,500*** | 9,772 | 13,681 | 35,030 | 49,042 | 25,258 | 35,361 |

**Scenario 2: 0 - 2 bgs**

| | *PCB-Impacted Soil* [1] | | *Excavation Required* [2] | | *Clean Soil* [3] | |
|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***50*** | 8,061 | 11,285 | 8,963 | 12,548 | 902 | 1,263 |
| ***500*** | 2,345 | 3,283 | 2,673 | 3,742 | 328 | 459 |
| ***1,500*** | 618 | 865 | 759 | 1,063 | 141 | 197 |

**Scenario 3: 0 - 10 bgs**

| | *PCB-Impacted Soil* [1] | | *Excavation Required* [2] | | *Clean Soil* [3] | |
|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***50*** | 46,821 | 65,549 | 89,096 | 124,734 | 42,275 | 59,185 |
| ***500*** | 14,379 | 20,130 | 28,764 | 40,270 | 14,385 | 20,140 |
| ***1,500*** | 4,955 | 6,936 | 12,265 | 17,172 | 7,311 | 10,235 |

**Scenario 4: 0 - 15 bgs**

| | *PCB-Impacted Soil* [1] | | *Excavation Required* [2] | | *Clean Soil* [3] | |
|---|---|---|---|---|---|---|
| *Isoconcentration (mg/kg)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* | *Volume (cu yd)* | *Tonnage (tons)* |
| ***50*** | 58,096 | 81,335 | 130,489 | 182,685 | 72,393 | 101,350 |
| ***500*** | 17,308 | 24,231 | 44,775 | 62,685 | 27,467 | 38,454 |
| ***1,500*** | 5,064 | 7,090 | 15,498 | 21,698 | 10,434 | 14,608 |

**Notes:**
PCB - Polychlorinated Biphenyl
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
mg/kg - milligrams per kilogram
cu yd - cubic yard
tons - short tons (2,000 lbs)
(1) - Based on calculations in Assessment of Volumes (Appendix A)
(2) - Excavation volume required to remove estimated volume of PCB-impacted materials based on open cut 3:1 excavation to meet safety requirements.
(3) - Volume of low/non-PCB-impacted soil requireing excavation of relocation to remove PCB-impacted soils.

# ATTACHMENT E.1

# CALCULATIONS OF VOLUMES CORRECTIONS

| CRA CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126 figure D.1 & D.2<br>DATE: Jan. 14, 2005 | DESIGNED BY: P.S.<br>CHECKED BY: [illegible]<br>PAGE 1 OF 12 |
|---|---|---|

figure ~~D~~E.1 : NO correction Required 0-5 ft bgs

figure ~~D~~E.2 : Volume correction 5-10 ft bgs

$V(10) = A(10)\,d(10) - A(5)\,d(5)$

$A(10) = \left[\frac{\Sigma \text{Offset} + \Sigma \text{Base}}{2}\right] = \frac{218\,586 + 117046}{2}$

$= 167\,816\ ft^2$

$d(10) = 10\ ft$

$A(5) = \left[\frac{\Sigma \text{Offset} + \Sigma \text{Base}}{2}\right]$

$= \left[\frac{0.4(95\,938) + 0.46(95938) + 0.75(1961) + 0.5(6746}{2}\right]$

↑ 0.4 = % overlapping A(10)

$= 46\,382\ ft^2$

$d(5) = 5ft.$

$V(10) = 167\,816(10) - 46\,382(5)$

$= 1\,446\,249.88\ ft^3$

figure E.3 10-15 ft bgs

$V(15) = A(15)\,d(15) - A(10)\,d(10) - A(5)\,d(5)$

$A(15) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \left[\frac{148\,836 + 60\,889}{2}\right]$

$= 104\,862.5\ ft^2$

$d(15) = 15\ ft$

$A(10) =$ % A(10) that overlaps A(15)

$= \left[\frac{12009 + 0.4(127\,623) + 3152 + 0.33(82\,837)}{2}\right]$

$= 46911.3\ ft^2$

$d(10) = 10ft$

$A(5) =$ % A(5) that overlaps A(15) but NOT A(10)

$= 0\ ft^2$

$d(5) = 5\ ft$

$V(15) = A(15)\,d(15) - A(10)\,d(10)$

$= 104\,862.5\,(15) - 46911.3(10)$

$= 1\,103\,825\ ft^3$

figure ~~7.4~~ E.4. 15-20ft bgs

$$V(20) = A(20)\times d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$$

$$A(20) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \left[\frac{110545 + 32896}{2}\right]$$

$$= 71720.5 \text{ ft}^2$$

$$d(20) = 20\text{ft}$$

$A(15)$ = % $A(15)$ overlapping $A(20)$

$$= \left[\frac{0.33(74335) + 1(37371) + 0.33(36047) + 1(12813)}{2}\right]$$

$$= 43489 \text{ ft}^2$$

$$d(15) = 15\text{ft}$$

$A(10)$ = % $A(10)$ overlapping only $A(20)$ & NOT $A(15)$

$$= \left[\frac{0.25(127623) + 0.25(82837)}{2}\right]$$

$$= 26307.5 \text{ ft}^2$$

$$d(10) = 10\text{ft}$$

$A(5)$ = % $A(5)$ overlapping only $A(20)$ & NOT $A(15)$ NOR $A(10)$

$$= \left[\frac{0+0}{2}\right]$$

$$= 0 \text{ ft}^2$$

$$d(5) = 5\text{ft}$$

$$V(20) = A(20)d(20) - A(15)d(15) - A(10)d(10)$$

$$= (71720.5)(20) - (43489)(15) - (26307.5)(10)$$

$$= 519\,000 \text{ ft}^3$$

figure ~~D~~ E 4.5 20-25 ft bgs

$$V(25) = A(25)\,d(25) - \left[A(15)d(15) + A(20)d(20) + A(10)d(10) + A(5)d(5)\right]$$

$$A(25) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \left[\frac{102281 + 17986}{2}\right]$$

$= 60\,108.5\ ft^2$

$d(25) = 25$ ft.

$A(20)$ = % $A(20)$ overlapping $A(25)$

$$= \left[\frac{1.0(62\,274) + 1.0(20\,226)}{2}\right]$$

$= 41\,250\ ft^2$

$d(20) = 20$ ft

$A(15)$ = % $A(15)$ overlapping only $A(25)$ (+ NOT $A(20)$)

$$= \left[\frac{0+0}{2}\right]$$

$= 0$

$A(10)$ = % $A(10)$ overlapping only $A(25)$

$$= \left[\frac{0.5(32450) + 0.5(8294) + 0.5(15\,565) + 0.5(1426)}{2}\right]$$

$= 14\,433.75\ ft^2$

$d(10) = 10$ ft

$A(5)$ = % $A(5)$ overlapping only $A(25)$

$= [0]$

$$V(25) = A(25)\,d(25) - \left[A(20)d(20) + A(10)d(10)\right]$$

$= 60\,108.5(25) - (41\,250(20) + 14\,433.75(10))$

$= 533\,375\ ft^3$

figure D/E 7.6 25-40 ft bgs

$V(40) = A(40)\,d(40) - A(10)\,d(10)$

$A(40) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \left[\frac{80\,319 + 4757}{2}\right]$

$= 42\,538 \text{ ft}^2$

$d(40) = 40 \text{ ft}$

$A(10) = \%\ A(10) \text{ overlapping } A(40)$

$= \left[\frac{13\,967 + 4123}{2}\right]$

$= 9045 \text{ ft}^2$

$d(10) = 10 \text{ ft}$

$V(40) = A(40)d(40) - A(10)d(10)$

$= 42\,538(40) - 9045(10)$

$= 1,611,070 \text{ ft}^3$

figure D/E 7.7 : No correction required 0-5 ft bgs

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 12b<br>figure D7.8<br>DATE: Jan 12, 2005 | DESIGNED BY: P.S<br>CHECKED BY: DC<br>PAGE 6 OF 12 |
|---|---|---|

figure ~~7~~ 8. 7.8 5-10ft bgs

$$V(10) = A(10)d(10) - A(5)d(5)$$

$$A(10) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \frac{83\,838 + 35\,302}{2}$$

$$= 59\,570 \text{ ft}^2$$

$$d(10) = 10\text{ft}$$

$A(5)$ = % $A(5)$ overlapping only $A(10)$

$$= \left[\frac{1(16086) + 0.75(2844) + 0.5(27375) + 9673 + 0.75(662)}{2} + 0.5(17966)\right]$$

$$= 25\,529.5 \text{ ft}^2$$

$$d(5) = 5\text{ft}$$

$$V(10) = A(10)d(10) - A(5)d(5)$$

$$= 59\,570(10) - 25\,529.5(5)$$

$$= 468\,052.5 \text{ ft}^3$$

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126<br>figure D.4.9<br>DATE: Jan 12, 2005 | DESIGNED BY: DS<br>CHECKED BY: DC<br>PAGE 7 OF 12 |
|---|---|---|

figure ~~D~~ E 4.9 10-15 ft bgs

$$V(15) = A(15)d(15) - A(10)d(10) - A(5)d(5)$$

$$A(15) = \left[\frac{70\,268 + 15818}{2}\right] = 43\,043 \text{ ft}^2$$

$$d(15) = 15 \text{ ft}$$

$$A(10) = \left[\frac{0.7(34\,169) + 1(6631) + 0.7(16\,179) + 1(797)}{2}\right]$$

$$= 21\,335.8 \text{ ft}^2$$

$$d(10) = 10 \text{ ft}$$

$$A(5) = 0$$

$$V(15) = A(15)d(15) - A(10)d(10)$$

$$= 43043(15) - 21335.8(10)$$

$$= 432\,287 \text{ ft}^3$$

figure E.10 15 - 20 ft bgs

$V(20) = A(20)d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$

$A(20) = \left[\frac{\Sigma offset + \Sigma Base}{2}\right] = \left[\frac{83501 + 19461}{2}\right]$

$= 51481\ ft^2$

$d(20) = 20\ ft$

$A(15) =$ % $A(15)$ that overlaps $A(20)$

$= \left[\frac{1.0(22833) + 1.0(5084)}{2}\right]$

$= 13958.5\ ft^2$

$d(15) = 15\ ft$

$A(10) =$ % $A(10)$ that overlaps $A(20)$ but NOT $A(15)$

$= \left[\frac{0.66(34459) + 0.66(16783)}{2}\right]$

$= 17080.67\ ft^2$

$d(10) = 10\ ft$

$A(5) =$ % $A(5)$ that overlaps $A(20)$ but NOT $A(15)$ NOR $A(10)$

$= \left[\frac{0.5(2844) + 0.1(27375) + 0.5(662) + 0.1(17966)}{2}\right]$

$= 3144\ ft^2$

$d(5) = 5ft$

$A(20) = A(20)d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$

$= 51481(20) - 13958.5(15) - 17080.67(10) - 3144(5)$

$= 633\ 718\ ft3$

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126<br>figure D.11<br>DATE: Jan 14, 2005 | DESIGNED BY: P.S<br>CHECKED BY: BC<br>PAGE 9 OF 12 |
|---|---|---|

figure E D.11 20-25 ft bgs

$V(25) = A(25)d(25) - A(20)d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$

$A(25) = \left[\frac{\Sigma Offset + \Sigma Base}{2}\right] = \left[\frac{82732 + 10731}{2}\right] = 46731.5\ ft^2$

$d(25) = 25\ ft$

$A(20) = \%\ A(20)$ that overlaps $A(25) = \left[\frac{51178 + 14137}{2}\right] = 32657\ ft^2$

$d(20) = 20\ ft$

$A(15) = \%\ A(15)$ that overlaps $A(25)$ and NOT $A(20)$
$= 0$

$A(10) = \%\ A(10)$ that overlaps $A(25)$ and NOT $A(15)$ NOR $A(20)$
$= 0$

$A(5) = \%\ A(5)$ that overlaps $A(25)$ and NOT $A(20), A(15), A(10)$
$= 0$

$V(25) = A(25)d(25) - A(20)d(20)$
$= 46731.5(25) - (32657)(20)$
$= 515\ 137.5\ ft3$

figure E D.12 : NO volume correction 0-5 ft bgs

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126<br>figure D.13<br>DATE: Jan 13/06 | DESIGNED BY: P.S<br>CHECKED BY:<br>PAGE 10 OF 12 |
|---|---|---|

figure E.13 5-10 ft bgs

$$V(10) = A(10)d(10) - A(5)d(5)$$

$$A(10) = \left[\frac{\Sigma \text{offset} + \Sigma \text{Base}}{2}\right] = \left[\frac{39565 + 14248}{2}\right] = 26906.5\ ft^2$$

$$d(10) = 10ft$$

$$A(5) = \left[\frac{0.5(10729) + 5465 + 0.5(5631) + 2205}{2}\right]$$

$$= 7925\ ft^2$$

$$d(5) = 5ft$$

$$V(10) = A(10)d(10) - A(5)d(5)$$
$$= 26906.5(10) - 7925(5)$$
$$= 229\,440\ ft^3$$

figure E.14 NO volume correction 10-15 ft bgs

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126<br>Figure D7.15<br>DATE: Jan 13/05 | DESIGNED BY: P.S<br>CHECKED BY: DE<br>PAGE 11 OF 12 |
|---|---|---|

Figure ~~D~~ E 7.15 15-20 ft bgs

$$V(20) = A(20)d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$$

$$A(20) = \left[\frac{4213 + 9447}{2}\right] = 25780 \text{ ft}^2$$

$$d(20) = 20 \text{ ft}$$

$$A(15) = 0$$

$$A(10) = \left[\frac{0.5(17260) + 0.5(5794)}{2}\right] = 5763.5 \text{ ft}^2$$

$$d(10) = 10 \text{ ft}$$

$$A(5) = \left[\frac{0.5(1734) + 0.5(209)}{2}\right] = 485.75 \text{ ft}^2$$

$$d(5) = 5 \text{ ft}$$

$$V(20) = A(20)d(20) - A(10)d(10) - A(5)d(5)$$
$$= 25780(20) - 5763.5(10) - 485.75(5)$$
$$= 455\,536.2 \text{ ft}^3$$

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Rpt 126<br>DATE: Jan 14, 2005 | DESIGNED BY: P.S<br>CHECKED BY: DR<br>PAGE 12 OF 12 |
|---|---|---|

figure E.16 20-25 ft bgs

$V(25) = A(25)d(25) - A(20)d(20) - A(15)d(15) - A(10)d(10) - A(5)d(5)$

$A(25) = \left[\frac{\Sigma Offset + \Sigma Base}{2}\right] = \left[\frac{41944 + 5049}{2}\right]$

$= 23496.5\ ft^2$

$d(25) = 25\ ft$

$A(20) = \%\ A(20)$ that overlaps $A(25)$

$= \left[\frac{42113 + 9447}{2}\right]$

$= 25780\ ft^2$

$d(20) = 20\ ft$

$A(15) = \%\ A(15)$ that overlaps $A(25)$ and NOT $A(20)$

$= 0$

$A(10) = \%\ A(10)$ that overlaps $A(25)$ and NOT $A(20)$, A(1

$= 0$

$A(5) = \%\ A(5)$ that overlaps $A(25)$ and NOT $A(20)$, $A(15)$, A

$= 0$

$V(25) = A(25)d(25) - A(20)d(20)$

$= 23496.5(25) - 25780(20)$

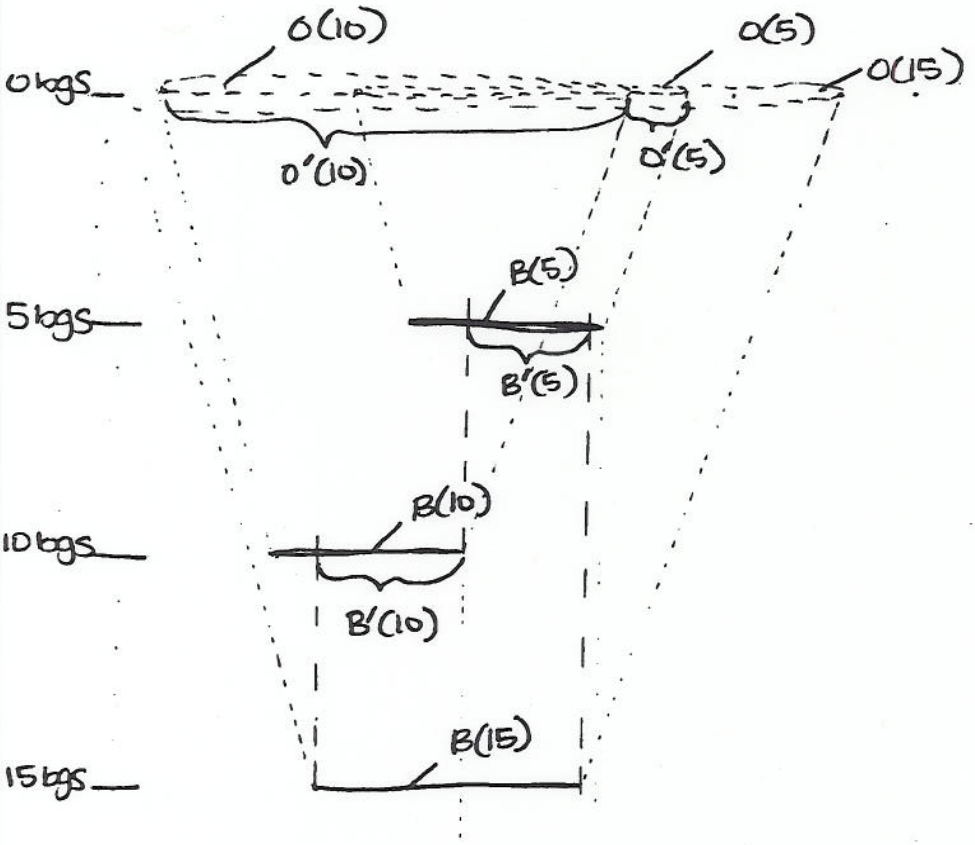
$= 71812.5\ ft^3$

# ATTACHMENT E.2

# DIAGRAM OF VOLUME CORRECTIONS

| CRA<br>CONESTOGA-ROVERS & ASSOCIATES | PROJECT No.: 13968<br>PROJECT NAME: Att E D.2<br>Diagram of Volume Corrections<br>DATE: Jan. 13, 2005 | DESIGNED BY: P.S.<br>CHECKED BY: VDS<br>PAGE 1 OF 1 |
|---|---|---|

Attachment E D.2 : Diagram of Volume Corrections




O(5) = offset area

O'(5) = offset area of B(5) that overlaps O(15) but not O(10)

B(5) = base area @ 5'

B'(5) = base area @ 5' which overlaps B(15) but not B(10).

$$V(15) = A(15)\,d(15) - A(10)\,d(10) - A(5)\,d(5)$$

$$A(15) = \frac{O(15) + B(15)}{2} \qquad d(15) = 15\text{ ft}$$

$$A(10) = \frac{O'(10) + B'(10)}{2} \qquad d(10) = 10\text{ ft}$$

$$A(5) = \frac{O'(5) + B'(5)}{2} \qquad d(5) = 5\text{ ft.}$$

# APPENDIX F

# ESTIMATE VOLUME OF ≥ 50 MG/KG PCB-IMPACTED MATERIAL IDENTIFIED AS TECHNICALLY IMPRACTICAL TO REMOVE

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

# MEMORANDUM

| | | | |
|---|---|---|---|
| TO: | Project File | REF. NO.: | 13968/cnb/234 |
| FROM: | Glenn Turchan | DATE: | April 13, 2005 |

**RE: Estimated Volume of ≥ 50 mg/kg PCB-Impacted Material Identified as Technically Impractical to Remove (Example Calculation for Alternative 4A and similar Alternatives)**
**East Plant Area Interim Measure**
**GM Bedford Powertrain Facility**
**Bedford, Indiana**

## A. INTRODUCTION

The purpose of this memorandum is to explain the calculations used to estimate the volume of ≥ 50 mg/kg PCB-impacted material which can not be removed during the proposed East Plant Area Interim Measure (IM) at the General Motors Corporation (GM) Powertrain Facility located in Bedford, Indiana (Site). Portions of the identified ≥ 50 mg/kg PCB-impacted material within or adjacent to the AOI 8 and AOI 10 areas have been identified as technically impractical to excavate. In the AOI 8 area, numerous underground utilities and structures, combined with the depth of the impacted material, makes excavation of soil in this area technically impractical. In areas adjacent to AOI 10, slope stability concerns associated with the stormwater pond make portions of the ≥ 50 mg/kg PCB-impacted material technically impractical to excavate.

## B. ESTIMATE VOLUME OF ≥ 50 MG/KG PCB-IMPACTED MATERIAL IDENTIFIED AS TECHNICALLY IMPRACTICAL TO REMOVE

Delineation of the ≥ 50 mg/kg PCB-impacted material was based on the investigations completed during the various phases of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). The two areas identified as impractical to remove are Area 1 (north of the AOI 10) and Area 2 (AOI 8). The ≥ 50 mg/kg PCB isoconcentration contours and the two Areas identified as technically impractical to remove are presented on Figures F.1 through F.5. A plan view of cross section locations at the two Areas is presented on Figure F.6. Cross sections are presented on Figures F.7 and F.8.

The volume of ≥ 50 mg/kg PCB impacted material which is technically impractical to remove is estimated by multiplying the isoconcentration areas by the depth per elevation interval. These areas are assumed to be the horizontal boundary for the entire elevation interval with a thickness of 5 feet. The bedrock profile is also presented on Figures F.7 and F.8 which is used to adjust the estimate to remove the volume of material that is actually bedrock. This volume will be subtracted from the total estimated volume of material which is technically impractical to remove providing an estimate of the net quantity of soil. A summary of the

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

estimated volume of PCB-impacted material identified as technically impractical to remove is presented in Table F.1.

## C. SUMMARY

The total volume of ≥ 50 mg/kg PCB-impacted material in the East Plant Area is approximately 182,000 tons. Based on the calculations presented in Table F.1, the estimated volume which is technically impractical to remove is 10,200 tons from Area 1, and 14,900 tons from Area 2. The remaining material which can be practically excavated and placed in the proposed on-Facility landfill vault is approximately 157,000 tons.

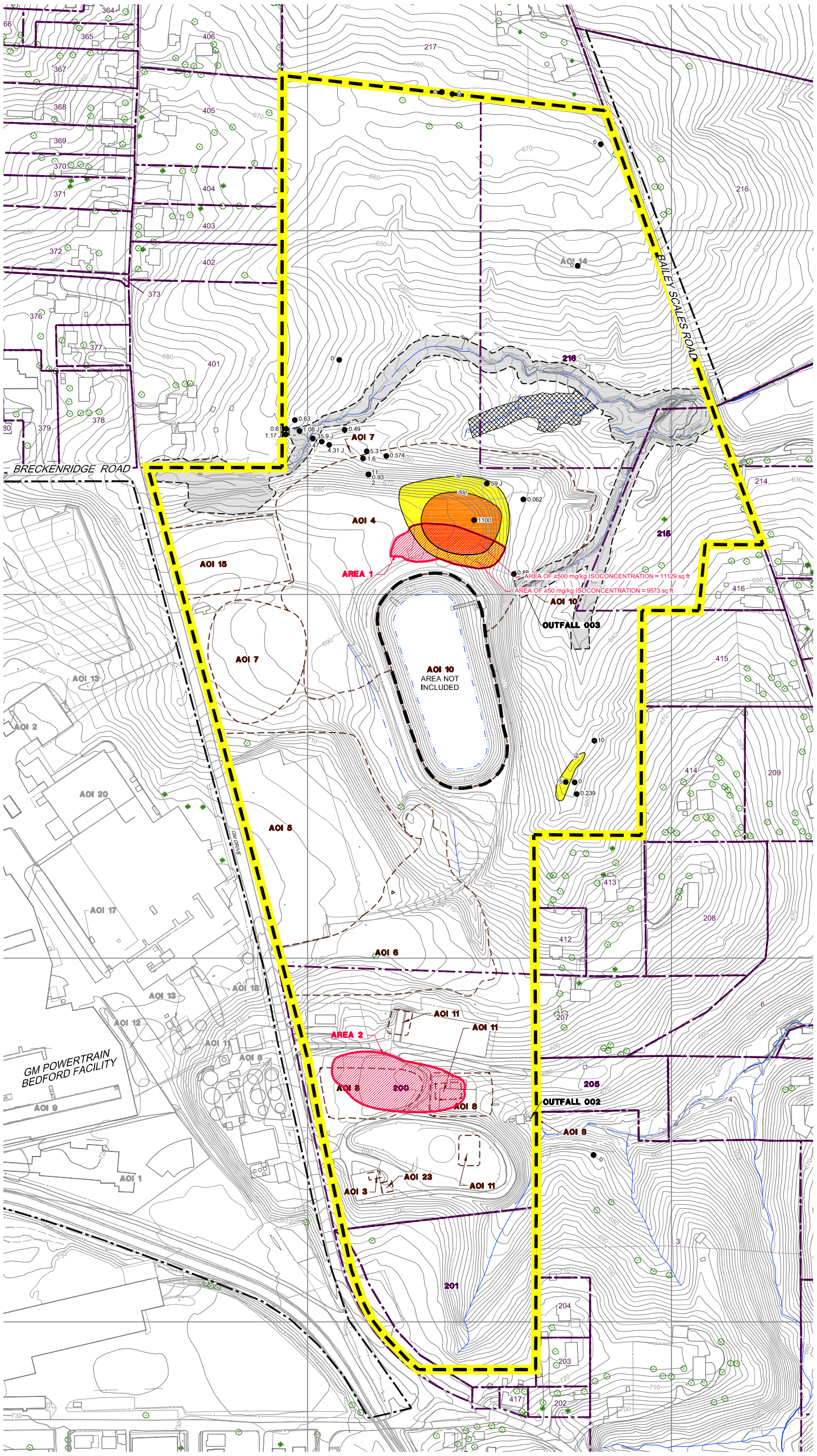
**TABLE F.1**

**ESTIMATE OF VOLUME OF PCB-IMPACTED MATERIAL NOT REMOVABLE DUE TO TECHNICAL IMPRACTICABILITY**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| Elevations | | Area | Depth | Estimated Volume of PCB-Impacted Soil and Bedrock | | | Estimated Volume of PCB-Impacted Bedrock | | | Net Volume of PCB-Impacted Soil Impractical to Remove | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *(feet AMSL)* | | *($ft^2$)* | *(ft)* | *($ft^3$)* | *(cu yd)* | *(Tons)* | *($ft^3$)* | *(cu yd)* | *(Tons)* | | *(Tons)* |
| *650-655* | Area 1 | 11,129 | 5 | 55,645 | 2,061 | 2,885 | 9,900 | 367 | 513 | | 2,372 |
| | | 9,573 | 5 | 47,865 | 1,773 | 2,482 | 11,250 | 417 | 583 | | 1,899 |
| | | | | | | | | | | sub-total for Area 1 | 4,271 |
| | | | | | | | | | | *sub-total 650-655* | *4,271* |
| *655-660* | Area 1 | 94 | 5 | 470 | 17 | 24 | | | | | 24 |
| | | | | | | | | | | sub-total for Area 1 | 24 |
| | | | | | | | | | | *sub-total 655-660* | *24* |
| *665-670* | Area 1 | 13,362 | 5 | 66,810 | 2,474 | 3,464 | | | | | 3,464 |
| | | 1,198 | 5 | 5,990 | 222 | 311 | | | | | 311 |
| | | | | | | | | | | sub-total for Area 1 | 3,775 |
| | Area 2 | 6,292 | 5 | 31,460 | 1,165 | 1,631 | 20,070 | 743 | 1,041 | | 591 |
| | | | | | | | | | | sub-total for Area 2 | 591 |
| | | | | | | | | | | *sub-total 665-670* | *4,365* |
| *670-675* | Area 1 | 5,022 | 5 | 25,110 | 930 | 1,302 | | | | | 1,302 |
| | | 3,110 | 5 | 15,550 | 576 | 806 | | | | | 806 |
| | | | | | | | | | | sub-total for Area 1 | 2,108 |
| | Area 2 | 21,303 | 5 | 106,515 | 3,945 | 5,523 | 4,950 | 183 | 257 | | 5,266 |
| | | 15,336 | 5 | 76,680 | 2,840 | 3,976 | 5,313 | 197 | 275 | | 3,701 |
| | | 4,046 | 5 | 20,230 | 749 | 1,049 | 3,000 | 111 | 156 | | 893 |
| | | | | | | | | | | sub-total for Area 2 | 9,860 |
| | | | | | | | | | | *sub-total 670-675* | *11,969* |
| *675-680* | Area 1 | 227 | 5 | 1,135 | 42 | 59 | | | | | 59 |
| | | | | | | | | | | sub-total for Area 1 | 59 |
| | Area 2 | 9,146 | 5 | 45,730 | 1,694 | 2,371 | 3,300 | 122 | 171 | | 2,200 |
| | | 8,379 | 5 | 41,895 | 1,552 | 2,172 | 5,500 | 204 | 285 | | 1,887 |
| | | 1,814 | 5 | 9,070 | 336 | 470 | 3,000 | 111 | 156 | | 315 |
| | | | | | | | | | | sub-total for Area 2 | 4,402 |
| | | | | | | | | | | *sub-total 675-680* | *4,461* |
| | | | | | | | | | | *Total for Area 1* | *10,237* |
| | | | | | | | | | | *Total for Area 2* | *14,853* |
| | | | | | | | | | | **TOTAL** | **25,090** |

**Notes:**
cu yd - cubic yard
kg - kilograms
mg/kg - milligrams per kilogram
tons - short tons (2,000 lbs)
Conversion rate of cubic yards to tons = 1.4 ton/cubic yards.
Conversion rate of pounds to kilograms = 2.2046 pounds/kilograms.
Dry weight content of soil is 76.2% dry solids to total mass.
(1) - Estimated based upon existing data.

References
http://www.onlineconversion.com/weight_all.htm




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- MATERIAL WHICH IS IMPRACTICAL TO REMOVE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

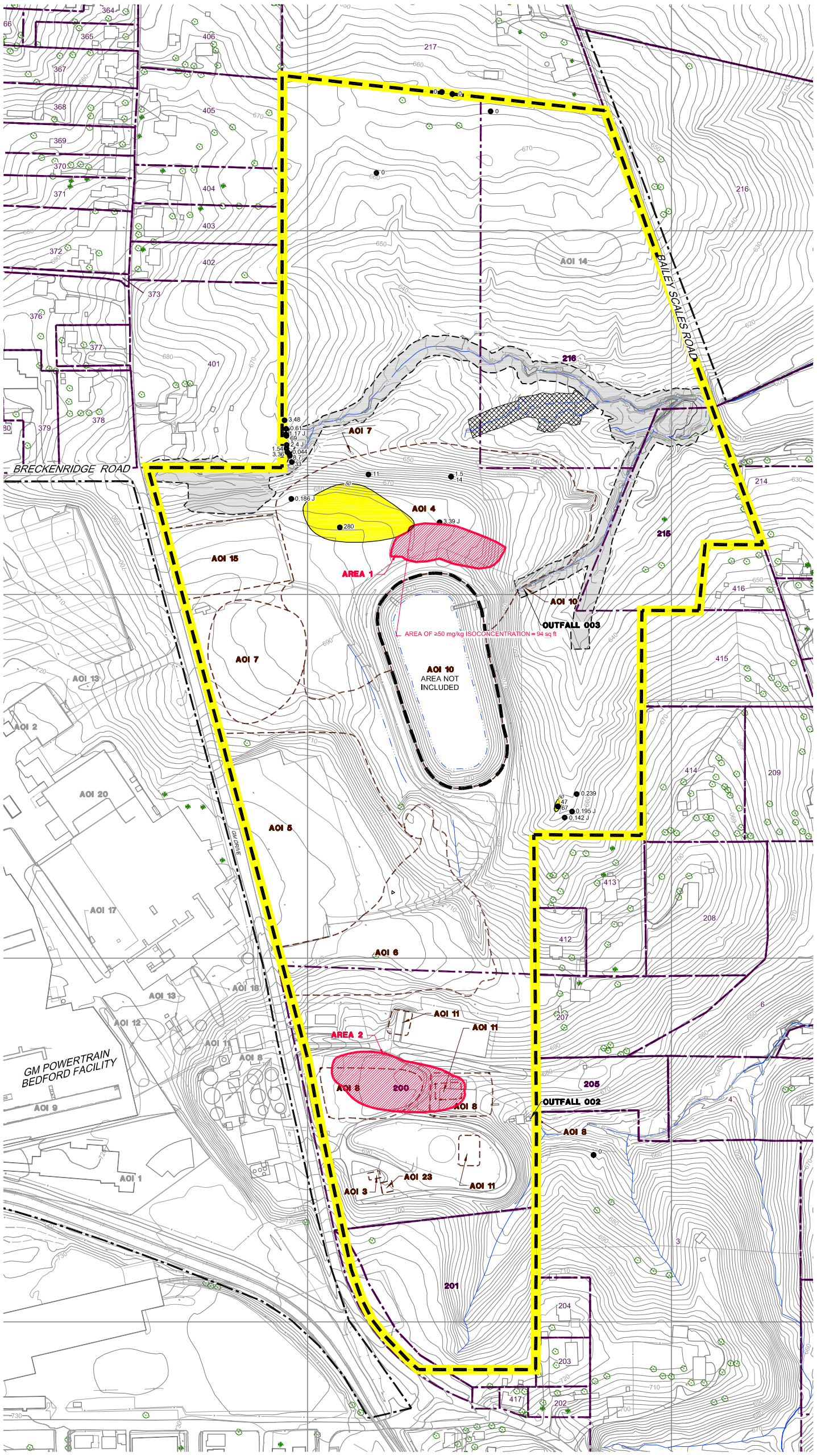
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
650-655 FEET AMSL

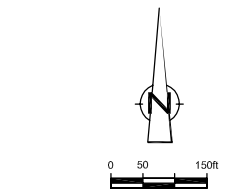
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure F.1 |

13968-00(151)GN-WA117 MAY 17/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- MATERIAL WHICH IS IMPRACTICAL TO REMOVE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
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| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge Disposal and Fire Training Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment Filter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

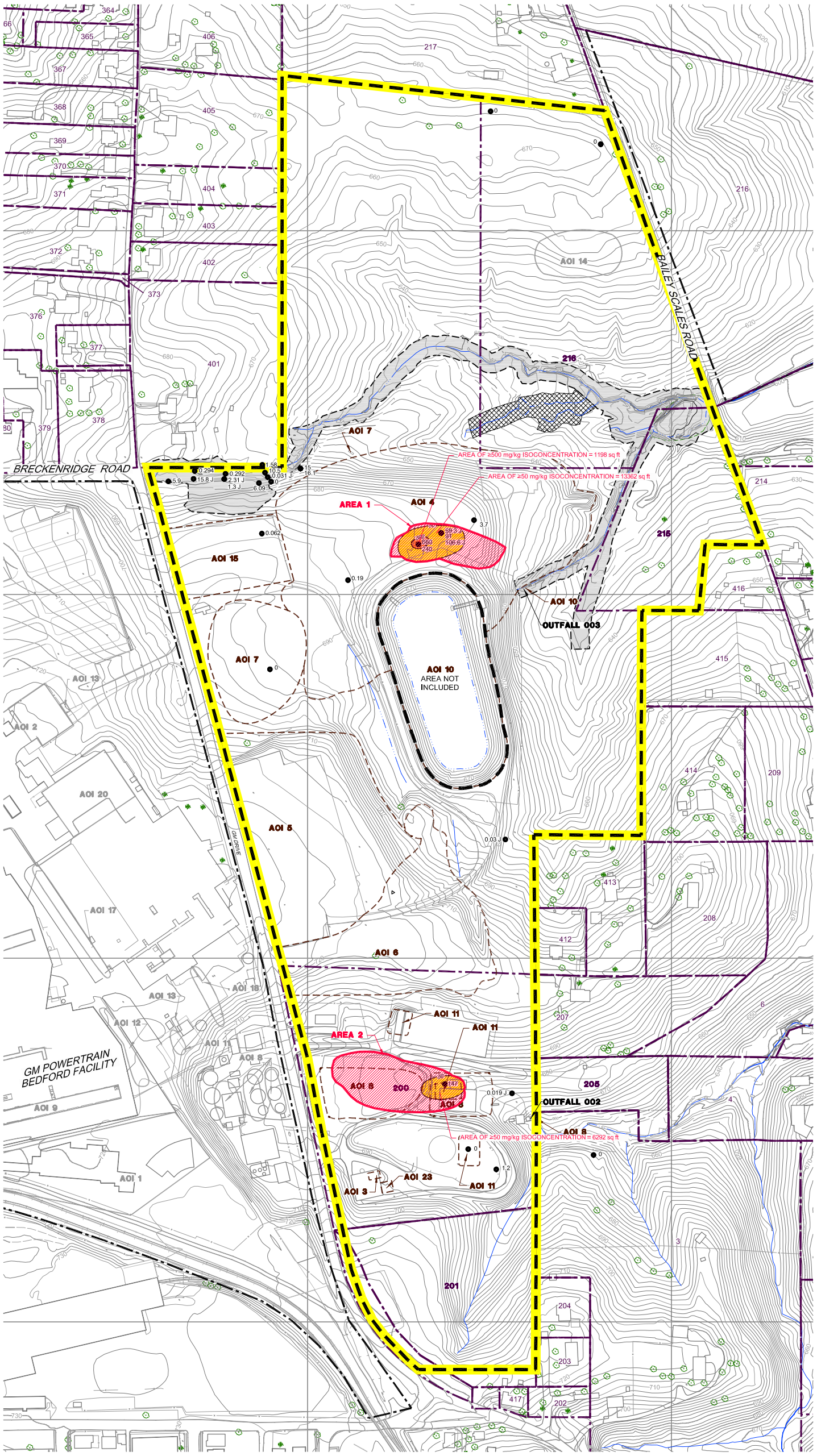
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
655-660 FEET AMSL

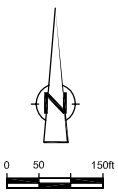
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure F.2 |

13968-00(151)GN-WA118 MAY 17/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- MATERIAL WHICH IS IMPRACTICAL TO REMOVE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
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| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment FIlter Cake Release |

| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

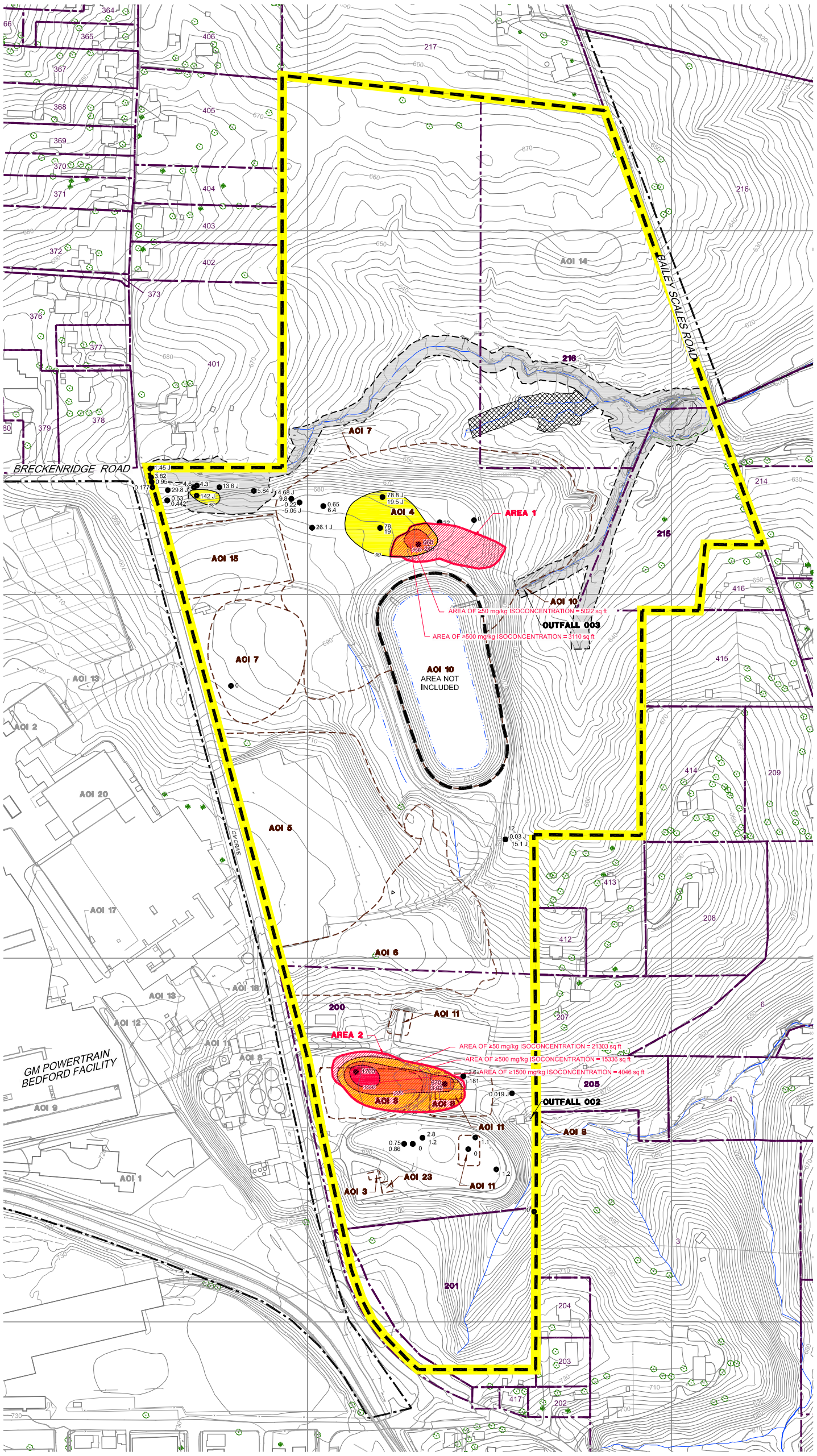
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
665-670 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure F.3 |

13968-00(151)GN-WA119 MAY 17/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION
- MATERIAL WHICH IS IMPRACTICAL TO REMOVE

NOTES:

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| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

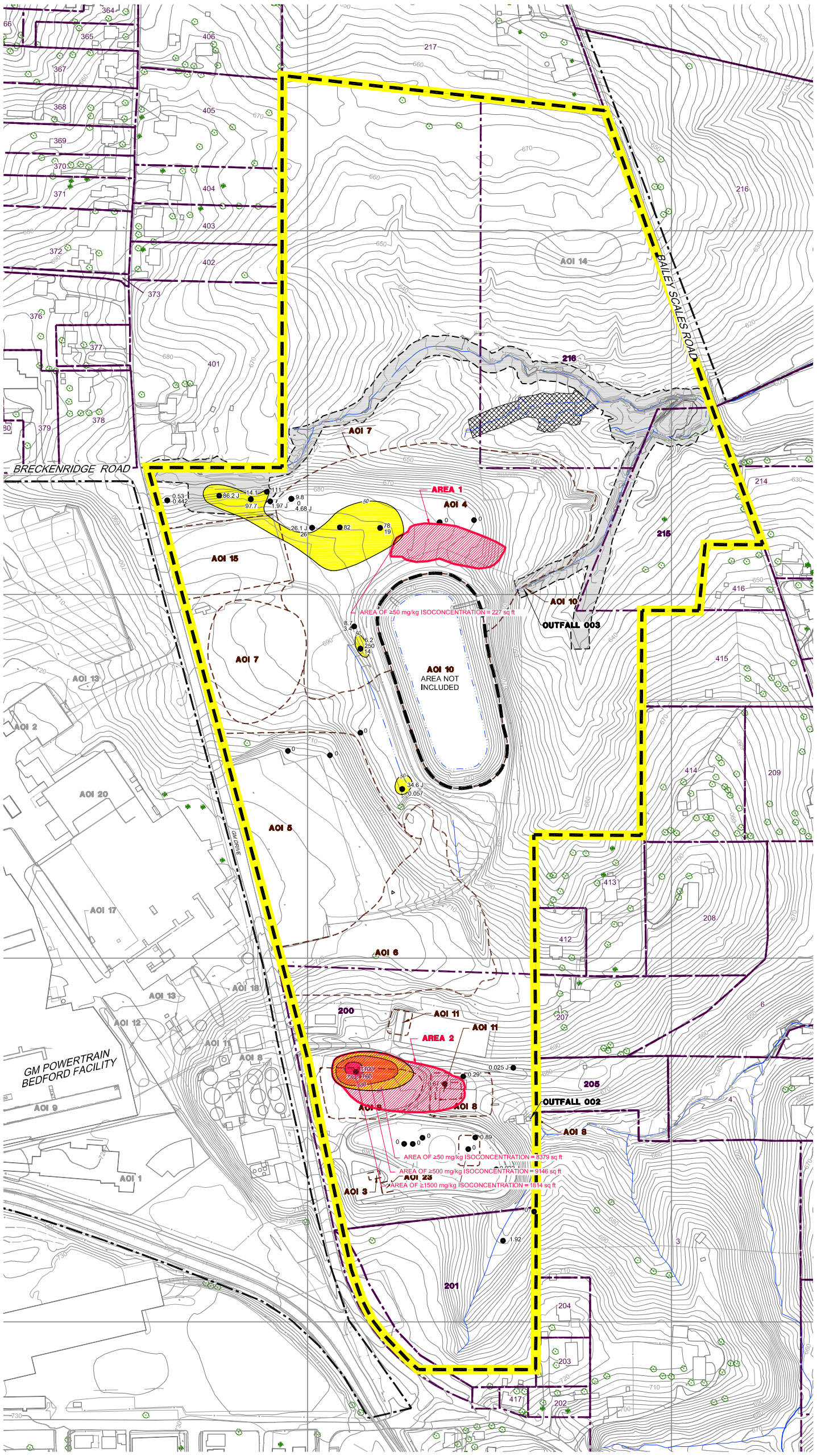
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
670-675 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure F.4 |

13968-00(151)GN-WA120 MAY 17/2005




0 50 150ft

## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
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- ≥50 mg/kg ISOCONCENTRATION
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- ≥1500 mg/kg ISOCONCENTRATION
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| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
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| № | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

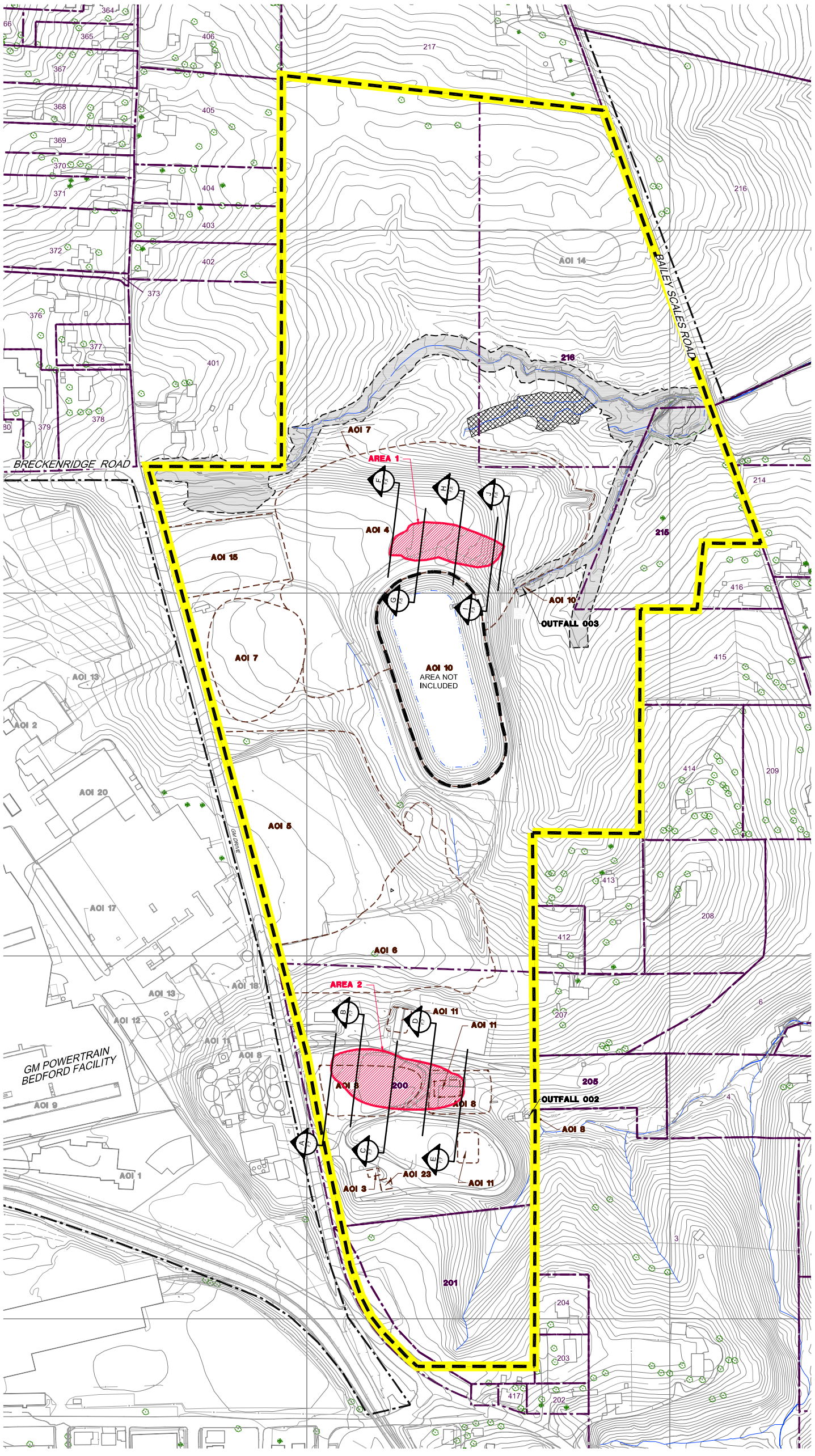
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS
675-680 FEET AMSL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project №: 13968-00 | Report №: 151 | Drawing №: figure F.5 |

13968-00(151)GN-WA121 MAY 17/2005




## LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- EAST PLANT AREA
- REMOVAL ACTION EXCAVATION AREA NOT INCLUDED IN EAST PLANT AREA IM
- RA EXCAVATION AREA INCLUDED IN COVER AREA
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION
- MATERIAL WHICH IS IMPRACTICAL TO REMOVE

NOTES:

1) PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

**AOI SUMMARY**

| AOI ID | Description |
|---|---|
| AOI 3 | PCB Storage Areas |
| AOI 4 | Former North Disposal Area |
| AOI 5 | Former East Sand Disposal Area |
| AOI 6 | Former Sludge DIsposal and FIre TraInIng Area |
| AOI 7 | Former North Lagoon and Outfall 001 |
| AOI 8 | Former South Lagoons and Outfall 002 |
| AOI 10 | Existing Stormwater Lagoon and Outfall 003 |
| AOI 11 | Aboveground Storage Tanks |
| AOI 15 | Former Equipment Storage Area |
| AOI 23 | Area Affected by the 1996 Wastewater Treatment FIlter Cake Release |

| Nº | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

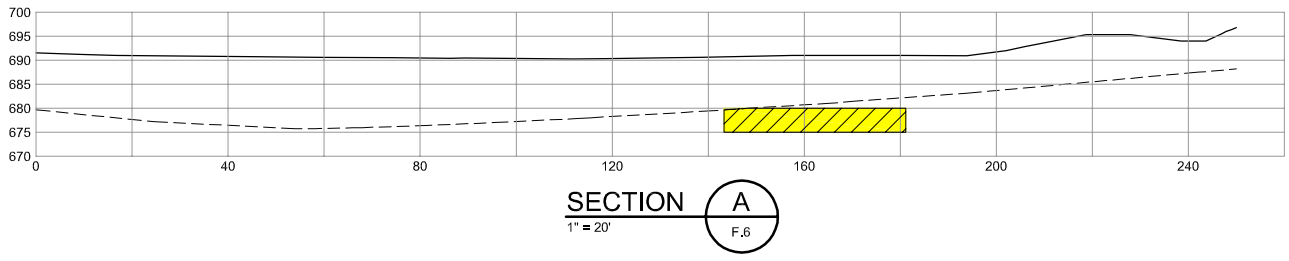
SCENARIO 1
PCB ISOCONCENTRATION CONTOURS

CONESTOGA-ROVERS & ASSOCIATES

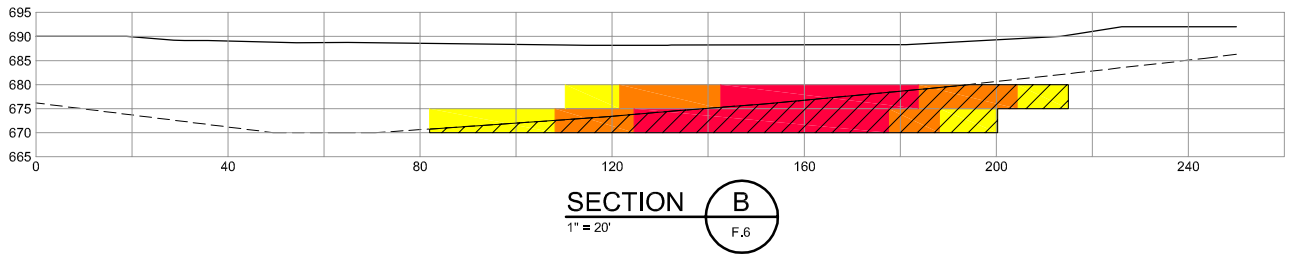
Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001.

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: AS SHOWN | Project Nº: 13968-00 | Report Nº: 151 | Drawing Nº: figure F.6 |

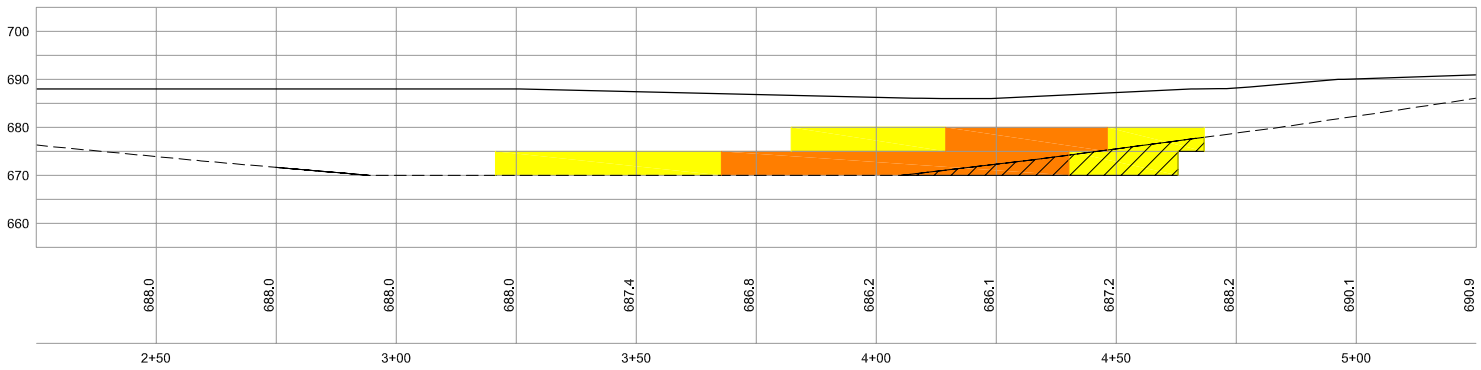
13968-00(151)GN-WA122 MAY 17/2005



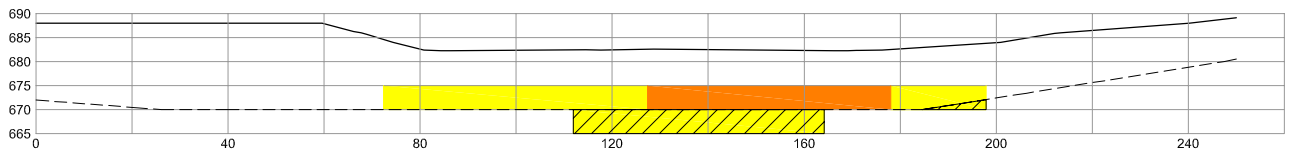

SECTION A
1" = 20'
F.6



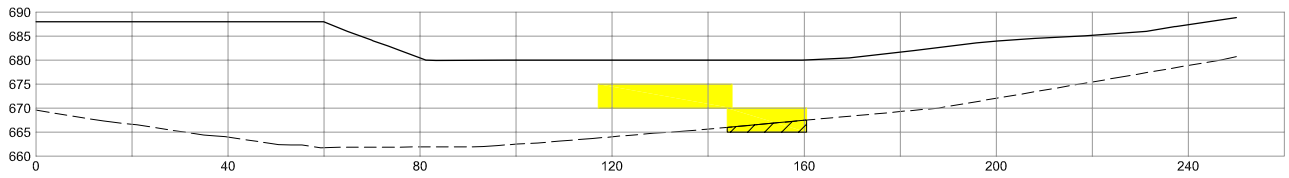

SECTION B
1" = 20'
F.6




SECTION C
1" = 20'
F.6




SECTION D
1" = 20'
F.6




SECTION E
1" = 20'
F.6

LEGEND

- EXISTING GROUND SURFACE
- APROXIMATE TOP OF BEDROCK
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION
- AREA BELOW BEDROCK

| N° | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

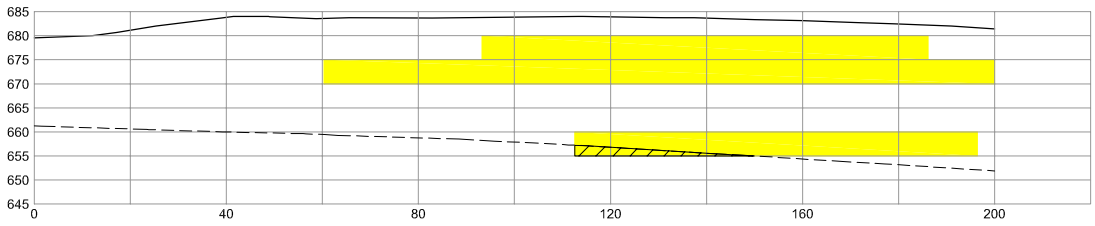
PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

CROSS SECTIONS
PCB ISOCONCENTRATION IN BEDROCK
AREA 2

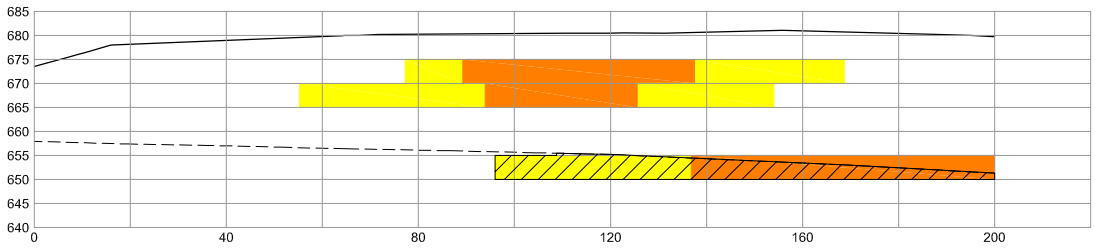
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

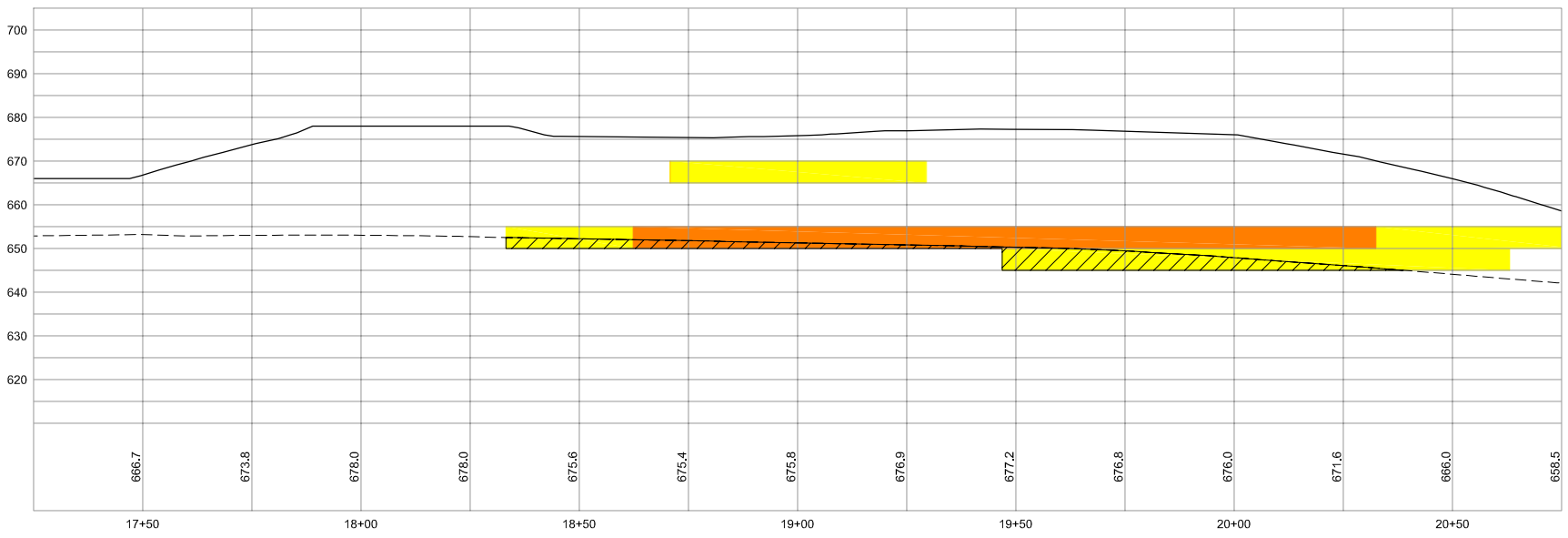
| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: 1" = 20' | Project N°: 13968-00 | Report N°: 151 | Drawing N°: figure F.7 |



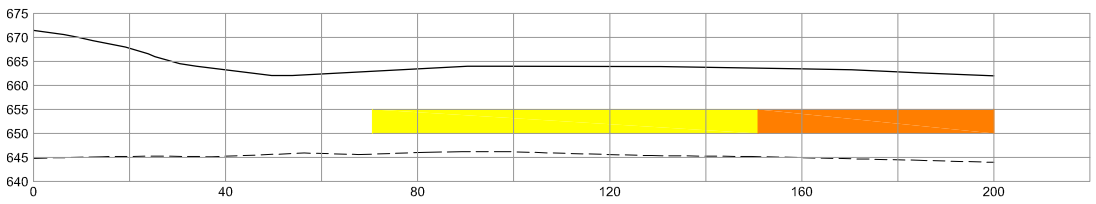

SECTION F
1" = 20'
F.6



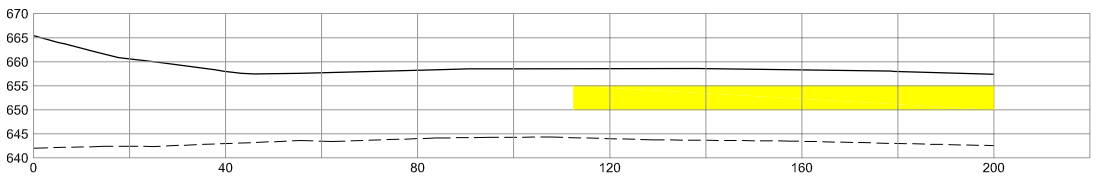

SECTION G
1" = 20'
F.6




SECTION H
1" = 20'
F.6




SECTION I
1" = 20'
F.6




SECTION J
1" = 20'
F.6

LEGEND

- EXISTING GROUND SURFACE
- APROXIMATE TOP OF BEDROCK
- ≥50 mg/kg ISOCONCENTRATION
- ≥500 mg/kg ISOCONCENTRATION
- ≥1500 mg/kg ISOCONCENTRATION
- AREA BELOW BEDROCK

| N♯ | Revision | Date | Initial |
|---|---|---|---|
| | | | |

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

PROPOSED SCOPE OF WORK FOR EAST PLANT AREA

CROSS SECTIONS
PCB ISOCONCENTRATION IN BEDROCK
AREA 1

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

| Project Manager: | Reviewed By: | Date: | |
|---|---|---|---|
| J.M. | J.S. | DECEMBER 2004 | |
| Scale: 1" = 20' | Project N♯: 13968-00 | Report N♯: 151 | Drawing N♯: figure F.8 |

13968-00(151)GN-WA122 MAY 17/2005

# APPENDIX G

## COST ESTIMATES FOR OTHER INTERIM MEASURE ALTERNATIVES

| | |
|---|---|
| APPENDIX G.1 | SCENARIO 2: 0 – 2 FOOT DEPTH BGS |
| APPENDIX G.2 | SCENARIO 3: 0 – 10 FOOT DEPTH BGS |
| APPENDIX G.3 | SCENARIO 4: 0 – 15 FOOT DEPTH BGS |

# APPENDIX G.1

# SCENARIO 2: 0 – 2 FOOT DEPTH BGS

**TABLE G.1-1**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 900 | cu yd | $ 15 | $ 13,500 |
| | b) Excavation of PCB-Impacted Soil | 9,000 | cu yd | $ 6 | $ 54,000 |
| | c) Transportation and Off-Facility Disposal | 12,600 | Ton | $ 125 | $ 1,575,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 12,600 | Ton | $ 16 | $ 201,600 |
| | e) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,856,100 |

**TABLE G.1-1**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 566,200 | $ 566,200 |
| 9. | Mobilization/Demobilization | 5 | % | $ 566,200 | $ 566,200 |
| 10. | Permits | 2 | % | $ 226,500 | $ 226,500 |
| 11. | Health and Safety | 5 | % | $ 566,200 | $ 566,200 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 339,700 | $ 339,700 |
| | | | Estimated Capital Cost | | $ 13,589,250 |
| | | | Engineering (20%) | | $ 2,717,850 |
| | | | Subtotal | | $ 16,307,100 |
| | | | Contingency (20%) | | $ 3,261,420 |
| | | | Total Estimated Capital Cost | | $ 19,568,520 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.1-1**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 19,568,520 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | | **Total Present Worth (1)** | | | $ 33,131,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-2**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 350 | cu yd | $ 15 | $ 5,250 |
| | b) Excavation of PCB-Impacted Soil | 2,700 | cu yd | $ 6 | $ 16,200 |
| | c) Transportation and Off-Facility Disposal | 3,780 | Ton | $ 125 | $ 472,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,780 | Ton | $ 16 | $ 60,480 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | | | | Item 6 Subtotal | $ 560,430 |

**TABLE G.1-2**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 501,400 | $ 501,400 |
| 9. | Mobilization/Demobilization | 5 | % | $ 501,400 | $ 501,400 |
| 10. | Permits | 2 | % | $ 200,600 | $ 200,600 |
| 11. | Health and Safety | 5 | % | $ 501,400 | $ 501,400 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 300,900 | $ 300,900 |
| | | Estimated Capital Cost | | | $ 12,034,480 |
| | | Engineering (20%) | | | $ 2,406,896 |
| | | Subtotal | | | $ 14,441,376 |
| | | Contingency (20%) | | | $ 2,888,275 |
| | | Total Estimated Capital Cost | | | $ 17,329,651 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | Estimated Annual Operation and Maintenance Cost | | $ 494,000 to | $ 704,000 |
| | | Contingency (20%) | | $ 98,800 to | $ 140,800 |
| | | Total Estimated Annual Operation and Maintenance Cost | | $ 592,800 to | $ 844,800 |

**TABLE G.1-2**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 17,329,651 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 30,892,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-3**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 150 | cu yd | $ 15 | $ 2,250 |
| | b) Excavation of PCB-Impacted Soil | 800 | cu yd | $ 6 | $ 4,800 |
| | c) Transportation and Off-Facility Disposal | 1,120 | Ton | $ 125 | $ 140,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 1,120 | Ton | $ 16 | $ 17,920 |
| | e) Existing utilities in place support | 100 | ft | $ 30 | $ 3,000 |
| | | | | Item 6 Subtotal | $ 167,970 |

**TABLE G.1-3**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 481,800 | $ 481,800 |
| 9. | Mobilization/Demobilization | 5 | % | $ 481,800 | $ 481,800 |
| 10. | Permits | 2 | % | $ 192,700 | $ 192,700 |
| 11. | Health and Safety | 5 | % | $ 481,800 | $ 481,800 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 289,100 | $ 289,100 |
| | | | Estimated Capital Cost | | $ 11,563,520 |
| | | | Engineering (20%) | | $ 2,312,704 |
| | | | Subtotal | | $ 13,876,224 |
| | | | Contingency (20%) | | $ 2,775,245 |
| | | | Total Estimated Capital Cost | | $ 16,651,469 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.1-3**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 16,651,469 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 30,214,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-4**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,128,000 | sq ft | $ 0.30 | $ 338,400 |
| | b) 12-in Clay Barrier Layer | 1,128,000 | sq ft | $ 1.10 | $ 1,240,800 |
| | c) Geocomposite Clay Liner | 1,128,000 | sq ft | $ 0.80 | $ 902,400 |
| | d) Geonet drainage layer | 1,128,000 | sq ft | $ 0.90 | $ 1,015,200 |
| | e) Common Fill | 1,128,000 | sq ft | $ 0.60 | $ 676,800 |
| | f) Vegetative Cover | 1,128,000 | sq ft | $ 0.10 | $ 112,800 |
| | g) 6-in Topsoil | 1,128,000 | sq ft | $ 0.40 | $ 451,200 |
| | | | | Item 4 Subtotal | $ 4,737,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 425,000 | sq ft | $ 0.40 | $ 170,000 |
| | b) 18-in Common Fill | 425,000 | sq ft | $ 0.90 | $ 382,500 |
| | c) 12-in Sand Drainage Layer | 425,000 | sq ft | $ 0.75 | $ 318,750 |
| | d) 20-mil HDPE Liner | 425,000 | sq ft | $ 0.45 | $ 191,250 |
| | e) 24-in Clay Barrier | 425,000 | sq ft | $ 2.20 | $ 935,000 |
| | f) Vegetative Cover | 425,000 | sq ft | $ 0.10 | $ 42,500 |
| | g) Liner System | 425,000 | sq ft | $ 2.85 | $ 1,211,250 |
| | | | | Item 5 Subtotal | $ 3,251,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-4**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 900 | cu yd | $ 15 | $ 13,500 |
| | b) Excavation of PCB-Impacted Soil | 9,000 | cu yd | $ 6 | $ 54,000 |
| | c) Placement of Soil in On-Facility Vault | 12,600 | Ton | $ 4 | $ 50,400 |
| | d) Supply and backfill imported clean fill to excavated areas | 6,300 | Ton | $ 16 | $ 100,800 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | | | | Item 7 Subtotal | $ 224,700 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 558,000 | $ 558,000 |
| 10. | Mobilization/Demobilization | 5 | % | $ 558,000 | $ 558,000 |
| 11. | Permits | 2 | % | $ 223,200 | $ 223,200 |
| 12. | Health and Safety | 5 | % | $ 558,000 | $ 558,000 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 334,800 | $ 334,800 |
| | | | | Estimated Capital Cost | $ 13,391,300 |
| | | | | Engineering (20%) | $ 2,678,260 |
| | | | | Subtotal | $ 16,069,560 |
| | | | | Contingency (20%) | $ 3,213,912 |
| | | | | Total Estimated Capital Cost | $ 19,283,472 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-4**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 19,283,472 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually<br>for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 32,896,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-5**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-5**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 350 | cu yd | $ 15 | $ 5,250 |
| | b) Excavation of PCB-Impacted Soil | 2,700 | cu yd | $ 6 | $ 16,200 |
| | c) Placement of Soil in On-Facility Vault | 3,780 | Ton | $ 4 | $ 15,120 |
| | d) Supply and backfill imported clean fill to excavated areas | 1,890 | Ton | $ 16 | $ 30,240 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | | | | Item 7 Subtotal | $ 72,810 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 507,200 | $ 507,200 |
| 10. | Mobilization/Demobilization | 5 | % | $ 507,200 | $ 507,200 |
| 11. | Permits | 2 | % | $ 202,900 | $ 202,900 |
| 12. | Health and Safety | 5 | % | $ 507,200 | $ 507,200 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 304,300 | $ 304,300 |
| | | | | Estimated Capital Cost | $ 12,173,710 |
| | | | | Engineering (20%) | $ 2,434,742 |
| | | | | Subtotal | $ 14,608,452 |
| | | | | Contingency (20%) | $ 2,921,690 |
| | | | | Total Estimated Capital Cost | $ 17,530,142 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-5**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,530,142 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,143,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-6**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3.00 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-6**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 150 | cu yd | $ 15 | $ 2,250 |
| | b) Excavation of PCB-Impacted Soil | 800 | cu yd | $ 6 | $ 4,800 |
| | c) Placement of Soil in On-Facility Vault | 1,120 | Ton | $ 4 | $ 4,480 |
| | d) Supply and backfill imported clean fill to excavated areas | 560 | Ton | $ 16 | $ 8,960 |
| | e) Existing utilities in place support | 100 | ft | $ 30 | $ 3,000 |
| | | | | Item 7 Subtotal | $ 23,490 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 487,500 | $ 487,500 |
| 10. | Mobilization/Demobilization | 5 | % | $ 487,500 | $ 487,500 |
| 11. | Permits | 2 | % | $ 195,000 | $ 195,000 |
| 12. | Health and Safety | 5 | % | $ 487,500 | $ 487,500 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 292,500 | $ 292,500 |
| | | | Estimated Capital Cost | | $ 11,700,590 |
| | | | Engineering (20%) | | $ 2,340,118 |
| | | | Subtotal | | $ 14,040,708 |
| | | | Contingency (20%) | | $ 2,808,142 |
| | | | Total Estimated Capital Cost | | $ 16,848,850 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-6**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 16,848,850 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 30,462,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-7**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 9,000 | cu yd | $ 40 | $ 360,000 |
| | b) Jet grouting | 200 | ft | $ 15 | $ 3,000 |
| | | | | Item 6 Subtotal | $ 363,000 |

**TABLE G.1-7**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 491,600 | $ 491,600 |
| 9. | Mobilization/Demobilization | 5 | % | $ 491,600 | $ 491,600 |
| 10. | Permits | 2 | % | $ 196,600 | $ 196,600 |
| 11. | Health and Safety | 5 | % | $ 491,600 | $ 491,600 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 294,900 | $ 294,900 |
| | | | Estimated Capital Cost | | $ 11,797,650 |
| | | | Engineering (20%) | | $ 2,359,530 |
| | | | Subtotal | | $ 14,157,180 |
| | | | Contingency (20%) | | $ 2,831,436 |
| | | | Total Estimated Capital Cost | | $ 16,988,616 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.1-7**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,988,616 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 30,551,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-8**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 2,700 | cu yd | $ 40 | $ 108,000 |
| | b) Jet grouting | 50 | ft | $ 15 | $ 750 |
| | | | | Item 6 Subtotal | $ 108,750 |

**TABLE G.1-8**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 478,900 | $ 478,900 |
| 9. | Mobilization/Demobilization | 5 | % | $ 478,900 | $ 478,900 |
| 10. | Permits | 2 | % | $ 191,500 | $ 191,500 |
| 11. | Health and Safety | 5 | % | $ 478,900 | $ 478,900 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 287,300 | $ 287,300 |
| | | | | Estimated Capital Cost | $ 11,492,600 |
| | | | | Engineering (20%) | $ 2,298,520 |
| | | | | Subtotal | $ 13,791,120 |
| | | | | Contingency (20%) | $ 2,758,224 |
| | | | | Total Estimated Capital Cost | $ 16,549,344 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE G.1-8**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,549,344 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | | **Total Present Worth (1)** | | | $ | 30,112,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-9**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 800 | cu yd | $ 40 | $ 32,000 |
| | b) Jet grouting | 25 | ft | $ 15 | $ 375 |
| | | | | Item 6 Subtotal | $ 32,375 |

**TABLE G.1-9**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 475,000 | $ 475,000 |
| 9. | Mobilization/Demobilization | 5 | % | $ 475,000 | $ 475,000 |
| 10. | Permits | 2 | % | $ 190,000 | $ 190,000 |
| 11. | Health and Safety | 5 | % | $ 475,000 | $ 475,000 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 285,000 | $ 285,000 |
| | | | Estimated Capital Cost | | $ 11,400,725 |
| | | | Engineering (20%) | | $ 2,280,145 |
| | | | Subtotal | | $ 13,680,870 |
| | | | Contingency (20%) | | $ 2,736,174 |
| | | | Total Estimated Capital Cost | | $ 16,417,044 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.1-9**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,417,044 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | | **Total Present Worth (1)** | | | $ | 29,980,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-10**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | FT | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | FT | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | FT | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | FT | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | FT | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | FT | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | $FT^2$ | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | $FT^2$ | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | $FT^2$ | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | $FT^2$ | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | $FT^2$ | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | $FT^2$ | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | $FT^2$ | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | $FT^2$ | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | FT | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | FT | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 350 | C.Y. | $ 10 | $ 3,500 |
| | b) Excavation of PCB-Impacted Soil | 2,700 | C.Y. | $ 6 | $ 16,200 |
| | c) Transportation and Off-Facility Disposal | 3,780 | Ton | $ 125 | $ 472,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,780 | Ton | $ 16 | $ 60,480 |
| | e) Existing utilities in place support | 200 | FT | $ 30 | $ 6,000 |
| | | | | Item 6 Subtotal | $ 558,680 |

**TABLE G.1-10**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 6,300 | C.Y. | $ 40 | $ 252,000 |
| | b) Jet grouting | 125 | FT | $ 15 | $ 1,875 |
| | | | | Item 7 Subtotal | $ 253,875 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 85,700 | $ 85,700 |
| 10. | Mobilization/Demobilization | 5 | % | $ 100,100 | $ 100,100 |
| 11. | Permits | 2 | % | $ 75,000 | $ 75,000 |
| 12. | Health and Safety | 5 | % | $ 514,000 | $ 514,000 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 308,400 | $ 308,400 |
| | | | | Estimated Capital Cost | $ 11,364,105 |
| | | | | Engineering (20%) | $ 2,272,821 |
| | | | | Subtotal | $ 13,636,926 |
| | | | | Contingency (20%) | $ 2,727,385 |
| | | | | Total Estimated Capital Cost | $ 16,364,311 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE G.1-10**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,364,311 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 29,927,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-11**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 150 | cu yd | $ 10 | $ 1,500 |
| | b) Excavation of PCB-Impacted Soil | 800 | cu yd | $ 6 | $ 4,800 |
| | c) Transportation and Off-Facility Disposal | 1,120 | Ton | $ 125 | $ 140,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 1,120 | Ton | $ 16 | $ 17,920 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | | | | Item 6 Subtotal | $ 170,220 |

**TABLE G.1-11**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 1,900 | cu yd | $ 40 | $ 76,000 |
| | b) Jet grouting | 50 | ft | $ 15 | $ 750 |
| | | | | Item 7 Subtotal | $ 76,750 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 69,100 | $ 69,100 |
| 10. | Mobilization/Demobilization | 5 | % | $ 64,000 | $ 64,000 |
| 11. | Permits | 2 | % | $ 57,000 | $ 57,000 |
| 12. | Health and Safety | 5 | % | $ 485,800 | $ 485,800 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 291,500 | $ 291,500 |
| | | | | Estimated Capital Cost | $ 10,682,720 |
| | | | | Engineering (20%) | $ 2,136,544 |
| | | | | Subtotal | $ 12,819,264 |
| | | | | Contingency (20%) | $ 2,563,853 |
| | | | | Total Estimated Capital Cost | $ 15,383,117 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-11**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 494,000 to | $ 704,000 |
| | Contingency (20%) | | | $ 98,800 to | $ 140,800 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 592,800 to | $ 844,800 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 15,383,117 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually<br>for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 28,946,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-12**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-12**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 350 | cu yd | $ 10 | $ 3,500 |
| | b) Excavation of PCB-Impacted Soil | 2,700 | cu yd | $ 6 | $ 16,200 |
| | c) Placement of Soil in On-Facility Vault | 3,780 | Ton | $ 4 | $ 15,120 |
| | d) Supply and backfill imported clean fill to excavated areas | 1,890 | Ton | $ 16 | $ 30,240 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | | | | Item 7 Subtotal | $ 71,060 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 6,300 | cu yd | $ 40 | $ 252,000 |
| | b) Jet grouting | 125 | ft | $ 15 | $ 1,875 |
| | | | | Item 8 Subtotal | $ 253,875 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 519,900 | $ 519,900 |
| 11. | Mobilization/Demobilization | 5 | % | $ 519,900 | $ 519,900 |
| 12. | Permits | 2 | % | $ 207,900 | $ 207,900 |
| 13. | Health and Safety | 5 | % | $ 519,900 | $ 519,900 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 311,900 | $ 311,900 |
| | | Estimated Capital Cost | | | $ 12,476,535 |
| | | Engineering (20%) | | | $ 2,495,307 |
| | | Subtotal | | | $ 14,971,842 |
| | | Contingency (20%) | | | $ 2,994,368 |
| | | Total Estimated Capital Cost | | | $ 17,966,210 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-12**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,966,210 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,579,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-13**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-13**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 150 | cu yd | $ 10 | $ 1,500 |
| | b) Excavation of PCB-Impacted Soil | 800 | cu yd | $ 6 | $ 4,800 |
| | c) Placement of Soil in On-Facility Vault | 1,120 | Ton | $ 4 | $ 4,480 |
| | d) Supply and backfill imported clean fill to excavated areas | 560 | Ton | $ 16 | $ 8,960 |
| | e) Existing utilities in place support | 100 | ft | $ 30 | $ 3,000 |
| | | | | Item 7 Subtotal | $ 22,740 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 1,900 | cu yd | $ 40 | $ 76,000 |
| | b) Jet grouting | 50 | ft | $ 15 | $ 750 |
| | | | | Item 8 Subtotal | $ 76,750 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 491,300 | $ 491,300 |
| 11. | Mobilization/Demobilization | 5 | % | $ 491,300 | $ 491,300 |
| 12. | Permits | 2 | % | $ 196,500 | $ 196,500 |
| 13. | Health and Safety | 5 | % | $ 491,300 | $ 491,300 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 294,800 | $ 294,800 |
| | | | | Estimated Capital Cost | $ 11,791,790 |
| | | | | Engineering (20%) | $ 2,358,358 |
| | | | | Subtotal | $ 14,150,148 |
| | | | | Contingency (20%) | $ 2,830,030 |
| | | | | Total Estimated Capital Cost | $ 16,980,178 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-13**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 16,980,178 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 30,593,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-14**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,488,000 | sq ft | $ 0.30 | $ 446,400 |
| | b) 12-in Clay Barrier Layer | 1,488,000 | sq ft | $ 1.10 | $ 1,636,800 |
| | c) Geocomposite Clay Liner | 1,488,000 | sq ft | $ 0.80 | $ 1,190,400 |
| | d) Geonet drainage layer | 1,488,000 | sq ft | $ 0.90 | $ 1,339,200 |
| | e) Common Fill | 1,488,000 | sq ft | $ 0.60 | $ 892,800 |
| | f) Vegetative Cover | 1,488,000 | sq ft | $ 0.10 | $ 148,800 |
| | g) 6-in Topsoil | 1,488,000 | sq ft | $ 0.40 | $ 595,200 |
| | | | | Item 4 Subtotal | $ 6,249,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 65,000 | sq ft | $ 0.40 | $ 26,000 |
| | b) 18-in Common Fill | 65,000 | sq ft | $ 0.90 | $ 58,500 |
| | c) 12-in Sand Drainage Layer | 65,000 | sq ft | $ 0.75 | $ 48,750 |
| | d) 20-mil HDPE Liner | 65,000 | sq ft | $ 0.45 | $ 29,250 |
| | e) 24-in Clay Barrier | 65,000 | sq ft | $ 2.20 | $ 143,000 |
| | f) Vegetative Cover | 65,000 | sq ft | $ 0.10 | $ 6,500 |
| | g) Liner System | 65,000 | sq ft | $ 2.85 | $ 185,250 |
| | | | | Item 5 Subtotal | $ 497,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-14**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 900 | cu yd | $ 15 | $ 13,500 |
| | b) Excavation of PCB-Impacted Soil | 9,000 | cu yd | $ 6 | $ 54,000 |
| | c) Placement of Soil in On-Facility Vault | 11,480 | Ton | $ 4 | $ 45,920 |
| | d) Transportation and Off-Facility Disposal | 1,120 | Ton | $ 125 | $ 140,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 6,860 | Ton | $ 16 | $ 109,760 |
| | f) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 375,180 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 503,400 | $ 503,400 |
| 10. | Mobilization/Demobilization | 5 | % | $ 503,400 | $ 503,400 |
| 11. | Permits | 2 | % | $ 201,400 | $ 201,400 |
| 12. | Health and Safety | 5 | % | $ 503,400 | $ 503,400 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 302,000 | $ 302,000 |
| | | | | Estimated Capital Cost | $ 12,081,380 |
| | | | | Engineering (20%) | $ 2,416,276 |
| | | | | Subtotal | $ 14,497,656 |
| | | | | Contingency (20%) | $ 2,899,531 |
| | | | | Total Estimated Capital Cost | $ 17,397,187 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-14**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,397,187 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,010,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.1-15**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,518,000 | sq ft | $ 0.30 | $ 455,400 |
| | b) 12-in Clay Barrier Layer | 1,518,000 | sq ft | $ 1.10 | $ 1,669,800 |
| | c) Geocomposite Clay Liner | 1,518,000 | sq ft | $ 0.80 | $ 1,214,400 |
| | d) Geonet drainage layer | 1,518,000 | sq ft | $ 0.90 | $ 1,366,200 |
| | e) Common Fill | 1,518,000 | sq ft | $ 0.60 | $ 910,800 |
| | f) Vegetative Cover | 1,518,000 | sq ft | $ 0.10 | $ 151,800 |
| | g) 6-in Topsoil | 1,518,000 | sq ft | $ 0.40 | $ 607,200 |
| | | | | Item 4 Subtotal | $ 6,375,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 35,000 | sq ft | $ 0.40 | $ 14,000 |
| | b) 18-in Common Fill | 35,000 | sq ft | $ 0.90 | $ 31,500 |
| | c) 12-in Sand Drainage Layer | 35,000 | sq ft | $ 0.75 | $ 26,250 |
| | d) 20-mil HDPE Liner | 35,000 | sq ft | $ 0.45 | $ 15,750 |
| | e) 24-in Clay Barrier | 35,000 | sq ft | $ 2.20 | $ 77,000 |
| | f) Vegetative Cover | 35,000 | sq ft | $ 0.10 | $ 3,500 |
| | g) Liner System | 35,000 | sq ft | $ 2.85 | $ 99,750 |
| | | | | Item 5 Subtotal | $ 267,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.1-15**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 350 | cu yd | $ 15 | $ 5,250 |
| | b) Excavation of PCB-Impacted Soil | 2,700 | cu yd | $ 6 | $ 16,200 |
| | c) Placement of Soil in On-Facility Vault | 2,660 | Ton | $ 4 | $ 10,640 |
| | d) Transportation and Off-Facility Disposal | 1,120 | Ton | $ 125 | $ 140,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 2,450 | Ton | $ 16 | $ 39,200 |
| | f) Existing utilities in place support | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 223,290 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 490,600 | $ 490,600 |
| 10. | Mobilization/Demobilization | 5 | % | $ 490,600 | $ 490,600 |
| 11. | Permits | 2 | % | $ 196,200 | $ 196,200 |
| 12. | Health and Safety | 5 | % | $ 490,600 | $ 490,600 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 294,400 | $ 294,400 |
| | | | | Estimated Capital Cost | $ 11,774,790 |
| | | | | Engineering (20%) | $ 2,354,958 |
| | | | | Subtotal | $ 14,129,748 |
| | | | | Contingency (20%) | $ 2,825,950 |
| | | | | Total Estimated Capital Cost | $ 16,955,698 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.1-15**
**SCENARIO 2: 0-2 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to $ | 706,000 |
| | Contingency (20%) | | | $ 99,200 to $ | 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to $ | 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 16,955,698 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 30,569,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

# APPENDIX G.2

# SCENARIO 3: 0 – 10 FOOT DEPTH BGS

**TABLE G.2-1**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 42,500 | cu yd | $ 15 | $ 637,500 |
| | b) Excavation of PCB-Impacted Soil | 47,000 | cu yd | $ 6 | $ 282,000 |
| | c) Transportation and Off-Facility Disposal | 65,800 | Ton | $ 125 | $ 8,225,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 65,800 | Ton | $ 16 | $ 1,052,800 |
| | e) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 6 Subtotal | $ 10,350,300 |

**TABLE G.2-1**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 990,900 | $ 990,900 |
| 9. | Mobilization/Demobilization | 5 | % | $ 990,900 | $ 990,900 |
| 10. | Permits | 2 | % | $ 396,400 | $ 396,400 |
| 11. | Health and Safety | 5 | % | $ 990,900 | $ 990,900 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 594,600 | $ 594,600 |
| | | | Estimated Capital Cost | | $ 23,782,350 |
| | | | Engineering (20%) | | $ 4,756,470 |
| | | | Subtotal | | $ 28,538,820 |
| | | | Contingency (20%) | | $ 5,707,764 |
| | | | Total Estimated Capital Cost | | $ 34,246,584 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.2-1**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 34,246,584 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 47,809,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-2**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 15 | $ 225,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Transportation and Off-Facility Disposal | 20,300 | Ton | $ 125 | $ 2,537,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 20,300 | Ton | $ 16 | $ 324,800 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 6 Subtotal | $ 3,198,300 |

**TABLE G.2-2**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 633,300 | $ 633,300 |
| 9. | Mobilization/Demobilization | 5 | % | $ 633,300 | $ 633,300 |
| 10. | Permits | 2 | % | $ 253,300 | $ 253,300 |
| 11. | Health and Safety | 5 | % | $ 633,300 | $ 633,300 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 380,000 | $ 380,000 |
| | | Estimated Capital Cost | | | $ 15,199,850 |
| | | Engineering (20%) | | | $ 3,039,970 |
| | | Subtotal | | | $ 18,239,820 |
| | | Contingency (20%) | | | $ 3,647,964 |
| | | Total Estimated Capital Cost | | | $ 21,887,784 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | Estimated Annual Operation and Maintenance Cost | | $ 494,000 to | $ 704,000 |
| | | Contingency (20%) | | $ 98,800 to | $ 140,800 |
| | | Total Estimated Annual Operation and Maintenance Cost | | $ 592,800 to | $ 844,800 |

**TABLE G.2-2**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 21,887,784 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 35,451,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-3**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 7,500 | cu yd | $ 15 | $ 112,500 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,141,500 |

**TABLE G.2-3**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 530,500 | $ 530,500 |
| 9. | Mobilization/Demobilization | 5 | % | $ 530,500 | $ 530,500 |
| 10. | Permits | 2 | % | $ 212,200 | $ 212,200 |
| 11. | Health and Safety | 5 | % | $ 530,500 | $ 530,500 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 318,300 | $ 318,300 |
| | | | Estimated Capital Cost | | $ 12,731,850 |
| | | | Engineering (20%) | | $ 2,546,370 |
| | | | Subtotal | | $ 15,278,220 |
| | | | Contingency (20%) | | $ 3,055,644 |
| | | | Total Estimated Capital Cost | | $ 18,333,864 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.2-3**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 18,333,864 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 31,897,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-4**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ? 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,128,000 | sq ft | $ 0.30 | $ 338,400 |
| | b) 12-in Clay Barrier Layer | 1,128,000 | sq ft | $ 1.10 | $ 1,240,800 |
| | c) Geocomposite Clay Liner | 1,128,000 | sq ft | $ 0.80 | $ 902,400 |
| | d) Geonet drainage layer | 1,128,000 | sq ft | $ 0.90 | $ 1,015,200 |
| | e) Common Fill | 1,128,000 | sq ft | $ 0.60 | $ 676,800 |
| | f) Vegetative Cover | 1,128,000 | sq ft | $ 0.10 | $ 112,800 |
| | g) 6-in Topsoil | 1,128,000 | sq ft | $ 0.40 | $ 451,200 |
| | | | | Item 4 Subtotal | $ 4,737,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 425,000 | sq ft | $ 0.40 | $ 170,000 |
| | b) 18-in Common Fill | 425,000 | sq ft | $ 0.90 | $ 382,500 |
| | c) 12-in Sand Drainage Layer | 425,000 | sq ft | $ 0.75 | $ 318,750 |
| | d) 20-mil HDPE Liner | 425,000 | sq ft | $ 0.45 | $ 191,250 |
| | e) 24-in Clay Barrier | 425,000 | sq ft | $ 2.20 | $ 935,000 |
| | f) Vegetative Cover | 425,000 | sq ft | $ 0.10 | $ 42,500 |
| | g) Liner System | 425,000 | sq ft | $ 2.85 | $ 1,211,250 |
| | | | | Item 5 Subtotal | $ 3,251,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-4**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ? 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 42,500 | cu yd | $ 15 | $ 637,500 |
| | b) Excavation of PCB-Impacted Soil | 47,000 | cu yd | $ 6 | $ 282,000 |
| | c) Placement of Soil in On-Facility Vault | 65,800 | Ton | $ 4 | $ 263,200 |
| | d) Supply and backfill imported clean fill to excavated areas | 32,900 | Ton | $ 16 | $ 526,400 |
| | e) Existing utilities in place support | 400 | ft | $ 30 | $ 12,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 100 | $ 15,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 60 | $ 15,000 |
| | | | | Item 7 Subtotal | $ 1,751,100 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds / Insurance | 5 | % | $ 634,300 | $ 634,300 |
| 10. | Mobilization / Demobilization | 5 | % | $ 634,300 | $ 634,300 |
| 11. | Permits | 2 | % | $ 253,700 | $ 253,700 |
| 12. | Health and Safety | 5 | % | $ 634,300 | $ 634,300 |
| 13. | Construction Facilities / Temporary Controls | 3 | % | $ 380,600 | $ 380,600 |
| | | | | Estimated Capital Cost | $ 15,222,900 |
| | | | | Engineering (20%) | $ 3,044,580 |
| | | | | Subtotal | $ 18,267,480 |
| | | | | Contingency (20%) | $ 3,653,496 |
| | | | | Total Estimated Capital Cost | $ 21,920,976 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.2-4**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ? 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 21,920,976 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 35,534,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-5**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-5**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 15 | $ 225,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Placement of Soil in On-Facility Vault | 20,300 | Ton | $ 4 | $ 81,200 |
| | d) Supply and backfill imported clean fill to excavated areas | 10,150 | Ton | $ 16 | $ 162,400 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 7 Subtotal | $ 579,600 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 532,600 | $ 532,600 |
| 10. | Mobilization/Demobilization | 5 | % | $ 532,600 | $ 532,600 |
| 11. | Permits | 2 | % | $ 213,000 | $ 213,000 |
| 12. | Health and Safety | 5 | % | $ 532,600 | $ 532,600 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 319,600 | $ 319,600 |
| | | | | Estimated Capital Cost | $ 12,782,100 |
| | | | | Engineering (20%) | $ 2,556,420 |
| | | | | Subtotal | $ 15,338,520 |
| | | | | Contingency (20%) | $ 3,067,704 |
| | | | | Total Estimated Capital Cost | $ 18,406,224 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.2-5**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 18,406,224 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 32,019,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-6**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3.00 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-6**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 7,500 | cu yd | $ 15 | $ 112,500 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Placement of Soil in On-Facility Vault | 7,000 | Ton | $ 4 | $ 28,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,500 | Ton | $ 16 | $ 56,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 238,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 498,300 | $ 498,300 |
| 10. | Mobilization/Demobilization | 5 | % | $ 498,300 | $ 498,300 |
| 11. | Permits | 2 | % | $ 199,300 | $ 199,300 |
| 12. | Health and Safety | 5 | % | $ 498,300 | $ 498,300 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 299,000 | $ 299,000 |
| | | | | Estimated Capital Cost | $ 11,958,800 |
| | | | | Engineering (20%) | $ 2,391,760 |
| | | | | Subtotal | $ 14,350,560 |
| | | | | Contingency (20%) | $ 2,870,112 |
| | | | | Total Estimated Capital Cost | $ 17,220,672 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.2-6**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,220,672 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 30,834,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-7**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 47,000 | cu yd | $ 40 | $ 1,880,000 |
| | b) Jet grouting | 1,000 | ft | $ 15 | $ 15,000 |
| | | | | Item 6 Subtotal | $ 1,895,000 |

**TABLE G.2-7**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 568,200 | $ 568,200 |
| 9. | Mobilization/Demobilization | 5 | % | $ 568,200 | $ 568,200 |
| 10. | Permits | 2 | % | $ 227,300 | $ 227,300 |
| 11. | Health and Safety | 5 | % | $ 568,200 | $ 568,200 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 340,900 | $ 340,900 |
| | | | Estimated Capital Cost | | $ 13,636,150 |
| | | | Engineering (20%) | | $ 2,727,230 |
| | | | Subtotal | | $ 16,363,380 |
| | | | Contingency (20%) | | $ 3,272,676 |
| | | | Total Estimated Capital Cost | | $ 19,636,056 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.2-7**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 19,636,056 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 33,199,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-8**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 14,500 | cu yd | $ 40 | $ 580,000 |
| | b) Jet grouting | 300 | ft | $ 15 | $ 4,500 |
| | | | | Item 6 Subtotal | $ 584,500 |

**TABLE G.2-8**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 502,600 | $ 502,600 |
| 9. | Mobilization/Demobilization | 5 | % | $ 502,600 | $ 502,600 |
| 10. | Permits | 2 | % | $ 201,100 | $ 201,100 |
| 11. | Health and Safety | 5 | % | $ 502,600 | $ 502,600 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 301,600 | $ 301,600 |
| | | | Estimated Capital Cost | | $ 12,063,350 |
| | | | Engineering (20%) | | $ 2,412,670 |
| | | | Subtotal | | $ 14,476,020 |
| | | | Contingency (20%) | | $ 2,895,204 |
| | | | Total Estimated Capital Cost | | $ 17,371,224 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.2-8**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 17,371,224 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 30,934,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-9**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 5,000 | cu yd | $ 40 | $ 200,000 |
| | b) Jet grouting | 100 | ft | $ 15 | $ 1,500 |
| | | | | Item 6 Subtotal | $ 201,500 |

**TABLE G.2-9**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 483,500 | $ 483,500 |
| 9. | Mobilization/Demobilization | 5 | % | $ 483,500 | $ 483,500 |
| 10. | Permits | 2 | % | $ 193,400 | $ 193,400 |
| 11. | Health and Safety | 5 | % | $ 483,500 | $ 483,500 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 290,100 | $ 290,100 |
| | | | Estimated Capital Cost | | $ 11,603,850 |
| | | | Engineering (20%) | | $ 2,320,770 |
| | | | Subtotal | | $ 13,924,620 |
| | | | Contingency (20%) | | $ 2,784,924 |
| | | | Total Estimated Capital Cost | | $ 16,709,544 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.2-9**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,709,544 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 30,272,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-10**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 10 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Transportation and Off-Facility Disposal | 20,300 | Ton | $ 125 | $ 2,537,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 20,300 | Ton | $ 16 | $ 324,800 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 6 Subtotal | $ 3,123,300 |

**TABLE G.2-10**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 32,500 | cu yd | $ 40 | $ 1,300,000 |
| | b) Jet grouting | 700 | ft | $ 15 | $ 10,500 |
| | | | | Item 7 Subtotal | $ 1,310,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 189,000 | $ 189,000 |
| 10. | Mobilization/Demobilization | 5 | % | $ 331,500 | $ 331,500 |
| 11. | Permits | 2 | % | $ 188,700 | $ 188,700 |
| 12. | Health and Safety | 5 | % | $ 695,100 | $ 695,100 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 417,100 | $ 417,100 |
| | | | | Estimated Capital Cost | $ 15,723,550 |
| | | | | Engineering (20%) | $ 3,144,710 |
| | | | | Subtotal | $ 18,868,260 |
| | | | | Contingency (20%) | $ 3,773,652 |
| | | | | Total Estimated Capital Cost | $ 22,641,912 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE G.2-10**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 22,641,912 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 36,205,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-11**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 7,500 | cu yd | $ 10 | $ 75,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,104,000 |

**TABLE G.2-11**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 9,500 | cu yd | $ 40 | $ 380,000 |
| | b) Jet grouting | 200 | ft | $ 15 | $ 3,000 |
| | | | | Item 7 Subtotal | $ 383,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 105,900 | $ 105,900 |
| 10. | Mobilization/Demobilization | 5 | % | $ 147,500 | $ 147,500 |
| 11. | Permits | 2 | % | $ 96,500 | $ 96,500 |
| 12. | Health and Safety | 5 | % | $ 547,800 | $ 547,800 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 328,700 | $ 328,700 |
| | | | | Estimated Capital Cost | $ 12,181,750 |
| | | | | Engineering (20%) | $ 2,436,350 |
| | | | | Subtotal | $ 14,618,100 |
| | | | | Contingency (20%) | $ 2,923,620 |
| | | | | Total Estimated Capital Cost | $ 17,541,720 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.2-11**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 494,000 to | $ 704,000 |
| | Contingency (20%) | | | $ 98,800 to | $ 140,800 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 592,800 to | $ 844,800 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,541,720 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,104,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-12**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-12**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 10 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Placement of Soil in On-Facility Vault | 20,300 | Ton | $ 4 | $ 81,200 |
| | d) Supply and backfill imported clean fill to excavated areas | 10,150 | Ton | $ 16 | $ 162,400 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 7 Subtotal | $ 504,600 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 32,500 | cu yd | $ 40 | $ 1,300,000 |
| | b) Jet grouting | 700 | ft | $ 15 | $ 10,500 |
| | | | | Item 8 Subtotal | $ 1,310,500 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 594,400 | $ 594,400 |
| 11. | Mobilization/Demobilization | 5 | % | $ 594,400 | $ 594,400 |
| 12. | Permits | 2 | % | $ 237,700 | $ 237,700 |
| 13. | Health and Safety | 5 | % | $ 594,400 | $ 594,400 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 356,600 | $ 356,600 |
| | | | | Estimated Capital Cost | $ 14,264,700 |
| | | | | Engineering (20%) | $ 2,852,940 |
| | | | | Subtotal | $ 17,117,640 |
| | | | | Contingency (20%) | $ 3,423,528 |
| | | | | Total Estimated Capital Cost | $ 20,541,168 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.2-12**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 20,541,168 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 34,154,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLEG.2-13**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLEG.2-13**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 7,500 | cu yd | $ 10 | $ 75,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Placement of Soil in On-Facility Vault | 7,000 | Ton | $ 4 | $ 28,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,500 | Ton | $ 16 | $ 56,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 201,000 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 9,500 | cu yd | $ 40 | $ 380,000 |
| | b) Jet grouting | 200 | ft | $ 15 | $ 3,000 |
| | | | | Item 8 Subtotal | $ 383,000 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 515,600 | $ 515,600 |
| 11. | Mobilization/Demobilization | 5 | % | $ 515,600 | $ 515,600 |
| 12. | Permits | 2 | % | $ 206,200 | $ 206,200 |
| 13. | Health and Safety | 5 | % | $ 515,600 | $ 515,600 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 309,300 | $ 309,300 |
| | | | | Estimated Capital Cost | $ 12,373,400 |
| | | | | Engineering (20%) | $ 2,474,680 |
| | | | | Subtotal | $ 14,848,080 |
| | | | | Contingency (20%) | $ 2,969,616 |
| | | | | Total Estimated Capital Cost | $ 17,817,696 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLEG.2-13**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,817,696 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,431,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-14**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,373,000 | sq ft | $ 0.30 | $ 411,900 |
| | b) 12-in Clay Barrier Layer | 1,373,000 | sq ft | $ 1.10 | $ 1,510,300 |
| | c) Geocomposite Clay Liner | 1,373,000 | sq ft | $ 0.80 | $ 1,098,400 |
| | d) Geonet drainage layer | 1,373,000 | sq ft | $ 0.90 | $ 1,235,700 |
| | e) Common Fill | 1,373,000 | sq ft | $ 0.60 | $ 823,800 |
| | f) Vegetative Cover | 1,373,000 | sq ft | $ 0.10 | $ 137,300 |
| | g) 6-in Topsoil | 1,373,000 | sq ft | $ 0.40 | $ 549,200 |
| | | | | Item 4 Subtotal | $ 5,766,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 180,000 | sq ft | $ 0.40 | $ 72,000 |
| | b) 18-in Common Fill | 180,000 | sq ft | $ 0.90 | $ 162,000 |
| | c) 12-in Sand Drainage Layer | 180,000 | sq ft | $ 0.75 | $ 135,000 |
| | d) 20-mil HDPE Liner | 180,000 | sq ft | $ 0.45 | $ 81,000 |
| | e) 24-in Clay Barrier | 180,000 | sq ft | $ 2.20 | $ 396,000 |
| | f) Vegetative Cover | 180,000 | sq ft | $ 0.10 | $ 18,000 |
| | g) Liner System | 180,000 | sq ft | $ 2.85 | $ 513,000 |
| | | | | Item 5 Subtotal | $ 1,377,000 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-14**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 42,500 | cu yd | $ 15 | $ 637,500 |
| | b) Excavation of PCB-Impacted Soil | 47,000 | cu yd | $ 6 | $ 282,000 |
| | c) Placement of Soil in On-Facility Vault | 58,800 | Ton | $ 4 | $ 235,200 |
| | d) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 36,400 | Ton | $ 16 | $ 582,400 |
| | f) Existing utilities removal and replacement | 800 | ft | $ 60 | $ 48,000 |
| | g) Sheet pile wall along existing STM pond (20ft) | 150 | ft | $ 200 | $ 30,000 |
| | h) Sheet pile wall along existing STM pond (30ft) | 250 | ft | $ 300 | $ 75,000 |
| | | | | Item 7 Subtotal | $ 2,765,100 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 642,700 | $ 642,700 |
| 10. | Mobilization/Demobilization | 5 | % | $ 642,700 | $ 642,700 |
| 11. | Permits | 2 | % | $ 257,100 | $ 257,100 |
| 12. | Health and Safety | 5 | % | $ 642,700 | $ 642,700 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 385,600 | $ 385,600 |
| | | | | Estimated Capital Cost | $ 15,425,250 |
| | | | | Engineering (20%) | $ 3,085,050 |
| | | | | Subtotal | $ 18,510,300 |
| | | | | Contingency (20%) | $ 3,702,060 |
| | | | | Total Estimated Capital Cost | $ 22,212,360 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE G.2-14**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 22,212,360 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 35,825,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.2-15**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,483,000 | sq ft | $ 0.30 | $ 444,900 |
| | b) 12-in Clay Barrier Layer | 1,483,000 | sq ft | $ 1.10 | $ 1,631,300 |
| | c) Geocomposite Clay Liner | 1,483,000 | sq ft | $ 0.80 | $ 1,186,400 |
| | d) Geonet drainage layer | 1,483,000 | sq ft | $ 0.90 | $ 1,334,700 |
| | e) Common Fill | 1,483,000 | sq ft | $ 0.60 | $ 889,800 |
| | f) Vegetative Cover | 1,483,000 | sq ft | $ 0.10 | $ 148,300 |
| | g) 6-in Topsoil | 1,483,000 | sq ft | $ 0.40 | $ 593,200 |
| | | | | Item 4 Subtotal | $ 6,228,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 70,000 | sq ft | $ 0.40 | $ 28,000 |
| | b) 18-in Common Fill | 70,000 | sq ft | $ 0.90 | $ 63,000 |
| | c) 12-in Sand Drainage Layer | 70,000 | sq ft | $ 0.75 | $ 52,500 |
| | d) 20-mil HDPE Liner | 70,000 | sq ft | $ 0.45 | $ 31,500 |
| | e) 24-in Clay Barrier | 70,000 | sq ft | $ 2.20 | $ 154,000 |
| | f) Vegetative Cover | 70,000 | sq ft | $ 0.10 | $ 7,000 |
| | g) Liner System | 70,000 | sq ft | $ 2.85 | $ 199,500 |
| | | | | Item 5 Subtotal | $ 535,500 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.2-15**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 15,000 | cu yd | $ 15 | $ 225,000 |
| | b) Excavation of PCB-Impacted Soil | 14,500 | cu yd | $ 6 | $ 87,000 |
| | c) Placement of Soil in On-Facility Vault | 13,300 | Ton | $ 4 | $ 53,200 |
| | d) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 13,650 | Ton | $ 16 | $ 218,400 |
| | f) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | | | | Item 7 Subtotal | $ 1,482,600 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 559,600 | $ 559,600 |
| 10. | Mobilization/Demobilization | 5 | % | $ 559,600 | $ 559,600 |
| 11. | Permits | 2 | % | $ 223,800 | $ 223,800 |
| 12. | Health and Safety | 5 | % | $ 559,600 | $ 559,600 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 335,800 | $ 335,800 |
| | | | | Estimated Capital Cost | $ 13,430,850 |
| | | | | Engineering (20%) | $ 2,686,170 |
| | | | | Subtotal | $ 16,117,020 |
| | | | | Contingency (20%) | $ 3,223,404 |
| | | | | Total Estimated Capital Cost | $ 19,340,424 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE G.2-15**
**SCENARIO 3: 0-10 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 19,340,424 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 32,953,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

# APPENDIX G.3

## SCENARIO 4: 0 – 15 FOOT DEPTH BGS

**TABLE G.3-1**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 72,500 | cu yd | $ 15 | $ 1,087,500 |
| | b) Excavation of PCB-Impacted Soil | 60,000 | cu yd | $ 6 | $ 360,000 |
| | c) Transportation and Off-Facility Disposal | 84,000 | Ton | $ 125 | $ 10,500,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 84,000 | Ton | $ 16 | $ 1,344,000 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | f) Sheet pile wall along existing utlities | 150 | ft | $ 100 | $ 15,000 |
| | g) Existing utilities removal and replacement | 1,200 | ft | $ 60 | $ 72,000 |
| | h) Sheet pile wall along existing STM pond (30ft) | 300 | ft | $ 300 | $ 90,000 |
| | i) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 6 Subtotal | $ 13,514,500 |

**TABLE G.3-1**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 1,149,100 | $ 1,149,100 |
| 9. | Mobilization/Demobilization | 5 | % | $ 1,149,100 | $ 1,149,100 |
| 10. | Permits | 2 | % | $ 459,700 | $ 459,700 |
| 11. | Health and Safety | 5 | % | $ 1,149,100 | $ 1,149,100 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 689,500 | $ 689,500 |
| | | Estimated Capital Cost | | | $ 27,579,350 |
| | | Engineering (20%) | | | $ 5,515,870 |
| | | Subtotal | | | $ 33,095,220 |
| | | Contingency (20%) | | | $ 6,619,044 |
| | | Total Estimated Capital Cost | | | $ 39,714,264 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | Estimated Annual Operation and Maintenance Cost | | $ 494,000 to | $ 704,000 |
| | | Contingency (20%) | | $ 98,800 to | $ 140,800 |
| | | Total Estimated Annual Operation and Maintenance Cost | | $ 592,800 to | $ 844,800 |

**TABLE G.3-1**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 39,714,264 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 53,277,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-2**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 27,500 | cu yd | $ 15 | $ 412,500 |
| | b) Excavation of PCB-Impacted Soil | 17,500 | cu yd | $ 6 | $ 105,000 |
| | c) Transportation and Off-Facility Disposal | 24,500 | Ton | $ 125 | $ 3,062,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 24,500 | Ton | $ 16 | $ 392,000 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 100 | ft | $ 200 | $ 20,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 200 | ft | $ 300 | $ 60,000 |
| | | | | Item 6 Subtotal | $ 4,076,000 |

**TABLE G.3-2**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 677,200 | $ 677,200 |
| 9. | Mobilization/Demobilization | 5 | % | $ 677,200 | $ 677,200 |
| 10. | Permits | 2 | % | $ 270,900 | $ 270,900 |
| 11. | Health and Safety | 5 | % | $ 677,200 | $ 677,200 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 406,300 | $ 406,300 |
| | | | Estimated Capital Cost | | $ 16,253,150 |
| | | | Engineering (20%) | | $ 3,250,630 |
| | | | Subtotal | | $ 19,503,780 |
| | | | Contingency (20%) | | $ 3,900,756 |
| | | | Total Estimated Capital Cost | | $ 23,404,536 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.3-2**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 23,404,536 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 36,967,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-3**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | FT | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | FT | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | FT | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | FT | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | FT | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | FT | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | FT | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | FT | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 10,000 | cu yd | $ 15 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | FT | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,179,000 |

**TABLE G.3-3**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 532,400 | $ 532,400 |
| 9. | Mobilization/Demobilization | 5 | % | $ 532,400 | $ 532,400 |
| 10. | Permits | 2 | % | $ 212,900 | $ 212,900 |
| 11. | Health and Safety | 5 | % | $ 532,400 | $ 532,400 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 319,400 | $ 319,400 |
| | | | Estimated Capital Cost | | $ 12,776,850 |
| | | | Engineering (20%) | | $ 2,555,370 |
| | | | Subtotal | | $ 15,332,220 |
| | | | Contingency (20%) | | $ 3,066,444 |
| | | | Total Estimated Capital Cost | | $ 18,398,664 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.3-3**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 4C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Total Present Worth | | | | | |
| | Capital Cost | | | | $ 18,398,664 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ 1,255,740 |
| | **Total Present Worth (1)** | | | | $ 31,961,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-4**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,128,000 | sq ft | $ 0.30 | $ 338,400 |
| | b) 12-in Clay Barrier Layer | 1,128,000 | sq ft | $ 1.10 | $ 1,240,800 |
| | c) Geocomposite Clay Liner | 1,128,000 | sq ft | $ 0.80 | $ 902,400 |
| | d) Geonet drainage layer | 1,128,000 | sq ft | $ 0.90 | $ 1,015,200 |
| | e) Common Fill | 1,128,000 | sq ft | $ 0.60 | $ 676,800 |
| | f) Vegetative Cover | 1,128,000 | sq ft | $ 0.10 | $ 112,800 |
| | g) 6-in Topsoil | 1,128,000 | sq ft | $ 0.40 | $ 451,200 |
| | | | | Item 4 Subtotal | $ 4,737,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 425,000 | sq ft | $ 0.40 | $ 170,000 |
| | b) 18-in Common Fill | 425,000 | sq ft | $ 0.90 | $ 382,500 |
| | c) 12-in Sand Drainage Layer | 425,000 | sq ft | $ 0.75 | $ 318,750 |
| | d) 20-mil HDPE Liner | 425,000 | sq ft | $ 0.45 | $ 191,250 |
| | e) 24-in Clay Barrier | 425,000 | sq ft | $ 2.20 | $ 935,000 |
| | f) Vegetative Cover | 425,000 | sq ft | $ 0.10 | $ 42,500 |
| | g) Liner System | 425,000 | sq ft | $ 2.85 | $ 1,211,250 |
| | | | | Item 5 Subtotal | $ 3,251,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-4**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 72,500 | cu yd | $ 15 | $ 1,087,500 |
| | b) Excavation of PCB-Impacted Soil | 60,000 | cu yd | $ 6 | $ 360,000 |
| | c) Placement of Soil in On-Facility Vault | 84,000 | Ton | $ 4 | $ 336,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 42,000 | Ton | $ 16 | $ 672,000 |
| | e) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | f) Sheet pile wall along existing utlities | 150 | ft | $ 100 | $ 15,000 |
| | g) Existing utilities removal and replacement | 1,200 | ft | $ 60 | $ 72,000 |
| | h) Sheet pile wall along existing STM pond (30ft) | 300 | ft | $ 300 | $ 90,000 |
| | i) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 7 Subtotal | $ 2,678,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 680,700 | $ 680,700 |
| 10. | Mobilization/Demobilization | 5 | % | $ 680,700 | $ 680,700 |
| 11. | Permits | 2 | % | $ 272,300 | $ 272,300 |
| 12. | Health and Safety | 5 | % | $ 680,700 | $ 680,700 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 408,400 | $ 408,400 |
| | | | | Estimated Capital Cost | $ 16,335,900 |
| | | | | Engineering (20%) | $ 3,267,180 |
| | | | | Subtotal | $ 19,603,080 |
| | | | | Contingency (20%) | $ 3,920,616 |
| | | | | Total Estimated Capital Cost | $ 23,523,696 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-4**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5A: SOIL SOURCE REMOVAL (PCBs ≥ 50 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 23,523,696 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 37,137,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-5**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-5**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 27,500 | cu yd | $ 15 | $ 412,500 |
| | b) Excavation of PCB-Impacted Soil | 17,500 | cu yd | $ 6 | $ 105,000 |
| | c) Placement of Soil in On-Facility Vault | 24,500 | Ton | $ 4 | $ 98,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 12,250 | Ton | $ 16 | $ 196,000 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 100 | ft | $ 200 | $ 20,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 200 | ft | $ 300 | $ 60,000 |
| | | | | Item 7 Subtotal | $ 915,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 549,400 | $ 549,400 |
| 10. | Mobilization/Demobilization | 5 | % | $ 549,400 | $ 549,400 |
| 11. | Permits | 2 | % | $ 219,800 | $ 219,800 |
| 12. | Health and Safety | 5 | % | $ 549,400 | $ 549,400 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 329,600 | $ 329,600 |
| | | | | Estimated Capital Cost | $ 13,185,200 |
| | | | | Engineering (20%) | $ 2,637,040 |
| | | | | Subtotal | $ 15,822,240 |
| | | | | Contingency (20%) | $ 3,164,448 |
| | | | | Total Estimated Capital Cost | $ 18,986,688 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-5**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5B: SOIL SOURCE REMOVAL (PCBs ≥ 500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GM POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 18,986,688 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 32,600,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-6**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3.00 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-6**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 10,000 | cu yd | $ 15 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Placement of Soil in On-Facility Vault | 7,000 | Ton | $ 4 | $ 28,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,500 | Ton | $ 16 | $ 56,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 276,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 500,200 | $ 500,200 |
| 10. | Mobilization/Demobilization | 5 | % | $ 500,200 | $ 500,200 |
| 11. | Permits | 2 | % | $ 200,100 | $ 200,100 |
| 12. | Health and Safety | 5 | % | $ 500,200 | $ 500,200 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 300,100 | $ 300,100 |
| | | | | Estimated Capital Cost | $ 12,003,900 |
| | | | | Engineering (20%) | $ 2,400,780 |
| | | | | Subtotal | $ 14,404,680 |
| | | | | Contingency (20%) | $ 2,880,936 |
| | | | | Total Estimated Capital Cost | $ 17,285,616 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-6**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 5C: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**TO ON-FACILITY LANDFILL VAULT**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,285,616 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 30,899,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-7**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 60,000 | cu yd | $ 40 | $ 2,400,000 |
| | b) Jet grouting | 1,200 | ft | $ 15 | $ 18,000 |
| | | | | Item 6 Subtotal | $ 2,418,000 |

**TABLE G.3-7**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 594,300 | $ 594,300 |
| 9. | Mobilization/Demobilization | 5 | % | $ 594,300 | $ 594,300 |
| 10. | Permits | 2 | % | $ 237,700 | $ 237,700 |
| 11. | Health and Safety | 5 | % | $ 594,300 | $ 594,300 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 356,600 | $ 356,600 |
| | | | Estimated Capital Cost | | $ 14,263,550 |
| | | | Engineering (20%) | | $ 2,852,710 |
| | | | Subtotal | | $ 17,116,260 |
| | | | Contingency (20%) | | $ 3,423,252 |
| | | | Total Estimated Capital Cost | | $ 20,539,512 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.3-7**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6A: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 50 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 20,539,512 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 34,102,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-8**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 17,500 | cu yd | $ 40 | $ 700,000 |
| | b) Jet grouting | 400 | ft | $ 15 | $ 6,000 |
| | | | | Item 6 Subtotal | $ 706,000 |

**TABLE G.3-8**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 508,700 | $ 508,700 |
| 9. | Mobilization/Demobilization | 5 | % | $ 508,700 | $ 508,700 |
| 10. | Permits | 2 | % | $ 203,500 | $ 203,500 |
| 11. | Health and Safety | 5 | % | $ 508,700 | $ 508,700 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 305,200 | $ 305,200 |
| | | | Estimated Capital Cost | | $ 12,209,150 |
| | | | Engineering (20%) | | $ 2,441,830 |
| | | | Subtotal | | $ 14,650,980 |
| | | | Contingency (20%) | | $ 2,930,196 |
| | | | Total Estimated Capital Cost | | $ 17,581,176 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to | $ 704,000 |
| | | | Contingency (20%) | $ 98,800 to | $ 140,800 |
| | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to | $ 844,800 |

**TABLE G.3-8**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6B: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 17,581,176 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 31,144,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-9**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 5,000 | cu yd | $ 40 | $ 200,000 |
| | b) Jet grouting | 100 | ft | $ 15 | $ 1,500 |
| | | | | Item 6 Subtotal | $ 201,500 |

**TABLE G.3-9**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 8. | Bonds/Insurance | 5 | % | $ 483,500 | $ 483,500 |
| 9. | Mobilization/Demobilization | 5 | % | $ 483,500 | $ 483,500 |
| 10. | Permits | 2 | % | $ 193,400 | $ 193,400 |
| 11. | Health and Safety | 5 | % | $ 483,500 | $ 483,500 |
| 12. | Construction Facilities/Temporary Controls | 3 | % | $ 290,100 | $ 290,100 |
| | | | | Estimated Capital Cost | $ 11,603,850 |
| | | | | Engineering (20%) | $ 2,320,770 |
| | | | | Subtotal | $ 13,924,620 |
| | | | | Contingency (20%) | $ 2,784,924 |
| | | | | Total Estimated Capital Cost | $ 16,709,544 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | | | Estimated Annual Operation and Maintenance Cost | $ 494,000 to $ 704,000 |
| | | | | Contingency (20%) | $ 98,800 to $ 140,800 |
| | | | | Total Estimated Annual Operation and Maintenance Cost | $ 592,800 to $ 844,800 |

**TABLE G.3-9**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 6C: IN SITU SOLIDIFICATION OF SOIL (PCBs ≥ 1,500 mg/kg)**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 16,709,544 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 30,272,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-10**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**MATERIALS (50 MG/KG ≤ PCBS < 500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 27,500 | cu yd | $ 15 | $ 412,500 |
| | b) Excavation of PCB-Impacted Soil | 17,500 | cu yd | $ 6 | $ 105,000 |
| | c) Transportation and Off-Facility Disposal | 24,500 | Ton | $ 125 | $ 3,062,500 |
| | d) Supply and backfill imported clean fill to excavated areas | 24,500 | Ton | $ 16 | $ 392,000 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 100 | ft | $ 200 | $ 20,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 200 | ft | $ 300 | $ 60,000 |
| | | | | Item 6 Subtotal | $ 4,076,000 |

**TABLE G.3-10**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**MATERIALS (50 MG/KG ≤ PCBS < 500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 42,500 | cu yd | $ 40 | $ 1,700,000 |
| | b) Jet grouting | 1,000 | ft | $ 15 | $ 15,000 |
| | | | | Item 7 Subtotal | $ 1,715,000 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 215,200 | $ 215,200 |
| 10. | Mobilization/Demobilization | 5 | % | $ 405,400 | $ 405,400 |
| 11. | Permits | 2 | % | $ 226,400 | $ 226,400 |
| 12. | Health and Safety | 5 | % | $ 763,000 | $ 763,000 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 457,800 | $ 457,800 |
| | | Estimated Capital Cost | | | $ 17,327,150 |
| | | Engineering (20%) | | | $ 3,465,430 |
| | | Subtotal | | | $ 20,792,580 |
| | | Contingency (20%) | | | $ 4,158,516 |
| | | Total Estimated Capital Cost | | | $ 24,951,096 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | | Estimated Annual Operation and Maintenance Cost | | $ 494,000 to | $ 704,000 |
| | | Contingency (20%) | | $ 98,800 to | $ 140,800 |
| | | Total Estimated Annual Operation and Maintenance Cost | | $ 592,800 to | $ 844,800 |

**TABLE G.3-10**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7A: SOIL SOURCE REMOVAL (PCBs ≥ 500mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**MATERIALS (50 MG/KG ≤ PCBS < 500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | | *Cost* |
|---|---|---|---|---|---|---|
| Total Present Worth | | | | | | |
| | Capital Cost | | | | $ | 24,951,096 |
| | Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | | | | $ | 286,701 |
| | Site Maintenance (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | | | | $ | 602,755 |
| | Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | | | | $ | 6,444,824 |
| | Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | | | | $ | 3,767,220 |
| | Site Source Control (SSC) (discount factor of 2.5% for 30 years) | | | | $ | 1,255,740 |
| | **Total Present Worth (1)** | | | | $ | 38,514,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-11**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**MATERIALS (500 MG/KG ≤ PCBS < 1,500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,553,000 | sq ft | $ 0.30 | $ 465,900 |
| | b) 12-in Clay Barrier Layer | 1,553,000 | sq ft | $ 1.10 | $ 1,708,300 |
| | c) Geocomposite Clay Liner | 1,553,000 | sq ft | $ 0.80 | $ 1,242,400 |
| | d) Geonet drainage layer | 1,553,000 | sq ft | $ 0.90 | $ 1,397,700 |
| | e) Common Fill | 1,553,000 | sq ft | $ 0.60 | $ 931,800 |
| | f) Vegetative Cover | 1,553,000 | sq ft | $ 0.10 | $ 155,300 |
| | g) 6-in Topsoil | 1,553,000 | sq ft | $ 0.40 | $ 621,200 |
| | | | | Item 4 Subtotal | $ 6,522,600 |
| 5. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 5 Subtotal | $ 122,250 |
| 6. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 10,000 | cu yd | $ 15 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 7,000 | Ton | $ 16 | $ 112,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 6 Subtotal | $ 1,179,000 |

**TABLE G.3-11**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**MATERIALS (500 MG/KG ≤ PCBS < 1,500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 12,500 | cu yd | $ 40 | $ 500,000 |
| | b) Jet grouting | 250 | ft | $ 15 | $ 3,750 |
| | | | | Item 7 Subtotal | $ 503,750 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 105,900 | $ 105,900 |
| 10. | Mobilization/Demobilization | 5 | % | $ 151,200 | $ 151,200 |
| 11. | Permits | 2 | % | $ 100,400 | $ 100,400 |
| 12. | Health and Safety | 5 | % | $ 557,600 | $ 557,600 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 334,500 | $ 334,500 |
| | | Estimated Capital Cost | | | $ 12,400,700 |
| | | Engineering (20%) | | | $ 2,480,140 |
| | | Subtotal | | | $ 14,880,840 |
| | | Contingency (20%) | | | $ 2,976,168 |
| | | Total Estimated Capital Cost | | | $ 17,857,008 |
| Annual Operation and Maintenance Costs | | | | | |
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system and fence) | -- | L.S. | -- | $ 24,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-11**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 7B: SOIL SOURCE REMOVAL (PCBs ≥ 1,500 mg/kg)**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**MATERIALS (500 MG/KG ≤ PCBS < 1,500 MG/KG)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 494,000 to | $ 704,000 |
| | Contingency (20%) | | | $ 98,800 to | $ 140,800 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 592,800 to | $ 844,800 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 17,857,008 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,420,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-12**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,378,000 | sq ft | $ 0.30 | $ 413,400 |
| | b) 12-in Clay Barrier Layer | 1,378,000 | sq ft | $ 1.10 | $ 1,515,800 |
| | c) Geocomposite Clay Liner | 1,378,000 | sq ft | $ 0.80 | $ 1,102,400 |
| | d) Geonet drainage layer | 1,378,000 | sq ft | $ 0.90 | $ 1,240,200 |
| | e) Common Fill | 1,378,000 | sq ft | $ 0.60 | $ 826,800 |
| | f) Vegetative Cover | 1,378,000 | sq ft | $ 0.10 | $ 137,800 |
| | g) 6-in Topsoil | 1,378,000 | sq ft | $ 0.40 | $ 551,200 |
| | | | | Item 4 Subtotal | $ 5,787,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 175,000 | sq ft | $ 0.40 | $ 70,000 |
| | b) 18-in Common Fill | 175,000 | sq ft | $ 0.90 | $ 157,500 |
| | c) 12-in Sand Drainage Layer | 175,000 | sq ft | $ 0.75 | $ 131,250 |
| | d) 20-mil HDPE Liner | 175,000 | sq ft | $ 0.45 | $ 78,750 |
| | e) 24-in Clay Barrier | 175,000 | sq ft | $ 2.20 | $ 385,000 |
| | f) Vegetative Cover | 175,000 | sq ft | $ 0.10 | $ 17,500 |
| | g) Liner System | 175,000 | sq ft | $ 2.85 | $ 498,750 |
| | | | | Item 5 Subtotal | $ 1,338,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-12**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 27,500 | cu yd | $ 15 | $ 412,500 |
| | b) Excavation of PCB-Impacted Soil | 17,500 | cu yd | $ 6 | $ 105,000 |
| | c) Placement of Soil in On-Facility Vault | 24,500 | Ton | $ 4 | $ 98,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 12,250 | Ton | $ 16 | $ 196,000 |
| | e) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | f) Sheet pile wall along existing STM pond (20ft) | 100 | ft | $ 200 | $ 20,000 |
| | g) Sheet pile wall along existing STM pond (30ft) | 200 | ft | $ 300 | $ 60,000 |
| | | | | Item 7 Subtotal | $ 915,500 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 42,500 | cu yd | $ 40 | $ 1,700,000 |
| | b) Jet grouting | 1,000 | ft | $ 15 | $ 15,000 |
| | | | | Item 8 Subtotal | $ 1,715,000 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 635,100 | $ 635,100 |
| 11. | Mobilization/Demobilization | 5 | % | $ 635,100 | $ 635,100 |
| 12. | Permits | 2 | % | $ 254,100 | $ 254,100 |
| 13. | Health and Safety | 5 | % | $ 635,100 | $ 635,100 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 381,100 | $ 381,100 |
| | | | | Estimated Capital Cost | $ 15,243,100 |
| | | | | Engineering (20%) | $ 3,048,620 |
| | | | | Subtotal | $ 18,291,720 |
| | | | | Contingency (20%) | $ 3,658,344 |
| | | | | Total Estimated Capital Cost | $ 21,950,064 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-12**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8A: SOIL SOURCE REMOVAL**
**(PCBs ≥ 500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (50 mg/kg ≤ PCBs < 500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 21,950,064 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 35,563,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-13**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-13**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 10,000 | cu yd | $ 15 | $ 150,000 |
| | b) Excavation of PCB-Impacted Soil | 5,000 | cu yd | $ 6 | $ 30,000 |
| | c) Placement of Soil in On-Facility Vault | 7,000 | Ton | $ 4 | $ 28,000 |
| | d) Supply and backfill imported clean fill to excavated areas | 3,500 | Ton | $ 16 | $ 56,000 |
| | e) Existing utilities removal and replacement | 200 | ft | $ 60 | $ 12,000 |
| | | | | Item 7 Subtotal | $ 276,000 |
| 8. | In-Situ Soil Solidification | | | | |
| | a) Mechanical soil mixing | 12,500 | cu yd | $ 40 | $ 500,000 |
| | b) Jet grouting | 250 | ft | $ 15 | $ 3,750 |
| | | | | Item 8 Subtotal | $ 503,750 |
| 9. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 10. | Bonds/Insurance | 5 | % | $ 525,300 | $ 525,300 |
| 11. | Mobilization/Demobilization | 5 | % | $ 525,300 | $ 525,300 |
| 12. | Permits | 2 | % | $ 210,100 | $ 210,100 |
| 13. | Health and Safety | 5 | % | $ 525,300 | $ 525,300 |
| 14. | Construction Facilities/Temporary Controls | 3 | % | $ 315,200 | $ 315,200 |
| | | | | Estimated Capital Cost | $ 12,608,050 |
| | | | | Engineering (20%) | $ 2,521,610 |
| | | | | Subtotal | $ 15,129,660 |
| | | | | Contingency (20%) | $ 3,025,932 |
| | | | | Total Estimated Capital Cost | $ 18,155,592 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |

**TABLE G.3-13**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 8B: SOIL SOURCE REMOVAL**
**(PCBs ≥ 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**IN SITU SOLIDIFICATION OF SOIL (500 mg/kg ≤ PCBs < 1,500 mg/kg)**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 18,155,592 |
| Site Evaluation<br>(discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance<br>(discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System<br>(discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling<br>(discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System<br>(discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC)<br>(discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 31,769,000 |

Notes:
(1) Total Costs have been rounded to three significant figures
bgs - below ground surface
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-14**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,328,000 | sq ft | $ 0.30 | $ 398,400 |
| | b) 12-in Clay Barrier Layer | 1,328,000 | sq ft | $ 1.10 | $ 1,460,800 |
| | c) Geocomposite Clay Liner | 1,328,000 | sq ft | $ 0.80 | $ 1,062,400 |
| | d) Geonet drainage layer | 1,328,000 | sq ft | $ 0.90 | $ 1,195,200 |
| | e) Common Fill | 1,328,000 | sq ft | $ 0.60 | $ 796,800 |
| | f) Vegetative Cover | 1,328,000 | sq ft | $ 0.10 | $ 132,800 |
| | g) 6-in Topsoil | 1,328,000 | sq ft | $ 0.40 | $ 531,200 |
| | | | | Item 4 Subtotal | $ 5,577,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 225,000 | sq ft | $ 0.40 | $ 90,000 |
| | b) 18-in Common Fill | 225,000 | sq ft | $ 0.90 | $ 202,500 |
| | c) 12-in Sand Drainage Layer | 225,000 | sq ft | $ 0.75 | $ 168,750 |
| | d) 20-mil HDPE Liner | 225,000 | sq ft | $ 0.45 | $ 101,250 |
| | e) 24-in Clay Barrier | 225,000 | sq ft | $ 2.20 | $ 495,000 |
| | f) Vegetative Cover | 225,000 | sq ft | $ 0.10 | $ 22,500 |
| | g) Liner System | 225,000 | sq ft | $ 2.85 | $ 641,250 |
| | | | | Item 5 Subtotal | $ 1,721,250 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-14**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 72,500 | cu yd | $ 15 | $ 1,087,500 |
| | b) Excavation of PCB-Impacted Soil | 60,000 | cu yd | $ 6 | $ 360,000 |
| | c) Placement of Soil in On-Facility Vault | 77,000 | Ton | $ 4 | $ 308,000 |
| | d) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 45,500 | Ton | $ 16 | $ 728,000 |
| | f) Existing utilities in place support | 200 | ft | $ 30 | $ 6,000 |
| | g) Sheet pile wall along existing utilities | 150 | ft | $ 100 | $ 15,000 |
| | h) Existing utilities removal and replacement | 1,200 | ft | $ 60 | $ 72,000 |
| | i) Sheet pile wall along existing STM pond (30ft) | 300 | ft | $ 300 | $ 90,000 |
| | j) Sheet pile wall along existing STM pond (20ft) | 200 | ft | $ 200 | $ 40,000 |
| | | | | Item 7 Subtotal | $ 3,581,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 691,300 | $ 691,300 |
| 10. | Mobilization/Demobilization | 5 | % | $ 691,300 | $ 691,300 |
| 11. | Permits | 2 | % | $ 276,500 | $ 276,500 |
| 12. | Health and Safety | 5 | % | $ 691,300 | $ 691,300 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 414,800 | $ 414,800 |
| | | | | Estimated Capital Cost | $ 16,591,300 |
| | | | | Engineering (20%) | $ 3,318,260 |
| | | | | Subtotal | $ 19,909,560 |
| | | | | Contingency (20%) | $ 3,981,912 |
| | | | | Total Estimated Capital Cost | $ 23,891,472 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE G.3-14**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9A: SOIL SOURCE REMOVAL**
**(50 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 23,891,472 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 37,504,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant

**TABLE G.3-15**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| Capital Costs | | | | | |
| 1. | Institutional Controls | | | | |
| | a) Perimeter Fencing (With Signs) | 7,750 | ft | $ 18 | $ 139,500 |
| | b) Deed Restrictions | -- | L.S. | $ 30,000 | $ 30,000 |
| | | | | Item 1 Subtotal | $ 169,500 |
| 2. | Perimeter Collection System | | | | |
| | a) Collection Trench including piping, bedding and sumps | | | | |
| | Zone A - 5 to 15 ft overburden depth / 15 ft bedrock depth, wet well/sump | 850 | ft | $ 265 | $ 225,250 |
| | Zone B - 10 to 30 ft overburden depth / 15 ft bedrock depth, wet well/sump | 800 | ft | $ 1,000 | $ 800,000 |
| | Zone C - 0 to 5 ft overburden depth / 15 ft bedrock depth, wet well/sump | 2,200 | ft | $ 235 | $ 517,000 |
| | Zone D - 5 to 15 ft overburden depth/15 ft bedrock depth | 650 | ft | $ 250 | $ 162,500 |
| | b) HDPE Forcemain to WWTP | 2,550 | ft | $ 15 | $ 38,250 |
| | | | | Item 2 Subtotal | $ 1,743,000 |
| 3. | Asphalt Cover for Parking Lots | 273,000 | sq ft | $ 3 | $ 819,000 |
| 4. | Cover System | | | | |
| | a) Grading Layer | 1,478,000 | sq ft | $ 0.30 | $ 443,400 |
| | b) 12-in Clay Barrier Layer | 1,478,000 | sq ft | $ 1.10 | $ 1,625,800 |
| | c) Geocomposite Clay Liner | 1,478,000 | sq ft | $ 0.80 | $ 1,182,400 |
| | d) Geonet drainage layer | 1,478,000 | sq ft | $ 0.90 | $ 1,330,200 |
| | e) Common Fill | 1,478,000 | sq ft | $ 0.60 | $ 886,800 |
| | f) Vegetative Cover | 1,478,000 | sq ft | $ 0.10 | $ 147,800 |
| | g) 6-in Topsoil | 1,478,000 | sq ft | $ 0.40 | $ 591,200 |
| | | | | Item 4 Subtotal | $ 6,207,600 |
| 5. | On-Facility Vault - RCRA Subtitle C Cap | | | | |
| | a) 6-in Topsoil | 75,000 | sq ft | $ 0.40 | $ 30,000 |
| | b) 18-in Common Fill | 75,000 | sq ft | $ 0.90 | $ 67,500 |
| | c) 12-in Sand Drainage Layer | 75,000 | sq ft | $ 0.75 | $ 56,250 |
| | d) 20-mil HDPE Liner | 75,000 | sq ft | $ 0.45 | $ 33,750 |
| | e) 24-in Clay Barrier | 75,000 | sq ft | $ 2.20 | $ 165,000 |
| | f) Vegetative Cover | 75,000 | sq ft | $ 0.10 | $ 7,500 |
| | g) Liner System | 75,000 | sq ft | $ 2.85 | $ 213,750 |
| | | | | Item 5 Subtotal | $ 573,750 |
| 6. | Groundwater Source Removal System - AOI 8 | | | | |
| | a) Collection Trench including piping, bedding and sumps | 600 | ft | $ 150 | $ 90,000 |
| | b) HDPE Forcemain to WWTP | 2,150 | ft | $ 15 | $ 32,250 |
| | | | | Item 6 Subtotal | $ 122,250 |

**TABLE G.3-15**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 7. | Soil Source Removal | | | | |
| | a) Excavation, stockpiling, and backfilling of clean overburden to support excavation of impacted soil | 27,500 | cu yd | $ 15 | $ 412,500 |
| | b) Excavation of PCB-Impacted Soil | 17,500 | cu yd | $ 6 | $ 105,000 |
| | c) Placement of Soil in On-Facility Vault | 17,500 | Ton | $ 4 | $ 70,000 |
| | d) Transportation and Off-Facility Disposal | 7,000 | Ton | $ 125 | $ 875,000 |
| | e) Supply and backfill imported clean fill to excavated areas | 15,750 | Ton | $ 16 | $ 252,000 |
| | f) Existing utilities removal and replacement | 400 | ft | $ 60 | $ 24,000 |
| | g) Sheet pile wall along existing STM pond (20ft) | 100 | ft | $ 200 | $ 20,000 |
| | h) Sheet pile wall along existing STM pond (30ft) | 200 | ft | $ 300 | $ 60,000 |
| | | | | Item 7 Subtotal | $ 1,818,500 |
| 8. | Groundwater Monitoring System Well Installations | -- | L.S. | $ 92,000 | $ 92,000 |
| 9. | Bonds/Insurance | 5 | % | $ 577,300 | $ 577,300 |
| 10. | Mobilization/Demobilization | 5 | % | $ 577,300 | $ 577,300 |
| 11. | Permits | 2 | % | $ 230,900 | $ 230,900 |
| 12. | Health and Safety | 5 | % | $ 577,300 | $ 577,300 |
| 13. | Construction Facilities/Temporary Controls | 3 | % | $ 346,400 | $ 346,400 |
| | | | | Estimated Capital Cost | $ 13,854,800 |
| | | | | Engineering (20%) | $ 2,770,960 |
| | | | | Subtotal | $ 16,625,760 |
| | | | | Contingency (20%) | $ 3,325,152 |
| | | | | Total Estimated Capital Cost | $ 19,950,912 |

Annual Operation and Maintenance Costs

| | | | | | |
|---|---|---|---|---|---|
| 1. | Site Evaluation ($60,000 every 5 years) | -- | L.S. | -- | $ 12,000 |
| 2. | Site Maintenance (cover system, vault, and fence) | -- | L.S. | -- | $ 26,000 |
| 3. | Operation of Perimeter Collection System | -- | L.S. | -- | $ 24,000 |
| 4. | Operation of Groundwater Source Removal System | -- | L.S. | -- | $ 24,000 |

**TABLE G.3-15**
**SCENARIO 4: 0-15 FOOT DEPTH (BGS)**
**DETAILED COST ESTIMATE**
**ALTERNATIVE 9B: SOIL SOURCE REMOVAL**
**(500 mg/kg ≤ PCBs < 1,500 mg/kg) TO ON-FACILITY LANDFILL VAULT**
**AND (PCBs ≥ 1,500 mg/kg) TO OFF-FACILITY DISPOSAL**
**GROUNDWATER SOURCE REMOVAL SYSTEM**
**IM ALTERNATIVES REVIEW REPORT - EAST PLANT AREA**
**GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**
**BEDFORD, INDIANA**

| *Item* | *Task* | *Quantity* | *Unit* | *Unit Cost* | *Cost* |
|---|---|---|---|---|---|
| 5. | Groundwater Monitoring System Sampling (42 wells including 20 additional ports sampled semi-annually for 5 years and annually thereafter, samples analyzed for PCBs, VOCs, and metals) | | | | |
| | a) Years 1 to 5 | -- | L.S. | -- | $ 420,000 |
| | b) Years 6 to 30 | -- | L.S. | -- | $ 210,000 |
| 6. | Spring/Seep Monitoring | -- | L.S. | -- | $ 150,000 |
| 7. | Site Source Control (SSC) | -- | L.S. | -- | $ 50,000 |
| | Estimated Annual Operation and Maintenance Cost | | | $ 496,000 to | $ 706,000 |
| | Contingency (20%) | | | $ 99,200 to | $ 141,200 |
| | Total Estimated Annual Operation and Maintenance Cost | | | $ 595,200 to | $ 847,200 |

Total Present Worth

| | |
|---|---|
| Capital Cost | $ 19,950,912 |
| Site Evaluation (discount factor of 2.5% every 5 years for 30 years) | $ 286,701 |
| Site Maintenance (discount factor of 2.5% for 30 years) | $ 652,985 |
| Operation of Perimeter Collection System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Operation of Groundwater Source Removal System (discount factor of 2.5% for 30 years) | $ 602,755 |
| Groundwater Monitoring System Sampling (discount factor of 2.5% for 30 years, semi-annually for first 5 years; annually thereafter) | $ 6,444,824 |
| Spring/Seep Monitoring System (discount factor of 2.5% for 30 years) | $ 3,767,220 |
| Site Source Control (SSC) (discount factor of 2.5% for 30 years) | $ 1,255,740 |
| **Total Present Worth (1)** | $ 33,564,000 |

Notes:
(1) Total Costs have been rounded to three significant figures.
cu yd - cubic yard
ft - feet
L.S. - Lump Sum
sq ft - square feet
AOI - Area of Interest
HDPE - High Density Polyethylene
PCB - Polychlorinated Biphenyl
RCRA - Resource Conservation and Recovery Act
STM - Stormwater
VOC - Volatile Organic Compound
WWTP - Wastewater Treatment Plant