GM Sustainable Workplaces
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March 24, 2020

Mr. Peter Ramanauskas
U.S. EPA Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604-3590

Dear Mr. Ramanauskas:

Re: Final Submittal of the final RCRA Facility Investigation Report
GM BCO – Bedford Facility,
ID 006036099, Docket No. RCRA 05 2017 0011
Bedford, Indiana

Please find enclosed the final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for the General Motors (GM) Bedford Casting Operations (BCO) Facility, formerly known as Global Propulsion Systems (GPS), at 105 GM Drive in Bedford, Indiana (U.S. EPA ID No. IND 006036099), submitted in accordance with the Conditions of the Administrative Order on Consent (AOC) dated August 4, 2014 (AOC Docket No. RCRA-05-2014-0011). This final document includes revisions set forth in the agreed upon responses to the U.S. EPA comments on the draft reports, submitted on January 31, 2020, and September 30, 2015. In addition, it includes the minor changes made for consistency and clarification which were emailed to you March 18, 2020.

Please note that GHD is currently working on the RFI Report Addendum which, when approved, will determine the submittal date for the Corrective Measures Proposal.

If you have any questions regarding the RFI Report please do not hesitate to contact me at 313-506-9465.

Sincerely,

Edward Peterson

Ed Peterson
Project Manager, Eco-Restorers
GM Sustainable Workplaces

jv/aj/267
Encl.
cc: See Attached Distribution List

GM Bedford Electronic Distribution List

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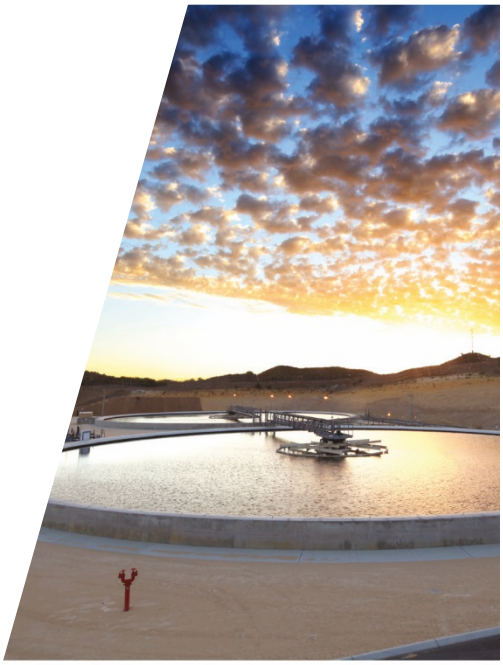


Resource Conservation and Recovery Act Facility Investigation (RFI) Report

General Motors LLC
Bedford Casting Operations
Bedford, Indiana

U.S. EPA ID NO. IND 006036099

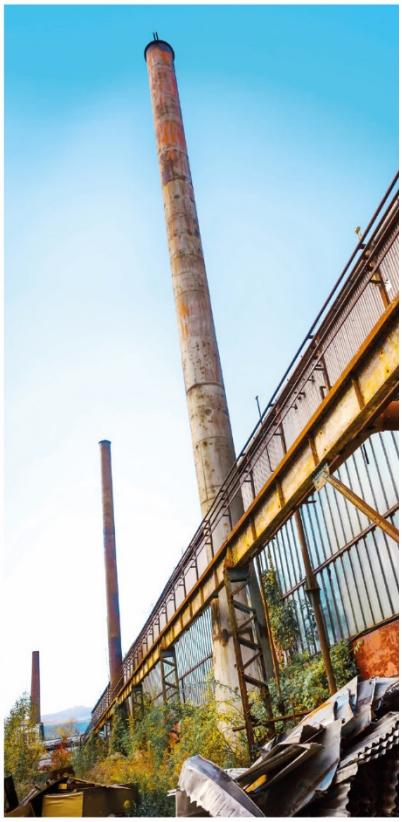


Table of Contents

1. Introduction 1
   - 1.1 Purpose 1
   - 1.2 Report Organization 1
   - 1.3 Community Relations 2
2. Environmental Setting 3
   - 2.1 Land Use 3
   - 2.2 Climate 4
   - 2.3 Topography 5
   - 2.4 Public Water Supply 5
     - 2.4.1 Off-Facility Residential Well Survey and Sampling 6
   - 2.5 Surface Water Hydrology 7
     - 2.5.1 Regional Surface Water Hydrology 7
     - 2.5.2 Local Surface Water Hydrology 7
     - 2.5.3 Hydrologic Studies and Models 9
     - 2.5.3.1 Bailey's Branch Surface Water Assessment 9
     - 2.5.3.2 Surface Water Flow Monitoring 10
     - 2.5.3.3 Creek Flow Monitoring 10
     - 2.5.3.4 Stream Flow Modeling 11
     - 2.5.3.5 Hydrologic Modeling 11
     - 2.5.3.6 Hydraulic Modeling 11
     - 2.5.3.7 Modeling Results 12
   - 2.6 Geologic Characterization 13
     - 2.6.1 Regional Geologic Characterization 13
     - 2.6.1.1 Overburden 13
     - 2.6.1.2 Bedrock 13
     - 2.6.2 Local Geologic Characterization 15
     - 2.6.2.1 Overburden 15
     - 2.6.2.2 Bedrock 16
   - 2.7 Hydrogeologic Characterization 25
     - 2.7.1 Regional Hydrogeologic Characterization 25
     - 2.7.2 Local Hydrogeologic Characterization 25
     - 2.7.2.1 Overburden 26
     - 2.7.2.2 Bedrock Water-Bearing Characteristics 26
     - 2.7.2.3 Groundwater Flow systems 33
     - 2.7.2.4 Seasonal Fluctuations 36
     - 2.7.2.5 Discussion and Summary of Groundwater and Surface Water Flow Systems37
3. Overview of RFI Activities 41
   - 3.1 Current and Historical Operations 41
   - 3.2 Current Conditions Report Summary 42
   - 3.3 RFI Objectives and Strategy 42

3.4 Pre-RFI Activities 43
3.4.1 Off-Facility Residential Well Survey 44
3.4.2 Stream Investigation 44
3.5 RFI Work Plan and Addenda 45
3.5.1 RFI Work Plan Addendum 1 46
3.5.2 RFI Work Plan Addendum 2 46
3.5.3 RFI Work Plan Addendum 3 46
3.5.4 RFI Work Plan Addendum 4 47
3.5.5 RFI Work Plan Addendum 5 47
3.5.6 RFI Work Plan Addendum 6 47
3.5.7 RFI Work Plan Addendum 7 47
3.5.8 RFI Work Plan Addendum 8 48
3.5.9 RFI Work Plan Addendum 9 48
3.5.10 RFI Work Plan Addendum 10 49
3.5.11 RFI Work Plan Addendum 11 49
3.5.12 RFI Work Plan Addendum 12 49
3.5.13 RFI Work Plan Addendum 13 49
3.6 RFI Investigation Sampling and Methodology 50
3.6.1 Sample Locations and Identification 50
3.6.2 Sampling Procedures 50
3.6.2.1 Sediment and Surface Water 51
3.6.2.2 Wipe 51
3.6.2.3 Surface Soil 51
3.6.2.4 Subsurface Soil 52
3.6.2.5 Bedrock 53
3.6.2.6 Groundwater Sampling 53
3.6.3 Geophysical Surveys 54
3.6.3.1 Surface Geophysical Surveys 54
3.6.3.2 Borehole Geophysical Logging 54
3.6.4 Monitoring Wells 55
3.6.4.1 Overburden 56
3.6.4.2 Bedrock 56
3.6.5 Hydraulic Conductivity Testing 58
3.6.5.1 Drawdown and Recovery Testing 58
3.6.5.2 Packer-Pressure Testing 59
3.6.5.3 Single-Well Response Testing 60
3.6.6 Additional Field Investigations 61
3.6.6.1 Bedrock Mapping and Field Measurements 61
3.6.6.2 Monitoring Well Dye Tracer Testing 61
3.6.6.3 Water Level Monitoring 64
3.6.6.4 Spring Identification, Monitoring, and Site Source Control Program 65
3.6.6.5 Thermal Aerial Survey 66
3.6.6.6 Phase I/II SSC Monitoring Program 66
3.6.6.7 Installed Collection Systems 67
3.6.6.8 Spring 018 Area 68
3.7 Stream Gage, Piezometer, and Stream Weir Installation 70
3.7.1 Stream Gage and Piezometer Installation 71
3.7.2 Stream Weir Installation 71
3.8 Location and Elevation Survey 72
4. Hydrogeologic Conceptual Flow Model 72

4.1 Source characterization 72
4.2 Physical Characteristics 73
4.2.1 Source Areas 73
4.2.2 Contaminant Migration Pathways 73
4.2.3 Contaminant Attenuation during Migration 77
4.2.4 Potential Receptors 77
5. Data Quality Assessment and Validation 78
5.1 Sampling Procedures 79
5.1.1 Sample Containers 79
5.1.2 Sample Labeling 79
5.1.3 Field QC Sample Collection 79
5.2 Custody Procedures 80
5.2.1 Field Custody Procedures 80
5.2.2 Transfer of Custody and Shipment Procedures 80
5.2.3 Laboratory Chain-Of-Custody Procedures 80
5.3 Sample Analysis 81
5.3.1 Soil Sample Analyses 81
5.3.2 Sediment Sample Analyses 81
5.3.3 Bedrock Sample Analyses 82
5.3.4 Surface Water Sample Analyses 82
5.3.5 Groundwater Sample Analyses 83
5.3.6 Surface Wipe Sample Analyses 83
5.3.7 Air Monitoring Sample Analyses 83
5.4 Data Validation 83
5.5 Data Quality 84
6. Risk Based Screening Levels for RFI Investigation 85
6.1 Phased Investigation 85
6.2 Risk-Based Screening Levels 85
6.2.1 Soil, Bedrock and Sediment 85
6.2.2 Groundwater, Spring Water, Surface Water, and Borehole Water 86
6.2.3 Presentation of Data on Figures 87
6.3 Background Calculations and Analytical Results 87
7. Results of Investigation 88
7.1 Results by Area of Interest 89
7.1.1 AOI 1 – Former Railroad Operations and Minerals Processing Facility 90
7.1.2 AOI 2 – Waste Storage Area 91
7.1.3 AOI 3 – PCB Storage Areas 91
7.1.4 AOI 4 – Former North Disposal Area 92
7.1.5 AOI 5 – Former East Sand Disposal Area 93
7.1.6 AOI 6 – Former Sludge Disposal and Fire Training Area 93
7.1.7 AOI 7 – Former North Lagoon and Outfall 001 93
7.1.8 AOI 8 – Former South Lagoons and Outfall 002 94
7.1.8.1 NAPL Investigation – AOI 8 94
7.1.9 AOI 9 – Service Tunnels 97
7.1.10 AOI 10 – Existing Stormwater Pond and Outfall 003 98

7.1.11 AOI 11 – Aboveground Storage Tanks 99
7.1.12 AOI 12 – Area Affected by the Reclaimed Hydraulic Fluid Release 100
7.1.13 AOI 13 – Underground Storage Tanks 100
7.1.14 AOI 14 – McBride Cows Disposal Area 101
7.1.15 AOI 15 – Former Equipment Storage Area 102
7.1.16 AOI 16 – Former East Electrical Substation 102
7.1.17 AOI 17 – Piston Building Oil Accumulations 102
7.1.18 AOI 18 – Area Affected by the Henry System Discharge 103
7.1.19 AOI 19 – Area Affected by a Paint and Thinner Spill 103
7.1.20 AOI 20 – Northern Portion of the Piston Building 104
7.1.21 AOI 21 – Filled Ravine North of the Die Cast Building 104
7.1.21.1 AOI 21-1 – Former Drainage Valley under Hourly Parking Lot 105
7.1.21.2 AOI 21-2 – Former Drainage Valley Northeast of Piston and Office Buildings105
7.1.21.3 AOI 21-3 – Surface Water Ditches Located Along GM Drive and Breckenridge Road 106
7.1.21.4 AOI 21-4 – Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road 106
7.1.22 AOI 22 – Tool Room Annex Dock Release 107
7.1.23 AOI 23 – Area Affected by the 1996 Wastewater Treatment Filter Cake Release 107
7.1.24 AOI 24 – Area Affected by the June 2000 Die Lube 5150 Release 108
7.1.25 AOI 30 – On-Facility Suspected Fill Area - Parcels 201 And 204 108

7.2 AOIs Not Owned by GM 109

7.2.1 AOI 25 Off-Site Fill Area – Parcel 398 109
7.2.2 AOI 26 Off-Site Fill Area – Parcels 384 & 386 109
7.2.3 AOI 27 Off-Site Fill Area – Parcels 381 & 382 110
7.2.4 AOI 28 Off-Site Fill Area – Parcel 401 110
7.2.5 AOI 29 Off-Site Fill Area – Parcel 39 110
7.2.6 AO 31 Off-Site Fill Area – Parcel 400 110

7.3 Other Sampling Investigations 110

7.3.1 Plant Boundary 110
7.3.2 Groundwater-Surface Water Investigation in Creeks 111
7.3.2.1 General 111
7.3.2.2 Swallet/Spring 018 Area 112

7.4 Geotechnical Testing Results 112

7.4.1 Facility Wide 112
7.4.2 AOI 4 113

7.5 Groundwater Investigation 113

7.6 Containment and Collection systems 116

8. Summary of RCRA Interim Measures and CERCLA Removal Actions 118

8.1 On-Facility RCRA Interim Measures 118

8.1.1 East Plant Area Interim Measures 118
8.1.1.1 Over 50mg/kg PCBs Soil Removal 118
8.1.1.2 Vault 119
8.1.1.3 East Plant Area Cover System 120
8.1.1.4 Perimeter Groundwater Trench Collection System 121
8.1.1.5 AOI 8 Oil Collection System 121
8.1.2 West Plant Area Interim Measures 122

8.1.2.1 MH-ST-43 Catch Basin 123
8.1.2.2 AOI 18 - Area Affected by the Henry System Discharge 123
8.1.2.3 AOI 21-1 - Former Drainage Valley under Hourly Parking Lot 124
8.1.2.4 AOI 21-2 - Former Drainage Valley Northeast of Piston and Office Buildings 124
8.1.2.5 AOI 13 – South Piston Yard 124
8.2 Off-Facility RCRA Interim Measures 125
8.2.1 Western Tributary 125
8.2.2 Parcels 387 and 389 Along The Northern Tributary 125
8.2.3 Parcels 201 and 204 125
8.3 CERCLA Removal Actions 126
8.3.1 Bailey's Branch Creek and Pleasant Run 126
8.3.2 Spring 018 Area 127
9. Baseline Human Health Risk Assessment 128
9.1 Introduction 128
9.2 Data selection and Preparation 130
9.2.1 Data selection 130
9.2.2 Data Preparation 131
9.3 Exposure Assessment 132
9.3.1 Exposure Setting 132
9.3.2 Potentially Exposed Populations 132
9.3.3 Exposure Pathways 133
9.3.3.1 Potential Exposure at the Facility and Industrial Zoned Parcels Owned By GM 133
9.3.3.2 Potential exposure at Residential Zoned Parcels Owned by GM 135
9.3.3.3 Potential Exposure at Parcels not Owned by GM 137
9.3.4 Selection of Exposure Concentrations 137
9.3.5 Fate and Transport Models 140
9.3.6 Estimation of Intakes 141
9.3.6.1 Routine Workers 142
9.3.6.2 Maintenance Workers 143
9.3.6.3 Construction Workers 145
9.3.6.4 Adolescent Trespassers 145
9.3.6.5 Residents 146
9.4 Toxicity Assessment 147
9.4.1 Cancer Toxicity Values 147
9.4.2 Noncancer Toxicity Values 148
9.4.3 Extrapolation of Toxicity Values 149
9.4.4 Lead 149
9.4.4.1 Soil 149
9.4.4.2 Groundwater 149
9.5 Risk Characterization 149
9.5.1 Cancer Risk and Noncancer Hazard Index 150
9.5.2 Risk Characterization for On-Facility Receptors 151
9.5.2.1 Routine Workers 151
9.5.2.2 Maintenance Workers 154
9.5.2.3 Construction Workers 155
9.5.2.4 Trespassers 157
9.5.3 Risk Characterization for Off-Facility Receptors 158

9.5.3.1 Residents 158
9.5.3.2 Maintenance Workers 159
9.5.4 Uncertainty Analysis 159
9.5.4.1 Exposure Concentrations 159
9.5.4.2 Exposure Factors 160
9.5.4.3 Extrapolated Toxicity Values 160
9.5.4.4 Risk Characterization 161
9.6 Risk Assessment Summary 161
10. Ecological Risk Assessment (ERA) 164
10.1 Introduction 164
10.2 Habitat and Exposure Evaluation 165
10.3 Assessment and Measurement Endpoint Evaluation 165
10.4 Risk Assessment Summary 165
11. Summary and Conclusions 166
11.1 RFI Review 166
11.2 Risk Assessment 167
11.3 Corrective Measures Proposal (CMP) 168
11.4 Financial Assurance and Operations Maintenance and Monitoring 170
12. References 170

Figure Index

Figure 2.1 Facility Location
Figure 2.2 Facility Plan
Figure 2.3 Monthly Precipitation at the GM Bedford Weather Station
Figure 2.4 Topography in the Vicinity of the Facility
Figure 2.5 Residential Well Survey
Figure 2.6 Lower East Fork White River Drainage Basin
Figure 2.7 Spring 018 Area
Figure 2.8 Location of Stream Gauges and Piezometers
Figure 2.9 Catchment Boundaries in Pleasant Run/Bailey's Branch Watershed – Upstream Portion of Bailey's Branch Creek and Pleasant Run Watershed
Figure 2.10 Glacial Features of South-Central Indiana
Figure 2.11 Bedrock Geology of Indiana
Figure 2.12 Generalized Stratigraphic Column for Paleozoic Rocks in Indiana
Figure 2.13 Bedrock Structural Features of Indiana
Figure 2.14 Base of Vault Showing Irregular Bedrock Surface
Figure 2.15 BIPS Images from MW-X143Y245S Showing Clay-Filled Fracture
Figure 2.16 Vertical Fracture in Vault Area

Figure Index

Figure 2.17 Top of Bedrock Contour Map
Figure 2.18 Elevation of the Top of the St. Louis Formation
Figure 2.19 Salem Formation Structure Contour Map
Figure 2.20 Elevation of the Top of the Harrodsburg Formation
Figure 2.21 Thickness of the Harrodsburg Formation
Figure 2.22 Elevation of the Top of the Ramp Creek Formation
Figure 2.23 Thickness of the Ramp Creek Formation
Figure 2.24 Elevation of the Top of the Edwardsville Formation
Figure 2.25 Limestone Thickness (All Formations)
Figure 2.26 Cross-Section Locations
Figure 2.27 Geologic Cross-Section A-A'
Figure 2.28 Geologic Cross-Section B-B'
Figure 2.29 Geologic Cross Section C-C'
Figure 2.30 Geologic Cross Section D-D'
Figure 2.31 Geologic Cross Section E-E'
Figure 2.32 Geologic Cross Section F-F'
Figure 2.33 Geologic Cross Section G-G'
Figure 2.34 Geologic Cross Section H-H'
Figure 2.35 Geologic Cross Section I-I'
Figure 2.36 Geologic Cross Section J-J'
Figure 2.37 Geologic Cross Section K-K'
Figure 2.38 Geologic Cross Section L-L'
Figure 2.39 Geologic Cross Section M-M'
Figure 2.40 Parcels 3 And 205 Storm Sewer Plan and Profile
Figure 2.41 Calculated Hydraulic Apertures Based on Packer-Pressure Tests
Figure 2.42 Distribution of Calculated Hydraulic Apertures Above Lower Limit of Testing
Figure 2.43 Shallow Groundwater Flow System Upper Potentiometric Surface
Figure 2.44 Intermediate Groundwater Flow System Potentiometric Surface Elevation (540 to 565 Ft AMSL)
Figure 2.45 Deep Groundwater Flow System Potentiometric Surface Elevation
Figure 2.46 MW-X128Y255 Groundwater Elevation and Daily Precipitation
Figure 2.47 MW-X234Y157S Groundwater Elevation and Daily Precipitation
Figure 2.48 Comparison of GPR Survey and Willowstick Results
Figure 3.1 Areas of Interest
Figure 3.2 Location of Geophysically Logged Bedrock Boreholes

Figure Index

Figure 3.3.1 RFI Soil Borings Locations
Figure 3.3.2 RFI Monitoring Wells Locations
Figure 3.3.3 Soil, Sediment, Surface, and Wipe and Groundwater Sampling Locations – Region 1
Figure 3.3.4 Soil, Sediment, and Wipe Sample Locations – Region 2
Figure 3.3.5 Soil, Sediment, and Wipe Sample Locations – Region 3
Figure 3.3.6 Soil, Sediment, and Wipe Sample Locations – Region 4
Figure 3.3.7 Soil, Sediment, and Wipe Sample Locations – Region 5
Figure 3.4 Monitoring Well Dye Tracer Tests
Figure 3.5 Location of SSC Seeps and Springs Collection Systems
Figure 3.6 Off-Facility SSC Seeps and Springs Monitoring Network
Figure 4.1 PCB Source Areas
Figure 6.1 Background Soil Sample Locations
Figure 7.1.1 AOI 1, 3, 8, 9, 11, 12, 13, 17, 18, 22, and 24 PCB Detection Summary – Region 1
Figure 7.1.2 AOI 2, 13, 19, 20, 21, 21-1, 21-2, 21-3, and 21-4 24 PCB Detection Summary – Region 2
Figure 7.1.3 AOI 3, 5, 6, 8, 11, 16, 23, and 30 PCB Detection Summary – Region 3
Figure 7.1.4 AOI 4, 7, 10, and 15 CB Detection Summary – Region 4
Figure 7.1.5 AOI 14 PCB Detection Summary – Region 5
Figure 7.2 RFI Monitoring Well and Soil Boring Locations AOI- 8
Figure 7.3 AOI 8 Overburden Geologic Cross-Section A-A'
Figure 7.4 AOI 8 Overburden Geologic Cross-Section B-B'
Figure 7.5 SW1 Stream Monitoring Location
Figure 7.6 SW2 Stream Monitoring Location
Figure 7.7 SW3 Stream Monitoring Location
Figure 7.8 SW4 Stream Monitoring Location
Figure 7.9 SW5 Stream Monitoring Location
Figure 7.10 Spring 018 Area Cross-Section Locations
Figure 7.11 Spring 018 Area Cross-Section A-A'
Figure 7.12 Spring 018 Area Cross-Section B-B'
Figure 7.13 Spring 018 Area Cross-Section C-C'
Figure 7.14 Spring 018 Area Cross-Section D-D'
Figure 7.15 Spring 018 Area Cross-Section E-E'
Figure 7.16 Spring 018 Area Cross-Section F-F'
Figure 7.17 Spring 018 Area Cross-Section G-G'
Figure 7.18 Groundwater Sample Locations, Overburden Non-PCB Sample Results
Figure 7.19 Groundwater Sample Locations, Shallow Bedrock Non-PCB Sample Results

Figure Index

Figure 7.20 Groundwater Sample Locations, Intermediate Bedrock Non-PCB Sample Results

Figure 7.21 Groundwater Sample Locations, Deep Bedrock Non-PCB Sample Results

Figure 7.22 Groundwater Sample Locations, Overburden PCB Delineation and NAPL Results

Figure 7.23 Groundwater Sample Locations, Shallow Bedrock PCB Delineation and NAPL Results

Figure 7.24 Groundwater Sample Locations, Intermediate Bedrock PCB Delineation and NAPL Results

Figure 7.25 Groundwater Sample Locations, Deep Bedrock PCB Delineation and NAPL Results

Figure 8.1 Summary of On-Site Remediation RCRA CA IM Activities

Figure 8.2 Perimeter Trench Groundwater Collection System Alignment

Figure 8.3 Proposed Groundwater Collection System Pilot Trench Alignment

Figure 8.4 Off-Site RCRA Remediation Parcels

Figure 8.5 CERCLA RA Excavation

Figure 8.6 Spring 018 Analytical Results

Table Index

Table 2.1 Summary of Stratigraphic Contacts and Formation Thicknesses

Table 2.2 Soil Geotechnical Testing Results

Table 2.3 Bedrock Core Geotechnical Testing Results

Table 2.4 Fractures per Foot in Rock Trenches Near Outfall #002

Table 2.5 Summary of Single-Well Response Test Data

Table 2.6a Summary of Monitoring Locations and Hydrostratigraphic Units – Shallow Bedrock Flow System Monitoring Wells

Table 2.6b Summary of Monitoring Locations and Hydrostratigraphic Units - Shallow Bedrock Flow System Monitoring Wells

Table 2.6c Summary of Monitoring Locations and Hydrostratigraphic Units – Intermediate Bedrock Flow System Monitoring Wells

Table 2.6d Summary of Monitoring Locations and Hydrostratigraphic Units – Deep Bedrock Flow System Monitoring Wells

Table 3.1 Areas of Interest

Table 3.2 Summary of Geophysically Logged Boreholes

Table 3.3 Well Construction Details

Table 3.4 Summary of Packer-Pressure Test Data

Table 3.5 Summary of Straddle Packer Test Data

Table 5.1 CERCLA Removal Action Sampling Summary

Table 5.2 Off-Site RCRA Interim Measures Summary

Table 6.1 Metal Concentrations in Background Soil from 0 to 2 Ft bgs

Table 6.2 Cancer Risks and Hazard Quotients for Background Metals in Soil

Table Index

Table 7.1.1 Matrix Detection Summary – Sediment

Table 7.1.2 Matrix Detection Summary – Surface Water

Table 7.1.3 Matrix Detection Summary – Wipe Sampling

Table 7.1.4 Matrix Detection Summary – Soil

Table 7.1.5 Matrix Detection Summary – Groundwater

Table 7.1.6 Matrix Detection Summary – Bedrock

Table 7.1.7 Matrix Detection Summary – NAPL

Table 7.1.8 Matrix Detection Summary – Liquid Emulsion

Table 7.2 AOI 8 NAPL Accumulation and Recovery

Table 7.3 Packer Pressure Test Recovery Results

Table 9.1 Conceptual Site Model - Scenarios for Potential Human Exposure

Table 9.2 Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to Soil

Table 9.3 Evaluation of Lead in On-Facility Soil

Table 9.4 Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to Groundwater in Overburden and Shallow Bedrock

Table 9.5 Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to NAPL and Liquid Emulsion

Table 9.6a Summary of Media-Specific Cumulative Cancer Risk and Hazard Index (HI) Estimates for On-Facility Media

Table 9.6b Summary of Media-Specific Cumulative Cancer Risk and Hazard Index (HI) Estimates for Off-Facility Media

Appendix Index

Appendix A Climate Data

- Appendix A.1 Weather Station Data (August 2003 through September 30, 2008)
- Appendix A.2 Monthly Precipitation Normals (1971-2000)

Appendix B Technical Memorandums and Certification Reports

- Appendix B.1 Off-Site Residential Well Survey and Sampling Technical Memorandum
- Appendix B.2 Bedford RFI Technical Memorandum 1 2001 Stream Investigation Data Summary
- Appendix B.3 Bedford RFI Technical Memorandum 1: 2001 Stream Investigation Data Summary Addendum, 2002 High Flow Surface Water Sampling
- Appendix B.4 Technical Memorandum Phase II Stream Investigation
- Appendix B.5 RFI Work Plan Field Sampling Plan
- Appendix B.6 Phase I and II Site Source Control Monitoring Program Memorandums

Appendix Index

Appendix B.7 Air Monitoring Data

Appendix B.8 Western Tributary IM Construction Certification Report

Appendix B.9 Northern Tributary IM Construction Certification Report

Appendix B.10 Parcels 201 and 204 IM Construction Certification Report

Appendix B.11 Upstream Parcels Removal Action Construction Certification Report

Appendix B.12 Parcel 22 Removal Action Construction Certification Report

Appendix B.13 Downstream Parcels Removal Action Construction Certification Report

Appendix B.14 Bailey's Branch Creek and Tributary 3 Concrete Sealing – Spring 018 Interim Measure

Appendix B.15 West Plant Area Interim Measures Construction Certification Report

Appendix B.16 East Plant Area Cover System Construction Certification

Appendix B.17 GM Powertrain Bedford Facility Sample EDAT

Appendix C Hydrogeology, Inc. and CRA Dye Test Summaries

Appendix D Schleede Hampton Associates, Inc. and Inspec-Sol Reports

Appendix E Geophysical Logs (Completed By Colog and CRA)

Appendix F Stratigraphic and Instrumentation Logs

Appendix G Core Laboratories Bedrock Core Testing Results

Appendix H Analytical Results Summaries

Appendix H.1 Sediment Sampling Analytical Results

Appendix H.1.1 AOI 4 Sediment Sampling Analytical Results

Appendix H.1.2 AOI 10 Sediment Sampling Analytical Results

Appendix H.2 Surface Water and Spring Water Sampling Analytical Results

Appendix H.2.1 AOI 1 Surface and Spring Water Analytical Results

Appendix H.2.2 AOI 4 Surface Water Analytical Results

Appendix H.2.3 AOI 6 Surface Water Analytical Results

Appendix H.2.4 AOI 7 Surface Water Analytical Results

Appendix H.2.5 AOI 8 Surface Water Analytical Results

Appendix H.2.6 AOI 10 Surface Water Analytical Results

Appendix H.2.7 AOI 30 Surface Water Analytical Results

Appendix H.3 Wipe Sampling Analytical Results

Appendix H.4 Soil Sampling Analytical Results

Appendix H.4.1 AOI 1 Soil Sampling Analytical Results

Appendix Index

Appendix H.4.2	AOI 2 Soil Sampling Analytical Results
Appendix H.4.3	AOI 4 Soil Sampling Analytical Results
Appendix H.4.4	AOI 5 Soil Sampling Analytical Results
Appendix H.4.5	AOI 6 Soil Sampling Analytical Results
Appendix H.4.6	AOI 7 Soil Sampling Analytical Results
Appendix H.4.7	AOI 8 Soil Sampling Analytical Results
Appendix H.4.8	AOI 9 Soil Sampling Analytical Results
Appendix H.4.9	AOI 10 Soil Sampling Analytical Results
Appendix H.4.10	AOI 11 Soil Sampling Analytical Results
Appendix H.4.11	AOI 12 Soil Sampling Analytical Results
Appendix H.4.12	AOI 13 Soil Sampling Analytical Results
Appendix H.4.13	AOI 14 Soil Sampling Analytical Results
Appendix H.4.14	AOI 15 Soil Sampling Analytical Results
Appendix H.4.15	AOI 17 Soil Sampling Analytical Results
Appendix H.4.16	AOI 18 Soil Sampling Analytical Results
Appendix H.4.17	AOI 19 Soil Sampling Analytical Results
Appendix H.4.18	AOI 20 Soil Sampling Analytical Results
Appendix H.4.19	AOI 21 Soil Sampling Analytical Results
	AOI 21-1 Soil Sampling Analytical Results
	AOI 21-2 Soil Sampling Analytical Results
	AOI 21-3 Soil Sampling Analytical Results
	AOI 21-4 Soil Sampling Analytical Results
Appendix H.4.20	AOI 22 Soil Sampling Analytical Results
Appendix H.4.21	AOI 23 Soil Sampling Analytical Results
Appendix H.4.22	AOI 24 Soil Sampling Analytical Results
Appendix H.4.23	AOI 30 (Parcel 201) Soil Sampling Analytical Results
Appendix H.4.24	West Plant Area Additional Soil Sampling Analytical Results
Appendix H.4.25	East Plant Area Additional Soil Sampling Analytical Results
Appendix H.4.26	All Verification Soil Sampling Analytical Results
Appendix H.4.27	Stream Delineation Sampling Analytical Results

Appendix Index

Appendix H.5 Background and Boundary Soil Sampling Analytical Results

Appendix H.5.1 Background Soils Sampling Analytical Results

Appendix H.5.2 Boundary Soils Sampling Analytical Results

Appendix H.6 Groundwater Sampling Analytical Results

Appendix H.7 Rock Sampling Analytical Results

Appendix H.7.1 AOI 1 Bedrock Sampling Analytical Results

Appendix H.7.2 AOI 9 Bedrock Sampling Analytical Results

Appendix H.7.3 AOI 21-4 Bedrock Sampling Analytical Results

Appendix H.8 NAPL Sampling Analytical Results

Appendix H.9 Liquid Emulsion Sampling Analytical Results

Appendix I Packer-Pressure Testing Results

Appendix J Dr. B.H. Kueper Documentation

Appendix J.1 Hydraulic Aperture Calculations – Dr. B.H. Kueper

Appendix J.2 Site Conceptual Model Contaminant Migration – Dr. B.H. Kueper

Appendix J.3 Updated Conceptual Site Model (as presented in the Pilot Trench Performance Monitoring Plan, GHD, September 24, 2019)

Appendix K Hydrographs of Water Levels

Appendix K.1 Open Hole Monitoring Wells

Appendix K.2 Waterloo System Monitoring Wells

Appendix K.3 East Plant Area Groundwater Collection Trench Coreholes

Appendix K.4 MW-X128Y255 and MW-X234Y157s

Appendix L Hydraulic Monitoring Data for Stream Gages and Piezometers

Appendix M Environmental Indicator Reports

Appendix M.1 Environmental Indicator CA725

Appendix M.2 Environmental Indicator CA750

Appendix N Bedrock Recovery Testing Results

Appendix O Geophysical Survey Results

Appendix P.1 Drawdown and Recovery Data and Graphs

Appendix P.2 Single-well Response Testing

Appendix Q Eagleview Industries Final Report

Appendix R Example Data Validation Summaries

Appendix S.1 Data Screening Results Tables

Appendix Index

Appendix S.2	Data Box Results from the Data screening
Appendix S.3	Samples Not Included In Human Health Risk Assessment
Appendix T	Human Health Risk Calculations
Appendix U	UST Closure Letters
Appendix V	Groundwater Collection Trench Plan & Profile Drawings
Appendix W	Self Implementing Plan (On USB Key)
Appendix X	Ecological Risk Assessment (Exponent, September 26, 2006)
Appendix Y	Response to Comment Memos on Draft RFI Report
Appendix Z	Abandoned Storm Sewer Lines

List of Acronyms and Terms

ADD	average daily dose
Agreement	GMC RCRA Corrective Action Agreement
amsl	above mean sea level
AOC	GM Administrative Order on Consent
AOI	Area of Interest
AST	Above-ground Storage Tank
AT	averaging time
ATEL	Aqua Tech Environmental Laboratories
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	acoustic televiewer
BCa	bias-corrected and accelerated
bgs	below ground surface
BIPS	borehole image processing system
CA	Corrective Action
CA725	RCRA Environmental Indicator CA725 for the Determination of Current Human Exposures Under Control
CA750	RCRA Environmental Indicator CA750 for the Determination of Migration of Contaminated Groundwater Under Control
Cair	concentration in air
CCR	Current Conditions Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act

List of Acronyms and Terms

CFD	Central Foundry Division
cfs	cubic feet per second
Cinergy	Cinergy Corporation
CLP	Community Liaison Panel
CM	Corrective Measure
CMP	Corrective Measures Proposal
cm	centimeter
cm/sec	centimeters per second
COC	Chain-of-Custody
Corps	U.S. Army Corps of Engineers
CPT	Cone Penetrometer Testing
CRA	Conestoga-Rovers & Associates, Inc. On July 1, 2015, CRA changed its name to GHD. CRA/GHD was retained by both GMC and GM to conduct and/or oversee the RFI-related activities.
CSM	Conceptual Site Model
CSP	Corrugated Steel Pipe
Cy	cubic yards
DC	Diversion Channel
DNAPL	Dense Non-Aqueous Phase Liquid
Downstream Parcels	The Downstream Parcels include Parcels 13 (RACER), 15, 20 (RACER), 21, 23 (RACER), 24, 25, 27 (RACER), 28 (RACER), 29, 30, 36, 37, 38 (RACER), 39 (RACER), 40, 72, 76 (RACER), 78 (RACER), 81, and 216 (east of Bailey Scales Road).
DQ	Decision Quest
DRO	diesel range organics
DWB	Drinking Water Branch
EagleView	EagleView Industries
ED	exposure duration
EDD	electronic data deliverable
East Plant Area	Portion of the Facility located East of GM Drive
EI	Environmental Indicator
EM	electromagnetic
ENVIRON	Ramboll Environ Incorporated (formerly ENVIRON International Corporation)

List of Acronyms and Terms

ERA	Ecological Risk Assessment
°C	degrees Celsius
°F	degrees Fahrenheit
Facility	Property owned by GM and constituting GM's Casting Operations (formerly known either as Powertrain or Castings, Engines, and Transmissions or Global Propulsion Systems) in Bedford, Indiana
fps	feet per second
FSP	Field Sampling Plan
ft	feet
ft/day	feet per day
ft/min	feet per minute
ft bgs	feet below ground surface
GCL	geosynthetic clay liner
GC/MS	Gas Chromatograph/Mass Spectrometry
GM	General Motors LLC
GMC	General Motors Corporation (renamed Motors Liquidation Company on July 9, 2009)
gpm	gallons per minute
GPR	ground penetrating radar
GPS	global positioning system
GRO	gasoline range organics
Groundwater Trench	Perimeter Groundwater Trench Collection System for the East Plant Area
≥50 mg/kg PCBs	greater than or equal to 50 mg/kg PCBs
HASP	Health and Safety Plan
HCFM	Hydrogeologic Conceptual Flow Model
HDPE	high-density polyethylene
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center – River Analysis System
HGI	Hydrogeology, Inc.
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	Hazard Quotient or standard core drill barrel size
HSA	hollow-stem auger

List of Acronyms and Terms

ICP	Inductively Coupled Plasma
ID	identification number
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IM	Interim Measure
IRIS	Integrated Risk Information System
Inspec-Sol	Inspec-Sol, Inc.
kg	kilograms
Kp	Permeability Coefficient
<50 mg/kg PCBs	less than 50 mg/kg PCBs
LADD	lifetime average daily dose
lbs	pounds
L/hour	liters per hour
LLDPE	linear low-density polyethylene
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
mD	millidarcies
mg/cm2	milligrams per centimeters squared
mg/day	milligrams per day
mg/kg	milligrams per kilogram
MGO	Municipal Groundwater Ordinance
MHz	megahertz
ml	milliliters
MLC	Motors Liquidation Company
mm	millimeters
MMP	Monitoring and Maintenance Plan
MP	Mile Point
MPC	Minerals Processing Corporation
MPE	multi phase extraction
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAAQS	National Ambient Air Quality Standard

List of Acronyms and Terms

NAPL	Non-Aqueous Phase Liquid
NAD	North American Datum
NAVD	North American Vertical Datum
NFA	No Further Action
NFG	National Functional Guidelines
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OMM	Operation, Maintenance, and Monitoring
OMMP	Operation, Maintenance, and Monitoring Plan
PCBs	polychlorinated biphenyls
PDF	portable document format
PID	photoionization detector
Pilot Trench	Pilot Perimeter Groundwater Collection System Study
PM10	Particulate Matter less than 10 micrometers in size (Respirable Soil Particulates)
PPE	Personal Protective Equipment
ppm	parts per million
PPRTV	Provisional Peer Reviewed Toxicity Values
PRGs	Preliminary Remediation Goals
psi	pounds per square inch
PVC	polyvinyl chloride
PWS	Public Water Supply
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RACER Trust	Revitalizing Automotive Communities Environmental Response Trust
RA	Removal Action conducted under CERCLA
RA Work Plans	Work Plans for the Upstream Parcels RA, Parcel 22 RA, and Downstream Parcels RA
RCG	Remediation Closure Guide
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RfC	reference concentration
RQD	Rock Quality Designation

List of Acronyms and Terms

RFI	RCRA Facility Investigation
RME	reasonable maximum exposures
RSLs	Regional Screening Levels
RTC	Rough Terrain Concept
SAP	Sampling and Analysis Plan
SF	cancer slope factor
SHA	Schleede Hampton Associates, Inc.
SHHRA	Streamlined Human Health Risk Assessment
SOP	Standard Operating Procedures
SOW	scope of work
SP	spontaneous (self) potential
SPR	single-point resistance
Spring 018 Area	Spring 018 Study region
SPT	standard penetration techniques (split-barrel)
SSC	Site Source Control
SL	Screening Level
STL	Severn Trent Laboratories
SVOC	Semi-volatile Organic Compound
TA	TestAmerica
TAL	Target Analyte List
TCL	Target Compound List
TDS	total dissolved solids
THQ	Target Hazard Quotient
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TPH	total petroleum hydrocarbons
Tributary 3	a tributary to Bailey's Branch in the north section of the East Plant Area
TR	Target cancer risk
TSCA	Toxic Substances Control Act
TSP	total suspended particulate
TSS	Total Suspended Solids
UCL	upper confidence limit

List of Acronyms and Terms

µg/L	micrograms per liter
µg/m3	micrograms per cubic meter
URF	unit risk factor
µm	micrometer
Upstream Parcels	The Upstream Parcels include Parcels 3, 4, 5 (RACER), 6, 7 (RACER), 8 (RACER), 10 (RACER), 11 (RACER), 12 (RACER), 205, 215, 216 (west of Bailey Scales Road), 401, and the area north of the AOI 4.
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
Vault	East Plant Area TSCA Permitted Vault
VOC	Volatile Organic Compound
Waterloo System	Waterloo/Solinst Multi-Level Groundwater Monitoring System
West Plant Area	Portion of the Facility located west of GM Drive
Willowstick	Willowstick Technologies, LLC
WWTP	GM Casting Operations Bedford Facility Wastewater Treatment Plant
WTP	On-Facility Site Source Control and Stormwater Treatment Facility

1. Introduction

1.1 Purpose

GHD (formerly Conestoga-Rovers & Associates, Inc. (CRA))[1] has prepared this Resource Conservation and Recovery Act (RCRA) Facility Investigation Report (RFI Report) on behalf of General Motors LLC (GM) for GM's Casting Operations (formerly referred to as either Powertrain Division or Castings, Engines, and Transmissions or Global Propulsion Systems) of the Bedford Facility (Facility) located in Bedford, Lawrence County, Indiana, in accordance with the RCRA Administrative Order on Consent (AOC) (effective August 4, 2014) by and between United States Environmental Protection Agency (U.S. EPA) and GM for the Facility (Docket No. RCRA 005-2014-0011)[2].

This RFI Report describes the procedures, methods, and results of the field investigations conducted at the Facility, GM-owned adjacent properties, and select third party properties not previously owned by General Motors Corporation (GMC) during the RFI and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Removal Action[3] (RA), including those related to the evaluation of effectiveness of the Interim Measure (IM) and RA activities. The information in this RFI Report includes a comparison of the RFI data with generic risk-based screening criteria to identify where a potentially significant release of hazardous waste or hazardous constituents has occurred. Where a potentially significant release is identified, the nature and extent of hazardous constituents in the environmental media characterized during the RFI are discussed. A site-specific Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) are also included in this RFI Report to provide a basis for determining whether the presence of these hazardous constituents poses an unacceptable risk to human health or the environment that would warrant additional Corrective Measures (CMs).

This RFI Report presents RFI information from May 2001 through May 31, 2015. Information gathered after May 31, 2015 will be addressed in a RFI Report Addendum, as applicable.

1.2 Report Organization

This report is organized as follows:

Section 1.0 This Section provides an introduction to the report and presents the purpose of the RFI Report.

1 On 2 July 2014, GHD and Conestoga-Rovers & Associates merged. On July 1, 2015, CRA changed its name to GHD. Where work was conducted prior to July 1, 2015, CRA is identified as the entity performing the work. GHD is the current entity providing consulting services for this project.

2 General Motors LLC (GM) refers to the company formed on July 10, 2009, as a result of the 363 Asset Sale pursuant to the bankruptcy of General Motors Corporation. Any reference in this RFI Report to historical documents or to the property or work prior to July 10, 2009, refers to the work performed by General Motors Corporation which includes work on properties owned by RACER Trust, third parties and/or GM.

3 The Removal Action was initiated by General Motors Corporation under the CERCLA Administrative Order on Consent (effective July 31, 2003), U.S. EPA Docket No. V-W-'03-C-747 and completed by both General Motors LLC and RACER Trust.

Section 2.0 This Section presents the environmental setting; including a discussion of the site setting, surface water hydrology, and regional and local geologic and hydrogeologic conditions.

Section 3.0 This Section provides an overview of the Facility location and the current and historical operations. It also provides an overview of pre-RFI activities, and the RFI activities conducted including: the RFI objectives, RFI work plans and addenda, sampling methodology along with sample location and elevation surveys.

Section 4.0 This Section presents the hydrogeologic conceptual flow model and contaminant migration pathways.

Section 5.0 This Section provides a description of the data validation and assessment process and the Quality Assurance/Quality Control (QA/QC) procedures that were implemented during the investigative sampling.

Section 6.0 This Section provides a description of the development and use of risk-based screening levels for evaluating the adequacy of the Facility characterization data to support the RFI baseline risk assessment, the calculation of Facility-specific background levels for metals, the subsurface conditions and soil, sediment, and surface water analytical results for each Area of Interest (AOI), and the results and findings of the groundwater investigation.

Section 7.0 This Section presents the results of the RFI field investigations by AOI and background sample analyses, a summary and discussion of the investigation results for each of the areas evaluated in the RFI, and a discussion on the overall groundwater investigation and results. The discussion for each investigated area includes a summary of the scope of the field investigations, and a summary and evaluation of the RFI data obtained.

Section 8.0 This Section presents a summary of IMs completed to date or in progress, and RA activities in Bailey's Branch Creek and Pleasant Run.

Section 9.0 This Section presents the HHRA for the areas investigated in the RFI and discusses the results.

Section 10.0 This Section presents the ERA as it applies to the areas investigated in the RFI.

Section 11.0 This Section provides the summary and conclusions regarding the information presented in this RFI Report to support a Corrective Measures Proposal (CMP).

Section 12.0 This Section lists the references used in compiling this RFI Report.

1.3 Community Relations

This project included extensive public involvement, which included the following mechanisms for providing public access to information about the project:

- Submittal of a Community Relations Plan by GM on June 6, 2001, which was approved by U.S. EPA
- Quarterly (July 2001 – present) progress reports related to the RCRA CA

- Monthly progress reports related to the CERCLA RA during the period of July 2003 through August 2012
- Fact sheets (40 from May 2001 – June 2015)
- Public meetings
- Mass mailings for meeting invitations and distribution of Fact Sheets
- Community Liaison Panel (CLP) meetings
- A dedicated information phone line
- A dedicated phone line to report traffic issues
- An information repository
- Project website (www.gmbedfordcorrectiveaction.com)

Copies of the progress reports, fact sheets, public meeting presentation, CLP minutes, and other pertinent project documents can be found on the project website (www.gmbedfordcorrectiveaction.com).

2. Environmental Setting

The Facility is located on the northeast side of the City of Bedford at 105 GM Drive, Bedford, Shawswick Township, Lawrence County, Indiana 47421. The Facility contains approximately 1,080,000 square feet of floor space and is located on 152 acres of land on either side of GM Drive and extending north along Bailey Scales Road (excluding several parcels recently purchased by GM — referred to as owned residential properties) and currently employs approximately 600 to 700 people. The Facility location and Facility plan are presented on Figures 2.1 and 2.2, respectively.

2.1 Land Use

The Facility, which is zoned for light and heavy industry in Bedford, Indiana, is bordered: by residential and undeveloped areas to the north; by the White River Port Authority (former Canadian and Pacific Railway railroad tracks have been removed) and Bedford Recycling (formerly IMCO, a Kaiser Aluminum recycling facility) and residential properties to the south; by residential property and undeveloped areas to the east; and by the abandoned railway, church, residential properties, commercial properties, and a cemetery to the west. The Facility was historically utilized as a stone mill circa 1890 to 1942, at which time the U.S. Government acquired the Facility and leased it to GMC for operations as an aluminum foundry. GMC purchased the property in 1946 and the Facility has been operated by GMC and GM as a foundry since that time. The future land use at the Facility is expected to remain commercial/industrial. Surrounding areas include zoning for industrial, commercial, and residential land use. The manufacturing portions of the Facility are surrounded by a perimeter security fence and signs to limit access, and Plant security is provided 24-hours a day. In addition to limited access, GM will propose in the CMP that the Facility will have a deed restriction applied to areas of known potential for unacceptable exposure to environmental media. As a standard of care, a health and safety plan (HASP), or appropriate safety procedures, will be

implemented for work in these impacted areas or such work will be authorized by personnel knowledgeable of the potential exposure hazards posed by conducting the work (such as GM Remediation Staff, Facility Environmental Engineering, etc.). GM intends to also propose groundwater use restrictions for off-Facility properties that GM owns.

2.2 Climate

According to the National Oceanic and Atmospheric Administration (NOAA) and the Western Regional Climate Center, the State of Indiana's climate has strongly marked seasons with cold winters, warm and humid summers, and a transition period that produces an active spring with thunderstorms and tornados. Climate data for the City of Bedford, Indiana are summarized below, based on data collected from 1987-2010 by NOAA and their affiliates.

January is typically the coldest month with a normal daily maximum temperature of 38.1 °F and a normal daily minimum of 19.9 °F. July is typically the warmest month with a normal daily maximum of 85.4 °F and a normal daily minimum of 63.8 °F. In recent years, prolonged summer temperatures in excess of 90 °F have been observed.

The average annual precipitation in for the Bedford, Indiana region is 46.22 inches. The wettest month of the year is typically May, with an average rainfall of 5.79 inches. Winter is the driest time of the year, averaging 3.09 inches of precipitation per month. The average annual snowfall is approximately 17 inches. According to the NOAA, the average length of the growing season, or freeze-free period, is approximately 199 days in southwestern Indiana.

CRA established a weather station at the Facility to record weather data including precipitation events, beginning in August 2003. Following a lightning strike that knocked the weather station out of service, daily precipitation was subsequently recorded using a pole-mounted rain gauge. Figure 2.3 presents the monthly precipitation data recorded by the station for September 2003 through May 2015. Precipitation generally varied from 2.28 to 5.38 inches per month, although extremes of 0.00 inches and 12.29 inches of precipitation were recorded during December 2010 and March 2008, respectively. Historical weather data are presented in Appendix A.1.

The monthly precipitation normals (arithmetic mean or average) for Bedford (1981-2010) were obtained from NOAA's National Climatic Data Center, and are included in Appendix A.2. These data have also been presented on Figure 2.3 for comparative purposes. A review of the data from Appendix A.2 and the NOAA report (NOAA, 2002) (summarized below) indicates that September through December 2003 was slightly drier than normal. The calendar years 2003, 2004, 2006, and 2008, were substantially wetter than average while calendar year 2005, 2009, 2011, 2013,and 2014 were normal years with similar precipitation totals. 2007, 2010, 2012, and 2015 were drier than average.

Year	Actual Measured Facility Precipitation (inches)	NOAA's Bedford Precipitation Normal (inches)
2003 (September to December)	13.19	17.73
2004 (January to December)	52.90	46.22
2005 (January to December)	43.18	46.22
2006 (January to December)	55.39	46.22

Year	Actual Measured Facility Precipitation (inches)	NOAA's Bedford Precipitation Normal (inches)
2007 (January to December)	36.43	46.22
2008 (January to December)	54.72	46.22
2009 (January to December)	50.35	46.22
2010 (January to December)	31.01	46.22
2011 (January to December)	49.87	46.22
2012 (January to December)	21.13	46.22
2013 (January to December)	49.54	46.22
2014 (January to December)	43.4	46.22
2015 (January to May)	13.1	19.71

2.3 Topography

Based on the United States Geological Survey (USGS) 7.5 minute topographical quadrangles (Oolitic, Bartlettsville, Bedford East, and Bedford West Quadrangles), elevations around the Facility in Lawrence County range from 550 to 700 feet (ft) above mean sea level (amsl). The elevation of Bailey's Branch and Pleasant Run stream channels range from approximately 550 to 600 ft amsl. Figure 2.4 presents the topography in the vicinity of the Facility based on the USGS quadrangle maps.

2.4 Public Water Supply

The Indiana Department of Environmental Management (IDEM), Office of Water Management, Drinking Water Branch (DWB) is the primary administrator of the Indiana Public Water Supply Supervision Program. The IDEM DWB maintains an inventory of all public water supplies (PWSs). Each PWS is required to collect and analyze drinking water samples for various contaminants (IDEM, 2001). The water sample analysis data are compiled to ensure that public water systems do not exceed the maximum contaminant levels established by the State and the U.S. EPA.

PWS pipelines are present along major roads throughout Lawrence County. These pipelines are owned by the Bedford City Utilities, East Lawrence Water Corporation, or North Lawrence Water Authority. The surface water intake for the Bedford City utilities is located on the East Fork White River. East Lawrence Water Corporation purchases their water from the City of Bedford. The North Lawrence Water Authority purchases water from the City of Bedford for their customers located east of Salt Creek. For customers west of Salt Creek, the North Lawrence Water Authority supplies water from water supply wells completed in the bedrock (IDEM, 2001). The Facility receives water from the City of Bedford (from the surface water intake on the East Fork White River) for potable and process water use.

The human population surrounding the Facility receives potable water from the water intake on the East Fork White River, due to the proximity to the City utilities and geographical location east of Salt Creek since groundwater is generally only used as a drinking water source for the human population west of Salt Creek. It is our understanding that residents proximate to the Facility do not use groundwater as their drinking water source. To verify this, GM conducted a residential well survey described in Section 2.4.1 and further discussed in Sections 3.5.1 and 7.4.

2.4.1 Off-Facility Residential Well Survey and Sampling

A residential well survey and sampling event strategy was initiated in June 2001. The initial effort consisted of a door-to-door survey by one representative from CRA and one representative from Decision Quest (DQ), a community relations subcontractor. During the initial door-to-door residential well survey, which was completed by August 10, 2001 (further discussed in Section 3.4.1), 392 properties were visited within the one-half mile radius of the Facility (Figure 2.5). These properties contained structures including houses, businesses, and churches. Each survey team used maps showing structures currently within this area, which were identified from aerial photographs taken on March 27, 2001. The survey teams verified the presence of structures on each property and interviewed the current occupants to determine the property owner and whether a groundwater supply well or cistern, was present on the property. If a well or cistern was present, the survey teams determined the current and historical use, and whether the survey team or resident could access the well or cistern in order to obtain a water sample.

Once the survey team contacted an owner, the CRA representative completed a "Well Survey Form". Information collected on the form included the address and phone number of the owner and well information. Well information on the form included water source, date of well installation, well depth and location, plumbing material, well casing material, screen material, static water depth, and aesthetic qualities of the water. If the property contained an accessible well or cistern, the owner was asked to sign a property access agreement, and the CRA representative sampled the well and collected a groundwater sample for laboratory analysis, if possible**.** Additional requests from local residents for groundwater sampling following completion of this survey were also evaluated for potential to be impacted by Facility activities. Property owners from 350 of the 392 properties were contacted and surveyed during this door-to-door effort. DQ continued to call and send letters to the outstanding property owners that the survey teams had not been able to contact. A second door-to-door survey of these non-surveyed properties was conducted on September 13, 2001. In the final stage of this effort, the status of 25 properties remained outstanding. Personalized letters were mailed on October 23, 2001, to 22 of these properties with a return receipt requested. As a result of these letters, five additional properties were completed: four called the information line to report that they did not have a well and one signed an access agreement to allow a cistern to be sampled. Ten properties returned a receipt, but did not respond to the information line with the requested responses. Seven properties did not return a receipt. In summary, owners of 372 of the 392 properties within a one-half mile radius of the Facility have been contacted and surveyed for potential groundwater usage (Figure 2.5).

The locations of the remaining 20 properties within half mile radius of the Facility that did not respond to the well survey are shown on Figure 2.5. These properties receive drinking water from the City of Bedford or the North Lawrence Water Authority which obtain water from the East Fork White River. As such, if a working well is present on any of the outstanding properties, it is unlikely that it is used as a potable water source.

None of the 37 wells and 12 cisterns identified as a result of the survey conducted within the one-half mile radius of the Facility were used for potable water. However, one well (Parcel 208 well) was being used for watering the lawn and gardens (the well has since been taken out of service and the property is currently owned by GM), and one well (Parcel 292 well) located outside of the one-half mile radius was being used for drinking water (Polychlorinated Biphenyls [PCBs] not

detected). The other wells sampled were not functional as a drinking water supply (e.g., buried, built over, no working pumps, disconnected, etc.).

Since completion of this initial survey, GM has continued to consider requests for sampling from local residents (outside the half mile radius). The groundwater sampling results for residential properties are presented in the Off-Site Residential Well Survey and Sampling Technical Memorandum attached in Appendix B.1 and their locations are presented on Figure 2.5. The residential well sampling analytical results are discussed in Section 7.4.

2.5 Surface Water Hydrology

The regional and local surface water hydrology is presented in the following sections. The regional surface water hydrology is based on published literature sources, while the local surface water hydrology is based on the information gained through the RFI field investigations.

2.5.1 Regional Surface Water Hydrology

The Facility is located within the East Fork White River Basin, which lies within several counties including Lawrence, Henry, Brown, Marion, Monroe, and Orange, and has a drainage area of approximately 3,861 square miles as presented in Figure 2.6. The majority of the rivers in this basin drain to the southwest. Stream flow is recorded at the USGS East Fork White River gauging station (station ID 03371500), located 7.8 miles southeast of Bedford in Lawrence County. According to the USGS Water Resources Division, the monthly average flow rate (October 1939 to September 2005) is 4,335 cubic ft per second (cfs) and ranged from a minimum of 228 cfs to a maximum of 30,650 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 Blue River.

Rivers in the eastern half of the East Fork White River Basin have a sub parallel drainage. Those rivers include the Sugar Creek, Big Blue River, Little Blue River, Flatrock River, Clifty Creek, Sand Creek, Vernon Forth, Graham Creek, and the East Fork White River from Medora to Jonesville.

Drainage of the Mitchell Plain in the central Lawrence County, 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, some of the surface water is intercepted by sink holes and diverted underground into the groundwater system or subterranean channels.

2.5.2 Local Surface Water Hydrology

The Facility is situated on a topographic ridge. The ridge crest is approximately 150 ft to 185 ft higher than the valley bottom, which is located approximately one-half mile northeast of the Facility. At the start of the RFI investigation, the Facility surface runoff was observed to drain primarily to the east and northeast in small valleys which were tributaries of Bailey's Branch of Pleasant Run Creek, including those referred to herein as the Western Tributary and Northern Tributary (Figure 2.2). It was observed that surface water runoff from the Facility toward the west is minimal.

The Western Tributary, which begins just off of the west boundary of the Facility, is the product of an emanating groundwater spring. This Western Tributary begins just to the west of the Facility and flows northwesterly, draining much of the north-western portion of the City of Bedford, ultimately discharging to Salt Creek, northwest of Bedford.

Other observed surface drainage off of the Facility occurs toward the north and east. This Northern Tributary begins just north of Breckinridge Road as natural springs and is also fed by underground drainage tiles north of Breckinridge Road, which appear to convey groundwater into the Northern Tributary from areas south and west. Ultimately, surface water drainage flows to the north where another small tributary joins from the west and confluences with Bailey's Branch just downstream of Broomsage Road. To the east, surface water off of the Facility drains to Bailey's Branch, which flows east and north, where it eventually joins Pleasant Run Creek northeast of the Facility. Surface water drainage also occurs within the East Plant Area, where filling has been completed. Drainage swales are located atop the final cap of the filled areas and drain to five drainage basins prior to being released to Tributary 3 northeast of the Facility. Parcels 201 and 205 also collect direct precipitation and both areas drain to a drainage basin, prior to being released to Bailey's Branch.

While limited cleanup IM activities were completed on both the Northern Tributary and Western Tributary drainages, neither is believed to be sourced directly from the Facility (Sections 8.2.1 and 8.2.2 of this Report summarize the IM activities completed for the Western Tributary and at Parcels 387 and 389 of the Northern Tributary, respectively prior to the GM Corporation bankruptcy in 2009 and divestiture of the those related properties).

The Facility consists of a die cast operation in the portion of the Facility located west of GM Drive (West Plant Area) and supporting operations (e.g., water treatment, electrical substation) to the east in the portion of the Facility located east of GM Drive (East Plant Area). Stormwater from the manufacturing portions (e.g., improved surfaces) of the Facility is routed via a stormwater sewer system and collected in the stormwater pond located immediately east of the Plant, within the East Plant Area. Stormwater from the pond is either recycled back to the Plant for reuse or treated at an on-Facility treatment system and discharged via a National Pollutant Discharge Elimination System (NPDES) permit with the State of Indiana.

Stormwater from non-operational portions of the Facility located adjacent to the east side of GM Drive (i.e., water running on top of the clean East Plant Area Cover System) drains directly to Tributary 3 or Bailey's Branch Creek of Pleasant Run Creek after draining through a series of swales and detention basins designed to limit the peak flow to downstream receivers during precipitation events. All other surface water from the Facility is directed through a series of pipes and catchment basins to the stormwater pond, located on the east side of GM Drive.

Bailey's Branch Creek receives flow from a number of unnamed ditches and drains located in the vicinity of the Facility and the Upstream Parcels. Discharge sources to Bailey's Branch Creek include a NPDES (Permit No. IN0003573) permitted discharge of treated process and stormwater from the Facility, surface water drainage from surrounding upland areas, and groundwater discharges from bedrock outcrop formations. The contribution from the Facility includes treated water from the Facility's production, treated stormwater, and treated groundwater from Site Source Control (SSC) collection systems. Discharge rates vary, and the actual rate of flow depends on production rates and precipitation. Flows from the surrounding upland areas and groundwater discharge are generally tied to storm events and are intermittent in nature.

In the upstream sections of Bailey's Branch near the confluence of Bailey's Branch and Tributary 3, the creek channel in select areas is comprised of highly fractured bedrock, and swallets (holes within the surface water channels) are present within the creek channel, which historically acted to divert surface water into the local groundwater regime. These swallet features are found near the confluence of the Tributaries and Baileys Branch Creek, and Spring 018, and the diverted surface water from the creek bottom historically recharged groundwater which emanates from the spring. During normal and high surface water flow events, only a portion of the flow was diverted to the groundwater regime through the swallets, but during low flow conditions in Bailey's Branch the surface water would be fully diverted and the creek channel would dry up in the local area just upstream of Spring 018. Additional information regarding the swallets and remediation work performed to address these swallets are described in subsequent sections of this RFI Report.

Bailey's Branch flows from the south, generally northward from the Upstream Parcels and discharges to Pleasant Run Creek. Pleasant Run Creek subsequently discharges to Salt Creek. The upper portions of the Bailey's Branch Creek watershed have small drainage tributaries and sub-basins. The tributaries may be intermittent or have perennial flow depending on seasonal rainfall.

2.5.3 Hydrologic Studies and Models

Surface water flow studies conducted to support the RFI are discussed in the following sections.

2.5.3.1 Bailey's Branch Surface Water Assessment

To understand the specific surface water hydrology within the area of Bailey's Branch where surface water is diverted underground (i.e., swallets upstream of Spring 018 Area), additional instrumentation was employed.

During the week beginning June 26, 2004, CRA installed seven temporary surface water weirs at the locations depicted on Figure 2.7. Each weir was instrumented with a pressure transducer and calibrated to provide discharge data gathered during this week.

The temporary weirs were dislodged after strong storms passed through the area after the completion of testing at Swallet #1. These weirs were re-established and calibrated and began recording data again for the dye trace testing at Swallet #2.

The average flow into Swallet #1 (calculated as Weir 1 flow - Weir 2 flow) for the first dye test was approximately 0.46 cfs, or approximately 58 percent (%) of the total flow upstream. The average flow into Swallet #2 (calculated as (Weir 2 flow + Weir 3 flow) - Weir 4 flow) for the first dye test was approximately 0.37 cfs, or approximately 98% of the remaining flow downstream of Swallet #1. For the first dye test, the combined average discharge from Spring 018 and Spring 021-002, back into the creek system, was approximately 0.48 cfs, and the average discharge of Spring 021-003 was approximately 0.13 cfs.

The average flow into Swallet #1 prior to the second dye test was approximately 0.63 cfs, or approximately 73% of the total flow upstream. The average flow into Swallet #2 prior to the second dye test was approximately 0.20 cfs, or approximately 72% of the remaining flow downstream of Swallet #1. Prior to the second dye test, the combined average discharge from Spring 018 and

Spring 021-002, back into the creek system, was approximately 0.74 cfs, and the average discharge of Spring 021-003 was approximately 0.23 cfs.

At approximately 8:30 a.m. on July 21, 2004 (prior to the second dye injection), the discharge from the Plant was significantly reduced, thereby significantly reducing the flow within the stream (as observed from the flow data at Weir 1). The flow reduction from the Plant was unknown at the time of the second dye injection. The flow within the creek continued to decline until approximately 1:15 p.m., when the stream flow appeared to stabilize at an average flow of approximately 0.18 cfs. An increase in stream flow was observed at approximately 3:50 p.m. on the same day due to rain storms moving through the area. The full dye trace study summary and flow data are presented in Appendix C.

2.5.3.2 Surface Water Flow Monitoring

Prior to this investigation there had been no known flow measurements on either Bailey's Branch Creek or Pleasant Run Creek. Therefore, surface water flow monitoring was set up to develop a hydraulic model of the Facility and local creek systems. Five stream monitoring stations, in conjunction with rainfall and groundwater monitoring, were installed with each station having a water level and water velocity recorder. There were three rainfall stations.

A shallow piezometer was installed near the location of each stream monitoring station (PZ08, PZ23, PZ31, PZ38, and PZ39) as shown on Figure 2.8. The purpose of these piezometers was to determine the groundwater elevation near the surface water monitoring location. Discussion of the interaction of groundwater and surface water, based on data from these stream gages and piezometers are presented in Section 3.7.

2.5.3.3 Creek Flow Monitoring

Stream monitoring was conducted before, during, and after remediation efforts to determine design criteria for remediation water control measures and subsequent stream restoration. Hydrologic modeling was completed but required calibration data. Stream monitoring was also used to document the impact, if any, of remediation work on stream geometry within the work areas, as well as flow and sediment transport in the stream immediately downstream of the work area(s).

To provide monitoring of creek conditions, a system of flow gages, turbidity sensors, a weather station, and additional rain gages were installed at the Facility. Data were logged electronically and recorded at 15-minute intervals during the monitoring period. Recording stream flow gages were installed at five locations along Bailey's Branch Creek and Pleasant Run Creek. The locations were chosen to provide coverage of the watershed, and some redundancy. Various gages were temporarily removed and, in some instances, relocated as the remediation and restoration work progressed.

As discussed in Section 2.2, a weather station was installed at the southern limit of the Facility. The weather station includes a wind and rain gage. Two additional rain gages were placed along Pleasant Run Creek, north of the Facility.

2.5.3.4 Stream Flow Modeling

To design structures to divert surface water around areas undergoing remediation, such as temporary channels or levees, it was necessary to know the discharge and water elevation along the creeks.

Two types of models were used; the first model converts rainfall data into discharge-with-time from the tributaries; and the second model combines and routes those discharges from the tributaries down the creeks to the mouth of Pleasant Run.

2.5.3.5 Hydrologic Modeling

Discharge was determined by converting rainfall to discharge using the numerical model Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS). HEC-HMS is a model produced by the U.S. Army Corps of Engineers (Corps). HEC-HMS accepts rainfall and watershed data and gives discharge-with-time (hydrographs) within the watershed sub-catchments.

The hydrologic model was constructed by subdividing the entire Pleasant Run watershed into sub-catchments and assigning values to the characteristics of each sub-catchment such as area, slope, dimensions, soil type, and type of vegetative cover (see Figure 2.9). Then a network of stream channels was constructed that reflects how flow is routed from each of the sub-catchments to the next downstream sub-catchment, or in the main channel, and eventually to the mouth of the stream. Rainfall events, in the form of specific, individual storm events, were input to the model. The output from the model is discharge from each sub-catchment as a function of time. HEC-HMS was run for various return period events, determining the discharge from each tributary and basin.

2.5.3.6 Hydraulic Modeling

Once discharge from each of the sub-catchments and tributaries was determined, the river flow model Hydrologic Engineering Center - River Analysis System (HEC-RAS) was used to calculate stage and discharge along the entire creek. HEC-RAS is a model also produced by the Corps.

The main inputs to HEC-RAS, in addition to discharge along the stream, are cross-sections, hydraulic roughness (Manning's "n" values) and special geometries such as fills, bridges, and culverts. Geometry is input at cross-sections. The model output is water elevation (stage) at each cross-section, as well as average velocity at each cross-section. These values of stage, velocity, and slope can be used in other modeling, such as sediment deposition and transport modeling.

The geometry of the channels was determined in part from a 2-foot contour map developed for this project. For each cross-section the hydraulic roughness parameter, Manning's "n", was assigned separately for the main channel and each of the two overbank portions of the cross-section. Based on field observation, it was determined that the main channel of each cross-section was devoid of vegetation, but that the overbank portions were heavily vegetated. Subsequently, above approximate Mile Point (MP) 3.988 in Bailey's Branch, the creek has a rock bed and mud/gravel banks; thus, for the Upstream Parcels section Manning’s "n" was taken as 0.060. Three sections, at approximately MP 4.291, were assigned an overbank "n" value of 0.061. For other overbank areas, the value of Manning’s "n" was assumed to be 0.080.

2.5.3.7 Modeling Results

The Indiana Department of Natural Resources (IDNR) has previously estimated the 100-year discharge at Broomsage Road Bridge as being 1,500 cfs based on Regional Regression Equations. Initially the HEC-HMS model was calibrated to show 1,500 cfs at Broomsage Road, however this required very large initial infiltration rates and some doubt existed about the validity of the regional values as applied to this small, local watershed. The monitoring data later suggested that the value was about 10% lower than anticipated and the detailed HEC-HMS modeling estimates the 100-year discharge to be about 1,580 cfs at the same location.

Remediation work was designed with consideration of the rainfall event that has a 1 percent chance of occurrence in any one year, also known as the 100-year event or the 1 percent discharge. Pre-construction, the estimate of the 1 percent discharge within the work area along Parcels 205, 3, and the upper section of Parcel 4 was 120 cfs. Pre-construction, the estimate of the 1 percent discharge within the work area along the lower section of Parcel 4 and Parcels 5, 6, 7, 8, 10, 11, and 12 is 240 cfs.

During an event as severe as the 1 percent event, water depths in the upper section (from Parcel 4 and upstream) may reach 2 ft above the streambed and cover the entire width of the stream valley floor. Water velocities in the middle of the stream channel in this reach could average about 8 to 10 ft per second (fps), with lower velocities at the perimeter of the stream channel. In the lower reach of the Upstream Parcels (from Parcel 4 downstream to Parcel 12) the water depth may reach 4 ft above the streambed and cover the entire width of the stream valley floor. Water velocities in the middle of the stream in this reach could average about 9 to 13 fps. In this reach, almost all loose material could be moving, including rocks up to 1-foot in diameter.

The 100-year discharge in Bailey's Branch Creek down to the confluence with Pleasant Run Creek (located approximately 1.5 miles from the Facility) increases from 1,580 cfs to 2,580 cfs. Downstream of the confluence, the 100-year discharge increases to 4,370 cfs at Peerless Road Bridge (located approximately 1.9 miles from the Facility). Further downstream in Pleasant Run Creek, downstream of the bifurcated section (located approximately 2.0 miles from the Facility), the 100-year discharge increases to 5,430 cfs. Downstream, at the former railroad bridge (located approximately 2.6 miles from the Facility), the 100-year discharge increases to 5,940 cfs.

At the 5-year to 10-year event occurrence, the discharges at these locations are estimated to be roughly one-quarter to one-third of the discharges noted above. That is, at a probability of occurrence that might be used for designing temporary works, the design discharge within Bailey's Branch might be about 400 cfs. Similarly, in the reach from the confluence of Pleasant Run and Bailey's Branch downstream to the former railroad bridge, a design discharge might be on the order of 1,200 to 1,500 cfs.

Based on present information, the 100-year flood elevation is estimated to be 1 to 6 ft above the floodplain, depending on location within the valley and pre-construction assumptions made about the stream geometry.

2.6 Geologic Characterization

The regional and local geological characteristics are presented in the following sections. The regional geological characterization is based on published literature sources, while the local geological characterization is based on the information gained through the RFI field investigations.

2.6.1 Regional Geologic Characterization

The Facility lies within an area of Indiana that was not glaciated (driftless area) (Gray, 1974). As shown on Figure 2.10, the maximum progression of the Illinoian Glacial advance (the furthest advance of the Laurentide Ice Sheet in this area) lies to the west, north, and east of the immediate region surrounding the Facility.

2.6.1.1 Overburden

The surficial geology of the area generally consists of a relatively thin layer of unconsolidated deposits of sand, clay, and chert produced by the weathering of limestone bedrock (regolith), and wind-deposited silty material, known as loess. Due to the reddish color, the soil in this region is commonly referred to as terra rosa. Thicker deposits of proglacial outwash, glacial lake sediments, and recent alluvium occur along the major stream valleys (Figure 2.10). The surficial deposits range in thickness from zero ft along bedrock outcrops to approximately 100 ft thick along Salt Creek and the East Fork White River (Gray, 1974).

2.6.1.2 Bedrock

The 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 middle and eastern portions of the county. The City of Bedford lies within the physiographic province known as the Mitchell Plain, a karst plain. The Mitchell Plain extends from near Bloomington south to the Ohio River within the State of Indiana.

The bedrock within the immediate vicinity of the Facility is Middle to Early Mississippian-age and consists of the following formations from youngest to oldest (or near-surface to depth): the St. Louis Formation (the oldest formation within the Blue River Group); the Sanders Group, consisting of the Salem Formation, the Harrodsburg Formation, and the Ramp Creek Formation, and youngest formation of the Borden Group, and the Edwardsville Formation (Melhorn and Smith, 1959). Figure 2.11 presents the bedrock geology of Indiana and Figure 2.12 presents a generalized stratigraphic column for Paleozoic formations in Indiana found within the area of the Facility.

Stratigraphic Description and Nomenclature

The following provides a brief discussion of each formation encountered, starting with the shallowest formation:

St. Louis Formation: The St. Louis Formation consists mostly of thin-bedded, generally micritic, limestone (becoming more of a calcarenite at its base). The base of this formation grades into and conformably overlies the Salem Formation.

Salem Formation: The youngest unit of the Sanders Group consists of the Salem Formation, which is more massively bedded limestone than the St. Louis Formation. It is also known as Indiana Limestone, Bedford Limestone, or Oolitic Limestone. The Salem Formation consists of medium- to coarse-grained calcarenite, grading into a biocalcirudite near its base. The individual grains consist of microfossils and fossil fragments, cemented with calcite. The thickness of the Salem Formation is approximately 60 to 100 ft in this area of Indiana (Camp and Richardson, 1999). The base of this formation grades into and conformably overlies the Harrodsburg Formation. The Salem Formation is locally quarried as fine building stone material in this region of Indiana.

Harrodsburg Formation: The Harrodsburg Formation generally consists of medium- to coarse-grained limestone with beds of variable thickness. Calcareous shale is present in beds and as thin laminae throughout the formation, but is more dominant toward the base (becoming argillaceous). The Harrodsburg Formation has been divided in the literature into upper and lower units. The upper portion of the Harrodsburg Formation consists of coarse-grained biocalcirudite and bioclastic calcarenite. The lower portion of the Harrodsburg Formation consists of a fine- to medium-grained calcarenite, interbedded with shale beds and shale laminae. The approximate thickness of the Upper Harrodsburg is 50 ft and the Lower Harrodsburg thickness is approximately 25 ft. The base of the lower Harrodsburg contains numerous siliceous geodes. The contact between the Harrodsburg Formation and the underlying Ramp Creek Formation is sharp and conformable (Nicoll and Rexroad, 1975).

Ramp Creek Formation: The Ramp Creek Formation, the oldest formation of the Sanders Group, consists of medium-grained calcarenite and is interbedded with fine grained dolomitic limestone, shale and chert. Geodes are abundant throughout the approximate 20 ft thickness of the Ramp Creek Formation. The contact between the Ramp Creek Formation and the underlying Edwardsville Formation of the Borden Group is characterized by a sharp lithologic break. According to the literature, this contact is disconformable (Nicoll and Rexroad, 1975).

Edwardsville Formation: The youngest formation of the Borden Group encountered at the Facility is the Edwardsville Formation. In the vicinity of the Facility, the Edwardsville Formation consists of a relatively soft, grey to black calcareous shale. The very top of this formation was observed to contain a thin layer of green shale and small crystals of pyrite. Published information indicates that the green shale is glauconitic (Nicoll and Rexroad, 1975). The Edwardsville Formation ranges in thickness from 120 to 170 ft in this area of Indiana (Melhorn and Smith, 1959). The top of the Edwardsville Formation (shale) is easily recognized by its sharp contact with the overlying Ramp Creek Formation (limestone).

Structure

The Facility is located near the eastern margin of a structure known as the Illinois Basin. The bedrock formations in this area generally dip to the west-southwest at approximately 20 to 30 ft per mile. The Cincinnati Arch lies to the east of the Illinois Basin and covers much of Indiana.

Two regional structures are located approximately 10 miles north and east of the Facility, the Leesward Anticline and the Mt. Carmel Fault (Figure 2.13). The Leesward Anticline axis 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 truncates the Leesward Anticline on its western side. The Mt. Carmel

Fault generally acts as a hinge line, with gentler dips to the immediate west of the fault and slightly steeper dips to the east (Melhorn and Smith, 1959).

Numerous fractures and joints are present in the Mississippian carbonate bedrock with master sets (those that predominate) trending approximately east to west. Minor sets (those that are less dominant) trend 90 degrees to the master sets, trending approximately north to south (Powell, 1976, 2001). This general rectangular structure pattern is visible in the general pattern of stream and topographic contour orientations, such as presented on Figure 2.4. At least some of the streams in the Bedford area may be formed in zones where vertical fractures allowed the infiltration of surface water and the subsequent solution widening and erosion of the bedrock that eventually formed the stream channel.

2.6.2 Local Geologic Characterization

The local geologic characterization is based on geologic logging of overburden soil and bedrock drill core, geophysical borehole logging, geotechnical testing of soil and bedrock samples, preparation of maps and cross-sections, and interpretation of these data.

2.6.2.1 Overburden

The natural soil in the immediate vicinity of the 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; Etzel, 1982). Soil in the vicinity of the Facility has been mapped by the USDA (USDA, 1985) as Udorthents (or man-made soil). This soil classification includes earth and broken rock materials for road fills and embankments.

Lithologic Description

The surficial geologic deposits at the Facility generally consist of a relatively thin layer of unconsolidated deposits of clay, sand, and chert produced by the weathering of limestone bedrock (regolith), and loess, often called terra rosa. The native (undisturbed) overburden materials at the Facility are generally described as:

- Clay, trace silt and trace gravel, low plasticity, yellow-brown to yellow-red to red to brown
- Silty sand, fine- to medium-grained, tan to dark brown
- Clayey sand, medium- to coarse-grained, brown

The fill materials at the Facility are generally described as:

- Gravel, sand and gravel, silty gravel
- Sand, fine-grained, brown to black to red-brown, with some areas of white, olive-gray, or gray-brown sand (possibly foundry sand)
- Clay, trace sand, dark brown

Debris, such as wood, plastic, brick, or metal, was uncommonly encountered in the boreholes at the Facility.

Thickness

The thickness of the overburden materials varies considerably across the Facility from approximately 2 ft to over 40 ft; being thicker in the disposal areas and beneath the manufacturing buildings at the Facility. The overburden is generally thinnest where minimal to no filling has occurred (e.g., in existing topographic valleys). In some areas along the creek valleys, bedrock is exposed due to erosion. Table 2.1 presents the depth to overburden/bedrock interface and bedrock stratigraphic contacts, where encountered.

Geotechnical Properties

At select locations, soil samples for geotechnical analyses (e.g., grain size, Atterberg Limits, vertical permeability, etc.) were collected. Samples collected for vertical permeability were collected via Shelby tube, so as to provide a minimally disturbed sample for analysis. Soil samples for other parameters were also collected by hand auger, or by split-spoon, as described in Section 2.6. Soil samples were submitted to Schleede-Hampton Associates, Inc. (SHA), located in Birmingham, Michigan, or to Inspec-Sol, Inc. (Inspec-Sol), located in Waterloo, Ontario, Canada for geotechnical analysis. Table 2.2 presents a summary of the testing results for geotechnical samples submitted for analysis. Appendix D presents the reports prepared by SHA and Inspec-Sol.

A geotechnical evaluation of AOI 4 was conducted to evaluate slope stability for the potential placement of additional fill materials in this area and for the evaluation of the slopes for use in determining an interim or final remedy, regardless of the potential placement of additional fill materials. The geotechnical evaluation consisted of 11 borings conducted throughout AOI 4 utilizing cone penetrometer testing (CPT) equipment.

In addition to the CPT activities, additional samples were obtained during excavation of test pits. The test pit locations were based on the results of the surface geophysical survey completed in 2002. During excavation of the test pits, CRA generally collected two samples each of the foundry sand/fill material and the underlying native clay, where possible. These samples were sent to SHA for the following analyses:

Foundry Sand	Native Clay
Moisture content	Moisture content
Grain size distribution	Atterberg limits
Remolded direct shear	Grain size distribution
Standard proctor density	Bulk density

2.6.2.2 Bedrock

The ridge tops and higher hill slopes in the vicinity of the Facility are underlain by limestone and thin shale of the Mississippian St. Louis Formation. Further from the Facility, the St. Louis Formation is truncated by erosion and the Sanders Group (Salem Formation, Harrodsburg Formation, and Ramp Creek Formation) form the bedrock either at the surface or directly below the overburden. Bailey's Branch and Pleasant Run creeks are incised through the Sanders Group limestones, with the more

distant parts of these creeks are developed within the upper part of the Borden Group (Edwardsville Formation).

The upper surface of the bedrock is typically highly weathered and fractured. This weathered and fractured surface is known as epikarst. The formation and description of epikarst is further discussed below.

Bedrock Descriptions

General

The following subsections provide a lithologic description of each bedrock stratigraphic unit based on the features observed in drill cores and structure contour maps, and unit thickness based on the interpretation of the stratigraphic data from the drill cores, and borehole geophysics.

At 13 locations around the Facility, bedrock borings were completed through the entire limestone sequence and terminated at the Edwardsville Formation (shale unit) at an approximate elevation range of 475 to 525 ft AMSL. In addition, many other bedrock borings were drilled through more than one stratigraphic unit, providing additional stratigraphic information.

The stratigraphic contacts were estimated in the field upon visual examination of the collected cores. The St. Louis/Salem Formations and Salem/Harrodsburg Formations stratigraphic contacts are gradational in nature, and are not readily defined based on visual examination. Therefore, final stratigraphic contacts were approximated utilizing the core descriptions, the results of the downhole geophysical logging, and professional interpretation, and have a potential error of several feet associated with the stratigraphic contact. The Harrodsburg/Ramp Creek Formations and Ramp Creek/Edwardsville Formations stratigraphic contacts are readily apparent and were defined based on visual examination of the drill core.

Epikarst

Epikarst is defined by Klimchouk (Klimchouk, 2004) as:

> *"The upper weathered zone of carbonate rocks with substantially enhanced and more homogeneously distributed porosity and permeability, as compared to the bulk rock mass below; a regulative subsystem that functions to store, split into several components and temporally distribute authogenic infiltration recharge to the vadose zone. Permeability organization in the epikarst dynamically develops to facilitate convergence of infiltrating water towards deeply penetrating collector structures such as prominent fissures that drain the epikarstic zone. This is manifested by epikarstic morphogenesis that tends to transform disperse appearance of surface karst landforms into focused appearance adapted to the permeability structure at the base of epikarst."*

Epikarst is also defined by U.S. EPA (U.S. EPA, 2002) as:

> *"A relatively thick portion of bedrock that extends from the base of the soil zone and is characterized by extreme fracturing and enhanced solution. It is separated from the phreatic zone by an inactive, relatively waterless interval of bedrock that*

is locally breached by vadose percolation. Significant water storage and transport are known to occur in this zone."

These two definitions provide a description of epikarst that is generally applicable to the Facility.

Epikarst is formed from a combination of factors including stress relief (unloading) causing fracturing of the bedrock, weathering and dissolution of the bedrock along fractures by infiltrating precipitation and perched groundwater. The lower boundary of the epikarst zone is typically irregular, depending on rock-structure and rock-mass characteristics, the nature of the permeable cover soil (i.e., regolith, native soil), climate and biogenic processes. The presence of cover soil tends to enhance solutional fissures in the epikarst due to the water holding characteristics of the soil. However, with further development of epikarst linkages to deeper flow systems, the fine-grained soil cover materials tend to be removed (Klimchouk, 2004).

At the Facility, the upper zone of the bedrock shows significant weathering consistent with the initial stages of development of epikarst. Solution-widened fracture density and size was noted to decrease with depth. However, beneath this surficial weathering layer (both vadose zone and the shallow water table), little enhanced permeability was noted (i.e., from packer-pressure test results presented in Section 2.7.2.1). The general lack of deep, open connecting fissures and fractures suggests that the majority of groundwater in the epikarst is transported laterally and discharges in the form of shallow springs and seeps in the creek valleys. The bedrock surface was exposed in the excavation to construct the East Plant Area Toxic Substances Control Act (TSCA) Permitted Vault (Vault) bottom liner for the storage of soil containing PCB concentrations greater than or equal to 50 milligrams per kilogram (mg/kg). The bedrock surface was noted to be very irregular. Photographs of the base of the Vault (Figure 2.14) show the irregular nature of the bedrock surface in the epikarst zone (above the shallow water table) in the Vault area.

At some boring locations, the uppermost bedrock unit, whether the St. Louis or Salem Formation, was observed to contain solution-enhanced, horizontal fractures at various depths within approximately 20 ft of the bedrock surface. The borehole image processing system (BIPS (digital imaging within the coreholes) and optical televiewer images, provided in Appendix E, show solution-enhanced fractures that are clay-filled, but washed by the drilling process to be slightly larger than the borehole. Selected BIPS images from corehole geophysical logging of MW-X143Y245S are presented on Figure 2.15. This figure shows a clay-filled bedrock fracture in the epikarst zone at approximately 11.5 to 12.25 ft below ground surface (bgs), which was washed out by the drilling process (the coring process utilized water to flush the corehole and to cool the drilling bit). Below 13 ft bgs, the bedrock fractures are thin planes (at 16.5 and 17 ft bgs) and a stylolite is present (at 16.25 ft bgs). The water level in the well at the time of geophysical logging was approximately 20 ft bgs, thus these clay-filled fractures were above the natural water table in the shallow bedrock. These images are consistent with the development of epikarst that is confined to the shallow weathered zone in the bedrock.

At most geophysically logged corehole locations, no observable permeable features were identified on the corehole geophysical logs from the top of the corehole geophysical logging to the total depth of the corehole. In the shallow weathered zone, this is due in part to the drilling out of incompetent (weathered) bedrock in order to set the steel surface casing (outer casing used to prevent surface or perched water to infiltrate deeper portions of the bedrock, as drilling continued to greater depths

inside of the outer casing). This is similar to the visual core logging results (see bedrock stratigraphic logs in Appendix F) that indicated few permeable fractures below the shallow weathered zone.

During preparation/excavation of the base of the East Plant Area Vault, a west to east trending vertical fracture within the St. Louis Formation was noted. This fracture was first detected using a surface geophysical electrical resistivity survey, after which the overlying soil was removed to expose the fracture for visual inspection and appropriate capping. The fracture was determined to be filled with hard dry clay as a likely result of in-situ weathering. The fracture was determined to be approximately 135 ft long and varied in width from 4 inches (eastern end) to 18 inches (western end). There was no evidence that the fracture extended into the underlying Salem Formation. In addition, a separate small void, approximately 2 ft by 2 ft by 10 to 15 ft long was also identified, and removed via rock breaking. Figure 2.16 presents a close-up photograph of the fracture after the area was cleaned of overburden material. This photograph also shows the irregular nature of the bedrock surface. This irregular surface and solution-enhanced jointing is consistent with the development of epikarst.

Further confirmation of the irregular, weathered nature of the bedrock surface was obtained by ground penetrating radar (GPR) geophysical surveys. A shallow GPR response indicated that the overburden-bedrock interface is an irregular, weathered surface, occurring at a depth of approximately 10 to 15 ft bgs in the vicinity of Spring 018.

As part of epikarst development, sinkholes can form where the water is funneled into vertical and horizontal, solution-enhanced fractures. These features have not been noted to occur at the Facility, but were noted on the east side of Bailey's Branch east of the Spring 018 Area (Figure 2.7). These sinkholes formed in the Harrodsburg Formation, which over most of the Facility is deeply buried by overlying bedrock units, where the surface is exposed, showing a highly weathered, loose rock face.

The top of the bedrock surface is irregular, as previously shown in the East Plant Area Vault photographs (Figures 2.14 and 2.16). The generalized elevation of the top of the bedrock surface is presented on Figure 2.17. As can be seen based on deflections in the contours on the top of bedrock figure, two prominent bedrock valleys exist within the bedrock surface: one originating near the northern portion of the manufacturing building and extending to the north-northeast across the Facility, before trending easterly; and the second valley bedrock from AOI 8 to the east toward Outfall 002 and along the creek channel of Bailey's Branch Creek. Also shown is the bedrock valley formed by erosion within Bailey's Branch, the upper portion of which have been filled by soil/fill materials as part of the Facility historical operations. Bedrock high points exist beneath the manufacturing buildings at the Facility. On the north side of the Facility, two smaller bedrock valleys were noted based on the contours: one originating beneath the east side of the parking lot and trending to the northeast; and the second originating on the west side of the parking lot and trending north across Breckenridge Road.

St. Louis Formation

The St. Louis Formation was described in borehole stratigraphic logs to be light to dark gray, to gray-brown, thin-bedded, fine-grained to micritic limestone. It contains weathered layers that form clay seams and clay partings and is generally fractured. Epikarst is generally well developed within this unit. Within the St. Louis Formation were layers that were granular or coarse-grained in texture (calcarenite), along with some fractured, porous layers. This formation was observed to contain very

thin interbeds of calcareous shale at all locations where encountered. Published information indicates that the St. Louis Formation can contain gypsum and anhydrite beds near its base. However, this was not observed beneath the Facility or in the rock faces in the creek.

The base of this formation grades into and conformably overlies the Salem Formation. The mapped contact between the St. Louis Formation and the underlying Salem Formation was approximated through field observation and a change in the rock's measured natural radioactivity (based on corehole geophysical measurements).

The top of the St. Louis Formation was identified at an approximate high elevation of 710 ft amsl at the Plant to a low elevation of approximately 646 ft amsl along the eastern portion of the Facility. Figure 2.18 presents the elevation of the top of the St. Louis Formation prepared from all borings reaching this unit. This figure shows the erosional surface of the bedrock rather than being representative of the strike and dip of the formation (i.e., the bedrock surface does not correlate to the top of the formation). This figure also presents the approximate lateral extent of the St. Louis Formation across the Facility.

The St. Louis Formation is present throughout much of the Facility as the uppermost bedrock unit. However, this unit has been eroded away along the eastern to northeastern portion of the Facility, where the uppermost bedrock surface is the underlying Salem Formation. The St. Louis Formation average thickness was approximately 21 ft, varying from zero (where eroded away) to 66 ft, with greater thickness to the south-southwest.

Salem Formation

The Salem Formation was described in borehole stratigraphic logs to be gray, fine- to coarse-grained (granular), thin- to thick-bedded, limestone. It contains stylolites and non-continuous openings, but generally contains few fractures. Much of the Salem matrix is composed of fossil fragments cemented with calcite, with occasional porous (less-cemented) layers. The Salem Formation also contains occasional laminated shale beds and seams. Where the St. Louis Formation is absent, the Salem Formation is more weathered and often contains horizontal, clay-filled fractures within the upper section of the formation.

The base of this formation grades into and conformably overlies the Harrodsburg Formation. The mapped contact between the Salem Formation and the underlying Harrodsburg Formation was approximated through field observation and a noted change in the rock's measured resistivity (based on borehole geophysical measurements).

The top of the Salem Formation was identified at an approximate maximum elevation of 688 ft amsl north of the Facility, near the bedrock subcrop, to approximately 631 ft amsl along the southwestern portion of the Facility. Where the Salem Formation is eroded in creeks to the northeast of the Plant, the bottom of the Salem is found at approximately 600 ft amsl, while near the south end of the Facility, the Salem/Harrodsburg contact occurs at approximately 575 ft amsl. Figure 2.19 presents the elevation of the top of the Salem Formation prepared from all borings reaching the Salem Formation. This bedrock elevation figure shows the general strike and dip of the top of the Salem Formation, except where the overlying St. Louis Formation has been eroded away and the Salem Formation is the uppermost bedrock unit. In this area, the figure also shows the approximate lateral extent of the Salem Formation and bedrock erosional surface through the study area.

The Salem Formation was present beneath the Facility at an average thickness of approximately 61 ft, ranging from 47 to 75 ft, where overlain by the St. Louis Formation. In the northeast portion of the Facility, the St. Louis Formation is absent due to erosional truncation, and the Salem Formation forms the uppermost bedrock surface, resulting in thinner Salem Formation.

Where the Salem Formation underlies the St. Louis Formation, the top of the Salem Formation slopes to the southwest at an approximate gradient of 0.02 ft/foot on the west side of the Facility to 0.011 ft/foot on the east side of the Facility, in the vicinity of Barlow Lane. This equates to approximately 106 ft per mile to 59 ft per mile, respectively, which is somewhat steeper than the regional dip of 20 to 30 ft per mile, based on published literature. The difficulty in determining the St. Louis/Salem Formations contact results in minor uncertainty in the magnitude and direction of trend of the contact.

Harrodsburg Formation

The Harrodsburg Formation has been divided in the literature into an upper and a lower unit. Across the Facility, this distinction was approximated based on changes noted in the lithology (the presence of two semi-correlatable shale layers) and in the rock's measured resistivity (based on corehole geophysical measurements).

The upper portion of the Harrodsburg Formation was described in borehole stratigraphic logs to be gray, medium- to coarse-grained (granular), limestone with beds of variable thickness. It contains stylolites and shale laminae, but generally few open fractures, where present below the Salem Formation. At some locations, the upper part of the formation closely resembled the lower portion of the Salem Formation. Individual grains consisted of well-cemented fossil fragments of varying sizes (including the presence of abundant fan-like bryozoans, as well as brachiopods and crinoids). A few small vugs were noted in the upper Harrodsburg Formation.

The lower portion of the Harrodsburg Formation was described in borehole stratigraphic logs to be white to gray, fine-grained limestone with beds of variable thickness. It contains numerous stylolites and shale laminae. The Harrodsburg has been shown to be thinly bedded during coring beneath the Facility; there are fine fractures associated with the bedding planes at depth, but no open fractures were identified during the coring. Off-Facility, where exposed (Spring 018 Area), these bedding planes are known to have open fractures, are weathered, and contain karstic features. There is a significant component of shale in the lower Harrodsburg, in the form of interbedded shale laminae and thicker shale beds, as compared to the upper Harrodsburg. It contains both sparsely fossiliferous and highly fossiliferous layers. Where the bedrock is highly fossiliferous, the fossil fragments tend to have an open texture (due to a lesser amounts of matrix infilling material) resulting in zones of increased porosity (but not necessarily increased permeability). Small vugs were noted throughout the lower Harrodsburg Formation, with small siliceous geodes near the base of the unit.

The contact between the base of the Harrodsburg Formation and the underlying Ramp Creek Formation is sharp and conformable (Nicoll and Rexroad, 1975). This contact was mapped at the Facility through field observation of the change in lithology.

Figure 2.20 presents the elevation of the top of the Harrodsburg Formation prepared from all borings reaching the Harrodsburg Formation. This bedrock elevation figure shows the general strike and dip of the top of the Harrodsburg Formation. The top of the Harrodsburg Formation was identified at an

approximate elevation of 592 ft amsl to the northeast of the Facility to approximately 574 ft amsl along the western portion of the Facility.

The average thickness of the Upper Harrodsburg is 51 ft (ranging from 41 to 61 ft) and the Lower Harrodsburg average thickness is approximately 26 ft (ranging from 22 to 31 ft). The Harrodsburg Formation was present beneath the Facility at a total average thickness of approximately 77 ft, ranging from 63 to 92 ft. Figure 2.21 presents the thickness of the Harrodsburg Formation.

The slope of the top of the Harrodsburg Formation is to the southwest at an approximate gradient of 0.012 ft/foot on the west side of the Facility, to 0.008 ft/foot on the east side of the Facility, in the vicinity of Barlow Lane. This equates to approximately 62 ft per mile to 44 ft per mile, respectively, which is somewhat steeper than the regional dip of 20 to 30 ft per mile, based on published literature. The difficulty in determining the Salem/Harrodsburg Formations contact results in minor uncertainty in the magnitude and direction of trend of the contact.

Ramp Creek Formation

The Ramp Creek Formation was described in borehole stratigraphic logs to be gray, very fine- to medium-grained, even-bedded, dolomitic limestone. It contains interbedded shale at the top, and shale seams within the unit. The Ramp Creek Formation contains numerous vugs and geodes throughout the unit, partially to fully filled with finely to coarsely crystalline calcite and/or quartz. Near the base of the unit, occasional small pyrite crystals were noted.

The contact between the Ramp Creek Formation and the underlying Edwardsville Formation is characterized by a sharp lithologic break (from limestone to shale). According to the literature, this contact is disconformable (Nicoll and Rexroad, 1975). This contact was mapped at the Facility based on field observations and the noted change in the rock's measured natural radioactivity.

The top of the Ramp Creek Formation was identified at an approximate elevation of 524 ft amsl to the northeast of the Facility to approximately 495 ft amsl along the western portion of the Facility. Figure 2.22 presents the elevation of the top of the Ramp Creek Formation prepared from all borings reaching the Ramp Creek Formation. This bedrock elevation figure shows the general strike and dip of the top of the Ramp Creek Formation.

The Ramp Creek Formation was present beneath the Facility at an average thickness of approximately 20 ft, ranging from 19 to 21 ft. Figure 2.23 presents the thickness of the Ramp Creek Formation.

The slope of the top of the Ramp Creek Formation is to the southwest at an approximate gradient of 0.025 ft/foot on the West Side of the Facility to 0.013 ft/foot on the east side of the Facility, in the vicinity of Barlow Lane. This equates to approximately 132 ft per mile to 70 ft per mile, respectively, which is somewhat steeper than the regional dip of 20 to 30 ft per mile, based on published literature.

Edwardsville Formation

The Edwardsville Formation was described in borehole stratigraphic logs to be dark gray-green to black, relatively soft, calcareous shale. The very top of this formation was observed to contain a thin layer of green shale with small crystals of pyrite. Published information indicates that the green shale is glauconitic (Nicoll and Rexroad, 1975). The thickness of this formation beneath the Facility is

unknown, as the maximum depth that the Edwardsville Formation was penetrated by borings only a few feet deep.

The top of the Edwardsville Formation was identified at an approximate elevation of 505 ft amsl to the northeast of the Facility to approximately 475 ft along the western portion of the Facility. Figure 2.24 presents the elevation of the top of the Edwardsville Formation prepared from all 13 borings reaching the Edwardsville Formation. This bedrock elevation figure shows the general strike and dip of the top of the Edwardsville Formation.

The slope of the top of the Edwardsville Formation is to the southwest at an approximate gradient of 0.02 ft/foot on the west side of the Facility to 0.0125 ft/foot on the east side of the Facility, in the vicinity of Barlow Lane. This equates to approximately 106 ft per mile to 66 ft per mile, respectively, which is somewhat steeper than the regional dip of 25 to 30 ft per mile, based on published literature.

Summary

The general similarities of the trend and slope of the tops of the stratigraphic units indicates that the steeper dips at the Facility compared to published literature values are likely a feature related to the overall bedrock sequence in the Bedford area, rather than to specific depositional features within a specific unit. Thus the observed and slightly steeper dips (than that published on a basin-wide scale) are considered regional phenomena.

The overall thickness of the limestone units above the Edwardsville Formation is presented on Figure 2.25. This figure is based on 13 deep boreholes; thus it presents a generalized thickness rather than being detailed based on the detail provided on the top of bedrock figure (Figure 2.17).

The overall distribution of the overburden and bedrock units is presented on a series of 13 cross-sections oriented approximately west to east or north to south. The locations of the cross-sections are presented on Figure 2.26, with the individual cross-sections presented on Figures 2.27 to 2.39.

Bedrock Geotechnical Properties

Bedrock core samples were collected from five borehole locations across the Facility. At each borehole location, a representative plug of core was collected from each of the limestone formations encountered at that location. Each plug, consisting of two-inch sections of rock matrix cut out of the original cores, was submitted to Core Laboratories in Houston, Texas for analysis. Conventional analyses included bulk density, fraction of organic carbon, and porosity. Additional matrix porosity testing was completed in the laboratory using a high-pressure mercury injection method.

Table 2.3 presents a summary of the bedrock core testing completed by Core Laboratories. In general, the average porosity results for the high-pressure mercury injection testing were 8.6 % for the St. Louis, 9% for the Salem, 5.4% for the Upper Harrodsburg, and 23% for the Ramp Creek Formations. Appendix G presents the final report prepared by Core Laboratories.

At select locations, bedrock samples for geotechnical analysis (e.g., porosity, permeability, etc.) were also collected. A portion of the core was broken out and submitted to the analytical laboratory for analysis. At each location drilled near AOI 9, samples of the bedrock were collected for additional analyses, as described in the RFI Work Plan and Quality Assurance Project Plan (QAPP) (CRA,

October 29, 2001). Bedrock samples generally consisted of gravel-sized pieces that were placed into glass jars, sealed, placed on ice in coolers, and transported to the laboratory under COC protocols. A summary of results for these rock samples can be found in Appendix H.7.

Bedrock Fractures and Jointing

The general bedrock fracture patterns in the area can be observed in quarries and road cuts. Identifiable sets of fractures or joints are near the bedrock surface. The fractures provide the primary network for lateral and vertical movement for any water in limestone in this area (Etzel, 1982). The joint types include sheet (near-horizontal), vertical to near-vertical, and inclined. The general orientation of major vertical fracture sets is approximately east to west and north to south, as shown by the orientation of the major drainage features that are incised through all or part of the limestone formations in the vicinity of the Facility.

Sheet joints are horizontal fractures (also known as bedding-plane fractures) that occur at or near the bedrock surface. Based on data collected from adjacent abandoned quarries, and nearby road and railroad cuts, vertical and near-vertical joints that occur in the limestone bedrock are relatively planar as compared to other fractures. Inclined joints occur in the lower part of the St. Louis Limestone and the upper part of the Salem Limestone at an approximate 60-degree angle from the horizontal (Etzel, 1982).

The drill cores exhibited few open (generally clay-filled) bedrock fractures except at shallow depths, such as the fracture shown on Figure 2.16. However, there were numerous stylolites formed by the pressure-dissolution of the carbonate bedrock leaving behind insoluble residues. Stylolites typically have a tooth-like pattern due to the varying position of the dissolution fronts at the crystal-scale. Stylolites are commonly closed and part of the bedrock, permitting no groundwater flow. At the Facility, some stylolites were also found to be open, where the stylolite represented a zone of weakness that allowed the drill core to break along the plane of the stylolite. Many of these open stylolites exhibited slight traces of weathering, in the form of rounding of the stylolite plane, minor discoloration of the insoluble residues, and precipitation of very fine-grained calcite crystals in the stylolite plane. These open stylolites did not typically exhibit infilling by sediment below the epikarst zone. Thus, the open stylolites represent minimal groundwater flow pathways as evidenced by the very low hydraulic conductivity determined from packer-pressure testing (see Section 2.7.2.2 and discussion of test results in Section 3.5.5).

Three bedrock trenches were excavated as part of the Dense Non-Aqueous Phase Liquid (DNAPL) seep source investigation near Outfall 002 (see Figure 2.40). These trenches were excavated to depths of between 9 and 12 ft bgs. These trenches were noted to have several horizontal (bedding-plane) fractures, many of which were clay filled. The numbers of fractures per foot depth were noted to decrease with depth. The numbers of fractures per foot of depth were recorded for each trench and the data are presented in Table 2.4.

From the GPR geophysical survey near the Spring 018 Area, fractures appear to occur along two main orientations, namely as shallow-dipping features to the west and as vertical to sub-vertical fractures dipping steeply to the east (trending north to south). These results are presented and discussed in Sections 3.7.3 and 3.7.6 with respect to groundwater flow and interaction with surface water.

2.7 Hydrogeologic Characterization

Groundwater is found within the bedrock primarily within fractures and joints, separated by the unfractured bulk rock, which acts as an aquitard. As such, characterization of the presence of fractures, joints and the intervening non-fractured aquitard material is essential for the understanding of flow and transport within the bedrock units. Characterization of hydraulic characteristics of the bedrock has been performed using pressurized packers to determine the hydraulic conductivity of the bedrock interval. Characterization of the bulk rock properties has been performed using various geotechnical testing procedures discussed in Section 2.6.2.2.

The local hydrogeologic characterization is based on geologic mapping and cross-sections, packer-pressure and single-well response testing, groundwater elevation data, preparation of potentiometric surface maps, geotechnical testing and interpretation of these data.

2.7.1 Regional Hydrogeologic Characterization

Groundwater resources in Lawrence County are found in the overburden deposits along the valleys of the major rivers or streams and within the thick Mississippian carbonate deposits (within the western portion of Lawrence County) and the Silurian-Devonian carbonate deposits (within the eastern portion of Lawrence County) (Fenelon and Bobay, 1994).

There are two basic types of aquifers: unconsolidated and consolidated. Unconsolidated aquifers in Lawrence County generally occur along Salt Creek and the East Fork of the White River within the overburden materials, which include 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).

The consolidated aquifers in Lawrence County are found in the Mississippian and Silurian-Devonian carbonate bedrock. Groundwater is found primarily within joints, fractures, and bedding planes in the bedrock, with lesser amounts of groundwater in the low permeability bedrock matrix. Groundwater flow within these aquifers primarily takes place along the joints, fractures, and bedding planes. In the more soluble portions of the bedrock, the joints, fractures, and bedding planes may eventually become enlarged by dissolution to form karst features. Typically, recharge to a karst system occurs through surface openings that vary in scale from narrow, solutionally-widened joints to large sinkholes. Discharge in a karst system typically occurs through springs, which are solution-widened joints or bedding planes that discharge to the ground surface, usually in or near creeks. Most groundwater within a karst aquifer system discharges to the creeks and rivers via springs, and to underground conduits (Etzel, 1982).

2.7.2 Local Hydrogeologic Characterization

Groundwater is not typically found in the overburden materials at the Facility due to the impermeable nature of the clay soil, the relatively fast draining nature of the fill soil and underlying bedrock, and the general limited thickness of the overburden materials in the vicinity of the Facility. Much of the groundwater flow in the Mississippian carbonate bedrock occurs in shallow, solution-enlarged fractures and joints of the St. Louis and Salem Formations and emerges as seeps and springs in the nearby creek valleys.

Several springs were observed on the Facility property during the investigation (see Section 3.6.6.4). Some springs originated as minor soil seeps, which occasionally disappeared into the ground, only to reappear downstream. Some springs on the property were established in bedrock and provided continuous flow. These springs originally contributed to the baseflow of the unnamed ditches and creek tributaries; however, they have subsequently been diverted into a collection system and are currently being treated.

2.7.2.1 Overburden

Perched groundwater was encountered in the overburden at seven locations. At each location, a temporary monitoring well (standard nomenclature is TMW-X###Y###) was installed to the base of the overburden. At two locations, nested overburden monitoring wells were installed (TMW-X128Y255A/B and TMW-X237Y263A/B), providing a total of nine overburden monitoring wells.

Single-well response tests were conducted on three overburden monitoring wells. The results of the single-well response tests indicate a general hydraulic conductivity range in the overburden of 1.41×10^{-4} to 1.03×10^{-7} centimeters per second (cm/sec), depending on the type of soil or fill encountered. See a summary of the single-well response test data in Table 2.5 and also Section 3.6.5.3 for further discussion.

The overburden soil acts to retard the infiltration of precipitation due to the fine-grained nature of the soil. As such, limited infiltration reaches the top of the bedrock. The overburden also acts as a temporary storage mechanism, whereby infiltrating precipitation is temporarily stored and released slowly to the shallow bedrock/epikarst system. This is evidenced by the overall lack of overburden saturation despite considerable overburden thicknesses across some areas of the Facility. As such, the overburden materials across the Facility are not considered to form an aquifer unit, but locally form isolated saturated zones (i.e. perched).

2.7.2.2 Bedrock Water-Bearing Characteristics

Groundwater was encountered in the bedrock at shallow depths below the overburden/bedrock interface. Groundwater was also found deeper within the bedrock sequence, although in very limited amounts based on the packer-pressure testing results.

Figure I.1 in Appendix I presents the hydraulic conductivity versus depth below ground surface for packer-pressure tests. This figure shows that the highest hydraulic conductivity (i.e., 10^{-3} to 10^{-2} cm/sec) was typically found at depths less than approximately 50 ft bgs within the shallow bedrock. Lower hydraulic conductivities (i.e., 10^{-3} to 10^{-5} cm/sec) were found at depths from near ground surface to approximately 190 ft bgs. Hydraulic conductivities that were even lower but still measurable (i.e., 10^{-5} to 10^{-6} cm/sec) were found from near ground surface to nearly 250 ft bgs. Hydraulic conductivities that were below the limit of resolution of the equipment and testing method, which varied between tests (i.e., 10^{-5} to 10^{-7} cm/sec) were also found from near ground surface to nearly 250 ft bgs. This generally supports the conclusion that the unweathered bedrock conveys limited amounts of groundwater. Review of Figure I.1 clearly shows the relationship of the measured hydraulic conductivities with depth, which is directly related to the more fractured/weathered nature of the shallow bedrock when compared to the less fractured portions of the deeper bedrock that was investigated during this RFI.

The center point of each packer-pressure test was determined and compared to stratigraphic contact elevations to determine which stratigraphic unit each test was conducted in. The varying lengths of the packer-pressure tests (e.g., 5 or 10 ft) resulted in some packer-pressure tests overlapping a stratigraphic contact. The results are discussed below for each stratigraphic unit. The packer-pressure testing data were also used to mathematically determine the hydraulic aperture width, assuming one fracture per test interval. The calculations based on these data are presented in Appendix J.1, as prepared by Dr. B.H. Kueper of Queen's University, Kingston, Ontario, Canada, and are further discussed in Section 2.7.2.2. The hydraulic aperture width is important in the potential for transport of DNAPL in fractures.

Epikarst

The precipitation that infiltrates through the overburden soil enters the epikarst. The epikarst, where present, acts as a temporary reservoir of groundwater, storing the infiltrating precipitation and releasing it to the groundwater or surface water systems. The majority of groundwater in the epikarst is transported laterally within the solution widened fractures and bedding planes and discharges via seeps and springs to the creeks and creek tributaries in the vicinity of the Facility. Some groundwater also infiltrates vertically through fractures to deeper sections of the bedrock.

Groundwater in the epikarst and shallow bedrock forms the water table aquifer. Groundwater in the water table aquifer flows from areas of high groundwater elevations (typically near the Plant) to areas of low groundwater elevation and discharges in/along the creeks and tributaries. Groundwater flow is further discussed in Section 2.7.2.2.

Single-well response tests were conducted on two shallow bedrock monitoring wells completed in the St. Louis Formation (MW-X033Y147S and MW-X085Y070S) (see also Section 3.6.5). The results of the single-well response tests indicate hydraulic conductivity in the weathered shallow bedrock (i.e. epikarst) at these locations of 5.4×10^{-5} and 2.3×10^{-4} cm/sec, respectively (Table 2.5).

St. Louis Formation

The epikarst locally is developed primarily in the St. Louis Formation. Below the zone of the intense weathering associated with the epikarst zone, the St. Louis Formation is relatively competent, but is commonly more fractured than the underlying units.

The porosity, mean pore throat radius, and the intrinsic permeability of the St. Louis Formation bulk rock (i.e., rock matrix) were tested in four core samples taken from competent, relatively unweathered bedrock, and the results presented in Appendix G. The intrinsic permeability of the unfractured rock matrix is related to hydraulic conductivity using the following equation:

$$K = \frac{k\rho g}{\mu}$$

where:

k = intrinsic permeability (millidarcies (mD))
ρ = density of water (999.13 kg/m^3 at 15 degrees Celsius (°C))

g = gravitational acceleration (9.81 m/sec^2)

μ = water viscosity (1.145 centipoise at 15°C)

The results were:

Porosity (conventional)	3.53 to 13.33 percent
Median Pore Throat Radius	0.009 to 0.109 microns
Intrinsic Permeability to Air	0.003 to 0.271 mD
Hydraulic Conductivity	2.5×10^{-9} to 2.3×10^{-7} cm/sec

The bulk rock hydraulic conductivity indicates that minimal groundwater will flow through the unfractured and unweathered bedrock matrix of the St. Louis Formation.

Within the formation, hydraulic conductivity values (bulk matrix and fractures) versus depth below ground surface of the pressure-packer test results (for packer intervals where the center point was within the St. Louis Formation) are presented on Figure I.2 in Appendix I. There were 17 tests with calculated values above the lower limit of testing and 16 tests with results below the lower limit of testing, with testing conducted at 15 locations. This figure shows that hydraulic conductivity above the lower limit of testing was noted primarily at depths of less than 50 ft bgs. There was a limited amount of testing done below 50 ft bgs, as the St. Louis Formation is typically less than 50 ft thick (averaging 21 ft thick, see Section 2.6.2.2). Also shown on this figure are the calculated hydraulic conductivity results based on the laboratory determined intrinsic permeability results for the relatively unweathered rock matrix.

The unweathered rock matrix hydraulic conductivity is one to two orders of magnitude lower than the values determined from packer-pressure testing. The hydraulic conductivity values determined from single-well response tests in the epikarst and weathered shallow bedrock (5.4×10^{-5} and 2.3×10^{-4} cm/sec) are in the range of values determined by packer-pressure testing of the bedrock. The lower limit of the packer-pressure test hydraulic conductivity values were above the calculated rock matrix hydraulic conductivity. This indicates that, where there was no detectable hydraulic conductivity, the packer-pressure testing equipment was likely testing the bulk rock matrix.

The comparison of calculated rock matrix hydraulic conductivity to packer-pressure and single-well response test hydraulic conductivity also demonstrates that the secondary permeability features (e.g., fractures, joints, solution-enhanced bedding planes) are the primary means of groundwater transport through the St. Louis Formation and that there is little to no groundwater transport through the rock matrix of the formation.

Salem Formation

The epikarst is also developed in the Salem Formation, where the St. Louis Formation is thin to absent. However, below the zone of the intense weathering associated with the epikarst zone, the Salem Formation is competent (massively bedded with few fractures).

The porosity, mean pore throat radius, and intrinsic permeability to air of the Salem Formation rock matrix were tested in five samples, and the results were presented in Appendix G. The intrinsic permeability can be converted to hydraulic conductivity using the equation presented previously.

The results were:

Porosity (conventional)	7.41 to 12.03 percent
Median Pore Throat Radius	0.114 to 0.394 microns
Intrinsic Permeability	0.145 to 0.544 mD (plus one value of 3.96 mD)
Hydraulic Conductivity	1.2×10^{-7} to 4.6×10^{-7} cm/sec (plus one value of 3.3×10^{-6} cm/sec)

The bulk rock hydraulic conductivity indicates that minimal groundwater will flow through the unfractured and unweathered bedrock matrix of the Salem Formation.

The hydraulic conductivity versus depth below ground surface of the packer-pressure test results for packer intervals where the center point was within the Salem Formation are presented on Figure I.3 in Appendix I. There were 34 tests with calculated values above the lower limit of testing and 54 tests with results below the lower limit of testing, with testing conducted at 27 locations. This figure shows that the highest hydraulic conductivity is found at shallow depths, below approximately 40 ft bgs, with low hydraulic conductivity below 60 ft bgs. Approximately two-thirds of the packer-pressure tests were conducted at depths of less than 50 ft bgs, where enhanced hydraulic conductivity would be more common.

Where the packer-pressure test was conducted at a shallow depth, the Salem Formation was the surficial bedrock unit, or found beneath a thin layer of St. Louis Formation. In either case, the geology showed that the Salem Formation was subjected to enhanced weathering that was not present where the Salem was found at deeper bedrock intervals. Also shown on this figure are the calculated hydraulic conductivity results based on the laboratory determined intrinsic permeability to air test results for the (unweathered) rock matrix.

The highest calculated rock matrix hydraulic conductivity value is within the lower range of packer-pressure test results above the lower limit of testing. This indicates the potential for the packer-pressure testing to have measured hydraulic conductivity of the bulk rock matrix on a few occasions.

The remaining calculated rock matrix hydraulic conductivity values are lower than the lower limit of testing for the packer-pressure tests. This indicates that, where there was no detectable hydraulic conductivity, the packer-pressure testing equipment was likely testing the bulk rock matrix.

The comparison of calculated rock matrix hydraulic conductivity to packer-pressure test results demonstrates that the secondary permeability features (e.g., fractures, joints, solutionally enhanced bedding planes) are the primary means of groundwater transport through the Salem Formation and that there is little to no groundwater transport through the bulk mass of the formation.

The Harrodsburg Formation

The Harrodsburg Formation is a competent unit, with few fractures, when not near the ground surface. The Harrodsburg Formation has been divided into an Upper and Lower unit, based on geologic information. It is thinly bedded with numerous bedding planes that tend to be open when the Harrodsburg is found near the ground surface, but are otherwise typically closed or tight when the Harrodsburg is found underlying the Salem and St. Louis Formations.

The porosity, mean pore throat radius, and intrinsic permeability of the Upper Harrodsburg Formation rock matrix was tested in five samples and the results presented in Appendix G. The

intrinsic permeability can be converted to hydraulic conductivity using the equation presented previously.

The results were:

Porosity (conventional)	4.10 to 9.75 percent
Median Pore Throat Radius	0.043 to 0.255 microns
Intrinsic Permeability	0.008 to 0.848 mD
Hydraulic Conductivity	6.8×10^{-9} to 7.2×10^{-7} cm/sec

The rock matrix hydraulic conductivity indicates that minimal groundwater will flow through the unweathered bedrock matrix of the Harrodsburg Formation.

The hydraulic conductivity versus depth below ground surface of the packer-pressure test results for packer intervals where the center point was within the Upper Harrodsburg Formation are presented on Figure I.4 in Appendix I. There were 41 tests with calculated values above the lower limit of testing and 35 tests with results below the lower limit of testing, with testing conducted at 20 locations. This figure shows that the high hydraulic conductivity is found at varying depths with very low hydraulic conductivity also found at similar depths below ground surface. However, the highest hydraulic conductivity values (i.e., 10^{-3} to 10^{-2} cm/sec) are found in secondary features (e.g., fractures) at depths less than 50 ft bgs, where the Harrodsburg Formation is overlain by less than 10 ft of Salem Formation. Also shown on this figure are the calculated hydraulic conductivity results based on the laboratory determined intrinsic permeability test results for the five (unweathered) rock matrix samples.

The highest calculated rock matrix hydraulic conductivity value is slightly less than the lower limit of testing for the packer-pressure testing. This indicates that, where there was no detectable hydraulic conductivity, the packer-pressure testing equipment was likely testing the bulk rock matrix.

The comparison of calculated rock matrix hydraulic conductivity to packer-pressure test results demonstrates that the secondary permeability features are the primary means of groundwater transport through the Upper Harrodsburg Formation and that there is little to no groundwater transport through the bulk mass of the formation.

Figure I.5 in Appendix I presents the Upper Harrodsburg Formation hydraulic conductivity versus height above the top of the Ramp Creek Formation, an obvious and easily defined stratigraphic contact. This figure shows that there are two zones where the hydraulic conductivity from the packer-pressure tests appears to cluster, 48 to 52 ft and 58 to 64 ft above the top of the Ramp Creek Formation. This clustering may be a result of stratigraphic features that causes slightly enhanced permeability, such as bedding planes, stylolites, or coarse texture of the bedrock as a result of the concentration of large fossil fragments. This figure includes data from 13 of the 20 packer-pressure tests for the Upper Harrodsburg Formation as the remaining tested boreholes did not extend to the Ramp Creek Formation.

The hydraulic conductivity versus depth below ground surface of the packer-pressure test results for packer intervals where the center point was within the Lower Harrodsburg Formation are presented

on Figure I.6 in Appendix I. There were 13 tests with calculated values above the lower limit of testing and 14 tests with results below the lower limit of testing, with testing conducted at 13 locations. This figure shows that the hydraulic conductivity is generally low with one exception (MW-X297Y305D, 6.6×10^{-4} cm/sec). This test interval is at 59 to 69 ft bgs, potentially within the zone of slightly higher permeability caused by weathering. There were no rock matrix test results for the Lower Harrodsburg Formation.

Ramp Creek Formation

The Ramp Creek Formation is a competent unit, with few fractures. It commonly contains geodes, but otherwise is relatively unfractured and contains few stylolites. The Ramp Creek Formation also contains thin shale and shaley limestone beds.

The porosity, mean pore throat radius, and intrinsic permeability of the Ramp Creek Formation rock matrix was tested in five samples and the results presented in Appendix G. The intrinsic permeability can be converted to hydraulic conductivity using the equation previously presented.

The results were:

Porosity (conventional)	21.28 to 24.17 percent
Median Pore Throat Radius	0.240 to 0.500 microns
Intrinsic Permeability	1.22 to 5.32 mD
Hydraulic Conductivity	1.0×10^{-6} to 4.5×10^{-6} cm/sec

The low hydraulic conductivity indicates that minimal groundwater will flow through the unweathered bedrock matrix of the Ramp Creek Formation.

The hydraulic conductivity versus depth below ground surface of the packer-pressure test results for packer intervals where the center point was within the Ramp Creek Formation are presented on Figure I.8 in Appendix I. There were 4 tests with calculated values above the lower limit of testing and 17 tests with results below the lower limit of testing, with testing conducted at 13 locations. This figure shows that the hydraulic conductivity is quite low with only four measured values out of 21 tests. The rock matrix hydraulic conductivity based on the laboratory determined intrinsic permeability test results and packer-pressure hydraulic conductivity values are similar, indicating that the packer-pressure testing was likely testing the rock matrix rather than open fractures.

Edwardsville Formation

The Edwardsville Formation forms an aquitard, restricting vertical flow and is considered to represent the base of the hydrostratigraphic sequence at the Facility. The rock matrix properties were not tested for the Edwardsville Formation. The hydraulic conductivity results versus depth below ground surface of the packer-pressure test results for packer intervals where the center point was within the Edwardsville Formation (although five of the six tests overlapped into the overlying Ramp Creek Formation) are presented on Figure I.8 in Appendix I. This figure shows that the hydraulic conductivity is quite low with only two measured values out of six tests (at a total of six locations), similar in magnitude to the Ramp Creek Formation results.

Calculations of Hydraulic Apertures

The following hydraulic aperture calculations were performed to determine the flow through naturally occurring, rough-walled fractures. These calculations are intended to show the relationship of the calculated hydraulic conductivity to the approximate apertures of the fractures tested, and are intended to further demonstrate the relationship of hydraulic conductivity with depth across the Facilty. These calculated apertures also provide an estimation of potential entry pressures of water and DNAPL into these fractures. Appendix J.1 provides a summary of hydraulic aperture calculations performed by Dr. B.H. Kueper using the packer-pressure testing results available as of January 2004. These hydraulic apertures were calculated using conservative principles, including one fracture per packer-pressure interval, to determine a maximum hydraulic aperture. Based on these calculations, the majority of the hydraulic aperture widths were below the lower limit of testing, with approximately one-third above the lower limit of testing, as shown in Appendix J.1.

The hydraulic aperture equation presented in Appendix J.1 was applied to recalculate hydraulic apertures for packer-pressure tests completed as of October 13, 2006. The hydraulic aperture equation and input parameters used were:

$$e = \sqrt[3]{\frac{12T\mu}{\eta\rho g}}$$

where:

e = hydraulic aperture width (meters)
T = transmissivity (m/sec, from individual packer-pressure tests)
μ = water viscosity (1.145 centipoise at 15°C)
η = number of fractures per test interval (assumed to be 1)
ρ = density of water (999.13 kg/m^3 at 15°C)
g = gravitational acceleration (9.81 m/sec^2)

Figure 2.41 presents the hydraulic aperture widths calculated using packer-pressure test results. For these calculations, the hydraulic conductivities from the packer-pressure testing were converted to fracture hydraulic apertures, assuming a single fracture per test interval. This figure shows similar results to Appendix J.1, in that the majority of the test results (144 out of 251) were below the lower limit of testing (approximately 30 to 60 micrometers (µm)). Where the calculated fracture aperture was based on packer-pressure data below the lower limit of testing, the resultant calculated aperture width is most likely a reflection of the bulk rock matrix hydraulic conductivity rather than the presence of an open fracture of finite width.

Of the results above the lower limit of testing, the calculated hydraulic aperture ranged from 31 µm to 450 µm, with a median of 63 µm and a mean of 95 µm. Figure 2.42 presents the distribution of calculated hydraulic aperture widths greater than the lower limit of testing and denoted with color for each formation. Only 30 of the 107 test results (28 percent) were greater than the mean value of 95 µm. The low values of calculated apertures within the bedrock indicate that, below the zone of solution enhanced features, there will be minimal groundwater flow within the bedrock sequence. Many of the lower values of calculated hydraulic aperture (i.e., below the median value of 63 µm)

may reflect the bulk rock matrix hydraulic conductivity rather than an open fracture of finite width, especially for the Harrodsburg and Ramp Creek Formations, where the rock matrix hydraulic conductivity approaches or is similar to the packer-pressure test determined hydraulic conductivity.

2.7.2.3 Groundwater Flow systems

The five bedrock stratigraphic units are divided into two hydrostratigraphic units based primarily on the water level data and interpreted groundwater flow directions. These two hydrostratigraphic units are:

- limestone as the water-bearing unit
- underlying shale as the aquitard unit

Within the water-bearing limestone hydrostratigraphic unit, there are three definable groundwater flow systems (shallow, intermediate, and deep). Each flow system was defined based on the groundwater elevations measured at each monitoring well through the approximately three years of routine monitoring. Groundwater elevations were grouped by open interval (or screen) elevation range. The groundwater elevations were contoured in each subgroup (where enough data were available) to determine potentiometric surface and the direction of groundwater flow. The monitoring well subgroups were then categorized into shallow, intermediate, and deep groundwater flow systems. Table 2.6 presents the monitoring well network for each groundwater flow system.

Shallow Groundwater Flow System Description

The shallow groundwater flow system includes portions of the St. Louis, Salem, and Upper Harrodsburg Formations. Recharge to this flow system occurs in upland areas through overburden soil, open joints, and exposed bedrock surfaces. Discharge of the shallow groundwater flow system is through seeps, springs and subsurface base flow to the creeks and drainage valleys located in the immediate vicinity of the Facility. This flow system includes portions of the epikarst (near the surface within existing valleys) and the underlying shallow, weathered bedrock during, and for some period immediately following, precipitation events (dependent upon the degree of existing soil saturation and the rates of evapotranspiration throughout the year). The shallow groundwater flow system includes a "water table" potentiometric surface. However, because flow through the limestone has been previously demonstrated to occur through secondary permeability features, a true "water table" does not exist; rather, the potentiometric surface can be defined for the purposes of demonstrating the general direction of groundwater flow. It is important to note here that this potentiometric surface does not imply direct groundwater flow pathways in this hydrogeologic setting, where groundwater will flow along interconnected fractures from high potentiometric elevations to lower potentiometric elevations.

The shallow bedrock in this flow system is characterized by open and clay-filled fractures that provide enhanced permeability to the flow of water. Most of the wide fractures are horizontal, bedding plane fractures, with widely spaced and generally narrow vertical fractures interconnecting the bedding plane fractures. These features were noted in occasional borehole geophysical logs and in the East Plant Area Vault area, where the overburden was removed and the bedrock surface was exposed. The photographs (Figures 2.14 and 2.16) discussed in Section 2.6.2.2 present the irregular surface of the bedrock surface seen in the East Plant Area Vault. Based on the borehole geophysics and the general nature of the shallow bedrock determined during drilling, this general

style of irregular bedrock surface is expected to be present wherever the bedrock surface is heavily weathered.

This flow system was defined by bedrock monitoring wells completed at shallow depths in the bedrock sequence, regardless of the stratigraphic unit. The groundwater elevation for the water table potentiometric surface (May 4 to 5, 2015) are presented on Figure 2.43. This figure shows the large number of monitoring wells used to determine the water table configuration. Groundwater is shown flowing primarily to the east and locally redirected toward the incised stream valleys, where groundwater discharges to surface water in the form of seeps, springs and groundwater base flow. On the west side of the Facility, a small component of groundwater flow is westerly, as well as to the southwest and to the north.

There are eight additional monitoring wells (Waterloo System ports) within the overall shallow groundwater flow system monitoring well network completed slightly deeper than the water table wells used to construct the water table potentiometric surface. These eight wells are listed in Table 2.6 under the heading Waterloo System Monitoring Well-Port Number (though not used to generate water level contours). Five of the eight wells are in a common elevation range of approximately 575 to 596 ft amsl. From these five wells, a potentiometric surface map was constructed. The groundwater flow direction generally follows the water table potentiometric surface, with the groundwater flow direction to the east. However, given that there are substantially fewer groundwater elevations from this deeper elevation range and because the topography drops significantly to the east (where the lower elevation range merges into the "water table" elevation range), this additional potentiometric surface map of the shallow groundwater flow system was not presented in this Report.

The shallow groundwater flow system extends at depth through the St. Louis, Salem, and the upper portions of the Upper Harrodsburg Formations. However, the actual groundwater flow below the water table zone appears to be minimal. Deeper within the shallow bedrock sequence, there is little enhanced permeability. The calculation of hydraulic conductivity based on packer-pressure testing provided an indication that the unweathered bedrock sequence is of a relatively low permeability with minimal groundwater flow in the unweathered bedrock. The lack of surficial derived sediment such as clays within the fractures and stylolites is further evidence of an overall disconnect from the shallow bedrock system. This lack of permeability and groundwater flow indicates that the unweathered bedrock may act as an aquitard to groundwater (and contaminant) infiltration from the shallow zone, compared with fracture flow.

The results of the dye tracer testing completed at AOIs 4, 6, and 8 confirm the above discussion. Dye injections for these tests were completed within the shallow groundwater flow system and the detections of dye within the monitoring network were either at seeps/springs within, or immediately adjacent to the Facility, at the SSC Systems, or within monitoring wells/coreholes completed within the shallow groundwater flow system. Fluoroscein was detected during one sampling event only at monitoring well MW-X234Y157D-4 (the shallowest open port of the Waterloo multiple port system installed at this well, completed at a depth of 79.3 to 90.8 ft bgs). PCBs have not been detected within the groundwater samples collected from this port.

There are occasional sinkholes and swallets that have formed in the soluble shallow bedrock that funnels surface water into the groundwater flow system. These have been found downstream of the

Facility east of and along Bailey's Branch Creek, respectively. These features play a small role in the transport of groundwater and contaminants.

The calculation of hydraulic apertures provides an indication of the ability of water (or DNAPL) to enter the bedrock fracture. The small width of the apertures results in high entry pressures (as discussed by Dr. B.H. Kueper in Appendix J.2). These high entry pressures result in the very limited ability of the individual bedrock fracture to transport groundwater (or even less for DNAPL). As well, the small diameter of the rock matrix pore throats determined from laboratory testing indicate that fluid entry into the bedrock matrix would be slow and that there is a limited ability for DNAPL to enter the bedrock matrix.

Intermediate Groundwater Flow System Description

The intermediate groundwater flow system exists within the unweathered limestone found primarily in the Harrodsburg Formation. This flow system is defined by bedrock monitoring wells completed as open hole and Waterloo Systems at various depths with varying open interval lengths. There are two common elevation ranges of monitoring wells located within this intermediate flow system. The differing zones are approximately 560 to 575 ft amsl and 540 to 565 ft amsl. The upper interval has eight monitoring wells (two of which are sample ports only), while the lower interval has seven monitoring wells (one of which is a sample port only). Groundwater elevations were contoured for the 540 to 565 ft amsl elevation range and the potentiometric surface flow direction was determined to be to the north-northeast within the intermediate groundwater flow system (Figure 2.44).

The low hydraulic conductivity determined from packer-pressure testing (10^{-4} to 10^{-6} cm/sec) indicates that minimal groundwater flow will occur in the intermediate flow system. No dyes or detectable concentrations of PCBs were observed within the groundwater in this flow system in the most recent round of data although, PCBs were detected on one groundwater sample collected from this flow system (at MW-X178Y367D-2 on May 9, 2006, at a concentration of 0.51 micrograms per liter [µg/L]).

Deep Groundwater Flow System Description

The deep bedrock groundwater flow system exists within the Ramp Creek Formation and the upper surface of the Edwardsville Formation. This deep flow system is monitored by eleven Waterloo System bedrock monitoring wells within these formations. The deep groundwater flow potentiometric surface exhibits a greater degree of separation of elevation from the intermediate flow system than that exhibited between the shallow and intermediate flow systems. This indicates that there is limited groundwater flow within the deep flow system and that the upper formations are limiting vertical groundwater flow. Figure 2.45 presents the potentiometric surface in the deep groundwater flow system for May 2015. This figure shows that groundwater flow is from the vicinity of the East Plant Area to the northeast, where the Ramp Creek Formation is eroded and the Edwardsville Formation is exposed (such as in the bottom of Bailey's Branch Creek), with a component of flow from the Facility to the south-southwest. The 595 ft amsl contour line depicts an approximation of the groundwater flow divide for the deep groundwater flow system.

The Ramp Creek and Edwardsville Formations had rarely detectable hydraulic conductivity based on the packer-pressure test results due to the very limited amount of fracturing within these units. However, the bulk rock hydraulic conductivity (10^{-5} to 10^{-6} cm/sec) suggests that minimal groundwater flow could occur within fractures or the rock matrix. PCBs were not observed within the

groundwater in this flow system in the most recent round of data. PCBs were detected at MW-X143Y245D-1 one time only on June 15, 2006 at an estimated concentration of 0.042 µg/L (Aroclor 1260). Dye has not been detected within the groundwater in this flow system.

Vertical Fluid Flow within Open Boreholes

Examination of the fluid characteristics in borehole geophysical logging data (fluid temperature and fluid conductivity) suggests that there were observable characteristic shifts in the fluid temperature and/or conductivity that indicate the potential for vertical flow within the borehole. Vertical flow in a borehole is a result of the borehole having two or more water bearing fractures that allow horizontal fluid flow and a hydraulic head differential between the two or more fractures.

The following boreholes had indications of vertical fluid flow at the time of borehole geophysical logging:

- MW-X297Y305D (now completed with a Waterloo System)
- MW-X033Y147S (now completed as a polyvinyl chloride (PVC) screened well from 43.0 to 56.0 ft bgs)
- MW-X085Y070D (now completed with a Waterloo System)
- MW-X085Y070S (now completed with a Waterloo System)
- MW-X178Y367 (now completed with a Waterloo System)
- MW-X234Y157D (now completed with a Waterloo System)

The potential for vertical flow of fluids within these boreholes was halted with the installation of the Waterloo System monitoring equipment in five of the six boreholes. The Waterloo system consists of sampling ports separated by packers that seal the entire borehole. For monitoring well MW-X033Y147S, the potential for minor amounts of vertical fluid flow still exists, however, the analytical results of water quality samples tested below the method detection limit for PCBs, indicating that vertical fluid flow is not a concern.

2.7.2.4 Seasonal Fluctuations

General Description

The hydrographs of the water levels for the overburden monitoring wells, open hole monitoring wells, the Waterloo System monitoring ports, and the East Plant Area coreholes are presented in Appendix K. The water levels presented on the hydrographs show some degree of variation. In addition, there are occasional minor anomalous water level measurements that are possibly due to larger, solution-enhanced openings in the bedrock (due to precipitation) and measurement/data recording/computational errors rather than large anomalous fluctuations in the water level.

As would be expected, the shallower monitoring wells generally show more water level variability than the deeper monitoring wells. Table 2.6 provided the listing of monitoring wells by groundwater flow system. In addition, the shallower monitoring wells tend to display a slight seasonal variation, where the highest groundwater elevations tend to be found during the late fall through winter period, and lowest groundwater elevations tend to be found during the summer period. The deep monitoring wells tend to show limited variability with time.

In order to further evaluate these shallow fluctuations and the potential implications to groundwater flow (i.e., possible shifts in the groundwater flow direction), a more detailed evaluation of the groundwater levels with two shallow monitoring wells is presented below. While both of these wells are located within the shallow bedrock groundwater flow system, these particular wells were chosen because one exhibited limited fluctuations and one exhibited observable fluctuations, as determined through the routine water level measurements.

Detailed Hydraulic Monitoring

Two shallow bedrock wells (MW-X128Y255 and MW-X234Y157S) were instrumented with pressure transducers; each for several months. The water level data for these wells were recorded at 15 minute intervals throughout the periods tested. Precipitation data, also recorded at 15 minute intervals during this monitoring period, were summed to produce a total daily precipitation values for comparison purposes.

Monitoring well MW-X128Y255 is completed in an area where the overburden is 32 ft thick and the well is open to the bedrock from 3 to 21.5 ft below top of bedrock (35 to 53.5 ft bgs). The water levels in this well (Figure 2.46) show a slow decline from early October 2005 to mid-November 2005 followed by a rise until early December 2005. This well appears to respond marginally to daily precipitation events but may be more indicative of overall aquifer water levels. Based on the lack of response to precipitation events, the thick overburden seems to act as an aquitard reducing infiltration to the epikarst and the shallow bedrock zone such that the fractures within this monitored zone do not appear to be directly connected to the recharge areas and that there is minimal groundwater flow occurring at this monitoring well location.

Monitoring well MW-X234Y157S is completed in an area where the overburden is 6 ft thick and the well is open to the bedrock from 3 to 33.4 ft below top of bedrock (9 to 39.4 ft bgs). The water level in this well (Figure 2.47) fluctuates to a greater degree than monitoring well MW-X128Y255. However, there does not appear to be a direct, obvious response of the groundwater elevations to each specific precipitation event. The groundwater elevation response to precipitation does suggest that the overburden at this location allows for fairly rapid infiltration of precipitation and that the monitoring well is in good hydraulic connection to the epikarst and shallow bedrock zone.

2.7.2.5 Discussion and Summary of Groundwater and Surface Water Flow Systems

The groundwater flow at the Facility occurs primarily in the epikarst and shallow bedrock sequence and discharges to the streams and tributaries in the vicinity of the Facility. The streams and tributaries flow to the north, and eventually merge with a regional drainage system, Salt Creek.

Summary of Groundwater Flow Systems

The flow of groundwater occurs primarily in the epikarst and the shallow weathered bedrock flow system that forms the shallow hydrostratigraphic flow system. This unit is characterized by open and clay-filled fractures that provide enhanced permeability to the flow of water. Most of the wide fractures are horizontal, bedding plane fractures, with widely spaced, generally narrow, vertical fractures interconnecting the bedding plane fractures. While the epikarst can store and transmit groundwater and potential contaminants both vertically and horizontally, it is not considered as an independent groundwater flow system within the context of this Report.

The flow of groundwater within the shallow hydrostratigraphic unit is primarily horizontal with the majority of flow from the Facility toward the east, where the groundwater discharges in the form of seeps and springs to the deeply incised surface water streams and tributaries.

There are occasional sinkholes and swallets that have formed in the soluble shallow bedrock that funnel surface water into the groundwater flow system. These have been found downstream of the Facility east of and along Bailey's Branch Creek, respectively. These features have been proven to play a role in the transport of groundwater and contaminants.

Deeper within the bedrock sequence, there is little enhanced permeability. The calculation of hydraulic conductivity based on packer-pressure testing provided an indication that the unweathered bedrock sequence is relatively impermeable and there is minimal groundwater flow in the unweathered bedrock. The lack of surficial derived sediment such as clays within the fractures and open stylolites is further evidence of an overall disconnect from the shallow bedrock system. This lack of permeability and groundwater flow indicates that the unweathered bedrock acts as an aquitard to groundwater (and contaminant) infiltration from the shallow zone.

The calculation of hydraulic apertures provides an indication of the ability of water (or DNAPL) to enter the bedrock fracture. The small width of the apertures results in high entry pressures (as discussed by Dr. B. Kueper in Appendix J.2). These high entry pressures with depth result in a limited ability of the individual bedrock fractures to transport groundwater (even less for DNAPL with a high viscosity). As well, the small diameter of the bulk rock pore throats were determined from laboratory testing, also indicate that fluid entry into the bedrock matrix would be slow and that there is a limited ability for DNAPL to enter the bedrock matrix. These conclusions are supported by additional data collected after publication of the memorandum by Dr. Kueper (Appendix J.1) as shown below:

	Kueper Analysis	GHD Analysis
# boreholes tested	14	38
Total # of measurements above the lower limit of testing (LLT)	34	107
% of tests above the LLT	30	43
Range of values above the LLT (µm)	24 to 235	31 to 450
Arithmetic mean (µm)	74.3	95.2

Apertures were calculated based on the hydraulic conductivity obtained through the packer-pressure testing (Section 2.7.2.2, Figures 2.4.1 and 2.4.2, and Appendix J.1 of the Draft RFI Report, CRA 2015). With respect to the presence of NAPL in the East and West Plant portions of AOI-8, most of the five bedrock wells where NAPL was identified in the East Plant Area (either during drilling or where it accumulated afterward), the features that produced the NAPL were predominantly:

- In bedrock that was interpreted in the RFI to be weathered (the epikarst above competent rock)
- In fractures rather than solution porosity

NAPL present in the West Plant Area is believed to have accumulated at the bedrock/fill interface as a results of surface spills/leaks.

These observations are consistent with the conceptual model for DNAPL movement at the Facility. The solution porosity (solution-widened openings in the rock) in the epikarst provides significant storage capacity for DNAPL, and the large openings (relative to unweathered fractures) will generally offer little resistance to DNAPL entry. The fact that features producing DNAPL at most wells where DNAPL has accumulated are fractures, not solution openings, is because borings are more likely to intercept fractures, particularly bedding-plane fractures (which tend to be laterally extensive and near-horizontal) rather than solution openings (which tend to form discrete channels). The presence of pooled DNAPL in fractures demonstrates that DNAPL in the epikarst, at least locally, has generated sufficient capillary pressure to penetrate some fractures. In four of the five bedrock wells where DNAPL accumulated, the producing features were either demonstrated through visual observation and packer testing to be horizontal, or the open interval of the well contained only horizontal fractures (refer to Section 7.1.8.1 for further discussion).

An updated Conceptual Site Model was prepared and presented after the initial publication of this Report found within the Pilot Trench Performance Monitoring Plan (September 24, 2019) and is provided here as Appendix J.3. The Conceptual Site Model will be further updated in the CMP to reflect results of the dye tracer testing, as necessary.

Summary of Surface Water Flow Systems

The streams and tributaries in the vicinity of the Facility receive overland flow during storm events, and groundwater discharge via seeps and springs. The source of the groundwater is infiltrating precipitation across the Facility and nearby properties. The surface water flow system are further presented in Section 2.5.2.

Groundwater/Surface Water Interaction

The interaction of groundwater and surface water was generally determined through the comparison of groundwater elevations at the five piezometers to the adjacent surface water monitoring locations (staff gages). In the Spring 018 Area, the interaction of groundwater and surface water was determined through the dye trace testing of the swallets and associated creek flow measurements.

Staff Gages and Piezometer Data

The interaction of groundwater and surface water was determined in a general way through the comparison of groundwater elevations at the five piezometers versus the adjacent surface water monitoring locations (see Figure 2.8). The groundwater elevation data from the piezometers and surface water elevation data from the staff gages are provided in Appendix L. A general water elevation comparison for each piezometer/staff gage pair is discussed with respect to figures for each of the five locations below. The data sets used for these comparisons have missing data, and there were occasional problems with the data loggers, such that some minimal amount of data were lost or were non-representative of actual field conditions.

The groundwater elevations at PZ39 and surface water elevations at SW1 are presented on Figure L.1 in Appendix L. This figure shows that the groundwater elevations are typically slightly higher than the surface water elevations, although there were times when the surface water elevations were higher than the groundwater elevations, which are due to surcharging water volumes from the Plant's discharges and the flashy nature during high precipitation events. During the period of January 5 to 13, 2005, the groundwater and surface water elevations were greater than

500 ft amsl, which is above the top of riser elevation for this well (497.6 ft amsl). The water level during this flood event was thus over top of the piezometer for a period of 9 days. From March 12 to March 18, 2006, the creek elevation was again above the top of the piezometer. For most of the monitoring period, the groundwater elevation was higher than the surface water elevation, indicating that groundwater is likely discharging to surface water.

The groundwater elevations at PZ38 and surface water elevations at SW2 are presented on Figure L.2 in Appendix L. The surface water data prior to March 2004 appears anomalous and the data are not considered to be reliable. From July 2004 through January 2005 there are little data, and the available data cannot be relied upon for interpretation. This figure shows that for the period March 2004 through June 2004, the groundwater elevation was higher than the surface water elevation. Groundwater elevations were above ground surface during January 4, March 27 and 28, 2004; and January 12, 2005. The higher groundwater elevations than surface water elevations during the period of reliable monitoring data indicates that groundwater is likely discharging as surface water.

The groundwater elevations at PZ31 and surface water elevations at SW3 are presented on Figure L.3 in Appendix L. The surface water data show a flat lowest value of approximately 510.5 ft amsl, which is the elevation of the sensor, and surface water elevations below that value could not be measured by the monitoring station equipment. During this period, the monitoring equipment may have malfunctioned as well, and would result in a similar depiction of water levels. Where the water levels in the creek and the groundwater levels were recorded, the groundwater levels were higher than the creek levels, indicating that groundwater is likely discharging to the surface water.

The surface water elevations at SW4 are presented on Figure L.4 in Appendix L. There is no transducer data available for PZ23. The manual groundwater elevation data for PZ23 are presented on this figure for comparative purposes. The groundwater elevations are higher than the surface water elevations throughout most of the monitoring period, indicating that groundwater is likely discharging to the surface water.

The groundwater elevations at PZ08 are presented on Figure L.5 in Appendix L, for the period December 18, 2003 through January 7, 2004, for which data are available. There is no available surface water elevation data for SW5. The stream elevation from mapping (Figure 2.8) is approximately 618 to 620 ft amsl. The groundwater and surface water elevations are apparently similar in this area.

Spring 018 Area

The interaction of groundwater and surface water in the Spring 018 Area is complex due to the presence of ten identified swallets along Bailey's Branch and several springs downstream of the swallets (see Figure 2.7). Swallets #1 and #2 have since been cemented closed and rock removal in the vicinity of Spring 018 has altered several of the springs, resulting in flow only from Spring 018C. The dye testing indicated that, seasonally, under unusually low surface water flow conditions, all flow in the creek entered the swallets and was rapidly transported through the bedrock to emerge in a series of springs. Under normal and high creek flow conditions, some surface water flow bypassed the swallets.

The geophysical surveys were used to determine potential preferential groundwater flow pathways in the bedrock. Ground penetrating radar (GPR) (signals reflecting off breaks within the rock matrix)

surveys were used to determine potential open spaces between the bedrock layers. The AquaTrack™ geophysical survey used an electromagnetic signal induced in the groundwater and recorded at the surface to determine potential preferential flow pathways of conductive groundwater in an otherwise less conductive rock matrix. These two geophysical methods utilized different properties of the bedrock and groundwater, and as a result, different preferential pathways were determined. The results of the AquaTrack™ geophysical survey, interpreted by Willowstick, are shown on Figure 2.48. Some of the interpreted pathways (especially those trending east to north on the east side of Bailey's Branch) conflict with the interpreted groundwater flow directions and as such, are possibly a reflection of shallow fractures in the bedrock. Both of the geophysical surveys identified potential underground groundwater flow pathways that are approximately parallel to and east of Bailey's Branch.

The results of the dye tracer tests in Swallets #1, #2, and #5 indicated that the surface water entered the swallets, was rapidly transported underground in conduits, and reentered the creek system at several springs (now one spring, Spring 018C). The dye testing also indicated that there was very little storage capacity within the conduit system, as the dye was rapidly transported and flushed from the conduits, with no capture and slow release of the dye occurring.

3. Overview of RFI Activities

3.1 Current and Historical Operations

The following provides a brief summary of the current and historical operations at the Facility. Additional details are described in the Current Conditions Report (CCR), (CRA, May 25, 2001).

Circa 1890 until the early 1940's, Stone City Construction Company owned the Facility property and operated limestone cutting mills. In the early 1940's the U.S. Government acquired the property for military production to assist with the war effort. In 1942, GMC leased the property and the mill was converted to an aluminum foundry. Operations began in 1943 as an aluminum sand casting foundry to produce aircraft cylinder heads. From 1943 until 1945, the Delco Remy Division of GMC produced cylinder heads for Detroit Diesel Allison and Packard Merlin aircraft engines for the U.S. Government.

In 1946, GMC purchased the Facility from the U.S. Government, at which time the Facility became known as the Allison Bedford Foundry. In 1950, the Fabricast Division of GMC was formed and control of the property was transferred to Fabricast. In 1959, Fabricast consolidated with GMC's existing Central Foundry Division (CFD). GMC's CFD later reformed into GMC Powertrain, with GMC Powertrain operating the Facility from 1991 until GMC's bankruptcy in 2009.

GMC (renamed Motors Liquidation Company (MLC)) filed for bankruptcy protection in June of 2009. The Facility was one of the assets purchased from GMC by GM under Section 363 of the U.S. Bankruptcy Code on July 10, 2009. Following purchase by GM, the Facility has undergone a series of modifications/improvements. The Facility continues to produce automobile aluminum casting products, such as transmission cases and converter housings for fuel efficient 6-speed and 8-speed transmissions as well as cylinder heads for 6 and 8 cylinder engines. In the near future, the Facility will begin production of an all new Small Engine Block, also produced by die casting technology.

During GM's use, the Facility has historically produced aluminum casting products, such as transmission cases, pistons, and engine blocks. Major aluminum production processes included 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, 1977, 1979, 1980, 2013, and 2015.

3.2 Current Conditions Report Summary

GM prepared a CCR to describe the current and historical conditions at the Facility resulting from treatment, storage, or disposal of hazardous waste or hazardous constituents (CRA, May 25, 2001). Those areas with the potential for a release to the environment were identified as AOIs. AOIs identified in the CCR are summarized on Table 3.1, with their locations shown on Figure 3.1. In addition, potential impacts to areas outside of the Facility from releases from the Facility were discussed.

The following activities were completed in preparation of the CCR:

- Conducting a review of available documents concerning historical remediation, treatment, storage, releases, or disposal of hazardous waste.
- Conducting interviews with Facility employees.
- Performing a visual site inspection of the Facility.
- Conducting a review of available information regarding local land use, climate, geology, hydrogeology, surface water hydrology, and ecology.
- Preparing a summary of remedial activities completed at the Facility.
- Preparing a summary of previous environmental investigations.
- Completing an evaluation of existing data to identify AOIs at the Facility.

The CCR was compiled based on a review of information contained in GM, U.S.EPA, and IDEM files. In addition, other resources, including USGS data, were used to obtain information regarding local land-use, climate, geology, hydrogeology, surface water hydrology, and ecology.

Twenty-four on-Facility AOIs were initially identified on the basis of past treatment, storage, or disposal of hazardous waste or hazardous constituents having a release or the potential for release to the environment. Subsequent off-Facility AOIs were identified at later dates during the investigation activities.

The CCR summarized the identified on-Facility AOIs, the AOI description, current status, historical operations, and conclusions and recommendations for further investigation and/or remediation.

3.3 RFI Objectives and Strategy

The overall goal of the RFI is to characterize the nature and extent of releases of hazardous waste and/or hazardous constituents at or from the Facility that pose an unacceptable risk to human health and the environment.

Specifically, the RFI was undertaken to:

- Determine whether a release of hazardous waste/constituents to soil, groundwater, surface water, or sediment has occurred at AOIs identified as requiring investigation in the CCR.
- Characterize the source(s) of a release and determine the nature and extent of constituents in environmental media to the extent necessary to protect human health and the environment.
- Characterize actual and potential migration and exposure pathways, identify actual and potential human and environmental receptors, and identify current and reasonably expected future land and groundwater uses.
- Assess potential risk to human health and the environment associated with any significant releases of hazardous waste/constituents.
- Determine whether interim corrective measures were necessary to control current unacceptable human exposures, or to control migration of contaminated groundwater.
- Provide sufficient data to demonstrate that current human exposures to contamination above risk-based levels are under control (Environmental Indicator (EI) CA 725), and that the migration of groundwater contaminated above acceptable levels is stabilized (EI CA 750).
- Determine if final corrective measures are necessary to mitigate current and future unacceptable risks, if any, to human health and the environment.

To meet these objectives, samples were collected and analyzed until there were data of sufficient quality and quantity to support an assessment of potential current and future risks to human health and the environment associated with releases of hazardous waste and/or hazardous constituents.

The RFI sampling was conducted based on the information presented in the CCR and systematic sequential sampling during each phase of the RFI to fill identified data gaps. The RFI has been completed, with the exception of data to be collected following implementation of the Unsampled Areas Soil Sampling Work Plan (to be finalized), to allow a baseline risk assessment and the selection of final corrective measures to be submitted in the CMP. Results of the Unsampled Areas Soil Sampling will be provided as an addendum to this RFI Report.

The RFI demonstrates that: (1) human exposures to media contaminated with hazardous waste and/or hazardous constituents above acceptable risk-based levels are currently under control (EI CA725) as described in the demonstration submittal to U.S. EPA on January 27, 2005 , and (2) migration of groundwater contaminated with hazardous waste and/or hazardous constituents above acceptable levels are stabilized within any existing areas of contamination, and discharge of contaminated groundwater to surface water is either insignificant or shown to be currently acceptable (EI CA750) as described in the demonstration submittal to U.S. EPA on April 28, 2008. The EI CA725 and EI CA750 determinations are provided as Appendices M.1 and M.2, respectively.

3.4 Pre-RFI Activities

Two work plans were submitted prior to the submittal of the RFI Work Plan (CRA, October 29, 2001) in order to expedite those portions of the investigation ahead of the on-Facility RFI work:

- Off-Facility Well Survey and Sampling Work Plan (CRA, June 6, 2001), which included a door-to-door survey immediately surrounding the Facility, and groundwater sampling and analysis from wells and cisterns
- Stream Investigation Work Plan (Exponent, June 6, 2001), which included habitat mapping, fish and benthic community evaluations, stream geomorphology mapping, and human access and use evaluation

These work plans were implemented before the on-Facility RFI Work Plan to evaluate the potential for a completed exposure pathway off-Facility to either groundwater in wells/cisterns or to soil, sediment, and surface water in Bailey's Branch Creek and Pleasant Run Creek.

The following paragraphs briefly describe these two field investigation programs completed prior to the initiation of the RFI Work Plan.

3.4.1 Off-Facility Residential Well Survey

As described in Section 2.4.1 a residential well survey and sampling event was initiated in June 2001. Further details on this program are discussed in the Off-Site Residential Well Survey and Sampling Technical Memorandum, dated December 9, 2002, (refer to Appendix B.1), and Sections 2.4.1 and 7.4 of this Report.

3.4.2 Stream Investigation

The stream investigation consisted of Phase I/Phase II surface water investigations (habitat mapping, fish and benthic community evaluations, stream geomorphology mapping, and human access and use evaluation, soil sampling and aerial thermal imagery). These data were evaluated and a seep/spring sampling program, referred to as the SSC monitoring program was initiated as part of the CERCLA RA.

The Stream Investigation Work Plan (Exponent, June 6, 2001) and Stream Investigation Field Sampling Plan (Exponent, September 21, 2001) concentrated on portions of the Pleasant Run watershed, including Pleasant Run Creek, Bailey's Branch Creek, and Salt Creek. The investigation consisted of two phases and included field reconnaissance of the creek system and the collection of floodplain soil, sediment, surface water, and fish samples for laboratory analysis.

Results of the first phase of the stream investigation were documented in the Bedford RFI Technical Memorandum 1: 2001 Stream Investigation Data Summary (Exponent, March 19, 2002; Appendix B.2). Field activities were completed under low-flow conditions and concluded that the occurrences of PCBs were widely distributed throughout the study area in stream sediments, fish, and soil, and were less frequently detected in surface water. The concentrations of PCBs in sediment and fish similarly tended to be highest from sampling stations located closest to the GMC's stormwater and treated process water Outfalls 003 and 002. Limited soil data also suggested elevated PCB concentrations in bank soil were highest in Baliey's Branch and its headwater tributaries and PCB concentrations generally decreased with distance from the Facility. The upstream portion of Pleasant Run Creek (prior to its confluence with Bailey's Branch) and a reference station located on Gullets Creek did not contain detectable concentrations of PCBs. Samples collected in Salt Creek approximately one mile upstream and one mile downstream of the confluence of Pleasant Run Creek and Salt Creek detected similar or lower level concentrations of PCBs in the downstream area

to the upstream study area, suggesting conditions in Salt Creek were representative of background concentrations unrelated to the Bedford Facility activities. The Phase I Stream Investigation recommended additional characterization of surface water, bank, and floodplain soil during high-flow conditions.

Results of the second phase of the stream investigations were documented in the Bedford RFI Technical Memorandum 1: 2001 Stream Investigation Data Summary Addendum, 2002 High Flow Surface Water Sampling (Exponent, March 27, 2003; Appendix B.3) and Technical Memorandum Phase II Stream Investigation (CRA, February 11, 2003; Appendix B.4). The Phase II Stream Investigation included the sampling of surface water (including observed seeps and springs) in May 2002, after a period of extended wet weather, and additional sediment, bank, and floodplain soil sampling throughout the area that extended beyond the area of the Phase I Stream Investigation study. The results of this study generally defined the limits of PCBs in the floodplain soil in the main channel of Bailey's Branch Creek and Pleasant Run Creek, as well as within several associated tributaries to Bailey's Branch Creek.

3.5 RFI Work Plan and Addenda

The RFI Work Plan described the initial proposed investigation of the Facility and was based on the Preliminary RFI Sample Matrix Summary (CRA, August 31, 2001), originally submitted to U.S. EPA and IDEM and discussed at an August 28, 2001, meeting in Bedford. The final version of the Preliminary RFI Sample Matrix Summary was submitted to U.S. EPA and IDEM via email on September 11, 2001, which was based on discussions and comments received during the August 28, 2001, meeting. The purpose of the sampling activities was to determine whether a significant release of hazardous waste and/or hazardous constituents had occurred at the AOIs identified during compilation of the CCR. The proposed investigation was designed to identify contaminants of concern, if any, and to characterize exposure concentrations. The locations of the AOIs are presented on Figure 3.1, with a brief description of each AOI provided in Table 3.1.

Generally, the initial RFI Work Plan included the following:

- Advancement of soil borings and the collection of soil samples for laboratory analysis
- Completion of surface geophysical surveys at on-Facility areas where historical filling activities by GMC were alleged to have occurred
- Collection of surface soil and sediment samples for laboratory analysis
- Collection of surface water samples for laboratory analysis
- Installation of overburden and bedrock groundwater monitoring wells
- Collection of groundwater samples for laboratory analysis

As data were collected, several instances were identified where additional investigative work was required, either because additional data were obtained, a change in field conditions was noted, and/or the results of the initial RFI sampling results concluded existing data gaps, in order to meet the objectives of the RFI Work Plan, which is consistent with GM's streamlined approach. These additional investigations were summarized in RFI Work Plan Addenda, as described below in Sections 3.5.1 through 3.5.13.

3.5.1 RFI Work Plan Addendum 1

RFI Work Plan Addendum No. 1 (CRA, November 18, 2002) proposed additional on- and off-Facility investigative activities based on preliminary RFI results. The purpose of the proposed additional investigative activities was to further define the extent of hazardous constituents in soil at the Facility at AOIs 5 and 6, to gain more information on the transport of discovered DNAPL in Bailey's Branch (including the installation of several angled monitoring wells), and obtain additional information on the groundwater-surface water system at and near the Facility, as described in Section 2 of Addendum No. 1.The results of these activities are included in Section 7.1.5 of this Report.

3.5.2 RFI Work Plan Addendum 2

RFI Work Plan Addendum No. 2 (CRA, May 22, 2003) proposed additional soil delineation activities at the Former North Disposal Area; identified as AOI 4 in the CCR. Section 2 of this Addendum described completion of a geotechnical evaluation of the Former North Disposal Area (AOI 4), completion of two angled-deep bedrock cores and hydraulic testing, and the laboratory analysis of soil samples. The purpose of this RFI Work Plan Addendum No. 2 was to perform additional investigative activities at the Former North Disposal Area, identified as AOI 4 in the CCR in order to further define the extent of the fill materials and to characterize the constituents in the fill material to provide additional data to support interim measures and a final remedy at AOI 4.

The results of these activities are included in Section 7.1.4 of this Report.

3.5.3 RFI Work Plan Addendum 3

Section 2 of the RFI Work Plan Addendum No. 3 (CRA, March 23, 2004) proposed additional investigative activities at the GM hourly parking lot located north of the Facility due to the discovery of additional historical topographic maps showing the presence of historical drainage valleys and the surface water controls in the vicinity of Breckenridge Road and GM Drive through the advancement of soil borings and test pits. This Addendum proposed the following work activities:

- Limited storm manhole and piping investigation
- GMC North Parking Lot investigations (filled ravine north of the Die Cast Building or AOI 21)

AOI 21 (Filled Ravine North of Die Cast Building)was subdivided into the following sub areas, based on the individual historical drainage valleys identified:

- Former Drainage Valley Under Hourly Parking Lot (AOI 21-1)
- Former Drainage Valley Northeast of Piston and Office Buildings (AOI 21-2)
- Surface Water Ditches Located Along GM Drive and Breckenridge Road (AOI 21-3)
- Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road (AOI 21-4)

The results of these activities are included in Section 7.1.21 of this Report.

3.5.4 RFI Work Plan Addendum 4

RFI Work Plan Addendum No. 4 (CRA, May 3, 2004) proposed additional test pitting activities, based on the results of on- and off-Facility geophysical surveys of suspect fill areas (AOIs 25, 26, and 27). The geophysical investigation of on-Facility AOIs was completed in January 2002.

The test pit locations can be found on Figures 4.1 through 4.4 of the Geophysical Investigation Report submitted to U.S. EPA on January 3, 2003. The Geophysical Report was also included as Appendix A to RFI Work Plan Addendum No. 4.

The results of these activities are included in Sections 7.2.1, 7.2.2, and 7.2.3 of this Report.

3.5.5 RFI Work Plan Addendum 5

Section 2 of the RFI Work Plan Addendum No. 5 (CRA, July 26, 2004) describes proposed additional investigative activities on- and off-Facility based on the results of groundwater sampling conducted in 2003. These activities included:

- Aerial thermal imaging survey to identify temperature differences along the creek systems, which may represent groundwater discharge springs
- Dye trace testing to assist in the understanding of groundwater flow through the carbonate rocks underlying the Facility
- Installation and sampling of shallow bedrock groundwater monitoring wells at various locations on- and off-Facility
- A storm sewer investigation at Parcel 400

The results of these activities are included in various Sections of this Report, including 7.1.1, 7.1.4, 7.1.6, 7.1.8, 7.1.10, 7.1.21, 7.2.2, 7.2.3, and Appendices B and C.

3.5.6 RFI Work Plan Addendum 6

Section 2 of the RFI Work Plan Addendum No. 6 (CRA, September 27, 2004) describes the proposed scope of work (SOW), which included gauging the approximate gains and losses of surface water flow within a portion of Bailey's Branch Creek system through the installation and instrumentation of surface water weirs. Concurrent with the flow study, dye was also proposed to be injected into each of the two identified swallets discovered within the creek bed and the known downstream springs were then to be monitored for the presence of dye. The purpose of the dye tracing was to identify where surface water entering the bedrock was being discharged. This work was in response to the identification of swallet features within the creek channel and to characterize/quantify the surface water flow within the upper reaches of Bailey's Branch creek.

The results of these activities are included in Section 3.7 and Appendix C of this Report.

3.5.7 RFI Work Plan Addendum 7

A letter describing the RFI Work Plan Addendum No. 7 was submitted to the U.S. EPA on November 23, 2004. This Addendum proposed additional sampling to delineate the extent of elevated PCBs, antimony, lead, and mercury in surface soil identified during implementation of the

RFI Work Plan Addendum No. 3. Specifically, work completed under this Addendum consisted of the following investigations:

- Further delineation of AOI 21-1, AOI 21-2, and AOI 21-4 for PCBs in the surface and subsurface soil
- Further delineation of elevated lead and mercury concentrations in the surface soil at AOI 21-3
- Further delineation of surface and subsurface soil for PCB concentrations in the area affected by the Henry System Discharge (AOI 18)
- Further delineation of surface soil for concentrations of antimony at the Tool Room Annex Dock Release (AOI 22)

The results of these activities are included in Sections 7.1.18, 7.1.21, and 7.1.22 of this Report.

3.5.8 RFI Work Plan Addendum 8

RFI Work Plan Addendum No. 8 (CRA, March 11, 2005) proposed two additional and separate dye tracer tests on the Facility property. These additional areas located east of GM Drive had been identified through historical research and through implementation of the RFI at the Facility. Two dye tracer tests were completed as follows (Section 2 describes the proposed locations of the dye tracer testing):

- AOI 4 overburden (fill material) and bedrock were simultaneously injected on March 22, 2005, with Fluorescein and Rhodamine WT dyes, respectively
- Former Sludge Disposal and Fire Training Area (AOI 6) bedrock was injected with Eosine dye on October 6, 2005, and was reinjected on February 7, 2006, followed by an additional water flush on February 11, 2006

The results of these activities are included in Sections 7.1.4 and 7.1.6, and Appendix C of this Report.

3.5.9 RFI Work Plan Addendum 9

RFI Work Plan Addendum No. 9 (CRA, July 5, 2005) proposed additional sampling to supplement the existing RFI activities to address the following specific additional pre-design objectives for the East Plant Area IM:

- Delineate areas with PCBs >50 milligrams per kilogram (mg/kg) in the East Plant Area
- Define the topographic surface and strength of the bedrock in the East Plant Area
- Identify bedrock valleys/potential preferential groundwater flow pathways to assist in focusing groundwater collection systems for the East Plant Area
- Provide stratigraphic definition primarily along the northern and eastern sides of the East Plant Area to support the design of a downgradient perimeter groundwater collection trench

The proposed details of the proposed SOW are presented in Section 3 of the Addendum No. 9. The results of these activities are included in Appendix B of this Report.

3.5.10 RFI Work Plan Addendum 10

RFI Work Plan Addendum No. 10 (CRA, August 19, 2005) was proposed to characterize the subsurface soil and to review records associated with the five former USTs in the area referred to as the South Piston Yard (AOI 13). This investigation was conducted because formal closures had not been obtained from IDEM for these USTs. The proposed SOW is described in Section 3 of RFI Addendum No. 10.

The results of these activities are included in Section 7.1.13 and Appendix U of this Report.

3.5.11 RFI Work Plan Addendum 11

RFI Work Plan Addendum No. 11 (CRA, August 17, 2005) proposed an additional dye tracer test at the Service Tunnels (AOI 9). This investigation included the installation of two dye injection wells inside the Facility and the installation of additional bedrock monitoring wells to the west and north of the injection location because the initial RFI Work Plan results indicated the presence of PCBs associated with the former Service Tunnels beneath the Facility. Phloxine B dye was simultaneously injected into the two wells on August 14, 2006. Monitoring for the presence of dye at surrounding monitoring wells was conducted until December 2006, when the program was ended with no detected traces of dye. Section 2 of the RFI Addendum No. 11 describes the proposed SOW.

The results of these activities are included in Section 7.1.9 and Appendix C of this Report.

3.5.12 RFI Work Plan Addendum 12

RFI Work Plan Addendum No. 12 (CRA, December 6, 2005) proposed additional investigations to further define the stratigraphy along the proposed Groundwater Trench and to further define the bedrock valley north of AOI 4. This investigation was conducted as a supplemental investigation to the RFI Work Plan Addendum No. 9 in support of the design for an Interim Measure activity along the northern, eastern, and southern property boundaries of the Facility. The SOW, as described in Section 3 of Addendum No. 12 included the following:

- Advancement of seven additional coreholes (five along the eastern and two on the northern limits of the East Plant Cover System)
- Advancement of two soil borings to the top of bedrock along the northern limits of the East Plant Cover System to augment the investigation of a potential bedrock valley at this location
- Completion of packer-pressure testing at selected coreholes along the proposed alignment of the Groundwater Trench
- Completion of downhole geophysical logging at selected locations corresponding to the packer-pressure testing

The results of these activities are included in CA EI750 reports submitted and Appendices B, I, M, O and U of this Report.

3.5.13 RFI Work Plan Addendum 13

Section 2 of the RFI Work Plan Addendum No. 13 (CRA, April 20, 2006) proposed the installation of additional on- and off-Facility groundwater monitoring wells, and the sampling of these monitoring

wells along with sampling of residential wells where previous sampling indicated the presence of PCBs. This work was based on the results of the groundwater sampling conducted in 2003 and 2005, and was completed to augment the existing groundwater monitoring well network and provide support data to complete the EI CA750 Report (GMC, April 29, 2008); refer to Appendix M.2 of this Report.

3.6 RFI Investigation Sampling and Methodology

This section provides a description of the methodologies CRA employed to install boreholes, overburden and bedrock monitoring wells, piezometers, staff gages, and stream weirs under the RFI. This section also describes the monitoring well, piezometer, and staff gage monitoring network as of May 31, 2015. Monitoring locations installed after this date are not included in this Report but will be included in the Addendum. The boreholes, monitoring wells, piezometers, staff gages, and stream weirs were installed based on the requirements of the RCRA and CERCLA work plans. This section also includes surface soil, sediment, and surface water sampling methodologies.

3.6.1 Sample Locations and Identification

Sample locations were given a unique identifier based on an approximate easting and northing coordinate (1983 North American Datum [NAD '83]). An arbitrary origin (east = 0 foot and north = 0 foot) was established on paper at the southwest corner of the Facility (NAD '83 coordinate of East = 3122200.0 and North = 1321700.0). The origin is located on Figure 2.2. The coordinate is based on the easting and northing distance difference from the origin to the investigative location, divided by 10. For example, soil boring B-X046Y098 would roughly correspond to a location located 460 foot east and 980 foot north of the origin (or, NAD '83 coordinate easting = 3122660.0 and northing = 1322680.0). Actual locations were adjusted in the field, and final locations were surveyed for their exact coordinates and ground elevations upon completion. It should be noted that sample location identifications (IDs) are not precise and some were mislabeled during sample collection (e.g., MW-X251Y189D is not located where the ID would suggest). Location IDs that were mislabeled during sample collection were not revised based on their final placement, to minimize confusion with analytical results in the database. However, final locations were surveyed and appropriately plotted on figures and plans.

Samples were given a unique sample ID at the time of collection, in accordance with the QAPP (CRA, July 18, 2001) and subsequent amendments. In general, sample ID numbers included information such as sample matrix, sample date, location ID, and the initials of the primary sampler. Sampling information was recorded and retained in field books and on forms in the field at the time of collection.

After the initial investigations, additional investigative locations were either numbered using the method described above or for the specific investigation, resulting in additional prefixes such as AD-, BH-, CH-, etc.

3.6.2 Sampling Procedures

Drilling, soil sampling, surface water sampling, sediment sampling, well installation, well development, well purging, and groundwater sampling activities were performed in accordance with the Field Sampling Plan (FSP) and the Standard Operating Procedures (SOP) previously provided

as an appendix to the RFI Work Plan and addenda thereto. The FSP and SOPs utilized in the RFI Work Plan are provided as Appendix B.5. Prior to subsurface investigation, investigation locations were confirmed free of underlying utilities. Electronic equipment used during the RFI investigations was calibrated prior to use, in accordance with the QAPP. Calibrations were documented on appropriate field sampling records, such as field books.

Materials generated during investigative activities (e.g., decontamination water, purge water, soil, etc.) were characterized for appropriate disposal in accordance with applicable laws and the Waste Management Plan (CRA, 2003). Analytical results are provided in Appendices H.1 through H.9 and are discussed in Section 7.0 of this Report.

3.6.2.1 Sediment and Surface Water

Sediment samples were collected via an agricultural type soil probe, stainless-steel trowel, or by an Eckman type dredge sampler (existing on-Facility Stormwater Pond only). Sediment samples were collected from the upper 10 centimeters (cm) (approximately 4 inches) of the sediment surface, or less depending upon the amount of sediment present. Sediment samples were submitted to the analytical laboratory for analysis of selected constituents. The results of the sediment analyses are discussed in Section 7.1.6. Analytical results are presented in Appendix H.1.

In general, where sediment samples were collected, surface water samples were also collected (where present at the time of collection). Surface water samples were collected prior to the sediment sample, to minimize the disturbance of the sample. Surface water samples were collected either by directly filling sample containers (e.g., at springs and seeps), or by the filling of clean sample containers, not containing preservatives, which were opened immediately below the water surface (e.g., existing on-Facility Stormwater Pond). The water from the containers used to collect the samples was then transferred to the appropriate containers with preservatives. Samples for dissolved analysis were filtered in the field at the time of collection using a 0.45 µm filter, prior to being preserved. Surface water samples were submitted to the analytical laboratory for analysis of selected constituents. The results of these samples are discussed in Section 7.1.6. Analytical results are presented in Appendix H.2.

3.6.2.2 Wipe

Five wipe samples were collected from the two former PCB Storage Areas (AOI 3). Three wipe samples were collected from the former PCB storage area located within the South Die Cast Building and two samples were collected from the former PCB storage area located in the Sludge Building (see Figure 2.2 for building/area names). Wipe samples were collected by swabbing the sample surface inside of a 10 x 10 cm template with a hexane-soaked swab provided by the analytical laboratory. The swab was immediately returned to the sample container provided and submitted to the laboratory for analysis of PCBs. The results of these samples are discussed in Section 7.1.3. Analytical results are presented in Appendix H.3.

3.6.2.3 Surface Soil

Surface soil samples were collected either by a stainless-steel hand auger, hydraulic push drilling, hollow-stem augers (HSAs) or by stainless-steel trowel. Surface soil samples were collected in accordance with the FSP (refer to Appendix B.5).

Surface soil samples were submitted to the analytical laboratory for analysis of selected constituents. The results of these samples are discussed in Section 7.1. Analytical results are presented in Appendix H.4.

3.6.2.4 Subsurface Soil

The surface and subsurface conditions at boring sample locations were recorded in the field at the time of collection by the field geologist. Boring logs are provided in Appendix F.

Overburden soil samples were collected through 4.25-inch, inside diameter, HSAs via standard penetration (split-barrel) techniques (SPT), through hydraulic-push equipment equipped with polyethylene soil sample liners, or by stainless-steel hand augers. For locations where the bedrock was drilled, the overburden was sampled as described in Section 5.3.3. Drilling 10.25-inch HSAs or 10 7/8-inch tri-cone techniques were utilized to set a 10-inch steel outer casing into place at approximately 2 feet into the top of the competent bedrock surface, which was usually below the overburden/bedrock interface. This outer casing was cement grouted into place and allowed to cure prior to further advancing the boring into bedrock. Where the bedrock was heavily fractured or drilling fluids (water) circulation was lost, the boring was terminated at the next competent interval and completed as an open hole, shallow bedrock monitoring well.

Surface Soil Collected for Chemical Analysis

Soil samples for laboratory chemical analysis were collected from the surface (e.g. 0 to 2 ft bgs). Surface samples were collected immediately beneath the pavement and undercourse materials, where present. For soil borings extending to depth, additional samples were collected from a 2-foot interval that would be typical of the excavation depth during construction activities (e.g. 6 to 8 ft bgs) and submitted for laboratory chemical analysis. A third sample was collected from soil borings extending to depth either immediately above bedrock, or immediately above saturation, if encountered. At some locations, a fourth sample was collected if visual, olfactory, or photoionization detector (PID) readings indicated potential contamination. PID measurements can be found on the soil boring logs provided in Appendix F. Analytical results are presented in Appendix H.4.

Surface Soil Samples Collected for Geotechnical Analysis

At select locations, soil samples for geotechnical analysis (e.g., grain size, Atterberg Limits, vertical permeability, etc.) were collected. Samples collected for vertical permeability were collected via Shelby tube, so as to provide a minimally disturbed sample for analysis. Samples for other parameters were also collected by hand auger, or by SPT, as described above. The results of the geotechnical soil sample analyses are presented in Appendix D. Analytical results are presented in Appendix H.4.

Surface Soil Samples Collected for Background Chemical Analysis

In accordance with the RFI Work Plan, several samples were collected from locations believed to be non-impacted by the Facility operations. These samples were collected for the purpose of determining site-specific background concentrations of inorganic compounds. At three of the initial locations presented in the RFI Work Plan, it was determined in the field that fill materials were present. Therefore, these samples were not used for background and an additional three locations were selected for background samples (RFI Work Plan Addendum No. 1). Background samples

were submitted to the analytical laboratory for analysis of selected inorganic constituents. A discussion of the results and related calculations for the background locations is presented in Section 6.3. Analytical results are presented in Appendix H.4.

3.6.2.5 Bedrock

Once an outer casing was set and cured, further advancement into the bedrock was accomplished using an HQ-size core barrel (approximately 3.8-inch outer diameter) and wireline techniques. At each bedrock boring location, core runs of five to ten feet were initially used to check the competency of the upper bedrock. Once competent rock was reached, core runs were generally 10 feet in length until total depth was reached. Cores were visually inspected and described (recorded) by the field geologist, in the field at the time of collection (boring logs are presented in Appendix F).

Bedrock cores were retrieved from the core barrel and placed into wooden core boxes. Core boxes were 4 feet in length and consisted of three rows for core placement, thus allowing for approximately 12 feet of core in each box. The top of the retrieved core was always placed in the upper left-hand corner (i.e., laid out from left to right, and from top to bottom). Cores were oriented to the north and marked as such with a permanent marker. Core orientation to the north was completed using geophysical logs after collection. Where necessary, cores were manually broken only to allow for placement into the core boxes (manual breaks were noted on the cores). Core boxes were labeled as to contents on the top and front, photographed, and placed into a storage container located at the Facility.

Bedrock Core Samples Collected for Laboratory Analysis

At predetermined background locations, a portion of the core was removed and submitted for inorganic chemical analyses. At locations drilled near AOI 9, additional chemical analyses were performed. Bedrock samples generally consisted of gravel-sized pieces that were placed into glass jars, sealed, placed on ice in coolers, and transported to the laboratory under chain-of-custody protocols. Results of these samples are discussed in Section 7.1.5.

Bedrock Core Samples Collected for Physical Properties Testing

Bedrock core samples were collected from five borehole locations across the Facility. At each borehole location, a representative plug of core was collected from each of the limestone formations encountered at that location. Plugs consisting of two-inch sections of rock matrix cut out of the original cores were submitted to Core Laboratories in Houston, Texas for analysis. Conventional analyses included bulk density, fraction of organic carbon, and porosity. Additional matrix porosity testing was completed in the laboratory using a high pressure mercury injection method. The results of these tests are described in Section 7.3.1. The Core Laboratories Bedrock Core Testing Results are presented in Appendix N.

3.6.2.6 Groundwater Sampling

Groundwater samples were collected from monitoring wells using low-flow sampling techniques except where Light Non-Aqueous Phase Liquid (LNAPL) or DNAPL was observed. In these cases where LNAPL or DNAPL was observed, a bailer was used to sample the LNAPL or DNAPL and low-flow sampling within the water zone was subsequently used to collect the groundwater sample,

if such a sample was required. Monitoring wells were sampled at a frequency to provide sufficient information to evaluate the environmental impact. Sampling was performed in accordance with procedures in the RFI Work Plan and QAPP. Data from sampling events were reported in Quarterly Progress Reports and the Technical Memorandum RFI Soil; Sediment; Surface Water; Wipe Sampling (CRA, April 18, 2005). Some monitoring wells were not sampled as the well has been continually dry or the groundwater field parameters did not stabilize as required under the RFI Work Plan and QAPP. Groundwater samples were submitted for chemical analysis of selected constituents. The results of these samples are discussed in Section 7.4. Analytical results are presented in Appendix H.6

3.6.3 Geophysical Surveys

3.6.3.1 Surface Geophysical Surveys

To supplement the subsurface investigation in areas where a large amount of filling had allegedly occurred, surface geophysical surveys were conducted to determine potential anomalies and to better delineate these disposal areas.

Five on-Facility AOIs (4, 5, 6, 7, and 15) and the off-Facility AOI 25 were targeted for surface geophysical surveys. These surveys consisted of electromagnetic (EM) terrain conductivity and metal detection (EM-31 and EM-38 instruments) and buried metal detection (EM-61 instrument).

The results of these surveys were summarized in RFI Work Plan Addendum No. 4 (CRA, May 3, 2004) and were used to develop the test pit work plan designed to investigate anomalies detected. The results of the geophysical survey are provided in Appendix O.

3.6.3.2 Borehole Geophysical Logging

The bedrock borehole geophysical logging program was conducted in five phases:

- April 2 to July 26, 2002, by COLOG, a Division of the Layne-Christensen Company, of Golden, Colorado (COLOG)
- June 23 to 30, 2003, by COLOG
- July 21 to August 10, 2005, by COLOG
- August 17 to 31, 2006, by CRA
- February 14, 2011, by COLOG
- December 17, 2012, to January 8, 2013, by COLOG

During the initial bedrock boring program, borehole geophysical logging was completed on deep bedrock boreholes by COLOG. At selected bedrock boring locations, downhole geophysical logging was conducted after a minimum of 20 feet of core was retrieved. A full suite of logs was also run upon completion of the borehole to total depth. COLOG provided the equipment and engineer/operator for the initial, second, and third phases of downhole geophysical logging. For the third phase of borehole geophysical logging, COLOG logged the boreholes running a full suite of logs but without the digital BIPS tool as it was unavailable at the time.

For the fourth phase of borehole geophysical logging, CRA completed a full suite of logs and used an optical televiewer, a logging tool similar to BIPS. Table 3.2 presents the list of bedrock boreholes logged geophysically, the date(s) of the geophysical logging, and the geophysical logging contractor. Figure 3.2 presents the locations of the 79 bedrock boreholes that were geophysically logged.

Geophysical logging generally consisted of measurements of the borehole diameter (caliper), the rock's natural radioactivity (natural gamma-ray), the rock's natural resistivity (four different electrode spacings), single point resistance (SPR), spontaneous (self) potential (SP), borehole fluid temperature, and borehole fluid specific conductance. Additionally, borehole geophysics utilized a digital acoustic televiewer (ATV). COLOG utilized a digital BIPS (an optical televiewer was used for some logs) for the borehole logging program, while CRA utilized an optical televiewer. The BIPS and optical televiewer tools provide digital pictures of the borehole wall in an "unwrapped" image, oriented from 0 to 360 degrees from north.

A description of the geophysical logging process, what the individual geophysical logs measure, how the gradational stratigraphic contacts were determined geophysically, and the final geophysical logs for the borehole geophysical logging completed by COLOG and CRA are presented in Appendix E.

Geophysical logs were primarily utilized to determine the stratigraphic contacts where these contacts were gradational in nature. Due to the limited presence of significant water-bearing fractures and the presence of numerous stylolites and shale laminae, the borehole geophysics were of limited use for the identification of the presence water-bearing fractures.

Of the 79 boreholes that were geophysically logged, only 6 showed the probable presence of vertical groundwater flow within the borehole based on fluid temperature, fluid conductivity responses, and associated fractures in the bedrock. A shift in the fluid temperature or fluid conductivity log can indicate the inflow or outflow of water from the borehole. This usually occurs due to hydraulic head differences between sections of the bedrock. Analysis of the fluid logs generally indicate a lack of groundwater flow within the bedrock sequence below the shallow system, as further discussed in Section 3.6.4.

3.6.4 Monitoring Wells

Boreholes were advanced for soil and geochemical information and either completed as monitoring wells, piezometers, open coreholes, or abandoned upon completion. Monitoring wells and piezometers were completed as open boreholes, standard screened monitoring wells, multi-level monitoring wells, or piezometers. Boreholes, monitoring wells, and piezometers were advanced using direct push, wet rotary, and bedrock coring methodologies discussed in the following sections. The subsurface conditions at each soil and bedrock boring location were recorded in the field at the time of collection by the field geologist. Boring logs for soil and bedrock borings are provided in Appendix F.

Table 3.3 provides a summary of the construction details (location, ground surface elevation, depth) and date installed for boreholes and monitoring wells completed at the Facility (as of May 31, 2015). Figure 3.3.1 presents the soil borings at the Facility. Figure 3.3.2 presents the monitoring wells installed at the Facility. Figures 3.3.3 through 3.3.7 provide a combined soil boring, monitoring well, sediment, surface water, and wipe sample locations for enlargements of portions (Regions) of the Facility to enable better comprehension of these locations.

3.6.4.1 Overburden

Monitoring wells were placed where groundwater was encountered in the overburden materials. At several locations across the Facility, temporary monitoring wells were installed. Because groundwater saturation was not typically encountered in the overburden, each well was labeled as a temporary well to determine if the saturation was temporary. Overburden wells are labeled with a location identification beginning with "TMW-". One overburden monitoring well (TMW-X225Y080) has remained dry since installation. Most of the temporary overburden monitoring wells have been abandoned due to the ongoing IM activity at the Facility.

Construction Details

Overburden boreholes were advanced using standard HSA drilling methods or direct push (e.g., Geoprobe™) drilling techniques. Soil samples were collected (continuously) using standard 2-inch diameter split-spoons advanced by SPT or standard Geoprobe™ sampling methods. At some locations, the overburden portion of bedrock boreholes (coreholes) was advanced by wet rotary methods without overburden sample collection.

Overburden monitoring wells consist of 2-inch inside diameter polyvinyl chloride (PVC) risers attached to 2-inch I.D. #10 slot PVC well screen. A Global No. 5 silica sand pack (10-30 sieve) was placed to a height of approximately 2 feet above the screen while the remaining annulus was backfilled with bentonite. Overburden monitoring wells were completed with a lockable cap and lock. One overburden monitoring well was completed as a flush mount set in a concrete surface seal. A second overburden monitoring well was converted to a flush mount set in a concrete surface seal in order to accommodate new road construction at the Facility.

3.6.4.2 Bedrock

Monitoring Well Construction

The overburden/epikarst portions of the bedrock boreholes were generally advanced using HSA drilling and sampling methods as described in Section 3.6.2.5 above. The overburden borehole advancement was terminated by bedrock refusal. If the bedrock was determined to be competent (i.e., known from other nearby borings), then a steel surface casing was installed and cement grouted in place. Where bedrock was likely to be less competent, with weathered zones that may have caused lost circulation, the boreholes were generally continued using wet rotary (tri-cone) drilling techniques until competent bedrock was encountered. A steel surface casing was then installed and cement grouted in place.

The borehole was further advanced into the bedrock utilizing HQ coring techniques cutting an approximate 3.8-inch diameter corehole. At bedrock boring locations, core runs of 5 to 10 feet were initially used to check the competency of the bedrock. Competent rock was determined by visual inspection of the cores by an experienced geologist and confirmation of two runs which exhibited 100% Rock Quality Designation (RQD) and 100% recovery. Once competent rock was reached, core runs were generally 10 feet in length until total depth was reached. Each core was visually inspected and described by the field geologist at the time of collection. Where the bedrock was heavily fractured or drilling water circulation was lost, the boring was terminated at the next competent interval. These locations were then completed as open-hole, bedrock monitoring wells, or abandoned. If required, an additional boring was advanced adjacent to the first boring, and a 4-inch

diameter casing was installed to a depth below the open interval of the first boring. Each bedrock monitoring well was completed at the ground surface with a locking lid set on the steel surface casing with the exception of seven bedrock monitoring wells, which were completed as flushmount monitoring wells set in concrete surface seals.

Two shallow bedrock monitoring wells (MW-X033Y147S and MW-X192Y048) were completed as PVC screened wells to monitor the shallow bedrock due to the potential for the open corehole to collapse. The well installation methodology was applied as described for the overburden monitoring wells.

The majority of the bedrock monitoring wells were left as open hole locations as the bedrock was considered to be competent. The inclined bedrock monitoring wells near Outfall #002 (described below) were completed in a similar fashion to the vertical bedrock monitoring wells. Where potential non-aqueous phase liquid (NAPL) was expected, the open holes were fitted with 2-inch inside diameter PVC sumps at the bottom of the holes.

A total of 13 boreholes/monitoring wells were advanced to the basal shale unit (Edwardsville Formation) which is considered to be the base of the hydrogeologic system for this investigation. An additional 209 boreholes/monitoring wells were advanced to various depths within the bedrock sequence above the shale unit.

Two bedrock borings were advanced on a 30-degree angle from vertical to assess the bedrock beneath AOI 4. Boring B-X223Y247D was advanced on an angle to the east and boring B-X177Y252D was advanced on an angle to the north. Boring B-X223Y247D consisted entirely of competent limestone and was advanced to the top of the Edwardsville Formation, to a total depth of 200 feet (equivalent to a vertical depth of 173.2 ft bgs). Boring B-X177Y252D was advanced a total depth of 61.9 ft bgs (equivalent to a vertical depth of 53.6 ft bgs), where a permeable feature was encountered and drilling fluid return was lost. The boring was terminated at this depth. Both these boreholes were abandoned after completion. Additional angle boreholes were advanced and completed as monitoring wells as discussed below.

To further characterize the potential for transport of NAPL within the bedrock in the vicinity of Outfall 002, a series of shallow bedrock boreholes were installed at a 30-degree angle from vertical as part of the RFI Work Plan Addendum No. 1 (CRA, November 18, 2002). The borings were completed on an angle to increase the chance of locating any vertical fractures that might be present. These boreholes are located along a line perpendicular to the flow of the stream at Outfall 002. At each well location, a steel casing was grouted approximately 2 feet into the bedrock. The borehole was further advanced through the upper weathered rock utilizing the HQ wet coring method until competent rock was encountered. Twelve of the 15 boreholes were completed as well nests (shallow and deep wells completed next to each other) because either a substantial loss of drilling fluids through the shallow bedrock fractures occurred during drilling, or because the presence of contamination was noted during drilling (residual or non-mobile oil in the unsaturated zone), resulting in a series of nine angled monitoring wells/well nests.

As a result of this intensive drilling program, over one mile of drill core was retrieved, described, and boxed for storage. Of the 136 of boreholes/monitoring wells that were cored into bedrock, 114 boreholes were less than 60 ft bgs, these were targeting the shallow flow system where contamination potential was shown to be the greatest.

Waterloo Multi-Level System Installation

Upon completion and analysis of the packer-pressure testing results (see Section 3.6.5.2) and further review of the downhole geophysical results, bedrock intervals were selected for discrete interval monitoring. At eleven deep and two shallow locations, the Waterloo Multi-Level System (Waterloo System) monitoring device was installed. The final design of each monitoring well system was provided to Solinst Canada, Ltd. who manufactured each Waterloo System for the Facility.

The Waterloo System generally consists of open intervals of bedrock, instrumented with six-inch long sample ports, which are separated by 3-foot long permanent rubber packers between each zone monitored. Each sample port is constructed of stainless steel and has a small, screened section that is open to a single or double stem inside of the port. A double-valve pump is attached to the stem and airline and sample tubing is located inside the 2-inch inside diameter, schedule 80, PVC casing and is run up the entire length of casing to the wellhead manifold. The second stem, if installed, is connected to Teflon™ tubing also run up the casing to the wellhead manifold, which can be utilized for the purposes of measuring the hydraulic head within each monitored zone. The space within the 2-inch inside diameter casing limits the number of tubes that will fit. For example, one well at the Facility (MW-X251Y189D) has tubes for measuring hydraulic heads at only two zones; at the five remaining zones within this well, only water samples can be collected (i.e., there was not enough room within the casing to fit five additional tubes for water level measurements).

The entire system was constructed piece-by-piece at the wellhead. Sample ports, packers, and blank casings were attached at the wellhead, lowered, and the next piece attached, etc. Each piece of the Waterloo System is attached to the next piece by means of a watertight seal (O-ring) and plastic wire ties. Once the desired depth was reached, the top of the assembly was completed with a manifold system to which each zone was affixed to a numbered port. The well assembly was hung inside the outer casing until the packers swelled against the borehole wall creating the permanent seal. Steel protective casings were then completed over the wellhead with a locking, hinged cap.

3.6.5 Hydraulic Conductivity Testing

Hydraulic conductivity testing was performed in selected overburden and bedrock monitoring wells. Hydraulic conductivity testing was completed at the conclusion of drilling of the bedrock boreholes by pumping the well and monitoring drawdown until the well went dry, and then monitoring recovery (drawdown/recovery testing). Hydraulic conductivity testing was also completed at 53 selected bedrock borehole locations using packers to isolate a test interval. Single-well response testing was completed on three overburden monitoring wells and at two shallow bedrock monitoring wells. The hydraulic conductivity testing methodologies are described in the following sections.

3.6.5.1 Drawdown and Recovery Testing

At 15 selected boreholes, water was removed after drilling or well installation completion and the water levels during pumping and post pumping were recorded over time. These drawdown and recovery tests were completed to remove remaining drilling fluids (water) and to determine the most appropriate method for in-situ, discrete, hydraulic conductivity testing (pumping out versus pumping in). This testing was performed on bedrock boreholes completed early in the drilling program, with testing performed from April through August 2002.

Prior to the drawdown and recovery testing, a cable was attached to a Grundfos™ submersible pump in order to lower and raise the pump in the open borehole. A static water level measurement was taken prior to equipment being placed into the borehole using an electric water level meter. The Grundfos™ pump and discharge tubing was installed approximately 2 feet from the bottom of the borehole. Another water level measurement was then taken with the pump in the borehole. The pumping rate was set at approximately 2 to 3 gallons per minute (gpm). The discharge water was pumped into a 500-gallon storage tank and then transferred into an on-Facility tank after each test for later disposal or treatment. Water level measurements were taken every minute to monitor drawdown. When the rate of drawdown began to decrease, the water level measurement time increment was increased to 5 to 10 minutes. The pumping rate was maintained at 2 to 3 gpm until either the borehole went dry or the water level remained constant. If the borehole went dry, pumping was stopped and the recovery test began. If the water level remained constant for 10 minutes or more, the pumping rate was increased by 1 to 2 gpm. This process continued until the borehole went dry. During the recovery test, water level measurements were taken until a minimum 80 percent well recovery was reached. The drawdown/recovery data and graphs are presented in Appendix P.1. Hydraulic conductivity values were not determined from these open borehole tests. Of the 15 boreholes tested, 12 subsequently had packer-pressure testing conducted to better determine hydraulic conductivity within the borehole.

3.6.5.2 Packer-Pressure Testing

In addition to the drawdown and recovery testing described above, packer-pressure testing was completed at select intervals in deep bedrock boreholes to provide further details and vertical resolution of the spatial distribution of bedrock permeability. Initially, the entire corehole was tested for permeability, however, most of the corehole intervals for testing were selected on the basis of inspecting both the core logs and the downhole geophysical test results for potential permeable features (i.e., fractures that showed potential groundwater flow in the form of deposits, or rounding of the fracture edges). Two shallow bedrock borings were not packer-pressure tested for the following reasons: monitoring well MW-X033Y147S was not completed as an open hole due to the fractured nature of the shallow bedrock at that location (the well was constructed with a PVC screen and riser – refer to Section 3.6.4); and monitoring well MW-X085Y070S was not tested due to the presence of an oily sheen at the surface of the groundwater. Single-well response tests were completed at both of these wells, as described in Section 3.6.5.3.

Prior to the pressure testing, the available geophysical information was reviewed in order to determine the section of the corehole to be tested. The testing was then performed at pre-determined 10-foot long intervals through the tested section. For the bottom interval, a single packer assembly was utilized for the test interval. After the bottom interval was completed, the single packer was removed and a double packer with a packer above and below the 10 foot perforated pipe was used. The packer was set at the interval to be tested using a drill rig. The packers were inflated to the manufacturer's recommended air pressure above the ambient pressure at the specified depth in order to maintain a seal against the borehole wall. A water level was recorded above the upper packer prior to and during testing to confirm that there was no water leakage around the packer. The 10-foot monitoring interval and tubing were filled with clean potable water. Calculated pressure was applied on the water column in the interval (water pressures were calculated so as to not exceed the hydraulic fracture pressure of the rock at each interval). The test was performed at various pressures to see if the interval would take water. Three 5-minute tests

were performed at each pressure setting (approximately 5 pounds per square inch (psi) above ambient, 10 psi above ambient, 15 psi above ambient, etc.), with 5 minutes of inactivity between the tests in order to allow the formation to equilibrate. A flow meter was used to determine if there was any water flow into the interval. A pressure meter was used to confirm that the pressure within the interval stayed constant. Once testing of the intervals at a given well were completed, the equipment was removed and decontaminated. The not-to-exceed pressure (minimum hydraulic fracture pressure) was determined for each interval using the lowest pressure as determined by the following two equation(s):

Δp = 0.7 psi * ft of overburden and bedrock; or

Δp = 1 psi * ft of unsaturated formation + 0.57 psi * ft of saturated formation (this method is more accurate when the water level is closer to the ground surface).

The results of the pressure testing were recorded on forms in the field at the time of measurement. The data were then analyzed using the following equation (Hvorslev, 1951):

$$Q = \frac{2\pi IKH}{Ln[I/rw]}$$

where:

K = Hydraulic Conductivity

Q = flow rate

l = length of test interval

rw = radius of borehole

H = total head

The results of the packer-pressure testing are summarized in Table 3.4 and the data can be found in Appendix I.

3.6.5.3 Single-Well Response Testing

Three overburden monitoring wells and 12 shallow bedrock monitoring wells were tested using the single well response method (slug test) to determine an approximate value of hydraulic conductivity at those locations.

Slug tests consisted of recording the changes in head levels with time after a slug (solid, or slug of water) was either removed or added from static water conditions. The changes in head were recorded by hand using an electronic water level indicator and were recorded on forms in the field at the time of measurement. Data from two of the bedrock wells tested were inconclusive as the water level changes did not recover during testing.

The results of the slug tests were analyzed by the methods of Bouwer and Rice (1976) and Bouwer (1989) for porous media. Several of the shallow bedrock slug tests were additionally analyzed by the

method of Hvorslev (1951). The slug test data, graphs, equations, and results are presented in Appendix P.2. The results are also summarized in Table 3.5.

3.6.6 Additional Field Investigations

A number of smaller field investigations were conducted to meet specific project objectives including:

- A field mapping program to locate sinkholes on the upland area near Spring 018
- Mapping of bedrock fracture orientation and number of fractures versus depth in bedrock trenches near Outfall 002
- Two geophysical investigations, one consisting of a GPR survey and the other an Aquatrack™ geophysical survey, conducted in the Spring 018 Area to determine the approximate water flow pathways within the bedrock
- GPR survey in the Vault area

3.6.6.1 Bedrock Mapping and Field Measurements

Field investigations including the mapping of the presence of sinkholes, swallets, and related bedrock solution features have been conducted at various times during the RFI investigation. Sinkholes were identified on the east side of Bailey's Branch in both open field and forested areas. The presence of sinkholes and swallets is discussed in Section 2.7.2.2.

During investigations for the source of the DNAPL observed at a groundwater seep near Outfall 002 in May 2002, three rock trenches were excavated across the upstream portion of Bailey's Branch (see Figure 2.40). The presence of fractures within the rock trenches versus depth below ground surface were counted and the fracture counts per foot are presented in Table 2.4. The orientations (strike and dip) of the fractures were attempted to be measured with a Brunton compass, however, the fractures were predominantly not accessible for measuring fracture orientation due to near-vertical sidewalls and the fact that many of the fractures are horizontal bedding fractures, and thus no data had been tabulated.

3.6.6.2 Monitoring Well Dye Tracer Testing

Carbonate rocks are prone to dissolution by infiltrating water passing through the soil cover and into the rock. Therefore, complicated patterns of flow can be encountered in groundwater especially in the shallow bedrock zone referred to as epikarst, which develops most intensely at the soil/bedrock interface. In this zone, the bedding planes, vertical joints, and fractures are solutionally enlarged creating a zone of enhanced secondary porosity and permeability. This zone can rapidly transport water both laterally and vertically during wet periods and heavy rain events. Dye tracing in karst terrains is the standard method for assessing groundwater flow directions, velocity of flow, and the interconnections from injection points to points of resurgence. Typically, dye tracing in contaminant investigations is conducted to identify the potential contaminant transport pathways. DNAPLs, such as the oil observed at this Facility, can settle in pockets within the epikarst and can subsequently be transported primarily as aqueous phase components during normal infiltration, and possibly as DNAPL primarily during storm events.

Five on-Facility dye tracer tests were conducted using monitoring wells as dye injection points. These dye injection wells were MW-X233Y087S, MW-X211Y131, TMW-X193Y251, MW-X143Y245S, and MW-X105Y102/MW-X106Y102.

MW-X233Y087S Dye Tracer Test – AOI 8

The purpose of the dye tracer test at monitoring well MW-X233Y087S was to provide information on the groundwater flow and aqueous phase contaminant migration directions and discharge points in the vicinity of Outfall 002, downstream of the former process water lagoons. In the vicinity of Outfall 002, DNAPL had been observed at one time, seeping from a bedrock fracture in May 2002.

The SOW included the injection of dye at monitoring well MW-X233Y087S and monitoring of nearby wells, springs, and SSC collection system locations for the presence of the dye. At 12:00 hours on August 30, 2004, Fluorescein dye was injected into MW-X233Y087S and was flushed with 20 gallons of potable water. The results of the dye test are presented in the report by Hydrogeology Inc. (HGI), of Bloomington, Indiana, in Appendix C.

Fluorescein dye was detected in Wet Well 1, downstream of the outfall, at 13:30 hours on August 30, 2004, 1.5 hours after dye injection. Fluorescein was still detected in Wet Well 1 during sampling the week of May 15, 2006. The results of the dye test indicate an approximate groundwater flow velocity of 2.2 feet per minute (ft/min) in shallow bedrock to the Wet Well. Figure 3.4 presents the location and detections of dye from the dye tracer tests including injection at MW-X233Y087S and detection at monitoring location (Wet Well 1).

Due to the relatively rapid flow from the injection well to Wet Well 1, it is likely that groundwater flow in the shallow bedrock is along preferential pathways that may include conduit flow. The lengthy detection of dye at Wet Well 1 may also indicate that the dye was adsorbed into the rock matrix and was diffused back into the groundwater currently collected at Wet Well 1.

MW-X211Y131 Dye Tracer Test – AOI 6

The purpose of the dye test at MW-X211Y131 was to determine the approximate shallow groundwater flow pathways in AOI 6. This area contained high PCB concentrations in the soil and is located near former wastewater lagoons that treated process water containing hydraulic fluid. This area was historically utilized for the drying of sludge materials removed from the former process water lagoons.

The SOW included the injection of the dye at monitoring well MW-X211Y131 and monitoring of nearby wells and SSC collection system locations for the presence of the dye. One gallon of Eosine dye was mixed with 200 gallons of potable water. This mixture was injected into MW-X211Y131 at 13:00 hours on October 26, 2006. The dye water mixture was circulated with a pump for 4 hours to prevent settling of the dye to the bottom of the well. The results of the dye test are presented in the HGI report in Appendix C.

Eosine dye was detected once in grab samples at the following locations:

- MW-X233Y071B detected December 8, 2005 at 10:12 hours (43 days)
- MW-X234Y157D-4 detected December 19, 2005 at 16:40 hours (54 days)

The results of this dye test indicated an approximate groundwater flow velocity of 14.4 and 7.6 feet per day (ft/day), respectively to these locations.

At 09:50 hours on February 7, 2006, an additional 5 pounds (lbs) of Eosine dye was mixed with 200 gallons of potable water and then injected into MW-X211Y131. The dye water mixture was circulated with a pump for eight hours to prevent settling of the dye at the bottom of the well. A subsequent injection of an additional 500 gallons of water occurred on February 11, 2006.

Eosine dye was detected several times in grab samples at the following locations, with the first detections at:

- MW-X234Y157S detected April 21, 2006 at 13:24 hours (73 days)
- SSC System C-2 detected May 5, 2006 at 02:18 hours (87 days)

The results of this dye test indicate an approximate groundwater flow velocity of 5.7 and 14.4 ft/day, respectively at these locations. Dye was not detected in monitoring wells MW-X233Y071B and MW-X234Y157D-4 as a result of this second test. Figure 3.4 presents the monitoring locations where Eosine dye was detected.

From these tests, HGI concluded that groundwater flow from AOI 6 is to both the northeast (dye detections at MW-X234Y157S, MW-X234Y157D-4, and SSC System C-2) and southeast (dye detection at MW-X233071B). The slow groundwater flow velocities and the low concentrations of dye detections indicate that the groundwater flow in bedrock is likely along small, poorly connected fractures and therefore diffuse in nature (as opposed to open conduit systems). This injection location has been noted to be located on a local groundwater divide (groundwater flow to the east and northeast) through the collection and evaluation of groundwater elevation measurements.

TMW-X193Y251 and MW-X143Y245S Dye Tracer Tests – AOI 4

The purpose of this dye trace study was to determine the groundwater flow pathways within AOI 4 due to the former waste disposal history in this area and the detection of PCBs in groundwater and leachate samples in the area of the former North Disposal Area. Monitoring well TMW-X193Y251 was formerly located within the unconsolidated deposits and MW-X143Y245S was formerly located within the shallow bedrock) in the former North Disposal Area. Both wells have subsequently been abandoned due to the construction of the East Plant Area Cover System.

The SOW included the injection of different dyes at two monitoring wells, overburden well TMW-X193Y251 and shallow bedrock well MW-X143Y245S, and the monitoring of nearby wells, surface water, springs, and SSC collection system locations for the presence of the dye. Fluorescein dye was injected in TMW-X193Y251 at 08:25 hours on March 22, 2005 and was flushed with 77 gallons of potable water. Rhodamine WT dye was injected in MW-X143Y245S at 08:25 hours on March 22, 2005 and was flushed with 65 gallons of potable water. An additional 75 gallons of potable water was injected into TMW-X193Y251 on April 29, 2005 to mix undissolved dye into solution. The results of the dye test provided in the HGI report are presented in Appendix C.

Fluorescein dye was detected at several locations after the test initiation:

- SSC System E
- SSC System A
- SSC System F

- Tributary 3-3
- Tributary 3-1
- Tributary 3-2
- TMW-X237263B
- CH-18
- TMW-X247Y261
- Spring N
- SSC System G
- SSC System B

Groundwater flow velocities to various monitoring points were calculated and range from 1.5 to 18.6 ft/day. Figure 3.4 presents the monitoring locations where Fluorescein dye was detected.

From this test, HGI concluded that groundwater flow occurs in minor fractures and overlying permeable material without significant conduit flow through bedrock. Groundwater flow is east to slightly north of east toward Tributary 3.

Rhodamine WT dye from the dye injection into MW-X143Y245S was not detected in any monitoring locations as of October 20, 2006. HGI concluded that groundwater flow in the shallow bedrock in the vicinity of this well is minimal.

MW-X105Y102/MW-X106Y102 Dye Tracer Test – AOI 9

The purpose of this dye tracer test was to determine the potential migration of contaminants from beneath the Facility floor of the manufacturing buildings, where die cast sumps and service tunnels were located. Historically, the PCB-containing oils would have been contained and collected in this area.

The SOW for this dye tracer test included the injection of Phloxine B dye simultaneously in two shallow bedrock monitoring wells (MW-X105Y102 and MW-X106Y102) beneath the manufacturing buildings portion of the Facility in the West Plant Area. A total of 150 gallons of water was used to mix the dye solution. The dye solution was simultaneously injected into both wells using a flow splitting device connected to the injection tubing on August 14, 2006. Approximately 175 gallons of water was added later that day to flush the dye into the bedrock at both locations. During the injection process, it was noted that MW-X105Y102 filled with the dye solution, however, the well drained slowly, but readily.

There were no detections of the dye at the nearby monitoring wells. Monitoring of the wells was therefore halted on December 11, 2006 (after 119 days), and no final report was prepared by HGI discussing the results of the dye test at this location.

3.6.6.3 Water Level Monitoring

Water levels have been measured on a routine basis at the overburden and bedrock monitoring wells and coreholes. The frequency of measurement has varied based on field programs, well completion dates, and data requirements.

Water level data through May 31, 2015 for the open hole monitoring wells are presented in Appendix K.1 and Waterloo System monitoring well ports are presented in Appendix K.2. Appendix K.3 presents the water level data for the Groundwater Trench coreholes through May 31, 2015.

For two monitoring wells (MW-X128Y255 and MW-X234Y157S), pressure transducers were used to measure water levels on a frequent (i.e., 15 minute interval) basis for a period of time to aid in the determination of hydrogeological characteristics. Monitoring well MW-X128Y255 was monitored for the period October 7, 2005 through December 8, 2005, at which time the equipment failed. Monitoring well MW-X234Y157S was monitored for the period March 20, 2006 through September 20, 2006. The water level and daily precipitation data for these wells are presented in Appendix K.4. The data for these two monitoring wells are further discussed in Section 7.4.

3.6.6.4 Spring Identification, Monitoring, and Site Source Control Program

A SSC Monitoring Program was developed and implemented to identify, characterize, and present a strategy to address seeps and springs, with potential to re-contaminate the surface water features in the vicinity of the Facility with PCBs following completion of RA activities. The program, outlined in the SSC Work Plan (CRA, November 6, 2003), was comprised of an initial identification of springs and seeps along the creek systems during various flow regimes, sampling of the springs and seeps to characterize the potential for PCB impacts, and a monitoring program for the seeps and springs along the creek system to measure seasonal variability (if any) of the PCB concentrations (if detected).

The following sections discuss the installed seep and spring control systems, the SSC Monitoring Program, a thermal aerial survey, dye tracings, and the specific activities that have been conducted in the Spring 018 Area.

Addenda No. 1, 2, and 3

SSC Work Plan Addenda No. 1 (CRA, May 4, 2004), No. 2 (CRA, July 29, 2004), and No. 3 (CRA, November 17, 2004) discussed details for the design and construction of collection systems for PCB impacted seeps and springs on Parcels 3 and 205 and the area north of AOI 4.

Addendum No. 4

SSC Work Plan Addendum No. 4 (CRA, June 22, 2005) presented the modified list of seeps and springs to be included in the SSC monitoring program. The revised sampling network went into effect on June 14, 2005, during the first quarter 2005 high-flow event.

Addendum No. 5

SSC Work Plan Addendum No. 5 (CRA, November 9, 2006) presented additional investigation activities in the Spring 018 Study Area (Spring 018 Area). The investigations served to further define groundwater flow pathways previously identified during completion of two separate geophysical surveys, and to further delineate the area of the Spring 018 groundwater drainage basin. Results of the investigation and proposed remediation were presented in the Summary and Proposed Removal Action Approach: Spring 018C (CRA, November 14, 2008).

Addendum No. 6

SSC Work Plan Addendum No. 6 (CRA, September 6, 2007) presented rationale for a revised network of seeps and springs to be monitored and a revised schedule; all based on the results compiled to date.

Addendum No. 7

SSC Work Plan Addendum No. 7, submitted on April 6, 2009, presented rationale for termination of the SSC Monitoring Program for springs unimpacted by PCBs, based on the results of sampling.

Parcels 201 and 401 Seep Controls

Seeps containing detectable levels of PCBs were also discovered along the western property boundary of Parcel 401 (Spring NAOI4/P401) and adjacent to a drainage ditch on Parcel 201 (Spring 201_001). Interim Measures activities included containment and routing of the discharge to the GM groundwater treatment plant in May 2006. Section 7.5 of this Report provides more detail on the seep controls.

3.6.6.5 Thermal Aerial Survey

The SOW for this task was to conduct an aerial survey of the Facility and surrounding drainage areas utilizing thermal imaging equipment. Thermal imaging of the area was completed to identify additional springs that may have been missed through visual reconnaissance. Thermal anomalies detected during this survey were verified in the field (i.e., the ground surface was visually inspected at each location which was accessible and potentially applicable to the project). Any previously unknown seep and/or spring, which was field verified, was considered for inclusion in the dye trace recovery monitoring and the SSC Monitoring Program, as applicable.

The thermal imagery study was completed during the late hours of March 20, 2004, through the early hours of March 21, 2004 in order to take advantage of the natural temperature gradient between land surface and any groundwater emanating from the ground. The imagery was completed by EagleView Industries (EagleView) of Vicksburg, Mississippi, using a Jet Ranger helicopter at an approximate altitude of 750 ft above the ground surface and a Mitsubishi 5120C infrared imager. An approximate six square mile area was surveyed during this flight. The final report from EagleView was submitted to U.S. EPA on April 21, 2005 and is provided in Appendix Q.

3.6.6.6 Phase I/II SSC Monitoring Program

The original SSC Monitoring Program presented in the SSC Work Plan (CRA, November 6, 2003) was designed to identify the potential for the seeps and springs to contain PCBs that could potentially re-contaminate Bailey's Branch, Pleasant Run Creek, and tributaries. The SSC Monitoring Program included the collection of samples at each of the identified seeps and springs for analysis of total and dissolved PCBs, an assessment of the approximate flow rate, and the mapping and sampling of any newly discovered seep or spring. Eight sampling events were initially proposed during the first year of monitoring: four samples were to be collected under high-flow conditions and four samples under low-flow conditions. The high-flow condition was defined as a minimum of two inches of rain in a 24-hour period; and the low-flow condition was defined as a minimum of seven calendar days without precipitation prior to the sampling event.

The SSC Work Plan identified the Phase I area seeps and springs of the initial SSC Monitoring Program. Phase I consisted of seeps and springs located along the creek system south of Broomsage Road. Additional seeps and springs north of Broomsage Road, Phase II area springs, were added to the SSC Monitoring Program as the RA progressed downstream.

The development of this sampling network culminated in 118 unique sampling locations since the beginning of the SSC Monitoring Program. Of these 118 locations, 103 were identified seeps and springs throughout the Phase I and Phase II areas. The remaining 15 locations were sampling points within collection systems. Memorandums of the sampling results submitted during the monitoring of the Phase I and II Monitoring are attached in Appendix B.6.

3.6.6.7 Installed Collection Systems

Seep and spring collection systems were installed at impacted seeps or springs to collect the impacted water and send it to treatment in the constructed on-site water treatment plant prior to discharge via a NPDES Permit. Construction techniques were discussed generally in the SSC Work Plan and subsequent addenda.

The following collection systems are generally located in the areas north of AOI 4 and east of AOI 10:

- NAOI4/P401 Sump
- SSC Collection System A
- SSC Collection System B
- SSC Collection System C
- SSC Collection System D
- SSC Collection System E
- SSC Collection System F
- SSC Collection System G
- SSC Collection System H
- SSC Collection System I
- SSC Collection System J-M
- Wet Well 3

The following collection systems are located in the area south of the East Plant Area:

- Wet Well 1
- Wet Well 2
- Spring 201-001 Sump
- Spring 201-002 Sump
- Spring 201-003 Sump

A temporary collection and treatment system had been installed at Spring 018 to collect water for treatment. During operation, water from the spring was collected and conveyed to a water treatment system operated pursuant to the CERCLA RA. Water from Spring 018 is currently discharged naturally to the creek in accordance with the Demobilization of Sevenson's Spring 018 Water Treatment Plant and Spring 018 Contingency Plan (CRA, February 24, 2014). Figure 3.5 presents

the locations of the SSC Seeps and Springs Collection Systems. Figure 3.6 shows the off-Facility SSC Seeps and Springs Monitoring Network. Memorandums of the sampling results submitted during the monitoring of the Phase I and II Monitoring are attached in Appendix B.6.

3.6.6.8 Spring 018 Area

The Spring 018 Area is located along Bailey's Branch, at the boundary of Parcels 15, 20, and 216. Several springs were identified along the streambed in a heavily forested and topographically varied area along Bailey's Branch. The stream banks in this reach are steep sided rock cliffs. Extensive sediment and rock removal work has been completed during the RA in this area, exposing sections of the underlying bedrock in the streambed and on the creek banks. Springs identified in the Spring 018 Area include the former springs Spring 018, Spring 018B, Spring 021-002, Spring 021-003, Spring 021-004, Spring 021-005, and the existing Spring 018C, which now is a combination of the water from the formerly noted springs. The surface expression of the spring is along the rock sidewall on the eastern bank of the excavated stream. The location of the Spring 018 Area is shown on Figure 2.7.

Three separate dye tracer tests were conducted in 2004 and 2005 by HGI in the Spring 018 Area during the initial stages of the investigation: one at Swallet #1 and one at Swallet #2 along Bailey's Branch; and one at Swallet #5 along a tributary to Bailey's Branch (Tributary 3). These swallets were part of eight swallets mapped in the immediate vicinity and were observed to divert an unquantified portion of the creek system's surface water underground as part of the groundwater regime. The purpose of these dye trace tests was to identify groundwater flow paths and recharge areas of the Spring 018 Area and to determine an estimate of the amount of potential underground storage in between the swallets and the Spring 018 Area through the analysis of breakthrough times and curves. Note that the term swallet refers to a void in the surface bedrock where surface water infiltrates to the subsurface.

The SOW included gauging the gains and losses of surface water flow within the system in this portion of the creek through the installation of temporary weirs. Dye was then injected into each of the swallets in separate tests and the presence and concentrations of dye were monitored at the known downstream springs. Approximately 60 milliliters (ml) of Rhodamine WT was injected into Swallet #1 on July 8, 2004, at 13:00 hours; approximately 40 ml of Rhodamine WT was injected into Swallet #2 on July 21, 2004, at 10:30 hours; and approximately 50 ml of Eosine dye was injected into Swallet #5 on February 10, 2005, at 10:30 hours. Three methods of sample collection were used during this dye trace test: water grab samples, passive charcoal detectors, and ISCO automated continuous water samples.

The monitoring points for dye recovery consisted of the springs downstream of the injection point that were identified during past reconnaissance. The automated ISCO samplers were utilized at the following springs: Spring 018, Spring 021-002, and Spring 021-003. Water grab samples were collected at the following locations: Spring 021-004, Spring 009, Spring Well 1, and Spring 021-002. Charcoal packages were placed at each of these locations and were to be utilized as backup in the case of equipment failure.

Further discussions of the dye trace investigations were presented in Section 2.7.2.3 (HGI reports are provided in Appendix C).

Swallets #1 and #2, located within the upstream portion of the Spring 018 Area, were subsequently sealed with concrete in 2005 in order to reduce the groundwater recharge of Spring 018 (this reduced the flow of water to be treated prior to discharge to the creek) through the swallets. This sealing activity was performed during initial streambed restoration completed in the summer of 2005. Prior to remediation work being conducted in the area, Spring 018 had an estimated base flow discharge of 500 to 800 gpm and peak discharge during storm events estimated to be 3,000 to 5,000 gpm. Following the initial swallet filling activities completed in 2005, Spring 018 discharge was reduced to approximately 200 to 400 gpm during base flow conditions and approximately 500 to 1,000 gpm during storm events.

To supplement the dye trace studies, two different geophysical studies were conducted: one by Willowstick Technologies, LLC (Willowstick) of Draper, Utah and one by CRA, to identify apparent groundwater flow pathways within the bedrock and to further delineate the area of the Spring 018 groundwater drainage basin. These flow pathways are known to exist, based on the results of dye tracer studies previously completed, showing a direct connection between the swallets and the discharge at several downstream springs (same source water that is currently flowing from Spring 018C). In 2006, GM retained Willowstick to perform a study utilizing their patented AquaTrack™ geophysical technology (Willowstick, March 17, 2006). In general, this technology uses a controlled source-frequency domain magnetic system. A low voltage, low amperage audio frequency electrical current is used to energize the system. The current is concentrated in zones of higher water saturation or higher total dissolved solids (TDS) concentration. The current (or resulting electromagnetic field) is then recorded at the ground surface by magnetic field sensing equipment (Willowstick, March 17, 2006). In 2006, CRA also completed several lines of GPR soundings, utilizing a low-frequency signal, in the Spring 018 Area. The study area for the GPR survey consisted of the hillsides located between Spring 018C and the upstream swallets. The lines were completed approximately perpendicular to the postulated orientation of the subsurface groundwater flow pathways feeding Spring 018C from the swallets, and perpendicular to Tributary 3. Control points were staked at 20 to 25-ft intervals and surveyed using a global positioning system (GPS) receiver, to provide horizontal and vertical control of the survey line locations. The GPR survey was completed using a Ramac™ Rough Terrain Concept (RTC) low frequency system, which transmits at 50 megahertz (MHz). This lower frequency system was utilized to allow the signal to penetrate through shallow clay seams into the underlying bedrock.

GPR systems utilize pulsed EM waves, which are emitted from a transmitting antenna. These waves propagate into the ground, and travel at velocities determined by the electrical properties of the earth materials. If a wave hits a buried object or boundary with different electrical properties as it moves downward, part of the wave energy is reflected back to the surface and is detected by a receiving antenna. The reflected wave is stored digitally, and processed as a trace of signal versus amplitude. As the antennas are moved along a survey line, a series of traces are recorded at discrete points. When presented collectively, these traces display a profile of the subsurface.

The GPR survey interpreted subsurface conduit system (heavy dashed lines as presented on Figure 2.48. A suspected groundwater conduit system was interpreted on each survey line between Swallets 1A/1B and the Spring 018C discharge location. In addition to the suspected subsurface conduit system, numerous fractures were also interpreted based on the GPR results (CRA, April 12, 2006).

Additional investigation activities in the Spring 018 Area, outlined in SSC Work Plan Addendum No. 5 (CRA, November 9, 2006), were conducted in order to field verify the results obtained from the two geophysical studies.

A bedrock drilling/coring investigation was completed in March and April 2007, targeting the pathways identified by the geophysical investigations. The investigation included packer-pressure permeability testing, a qualitative pumping test, groundwater head measurements, and three additional dye tracer tests.

Upon completion of the interim restoration work and the drilling/coring investigation, three separate qualitative dye trace investigations were conducted in the Spring 018 area, starting July 2007, as part of the SSC Addendum No. 5.

Results of the geophysical studies and dye trace investigations did not definitively locate any conduits that had been previously identified by the geophysical studies, but did support results from previous dye trace studies showing flowpaths connecting Spring 018 to the upstream swallets. The investigation concluded that Spring 018 Area groundwater is likely being recharged from surface water and groundwater from sources east of Spring 018, and transported through fractured bedrock zones in the general vicinity of those pathways interpreted from the investigation. The results were summarized in the SSC Investigation Summary and Proposed RA Approach – Spring 018C (CRA, November 14, 2008).

A new work plan proposing additional visual dye trace observations was submitted to U.S. EPA (CRA, September 7, 2012) in preparation of the final restoration of the Spring 018 Area. The Work Plan was designed to divide up Bailey's Branch Creek and Tributary 3 into discrete, isolated sections so as to provide direct and conclusive evidence of the location of any existing swallet areas losing surface water and contributing to the overall volume being discharged at Spring 018. The dye trace tests confirmed that a portion of the water emanating from Spring 018 continued to be a result of isolated recharge from the creek. Results were provided to U.S. EPA in CRA's memo dated November 26, 2012 and additional swallet and creekbed sealing completed in early 2013. Subsequent to this additional sealing the estimated Spring 018 discharge was reduced to approximately 200 to 400 gpm during base flow conditions and approximately 400 to 800 gpm following storm events.

Further discussion of the results of this investigation is provided in Section 7.3.2.2.

3.7 Stream Gage, Piezometer, and Stream Weir Installation

To further support the sediment and floodplain soil removal action on Bailey's Branch Creek, a stream gaging network was installed to determine the 100-year discharge and the corresponding 100-year flood water elevations along Bailey's Branch and that portion of Pleasant Run downstream of the junction of Bailey's Branch and Pleasant Run.

The purpose of the flow monitoring system was to collect sufficient data to accurately calibrate a hydrological model of the Bailey's Branch watershed and the relevant portion of the Pleasant Run watershed. The stream discharge monitoring system consisted of a number of stations, some of which contained rainfall recorders and others, which contained only flow measurement stations. The stations were portable, solar powered, and reported to a central computer by radio in real time.

3.7.1 Stream Gage and Piezometer Installation

Five stream monitoring stations were installed to determine the magnitude of surface water flow to aid in the creation of the hydrologic model. Each stream monitoring station had a water level pressure transducer and water velocity recorder.

To provide redundancy in flow measurements, three flow measurement stations were required, one on the upper reach of Pleasant Run near Mount Pleasant Road above the junction with Bailey's Branch, one on an upper reach of Bailey's Branch, and one at the downstream end of Pleasant Run. With data from any two of these stations, discharge could be determined at the other location. Two additional flow monitoring stations were added to better determine flow along Bailey's Branch and Pleasant Run. Flow monitoring station locations are presented on Figure 2.8.

The flow/rainfall station at the downstream end of Pleasant Run was established at the access point from Murdoch Station Road. At this location Salt Creek has the potential during high flow events to backflow into Pleasant Run temporarily reversing the flow direction in Pleasant Run. This station, called Station SW1, documented this Salt Creek backwater scenario.

As the remediation progressed, stations were necessarily removed to make way for the creek excavation.

A piezometer was installed near each surface water monitoring location to determine groundwater elevations near the creeks and how the groundwater/surface water system interacted. The piezometer identifications (PZ08, PZ23, PZ31, PZ38, and PZ39) reflect the Parcel Number on which they are located. The depth to which each piezometer was completed was considered to be below the seasonal groundwater low elevation. Each piezometer was equipped with a water level pressure transducer tied into the real time monitoring system. Groundwater level data were recorded within the same data stream as the stream flow data. The locations of stream gages and piezometers are presented on Figure 2.8.

The hydraulic monitoring data for the five stream gages and piezometers are presented in Appendix L. One main weather station was maintained at the Facility as part of the overall hydrologic modeling program. The weather data from the weather station recorded from August 2003 through May 31, 2015 are presented in Appendix A.1.

3.7.2 Stream Weir Installation

As part of detailed testing along a portion of Bailey's Branch Creek, in the vicinity of Spring 018, stream weir plates were installed to determine stream flow magnitudes at key locations such that stream flow, swallet and spring discharges could be determined. By measuring the height of the water surface above the weir, the discharge was determined. Electronic pressure transducers were used to measure and record water depth upstream of the weirs. The location of the stream weirs, swallets, and springs along a portion of Bailey's Branch Creek are presented on Figure 2.7. These weirs were used to quantify flow in Bailey's Branch Creek during dye testing of the swallets/springs, and were removed after completion of the testing. The flow data are provided in graphical format with respect to the Swallet #1 and Swallet #2 dye tests in Appendix C in reports prepared by HGI. The dye tests were further discussed in Section 3.6.6.8.

3.8 Location and Elevation Survey

Upon completion of boreholes, monitoring wells, surface soil samples, and background samples, each location was surveyed to determine its map coordinates and ground and reference elevations. The map coordinates were based on the NAD '83 coordinate system and were surveyed to the nearest horizontal 1.0 ft or better. Ground and reference (e.g., top of casing) elevations were surveyed to the nearest 0.1 and 0.01 ft, respectively. Elevations were surveyed to the USGS datum (1988 NAVD).

4. Hydrogeologic Conceptual Flow Model

The purpose of this discussion is to define the hydrodynamics of the Facility and to provide an aid in understanding and describing the hydrogeologic flow and contaminant transport theory at the Facility (or, the Hydrogeologic Conceptual Flow Model; HCFM). The primary contaminant has been determined through sample analysis to be PCBs (see Section 3.4.2). Therefore, the following presents a hypothesis related to the transport of PCBs for the following components of the Facility hydrodynamics:

- Source areas and source material characteristics
- Release and transport mechanisms
- Affected media
- Known routes of contaminant migration
- Potential receptors

The following sections provide a description of each of these components.

4.1 Source characterization

The source areas and source material characteristics have been described in Section 2.7 with respect to NAPL. The PCBs were contained within the hydraulic fluid (oil) used by GMC in the die casting operation. In 1965, the Bedford Facility began using Pydraul 312, a fire retardant hydraulic fluid containing approximately 35 percent PCBs in their operations. Due to the high levels of PCBs in Pydraul 312, the Bedford Facility switched to Pydraul 312A in 1972; a phosphate ester based hydraulic fluid believed to not contain PCBs. In August of 1972 the product manufacturer discovered that Pydraul 312A contained 3 to 5 percent PCBs. During this time, lost hydraulic fluid from the die cast machines was collected in a tunnel system (AOI 9) that channeled the fluid via gravity flow to the former South Lagoons, where the fluid was recovered and sent off-Facility to a fluid reclamation plant (CRA, May 25, 2001).

This lost hydraulic fluid is believed to be the major source of PCB impact at the Facility. Residual hydraulic fluid and PCB impacted media evaluated in the RFI were found in four main source areas, which are discussed below.

4.2 Physical Characteristics

The physical characteristics of the lost hydraulic fluid found in the environment (30 to 60% PCBs) were determined from laboratory testing of one sample collected from the groundwater/oil seep near Outfall 002. The following are the physical property results (at 20°C or 68°F):

Density	1.1349 grams/mL
Kinematic Viscosity	233.36 centiStokes
Absolute Viscosity	264.60 centiPoise
Interfacial Tension	16.91 mN/m

The density value, significantly greater than water, indicates that the oil is a DNAPL and, as a result, will sink in water.

4.2.1 Source Areas

Primary Facility Release Areas

PCBs are currently found in several locations as presented on Figure 4.1.The main source areas at the Facility include:

- The Service Tunnels (AOI 9), where the hydraulic fluid collected and flowed from the hydraulic casting machines
- The former lagoons (AOI 7 and 8), where the hydraulic fluid discharged from the service tunnels to settling basins and was collected and recycled
- The former sludge disposal area (AOI 5 and 6) where sludges containing hydraulic fluids and PCBs were placed from clean out of the lagoons
- The former North Disposal Area (AOI 4), an area used for landfilling of primarily solid waste
- The former filled ravine located east of the Plant's office facility (AOI 21-2), an area that was filled to re-grade the drainage at the Facility

4.2.2 Contaminant Migration Pathways

Determining PCB migration from the Facility is a significant component of the RFI and PCBs were the reason for performing many of the IMs. In this section the contaminant migration pathways from the Facility both prior to and after implementation of the IMs is described due to the significance of the IMs in eliminating or mitigating certain pathways.

The Site Conceptual Model for Contaminant Migration (Kueper, January 20, 2006), documented the conceptual model for contaminant migration prior to the initiation of any IMs, and is found in Appendix J.2. The physical and chemical properties of PCBs historically in use at the Facility imply that they will exhibit low mobility in either soil, sediment, or groundwater because of the PCB molecule's affinity to oil phase and adsorption to naturally occurring organic matter. In addition, vapor phase migration is insignificant given the low vapor pressure of PCB. The PCB hydraulic oil mixture used at the Facility was mostly a mixture of different blends, the dominant density was greater than water, implying the potential to migrate vertically through saturated media as DNAPL.

However, because of the low aqueous solubility of the PCBs, dissolution from the oil phase or from absorbed solids into either groundwater or surface water is slow and much less significant than migration with the oil phase or adsorbed solids migration.

Historical Site Conceptual Model

Historical contaminant migration included overland flow of oil and sediment from the former lagoons at AOI 8, as well as subsurface leakage through the bottom (these lagoons were removed from service in the 1970s, with the exception of Lagoon #4, which was removed in 1983) to the Pleasant Run watershed (via an outlet structure) and from the plant discharges from Outfall 002. The former lagoons were used to settle and consolidate oils from the process wastewater which contained PCB hydraulic oils.

These former lagoons operated in a cascading fashion in order to separate and allow reclamation of the heavier hydraulic oils, which settled to the bottom of the lagoons. Dissolved and free phase PCBs were often released, as well as entrained sediments, to the creek from these lagoons from the outlet structure when precipitation created an overflow from the lagoons to the creek, or by infiltrating the epikarst below the lagoon through spring activity.

Another source of PCBs emanated from the former stormwater pond just east of GM Drive (AOI 7) and discharged oily water and impacted sediments to the unnamed tributary in the northern portion of the Facility, eventually discharging to Tributary 3 and Bailey's Branch Creek. Discharges of PCBs would have increased during precipitation events. In 1987 this stormwater pond was removed from service and the sediment and soil were excavated and disposed of at off-Facility landfills.

PCBs also reached the creek system from the Former Sludge Disposal and Fire Training Areas (AOI 6) and Former North Disposal Areas (AOI 4) where PCB-impacted particulates were transported to the creek via overland stormwater runoff or towards the east through the epikarst/groundwater system.

As PCB oils and PCB-impacted particulates entered the creek system and settled to the bottom of the creek, the oil would tend to break up slowly and disperse with turbulence while flowing downstream with the entrained PCB-impacted sediment or as free phase. Some of the oily material would settle and absorb into fractures in the bedrock within the creek channel. During periods of heavy precipitation, PCB-impacted sediment was transported further downstream. Near Broomsage Road where the slope of the creek diminishes, the incised channel of the creek shallows and a floodplain develops, as the underlying bedrock changes from limestone to shale. From this location northward to Parcel 40, the floodplain of Bailey's Branch and Pleasant Run is well developed and widens downstream, allowing PCB-impacted sediment from the creek to become deposited out across the flood plain during precipitation and flooding events. This flood plain widens to approximately 3,000ft in the area of Parcel 40. Further western floodplain access is restricted by a railroad trestle, which acts as a dam across much of the flood plain area. Waters backup ease of the former rail trestle, rather than continuing down the creek. This phenomenon is accentuated by backwater from Salt Creek into Pleasant Run preventing further mobility.

Contaminant migration also occurred, although to a lesser extent, through migration of PCBs and free oil through the vertical migration from the Former Sludge Disposal Area, North Disposal Areas and the former lagoons to the underlying fractured bedrock. The epikarst zone contains numerous fractures and zones of shallow weathered soft to hard bedrock, inter-layered with clay from the

in-situ dissolution and infilling of voids of the bedrock. This zone, usually situated above the water table, is capable of containing a high degree of contaminant mass in the bedrock openings.

Any residual NAPL in the epikarst is mostly trapped when the water level is below the zone containing the oil, and there is limited infiltration through the zone. When high precipitation events caused enough hydraulic pressure within the fracture system, the oil was flushed or pushed through the epikarst zone to the shallow bedrock water table both vertically and horizontally (i.e., the residual oil became mobile through an increase in pressure).

If mobilized, NAPL will generally flow slowly in comparison to the groundwater, as the oil requires significantly higher hydraulic pressure to drive the oil through the fractures in the bedrock, since the oil is viscous and has a high interfacial tension. Thus, most NAPL is generally restricted to the source areas, with minor dissolved phase PCBs extending from the source toward the discharge points, those being seeps and springs that contribute to the surface water flow at the Facility.

Once mobile NAPL reached the water table, however, the NAPL phase can remain more or less distinct or a very small portion of the PCBs can be dissolved into solution and transported in the shallow groundwater regime. Infiltrating precipitation can also dissolved limited PCBs out of the residual NAPL, and the impacted infiltration recharged to the water table aquifer. This impacted recharge mixed with the groundwater and flowed with the impacted groundwater.

Although it is not clear how much migration actually occurred, the dissolved PCBs transported by the shallow groundwater were capable of flowing towards points of groundwater discharge to the surface water environment through nearby seeps, springs or Bailey's Branch Creek. The general pattern of groundwater flow in the shallow bedrock water table was presented on Figure 2.43. Once impacted groundwater entered the creek system it could discharge to the upper portion of Bailey's Branch and to other tributaries.

The general tight nature of the bedrock below the shallow bedrock water table, as demonstrated through physical testing and visual observations of cores, indicates that there is limited recharge vertically to the deeper bedrock, and thus limited potential for migration of PCB-impacted groundwater to the deeper bedrock units. This limited migration is also supported in the lack of PCBs detections in the deeper bedrock monitoring wells.

Current Contaminant Migration Pathways

Since the mid-1970's, and to an even greater extent since initiation of corrective actions at and downstream of the Facility, removal actions and RCRA IMs (Section 8) have been implemented to eliminate or mitigate these migration pathways. The efforts include the following:

- Removal at the former process waste water lagoons system (AOI 8);
- Removal of the former stormwater pond (AOI 7);
- Removal of PCB areas ≥50 mg/kg, where practical, in East Plant and West Plant Areas (AOI 4, 5, 6, 7, 8, 15, 16, 30);
- Installation of source controls at and adjacent to the Facility where PCBs were detected in groundwater (AOI 4, AOI 8, AOI 10, Outfall 002, Outfall 003);

- Removal of impacted sediments in creek channels, floodplain and bedrock fractures (CERCLA RA, Western Tributary IM); and,
- Installation of a Cover System over the East Plant Area.

In addition, further actions are planned to mitigate potential sources including the installation of a NAPL collection system at AOI-8 and a Groundwater Trench, where necessary, along the downgradient margin of the East Plant Area.

The following describes how the off-Facility migration routes described above have been addressed:

- Overland flow of oil and sediments from the former lagoons at AOI 8 have been eliminated by the removal of the lagoons and installation of a Cover System over this area.
- Transport of PCB impacted stormwater and sediment from AOI 7 has been eliminated by the removal of the lagoon and installation of a Cover System over this area.
- Overland transport of PCB impacted sediment from the Former Sludge Disposal and Fire Training Area (AOI 6) and Former North Disposal Area (AOI 4) have been eliminated by the removal of ≥50 mg/kg PCB impacted soil and the installation of a Cover System over these areas.
- Off-Facility migration of PCBs and free oil through the vertical migration from the Former Sludge Disposal and Fire Training Area and North Disposal Areas and the former lagoons to the underlying fractured bedrock has been mitigated by the removal of ≥50 mg/kg PCB impacted soil, installation of a Cover System over these areas, and installation of source controls to capture impacted groundwater and NAPL.

Removal of PCB impacted sediments from the waterways and floodplains at and downstream of the Facility.Spring 018 Area Contaminant Migration and Groundwater Flow Conceptual Model

The following presents the contaminant migration and groundwater flow conceptual model of the hydrogeologic conditions found at the Spring 018 Area:

- The source of flow to Spring 018C is groundwater that originates from several directions in the area of central Parcel 15:
  - As recharge through the soil and weathered rock column to underlying groundwater.
  - As surface water recharging the groundwater system via a series of swallets.
  - As recharge from upland sinkholes to the east.
- Groundwater flows along bedding planes and vertical fractures, with most of the flow occurring along these interfaces where they have been widened by solution development.
- Groundwater potentiometric surfaces and dye tracer studies indicate that groundwater flow to Spring 018C appears to originate primarily from the eastern uplands in Parcel 14 and from the southern stream recharge of swallets. Some recharge also occurs from the western uplands.
- PCB detections at Spring 018C are from entrained, impacted particulates.
- Removal of PCB impacted sediments in the creek channel to the south (upstream/upgradient) of Spring 018C is believed to have cleaned up any ongoing sources to groundwater contamination

upstream of the swallets. The source of remaining PCB mass is believed to be in the Harrodsburg Formation between former Swallet 1A and Spring 018C and residual impacted sediment in the rock between the swallets and the spring.

- There appears to be a relationship between seasonally higher temperature groundwater recharging Spring 018C through the unsealed swallets, and higher concentrations of PCBs emanating from Spring 018C.
- The reduction of recharge through former Swallet 1A/1B and other upstream swallets has reduced the base flow to Spring 018C. Recharge from the upland sinkholes to the east remains to be a source of clean water that is ultimately discharged at Spring 018C.

4.2.3 Contaminant Attenuation during Migration

The PCBs found within the hydraulic fluids remain primarily within the oil due to the low aqueous solubility and high adsorptive capacity of PCBs. Some of the DNAPL was bound to soil particles and was trapped in pore spaces between soil grains. DNAPL within the bedrock will remain primarily within the bedrock fractures due to the small pore throat radii within the bedrock matrix that results in a high entry pressure to DNAPL. Only those fractures with large enough pore throat radii would allow entry of DNAPL into the fractures as well.

The aqueous phase PCBs will be attenuated during transport through the adsorption onto clay and soil particles in the overburden and weathered bedrock and by the diffusion into the rock matrix from groundwater. These aspects were discussed in much greater detail in the memorandum prepared by Dr. B. Kueper, in Appendix J.2, as well as an updated version of the CSM provided in the Pilot Trench Performance Monitoring Work Plan (GHD, September 24, 2019) and included here as Appendix J.3.

4.2.4 Potential Receptors

The potential receptors in the vicinity of the Facility include the surface water tributaries to Bailey's Branch, and Bailey's Branch and Pleasant Run creeks which are fed by groundwater discharging in the form of seeps and springs to the surface water environment. In addition, historical transport has included the discharge of dissolved phase (or possibly free phase) PCBs via stormwater discharge to these creeks. Both of these discharge mechanisms likely led to the impact of sediments within these creeks and the adjacent floodplains.

Groundwater and DNAPL have also been noted to be present in one residential well located on Parcel 207, since abandoned (discussed in Section 7.4). The groundwater flow from the vicinity of this residential well eventually discharges to Bailey's Branch and Pleasant Run as the residential well is located between the Facility and the creeks. NAPL appeared to be limited to one observance in the well at this location, and has not been observed after at this location or at additional monitoring wells installed at the property at multiple depths. The installation of the bedrock trenches and Wet Wells 1 and 2 have likely influenced the historic location of the NAPL.

5. Data Quality Assessment and Validation

This section provides a summary of the QA/QC procedures completed during the on-Facility RFI sampling and analysis activities. Sample collection; sample handling and storage, chain-of-custody procedures; laboratory and field analyses; and data quality assessment and validation were completed in accordance with the RFI QAPP. A brief synopsis of the RFI QAPP history and revisions is presented below:

- QAPP – Preliminary RFI Activities:
  - Date Prepared – July 18, 2001
  - Scope Summary – Stream Investigation and Off-Facility Well Survey
  - Laboratories – Severn Trent Laboratories, Inc. (STL) North Canton, Ohio and Aqua Tech Environmental Laboratories (ATEL), Melmore, Ohio
- QAPP – RFI Work Plan:
  - Date Prepared – November 5, 2001
  - Scope Summary – On-Facility RFI, Facility-wide Hydrogeological Investigation, and Background Soil Sampling
  - Laboratories – STL North Canton, Ohio
- QAPP – RFI and RA Work Plans, Revision 1:
  - Date Prepared – August 13, 2003
  - Scope Summary – Revised to include the CERCLA RA activities which included:
    - Creek Verification Sampling
    - Long-term Air Monitoring
    - Fill Evaluation Sampling
    - Waste Characterization Sampling
    - Wastewater Compliance Monitoring
  - Laboratories – Added STL West Sacramento for air analyses

The STL laboratory became part of TestAmerica (TA) during the RFI activities addressed in this RFI during July of 2007.

- QAPP – RFI and RA Work Plans, Addendum 1:
  - Date Prepared – October 5, 2004
  - Scope Summary – No Change
  - Laboratories – Added STL On-Facility Laboratory for soil sample PCB analysis
- QAPP – RFI and RA Work Plans, Addendum 2:
  - Date Prepared – July 25, 2006

- Scope Summary – Update on-Facility RFI and RA sampling, added East Plant Area Vault Monitoring
- Laboratories – Changed Air Monitoring laboratory to DataChem Laboratories, Dayton, Ohio and added three STL laboratories (Pittsburgh, Pennsylvania; Denver, Colorado; and St. Louis, Missouri)

5.1 Sampling Procedures

Samples of soil, sediment, surface water, groundwater, surface wipes, NAPL (both light and dense), liquid emulsion, spring water, borehole water, residential well water, ambient air, and sump water, were obtained as detailed in Section 3.6 of this RFI Report with adherence to the QA/QC procedures detailed in the following subsections.

5.1.1 Sample Containers

The project laboratory provided sample containers for each sampling task. These containers were cleaned by the manufacturer to meet or exceed the analyte specifications. The specific sample containers, preservation methods, maximum holding times, and sample packaging information for each target parameter and sampling task were consistent with U.S. EPA protocols detailed in Table 4.1 of the RFI QAPP (CRA, July 2001).

5.1.2 Sample Labeling

Samples were labeled with a unique sample identification number, facilitating tracking and cross-referencing of sample information, as follows:

Example:	SW-MMDDYY-XX-001	
SW	=	SW-surface water, (S–soil, SD-sediment, W-surface wipe)
MMDDYY	=	Date in month/day/year
XX	=	Sampler's first and last initials
001	=	Sequential number for event

Equipment rinsate blank and field duplicate samples were also numbered with a unique sample number, consistent with the numbering system described above, to prevent laboratory bias of field QC samples.

The sample identification number along with sample type, sampler's name, date and time collected, preservation technique, and analysis requested were entered on the sample labels and sample tags.

5.1.3 Field QC Sample Collection

Field QC samples included the collection of trip blank samples, equipment rinsate blank samples, field duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples. Trip blank samples were submitted in each cooler containing aqueous samples for volatile organic compound (VOC) analysis. The equipment rinsate blank samples were collected at a frequency of one per 20 investigative samples or at least one daily for each type of equipment where non-dedicated or

disposable sampling equipment is used. The field duplicate samples were collected at a minimum frequency of one per 10 investigative samples, and MS/MSD samples were collected at a minimum frequency of one of each per 20 investigative samples in accordance with the procedures identified in Section 3.6 of this RFI Report.

5.2 Custody Procedures

Sample custody procedures during the RFI field sample collection, sample transfer, and laboratory analysis were adhered to as detailed in the RFI QAPP (CRA, July 2001) and as summarized in the following subsections:

5.2.1 Field Custody Procedures

Field custody was established and maintained through the use of field logbooks, sample labels, sample tags, and COC records. Field logbooks consisting of bound field survey books or notebooks were maintained by field personnel to record data collecting and sampling activities performed. The equipment used to collect samples were noted, along with the time of sampling, sample description, depth from which the sample was collected, volume, and number of containers.

Sample labels and sample tags were affixed to sample containers submitted for analysis.

All samples were accompanied by a properly completed COC record, which lists the sample numbers, sample dates and times, the number of containers, and requested parameters. This COC record documented the transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

5.2.2 Transfer of Custody and Shipment Procedures

Samples were packaged for transfer to the appropriate laboratory for analysis with a separate signed COC record. Shipping containers were secured with strapping tape and CRA custody tape for transfer to the laboratory. The COC record identifying the contents accompanied all shipments. Samples were transferred via a subcontracted courier service. During the use of the on-Facility field laboratory, sample shipments involved transferring the sample cooler to the on-Site trailer.

5.2.3 Laboratory Chain-Of-Custody Procedures

Laboratory custody procedures were maintained documenting sample receipt, integrity of custody tape on the coolers, sample condition (i.e., unbroken, cooled, etc.), and the completeness of associated paperwork, such as COC records for the samples submitted. The custodian also documented that sufficient sample volume was received and appropriate preservation maintained to complete the analytical program. The sample custodian assigned a unique number to each incoming sample for use in the laboratory. The samples were then placed into a secure, limited access storage (refrigerated storage, if required). Consistent with the analyses requested on the COC record, analyses by the laboratory's analyst began in accordance with the appropriate methodologies. Samples were removed from secure storage in accordance with the laboratory's internal custody procedures.

The sample receipt documentation of each sample shipment was reviewed by the laboratory Project Manager and verified with a sample confirmation report submitted to CRA's QA Officer.

Discrepancies were noted and resolved via communication between the laboratory Project Manager and CRA's QA Officer prior to sample analysis.

5.3 Sample Analysis

Samples were analyzed in accordance with the laboratory SOPs presented in the RFI QAPP (CRA, July 2001). The parameters and methods are detailed in the following subsections by sample matrix. Samples collected and analyzed for the purpose of delineation and verification of CERCLA RA and off-Facility RCRA IM activities are addressed by their respective Construction Certification Reports and are not included in the count of samples in the sample analysis sections that follow.

5.3.1 Soil Sample Analyses

A total of 1,582 soil samples (including duplicate samples), were collected during the RFI (an estimated sampling 2,059 when including the creek investigation), with the purpose of the investigation at each AOI addressed by this RFI Report, were submitted to STL for analysis of one or more of the following parameters:

- Target Compound List (TCL) VOC prepared and analyzed by "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, 3rd Edition and Promulgated Updates, November 1986 (SW-846), methods 5035 and 8260B
- TCL semi-volatile organic compounds (SVOC) prepared and analyzed by SW-846 methods 3550B and 8270C
- TCL PCB prepared and analyzed by SW-846 methods 3550B and 8082
- Target Analyte List (TAL) metals (less earth metals) prepared and analyzed by SW-846 methods 3050A and 6010B/6020/7471A
- TAL cyanide prepared and analyzed by SW-846 method 9012A
- Total Petroleum Hydrocarbons (TPH), Purgeable and Extractable fractions prepared and analyzed by modified SW-846 methods 3550B and 8082
- Total organic carbon (TOC) by the Walkley-Black method
- Chloride prepared and analyzed by "Methods for the Analysis of Water and Wastewater", EPA/600/4-88/039, Revised July 1991 (EPA-WW) method 300.0

5.3.2 Sediment Sample Analyses

A total of 5 sediment samples (including duplicate samples) collected during the RFI (additional sampling was conducted creek investigation), with the purpose of the investigation for each AOI, addressed by this RFI Report were submitted to STL for analysis of one or more of the following parameters:

- TCL VOC prepared and analyzed by SW-846 methods 5035 and 8260B
- TCL SVOC prepared and analyzed by SW-846 methods 3550B and 8270C
- TCL PCB prepared and analyzed by SW-846 methods 3550B and 8082

- TAL metals (less earth metals) prepared and analyzed by SW-846 methods 3050A and 6010B/6020/7471A
- TAL cyanide prepared and analyzed by SW-846 method 9012A
- TOC by the Walkley-Black method

5.3.3 Bedrock Sample Analyses

A total of 6 bedrock samples collected during the RFI, with the purpose of investigation of each AOI, addressed by this RFI Report were submitted to STL for analysis of one or more of the following parameters:

- TCL VOC prepared and analyzed by SW-846 methods 5035 and 8260B
- TCL SVOC prepared and analyzed by SW-846 methods 3550B and 8270C
- TCL PCB prepared and analyzed by SW-846 methods 3550B and 8082
- TAL metals (less earth metals) prepared and analyzed by SW-846 methods 3050A and 6010B/6020/747
- TAL cyanide prepared and analyzed by SW-846 method 9012A

An additional 8 bedrock samples were submitted for physical analysis.

5.3.4 Surface Water Sample Analyses

A total of 291 surface water, seep water, sump, and spring water samples (including duplicate samples and some samples collected under the SSC Phase I/II Monitoring) collected during the RFI, with the purpose of investigation of each AOI, addressed by this RFI Report were submitted to STL for analysis of one or more of the following parameters:

- TCL VOC prepared and analyzed by SW-846 methods 5030 and 8260B
- TCL SVOC prepared and analyzed by SW-846 methods 3520C and 8270C
- TCL PCB prepared and analyzed by SW-846 methods 3520C and 8082
- TAL metals (less earth metals) prepared and analyzed by SW-846 methods 3010A and 6010B/6020/7470A
- TAL cyanide prepared and analyzed by SW-846 method 9012A
- Ammonia nitrogen prepared and analyzed by EPA-WW method 350.1
- Chloride prepared and analyzed by EPA-WW method 300.0
- TDS analyzed by EPA-WW method 160.1
- Total suspended solids (TSS) analyzed by EPA-WW method 160.2
- Total Kjehdahl nitrogen (TKN) prepared and analyzed by EPA-WW method 351.2

5.3.5 Groundwater Sample Analyses

A total of 532 (including field blank, trip blank, and duplicate samples) groundwater samples collected during the RFI, with the purpose of investigation of each AOI, addressed by this RFI Report were submitted to STL for analysis of one or more of the following parameters:

- TCL VOC prepared and analyzed by SW-846 methods 5030 and 8260B
- TCL SVOC prepared and analyzed by SW-846 methods 3520C and 8270C
- TCL PCB prepared and analyzed by SW-846 methods 3520C and 8082
- TAL metals (less earth metals) prepared and analyzed by SW-846 methods 3010A and 6010B/6020/7470A
- TAL cyanide prepared and analyzed by SW-846 method 9012A
- Chloride prepared and analyzed by EPA-WW method 300.0

5.3.6 Surface Wipe Sample Analyses

A total of five (5) surface wipe samples collected during the RFI, with the purpose of investigation of each AOI, addressed by this RFI Report were submitted to STL for TCL PCB prepared and analyzed by SW-846 method 3500C and 8082.

5.3.7 Air Monitoring Sample Analyses

Air monitoring was not conducted specifically for investigative purposes during the RFI. However extensive construction air monitoring for total suspended particulates (TSPs) and PCBs was conducted during invasive work conducted on the IMs on-Facility and off-Facility RAs. In general, TSP exceedances occurred more regularly near haul roads and staging areas during drought conditions. Detections of PCBs above the action level (defined as 1 microgram per cubic meter [µg/m^3]) occurred occasionally on Facility when moving ≥50 mg/kg PCBs into the Vault and on one other occasion where a vacuum truck was parked next to the monitoring station while vacuuming NAPL from the creek. PCB detection levels above the action level did not occur when handling <50mg/kg PCB soil on-Facility. A data summary of the completed air monitoring was submitted to U.S. EPA on October 29, 2008, and is attached in Appendix B.7.

5.4 Data Validation

Laboratory analytical data were provided in electronic data deliverable (EDD) format and as hardcopy final reports. Electronic data were checked against hardcopy final reports and updated with the validation qualifiers established during data validation.

Validation was performed by qualified chemists at the direction of CRA's QA Officer in accordance with validation guidelines specified in the RFI QAPP (CRA, July 2001). Data review and validation consisted of two tiers of assessment, incorporating an approach similar to "Innovative Approaches to Data Validation", U.S. EPA Region III, June 1995.

Tier I data validation was performed on 100 percent of the laboratory quality control summary data deliverables and consisted of the following components:

i) Technical holding times

ii) Gas Chromatography/Mass Spectrometry (GC/MS) instrument performance check (organics)

iii) Initial and continuing calibration

iv) Internal standard performance

v) Calibration, method, trip and equipment rinsate blanks

vi) System monitoring compounds (surrogate spikes - organics)

vii) Inductively Coupled Plasma (ICP) interference check samples (inorganics)

viii) ICP/MS internal standards (inorganics)

ix) ICP serial dilutions (inorganics)

x) MS/MSD results

xi) Laboratory control samples

xii) Field duplicate samples

Tier II validation was completed on 10 percent of the expanded deliverables during the initial investigation activities. The Tier II validation included the above Tier I evaluation, as well as the evaluation of all raw data and mass spectra to validate the above components and verify analyte identification and quantitation.

Data qualifiers were applied based on this assessment using the following documents as guidance:

"U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-99/008, October 1999 and the "U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA-540/R-94-013, February 1994.

The specific data qualifiers used were as defined in the Contract Laboratory Program National Functional Guidelines (NFGs) and are summarized in Data Quality Assessment and Validation Memoranda, provided under separate cover.

For the most part, major quality control issues were not discovered during the data validation process, therefore, the data are considered complete and usable for decision making purposes. Example data validation summary memos are provided in Appendix R. Validated results are presented in data summaries in Appendix H.

5.5 Data Quality

The data quality achieved during the RFI was assessed in terms of precision, accuracy, representativeness, completeness, and comparability as defined in the RFI QAPP (CRA, July 2001). The QC sample collection frequencies were consistent with the RFI QAPP minimum frequencies. Field duplicates were collected at a frequency of one duplicate sample for every 10 investigative samples (245 field duplicates were collected for the Facility sampling). Equipment rinsate blanks were collected at a frequency above the required one per 20 investigative samples, or at least one daily for each type of equipment where non-dedicated or disposable sampling equipment was used. Trip blank samples were only required for aqueous matrices and were submitted at a frequency of one trip blank per cooler of samples for VOC analysis.

Overall objectives for precision, accuracy, representativeness, and completeness were achieved with less than 6% of the data qualified during data validation due to violation of the laboratory and/or NFG QC limits. The completeness objective of 90% was achieved with less than one percent of the data rejected due to QC violations. The analytical methods identified in the RFI QAPP (CRA, July 2001) as presented above were adhered to and the laboratory internal QC procedures were followed, insuring that the reported data were representative and comparable.

The RFI data can be used for quantitative purposes including a baseline risk assessment and design of the final corrective measures.

6. Risk Based Screening Levels for RFI Investigation

This Section provides a description of the development and use of risk-based screening levels for evaluating the adequacy of the Facility characterization data to support the RFI baseline risk assessment, the calculation of Facility-specific background levels for metals, the subsurface conditions and soil, sediment, and surface water analytical results for each AOI, and the results and findings of the groundwater investigation.

6.1 Phased Investigation

The results of the initial phased approach of sediment, soil, and groundwater sampling broadly delineated the general extent of PCB contamination. Based on these results, additional horizontal and vertical delineation efforts were completed during the RFI in order to support decisions regarding the need for IMs and to support the RFI baseline risk assessment. The additional phases of investigation were completed, as presented and described in Section 3.5 (RFI Work Plan and Addenda) of this Report. Some additional data were also collected during the implementation of the initial phase of work, due to changes in field conditions, obstructions, additional information, and/or through observations made in the field at the time of implementation.

6.2 Risk-Based Screening Levels

For the investigation, consistent with the RFI Work Plan, risk-based screening levels were used to evaluate data during the RFI field investigation at the Facility to support decisions regarding the need for further investigation and to identify situations that might warrant IMs.

6.2.1 Soil, Bedrock and Sediment

The soil characterization data have been compared with screening criteria that are based on U.S. EPA's Regional Screening Levels (RSLs) (U.S. EPA, 2015). IDEM based its generic criteria from the Remediation Closure Guide (RCG) (IDEM, 2012) on U.S. EPA's RSL. The commercial/industrial RSLs were used for identifying potential on-Facility soil contamination and residential RSLs were used for identifying potential off-Facility soil contamination. The generic risk-based RSLs were derived based on a single-chemical cancer risk of 10^{-5} and a Hazard Quotient (HQ) of 1, consistent with IDEM guidance. They are also derived from exposure factors that reflect conservative assumptions about the magnitude, frequency, and duration of exposures, which in combination are intended to provide estimates of exposures that are higher than actual exposures to a large portion (90% to 99%) of the population.

The RSLs for soil were conservatively compared to sediment and bedrock characterization data. Use of soil screening criteria is highly conservative because potential exposures of receptors to sediment and bedrock, if any, at the Facility are expected to be lower than those assumed in deriving the soil screening criteria.

A potentially significant release is considered at any area where the highest Facility-related concentrations of constituents detected in soil are higher than the generic RSLs. The comparisons of soil data to the RSLs are summarized in Appendix S.1, which also identifies the location of the maximum detected concentration of each constituent in soil at each AOI. The presence of constituent concentrations higher than these screening criteria does not mean that the media necessarily poses a significant risk; it only means that the potential to pose a significant risk should be further evaluated considering additional Facility-specific factors. All on-Facility AOIs discussed in Section 7 are evaluated in the baseline HHRA (Section 9).

The analytical data for sampling is provided in Appendix H. Monitoring well and soil boring logs are provided in Appendix F.

6.2.2 Groundwater, Spring Water, Surface Water, and Borehole Water

In a manner similar to that discussed above for screening soil characterization data, the groundwater monitoring data collected during the RFI were compared with generic drinking water criteria based on Indiana and Federal Maximum Contaminant Levels (MCLs) that are established under the Safe Drinking Water Act regulations. For chemicals that lack MCLs, risk-based tap water ingestion RSLs published by U.S. EPA (2015) were used, although none of these water bearing zones currently serve as a drinking water supply for the Facility or the surrounding area, nor are they anticipated to in the future.

The drinking water criteria for groundwater were conservatively compared to surface water and spring water characterization data. Use of drinking water criteria are highly conservative because potential human health exposures of receptors to surface water and spring water, if any, at the Facility are expected to be lower than those assumed in deriving the drinking water criteria.

The groundwater screening criteria described above include criteria that are designed to be protective of potential exposures via drinking water use and represent highly conservative screening criteria for evaluating groundwater that is not a current or reasonably expected future drinking water supply, as discussed in Section 3.6.2.6. Notwithstanding, a potentially significant release is considered at an area when the highest concentrations of constituents detected in groundwater at an area are higher than these generic screening criteria. The comparison of groundwater data from each saturated zone in each AOI to the generic screening criteria are summarized in Appendix S.1, which also includes the location and date of the maximum detected concentration of each constituent at each AOI. The presence of groundwater with constituent concentrations higher than these generic screening criteria does not mean that the media necessarily poses a significant risk; it only means that the potential to pose a significant risk should be evaluated considering additional Facility-specific factors. All on-Facility AOIs discussed in Section 7 are evaluated in the baseline HHRA (Section 9).

The analytical data for samples are provided in Appendix H. Monitoring well and soil boring logs are provided in Appendix F.

Borehole water samples were collected from some soil borings to assist in the assessment of potential groundwater impact and in the placement of groundwater monitoring wells. Although the procedures for collecting borehole water samples were intended to minimize the potential for introducing contaminants (including soil particles) into the sample by the sampling procedure itself, such influence could not be entirely eliminated because of the nature of the sample collection methods. As such, the borehole water data do not represent groundwater quality in the saturated zone. Therefore, these data do not provide sufficient basis for identifying the presence of a potentially significant release and are not appropriate for use in the risk assessment. However, these data were compared with the conservative screening criteria for groundwater to provide an additional point of reference and determine if additional sample locations should be placed in an area to further evaluate data.

6.2.3 Presentation of Data on Figures

In addition to the comparison of site characterization data to the screening criteria in the Appendix S.1 tables, the data are also summarized on the Appendix S.2 figures which are generally intended to display data for any constituent with a concentration anywhere on-Facility that exceed the generic residential screening criteria, post IMs. Specifically, the following criteria were used, in general, to identify the constituents to be displayed on the Appendix S.2 figures:

- Residential drinking water criteria
- Residential soil criteria

The constituents highlighted on the Appendix S.2 figures are those that exceed commercial/industrial screening criteria for soil on-Facility or residential screening criteria for soil off-site and groundwater concentrations exceeding the drinking water criteria.

6.3 Background Calculations and Analytical Results

Background soil samples were collected during the RFI to characterize naturally occurring levels of metals in soil at and around the Facility. Consistent with the RFI Work Plan and RFI Work Plan Addendum No. 1, background soil samples were collected from 16 locations (10 on-Facility and 6 off-Facility) where no manufacturing or management of production materials or wastes is known to have occurred. Locations where on-Facility and off-Facility background soil samples were collected are shown on Figure 6.1. At each location, one sample was collected from 0 to 2 ft bgs and additional subsurface samples (from 2 to 8 ft bgs) were collected at selected background locations. The boring logs for these samples are provided in Appendix F and the analytical data are provided in Appendix H.7.

The concentrations of metals in the samples from the 0 to 2 ft bgs interval are the most representative of background exposures to metals in soil because surface soil is encountered more often than deeper soil. Therefore, the data from the surface interval are used in calculating background levels of metals in soil for exposure assessment purposes. The metal concentrations in background soil from the surficial soil are summarized in Table 6.1, which also include summary statistics describing the concentration distributions.

Surface soil data collected from 10 on-Facility and 6 off-Facility locations, which were selected as they were believed to have not been impacted by Facility operations and, thus were determined to

be representative of background metal concentrations at and around the Facility. For the calculation of background concentrations in Table 6.1, only 9 of the 10 on-Facility background locations were used. The data from MW-X045Y258D were determined to be outside of the expected range of concentrations from the literature (Dragun, 2005) for several metals and therefore were not used in the calculations of background levels.

Table 6.1 summarizes the 95% Upper Confidence Limit (UCL) calculations for site-specific background metals. The 95% UCLs presented in Table 6.1 are nonparametric bootstrap confidence limits on the mean (Efron and Tibshirani, 1998) calculated from 4,000 bootstrap replications. Nonparametric bootstrap statistical limits are more reliable than parametric statistical limits because, unlike parametric limits, they do not rely on assumptions about distribution shapes that are often difficult to justify. Antimony, selenium, silver, and thallium were not detected in background samples or were detected in fewer than eight background samples. Therefore, background levels were not calculated for these metals. For the remaining metals, site-specific background concentrations were subtracted from the measured concentrations in soil prior to comparison with any of the screening criteria discussed in Section 6.2.

Table 6.2 presents the estimates of cancer risk and HQ that are associated with these background levels, based on the exposure and toxicity assumptions for exposure to soil discussed in Section 9.4.6 and Appendix T. These estimates represent the levels of cancer and non-cancer risk associated with potential exposure to background levels of metals in soil at and around the Facility. These background levels of risks are not included in the site-related risk estimates that are discussed in the baseline risk assessment in Section 9.

7. Results of Investigation

The results of the field investigations conducted during the RFI for on-Facility AOIs are discussed in this section. The validated analytical data summary tables are presented in Appendix H (samples of typical data validation summaries are included in Appendix R). Figures 7.1.1 through 7.1.5 present graphical representation of PCB detections by AOI. Tables 7.1.1 through 7.1.8 present the range of detected concentrations by matrix and area prior to completing the data screen and prior to accounting for the IMs such as the Cover System. These tables also identify the areas where data from specific media were collected to identify that the appropriate media were collected from each area to convey adherence with the RFI Work Plan. The summary results of data screening are provided in Appendix S.1 and these tables show all detected constituents. The Appendix S.2 figures only show those constituents that exceed the generic residential screening criteria anywhere on Facility, haven't been excavated or contained under the Cover System, and highlight concentrations that exceed the relevant (commercial/industrial for on-Facility [SLs for the Facility, as discussed in Section 6.2.] and residential for off-site) screening criteria discussed in Section 6. All detected concentrations have also been evaluated in the baseline HHRA, which is discussed in Section 9. As discussed in Section 3.5, the following presents final sample analyses and evaluation for all investigative samples collected. The final sample numbers and analyses may have varied from the original RFI Work Plan due to changes in field conditions, additional information was received, obstructions, and/or initial results of the collected samples.

7.1 Results by Area of Interest

AOIs were identified based on review of available files, interviews with Facility personnel, historical investigations and remedial actions, and Facility inspections. Based on review of sampling data, a Streamlined Human Health Risk Assessment (SHHRA) was prepared by ENVIRON International Corporation (now Ramboll Environ Inc.) (ENVIRON, April 23, 2007) to determine if an IM was warranted. Initial sampling in the RFI included a full suite of analytical constituents. Once it was determined that PCBs were the primary constituent of concern, later phases of the investigation only included PCB analysis.

The West Plant Area is comprised of AOIs, including AOIs 1, 2, 3, 8, 9, 11, 12, 13, 17, 18, 19, 20, 21, 21-1, 21-2, 21-3, 21-4, 22, and 24, which are described more fully in following sections. Multiple IMs were conducted on Facility property, west of GM Drive, collectively referred to as the West Plant IMs.

The East Plant Area is comprised of multiple AOIs, including AOIs 3, 4, 5, 6, 7, 8,10, 11, 14, 15, 16, 23, and 30 described more fully in the following sections. Further description of the AOIs and the IM which have been implemented or are in the process of being implemented for the East Plant Area can be found in the Interim Measures Alternatives Review Report (CRA, April 13, 2005), the Over 50 mg/kg PCB Soil Removal Design Report (CRA, May 26, 2006), the East Plant Area Cover System Design Report (CRA, April 18, 2008), the East Plant Area Cover System Construction Certification Report (CRA, March 2, 2015)), the Pilot Perimeter Groundwater Trench Collection System Study (CRA, December 2, 2014), and the AOI 8 Area Groundwater Source Collection System IM Work Plan (CRA, December 31, 2014). IMs constructed to date or in the process of being implemented are summarized in Section 8.0.

The HHRA presented in Section 9 did not evaluate potential exposures to constituents in much of the East Plant Area as PCB-impacted soil are enclosed within the Vault or secured under the Cover System and will be subject to institutional controls, which maintain the integrity of the Cover System and prevent potential exposure. Operation, Maintenance, and Monitoring (OMM) procedures are in place to protect occasional maintenance workers. Similarly, AOIs in the West Plant Area where soil removals were completed or Cover Systems were installed were excluded from the evaluation.

The following discussion is divided into subsections corresponding to the on-Facility AOIs that were investigated[4]. Each subsection includes a description of the areas investigated, the scope of the field investigations, a summary of the results, and discussion of the results with respect to whether a potentially significant release of hazardous constituents has been identified and if so, the nature and extent of the release. The identification of a potentially significant release at an area is based on comparison of the characterization data with generic screening criteria for the scenarios for potential human exposure under current and reasonably expected future conditions, which are summarized in the Conceptual Site Model (CSM) discussed in the baseline HHRA in Section 9.1.

[4] Sample location nomenclature has changed slightly over time and to coincide with how data were collected under different investigation programs. Therefore, data can be identified based on the AOI designation(s) (e.g., A011 for AOI 11) or the portion of the Facility, outside of an AOI, where a sample was collected (e.g., West_Plant_Area).

The locations of the AOIs are presented on Figure 3.1, with a brief description of each AOI provided in Table 3.1. The screened results data tables are provided in Appendix S.1 and the corresponding databox figures are provided in Appendix S.2.

7.1.1 AOI 1 – Former Railroad Operations and Minerals Processing Facility

The portion of land south and southeast of the Die Cast Building was the location of the former railroad maintenance operations and the Minerals Processing Facility. According to Facility records and historic Sanborn maps, the railroad operations included a railroad roundhouse (turn-around building) and maintenance shops. The Minerals Processing Corporation (MPC), which began operations at this location in 1971, leased the property from the railroad until GMC purchased the property in 1977. The railroad had ceased maintenance operations at this location in the 1940's. After GMC purchased the property from Milwaukee Railroad, MPC continued leasing the property from GMC for their operations. In 1989 Mica Resources, Ltd. acquired MPC. The locations and maximum detection summary of the former roundhouse and Minerals Processing Facility are shown on Figure 7.1.1.

The original RFI Work Plan called for 21 soil samples from seven locations; and two surface water samples from two locations. The completed RFI included the collection of 42 soil samples from 12 locations and five surface water samples from two locations. Figure 7.1.1 presents the sampling locations completed for this AOI. Tables 7.1.2 and 7.1.4 include sample detection summaries of the sampling completed in AOI 1.

From the 42 soil samples collected, 15 VOCs, 18 SVOCs, and 22 inorganic compounds were detected. None of these compounds were detected in concentrations that exceeded the Screening Levels (SLs). PCBs were detected in four of the 42 soil samples collected. None of the detections exceeded the SLs.

The CCR (CRA, 2001) identifies two springs along the riprap bank just west of the plant's WWTP. These springs, named Northern Spring and Southern Spring were identified in the plant drawings that we reviewed during the preparation of the CCR. Samples were collected on 4/29/02 and again on 5/21/02 and 5/22/02. The samples representing the Northern Spring were taken from an existing catch basin (ST-57), which is located off the southwest corner of the Raw Waste Building. This catch basin collects runoff from the hillside. The samples representing the Southern Spring were collected from an existing manhole (ST-59), which is located just west of the cooling tower. A pipe enters the manhole from the southwest and then discharges to the northeast.

Figures from 1979 that were prepared subsequent to inspections by the state identified a "spring by backwash tank". The location of this spring coincides with the location of the Northern Spring. These same figures identify a "pipe under the railroad". This pipe extends under the former railroad bed (the current hillside) - but does not show where the pipe begins. The pipe appears to enter a manhole in the location of ST-59. Piping from ST-59 sketched on the figure matches the general alignment of the piping and manholes downgradient of ST-59. Based on historical drawings and correspondence, these features originally discharged to Outfall-002. GM ran a camera into the pipe extending into the hillside from ST-59. According to plant personnel the camera was able to travel westward for approximately 150 feet before there was an obstruction, which would put the obstruction somewhere below AOI 1, west of the old rail line (further discussion was contained in the

CRA Memorandum 775 on January 23, 2015, a CRA Memorandum 780 on March 30, 2015, and in an email to the U.S. EPA from CRA on March 10, 2015).

The locations of these collection points were confirmed by survey on February 26, 2015, and the collected water currently flows to the stormpond. Total and dissolved antimony, bis (2-Ethylhexyl) phthalate, and total PCBs in the "spring water" samples collected from this AOI were detected at concentrations that exceeded the SLs (as discussed in Section 6.2.2). The northern spring (SW-X156Y082) was identified by the state circa 1979. Water from this spring was observed emitting from the hillside west of the Facility's Waste Water Treatment Plant (WWTP) clarifiers. Based on historical documents, water from the vicinity of the northern spring currently drains to an existing catch basin (ST-57), which then drains to the stormwater pond (AOI 10). The southern spring (SW-X168Y066) was not identified as a spring until circa 1987. Previous historical documents identify the southern spring, as a "pipe under the railroad". This pipe extends under the former railroad bed (the current hillside west of the Facility's WWTP) but does not show where the pipe begins. Currently the pipe appears to enter a manhole in the location of ST-59 which drains to the stormwater pond. The water collected from ST-57 and ST-59 is treated through the on-Facility stormwater treatment facility (WTP).

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.1 and S2.5 of Appendix S.2 for the databox results of the data screening.

7.1.2 AOI 2 – Waste Storage Area

The Waste Storage Area (also referred to as the Drum Storage Pad) is a secure fenced area located north of the Former Piston Building now called Semi-Permanent Mold Building (Figure 3.1). The Former RCRA Hazardous Waste Storage Area was located in the northeast corner of the Waste Storage Area.

The Work Plan called for twelve samples from four locations to characterize this AOI. Figure 7.1.2 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 2.

Eleven different VOCs, one SVOC, and 19 inorganics were detected from the 13 soil samples analyzed (including one duplicate sample). None of these compounds exceeded the SLs for the Facility. There was one detection of PCBs in the 13 samples at a concentration below the SLs.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.2 and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.3 AOI 3 – PCB Storage Areas

There have been two PCB storage areas utilized at the Facility. One former PCB storage area, consisting of a room (now removed), was located in the west area of the Die Cast Building, and an existing PCB storage area is currently located in the WWTP Filter Building (Figure 3.1).

The approved Work Plan described the collection of three wipe samples from three locations to address potential concerns regarding the potential exposure for PCBs bound within the pitted concrete floor at the former PCB storage area within this AOI. The completed RFI activities included the collection of five concrete wipe samples from five locations. Figures 7.1.1 and 7.1.3 present the locations of all sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 3.

PCBs were not detected in wipe samples collected for this AOI. Therefore, no further data are required for closure of these areas under TSCA.

7.1.4 AOI 4 – Former North Disposal Area

Beginning in the late 1950s, the Bedford Facility began disposing of waste materials northeast of the former North Lagoon (Figure 3.1). This area has been referred to as the Sand Fill Area, Sand Landfill, Foundry Sand Storage Area, Landfill Storage Area, North Landfill, and Landfill (for purposes of this Report, this area will be termed the Former North Disposal Area). Review of historical photographs and documents also suggests that there was a small quarry present in the 1950s. During investigative activities, this former quarry was not distinguishable for the surrounding area; however, quarry blocks were accumulated along the northeastern boundary of this AOI.

The initial Work Plan called for the collection of 15 soil samples from five locations, three sediment samples from three locations, and three surface water samples from three locations. Completed sampling under the RFI consisted of 83 soil samples from 28 locations (with additional sampling completed in the area attributed to the creek work). In total, 107 borings were completed for delineation and geologic description, and monitoring well replacement. The initial number of sediment and surface water samples collected for the RFI was one sediment samples from one locations and three surface water samples from two locations (additional spring/surface water sampling was completed in AOI 4 under SSC Phase 1 and II Monitoring in Appendix B.6). Water from the springs identified in this area currently contained and treated (see Section 7.5). The majority of analysis was for PCBs after the initial sampling. Note that some samples collected and assigned to AOI 10 may also be applicable here. Figure 7.1.5 presents the soil borings and sampling locations completed for this AOI. Tables 7.1.1, 7.1.2, and 7.1.4 presents a sample detection summary of the sampling completed in AOI 4.

From the 83 soil samples collected, 22 VOCs, 31 SVOCs, and 21 inorganic compounds were detected. Subsequent to the evaluation of these data, soil was excavated from AOI 4 for both the Upstream Parcels RA along the Tributary 3 creek alignment and the soil source removal of ≥50 mg/kg PCBs soil. Soil with PCBs greater than 1 mg/kg were excavated prescriptively to 25 ft from the creek centerline during the RA. PCBs ≥50 mg/kg in soil that were identified beyond 25 ft from the creek centerline were excavated prescriptively to achieve an 95% upper-confidence limit on the mean of 1.8 mg/kg of PCBs in soil, with no individual sample exceeding 5 mg/kg, within delineation verification grids. The remaining sample locations collected and assigned to AOI 4 exceeding the Removal Action clean-up criteria of 1.8 mg/kg PCBs for residential soil were then physically capped under the Cover System. None of the remaining locations (i.e., not removed or included under the Cover System) exceeded the SLs. Refer to Drawing S2.4 and S2.7 of Appendix S.2 for the databox results of the data screening.

7.1.5 AOI 5 – Former East Sand Disposal Area

In 1985, GMC began placing foundry sand east of the employee parking lot along the east side of GM Drive (hereinafter referred to as the east parking lot) (Figure 3.1). The foundry sand was reportedly used as fill to expand the east parking lot (AOI 5).

The RFI Work Plan called for 12 soil samples from four locations to characterize this AOI. However, during implementation of the RFI, 64 soil samples from 26 locations were collected. Figure 7.1.3 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 5.

From the 64 soil samples collected, 20 VOCs, 25 SVOCs, and 20 inorganic compounds were detected. PCBs were detected in 53 of the 64 soil samples collected. Following the screen accounting for soil removal and the Cover System, none of the detections exceeded the SLs. Refer to Drawing S2.4 and S2.7 of Appendix S.2 for the databox results of the data screening.

7.1.6 AOI 6 – Former Sludge Disposal and Fire Training Area

The former Sludge Disposal Area was identified from historical aerial photographs and from interviews with Facility personnel. This disposal area was located within the East Sand Disposal Area on Facility property to the east and south of the east parking lot (Figure 3.1). The Facility's fire-training area was located south of the east parking lot and was situated on top of the former Sludge Disposal Area. Prior to implementation of the East Plant IM, former disposal areas and fire training areas were covered with grass and contained several fire-training pits for the Facility.

The RFI Work Plan initially described 21 soil samples from seven locations to characterize this AOI. Actual final numbers were 88 soil samples collected from 33 locations. Figure 7.1.3 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 6.

From the 88 soil samples collected, 16 VOCs, 27 SVOCs, and 20 inorganic compounds were detected. PCBs were detected in 68 of the soil samples collected. Following the screen accounting for soil removal and the Cover System, none of the detections exceeded the SLs. Refer to Drawing S2.4 and S2.7 of Appendix S.2 for the databox results of the data screening.

7.1.7 AOI 7 – Former North Lagoon and Outfall 001

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 (refer to Figure 3.1). GMC 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 (closure of the former North Lagoon was completed in 1987).

The RFI Work Plan called for eight soil samples from two locations and the actual number of completed soil samples during the RFI was 126 from 43 locations. Figures 7.1.4 and 7.1.5 present the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 7. All soil was removed from this area during construction of the Vault. Soil with ≥50 mg/kg PCBs were placed in the Vault and soil with <50 mg/kg PCBs were placed in the grading areas for use under the Cover System. Therefore, no additional data are

required to assess this AOI, nor are any IMs necessary. The constructed landfill Vault for the Facility was completed within the entirety of this AOI.

From the 126 soil samples collected, 4 VOCs, 1 SVOC, and 15 inorganic compounds were detected. PCBs were detected in 76 of the soil samples collected. Following the screen accounting for soil removal and the Cover System, none of the detections exceeded the SLs. Refer to Drawing S2.4 and S2.7 of Appendix S.2 for the databox results of the data screening.

7.1.8 AOI 8 – Former South Lagoons and Outfall 002

GMC utilized five settling lagoons (South Lagoons #1 through #5) at the Bedford Facility for the purpose of treating process waste water prior to discharge to Outfall 002, pursuant to a NPDES permit (IN 0003573), originally issued in 1974. These former South Lagoons (also referred to as the Process Lagoons; South Lagoon #4 also referred to as the Sludge Storage Lagoon) operated in a cascading-type fashion to allow settling before discharge. It also allowed the settling of the heavier-than-water hydraulic oils which were periodically recovered and reclaimed. Drainage included any leakage into the existing service tunnels from the die cast machines. GMC constructed the former South Lagoons in 1959 (refer to Figure 3.1). South Lagoons #1 through #3 were removed for the construction of the current WWTP. South Lagoon #5 was cleaned and the materials placed with South Lagoon #4 prior to the construction of the WWTP surge basins. The final remaining lagoon, South Lagoon #4, underwent closure activities (excavation, disposal, and verification sampling) in 1983.

The original RFI Work Plan described seven soil samples from two locations to be collected to assess the potential impact of operations in this AOI. The completed RFI consisted of 38 soil samples collected from 14 locations. Figures 7.1.1 and 7.1.3 presents the sampling locations completed for this AOI. Table 7.1 presents a sample detection summary of the sampling completed in AOI 8.

From the 38 soil samples collected, 6 VOCs, 18 SVOCs, and 20 inorganic compounds were detected. Some of these compounds were detected in concentrations that exceeded the SLs. PCBs were detected in 22 of the 36 soil samples collected. None of the PCBs soil detections exceeded the SLs.

The subsurface conditions at former #4 South Lagoon consisted of topsoil underlain by approximately 13 ft of clay fill. At approximately 12 ft bgs, the clay was observed to be stained and exhibiting a noticeable petroleum odor. Bedrock was encountered at 14 ft bgs. The subsurface conditions at former #5 South Lagoon consisted of variable fill materials (clay, sand, and gravel) ranging in thickness between 6 ft and 14 ft, below which bedrock was encountered. The logs can be found in Appendix F.

7.1.8.1 NAPL Investigation – AOI 8

In May 2002, after a period of heavy rainfall, a small quantity of DNAPL/oil was discovered seeping into the creek bottom near the existing Outfall 002. Measures were implemented to contain, remove, and appropriately dispose of the material. In order to determine a possible source for the DNAPL, several borings were advanced between Facility and the Outfall 002 area, as described in the RFI

Work Plan Addendum No. 1 (CRA, November 18, 2002). Consequently, a source control was installed in this area. Initial work conducted under Addendum No. 1 included:

- Advancement of two vertical wells (MW-X220Y088S and MW-X233Y087S) in the vicinity of the existing Calgon Building.
- Advancement of three borings (B-X209Y078A/B/C) within the footprint of the removed million gallon AST, just south of the Former South Lagoon No. 4. One boring was later re-drilled and advanced into the bedrock as a shallow monitoring well (MW-X209Y078S). Soil samples collected and analyzed for PCBs, VOC, SVOCs and inorganics indicated that no results exceeded the screening levels.
- Advancement of two additional borings northeast of the million gallon AST (MW-X225Y080S and TMW-X225Y080). Monitoring well MW-X225Y080S was completed within the shallow bedrock, while TMW-X225Y080 was completed within the overburden due to the presence of perched groundwater during the drilling activity. Soil analytical results indicated no contaminants of concern above the SLs.

Boreholes and monitoring wells completed within the secondary containment area of the ASTs were sealed with bentonite to ensure the clay secondary containment liner remained secure. The locations of the wells and borings are identified on Figure 7.2.

To further characterize the transport of NAPL within the bedrock in the vicinity of Outfall 002, a series of shallow bedrock monitoring wells were installed at a 30-degree angle (to vertical) as part of the RFI Work Plan Addendum No. 1 (CRA, November 18, 2002). These wells are located along a line perpendicular to the flow of the stream at Outfall 002. At each well location a steel casing was grouted approximately two feet into the bedrock. Boring were advanced through the upper weathered rock utilizing the HQ (standard core drill barrel size) wet coring method until competent rock was encountered.

Fifteen angle-monitoring wells (MW-X242Y060S, MW-X233Y071A/B, MW-X233Y095, MW-X233Y100, MW-X233Y105A/B, MW-X233Y110A/B, MW-X233Y115A/B, MW-X233Y120A/B, and MW-X233Y125A/B) were completed east of the aeration tank (15 wells at 9 locations in total) as presented on Figure 7.2. The borings were completed on an angle to increase the chance in locating any vertical fractures within the bedrock. Six of the nine monitoring well locations were completed as well nests (shallow and deep wells completed next to each other). The monitoring well nests were completed as a result of substantial loss of drilling fluids through the shallow bedrock fractures that occurred during drilling at those locations. Therefore, many of the shallow wells within a well nest were completed above the water table and a nested monitoring well was installed deeper. Eighteen (including one duplicate) soil samples were submitted for laboratory analysis. Total arsenic from one sample collected from 6 ft bgs to 7 ft bgs at soil boring MW-X233Y115A at a concentration of 27.3 mg/kg exceeded the screening level of 16.0 mg/kg, even after accounting for the Site specific background concentration of 10.0 mg/kg.

The location of AOI RFI monitoring well and soil boring locations are presented on Figure 7.2. AOI 8 overburden geologic cross-sections are presented on Figures 7.3 and 7.4.

An additional eight groundwater monitoring wells (MW-X190Y048; MW-X192Y048; MW-X209Y053; MW-X214Y041 [since abandoned due to placement of the landfill Cover System on Parcel 201];

MW-X227Y049; MW-X227Y054; MW-X228Y032 [since abandoned due to placement of the landfill Cover System on Parcel 201]; and MW-X234Y042 [since abandoned due to placement of the landfill Cover System on Parcel 201]) were installed between July and December 2006 to delineate the extent of NAPL in the shallow bedrock south and southeast of AOI 8. NAPL was present in two of the wells (MW-X209Y053 and MW-X227Y049). The presence of NAPL (trace amounts, not recoverable) was noted upon removal of the pump from MW-X227Y054; however, it was not of measurable thickness or recoverable and has not been observed since.

Groundwater samples were collected from MW-X190Y048, MW-X214Y041, and MW-X234Y042. Groundwater analytical results exhibited a total (unfiltered) concentration of 0.11J μg/L PCBs at MW-X190Y048. Groundwater analytical results are presented in Table H.6. Groundwater samples were not collected from the wells that exhibited NAPL. An oil-water characterization sample was collected from MW-X209Y053, which exhibited a PCB concentration of 400,000 mg/kg (this well did not contain NAPL in later sampling). NAPL was not recoverable (only trace amounts) from the other wells. Analytical results for oil-water characterization are presented in Table C.10. Borehole logs are presented in Appendix F.

Due to the drilling process and the relatively small apertures of the fractures within the bedrock, NAPL was typically not observed while advancing the core barrel. In several cases, the NAPL was not observable until several days after completion of the hole. Therefore, it could not be determined from which discrete interval the NAPL may be emanating.

After installation, five wells began to accumulate NAPL. NAPL was first observed at CH-5 in July 2005. NAPL was later observed at four additional monitoring well locations (CH-1B, CH-2A, MW-X209Y053, and MW-X227Y049) in October 2006. Coreholes CH-1B, CH-2A, and CH-5 were installed in 2005 as part of an investigation to determine proposed groundwater collection trench alignments. MW-X209Y053 and MW-X227Y049 were installed as part of eight additional well installations in 2006 for NAPL delineation as discussed above. Thicknesses were measured and recorded and are presented in Table 7.2, as previously reported; however, subsequent bench testing has shown that the probe was coated in oil and therefore some measurements were erroneous. As a result of these observations of accumulated NAPL, a program was begun to remove the NAPL manually by either bailing or pumping. Table 7.2 also presents the amounts recovered from each well.

To further assess the vertical interval from which the NAPL may be entering specific wells, each well with measurable NAPL was bailed to remove the NAPL and a packer assembly installed to monitor specific vertical intervals. Table 7.3 presents the results of this testing. An additional evaluation was conducted at corehole CH-2A and MW-X209Y053 via discrete interval packer testing, which provided clear indication of the vertical intervals the DNAPL was entering in each well location. The results of the investigation were summarized in the AOI 8 IM Work Plan (refer to Section 8.1.1.5). Due to concern regarding the emulsified oil product (or mixed water/NAPL) present in CH-5, on-Site bench scale tests were performed, which determined that the recovered liquid did not appear to stay emulsified upon removal from the well, as there was noticeable separation upon minimal settlement time, and that the addition of coagulant did not have a significant effect on separation time. Results of the investigation are discussed in the AOI 8 IM Work Plan.

As a result of observations of NAPL in the AOI 8 general area, an IM Work Plan was prepared describing the installation of an automated recovery system so that the NAPL recovery could be

completed more thoroughly and efficiently (refer to Section 8.1.1.5). The HHRA presented in Section 9.0 did not evaluate potential exposures to constituents in the AOI 8 area that are covered by the Cover System in the East Plant Area and workers in this rea are subject to institutional controls, which maintains the integrity of the Cover System and prevent potential exposure. Sample locations within the East Plant portion of AOI 8 that are outside of the toe of the Cover System were evaluated in the HHRA.

In late 1983, after removal of sediment and soil at the former south lagoon 4, oil and groundwater was observed entering the excavation. Prior to backfilling, a perimeter collection system within the excavation was installed. The collection system drains by gravity to a central collection point (Sample Location ID SU-X208Y096). Construction details were not available in the plant records during completion of the Current Conditions Report; however, Plant personnel indicated that the collection sump water is pumped to the nearby Surge Basin, where it eventually enters the GM industrial treatment plant. The dimensions of the sump are five feet in diameter and 24.75 feet in depth from top of casing (approximate bottom elevation of 607 feet amsl), which is consistent with the elevation of the bedrock valley in this area. GM regularly monitors (quarterly) the water levels and the potential presence of NAPL. The sump pump is periodically replaced by Plant personnel, as needed to keep the system operational.

The lines of evidence (Kueper and Davies, 2009) were largely used during the investigation at the Facility, as guided by Dr. Kueper. Other methods described in that publication are more appropriate in an unconsolidated, non-fractured hydrogeological setting. Specifically, this publication describes the assessment of DNAPL presence and source delineation using multiple lines of evidence, as depicted in Figure 3 of the paper. Addressing the assessment of DNAPL at this site was via visual, site use and history, chemical, oil-water interface probe, and analytical methods. The delineation of the source zone was accomplished in the initial stages through following the general outline presented in the paper, which was directed in consultation with Dr. Kueper for a fractured rock scenario, where this site is situated. The certainty of the lines of evidence within AOI 8 is clear in that this area is located within a known source area (visual confirmation). The source of the NAPL within the fractures is from the former, unlined treatment ponds, where vertical migration occurred and NAPL pooled within the bedrock valley. Horizontal migration then likely occurred through weathered fractures and conduits from the bottom of the bedrock valley and remains now within fractures at the known locations currently being monitored. Due to the nature of the fractured, karstic bedrock in and surrounding the area around AOI 8, wells are checked for the presence of NAPL quarterly. Given that the area hydraulically downgradient (known direction of migration) and surrounding locations, including structurally down-dip (or hydraulically upgradient) have been shown to be free of NAPL outside of the source zone, it is believed that the source zone has been roughly delineated at AOI 8.

7.1.9 AOI 9 – Service Tunnels

Six service tunnels are located within the Die Cast Building at the Bedford Facility. The tunnels were historically connected to the process sewers that discharged to the industrial settling ponds, but were subsequently connected to the industrial wastewater treatment plant where treated water is discharged to the creek system through a NPDES permit issued by the State of Indiana. The service tunnels are located beneath the die cast machines and are identified as: North Make #'s 1 through #5 and South Make #1. The location of AOI 9 is shown on Figure 3.1.

The RFI Work Plan called for the collection of 18 soil samples from nine locations. The actual number of samples collected during the RFI included 25 soil samples from eight locations (several refusals were encountered due to the presence of historical foundations). In addition, six rock samples were collected from five locations for laboratory analysis. Figure 7.1.1 presents the sampling locations completed for this AOI. Table 7.1.4 and 7.1.6 presents a sample detection summary of the sampling completed in AOI 9.

In all, 10 VOCs, 19 SVOCs, and 19 inorganic compounds were detected in the soil samples. There were four detections of PCBs in the 25 samples collected. No VOCs, SVOCs, or inorganic compounds exceeded the SLs. PCB detections in soil samples ranged from 0.05 to 3,689.5 mg/kg.

There were six VOCs and six SVOCs detected from the rock samples analyses: none of which exceeded the SLs. Only arsenic exceeded the SLs (one sample) for the 19 inorganic compounds detected within the rock samples. There were two detections of PCBs below the SLs in the six samples analyzed (detections ranged from 0.04 to 4.3 mg/kg).

Subsurface conditions encountered during drilling at this AOI consisted of 1 ft to 7 ft of sand and gravel fill overlying soft, brown clay fill material with traces of silt and gravel. The clay fill appears to overlie the bedrock surface. Figure 2.31 presents the thickness of overburden materials beneath AOI 9, which ranges from approximately 25 ft to 42 ft (thickness generally increases to the west). Approximately 20 ft of the limestone bedrock was drilled at most locations. The limestone was identified as the St. Louis Formation.

Soil samples at this AOI were collected under buildings that are currently in use. As such, it is not possible to fully characterize the lateral and horizontal extent of PCBs in subsurface soil at this AOI. However, a complete exposure pathway to these PCBs concentrations does not exist currently, and the significance of hypothetical future exposure to these concentrations (and the concentrations of the other detected constituents) are evaluated in the human health risk assessment (Section 9.0) to determine possible future actions.

Databox Drawing S2.1 in Appendix S.2 and Appendix S.1 data tables present the PCB and non-PCB exceedances of screening levels for soil and sediment data collected at the East Plant Area, which includes all of the East Plant Area AOIs.

7.1.10 AOI 10 – Existing Stormwater Pond and Outfall 003

The storm water management system is designed to direct all flows either to the Stormwater Pond in the East Plant Area or to process waste water treatment system. This Stormwater Pond is located northeast of the former east parking lot, east of GM Drive. The storm water management system has end of pipe treatment subject to an NPDES permit issued by the State of Indiana and is inspected and maintained by Facility personnel. Facility personnel have previously investigated the potential for active or uncapped storm sewer pipes around the perimeter of the Facility that could lead to off-Facility discharges. Visual assessments have revealed that documented storm sewers have been abandoned (See Appendix Z).

The Stormwater Pond primarily receives stormwater run-off from the Facility located west of GM Drive. Historically, the Stormwater Pond also received stormwater run-off from the area east of GM Drive. However, following the implementation of the East Plant Cover System, stormwater over the clean Cover System is directed into Tributary 3 which joins into Bailey's Branch Creek. In addition,

the Stormwater Pond also receives water generated from the northern and southern springs identified in Section 7.1.1, backwash water from operation of the stormwater treatment facility, and periodically groundwater from the SSC system. Water from the Stormwater Pond is treated for PCBs through the on-Facility WTP and discharged to Outfall 003 under the Facility's existing NPDES permit. Prior to 2005, the NPDES permit allowed emergency stormwater overflows from Outfall 003 to Tributary 3 and subsequently into Bailey's Branch Creek. The location of the Stormwater Pond and Outfall 003 are shown on Figure 3.1.

The initial RFI Work Plan described two surface water samples to be collected from two locations and three sediment samples to be collected from three locations within the Stormwater Pond and in Tributary 3. Final samples collected were 19 surface water samples (15, of which were from adjacent springs) collected from six locations (five spring locations) and four sediment samples collected from three locations (additional spring sampling was conducted during the SSC Phase I and II monitoring in Appendix B.6). In addition, the area surrounding AOI 10 (some of which are interchangeable with AOI 4), was also sampled; 27 soil and sediment samples were collected from 24 locations. Following a 2014 inspection of the storm sewer, which discharges to the southwest corner of the pond, additional sediment samples were collected from the lagoon and analyzed for PCBs. Sixteen soil/sediment samples from the pond, nine soil samples from along the sediment banks, and three surface water samples from the lagoon were collected. Figure 7.1.4 presents the sampling locations completed for this AOI. Tables 7.1.1, 7.1.2, and 7.1.4 present a sample detection summaries of the sampling completed in AOI 10.

One surface water sample exceeded the SLs for total PCBs and total and dissolved thallium at the location just downstream of the spring that was located near Outfall 003 (just east of AOI 10) prior to that spring being contained and treated. One other surface water sample exceeded the SL for total PCBs and the spring that fed that location is currently contained and treated. PCB concentrations exceeding the SLs were also detected in three springs located east of AOI 10, and total and dissolved manganese was detected at concentrations exceeded that the SLs at one spring (all of which are currently being contained and treated as discussed in Section 7.5).

Samples collected from the Stormwater Pond were not evaluated in the HHRA as the sewer pipes are scheduled to be cleaned of retained sediment, and the Stormwater Pond dredged, in 2016/2017.

7.1.11 AOI 11 – Aboveground Storage Tanks

The Bedford Facility historically utilized several Aboveground Storage Tanks (ASTs) for storage of various materials including vehicle fuel and PCB-containing fluids. Those ASTs with documented, or suspected releases, have been classified as AOI 11. These include: Former Used Hydraulic Fluid ASTs; Used Mineral Oil AST Release; and Temporary Diesel AST Release. The locations of these former ASTs can be found on Figure 3.1.

All ASTs used for containing Former Hydraulic Fluid ASTs were located in three bermed areas within the East Plant Area. The WWTP concrete holding basin (Aeration Basin) currently covers most of one of the former bermed areas; the second former bermed AST area is located at the current location of the Calgon Building and Surge Basin; and, the third former bermed AST area is located within the currently bermed containment for the one-million gallon AST. The Former Used Mineral Oil AST, which was formerly located to the west of the Dye Cast operations, had a release in

1977 and the surrounding asphalt were removed between March and June 1977. The location of the October 2000 Temporary Diesel AST release is located south of the former Piston Building.

The RFI Work Plan described nine soil samples to be collected from three releases within the Used Hydraulic Fluid AST storage areas in the East Plant Area, and one sample from one location at each of the remaining two areas included as AOI 11 in the West Plant Area. The completed RFI included the collection of 17 soil samples from 8 locations (four samples from two locations at the Used Mineral Oil AST Release, one sample from one location at the Temporary Diesel AST Release, and 12 samples from three locations at the Former Used Hydraulic Fluid ASTs). Figures 7.1.1 and 7.1.3 present the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 11.

Soil samples collected from the former ASTs were analyzed for VOCs, SVOCs, inorganic compounds, and PCBs. Results from the Used Hydraulic Fluid AST storage areas found one detection of PCBs exceeding the SLs for the Facility. Results from the Used Mineral Oil AST and from the Temporary Diesel AST found no detections exceeding the SLs for the Facility.

7.1.12 AOI 12 – Area Affected by the Reclaimed Hydraulic Fluid Release

A release of reclaimed hydraulic fluid occurred when a tanker ruptured adjacent to the Die Cast Building on September 14, 1984. Two storm drains are located in the area where the release occurred and the area is currently covered with concrete. At the time of the spill, the storm drain flowed to a pump lift station that pumps stormwater to the Stormwater Lagoon. GM removed the hydraulic fluid from the lift station and flushed the sewer. During a February 2001 Facility walkover completed for the development of the CCR, the condition of the concrete was noted to be deteriorated from truck traffic and Facility use.

The complete RFI resulted in the collection of two surface soil samples from two locations, as identified in the RFI Work Plan. Sample results indicated the detection of two VOCs and 14 inorganic compounds; none of which exceeded the SLs for the Facility. Figure 7.1.1 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 12.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.1 of Appendix S.2 for the databox results of the data screening.

7.1.13 AOI 13 – Underground Storage Tanks

Seven USTs have been utilized at the Facility for the storage of vehicle fuel and ethyl silicate. These USTs were installed between 1950 and 1977 and all seven were removed between 1991 and 1994. Closure reports for the removal of all USTs have been submitted to the IDEM. These former USTs were located in two separate locations; the Oil House area and the south Piston Yard area. Specifically, two USTs were located at the Oil House, which were removed, and a No Further Action (NFA) letter was obtained from IDEM dated August 13, 2004 (Appendix U). Five USTs were removed from the South Piston Yard, for which a Conditional NFA was obtained from IDEM on March 20, 2008.

Because extensive work had been completed at this AOI prior to the RFI, no subsurface investigation was initially proposed for this AOI in the RFI Work Plan. Closure documentation was found for the Oil House USTs (Appendix U). However, in subsequent discussions with IDEM, IDEM requested documentation of current soil conditions at the South Piston Yard Area.

To characterize the existing conditions, 12 soil samples were collected from 6 locations in various areas surrounding the former USTs (Figures 7.1.1 and 7.1.2. Pursuant to IDEM closure guidelines in effect at the time the initial Closure Report was prepared in 1994, soil samples were analyzed for TPH, gasoline range organics (GRO), and diesel range organics (DRO), in addition to VOCs and SVOCs. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 13.

Analytical results exhibited detections of 12 VOCs and 6 SVOCs, which were all less than the SLs. Concentrations for TPH GRO, ranged from <0.13 to 530 mg/kg, and concentrations for TPH DRO ranged from 0.47 to 11,000 mg/kg. Based on the results obtained from the excavation limits of the former UST, IDEM granted a Conditional No Further Action (NFA) letter on March 10, 2008 (Appendix U).

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.1, S2.2, S2.5, and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.14 AOI 14 – McBride Cows Disposal Area

In April 1978, GM purchased and euthanized 91 head of cattle from the McBride dairy farm located along Bailey's Branch of Pleasant Run Creek, into which GM discharged its treated wastewater. The cattle had been exposed to PCBs in the creek and subsequent testing of the cattle indicated the presence of PCBs in the milk and fat. Documentation indicated that the cattle were properly disposed in accordance with Indiana Code IC-2.1-16-20. Euthanized cattle were placed in a prepared pit where the sidewalls and bottom were plastic-lined and the cattle were covered with 4 ft to 6 ft of clay (Figure 3.1 shows the location of this AOI).

The RFI Work Plan identified two soil samples collected from two locations to be analyzed for PCB to be sufficient in characterizing this AOI, and these were collected during the RFI. Only one of the two soil samples collected exhibited a detectable concentration of PCBs, at a concentration below the SLs. A total of nine soil borings were completed to identify the former burial site. Figure 7.1.5 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 14. The nine borings were utilized to verify subsurface geophysical conditions in this area. All borings were completed to the bedrock surface, where refusal was encountered. Subsurface conditions generally consisted of 12 ft to 13 ft of clay fill material within the disposal area and approximately 4 ft to 5 ft of native clay outside of the disposal area. The clay fill material generally consisted of brown, soft (medium plasticity) clay with a trace of silt. Grey, white, and black layering was noted in several borings advanced through the fill area. One boring indicated a trace of trash encountered within the disposal area. A 6-inch layer of sand was encountered immediately above the bedrock at the eastern limit of the disposal area. A stiff, reddish-brown to strong brown clay with a trace of silt was encountered outside of the disposal area and immediately above the weathered bedrock surface.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.7 of Appendix S.2 for the databox results of the data screening, of which no exceedances are identified.

7.1.15 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 the Former North Disposal Area (AOI 4). Prior to the implementation of the East Plant IM, the area was covered with gravel and used for tractor trailer parking.

Six soil samples from two locations were initially proposed in the RFI Work Plan. Actual soil samples were 21 from five locations from the completed investigation. Figure 7.1.4 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 15.

From the 21 soil samples collected, 13 VOCs, 18 SVOCs, and 19 inorganic compounds were detected. PCBs were detected in 17 of the 21 soil samples collected. After accounting for soil removal and construction of the Cover System in the East Plant Area, none of the locations exceeded the SLs for the Facility. Refer to Drawing S2.7 of Appendix 2 for the databox results of the data screening, of which no exceedances were identified.

7.1.16 AOI 16 – Former East Electrical Substation

An electrical substation was located west of the aeration basin on the east side of GM Drive (Figure 3.1). As this property was owned by Cinergy Corporation (Cinergy) of Cincinnati, Ohio, at the time of investigative sampling was being conducted, no samples were collected at this AOI. The entirety of this AOI footprint falls within the limits of the East Plant Area Cover System.

7.1.17 AOI 17 – Piston Building Oil Accumulations

In late 1977, oil accumulations were identified in a ditch along the west side of the Former Piston Building (Figure 3.1).

The six soil samples from the two locations that were proposed under the initial RFI Work Plan were collected during the completion of the investigation. Analytical results indicated six VOCs identified, 18 inorganic compounds identified, and two of the samples exhibited concentrations of detectable PCBs. All detections were below the SLs for the Facility. Figure 7.1.1 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 17.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the human health risk assessment presented in Section 9.0. Refer to Drawings S2.1 and S2.5 of Appendix S.2 for the databox results of the data screening.

7.1.18 AOI 18 – Area Affected by the Henry System Discharge

On April 7, 1986, wastewater from the Henry System, formerly located inside the Former Piston Building, was discharged onto a concrete slab south of the building. The discharge entered a storm sewer and flowed down the steps leading into the WWTP (Figure 3.1). The Henry System is located in the southern portion of the Former Piston Building.

The original RFI Work Plan called for the collection of two soil samples from two locations. Actual soil samples were 25 soil samples collected from 13 locations. Figure 7.1.1 presents the locations of all sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 18.

For the soil samples analyzed for compounds other than PCBs, 10 VOCs, 18 SVOCs, and 19 inorganic compounds were detected. One inorganic detection exceeded the SLs for the Facility. Of the 25 soil samples submitted for PCB analysis, there were 14 detections, results ranging from non-detect to 140 mg/kg, with one exceeding the SLs for the Facility. An SL exceedance was excavated from under a concrete pad, and the pad was restored during the West Plant Area IM completion (Appendix B.15).

Soil samples were also collected at the location of the former Henry System (LaSalle Units), within the southern portion of the Former Piston Building. This area had not been previously identified as an AOI, based on the historical records reviewed but was added based on wipe samples collected in the area. Soil samples were collected in accordance with the RFI Work Plan and were described in the RFI Work Plan Addendum No. 1 (CRA, November 18, 2002).

One soil boring (B-X137Y132) was advanced near a location where Plant personnel had obtained a suspect concrete wipe sample result for PCBs. This location was inside of the Former Piston Building, adjacent to the former Henry System (Figure 3.1). This boring was extended until refusal was encountered at the bedrock surface.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of remaining human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.1 and S2.5 of Appendix S.2 for the databox results of the data screening.

7.1.19 AOI 19 – Area Affected by a Paint and Thinner Spill

In May 1990, spent thinner and paint was spilled on the ground surface north of the concrete pad on the outside of the Paint and Thinner Storage Area at the Oil House (refer to Figure 3.1).

The complete investigation included the collection of three soil samples from one location, as described in the RFI Work Plan. Figure 7.1.2 presents the sampling location completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 19.

Two VOCs were detected in two of the samples analyzed at concentrations well below the SLs for the Facility.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential

exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.2 of Appendix S.2 for the databox results of the data screening, for which no exceedances were identified.

7.1.20 AOI 20 – Northern Portion of the Piston Building

The Manifold Department was located in the northern portion of the Former Piston Building (refer to Figure 3.1). Plant records indicated that there may have been releases of cooling water and oily substances in 1990 from this area.

The RFI investigation included the collection of one soil sample from one location, as described in the RFI Work Plan. Analysis of this sample indicated one VOC and 14 inorganic compounds were at detectable concentrations. None of these results exceeded the SLs for the Facility. Figure 7.1.2 presents the sampling location completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 20.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.2 and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.21 AOI 21 – Filled Ravine North of the Die Cast Building

Reviews of historic photographs (1945) indicate that a ravine existed north of the current Die Cast Building. The photograph also showed manufacturing activities, including product storage in this area. This area has been filled in to the same approximate elevation of the main plant and is currently paved or otherwise occupied by the Bulk Storage, Maintenance Sheet Metal and Fabrication Building, Chip Processing and Crusher Buildings, and the Alloy Storage Building. Chip system residue is still generated from the chip drying process. The residue is disposed or recycled at a licensed facility based on analytical sample results. The existing Equipment Storage Area is paved and is utilized for the storage of equipment.

The initial RFI Work Plan called for the collection of 12 soil samples from four separate locations. Twenty-seven soil samples from 10 locations were collected during completion of the investigation of the initial area. Of the 27 soil samples collected, eight VOCs, 10 SVOCs, and 18 inorganic compounds were detected. Of the 27 samples, four had PCBs detections. No compounds exceeded the soil SLs for the Facility from the initial investigation area. Figure 7.1.2 presents the locations of all sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the soil sampling completed in AOI 21.

Subsequent to the initial RFI Work Plan, additional information was discovered in the form of historic photographs, figures and maps, depicting the historic topography and subsequent filling (Figure 1.1 of the RFI Work Plan Addendum 3, CRA March 2004 shows the historic topographic contours used to identify the subdivided AOI 21 described below). In addition, a Bartlettsville quadrangle historic USGS topographic map from 1958 also gives indication of the former topography in most of these areas. Four sub-areas to AOI 21 were identified based on this information and sampled, as described below.

7.1.21.1 AOI 21-1 – Former Drainage Valley under Hourly Parking Lot

Sub Area 1 of AOI 21 (AOI 21-1) is located to the north and east of AOI 21 and consists of a former drainage valley, trending southwest to northeast and underlying a majority of the north Facility parking lot (to the north of the manufacturing area of the Facility). Based on review of historical documents, this drainage valley appears to have originated at AOI 21 and was a fairly narrow, steep-banked valley. Currently, there is no surface expression to indicate where this former drainage valley was located.

In order to evaluate this sub-area of AOI 21, a total of 82 soil samples were collected from 32 locations. Figure 7.1.2 presents the locations of all sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 21-1.

There were 14 VOCs detected, 22 SVOCs detected, and 21 inorganic compounds detected in the soil samples submitted for these analyses. Of these compounds, only total chromium was found at a concentration exceeding the SLs for the Facility. There were 52 out of the 82 samples collected that exhibited detectable concentrations for PCBs with concentrations ranging from non-detect to 67 mg/kg; with one sample detection which exceeded 50 mg/kg. The soil at this location was subsequently removed during the IM activities for the West Plant Area.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI (remaining after excavation) is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.2 and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.21.2 AOI 21-2 – Former Drainage Valley Northeast of Piston and Office Buildings

Sub Area 2 of AOI 21 (AOI 21-2) is located east of the Former Piston Building and north and east of the office area at the Facility. This drainage valley appears to have historically carried surface water from portions of the west side of GM Drive across to the East Plant Area to the north and east, although historical documents reviewed do not show the extension of this valley to the east. This former drainage valley was filled, and a current ground surface depression is not observed.

Initial sampling in this area to determine the location of the former drainage valley, revealed one sample, with a PCB concentration that exceeded the SLs for the Facility. Subsequent sampling to determine the extent of that exceedance, resulted in the collection of 536 samples from 82 locations due to the nature of the material that had been used to fill the former drainage valley. Figure 7.1.2 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI-2.

The resulting limits of soil concentrations greater than 50 parts per million (ppm) PCBs were delineated; most of which was removed during implementation of the West Plant Area IM Work Plan (CRA, April 23, 2007). Some of the material that exceeded 50 mg/kg PCBs could not be removed due to the presence of a high pressure gas main along GM Drive. However, the delineated area of soil concentrations greater than 50 mg/kg PCBs that were not practical to remove have been capped in accordance to the West Plant Area IM Work Plan and the Request for Amendment - 40 CFR 761.61 (C) Approval Over 50 mg/kg PCB Soil Source Removal and Cover System Design (CRA, December 12, 2007).

In addition to the PCBs detections in the initial sampling, five VOC, and 20 SVOCs were detected and 18 inorganic compounds were detected in samples submitted for these analyses. Of the 530 soil samples analyzed for PCBs, 410 had detections. No compounds detected throughout this sub-area of AOI 21 that exceeded the SLs for the Facility remain, or are located under the engineered Cover System completed as part of the West Plant Area IM.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0 for constituents remaining after removal and Cover System completion. Refer to Drawings S2.1 and S2.3 of Appendix S.2 for the databox results of the data screening.

7.1.21.3 AOI 21-3 – Surface Water Ditches Located Along GM Drive and Breckenridge Road

Sub Area 3 of AOI 21 (AOI 21-3) consists of surface water drainage swales located along GM Drive and Breckenridge Road. Stormwater running through these swales was collected by two drainage pipes (the 48-inch culvert and a 15-inch corrugated steel pipe [CSP]), which ran beneath GM Drive and discharged to the headwaters of Tributary 3 (see Figure 3.1). The 48-inch culvert originated at the MH-ST-43 catch basin, which was closed off following this investigation (discussed further in Section 8.1.2.1). The 15-inch pipe is shallower, and is located closer to the intersection of GM Drive and Breckenridge Road, and is not known to be part of Facility operations. Note that some of the sampling described below is also included in AOI 21-1 (Section 7.1.14.1), as these areas overlap.

There were 12 soil samples analyzed for VOCs and SVOCs during the investigation of this sub-area of AOI 21, and four VOCs and 14 SVOCs were detected; none of which exceeded the SLs for the Facility. There were 12 detections of PCBs in the 21 soil samples analyzed for these compounds with concentrations ranging from non-detect to 0.203 mg/kg; none of which exceeded the SLs for the Facility or at a concentration that exceeded 50 mg/kg PCBs. This location was subsequently removed during the IM activities for the West Plant Area (this was the same location described under Section 5.7.21.1). There were 21 soil samples analyzed for inorganic compounds; which detected 19 metals. Three inorganic detections exceeded the SLs for the Facility as follows: lead exceeded the SLs for the Facility at one sample location, total Chromium exceeded the SLs for the Facility at one sample location, and mercury exceeded the SLs for the Facility at one location. Figure 7.1.2 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 21-3.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0 for constituents remaining after removal. Refer to Drawings S2.2 and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.21.4 AOI 21-4 – Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

The beginning of this former drainage valley is beneath the Cinergy owned electrical substation on the Facility property south of Breckenridge Road (see Figure 3.1). Based on review of historical documents, this former drainage valley may have continued under Breckenridge Road beneath

Off-Facility Fill Area – Parcels 384 and 386 (AOI 26) and into the headwaters for the Northern Tributary at one time. This fill area was removed as part of the Northern Tributary IM. However, little surface expression remains showing the former drainage valley.

This investigation consisted of the collection of 16 samples for PCBs, and seven samples for VOCs, SVOCs, and inorganic compounds. There were two VOCs detected, 20 SVOCs detected, and 18 inorganic compounds detected within the seven samples analyzed. None of these compounds exceeded the SL for the Facility. Out of the 16 samples analyzed for PCBs, there were 12 detections with concentrations ranging from non-detect to 54.1 J mg/kg; only one of which exceeded the SLs for the Facility. The sample analyzed for PCBs which exceeded the SL for the Facility could not be confirmed during delineation or resampling in this area; all delineation and resampling resulted in detections below the SL for the Facility. Figure 7.1.2 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 21-4.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.2 and S2.6 of Appendix S.2 for the databox results of the data screening.

7.1.22 AOI 22 – Tool Room Annex Dock Release

A release of cleaner (Spray Kleen) to the Tool Room Annex Dock and adjacent unpaved rail bed occurred on March 21, 2000, when a tote containing the cleaner fell off of a fork truck and spilled in this area.

There were 24 soil samples collected from 9 locations (24 for metals, and 17 for VOCs, SVOCs, and PCBs (the RFI Work Plan initially described one soil sample from one location). Figure 7.1.1 presents the sampling locations completed for this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 22.

There were four VOCs, 17 SVOCs, and 21 inorganic compounds detected while completing this investigation. Two of the detected metals (antimony and lead) exceeded the SLs for the Facility. No other compound exceeded the SLs. Both metals were detected in the same soil sample that was collected from beneath concrete. Of the 17 samples collected and submitted for PCBs analyses, 3 had detections. None of the PCBs detections exceeded the SLs for the Facility.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.1 of Appendix S.2 for the databox results of the data screening.

7.1.23 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 (Figure 3.1).

The RFI Work Plan called for the collection of one soil sample from the location where the release occurred to verify that it was adequately cleaned up.

The one sample exhibited a detected concentration of total PCBs of 3.3 mg/kg and a detection of 15 inorganics. No other parameters were detected. No detected concentration exceeded the SLs for the Facility. The location of the sample collected for this AOI is presented in Figure 7.1.3. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 23.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawing S2.7 of Appendix S.2 for the databox results of the data screening.

7.1.24 AOI 24 – Area Affected by the June 2000 Die Lube 5150 Release

A release of Die Lube 5150 (used on the die cast forms to allow for release of the parts) occurred near the Receiving Office in the Die Cast Building. Figure 3.1 presents the location of AOI 24.

The RFI Work Plan called for the collection of two soil samples at two locations. The actual investigation included the collection of three soil samples from three locations (due to refusal at one location). The sample collection locations for this AOI are presented on Figure 7.1.1. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 24.

There were two samples submitted for VOCs, with one detection resulting, which was below the SLs. All three samples were analyzed for SVOCs, PCBs, and inorganic compounds. One sample exhibited a detection for PCBs, no SVOCs were detected, and 17 inorganics were detected. No detected concentration for any compound exceeded the SLs for the Facility.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Drawings S2.1 and S2.5 of Appendix S.2 for the databox results of the data screening.

7.1.25 AOI 30 – On-Facility Suspected Fill Area - Parcels 201 And 204

Parcel 201 is owned by GM and is located on the southern extent of the East Plant Area and consisted of a parking area and a tree-filled ravine that drained surface water to the headwaters of Bailey's Branch, near Outfall 002 (Figure 3.1). Parcel 204 is a residential property owned by GM located due east of Parcel 201 at the top of the ravine.

Upon completion of the thermal aerial survey, several springs were noted at Parcel 201. These springs emanated from the then existing valley and the resulting surface water flowed to the northeast along the former valley to enter into the headwaters of Bailey’s Branch, near Outfall 002. Subsequent sampling of these waters indicated an impact of PCBs at the springs. Gravel blankets were installed and the water was hard-piped to Wet Well 1 for treatment. Subsequent filling of Parcel 201 resulted in burying the gravel blankets and piping.

Review of a 1979 aerial photograph revealed filling activity in Parcel 201. Several soil borings were advanced and soil samples analyzed. The results of these samples delineated the extent of ≥50 mg/kg PCBs within fill material, and a small area of household garbage. Delineation results indicated a small impacted area on Parcel 204 but the sample results and photographs indicated it was not

part of the main fill area. Figure 7.1.3 presents the locations of delineation in this AOI. Table 7.1.4 presents a sample detection summary of the sampling completed in AOI 30.

There were 141 samples collected from 58 locations within Parcel 201. Of the 141 samples, there were 118 detections of PCBs, with results ranging from non-detect to 692 J mg/kg. None of the samples were analyzed for VOCs, SVOCs or inorganic compounds. Following the screen accounting for soil removal and the Cover System in this area, none of the detections exceeded the SLs. Refer to Drawing S2.4 and S2.7 of Appendix S.2 for the databox results of the data screening.

Parcel 201 was added to the East Plant Area Cover System. GM completed soil excavation activities of ≥50 mg/kg PCBs soil at this AOI, and <50 mg/kg PCBs soil from Parcel 204 under the Parcels 201 and 204 IM Work Plan (CRA, May 16, 2008). This work was based on sampling completed to determine the extent of PCBs within the fill material. The remediation of Parcels 201 and 204 outlined in the Parcels 201 and 204 IM Work Plan is complete and the Cover System construction over Parcel 201 is also complete. The data from Parcels 201 and 204 that have been excavated or covered have not been evaluated in the HHRA presented in Section 9.0 of this RFI Report.

7.2 AOIs Not Owned by GM

There were a few AOIs that were included for investigation. These AOIs were either privately owned or subsequently transferred to a trust as a result of the 2009 GMC bankruptcy. The status and ownership of these AOIs are list below.

7.2.1 AOI 25 Off-Site Fill Area – Parcel 398

This AOI was investigated at the property owner's request through a geophysical survey and a number to test pits to verify anomalies. The property appears to have been filled at one time and the anomalies confirmed to be various fill material consisting of steel reinforcement bar, clay tile, bricks, etc. Parcel 398 is privately-owned, because this property is non-GM or GMC owned and there is no evidence of waste disposal, storage, or handling at this location, no further investigation was warranted and sample results were excluded from the HHRA (Table S.3 lists the samples collected).

7.2.2 AOI 26 Off-Site Fill Area – Parcels 384 & 386

These parcels, located north of Breckenridge Road were previously owned by GMC and were subsequently transferred to the trust fund during bankruptcy. Both parcels are now privately owned. Investigation and remedial activities of the fill materials were conducted at these locations are referenced as the Northern Tributary (Section 8 of this report) and can be found as Appendix B.9. Work consisted of completing sampling and analysis of soil; identification and characterization of material containing PCBs; excavation of impacted soil and bedrock; verification and waste characterization sampling and analysis; transportation and placement of the excavated material at appropriate U.S. EPA-approved disposal facilities (including the Facility); backfilling of the excavations; and restoration of the Site.

The results obtained from the geophysical study completed under The Geophysical Investigation Report (February 3, 2004), which can be found as Appendix A to the RFI Work Plan Addendum No. 4 and Appendix O to this Report. The Construction Completion Report was prepared by CRA (December 2010) for Motors Liquidation Company, formed as a result of the GM bankruptcy in 2009.

7.2.3 AOI 27 Off-Site Fill Area – Parcels 381 & 382

These parcels, located north of Breckenridge Road were previously owned by GMC and were subsequently transferred to the trust fund during bankruptcy. Both parcels are now privately owned. Investigation and remedial activities of the fill materials were conducted at these locations are referenced as the Northern Tributary (Section 8 of this report) and can be found as Appendix B.9.

Similar to the work completed under AOI 26 (Section 7.2.2), the results of the IM activities was reported in The Construction Completion Report was prepared by CRA (December 2010) for Motors Liquidation Company, formed as a result of the GM bankruptcy in 2009.

7.2.4 AOI 28 Off-Site Fill Area – Parcel 401

PCBs were discovered during testing completed at Parcel 401, located immediately north of the East Plant Area of the Facility. Subsequent removal and disposal of fill material located here and completion of verification sampling was completed pursuant to the Upstream Parcels Removal Action Work Plan (CRA, July 16, 2003), with the final results provided in the Construction Certification Report – Upstream Parcels Removal Action (CRA, October 2007).

This parcel was privately-owned during remedial action activities and remains so at the time of publication of this Report.

7.2.5 AOI 29 Off-Site Fill Area – Parcel 39

During routine testing of materials at Parcel 39 for the purpose of finding a source of clean fill material to use at the Facility, a small area was found to contain minor concentrations of PCBs. Parcel 39 is located in the downstream section of Pleasant Run creek, west and south of the former railroad trestle. Material was removed pursuant to the Downstream Parcels Removal Action Work Plan (CRA, May 25, 2004) and results reported under the Downstream Parcels Construction Certification Report (CRA, December 8, 2015), included as Appendix B.13.

7.2.6 AO 31 Off-Site Fill Area – Parcel 400

This Parcel, along with Parcels 430 and 431 is located west of the Facility and investigations indicated a former drainage valley that had been filled at some time by an unidentified entity. All three Parcels are privately-owned and are not currently under the Administrative Order on Consent. GM submitted a Request for Removal Approval pursuant to 40 CFR 761.61 (C) to the U.S. EPA on December 30, 2019. This work will be completed by GM under good faith with the adjoining property owners.

7.3 Other Sampling Investigations

The following sections present a summary and discussion of the RFI results for other soil sampling at the Facility. The discussions include a summary of the scope of the field investigations, and a summary and evaluation of the RFI data.

7.3.1 Plant Boundary

Additional soil samples were collected during installation of the groundwater monitoring wells around the perimeter of the Facility. For those locations that fell within, or near, an existing AOI, the results

are previously discussed within the discussion of that particular AOI. The following monitoring well locations, considered as Plant Boundary locations, are as follows: MW-X045Y258D, MW-X261Y356D, MW-X033Y147S, MW-X169Y058S, MW-X178Y367D, MW-X234Y157D, and MW-X269Y201D.

Two sample locations exceeded the SL for PCBs. The parent sample (MW-X234Y157D, 0-2 ft bgs) exhibited a concentration of 17.2 mg/kg and the duplicate sample from the same interval exhibited a concentration of 19.7 mg/kg. The surface soil sample collected from MW-X045Y258D (0-2 ft bgs) exhibited a PCB concentration of 58.5 mg/kg (parent) and 4.18 mg/kg (duplicate). No other parameters exceeded any of the screening levels for this group. The location of monitoring well MW-X045Y258D was initially chosen as a background location. However, upon the collection of the initial soil sample it was determined that this area had potentially been filled and the result was excluded from the background data set. Also the discussion on AOI 21-4 in Section 7.1.21.4 where this location resides. Figures 7.1.1 through7.1.5 presents the sampling locations completed for the RFI. Table 7.1.4 presents a sample detection summary of the sampling completed at the RFI boundary.

Because of the discrepancy between the parent sample and the duplicate at the location of monitoring well MW-X045Y258D, additional surface soil samples were completed at and near this location. Five surface soil samples (BK-X045Y258, SS-X062Y257, SS-X065Y254, SS-X065Y260, and SS-X065Y256) were collected to delineate the extent of PCBs. Analytical results from the replicate sample (SS-X065Y256) and from the surrounding samples were all below the screening levels.

Based on a review of these data, it was determined that sufficient data have been collected to support the RFI baseline risk assessment. The evaluation of human health risks from potential exposure to constituents detected at this AOI is discussed in the HHRA presented in Section 9.0. Refer to Appendix S.2 for the databox results of the data screening.

7.3.2 Groundwater-Surface Water Investigation in Creeks

7.3.2.1 General

This section discusses activities that are in place to monitor surface water and nearby groundwater flow along Bailey's Branch and Pleasant Run Creek (completed as part of the RFI Work Plan Addendum No. 1 [CRA, November 18, 2002]). The flow monitoring was performed to support development of a hydraulic model of the Facility and local creek system. Five stream monitoring stations are in place at the locations presented on Figure 2.8 and Figures 7.5 through 7.9. Each stream monitoring station has a water level and water velocity recorder. Three locations were chosen to assist in determining flow from the various creeks and tributaries. Rainfall stations were also installed to collect site-specific data for the hydraulic modeling of the watershed.

Shallow piezometers (PZ08, PZ23, PZ31, PZ38, and PZ39) were installed near the location of the stream monitoring stations (boring logs for each well can be found in Appendix F). The piezometer IDs corresponds to the number of the Parcel on which they are located. The purpose of these piezometers is to determine groundwater/surface water hydraulic characteristics. Each piezometer is installed in the vicinity of the stream gages, which monitor level and flow of the surface water

throughout the creek system. The depth of each piezometer was completed at what was believed to be below the seasonal low groundwater elevation.

These results indicate that at each station, the groundwater elevation is higher than the creek elevation immediately adjacent to the piezometer, thereby indicating that the majority of the creek system is gaining groundwater from the surrounding highlands. The exception to this general statement (where the creek system is losing to the ground (or recharging the groundwater) is in the area of the identified swallets, near the Spring 018 area (refer to Sections 2.5.3.1 and 3.6.6.8).

7.3.2.2 Swallet/Spring 018 Area

Investigation Results

The focus of this investigation was to ground truth the results of the two geophysical surveys. These surveys were conducted to try to determine potential groundwater flow pathways from the swallet area to Spring 018C.

In all, 22 coreholes were installed along the suspected groundwater flow paths. These coreholes revealed a highly fractured Harrodsburg Formation throughout the investigation. Hydraulic conductivity testing was completed by packing off selected intervals of the formation and pumping water under various pressures. These results indicated that the secondary permeability features (i.e., fractures and bedding planes) transmit the groundwater through this system and that the matrix (i.e., solid bedrock void of fractures) does not play a large role in the movement of the groundwater. Figures 7.10 through 7.17 present the cross-sections of the Spring 018 Area.

The results of the analytical grab samples show PCB detections in several of the coreholes (Figure 7.10).

The results of the groundwater pumping and the mapping of the difference in head between two separate dates (recharge) both revealed similar apparent fracture sets in the east-west and north-south directions. However, the dye tracer testing indicated that these fracture sets are not the only transport pathway and that the bedding plane fractures also appear to play an important role in groundwater movement. Groundwater recharge to Spring 018C appears to be coming from the sinkhole(s) located east of the spring, from the surface water recharging the groundwater system through the swallet area, and likely also from the western slopes adjacent to Bailey's Branch. See Section 4.2.2 for a discussion on the migration pathways in the Spring 018 Area.

7.4 Geotechnical Testing Results

7.4.1 Facility Wide

During completion of soil borings across the Facility, soil samples were collected and submitted to SHA for analysis of geotechnical properties. Table 3.2 presents a summary of the testing results for all samples submitted to SHA. Appendix D presents the report prepared by SHA.

Table 3.3 presents a summary of the bedrock geophysical core testing completed by Core Laboratories. In general the average porosity results for the high-pressure mercury injection testing were 8.6% for the St. Louis, 9% for the Salem, 5.4% for the Harrodsburg, and 23% for the Ramp Creek. Appendix G presents the final reports prepared by Core Laboratories.

7.4.2 AOI 4

A geotechnical evaluation was conducted at AOI 4 to evaluate slope stability for the potential placement of additional fill materials. The report is presented in Appendix D.

To further investigate the subsurface conditions of AOI 4 two-bedrock borings (B-X177Y252D and B-X233Y247D) were completed by CRA at an approximate angle of 30 degrees from vertical in order to increase the opportunity to identify vertical fractures and solution features. At the completion of each boring, packer-pressure testing was completed along the entire run of the open bedrock core. Upon completion of the testing the borings were then sealed with cement/bentonite grout and the outer casing removed to 2 ft bgs (the boring logs for these two borings can be found in Appendix F).

7.5 Groundwater Investigation

Residential Wells

As discussed in Sections 2.4.1 and 3.5.1, a residential well survey and sampling event was conducted at the Facility between July 23, 2001, and October 23, 2001. The residential well survey covered the entire area within a one-half mile radius of the approximate geographic center of the Facility (Figure 2.5). Additional private wells were sampled at the owner's request after the initial survey was completed.

None of the wells surveyed within the one-half mile radius of the Facility were used for potable water. However, one well (Parcel 292 Well) located outside of the one-half mile radius was being used for drinking water (PCBs not detected), and one well inside the one-mile radius (Parcel 208 Well) was being used for watering the lawn and gardens (dissolved PCB concentrations of 1.1 and 0.95 µg/L based on two sampling events).

Initial investigations of this well identified potential NAPL at the Parcel 207 Well. Samples were collected from the oil/water at the top of the water column for LNAPL, and at the bottom of the water column for potential presence of DNAPL. PCB concentrations were estimated at 3.8 µg/L and 0.87 µg/L, respectively, as summarized in Appendices C.8 and C.9. This well has since been abandoned and the property is now owned by GM.

PCBs were detected in the initial sample obtained from a well located northeast of the Facility on Broomsage Road (Parcel 20/296 well, location presented on Figure 2.5). This well is outside the half mile radius, but was sampled at the owner's request. The initial sample results from the sample obtained from this well had an estimated PCB concentration of 1.7 µg/L. The well was re-sampled for both total and dissolved PCBs. The results were non-detect for PCBs (total or dissolved) in the new samples. It is believed that initial analysis was either cross-contaminated during sampling or analysis.

Residential well/cistern samples were submitted to ATEL in Melmore, Ohio and were analyzed using the U.S. EPA Method EPA-DW 508 for drinking water. In addition, several duplicates were submitted to STL in North Canton, Ohio for analysis using the U.S. EPA Method 8082.

Since this initial survey was completed, GM continued to evaluate residential requests for the collection of groundwater samples from wells that were either outside of the initial survey area, or those that were discovered afterward. As a result, three additional residential wells were found to

have detectable concentrations of PCBs (0.26 µg/L at Parcel 388 Well, 0.2 µg/L at Parcel 413 Well, and 0.74 µg/L at Parcel 414 Well). Additional samples collected in 2006 were non-detect for PCBs at the following wells: Parcel 20/296 Well, Parcel 390/392 Well, 216 Rawlins Mill Road, Parcel 413 Well and Parcel 414 Well. Furthermore, Parcel 20/296 Well was resampled in 2007 and was non-detect for PCBs. These wells are not available for use as a drinking water source. GM now owns Parcels 413 and 414.

Further details on this program and analytical results of the sampling are included in the Technical Memorandum: Off-Facility Residential Well Survey and Sampling (December 9, 2002), included as Appendix B.1.

Facility Monitoring Wells

As discussed in Section 2.7.2.3, groundwater at the Facility is found in four flow systems: overburden (non-continuous), shallow bedrock, intermediate bedrock, and deep bedrock. Groundwater in the overburden and shallow bedrock discharges to the ground surface as seeps and springs at some locations at and around the Facility. A survey of groundwater use around the Facility conducted during preparation of the CCR (CRA, 2001a) identified a few former residential wells, but found no current potable use of groundwater in the vicinity of the Facility (CRA, May 25, 2001). The locations where groundwater and spring water data have been collected from each of the groundwater flow systems are shown on Figures 7.18 through 7.25.

Table S2 in Appendix S.1 presents the screening tables, which compare the most recent groundwater and spring water data collected through May 2015, respectively, with the drinking water criteria discussed in Section 6.2.2. Locations that are contained and treated (i.e. SSC Collection Systems) are not included in the screen results. These data best represent current conditions at and around the Facility. The locations where the current data indicate presence of contamination on the Facility are shown on Figures 7.18 through 7.25. The comparison results for non-PCB chemicals are shown on Figures 7.18 through 7.21 and the comparison results for PCBs are shown on Figures 7.22 through 7.25. Figures 7.18 through 7.25 are also color-coded to show locations where the concentration of PCBs had been higher than the Maximum Contaminant Level (MCL) of 0.0005 mg/L even if subsequent monitoring showed that the concentration is not higher than the MCL (see Section 6.2.2). The HHRA presented in Section 9.0 evaluates potential exposures to groundwater at and around the Facility.

Consistent with the EI CA750 routine groundwater sampling is being conducted semi-annually under the EI CA750. The reports are submitted twice annually

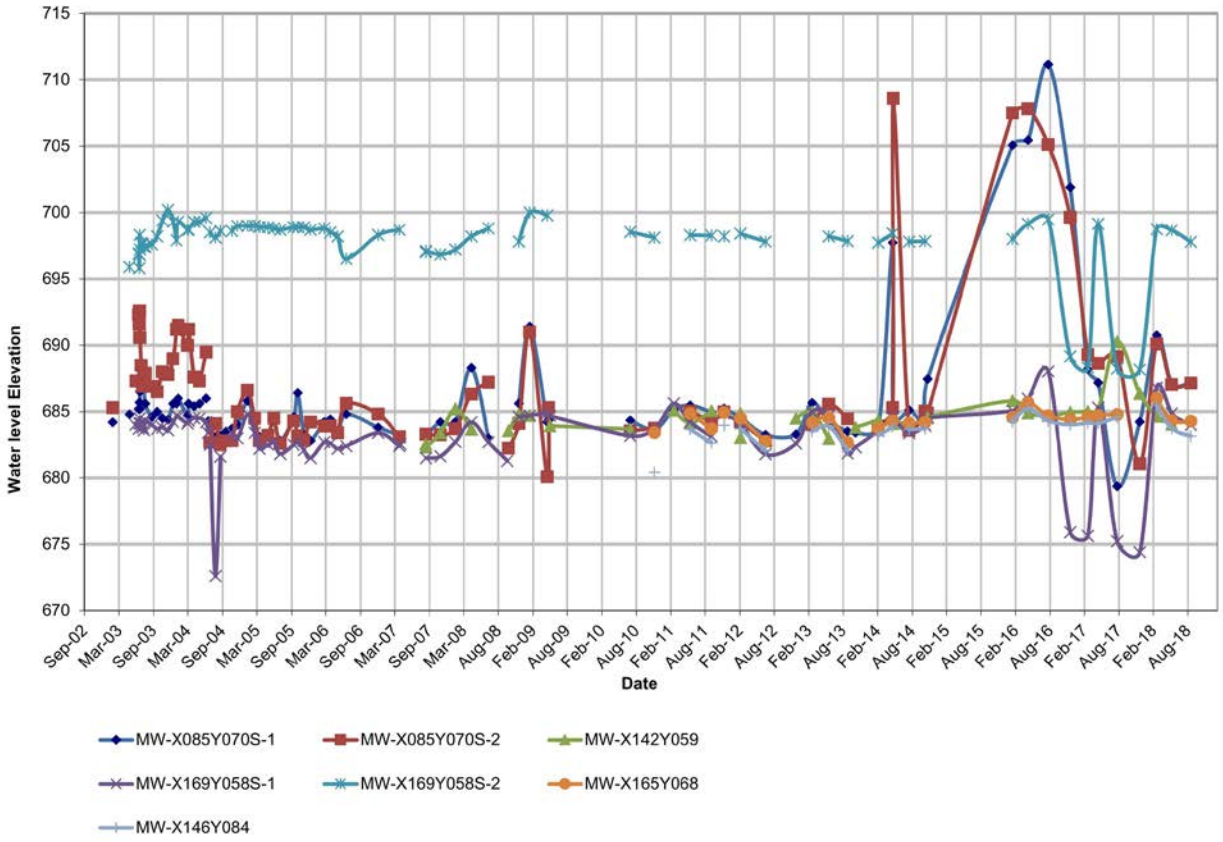
In Table S2, samples collected at overburden monitoring well TMW-X193Y251 had concentrations of chlorobenzene (0.15 µg/L) and vinyl chloride (2.7 µg/L) that exceeded the drinking water criteria. This location was removed as part of the AOI 4 soil removal action in March 2007.

Table S2 shows that a few metals (aluminum, arsenic, chromium, cobalt, iron, lead, and manganese) periodically have had concentrations that are higher than the drinking water criteria at several monitoring wells and springs. However, the presence of these metals is likely unrelated to the Facility based on their distribution in the groundwater and the RFI soil characterization data at and around these locations. Additional groundwater sampling and analysis for metals at certain locations (MW-X033Y147 cluster, MW-X257Y073, and MW-X169Y058S-1) were included as additional groundwater sampling event to verify the prior concentrations. The results of this sampling

show that the most recent concentrations of chromium III and VI, antimony, and thallium do not exceed drinking water criteria at the MW-X033Y147 cluster, MWX257Y073, and MW-X169Y058S-1, respectively. These data, including the recently collected data, do not indicate the presence of metal concentrations higher than the drinking water criteria.

NAPL was observed at one spring off-Facility and at a few monitoring wells in the overburden and shallow bedrock on the Facility property. The majority of the NAPL observed in overburden and shallow bedrock at the Facility is denser than water and likely hydraulic oil that was used in the die presses. NAPL that is lighter than water has been observed at only one location; (at the Facility, corehole location CH-5; NOTE: a thin film of LNAP was observed at MW-X080Y070 prior to completion of this well as a Waterloo, multiple port well – it has not been observed since that initial report, but that could be a function of the final well design). The thin film of LNAPL reported was observed only on the tip of the water level probe upon retrieval after gauging the open hole prior to the installation of the Waterloo system. The LNAPL was not measurable by the probe itself prior to final well completion (2002). The multiple level installation screened two zones that were shown to include open horizontal fractures during the geophysical logging, which is where this film was first observed at this location (2002). No LNAPL has been observed at this location since the multiple port installation. The optical televiewer did not show the presence of a separate phase liquid prior to final well completion.

Groundwater samples collected from both the lower and upper zones (S-1, and S-2, respectively) have shown the presence of very low level PCBs (ND to 1.51 ug/L). NAPL would typically produce PCB results in excess of 100 ug/L. Five of 35 groundwater samples collected from S-2 exhibited concentrations of PCBs, with 3 of the 5 concentrations being laboratory estimated. Although historical concentrations of PCB concentrations were above the saturation limit at the seeps along the west side of the IWTP, current concentrations of PCBs in the groundwater at the MW-X080Y070S location and at the historical seeps locations do not support the historic reports. Positive concentrations that have been detected from AOI 1 are well below the saturation concentrations that would lend further investigation into the initial observation of a LNAPL in this area. No other groundwater samples collected from AOI 1 within this zone have had detections of PCBs. The identification of the film observed on the tip of the probe is unknown, and based on the additional information obtained, further delineation in the area is not supported. Groundwater from this area would be collected through capture at Wet Wells 1 and 2 (treated prior to discharge). Other wells located within the shallow groundwater flow system at AOI1 are MW-X142Y059, MWX146Y084, MW-X165Y068, MW-X169Y058S-1, and MW-X169Y058S-2. The inset below shows the hydrographs of each of these wells of measurements to date. It can be noted on this graph that the static groundwater elevations for MW-X169Y058S-2 are above the remaining wells, however that well is completed at a higher elevation interval than others and more directly depicts the strong vertical downward gradient, rather than the potential for westward flow. To further monitor and to confirm the results included in the RFI, additional monitoring wells will be installed further south of AOI 1prior to initiating long-term monitoring.



At CH-5, both LNAPL and DNAPL have historically been reported. However, the most recent monitoring of this location has identified only LNAPL. The analytical data from NAPL and liquid emulsion are summarized in Appendices H.8 and H.9, which show that PCBs were detected in most of the NAPL samples. A few VOCs, SVOCs, and metals were also detected in some of the NAPL samples. NAPL was also present in the former residential well at Parcel 207 (which is in the shallow bedrock) and reportedly (circa. 1971) in the former residential well at Parcel 213. An attempt was made to locate, and sample the well on Parcel 213, however, when uncovered, the well was found previously grouted and a sample could not be collected from this location. However, GM has installed monitoring wells at both of these parcels (MW-X246Y118 and MWX318Y217) and has not observed NAPL in these monitoring wells. The most recent result from the Parcel 207 Well is included in Appendix H.10.

7.6 Containment and Collection systems

Parcels 3/205

As part of the RCRA CA for the Facility, a program was completed in June 2002 for the identification, sampling and analysis of seeps and springs near the Facility. Identified seeps and springs are shown on Figure 3.6. As part of that program, a spring located downstream of NPDES Outfall 002, was identified to contain PCBs in a NAPL during a high flow event in May 2002. The NAPL emanating from this spring was controlled through the installation of a temporary collection sump to separate and collect DNAPL. It was anticipated that a permanent sump and collection

system would be installed in this area to contain the seep following the soil and sediment removal phase of the implementation of the Upstream Parcels RA.

During implementation of the RA, portions of Parcels 3 and 205 within and immediately adjacent to the creek channel were excavated to the top of the bedrock. After removal of sediment and soil in the area adjacent to Outfall 002, impacted sediment was removed and the surface of the bedrock was cleaned to remove any remaining loose soil and oil staining from historic releases; however, further investigation identified NAPL and oily materials within the bedding planes of the near surface bedrock at a number of locations. This condition lessened significantly as the removal activities progressed down the creek. Several cores were advanced into the underlying rock that confirmed the presence of staining at shallow subsurface elevations on Parcel 3.

Three trenches were excavated into Parcel 3 and 205 between October 24, 2003 and December 5, 2003 (Figure 2.40). These trenches were excavated to examine the nature of the underlying rock. In general, the trenches were advanced to a nominal elevation that was about four feet below the original creek invert elevation. The trenches were installed perpendicular to the creek channel and had overall lengths between 60 and 70 ft. The trenches were 'excavated' near the rock fractures, using a hydraulic hoe-ram. As the excavation advanced vertically, the rock became noticeably harder and required more mechanical effort to affect fractures to allow the rock removal. The bottoms of the trenches were kept at a constant elevation, resulting in cuts that varied in thickness from about 4 ft at the alignment of the original channel to over 15 ft at the northern ends.

During the trench excavation (refer to Section 2.6.2.2 and 3.6.1.1), groundwater was observed to be seeping out of rock walls and into the open trenches. Based on all of these observations, (highly fractured rock that changes to more competent rock with depth, groundwater flow with NAPL) it was determined that a larger collection system was required than a series of individual shallow sumps as proposed in the SSC Work Plan (CRA, November 6, 2003) (refer to Figure 2.40; Section 3.6.6.4 and 3.6.7.). The revised collection system included installing two pre-cast concrete wet wells (wet wells 1 and 2), pumps, controls, etc. in Collection Trench 1 and Collection Trench 3; installing concrete barrier walls and membranes; installing drainage perforated pipes, pipes and gravel drainage layers; geotextile fabric and side wall drainage; placing common fill; and installing surface water collection and drainage system. Further details can be found in the SSC Work Plan Addendum No. 1 (CRA, April 21, 2004) and the SSC Work Plan Addendum No. 2 (CRA, October 1, 2004).

Three wet wells (1, 2, and 3, respectively) were installed as part of the SSC collection system. Wet Well 1 is located in the Parcel 3 valley, approximately 100 ft downstream (east) of Outfall 002. Wet Well 2 is located in the Parcel 3 valley, approximately 350 ft downstream (east) of Outfall 002. Wet Well 3 is located immediately west of Bailey Scales Road in the East Plant Area.

Northern and Eastern Drainage Areas

Several seeps and springs located just north of AOI 4 and east of AOI 10 near Outfall 003, were found to contain PCBs. As a result, the SSC Work Plan Addendum No. 2 (CRA, October 1, 2004) described collection systems for these springs (SSC Systems A through G). An additional system was installed after the identification of an eighth spring that was found to also exhibit significant PCB at concentrations ranging from 1.9 to 27 ug/L (SSC System H). Three additional springs (proximate to each other) with PCBs were discovered and gravel drainage blankets were constructed to divert the three springs to a single location (SSC System I and J). Lastly, a final intermittent spring was

discovered just east of AOI 28 (Parcel 401) upon completion of the excavation there, and a gravel blanket type system was installed for the collection of that water.

The SSC Systems (see Figure 3.5) were connected to a single wet well collection system (Wet Well 3), where the collected water gets pumped for treatment. Data collected from the SSC Systems are not evaluated in the HHRA because they are not representative of concentrations to which receptors could be exposed.

Parcels 201 and 401 Seep Controls

Seeps containing detectable levels of PCBs were also located along the western property boundary of Parcel 401 (Spring NAOI4/P401) and adjacent to a drainage ditch on Parcel 201 (Spring 201_001). The seeps are being fed into gravel blankets where the flow is directed toward the site source control collection systems for treatment (as-built drawings were included in a June 29, 2006, email to the U.S. EPA).

Each gravel blanket was constructed using a 12-inch thick layer of No. 53 stone, wrapped in filter fabric. A minimum 12-inches of compacted lay was placed over the blankets. A 6-inch perforated pipe was placed at the base of the gravel blanket to collect any accumulated water in the gravel blanket. The perforated pipe changes to a solid pipe as the pipe exits the gravel blanket.

The pipes gravity drain to their respective discharge points. The Parcel 401 seep discharges to into the gravel blanket of SSC Collection Sump B. Water from Sump B is drained to Wet Well #3 where it is pumped to GM groundwater treatment plant. The Parcel 201 seep discharges into Wet Well #1 where it is also pumped to GM's groundwater treatment system.

8. Summary of RCRA Interim Measures and CERCLA Removal Actions

8.1 On-Facility RCRA Interim Measures

8.1.1 East Plant Area Interim Measures

The East Plant Area, which includes AOIs 4, 5, 6, 7, 8, 10, 11, 15, and 16, are addressed by multiple IMs conducted in the East Plant Area. Data from the East Plant Area were extensively reviewed and U.S. EPA approved a series of IMs through a public comment period and statement of basis. The approved IM consisted of excavating soil containing ≥50 mg/kg PCBs, except in those areas where the soil could not be safely removed, and placement of the soil in an on-Facility Vault, constructing an impermeable Cover System over most of the remaining East Plant Area, construction of a Groundwater Trench, construction of an oil collection system in AOI 8 and procedures to ensure the maintenance of the installed systems. Figure 8.1 presents a summary of the IMs.

8.1.1.1 Over 50mg/kg PCBs Soil Removal

In order to remove PCB mass from the environment as part of the East and West Plant Area IMs, impacted fill material or impacted overburden soil within the East and West Plant Areas, which contained ≥50 mg/kg PCBs at any depth and, which is practical to remove, was excavated and

placed in the on-Facility Vault. Delineation of the ≥50 mg/kg PCBs soil was based on the investigations completed during the various phases of the RFI as well as data obtained during the implementation of the RA for Tributary 3 to Bailey's Branch Creek in the Area North of AOI 4.

Soil containing PCBs above the specified concentration of greater than or equal to 50 mg/kg PCBs (U.S. EPA, October 18, 2006 and IDEM, October 26, 2006) were excavated on a prescriptive basis and placed in the Vault. The removal areas were subject to technical constraints to identify portions of the Facility where excavation was impractical to complete. AOI 8 was deemed impractical to excavate due to the great number of utilities in the area. A portion of AOI 4 was deemed impractical to excavate due to proximity with AOI 10 and geotechnical restrictions to maintain the stability of the storm water pond.

The Vault was designed to accept the anticipated volume of material to be excavated from the identified regions. The Vault design (CRA, June 16, 2006) was modified on occasion with U.S.EPA and IDEM review and approval to accept more material as additional areas were identified during the design and operation period of the Vault (Northern Tributary, West Plant Area, and AOI 31/Parcel 201), and to accommodate changes to the surrounding grading. The grading plan was developed to ensure slope stability and proper surface water drainage controls specific to the volumes placed.

The volume of soil excavated was determined based on the assessment of PCB-impacted media. In addition to the excavation of soil above the specified concentrations, additional soil (containing < 50 mg/kg PCBs) was required to support the excavation of impacted soil. Areas excavated were restored using <50 mg/kg PCBs soil from the RA before capping the surface. Further details can be found in the RCRA CA Program IMs Alternatives Review Report - East Plant Area (April 13, 2005), U. S. EPA, Region V - East Plant Area IMs Statement of Basis (May 31, 2005), Final (100%) Design - Grading Areas 1 and 2 for the East Plant Area IM (June 10, 2005), Design Report Over 50 mg/kg PCB Soil Removal - East Plant Area (May 26, 2006), East Plant Area Cover System Final Design (April 18, 2008), and the Proposed Grading Areas 3 and 4 Pre-Final Design Drawings (January 16, 2006). Soil samples that have been excavated or were collected from areas beneath the Cover System are not evaluated in the HHRA because they are not representative of concentrations to which receptors could be exposed.

8.1.1.2 Vault

The Vault was constructed to provide a permanent, secure location for ≥50 mg/kg PCBs impacted soil excavated from select areas within the East Plant Area, West Plant Area, and Northern Tributary in a manner that is protective of both human health and the environment. The final Vault design volume for placement of ≥50 mg/kg PCBs impacted soil was 135,462 cubic yards (cy). Based on pre- and post-filling topographic surveys, an estimated 134,667 cy of ≥50 mg/kg PCBs impacted soil from the prescriptive soil removal was placed in the Vault and approximately 795 cy of additional <50 mg/kg PCBs impacted soil were placed in the Vault to achieve final design volume and slope.

The Vault bottom liner system consists of a double-liner system comprising a primary (12-inches compacted clay, geosynthetic clay liner [GCL], 60-mil high-density polyethylene [HDPE] geomembrane) and secondary liner (GCL, 60-mil LLDPE geomembrane), between which a leak detection layer was installed. The Vault bottom liner system was designed and constructed to provide a high level of protection, with a hydraulic conductivity less than 1×10^{-7} cm/s.

The Vault final Vault Cover System consists of a multi-layer soil and geosynthetic cap. The Vault final Cover System was designed to meet the requirements of 40 CFR § 761.61 (c). The final Vault cover system incorporates a low permeability clay layer overlain with an HDPE liner, a lateral drainage layer (drainage geocomposite), a protective soil cover layer (common fill), and a vegetative topsoil layer to control erosion of the cover materials.

Details of the Vault construction and prescriptive soil excavation are summarized in Construction Certification Report East Plant Area Vault (CRA, January 8, 2014).

8.1.1.3 East Plant Area Cover System

After removal of soil containing ≥ 50 ppm PCBs and placement into the Vault, a Cover System was designed and constructed to prevent direct contact to the underlying impacted fill material and to reduce infiltration of precipitation through the fill/soil and subsequent percolation of potentially impacted infiltration to the groundwater table, effectively providing long term protection against erosion and related transport of contaminants to surface water and groundwater. The following AOIs were part of these IMs either through soil removal or the Final Cover Placement.

- AOI 3 - Former 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 Lagoon and Outfall 001
- AOI 15 - Former Equipment Storage Area
- AOI 16 - Former East Electrical Substation
- AOI 30 - On-Facility Fill Area - Parcel 201

The Cover System consists of a multi-layer cover that incorporates a low permeability compacted clay layer overlain with an LLDPE liner, a lateral drainage layer (drainage geocomposite), a protective soil cover layer (common fill), and a vegetative topsoil layer to control erosion of the cover materials.

The multi-layer Cover System was constructed of both soil and geosynthetic materials placed in the following layers, listed from bottom to top:

- Grading layer (depth varies as necessary)
- Soil barrier layer - compacted clay (12 inches)
- LLDPE liner
- Drainage geocomposite
- Common fill (12 inches)
- Topsoil layer (6 inches)
- Vegetative cover (grass)

Details of the Cover System construction activities are summarized in Construction Certification Report East Plant Area Cover System (CRA, March 2, 2015).

8.1.1.4 Perimeter Groundwater Trench Collection System

Another component of the selected CA activities to be implemented for the Facility is construction of the Groundwater Trench for the East Plant Area (see Figure 8.2). The Groundwater Trench has been designed to work in conjunction with source removal and Cover System IM components to provide horizontal control of groundwater transport. Source removal activities will minimize contact between higher concentration wastes with groundwater, while the Cover System will reduce groundwater recharge, reducing the volume of groundwater collected by the Groundwater Trench. The Groundwater Trench is proposed to be constructed as a continuous gravel-filled trench that will be sloped to collection areas at the low points, with a barrier on the downgradient face of the trench to reduce the possibility of short-circuiting across the trench and to reduce water from coming into the trench from downgradient. An 8-inch perforated pipe will be placed at the bottom of the trench to convey groundwater to the collection areas. Collection sumps with float controlled pumping systems will be placed at each collection area to pump the groundwater to the treatment facility constructed at the Facility.

The Groundwater Trench location and alignment has been determined based on bedrock topography, the elevation of competent bedrock, and groundwater flow directions, and the contaminant migration model for the Facility.

The alignment for the Groundwater Trench is based on the following considerations:

- The nature and extent of impacted groundwater and preferential flow pathways based upon the information collected during the RFI
- The location of the perimeter of the East Plant Area Cover System and property boundaries
- The number and location of RA SSC systems which have been installed
- The location and depth of competent rock along the horizontal alignment of the Groundwater Trench

The proposed alignment of the Pilot Perimeter Groundwater Collection System Study (Pilot Trench) is presented on Figure 8.3. Detailed plan sections of the collection trench with its corresponding geological profile are presented in Appendix V. A portion of the trench is currently being installed as a pilot for the final trench.

8.1.1.5 AOI 8 Oil Collection System

Another component of the East Plant IMs includes installation of the AOI 8 oil collection system. Evidence of both LNAPL and DNAPL have been observed at and adjacent to AOI 8. Multiple studies were performed to delineate the extent of areas impacted by NAPL and determining the most suitable oil recovery system. The selected AOI 8 IM was presented to U.S.EPA in the AOI 8 Groundwater Source Collection Interim Measures Work Plan (CRA, December 31, 2014). Implementation of the approved plan is anticipated to occur in 2016.

Long term removal of NAPL from AOI 8 will be accomplished by actively recovering NAPL from existing wells within the AOI 8 area based on the preferred remedial selection of an automated system at CH-2A and a passive collection system at CH-5.

Coreholes CH-2A and CH-5 have been selected for the placement of permanent systems for the removal of NAPL from AOI 8 based on the following considerations:

- The proposed long term removal from CH-5 was designed based on the presence of NAPL in existing corehole CH-5. CH-5 is completed into the bedrock (as an open hole) to a depth of 46 ft bgs. Various horizontal fractures were identified in the shallow bedrock. However, water loss occurred during drilling at a vertical fracture at approximately 41 to 43 ft bgs (near the top of the Salem limestone formation). The bottom of this corehole is at 46 ft bgs.
- Results from the additional eight well installations in 2006 (discussed in Section 7.2.1) have provided for a general delineation of NAPL to the south and southeast of AOI 8. Groundwater analytical results from samples collected at monitoring wells MW-X190Y048 and MW-X214Y041 exhibited unfiltered concentrations of PCBs of 0.11J μg/L and non-detect, respectively. One sample of the NAPL collected from MW-X209Y053 exhibited a PCB concentration of 400,000 mg/kg (this well did not contain NAPL in later sampling events). CH-2A has been selected based on the presence of NAPL detected during the completion of the recovery test and its location with respect to AOI 8 and NAPL delineation.
- The recovery method was determined to be suitable based on the fractured rock characterization (calculation of hydraulic apertures, measurement of bedrock matrix properties, bedrock matrix diffusion process, estimation of potential rate of DNAPL transport in fractured bedrock) completed by Kueper (2006). Borings completed showed that shallow bedrock contains solution enhanced features (epikarst) and the deeper bedrock lacks significant amounts of weathering and fractures limiting vertical transport.
- CH-5 and CH-2A showed rapid recovery of product versus other wells in the NAPL Recovery Study, which did not recover product as quickly after being pumped.
- Results of the post NAPL Recovery Study monitoring and NAPL removal.
- Results of the AOI 8 NAPL Pumping Study.

CH-5 is completed into the bedrock (as an open hole) to a depth of 46 ft bgs. Due to the nature of the water-LNAPL mixture at CH-5, it was determined that future removal at this location would be best suited for a passive collection system. Existing LNAPL will be removed with a passive collection system (e.g., absorbent socks). Each sock will be placed into a stainless steel screened cage and lowered just into the water column.

Existing NAPL will be removed from CH-2A with a dedicated NAPL automated pumping system designed to cycle on a timed basis. The system would be set up such that it is piped directly into a receiving vessel (drum). NAPL could also be removed by periodic manual evacuation of the well (frequency to be determined).

8.1.2 West Plant Area Interim Measures

Similar to the East Plant Area IM, the AOIs located west of GM Drive were considered for the need of IM activities. The IM activities, implemented between July 2008 and September 2011, were

implemented, in accordance with the West Plant IM Work Plan (CRA, April 23, 2007) and the Request for Amendment 40 CFR 761.61 (C) Approval Over 50 mg/kg PCB Soil Source Removal and Cover System Design West Plant Area (CRA, December 12, 2007) and included the prescriptive excavation of PCB impacted soil, permanent abandonment of select storm sewer pipes, and removal of a catch basin (MH-ST-43) in the northeast corner of the West Plant Area.

Details of the West Plant IM activities are summarized in Construction Certification Report West Plant Area (CRA, November 12, 2014). A discussion of the stormwater and process water discharge lines in included in Section 7.1.10).

8.1.2.1 MH-ST-43 Catch Basin

The MH-ST-43 catch basin, the associated 22-inch diameter pipe and 24-inch diameter pipe, and the 48-inch diameter culvert under GM Drive were cleaned under the supervision of CRA in November 2003 as part of the CERCLA RA. Cleaning consisted of vacuuming sediment from the pipes, water jetting the pipes, and collecting the resulting rinse waters. The 22-inch diameter pipe and the 24-inch diameter pipe were blocked with temporary pneumatic plugs where they joined MH-ST-43 on July 17, 2004 (see Figure 8.1).

The selected IM for MH-ST-43 included pumping each connecting pipe full of grout. The catch basin, constructed of large limestone slabs, was removed entirely. The limestone slabs were broken into manageable sized pieces for transport to the East Plant Area for use as grading fill. Based on sampling performed during the RFI, the soil around the catch basin structure was handled as <50 mg/kg PCBs soil, while the soil below the structure was handled as ≥50 mg/kg PCBs soil and placed in the East Plant Area TSCA Vault.

Approximately one foot of soil directly beneath the catch basin was removed and disposed of in the Vault. Additional soil (beyond the one foot beneath the catch basin) was removed and disposed of in the Vault as ≥50 mg/kg PCBs soil, based on visual evidence of contamination. Upon completion of the excavation, a soil sample was collected from the excavation floor beneath the catch basin. Due to safety concerns with the stability of the excavation and the potential to undermine the roadway, the excavation was backfilled immediately following completion of excavation activities, prior to receiving sample results. The confirmation/ excavation floor sample result was non-detect for PCBs. The area was graded, and restored as an open grassed area. The surface water runoff from the swales on the Facility property was directed to the current stormwater system via grading, ensuring the roadway did not flood during precipitation events. An estimated 70 cy of material was removed as part of the MH-ST-43 removal.

8.1.2.2 AOI 18 - Area Affected by the Henry System Discharge

In a memorandum responding to U.S. EPA's comments received on July 2, 2007 (CRA, January 2008), GMC proposed to prescriptively remove the ≥50 mg/kg PCBs soil in this area (see Figure 8.1) up to 2 ft bgs within a prescribed 20 ft by 20 ft removal area. Removal activities began in July 2008 with the removal of the concrete slab above the impacted material. The area of concrete removal was slightly larger than the required 20 ft x 20 ft excavation area. A hoe ram was used to break the concrete and rebar into manageable pieces. Approximately 15 cy of concrete and rebar were removed and transported to the Vault for disposal. Following excavation, the area was

surveyed to confirm prescriptive excavation limits were met. Approximately 50 cy of soil was removed.

The area was restored following confirmation that excavation limits had been met. A single layer of drainage geocomposite material was placed at the base of the excavation followed by approximately 2 ft of granular fill. The concrete slab was reconstructed, leveled and brushed, and an expansion joint was cut into the poured slab.

8.1.2.3 AOI 21-1 - Former Drainage Valley under Hourly Parking Lot

A prescriptive excavation of the surface soil (to approximately 2 ft in depth) was selected to remove the elevated PCBs in this area (see Figure 8.1). Excavated soil was direct loaded into lined over-the-road trucks and transported to the Vault for disposal. Following excavation, the area was surveyed to confirm prescriptive excavation limits were met. Approximately 50 cy of soil was removed.

Upon completion of the excavation, the area was backfilled with clean material, and the surface restored Clean backfill was obtained from the project on-Site borrow area and was used to backfill the excavation to match the surrounding grade. The excavation was further overlain by the diversion embankment.

8.1.2.4 AOI 21-2 - Former Drainage Valley Northeast of Piston and Office Buildings

The data obtained through the completion of the investigations in this area (see Figure 8.1), were divided into 2 ft depth intervals for the purpose of defining the limits of the selected prescriptive soil excavation. Elevation intervals ranged from 0 to 2 ft bgs through 20 to 22 ft bgs. For each of these intervals, the limit of ≥50 mg/kg PCBs soil was determined. For each interval, the limit of <50 mg/kg PCBs soil, which required removal to reach ≥50 mg/kg PCBs soil at lower elevation intervals, was also determined.

The extent of the excavation was limited to maintain safe working slopes and the location of the adjacent pressurized gas line along GM Drive. A geotechnical engineer was required to be present during excavation in the vicinity of the gas line to determine the appropriate slope.

Upon excavation completion, this area was backfilled with low level PCB soil (i.e., <50 mg/kg PCBs) from the creek excavation and then capped with a double liner of clay and plastic or asphalt (the same design as the cap on the East Plant Area Cover System (CRA, August 2006) for the slopes and ditches. A section of the roadside drainage ditch was also excavated and rebuilt using a minimum of one foot of clay for grading and restored with topsoil and seed. The surface water from the Cover System was directed towards the rebuilt drainage ditch. Approximately 1,000 to 1,400 cy of ≥50 mg/kg PCBs material was placed in the TSCA Vault, and 500 cy transported to Heritage's Roachdale Indiana landfill for disposal.

8.1.2.5 AOI 13 – South Piston Yard

At the request of IDEM, GM conducted further subsurface investigations at former USTs 1 and 2 in order to finalize the tank closures (see Figure 8.1). Once samples were collected and evaluated, GM petitioned IDEM and received a NFA letter (see Appendix U).

8.2 Off-Facility RCRA Interim Measures

Additional RCRA IM Work Plans were prepared for off-Facility properties including the Western Tributary, and Parcels 201 and 204. The location of these work areas is presented on Figure 8.4. A summary of off-Facility RCRA IM activities to date is presented in Table 5.2. Construction Certification Reports for IMs completed for off-Facility properties are included in Appendices B.8 and B.9.

8.2.1 Western Tributary

The Western Tributary IM was implemented between February 2006 and June 2007. A Construction Certification Report detailing Western Tributary IM activities was approved by U.S. EPA November 17, 2008 and the final report was submitted to U.S. EPA on November 18, 2008. The IM called for remediation of floodplain soil statistically to 1.8 mg/kg total PCBs and 1 mg/kg total PCBs for creek sediment and stream bank material (as described for the CERCLA AOC, effective July 31, 2003) from Parcels 2, 57, 60, and 61. The Construction Certification Report documents that the RA excavation met the cleanup criteria and restoration has been completed (CRA, November 18, 2008).

Since the remediation of the area known as the Western Tributary is complete as documented in the Western Tributary Interim Measure Construction Certification, the data from this area are not evaluated in the HHRA presented in Section 9.0 of this RFI Report.

An electronic copy of the Western Tributary IM Construction Certification Report is provided in Appendix B.8.

8.2.2 Parcels 387 and 389 Along The Northern Tributary

Remediation of the Parcels 387 and 389 were implemented by GMC between July 2007 and December 2008, with the final report published on May 31, 2010. The IM Work Plan (January 6, 2006) called for the selective removal of floodplain soil and surface water sediment statistically to 1.8 mg/Kg for floodplain soil and 1 mg/Kg total PCBs for creek sediment and stream bank material, 2 ft. from edge of the stream channel and vertically down to the top of the stream bed, as described for the CERCLA AOC, effective July 31, 2003.

Since the remediation of the area known as the Parcel 387 and 389 of the Northern Tributary is complete as documented in the Construction Certification, the data from this area were not evaluated in the HHRA presented in Section 9.0 of this RFI Report.

An electronic copy of the completed Northern Tributary Construction Certification Report in provided in Appendix B.9.

8.2.3 Parcels 201 and 204

The IM for Parcel 201 involved the prescriptive excavation of previously delineated ≥50 mg/kg PCBs materials on this parcel (see Section 7.1.19). Subsequent to completion of the IM on Parcel201, the area was backfilled with grading fill from the creek RA and integrated into part of the East Plant Area Cover System. The IM for Parcel 204 included the excavation of impacted materials statistically to 1.8 mg/kg PCBs, verification sampling to document the cleanup, and restoration of the area.

Since the remediation of the fill materials on Parcel 204 is complete as documented in the Parcels 201 and 204 Interim Measure Construction Certification, the data from this area are not evaluated in the HHRA presented in Section 9.0 of this RFI Report.

An electronic copy of the Parcels 201 and 204 IM Construction Certification Report is provided in Appendix B.10.

8.3 CERCLA Removal Actions

In 2003, GMC began the RA for the creek system along Bailey's Branch and Pleasant Run Creek, as defined in the 2003 CERCLA AOC between U.S.EPA and GMC.

8.3.1 Bailey's Branch Creek and Pleasant Run

Due to the large area of floodplain and sediment contamination along Bailey's Branch, the stream cleanup approach was sub-divided into three sections: Upstream Parcels, Downstream Parcels, and Parcel 22 (this Parcel was segregated due to pending litigation). Figure 8.5 shows the excavation limits based on investigation samples. A CERCLA RA Work Plan for each of these reaches of stream was then prepared separately (Upstream Parcels RA Work Plan [CRA, July 18, 2003] and Addenda 1 through 5 [CRA, November 25, 3003; February 13, 2004; May 12, 2004; June 15, 2004; and October 2, 2004], Parcel 22 RA Work Plan [CRA, July 18, 2003], Downstream Parcels RA Work Plan [CRA, October 28, 2003]), Downstream Parcels and Parcel 22 RA Work Plan Addendum 1 [CRA, May 10, 2005], and Downstream Parcels RA Work Plan Addendum No. 2 [CRA, June 22, 2006])), with the work generally proceeding from upstream sections to downstream. Note that much of the RA work was performed prior to the bankruptcy of GMC and while all the parcels subject to the RA are listed herein, those which are the responsibility of the RACER Trust are identified as such.

The RA called for remediation of floodplain soil statistically to 1.8 mg/kg total PCBs and 1 mg/kg total PCBs for creek sediment and stream bank material (as described for the CERCLA AOC, effective July 31, 2003). In general, the RA along Bailey's Branch Creek consisted of dividing up each of the three sections into discrete work zones whereby surface water was diverted from a work area while removal of sediment, floodplain soil and any impacted surficial bedrock was conducted in order to meet the cleanup goals. The cleanup goals for each work area were confirmed through verification testing after soil and sediment removal.

Excavated areas in the floodplain and stream bank were restored with imported soil while the creek channel was restored with rock after any substantial bedrock excavations were filled with concrete. The creek channel ecosystem was restored with rock weirs, cobbles, riffles, runs, basking logs, and pools whereas the stream banks were stabilized by incorporating, as appropriate, specific vegetation, bedrock roughbacks, fascine bundles, and log deflectors. The floodplain areas were re-vegetated using native grasses, wildflowers, shrubbery and trees while habitat features such as snags, deadfalls, nesting boxes, perches, and vernal ponds were constructed to attract area wildlife.

Excavated material exhibiting PCB concentrations ≥50 mg/kg PCBs was disposed of at the Heritage Environmental Service's Subtitle C landfill located in Roachdale, Indiana and materials <50 mg/kg PCBs were either disposed at Republic Service's Subtitle D Sycamore Ridge Landfill located in

Pimento, Indiana (prior to March 10, 2005) or consolidated in the East Plant Area of the Facility prior to construction of the multilayer Cover System.

The Upstream Parcels RA was implemented between fall of 2003 and March 2007. The Upstream Parcels include Parcels 3, 4, 5 (RACER), 6, 7 (RACER), 8 (RACER), 10 (RACER), 11 (RACER), 12 (RACER), 205, 215, 216 (west of Bailey Scales Road), 401, and the area north of the AOI 4. A final Construction Certification Report detailing Upstream Parcels RA activities was submitted to U.S. EPA on October 1, 2007 and approved by U.S. EPA in December 2007.

The Parcel 22 RA was implemented starting in the winter of 2006 and was largely completed by the end of 2008 with some restoration work continuing into the spring of 2010. A final Construction Certification Report detailing Parcel 22 RA activities was submitted to U.S. EPA on May 14, 2010, and approved by U.S. EPA on April 11, 2011.

The Downstream Parcels RA was implemented starting in the fall of 2004 and work was completed in 2014. The Downstream Parcels include Parcels 13 (RACER), 15, 20 (RACER), 21, 23 (RACER), 24, 25, 27 (RACER), 28 (RACER), 29, 30, 36, 37, 38 (RACER), 39 (RACER), 40, 72, 76 (RACER), 78 (RACER), 81, and 216 (east of Bailey Scales Road). A final Construction Certification Report detailing the Downstream Parcels RA activities was submitted to U.S. EPA on December 12, 2014.

An Interim Operations, Maintenance, and Monitoring Plan (OMMP) (CRA, June 13, 2008) was prepared for the Upstream Parcels. The routine monitoring and maintenance activities were conducted through 2010, in accordance with the OMMP. OMM activities for the Upstream Parcels are complete. An Interim OMMP (CRA, May 14, 2010) was prepared for Parcel 22. The routine monitoring and maintenance activities were conducted through 2012 in accordance with the OMMP. OMM activities for Parcel 22 are complete. An Interim Monitoring and Maintenance Plan (MMP) (CRA, November 7, 2014) was prepared for the Downstream Parcels. Monitoring and maintenance activities are on-going and expected to be completed by the end of 2015 for the final Downstream sections of the creek.

A long term OMMP for the complete work conducted under the AOC will be submitted with the Final CMP. A summary of RA sampling activities is presented in Table 8.1. Construction certification reports for the CERCLA RAs are presented in Appendices B.10, B.11 and B.12.

Remediation activities in these three sections, Upstream Parcels, Parcel 22, and Downstream Parcels, has been completed and the cleanup criteria (state residential standards) were met. Therefore, the data from these areas are not evaluated in the HHRA presented in Section 9.0 of this RFI Report.

8.3.2 Spring 018 Area

A response to address the Spring 018 Area (CRA, 2013) was approved by U.S. EPA on June 19, 2013. Completed studies resulted in a conceptual site model whereby, on a seasonal basis, warmer surface water from unrestored swallets in the creek channel area was entering the groundwater flow regime and increasing the mobility of remaining historically PCB-contaminated sediment/clay material residing within the hydrogeologically active bedrock fractures between the various swallet locations and Spring 018 (located on Parcel 15). It was thus determined that reducing the flow of warmer surface water (during summer months) that could recharge the spring would minimize the mobilization and transport of entrained sediments, thereby lowering the PCB levels in the water

emanating at Spring 018. In order to minimize the amount of surface water entering the groundwater system near Spring 018 and change the flow pathways in the rock, GM determined the most efficient and effective IM would be to perform additional concrete sealing of the fractures within the creek bed, both upstream and directly adjacent to the Spring 018 area. This IM would limit the recharge of warmer surface water in the summer and early fall months, which is believed to have influenced the past exceedances above the accepted discharge level of 0.3 µg/L PCBs.

Based on investigations completed under the SSC Work Plan and addenda, Spring 018 was found to have been impacted by historical releases of PCBs from the Facility. In 2012 to 2013, GM implemented the interim measure by which the creek bed upstream of the spring was sealed with concrete. The Construction Certification Report for the creek sealing activities was submitted to U.S. EPA on February 20, 2014. The demobilization of Sevenson's Spring 018 Water Treatment Plant and Spring 018 Contingency Plan (CRA, February 24, 2014) (U.S.EPA approval on March 10, 2014) outlines the requirements for on-going monitoring of the spring. Concrete activities completed to date have successfully reduced the PCB concentrations at Spring 018 as shown on Figure 8.6.

An electronic copy of the Spring 018 Construction Certification Report is provided in Appendix B.14.

A CERCLA AOC is being negotiated between GM and U.S. EPA to facilitate additional concrete sealing work in the creek at an unrestored swallet identified upstream of Spring 018. It is anticipated that sealing this swallet may provide additional attenuation for PCBs concentrations observed at Spring 018.

9. Baseline Human Health Risk Assessment

9.1 Introduction

Section 7 and Section 8 discussed the scope of the RFI field investigation and remedial actions/interim measures (i.e., CERCLA RA and RCRA IMs), if any, that GM has performed at each of the areas investigated at the Facility and at each of the parcels identified in Paragraph 2 of the Order. Section 6 also discussed the comparison of site characterization data that represent current conditions with conservative risk-based screening criteria to identify where a potentially significant release of hazardous constituents of the environment may have occurred. The baseline HHRA discussed in this section evaluates the significance of reasonable maximum exposures (RME) to affected environmental media under current and reasonably expected future land use at and around the Facility.

The baseline conditions evaluated in this risk assessment account for the remediation that has been completed at and around the Facility as part of the CERCLA removal action, RCRA interim measures, and site source controls. Specifically, the baseline conditions account for the following:

- The engineered cap installed as part of the West Plant and East Plant Areas Interim Measures (see Certification Reports in Appendices B.14 and B.15) prevents current and future exposure to media under it because it is proposed to be maintained as part of the Facility's final RCRA corrective measures (CMs).

- The CERCLA removal action removed PCB-containing floodplain soil to achieve the statistical removal action limit of 1.8 mg/kg of PCBs as defined in (see Certification Reports in Appendices B.10, B.11, and B.12).
- The CERCLA removal action removed stream sediment with PCB concentrations greater than 1 mg/kg.
- Wet wells operating as part of the site source controls are currently preventing impacted groundwater migration from the Facility, and they will be augmented by a more significant bedrock Groundwater Trench to be installed as part of the Facility's final RCRA CMs corrective measures (the Pilot Trench construction was initiated in July 2015).
- Site source controls also prevent exposure to and recontamination of springs, seeps, and surface water.

The ways in which the risk assessment accounts for these baseline conditions is discussed in Section 9.2 (Data Selection and Preparation) and Section 9.3 (Exposure Assessment).

The methods used in the risk assessment are based on U.S. EPA risk assessment guidance and are consistent with agreements between U.S. EPA, Ramboll Environ, and GM on methodologies to streamline risk assessments (ENVIRON 2010). The methodologies used in the risk assessment are also generally consistent with recommendations of the Interstate Technology Regulatory Council (ITRC) on performing and using risk assessments to inform risk-based decisions (ITRC 2015). The results of the baseline risk assessment are intended for use in identifying where a release of hazardous constituents from the Facility may cause the RME to be significant enough to warrant further CMs.

The scope of the HHRA is summarized in the conceptual site model (CSM) shown in Table 9.1. The scenarios for potential human exposure presented in the CSM are described in terms of the potentially exposed populations, environmental media to which they could be exposed, and potential routes of exposure. These scenarios were developed based on the information discussed in the previous Sections. Further discussion of these scenarios is presented in Section 9.3.2.

Discussion of the HHRA is organized as follows:

- The preparation of data used in the risk assessment is discussed in Section 9.2, Data Collection and Preparation.
- The scenarios for potential human exposure are discussed in Section 9.3, Exposure Assessment, which also discusses the estimation of exposure concentrations and chemical intakes for each exposure scenario.
- Toxicity values for the constituents evaluated in the risk assessment are summarized in Section 9.4, Toxicity Assessment.
- The risk estimates associated with the potential exposures discussed in Section 9.3 and their significance are discussed in Section 9.5, Risk Characterization, which includes discussion of the uncertainties associated with the risk estimates.
- The findings and conclusions of the HHRA are summarized in Section 9.6, Summary and Conclusions.

Supporting information and calculations are provided in Appendix T.

9.2 Data selection and Preparation

9.2.1 Data selection

The objectives of the RFI field investigation and methods for determining when additional data collection was warranted were described in the RFI Work Plan (CRA, October 29, 2001) and subsequent RFI Work Plan Addenda. They are also summarized in Section 3.3 of this report. The scope of the RFI field investigation and a summary of the data collection activities are described in Section 3.5 and Section 6 of this RFI report. The complete RFI data (including R-qualified data and separate results for each sample of a duplicate pair) are provided in Appendix H.

All soil, groundwater, sediment, liquid emulsion, and NAPL data collected during the RFI from the Facility and parcels identified in Paragraph 2 of the Order (U.S. EPA 2014) are evaluated in the risk assessment, except as discussed below.

Data from any sample collected from a location within the areas of the Facility that were capped as part of an interim measure (e.g., East Plant Interim Measures) are not evaluated in the risk assessment because the engineered cap prevents exposure to media under it.

Soil, sediment, and rock data from samples collected at locations and depths where soil or sediment have been removed as part of remediation activities are not evaluated in the risk assessment.

Sediment data in AOI 10 (stormwater lagoon) are not evaluated in the risk assessment because an interim measure to remove PCB impacted sediments is scheduled to occur in 2016 (e.g. excavation and disposal, containment option (liner), or both). Current worker activities in AOI 10 are managed by Remediation staff who are aware the nature and extent of on-site contamination.

Rock data that were not removed were generally collected from at least 27 ft below ground surface (bgs), which is deeper than reasonably expected for potential human exposure (e.g., maintenance or construction worker). Therefore, these data are not evaluated in the risk assessment. Additionally, detected concentrations in all rock samples collected at the Facility (on-site) were below the commercial/industrial soil screening criteria and no constituents were detected in rock samples collected from the off-Facility parcels included in the Order, as discussed in Section 6.2.1.

Borehole water data are not evaluated in the risk assessment because they were collected primarily to support the placement of monitoring wells during the RFI field investigation, and they do not necessarily represent groundwater quality, as discussed in Section 6.2.2.

Data from water samples collected in old, inactive residential wells are not evaluated in the risk assessment because they do not represent concentrations to which individuals are currently exposed. Additionally, the survey of groundwater use near the Facility (within ½ mile) found no current household use of groundwater, as discussed in Section 2.4. There are also no off-site Parcels where PCBs have been detected above drinking water criteria. As discussed in Section 9.1, the interim measures will prevent future groundwater migration off-Facility.

Tissue data were also collected during the investigation and remediation at the Facility, often at the property owner's request. These samples included animal (cattle, deer, fish) and plant (various vegetables) that were collected in response to public feedback. These results from these samples

did not identify additional actions as part of the RFI and thus were not included in this evaluation. These samples are identified in Appendix S Table S.3-4.

All other data were evaluated in the risk assessment. Samples excluded from the risk assessment are listed by media in Appendix S.3. The “Area” column of the tables in Appendix S.3 is not intended as an AOI Identification number. The “Area” column references the AOI as “A###” and the Parcel as “P###” and other logical data grouping from which samples were collected.

9.2.2 Data Preparation

Validation of all soil, groundwater, sediment, liquid emulsion, and NAPL data used in the HHRA was performed in accordance with the QAPP in the RFI Work Plan (CRA, October 29, 2001). Summaries of the data validation results are provided in Appendix H. The following procedures were used to prepare the RFI data to support quantitative risk assessment. These procedures, which are based on U.S. EPA guidance on human health risk assessment (U.S. EPA 1989), are as follows:

- Constituent concentrations qualified as not detected (i.e., U or UJ-qualified data) during data validation were evaluated as non-detects.
- Constituent concentrations qualified as not usable (i.e., R-qualified data) during data validation were not included in the risk assessment.
- Concentrations qualified as estimated (i.e., J-qualified data) were included for quantitative assessment.
- Concentrations in duplicate field samples and samples where GM split field samples for analysis at multiple laboratories were averaged to obtain a representative concentration for the sample location. When a constituent was detected in only one sample of a duplicate pair, the average of the detected concentration and one half the quantitation limit was used in further calculations.
- The concentrations of 1,3 dichloropropene are the sums of the concentrations of the isomers that were detected and half the quantitation limits of the isomers that were not detected in the same sample but were detected in the same matrix at the Facility. If no isomer was detected in a sample, the constituent was considered to be not detected in the sample.
- The concentrations of PCBs are the sums of the Aroclors that were detected in the same sample. If no Aroclor was detected in a sample, the constituent was considered to be not detected in the sample.
- Concentrations of metals in soil that are at or below the site-specific background levels summarized in Table 6.1 (and discussed in Section 6.3) are considered to be background and not site-related. Metal concentrations in soil samples that are in excess of the site-specific background levels are considered to be site-related and are used in the calculation of site-related risks. Background risks for metals are summarized in Table 6.2.
- As a conservative assumption, all concentrations of organic constituents detected in on-site matrices are assumed to be site-related.

No constituent that was detected in soil, groundwater, sediment, liquid emulsion, and NAPL is excluded from the risk assessment, regardless of whether or not it exceeded screening criteria, except as discussed above.

9.3 Exposure Assessment

This section discusses the potential exposures that are relevant under current and reasonably expected future land use at and around the Facility. The exposure setting, potentially exposed populations, and exposure pathways are discussed below in Section 9.3.1 to Section 9.3.3.

Exposures via ingestion and dermal contact are quantified in terms of a dose, as follows:

$$Dose = Concentration \bullet Intake$$

The dose for evaluating cancer risk is averaged over a lifetime and is called the lifetime average daily dose (LADD). For evaluating noncancer effects, the dose is averaged over the duration of potential exposure and is called the average daily dose (ADD). The concentration term in the dose equation refers to the average chemical concentration in an environmental medium to which a population is exposed over a specified duration. The intake term refers to the intake rate of the contaminated environmental medium, which is a function of the magnitude, frequency, and duration of exposure. The methods for estimating the concentration term are discussed in Section 9.3.4. The exposure factors that are used to quantify the magnitude, frequency, and duration of potential exposures are discussed in Section 9.3.6.

Exposures via inhalation are quantified as a time-weighted average concentration in air. The exposure concentration for evaluating cancer risk is averaged over a lifetime. For evaluating noncancer effects, the exposure concentration is averaged over the period of exposure. The methods for estimating the concentration term are discussed in Section 9.3.4.

9.3.1 Exposure Setting

The environmental setting at and around the Facility, including climate, geology, hydrogeology, land cover, surface water bodies, water supply, and groundwater use, is discussed in Section 2 and is therefore not repeated in this sub-section.

9.3.2 Potentially Exposed Populations

As discussed in Section 2, the Facility occupies approximately 152 acres in Bedford, Indiana that are zoned for light and heavy industry, and are bounded by industrial, commercial, and residential properties. Future land use at the Facility is expected to remain commercial/industrial. As part of the CMs, GM intends to establish a deed restriction for the Facility to maintain commercial/industrial land use as part of the final CMs. As such, workers comprise the main receptor population at the Facility under both current and reasonably expected future land use.

Under current and reasonably expected future conditions, the only populations with potentially significant on-site exposures are routine workers and maintenance workers at the West Plant Area. Routine workers and maintenance workers are expected to be at the East Plant Area only occasionally, and potential exposure to contaminated media is precluded in most of this portion of the Facility by the engineered cap. Any subsurface maintenance work in the capped area will be conducted after coordinating with Remediation Staff, Facility Environmental Engineering and/or Industrial Hygiene staff to prevent significant exposures to environmental media. Construction workers are expected to be at the Facility as part of planned construction activities. Public access to

the Facility is limited by fencing, warning signs and/or site security patrols, and as such, trespasser exposure is unlikely.

The areas around the Facility consist of a mixture of commercial/industrial and residential land use. This includes several residential parcels purchased by GM and rezoned for industrial use, as well as some GM owned parcels that remain zoned for residential use. Current zoning for these areas is expected to remain unchanged, as discussed in Section 2.1. As such, the largest potentially exposed populations around the Facility are residents and workers.

Table 9.1 summarizes the potentially exposed populations at and around the Facility under current and reasonably expected future land use, which include the following:

- On-Facility:
  - Routine workers
  - Maintenance workers
  - Construction workers
  - Trespassers
- Off-Facility:
  - Residents
  - Maintenance workers

9.3.3 Exposure Pathways

The exposure pathways evaluated in the risk assessment are summarized in the CSM presented in Table 9.1. Exposure pathways for receptors at the Facility and industrial zoned parcels owned by GM are discussed in Section 9.3.3.1. Exposure pathways for receptors at residential zoned parcels owned by GM are discussed in Section 9.3.3.2. Exposure pathways for receptors at non-GM owned parcels are discussed in Section 9.3.3.3.

9.3.3.1 Potential Exposure at the Facility and Industrial Zoned Parcels Owned By GM

Current and future receptors at the Facility and at industrial-zoned parcels owned by GM include routine workers, maintenance workers, construction workers, and trespassers. The potential exposures evaluated for each receptor are discussed below.

Routine Workers

The largest receptor population at the Facility and at industrial-zoned parcels owned by GM consists of workers who are engaged in routine manufacturing. Routine workers are engaged in commercial/industrial activities that generally take place indoors. During limited time outdoors, workers could be exposed to soil in uncapped areas, areas without ground cover, and in areas where ground cover may be removed. Potential routes of exposure to surface soil would include incidental ingestion, dermal contact and inhalation of soil vapor and airborne particulates in outdoor air.

These workers also could be exposed via inhalation of constituents from the subsurface soil, groundwater, liquid emulsion, and NAPL if constituents were to volatilize and migrate to outdoor air or migrate through cracks in the building foundation into indoor air.

Exposure of routine workers via potable groundwater use is not evaluated because groundwater is not used as a potable water supply at the Facility and a deed restriction prohibiting future potable groundwater use will be put in place, as discussed in Section 10. Exposure of routine workers to groundwater via non-potable (e.g., noncontact cooling) uses is not currently possible at the Facility because groundwater is not used for non-potable purposes. A deed restriction prohibiting future groundwater use (potable and non-potable) will be put in place as part of the final CMs.

Maintenance Workers

Currently, workers who are involved with occasional maintenance activities at the Facility coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent significant exposures to environmental media in all areas of the Facility. However, the risk assessment evaluates potential exposures under a hypothetical future scenario in which maintenance workers do not necessarily coordinate with Facility staff or wear personal protective equipment while working in areas outside of the engineered cap. As such, workers conducting occasional subsurface maintenance or construction activities under this hypothetical scenario could be exposed to surface and subsurface soil in paved and unpaved areas of the Facility. Maintenance worker exposure involving subsurface activities is expected to be of limited size and duration (e.g., installation or repair of underground utilities, or removal or repair of pavement). Potential routes of exposure to surface and subsurface soil during such activities would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates.

Maintenance workers could encounter groundwater during excavations at the Facility where groundwater is shallower than about 10 to 15 ft bgs, the depth to which IDEM has assumed workers are expected to excavate. Potential routes of exposure to groundwater would include incidental ingestion, dermal contact and inhalation of vapor.

Maintenance workers could encounter sediment during occasional maintenance activities around the stream that runs through the northern portion of the Facility. However, such exposures would not pose an unacceptable risk because sediment in the stream has been remediated to 1 mg/kg of PCBs, which is the high occupancy cleanup criterion under 40 CFR 761.61(a)(4)(i)(A). Post-remediation verification data are provided in the RA Construction Certification Reports attached in Appendices B.10, B.11, and B.12. As such, evaluation of exposure to sediment in the stream is not necessary in the baseline risk assessment.

Potential exposure to surface water is not evaluated because the Interim Measures have or will have addressed surface water contamination to prevent exposure and recontamination of the remediated areas. The post-remediation concentrations of PCBs in surface water meet the maximum contaminant limit (MCL).

Maintenance workers are not expected to encounter liquid emulsion or NAPL during maintenance activities as liquid emulsion and NAPL collected in the West Plant area is deeper than the depth to which workers are assumed to excavate (about 10 to 15 ft bgs). Therefore, no current or reasonable expected future exposure scenario for maintenance worker exposure to liquid emulsion or NAPL

exists on-Facility. The potential for NAPL exposure for maintenance workers in the East Plant Area will be mitigated by engineering and institutional controls.

Construction Workers

Currently, workers who are involved with construction activities at the Facility coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent significant exposure. However, the risk assessment evaluates potential exposures under a hypothetical future scenario in which construction workers do not necessarily coordinate with Facility staff or wear personal protective equipment while working in areas outside of the engineered cap. As such, workers conducting subsurface construction activities under this hypothetical scenario could be exposed to surface and subsurface soil in paved and unpaved areas of the Facility. Potential routes of exposure to surface and subsurface soil during such activities would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates.

Construction workers could encounter groundwater during excavations. Potential routes of exposure to groundwater would include incidental ingestion, dermal contact, and inhalation of vapors.

Construction workers are not expected to encounter liquid emulsion or NAPL during construction activities as liquid emulsion and NAPL collected in the West Plant area were deeper than the depth to which workers are assumed to excavate (about 10 to 15 ft bgs). Therefore, no current or reasonable expected future exposure scenario for construction worker exposure to liquid emulsion or NAPL exists on-Facility.

Trespassers

Potential exposure of trespassers is possible, although fencing (with signs) and/or security personnel control access to the Facility. These controls make trespassing unlikely and would limit the duration of any unauthorized access as well as the types of activities while on the Facility. However, some of the East Plant and GM-owned parcels are not currently fenced. While on GM property, trespassers could be exposed to soil in uncapped areas, areas without ground cover and in areas where ground cover may be removed. Potential routes of exposure to surface soil would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates.

Trespassers also could be exposed via inhalation of constituents from the subsurface soil, groundwater, liquid emulsion, and NAPL if the constituents were to volatilize and migrate to outdoor air.

Trespassers also could be exposed to sediment and surface water in streams at and around the Facility. However, as discussed above, such exposure would not pose an unacceptable risk because of the stream remediation that has been completed. Therefore, evaluation of trespasser exposure to sediment and surface water is not necessary in the risk assessment.

9.3.3.2 Potential exposure at Residential Zoned Parcels Owned by GM

Current receptors at residential zoned parcels owned by GM include residents and maintenance workers. The potential exposures evaluated for each receptor are discussed below.

Residents

Residents at GM owned parcels adjacent to the Facility could be exposed via inhalation of constituents from the on-Facility surface or subsurface soil, groundwater, liquid emulsion, and NAPL if the constituents from areas not covered by the engineered cap were to volatilize and migrate off-Facility.

Residents on these parcels also could be exposed to post-remediation soil at a particular parcel. Such exposure would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates in outdoor air.

These residents also may have exposure to other media. However, as discussed above, the remediation performed by GM addressed contamination above the removal action levels and the potential for re-contamination. Exposure via potable or non-potable groundwater use is not expected because groundwater is not currently used within the well survey area around the Facility, and future groundwater use at the GM owned a number of parcels will be prevented through a deed restriction, as discussed in Section 2.1.

Exposure via vapor intrusion is likewise not expected as the potential source of vapor intrusion is off-site migration of VOCs in groundwater, which has not been shown to exist currently, as demonstrated in the CA750 (GM 2008) and subsequent monitoring. Specifically, VOCs detected in groundwater on-site that could migration off-site were detected sporadically (e.g., no identifiable plume) and/or detected at very low concentrations. While no VOC plumes were identified, certain on-site groundwater results exceeded residential drinking water criteria, e.g., for vinyl chloride at MW-X169Y058S-1. This location is however bounded by downgradient groundwater sample locations where vinyl chloride concentrations did not exceed the screening criteria.

Similarly, PCBs, in the NAPL does not currently extend off-site. Further, NAPL has not been observed off-site since previously mentioned interim measures were implemented.

Additionally, interim measures (source control system with wet wells and the planned groundwater collection trench (started in July 2015) barrier wall) prevent groundwater and NAPL migration from the Facility. These controls on contaminated groundwater and NAPL eliminate many potential off-site routes of exposure.

Residents also could be exposed to sediment, surface water in streams, spring water and seep water at and around the Facility. However, as discussed above, such exposure would not pose an unacceptable risk because of the stream remediation that has been completed. Therefore, evaluation of trespasser exposure to sediment, surface water in streams, spring water and seep water is not necessary in the risk assessment.

Maintenance Workers

Maintenance workers at GM owned parcels adjacent to the Facility could be exposed via inhalation of constituents from on-Facility soil-derived vapors, on-Facility surface soil-derived particulates, on-Facility groundwater-derived vapors, and on-Facility liquid emulsion or NAPL-derived vapors from areas not covered by the engineered cap if these emissions were to migrate off-Facility.

As discussed above, potential routes of exposure to post-remediation concentrations in soil would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates.

Maintenance workers also could be exposed to sediment, surface water in streams, spring water and seep water at and around the Facility. However, as discussed above, such exposure would not pose an unacceptable risk because of the stream remediation that has been completed. Therefore, evaluation of maintenance worker exposure to sediment, surface water in streams, spring water and seep water is not necessary in the risk assessment.

Interim measures (source control system with wet wells and the planned groundwater collection trench (started in July 2015) barrier wall) prevent future groundwater and NAPL migration from the Facility. Post-remediation concentrations of PCBs in groundwater meet the MCL. Therefore, potential off-Facility maintenance worker exposure to groundwater is not evaluated.

9.3.3.3 Potential Exposure at Parcels not Owned by GM

Receptors at parcels not owned by GM could include residents and maintenance workers. The potential exposures evaluated for each receptor are discussed below.

Residents

Residents at parcels not owned by GM could be exposed to the same media and via the same routes of exposure as the residents at the GM owned parcels discussed in Section 9.3.3.2. As discussed in Section 9.3.3.2, interim measures (source control system with wet wells and the planned groundwater collection trench (started in July 2015) barrier wall) prevent groundwater and NAPL migration from the Facility. These controls on contaminated groundwater and NAPL eliminate many potential off-site routes of exposure.

Maintenance Workers

Maintenance workers at parcels not owned by GM could be exposed to the same media and via the same routes of exposure as the maintenance workers at the GM owned parcels discussed in Section 6.3.3.2.

9.3.4 Selection of Exposure Concentrations

Soil

For potential exposures at the Facility, RMEs are conservatively estimated in this risk assessment by first using the maximum detected concentrations at any depth from the data collected during the RFI that represent current baseline conditions in each AOI. In estimating RMEs via inhalation of soil vapors in outdoor air, the concentrations of PCBs and mercury in soil are capped at the soil saturation limit (C_{sat}) to avoid using vapor emissions that are higher than possible, as discussed in Appendix T. Similarly, the vapor-phase concentrations of PCBs and mercury estimated from their concentrations in soil are capped at their vapor saturation limits to avoid using vapor concentrations that are higher than possible in vapor intrusion risk calculations. These highly conservative estimates of the RME are used to calculate upper-bound estimates of media-specific cumulative cancer and noncancer risks for each AOI. These upper-bound estimates of RME risks were compared to the U.S. EPA and IDEM limits for acceptable cumulative cancer risk and noncancer HI (i.e., cumulative site-related cancer risk of 10^{-4} and noncancer HI of 1). If these media-specific cumulative risks did not exceed the acceptable limits, then further calculations were not necessary.

If an upper-bound media-specific cumulative cancer risk or HI estimate exceeds the acceptable limit, then a RME estimate was calculated by appropriately replacing the maximum detected concentrations for the constituents that contributed most to the upper-bound estimates with concentrations that better represent the exposure concentrations for RME estimation. Where such refinements were made, the actual refinement for each case and rationale are discussed in Section 9.5.2. This approach is efficient in that it avoids calculations (such as 95% upper confidence limits [UCLs]) that would not materially affect media-specific cumulative cancer and noncancer risk estimates and is consistent with U.S. EPA guidance (U.S. EPA 1989).

In cases where a refined exposure concentration is estimated as a 95% UCL on the mean, the 95% UCL was calculated using a nonparametric bootstrap method known as the BCa (bias corrected and accelerated) method (Efron and Tibshirani 1998) with 4,000 bootstrap replications to ensure adequate accuracy. Like all nonparametric methods, this nonparametric bootstrap method does not require identification of a probability distribution for the data and is reliable for a wide range of distributions including normal and lognormal data (U.S. EPA 1997a). Current U.S. EPA guidance recommends the use of nonparametric methods (including nonparametric bootstrap methods) instead of methods recommended in older guidance (U.S. EPA 1992a), especially for situations where the probability distribution of a data set is not normal or is difficult to identify.

The use of maximum detected concentrations, rather than 95% UCLs, for many constituents in this risk assessment introduces more conservatism than necessary for RME estimates because it assumes constant, simultaneous worst case exposure to many constituents, when the RME generally would not have so many constituents at worst case concentrations at all times. The uncertainties associated with the use of such conservative estimates of exposure concentrations in evaluating the significance of potential exposures is discussed in Section 9.6.

As discussed in Section 8.1, an engineered cover system is in place at the East Side and in certain portions of the West Side of Facility as part of the remedy to prevent exposure. As discussed in Section 9.3.3.1, receptors coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent exposure to the material beneath the engineered cap. Therefore, the concentrations of constituents beneath the cap are not used in the calculation of risk estimates in this risk assessment.

Soil data representing current conditions that were collected under the Plant Buildings for the 2007 Self Implementing Plan (SIP) are used to calculate sample-specific risk estimates.

At offsite areas outside of the Facility, soil has been remediated to the removal action limit for PCBs. Therefore, the soil exposure concentration for PCBs in these areas is conservatively assumed to be the removal action limit of 1.8 mg/kg.

Groundwater

To assess potential exposures to groundwater under current and future conditions on- and off-Facility, the highest detected concentration for each constituent collected from all overburden and shallow bedrock monitoring wells within each AOI are initially used in the risk assessment to streamline risk calculations. In estimating RMEs via inhalation of vapors in indoor air, the vapor-phase concentration of PCBs and mercury estimated from their concentrations in groundwater is capped at their vapor saturation limits to avoid using vapor concentrations that are higher than possible. If an upper-bound media-specific cumulative cancer risk or HI estimate exceeds the U.S.

EPA and IDEM acceptable limit, then a RME estimate was calculated by appropriately replacing the maximum concentrations for the constituents that contributed most to the upper-bound estimates with concentrations that better represent the exposure concentrations for RME estimation. Where such refinements were made, the actual refinement for each case and the rationale are discussed in Section 9.5.2. This approach is efficient in that it avoids calculations that would not materially affect media-specific cumulative cancer and noncancer risk estimates and is consistent with U.S. EPA guidance (U.S. EPA 1989).

Groundwater data from deeper (intermediate and deep bedrock) saturated zones are not quantitatively evaluated in the risk assessment because there is no complete exposure pathway to groundwater in these deeper saturated units. These saturated units are much deeper than the depth to which workers are expected to excavate at and around the Facility (about 10 to 15 ft bgs), and are not relevant to vapor intrusion because they are overlain by shallower saturated units, which prevent vapor emission from the deeper saturated units to the vadose zone. Also, groundwater in these units is not a current or reasonably expected future water supply at the Facility, and the Interim Measures/CMs (source control system with wet wells and groundwater collection trench (started in July 2015) barrier wall) prevent future groundwater migration off of the Facility, as discussed in Section 2.4, 3.11, and 3.13.

As discussed above, the use of maximum detected concentrations introduces more conservatism than necessary for RME estimates. In addition, the maximum detected concentrations in unfiltered and filtered groundwater samples (when both were analyzed) are conservatively used to evaluate all exposure routes even though dissolved-phase concentrations (from the filtered samples) are more appropriate for calculating risks for the dermal and inhalation exposure routes. The uncertainties associated with the use of such conservative estimates of exposure concentrations in evaluating the significance of potential exposures is discussed in Section 9.5.4.

As shown in Figures 7.18 through 7.25, groundwater concentrations downgradient of the Interim Measure do not exceed MCLs. Therefore, risk estimates for potential exposure to groundwater off of the Facility are not calculated.

Sediment

Sediment outside of the stormwater retention basin has been remediated. As shown in Appendix S.2, the post-remediation concentrations of sediment meet this criterion. As such, evaluation of exposure to sediment in the stream is not necessary in the baseline risk assessment. The stormwater lagoon will be addressed as an IM in 2016.

Surface Water, Spring Water, and Seep Water

As shown in Appendix S.2, the most recent sample concentrations from surface water, seep or spring water concentrations in the stormwater lagoon and downgradient of the Interim Measure and Site Source Control do not exceed MCLs. Therefore, risk estimates for potential off-site exposure to surface water, seep or spring water are not calculated.

NAPL and Liquid Emulsion

To assess potential exposure to NAPL and liquid emulsion, the highest observed concentrations among the product samples collected in each area where potential vapor intrusion is possible are

used. In estimating RMEs, the vapor-phase concentration of PCBs and mercury estimated from their concentrations in liquid emulsion are capped at their vapor saturation limits to avoid using vapor concentrations that are higher than possible in vapor intrusion risk calculations. As discussed in Section 9.3.3.1, product that is not beneath the Engineered Cap is deeper than the depth to which maintenance or construction workers are expected to excavate. Therefore, the only current or reasonably expected future exposure scenario is for routine workers via vapor intrusion.

9.3.5 Fate and Transport Models

The following models were used in the risk assessment to estimate exposure concentrations for the exposure scenarios discussed in Section 9.3.2. These models are used by U.S. EPA and state regulatory agencies for screening level analysis. The following are brief descriptions of the models. Further details of these models are provided in Appendix T.

Vapor Intrusion into Buildings

Indoor air concentrations resulting from migration of vapors from soil, groundwater, liquid emulsion, or NAPL into a building are estimated using the model described by Johnson and Ettinger (1991), which U.S. EPA recommends for screening level evaluations (U.S. EPA 2004a, 2015). The calculations in this risk assessment use generic soil properties recommended by U.S. EPA (2004a) that are representative of the soil types at the Facility. The building characteristics used are based on recommended values for deriving the Michigan Part 201 generic vapor intrusion criteria for commercial/industrial sites (CSAG 2014), because neither USEPA nor IDEM provide default values for non-residential buildings. The building characteristics are considered conservative for the evaluation of current conditions because the buildings currently at the Facility are much larger in size than the commercial building assumed in the Michigan generic criteria. A discussion of the model and the input parameters used in the assessment is provided in Appendix T.

Vapor Emission from Exposed Water

The model for estimating vapor emissions from exposed water surfaces in excavations is based on mass transfer coefficients recommended in U.S. EPA guidance (U.S. EPA 1995a). A discussion of the model and the input parameters used in the calculation is provided in Appendix T.

Vapor Emission from Exposed Soil

Vapor emissions from exposed soil are estimated using the Jury model (Jury et al. 1983), based on depletion over time of soil initially contaminated from ground surface to a finite depth. A discussion of the model is provided in Appendix T.

Dust Emission

Emission of respirable soil particulates (PM_{10}) for routine worker and resident exposures to outdoor soil are calculated using the wind erosion model recommended by U.S. EPA (1996) with U.S. EPA default soil parameters. The wind speed and anemometer height are from the weather station nearest the Facility with an extensive data record, which is located in Indianapolis, Indiana (National Oceanic and Atmospheric Administration [NOAA] 2012).

During maintenance activities, the PM_{10} level is set at 50 micrograms per cubic meter (ug/m^3). This PM_{10} level is based on a time-weighted average assuming maintenance workers spend 1/3 of their

exposure period excavating into the subsurface and 2/3 of their exposure period conducting maintenance activities that do not involve excavation into the subsurface. In the time-weighted average calculation, the 24-hour average National Ambient Air Quality Standard (NAAQS) for PM_{10} of 150 ug/m^3 is used as the maximum PM_{10} concentration for the time spent excavating into the subsurface during maintenance activities and a PM_{10} concentration of 1 ug/m^3 is used for the time spent during maintenance activities that do not involve excavation. The PM_{10} concentration during non-excavation maintenance activities is expected to be less than 1 ug/m^3, based on the wind erosion model recommended by U.S. EPA (1996) using Facility-specific wind speed from Indianapolis, Indiana (NOAA 2012).

During construction activities, the PM_{10} level is set at 50 ug/m^3, which is the former annual average NAAQS for PM_{10}, since construction workers are assumed to be performing excavations for a working year. It is conservatively assumed that the PM_{10} concentration would be at this limit every day for the entire period of construction worker exposure[5].

Air Dispersion

Annual average air concentrations are estimated using the empirical correlations presented in U.S. EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (U.S. EPA 2002), assuming a square source area, and correlation coefficients for the Chicago, Illinois meteorological area. For exposure to soil vapor and particulates, the source area for routine workers and maintenance workers are conservatively based on 25 acres, which is the approximate size of the largest contiguous uncovered area of the West Plant. For off-Facility residents, the source area is also conservatively based on 25 acres.

For groundwater exposures during excavations to the water table by maintenance workers and construction workers, the source area is based on a 15 ft by 15 ft excavation. For this scenario, the maximum 1-hour air concentration at the ground surface is converted to a maximum 24-hour average air concentration using a conversion factor of 0.4 (U.S. EPA 1995b).

For exposure of on-Facility and off-Facility receptors to vapors from groundwater or NAPL that migrate through the vadose zone and into outdoor air, the source area is based on 25 acres.

Uncertainties inherent in the models and the conservative assumptions that are used in this risk assessment to address such uncertainties (particularly the estimation of exposure concentrations) are discussed in Section 9.5.4.

9.3.6 Estimation of Intakes

The exposure factors for evaluating the exposure scenarios summarized in the CSM are discussed in this section. In this risk assessment, standard default exposure factors recommended by U.S. EPA for estimating RME are used where available and appropriate. Where standard default exposure factors are not available or appropriate for an exposure scenario, the risk assessment

[5] This approach is believed to be more practical and has less uncertainty than using particulate emission/dispersion modelling to estimate air concentrations from different dust generating activities associated with construction projects. Since total dust emissions for which PM_{10} concentration are likely to exceed 50 ug/m^3 would be visible, PM_{10} levels less than 50 ug/m^3 would be easily achievable at the Facility by using typical practices for control of visible dust emissions.

uses similarly conservative exposure factors that are based on site-specific considerations and professional judgment, as discussed below.

9.3.6.1 Routine Workers

In this risk assessment, potential exposure of routine workers to soil is conservatively evaluated using the standard default exposure factors that U.S. EPA (1991a, 2014) recommends for estimating RME. According to U.S. EPA, the standard default exposure factors are conservative assumptions about the magnitude, frequency, and duration of exposures, which in combination, are intended to provide estimates of exposures that are higher than actual exposures to a large portion (90% to 99%) of a potentially exposed population.

Soil Ingestion Rate

An incidental soil ingestion rate of 50 milligrams per day (mg/day) is used for routine workers. U.S. EPA has recommended the use of this value for evaluating high-end routine worker hand-to-mouth exposures to soil (U.S. EPA 1991a).

Soil Dermal Contact Rate and Absorption

The dermal contact rate is the product of the exposed skin surface area and the soil to skin adherence factor. The exposed skin area of 3,527 cm^2 and the soil to skin adherence factor of 0.12 milligrams per centimeters squared (mg/cm^2) are the U.S. EPA-recommended skin area and adherence factor for evaluating high-end contact with soil by workers in industrial settings (U.S. EPA 2014). The absorbed dose from dermal contact with soil is estimated by multiplying the dermal contact rate by U.S. EPA-recommended absorption factors for absorption from soil (U.S. EPA 2004b).

Exposure Time

Routine workers are assumed to be at the Facility and inhale vapors and particulates from site-related sources for 8 hours per day, which is the U.S. EPA-recommended value for full-time workers (U.S. EPA 2009a, 2014).

Exposure Frequency and Duration

Routine workers are assumed to be at the Facility for 250 days per year for 25 years. This combination of exposure frequency and exposure duration is expected to be conservative for the amount of time that workers are actually exposed to soil during outdoor activities, as routine workers at most GM facilities spend the majority of their time indoors. If workers were to spend the majority of their time outdoors, the frequency of incidental ingestion and dermal contact exposures to soil would be limited by the weather, e.g., workers would not be expected to have uncovered skin during months where the temperatures are mostly below freezing. U.S. EPA has recommended the use of these values for evaluating high-end routine worker exposures (U.S. EPA 1991a, 2014).

Body Weight

The body weight of 80 kilograms (kg) is the standard U.S. EPA-recommended body weight for assessing exposure to adults (U.S. EPA 2014).

Averaging Time

The averaging time for evaluating cancer risk is equal to a lifetime of 70 years, and the averaging time for evaluating noncancer risk is equal to the exposure duration (U.S. EPA 1989, 2014).

Although it is recognized that the use of the default exposure factors, rather than site-specific factors (e.g., a site-specific exposure frequency or a fraction contacted term <1), results in overestimation of RME risks at the Facility, this approach streamlines the risk assessment.

9.3.6.2 Maintenance Workers

The exposure factors used for evaluating potential exposure of maintenance workers to soil, groundwater, and sediment are as follows:

Soil Ingestion Rate

U.S. EPA Region 5 suggested an incidental soil ingestion rate of 100 mg/day be used for workers performing occasional maintenance work that involves excavation into the soil. This soil ingestion rate is based on the time weighted average over an exposure frequency of 30 days per year, assuming that a maintenance worker spends 10 days per year excavating into the subsurface and 20 days per year conducting maintenance activities that do not involve excavation into the subsurface. An ingestion rate of 200 mg/day is used as the ingestion rate during excavation into the subsurface, and an ingestion rate of 50 mg/day is used as the ingestion rate during activities that do not involve excavation into the subsurface. The ingestion rate of 200 mg/day during excavation is consistent with the soil-to-hand adherence data for the construction-related activities in the 1997 Exposure Factors Handbook (U.S. EPA 1997b) and the ingestion rate of 50 mg/day during activities not involving construction is U.S. EPA's recommended value for evaluating high-end routine worker exposures to soil (U.S. EPA 1991a).

Soil Dermal Contact Rate and Absorption

The dermal contact rate is the product of the exposed skin surface area and the soil to skin adherence factor. The exposed skin area of 3,527 cm^2 and the soil to skin adherence factor of 0.12 mg/cm^2 are the U.S. EPA-recommended skin area and adherence factor for evaluating high-end contact with soil by workers in industrial settings (U.S. EPA 2014). The absorbed dose from dermal contact with soil was estimated by multiplying the dermal contact rate by U.S. EPA-recommended absorption factors for absorption from soil (U.S. EPA 2004b).

Groundwater Ingestion Rate

A rate of 0.005 liters per hour (L/hour) is used for incidental ingestion of groundwater during construction work in excavations that extend into groundwater. This rate is 10% of the rate that U.S. EPA (1989) recommends for ingestion while swimming, and represents a conservative estimate of incidental groundwater ingestion that could occur while workers are in an excavation pit.

Groundwater Dermal Contact

The exposed skin surface area of 3,527 cm^2 is based on the U.S. EPA-recommended exposed skin surface area for evaluating high-end contact with soil by workers in industrial settings (U.S. EPA 2014). Workers are conservatively assumed to be covered with groundwater over this exposed skin

surface area for 2 hours per event. The absorbed dose for organic chemicals is estimated using an unsteady state approach (U.S. EPA 2004b), which is more conservative than the steady state approach (U.S. EPA 1989), particularly for hydrophobic chemicals. The permeability coefficient (K_p) for dermal absorption from groundwater is estimated following U.S. EPA guidance (U.S. EPA 1992b and 2004b).

Exposure Time

Maintenance workers are assumed to be at the Facility and inhale vapors and particulates from site-related sources for 8 hours per day, which is the U.S. EPA recommended value for full-time workers (U.S. EPA 2009a, 2014).

Soil and Groundwater Exposure Frequency

U.S. EPA Region 5 suggested an exposure frequency of 30 days per year be used for workers performing occasional maintenance work that involves excavation into the soil. The number of days workers perform occasional maintenance that involves actual excavation into groundwater is assumed to be 5 days per year. The assumption of 5 days per year can represent the excavation time for a few small repairs per year or one larger repair. These exposure frequencies are expected to be conservative for the amount of time that workers are actually exposed to soil or groundwater (as opposed to the total time for maintenance or construction, which typically includes time not associated with excavation).

Exposure Duration

An exposure duration of 10 years is used for maintenance worker exposure to soil or groundwater. The exposure duration of 10 years is supported by the analysis of Burmaster (2000), using data from the Bureau of Labor Statistics through February 1996, which indicated that the 95th and 90th percentile job tenure of workers in construction is approximately 12.48 years and 7.7 years, respectively. The duration of 10 years is longer than the length of time that workers typically work at one location (U.S. EPA 1997b, 2011).

Body Weight

The body weight of 80 kg is the standard U.S. EPA-recommended body weight for assessing exposure to adults (U.S. EPA 2014).

Averaging Time

The averaging time for evaluating cancer risk is equal to a lifetime of 70 years, and the averaging time for evaluating noncancer risk is equal to the exposure duration (U.S. EPA 1989, 2014).

9.3.6.3 Construction Workers

The exposure factors used for evaluating potential exposure of construction workers to soil are the same as those for maintenance workers discussed in Section 9.3.6.2, except as follows:

Soil Ingestion Rate

An incidental soil ingestion rate of 200 mg/day, consistent with the soil-to-hand adherence data for the construction-related activities in the 1997 Exposure Factors Handbook (U.S. EPA 1997b), is used for the construction worker.

More recently, U.S. EPA guidance (U.S. EPA 2002) recommended an ingestion rate of 330 mg/day that is an estimated 95th percentile from a single soil ingestion study that involved 10 adults (Stanek et al. 1997). This ingestion rate is not used in the risk calculations because it is based on very limited data that might not be appropriate for representing actual exposure. However, the effects of using the somewhat higher ingestion rate of 330 mg/day are evaluated in Section 9.5.4. It should be noted that the estimated 90th percentile ingestion rate from the same study was approximately 200 mg/day.

Exposure Frequency and Duration

Construction workers are assumed to contact soil for up to 250 days for 1 year. This exposure frequency is expected to be conservative for the amount of time that workers are actually exposed to soil in excavations (as opposed to the total time for construction, which typically includes time not associated with excavation). This exposure frequency is also conservative because it does not account for days of the year when temperatures are below freezing when ingestion and dermal exposures would be minimal.

Potential exposure of construction workers to groundwater is conservatively evaluated using the risk estimates for maintenance workers, based on the exposure factors discussed in Section 9.3.6.2. The frequency of construction worker contact with groundwater is expected to be no more than the 5 days per year assumed for the maintenance worker, because foundation excavation depths are unlikely to reach groundwater in every portion of an excavation and workers would only contact water for the brief time it would take to dewater the excavation for construction to proceed.

9.3.6.4 Adolescent Trespassers

The following exposure factors for trespassers conservatively assume trespassers to be young adults from 6 to 16 years old.

Soil Ingestion Rate

An incidental soil ingestion rate of 100 mg/day is used for adolescent trespassers. U.S. EPA has recommended the use of this value for evaluating high-end exposures of adolescent and adult residents to soil (U.S. EPA 1991a, 2014).

Soil Dermal Contact Rate and Absorption

The exposed skin area of 4,400 cm^2 includes the forearms, lower legs, hands and head of adolescents using the mean values for body surface area from U.S. EPA (U.S. EPA 2011). The soil-to-skin adherence factor of 0.12 mg/cm^2 is the adherence factor for routine workers recommended by U.S. EPA (2014) and is conservatively used for trespassers. The absorbed dose

from dermal contact with soil is estimated by multiplying the dermal contact rate by U.S. EPA-recommended absorption factors for absorption from soil (U.S. EPA 2004b).

Exposure Time

Trespassers are assumed to be at the Facility and inhale vapors and particulates from site-related sources for 1 hour per day while trespassing. This exposure time considered that the Facility is in a rural area where there are locations other than the Facility that trespassers would find more desirable (e.g., lack of security patrols).

Soil Fraction Contacted

A fraction contacted term of 0.0625 is used to apportion the daily contact rates to hourly rates. For the soil ingestion and dermal contact routes, the daily rates discussed above are considered to apply over the 16 hours when people are awake and have potential contact with soil or soil -derived household dust. As such, a fraction contact term of 1/16 or (0.0625) is used.

Exposure Frequency and Duration

For trespassers contacting soil, the exposure frequency of 78 days/year is based on a conservative assumption that trespassers visit the Facility 2 days/week for the nine non-winter months (March through November).

The exposure duration of 10 years is based on the assumed age range of the trespassers.

Body Weight

The body weight of 44.3 kg is the mean body weight of 6 to 16 year olds (U.S. EPA 2011).

Averaging Time

The averaging time for evaluating cancer risk is equal to a lifetime of 70 years, and the averaging time for evaluating noncancer risk is equal to the exposure duration (U.S. EPA 1989, 2014).

9.3.6.5 Residents

Soil Ingestion Rate

The standard U.S. EPA-recommended ingestion rates of 200 and 100 mg/day are used for assessing exposure to children and adults, respectively (U.S. EPA 2014).

Soil Dermal Contact Rate and Absorption

The dermal contact rate is the product of the exposed skin surface area and the soil to skin adherence factor. The exposed skin area of 2,373 and 6,032 cm^2 and the soil to skin adherence factors of 0.2 and 0.07 mg/cm^2 are the U.S. EPA-recommended skin area and adherence factor for evaluating high-end contact with soil by children and adults, respectively (U.S. EPA 2014). The absorbed dose from dermal contact with soil is estimated by multiplying the dermal contact rate by U.S. EPA-recommended absorption factors for absorption from soil (U.S. EPA 2004b).

Exposure Time

Residents are assumed to be at home and inhale vapors and particulates from site-related sources for 24 hours per day, the U.S. EPA-recommended value for residents (U.S. EPA 2009a, 2014).

Exposure Frequency and Duration

Residents are assumed to be at home for 350 days per year for 26 years (6 years as children and 20 years as adults). This combination of exposure frequency and exposure duration is expected to be conservative for the amount of time that residents could actually be exposed to site-related soil and post-remediation soil and sediment. U.S. EPA has recommended the use of these values for evaluating high-end residential exposures (U.S. EPA 2014).

Body Weight

The body weights of 15 and 80 kg are the standard U.S. EPA-recommended body weights for assessing exposure to children and adults, respectively (U.S. EPA 2014).

Averaging Time

The averaging time for evaluating cancer risk is equal to a lifetime of 70 years, and the averaging time for evaluating noncancer risk is equal to the exposure duration (U.S. EPA 1989, 2014).

Uncertainties associated with the exposure factors used in estimating chemical intakes are discussed in Section 9.5.4.

9.4 Toxicity Assessment

A toxicity assessment identifies potential adverse health effects that are associated with exposure to chemicals, and determines the dose response relationship between exposure and the occurrence of adverse effects. The toxicity values used in this risk assessment were compiled from U.S. EPA's hierarchy of sources, as follows:

1. Integrated Risk Information System (IRIS)
2. Provisional Peer Reviewed Toxicity Values (PPRTV)
3. Other Toxicity Values

When a toxicity value was not available from the first two tiers of the hierarchy, other U.S. EPA and non U.S. EPA sources (e.g., Agency for Toxic Substances and Disease Registry (ATSDR)) of toxicity values were consulted. The toxicity values used in the risk assessment and their sources are summarized in Appendix T and are discussed below. The toxicity values used in this risk assessment are current as of July 2015.

9.4.1 Cancer Toxicity Values

For chemicals that U.S. EPA assessed prior to the 2005 Guidelines for Carcinogen Risk Assessment (U.S. EPA 2005a), U.S. EPA considers chemicals belonging to the following cancer weight of evidence groups as human carcinogens:

- Group A Known Human Carcinogen: Sufficient evidence of carcinogenicity in humans

- Group B1 Probable Human Carcinogen: Limited evidence of carcinogenicity in humans
- Group B2 Probable Human Carcinogen: Sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
- Group C Possible Human Carcinogen: Limited evidence of carcinogenicity in animals and inadequate or lack of evidence in humans

As shown in Appendix T, U.S. EPA has designated some of the constituents identified at the Facility as Group B2 or Group C, which means that U.S. EPA acknowledges that there is either inadequate evidence or a lack of evidence that these constituents actually cause cancer in humans. Therefore, evaluating these constituents as human carcinogens in the risk assessment is conservative.

For chemicals that U.S. EPA assessed after the 2005 Guidelines for Carcinogen Risk Assessment (U.S. EPA 2005a), U.S. EPA uses the following cancer weight of evidence groups:

- Carcinogenic to Humans
- Likely to be Carcinogenic to Humans
- Suggestive Evidence of Carcinogenic Potential
- Inadequate Information to Assess Carcinogenic Potential

U.S. EPA derived cancer slope factors (SFs) and inhalation unit risk factors (URFs) used in the risk assessment and their sources are shown in Appendix T. The oral SFs and URFs represent 95% upper confidence bounds on the probability of getting cancer over a lifetime per unit dose. As recognized by U.S. EPA, there is significant scientific evidence that some of the SFs and URFs may be overly conservative and may ignore the potential existence of threshold doses. Nonetheless, they are used here as conservative assessment tools. In addition, as recommended by U.S. EPA (2005b), ADAFs are used to adjust toxicity values for carcinogens with a mutagenic mode of action to assess potential exposures of children and adolescents.

9.4.2 Noncancer Toxicity Values

Constituents designated by U.S. EPA as belonging to the cancer weight-of-evidence Group D (Not Classifiable as to Human Carcinogenicity) are considered noncarcinogens. Constituents not designated as belonging to any cancer group are also treated as noncarcinogens. Chronic and subchronic reference doses (RfDs) and inhalation reference concentrations (RfCs) used in the risk assessment and their sources are shown in Appendix T.

The oral RfDs and inhalation RfCs represent conservative estimates of the daily exposure to the human population, including sensitive subpopulations (e.g., children), which are likely to be without an appreciable risk of deleterious effects. These RfDs and RfCs typically incorporate several safety factors to account for uncertainties in their derivation, which in combination often result in overall uncertainty factors of 1,000 or more. Furthermore, for many constituents, there is significant scientific debate about the validity of these RfDs and RfCs, and the association of these doses and concentrations to potential adverse health consequences. Nonetheless, the RfDs and RfCs are used here as conservative assessment tools.

9.4.3 Extrapolation of Toxicity Values

The U.S. EPA sources of toxicity values discussed above do not provide dermal toxicity values for any of the constituents. Therefore, oral toxicity values (i.e., oral SFs and RfDs) are used as dermal toxicity values in this risk assessment. Adjustments to the oral toxicity values, where appropriate, are made in this route-to-route extrapolation following U.S. EPA guidance (U.S. EPA 2004b).

The U.S. EPA sources of toxicity values discussed above do not provide inhalation toxicity values (URFs and RfCs) for all of the constituents. Route-to-route extrapolation from oral toxicity values was not performed to obtain inhalation toxicity values for these constituents, consistent with U.S. EPA guidance on performing inhalation risk assessments (U.S. EPA 2009a).

Uncertainties introduced by using extrapolated toxicity values are discussed in Section 9.5.4.

9.4.4 Lead

Potential exposure of receptors to lead in soil and groundwater is evaluated separately from the assessment for other constituents because U.S. EPA (U.S. EPA 2003) evaluates the significance of lead exposures using blood lead level as an index of exposure, rather than in terms of cancer risk or noncancer HQ. The screening level used to assess exposure to each environmental medium is discussed below.

9.4.4.1 Soil

Exposure of routine workers to lead in soil during outdoor activities is evaluated using an industrial screening level of 2,240 mg/kg. This screening level is calculated following USEPA guidance for the adult lead model (U.S. EPA 2003), including updates (U.S. EPA 2009b). The industrial screening level is intended to protect female workers of child-bearing age who contact lead in soil. The derivation of the industrial soil screening level is presented in Appendix T2. The industrial soil lead screening level for routine workers is also conservatively used to assess on-site maintenance and construction workers' exposure to lead in soil.

Exposure of residents to lead in soil during outdoor activities is evaluated using a residential screening level of 400 mg/kg that is intended to protect children who contact lead in soil. The residential soil lead screening level for is conservatively used to assess off-site maintenance workers' exposure to lead in soil.

9.4.4.2 Groundwater

Lead in groundwater is conservatively evaluated using the MCL (0.015 mg/L) for all receptors even though their exposures to groundwater are much lower than drinking water exposures.

9.5 Risk Characterization

The health significance of the potential exposures described in Section 9.3 is discussed in the following subsections. Section 9.5.1 describes the methods for quantifying cancer and noncancer risks. Section 9.5.2 and Section 9.5.3 discusses the risk estimates and their significance. Uncertainties in the risk estimates are discussed in Section 9.5.4.

9.5.1 Cancer Risk and Noncancer Hazard Index

The cancer risk associated with potential exposure to a chemical via ingestion and dermal contact is calculated by multiplying an estimate of the LADD for a particular exposure scenario by the cancer SF for the chemical, as follows:

$$Risk = LADD \cdot SF$$

For the inhalation route, the cancer risk is calculated using the chemical concentration in air (C_{air}) and the URF, as follows:

$$Risk = C_{air} \cdot URF \cdot \frac{ET \cdot EF \cdot ED}{AT_c}$$

where ET is exposure time, EF is exposure frequency, ED is exposure duration, and AT_c is the averaging time for cancer risks.

The noncancer hazard quotient (HQ) associated with potential exposure to a chemical via ingestion and dermal contact is calculated by dividing an estimate of the ADD for a particular exposure scenario by the RfD for the chemical, as follows:

$$HQ = \frac{ADD}{RfD}$$

For the inhalation route, the HQ is calculated using C_{air} and the RfC, as follows:

$$HQ = \frac{C_{air}}{RfC} \cdot \frac{ET \cdot EF \cdot ED}{AT_{nc}}$$

where AT_{nc} is the averaging time for noncancer risks.

The media-specific cumulative cancer risk and noncancer effects that may result from exposure to the combination of constituents at an area are estimated following U.S. EPA guidance (U.S. EPA 1989), as follows:

$$Cumulative\ Risk = \sum_i Risk_i$$

$$Hazard\ Index = \sum_i HQ_i$$

where:

$Risk_i$ = estimated cancer risk for the ith constituent

HQ_i = hazard quotient for the ith constituent

This approach may result in estimates of media-specific cumulative cancer risk and noncancer HI that are more conservative than necessary. For example, different chemicals may cause different and unrelated noncancer health effects, so summing the HQs for their individual effects would

overestimate the significance of their combined effects. Nonetheless, this approach is used here as a conservative assessment tool.

The media-specific cumulative cancer risk and HI estimates for each receptor population are compared with U.S. EPA's cancer risk limit of 10^{-4} and HI limit of 1, respectively, for determining whether CMs are warranted for a particular area of the Facility (61 FR 19432, May 1, 1996; U.S. EPA 1991b). IDEM uses the same cumulative cancer risk and HI limits for determining whether remedial action is necessary in its state cleanup programs (IDEM 2012). The risk estimates and results of the comparison to the U.S. EPA and IDEM limits are discussed in the following sections.

The details of the cumulative cancer risk and noncancer HI calculations are presented in Appendix T.

9.5.2 Risk Characterization for On-Facility Receptors

9.5.2.1 Routine Workers

Soil

Potential exposure of routine workers to constituents in soil at each area is evaluated in this risk assessment by conservatively assuming the following two alternate hypothetical cases at each area: (1) all soil at the area is outdoors and workers are exposed to the outdoor soil for the entire work day; and (2) all soil at the area is under an occupied building and workers are exposed to constituents in the soil via assumed vapor intrusion for the entire work day. Using these alternate hypothetical cases at each area is conservative and efficient because it avoids the need to prorate the work day between indoor and outdoor and risk estimates for any combination of time indoor and outdoor would not exceed the higher of the risk estimates for the two hypothetical cases.

Potential exposure for each hypothetical case was first evaluated using upper-bound estimates of media-specific cumulative cancer risk and noncancer HI to streamline the risk assessment, as explained in Section 9.3.3.1. The initial estimates were calculated using the highest Facility-related concentrations (i.e., excluding background) for all constituents detected in soil at an area. These estimates are considered upper-bound estimates because the RME risks for an area would be lower if concentrations representative of the area were used instead of the highest observed concentrations and if site-specific exposure factors were used to account for the magnitude, frequency, and duration of exposures appropriate for the area (e.g., using exposure factors that account for site-specific conditions, such as weather or workers spending only part of the work day at each area instead of the whole day).

The upper-bound estimates of Facility-related media-specific cumulative cancer risk and noncancer HIs were compared to the U.S. EPA and IDEM risk limits. Table 9.2 provides a summary of the upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of routine workers to soil for each alternate hypothetical case (i.e., all day exposure to outdoor soil or all day exposure indoors to soil constituents via vapor intrusion). These upper-bound risk estimates are based on the highest Facility-related concentrations for all constituents in soil at each area.

The table shows that the upper-bound media-specific cumulative risk estimates for 61 of the 64 on-Facility areas investigated during the RFI do not exceed the risk limits for either hypothetical

case. Upper-bound risk estimates at AOIs 9, 11, and 22 exceed the risk limits for hypothetical outdoor exposure.

The estimates of cancer risk and noncancer HQ associated with background levels of metals in soil (see Section 6.3) are shown in Table 6.2. The estimates of risks associated with background metal concentrations are low relative to the U.S. EPA and IDEM risk limits, and are not included in the Facility-related risk estimates presented in Table 6.2.

Based on the results shown in Table 9.2, the upper-bound estimates of Facility-related media-specific cumulative cancer risk and HI were further evaluated for the following areas and exposure pathways:

- AOI 9 – Service Tunnels for routine worker contact with soil
- AOI 11 – Aboveground Storage Tanks for routine worker contact with soil
- AOI 22 – Tool Room Annex Dock Release for routine worker contact with soil

AOI 9 – Service Tunnels

The upper-bound media-specific risk and HI estimates for routine worker exposure to outdoor soil at AOI 9 are primarily due to the maximum detected concentration of PCBs in soil which is currently under the service tunnels below the main building at the Facility. Because soil at AOI 9 is under the building, routine workers do not have a potential for current exposure to the soil. Potential exposure of routine workers to the soil is possible if the soil is moved and placed on the ground at the Facility. To prevent this potential, a deed restriction will be put in place as part of the CMs to require appropriate handling of soil under AOI 9 if soil with high PCB concentrations is moved. The soil with PCB concentrations that could pose an unacceptable risk to routine workers, if moved, include soil around B-X059Y135B (109 mg/kg) and B-X106Y102B (3,400 mg/kg). None of the other sampled locations at AOI 9 have PCB concentrations that would pose an unacceptable risk to routine workers; the media-specific cancer risk and HI estimates for these other locations are $5x10^{-6}$ and 0.2, respectively.

AOI 11 – Aboveground Storage Tanks

The upper-bound media-specific HI estimate for routine worker exposure to outdoor soil at AOI 11 is primarily due to the maximum detected concentration of PCBs in soil which is currently under the concrete pavement around the above ground storage tanks. Because soil at AOI 11 is under concrete pavement, routine workers do not have a potential for current exposure to the soil. However, potential exposure of routine workers to the soil is possible if the soil is moved and placed on the ground at the Facility. To prevent this potential, a deed restriction will be put in place as part of the CMs to require appropriate handling of soil under AOI 11 if soil with high PCB concentrations is moved. The soil with PCB concentration that could pose an unacceptable risk to routine workers, if moved, include soil around B-X223Y097A (181 mg/kg). None of the other sampled locations at AOI 11 have PCB concentrations that would pose an unacceptable risk to routine workers; the media-specific HI estimate for these other locations is 0.2.

AOI 22 – Tool Room Annex Dock Release

The upper-bound media-specific HI estimate for routine worker exposure to outdoor soil at AOI 22 is primarily due to the maximum detected concentration of antimony in soil (1,410 mg/kg from

SS-X031Y124). This HI was refined by replacing the maximum detected concentration of antimony with a 95% UCL calculated using the highest antimony concentration from any depth from all locations in AOI 22. The refined HI using the UCL for antimony (627 mg/kg) and the maximum detected concentrations for the remaining constituents is 0.7, which is below the limit of 1.

In addition to the risk estimates presented in Table 9.2, which are based on the RFI soil data, the risk assessment calculated risk estimates based on the soil PCBs data collected during renovation of the West Plant building floors per the U.S. EPA approved SIP. These data are for soil that is currently under the building floor, which is not accessible to routine workers. However, the sample-specific risk estimates calculated for these data may be used to identify locations where deed restrictions on soil movement may be necessary as part of the CMs. The sample-specific risk estimates for the SIP data are presented in Appendix T, and the locations with potentially unacceptable risk to routine workers if the soil is moved are summarized in Appendix W.

Lead

As discussed in Section 9.4.4, the screening level for routine worker exposure to lead in soil is 2,240 mg/kg, which is based on a blood lead modeling approach designed to be protective of potential exposures to soil lead in industrial settings. As U.S. EPA explained in promulgating the regulations at 40 CFR Part 745 (66 FR 1206, January 5, 2001), soil lead screening levels developed based on blood lead modeling should be compared with the arithmetic mean concentration of lead within the area where potential exposures are assumed to occur, in order to be consistent with the principles underlying the blood lead modeling approach.

As shown in Table 9.3, the maximum detected lead concentration for each on-Facility area is well below 2,240 mg/kg; therefore, the arithmetic means also must be lower, except at AOI 22. However, the arithmetic mean lead concentration at AOI 22 is 482 mg/kg, which is below the criterion. Therefore, no significant exposure of routine workers to soil lead is expected at any of the on-Facility areas.

Groundwater

Routine workers could be exposed to constituents in groundwater to the extent that such constituents volatilize and migrate into outdoor air or migrate through cracks in building foundations into indoor air, as discussed in Section 9.3.3.1. Media-specific cumulative cancer risk and HI estimates calculated using the highest detected concentration for each constituent for all on-Facility overburden and shallow bedrock monitoring wells are summarized in Table 9.4. These risk estimates are below the risk limits.

NAPL and Liquid Emulsion

Routine workers could be exposed to constituents in NAPL and liquid emulsion to the extent that such constituents volatilize and migrate to outdoor air or migrate through cracks in the building foundation into indoor air, as discussed in Section 9.3.3.1. Media-specific cumulative cancer risk and HI estimates for on-Facility routine worker exposure to constituents in NAPL and liquid emulsion are presented in Table 9.5. They are all below the risk limits.

9.5.2.2 Maintenance Workers

Currently, workers who are involved with occasional maintenance activities at the Facility coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent significant exposure in all areas of the Facility. However, as discussed in Section 9.3.3.1, the risk assessment evaluates potential exposures under a hypothetical future scenario in which maintenance workers do not necessarily coordinate with Facility staff or wear personal protective equipment while working in areas outside of the engineered cap.

Soil

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of maintenance workers to on-Facility soil are calculated using the concentrations discussed in Section 9.5.2.1 for routine worker exposure to soil. Table 9.2 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits, except at AOI 9.

At AOI 9, the upper-bound media-specific risk and HI estimates for maintenance worker exposure to soil are primarily due to the maximum detected concentration of PCBs in soil. These concentrations are the same as those discussed in Section 6.5.2.1 for routine worker, which will be addressed in the deed restriction as part of the CMs. To protect maintenance workers, the deed restriction would require use of appropriate PPE during subsurface work around B-X059Y135B (109 mg/kg) and B-X106Y102B (3,400 mg/kg). None of the other sampled locations at AOI 9 have PCB concentrations that would pose an unacceptable risk; the media-specific cancer risk and HI estimates for these other locations are $6x10^{-7}$ and 0.09, respectively.

The maintenance worker risk estimates calculated based on the SIP data are presented in Appendix T, and locations with potentially unacceptable risks for maintenance workers are summarized in Appendix W. Deed restrictions requiring use of appropriate PPE may be warranted for subsurface work around these locations.

Groundwater

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of maintenance workers to on-Facility groundwater are based on the highest detected concentration from all on-Facility overburden and shallow bedrock monitoring wells. Table 9.4 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits, except at AOI 8.

At AOI 8, the upper-bound media-specific HI estimate for maintenance worker exposure to groundwater is primarily due to the HQ for dermal contact with the maximum detected concentration of 0.072 mg/L of PCBs in an unfiltered groundwater sample (collected from MW-X233Y105B in 6/2004). This HQ overstates the dermal risk for two reasons. First, dermal contact risk calculations should be calculated using aqueous-phase ("filtered" or "dissolved") concentrations, and the filtered concentration from the same event was non-detect. Second, more recent sampling of this monitoring well in 5/2006 found no detectable PCBs in either the filtered or unfiltered samples. Excluding the

concentration of 0.072 mg/L, no other concentrations would result in a media-specific HI estimate that exceed the HI limit of 1.

9.5.2.3 Construction Workers

Soil

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of construction workers to on-Facility soil are calculated using the concentrations discussed in Section 9.5.2.1 for routine worker exposure to soil. Table 9.2 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits, except at AOIs 9, 11, 18, 21-3, 21-4, and 22.

AOI 9 – Service Tunnels

The upper-bound media-specific risk and HI estimates for construction worker exposure to soil at AOI 9 are primarily due to the maximum detected concentration of PCBs and manganese in soil. The PCB concentrations are the same as those discussed in Section 9.5.2.1 for routine worker, which will be addressed in the deed restriction as part of the CMs. The soil with manganese concentrations that could pose an unacceptable risk to construction workers include soil around B-X069Y098B (14,800 mg/kg). To protect construction workers, the deed restriction would require use of appropriate PPE during subsurface work around B-X059Y135B, B-X106Y102B, and B-X069Y098B. None of the other sampled locations at AOI 9 have PCB or manganese concentrations that would pose an unacceptable risk; the media-specific cancer risk and HI estimates for these other locations are $8x10^{-7}$ and 0.5, respectively.

AOI 11 – Aboveground Storage Tanks

The upper-bound media-specific HI estimate for construction worker exposure to soil at AOI 11 is primarily due to the maximum detected concentration of PCBs in soil. These concentrations are the same as those discussed in Section 9.5.2.1 for potential routine worker exposures, which will be addressed in the deed restriction as part of the CMs. To protect construction workers, the deed restriction would require use of appropriate PPE during subsurface work around B-X223Y097A (181 mg/kg). None of the other sampled locations at AOI 11 have PCB concentrations that would pose an unacceptable risk; the media-specific HI estimate for these other locations is 0.2.

AOI 18 – Area Affected by the Henry System Discharge

The upper-bound media-specific HI estimate for construction worker exposure to soil at AOI 18 is primarily due to the maximum detected concentration of PCBs in soil (17 mg/kg from SS-X154Y117H). This HI estimate was refined by replacing the maximum detected concentration of PCBs with a 95% UCL calculated using the highest PCB concentration from any depth from all locations in AOI 18. The refined HI using the UCL for PCBs (8.5 mg/kg) and the maximum detected concentrations for the remaining constituents is 1, which does not exceed the HI limit of 1.

AOI 21-3 – Surface Water Ditches Located Along GM Drive and Breckenridge Road

The upper-bound media-specific HI estimate for construction worker exposure to soil at AOI 21-3 is primarily due to the maximum detected concentration of mercury in soil (104 mg/kg from

B-X114Y258). This HI estimate was refined using a 0.016 acre (700 ft^2) source area (area represented by B-X114Y258) for calculating the outdoor air concentration of mercury, in place of the 25 acre source area assumed in the upper-bound calculations. The refined HI using the refined outdoor air concentration for mercury and the maximum detected concentrations for the remaining constituents is 0.7, which is below the HI limit of 1.

AOI 21-4 – Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

The upper-bound media-specific HI estimate for construction worker exposure to soil at AOI 21-4 is primarily due to the maximum detected concentration of PCBs in soil (54.1 mg/kg from MW-X045Y258D). This HI was refined by replacing the maximum detected concentration of PCBs with a 95% UCL calculated using the highest PCB concentration from any depth from all locations in AOI 21-4. The refined HI using the UCL for PCBs (12.2 mg/kg) and the maximum detected concentrations for the remaining constituents is 0.8, which is below the HI limit of 1.

AOI 22 – Tool Room Annex Dock Release

The upper-bound media-specific HI estimate for construction worker exposure to soil at AOI 22 is primarily due to the maximum detected concentration of antimony in soil. These concentrations are the same as those discussed in Section 9.5.2.1 for potential routine worker exposures. The refined HI after replacing the maximum detected concentration of antimony with the 95% UCL and using with the maximum detected concentrations for the remaining constituents is 3, which is higher than the HI limit of 1. However, the area represented by the surface soil sample that is covered by pavement in the loading dock is approximately 0.02 acres (900 ft^2). It is unlikely that construction workers would contact soil over such a small area for the assumed EF of 250 days/year. A more reasonable EF for this area is IDEM's recommended EF of 45 days/year (IDEM 2012). The media-specific HI estimate after refining the construction worker EF to 45 days/year is 0.5, which is below the HI limit of 1.

The construction work risk estimates calculated based on the SIP data are presented in Appendix T, and locations with potentially unacceptable risks for construction workers are summarized in Appendix W. Deed restrictions requiring use of appropriate PPE may be warranted for subsurface work around these locations.

Groundwater

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of construction workers to on-Facility groundwater are based on the highest detected concentration from all on-Facility overburden and shallow bedrock monitoring wells. Table 9.4 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the risk limits, except at AOI 8.

At AOI 8, the upper-bound media-specific HI estimate for construction worker exposure to groundwater is primarily due to the maximum detected concentration of PCBs in the same unfiltered groundwater sample discussed in Section 9.5.2.2 for potential maintenance worker exposures. The media-specific HI estimate after replacing the maximum detected unfiltered PCB concentration with the most recent non-detect concentration for the dermal route of exposure and the maximum

detected concentrations for the remaining constituents and routes of exposure is 0.0003, which is below the HI limit of 1.

9.5.2.4 Trespassers

As discussed in Section 9.3.3.1, potential exposure of trespassers is possible, although fencing (with signs) and/or security personnel control access to the Facility. These controls, and the absence of any obvious attractive nuisance, make trespassing unlikely and would limit the duration of any unauthorized access as well as the types of activities while on Facility. However, some of the East Plant and adjacent GM-owned parcels are not currently fenced.

Soil

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of trespassers to on-Facility soil are calculated using the concentrations discussed in Section 9.5.2.1 for routine worker exposure to soil. Table 9.2 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits, except at AOI 9.

At AOI 9, the upper-bound media-specific HI estimate for trespasser exposure to soil if in the future the soil beneath the service tunnels below the main building at the Facility is moved and left uncovered is primarily due to the maximum detected concentration of PCBs. These concentrations are the same as those discussed in Section 9.5.2.1 for routine worker, which will be addressed in the deed restriction as part of the CMs. To protect trespassers, the deed restriction would require appropriate handling of soil, if moved, at and around B-X059Y135B (109 mg/kg) and B-X106Y102B (3,400 mg/kg). None of the other sampled locations at AOI 9 have PCB concentrations that would pose an unacceptable risk; the media-specific cancer risk and HI estimates for these other locations are $2x10^{-7}$ and 0.02, respectively.

The trespasser risk estimates calculated based on the SIP data are presented in Appendix T. These data are for soil that is currently under the building floor, which is not accessible to trespassers. However, the sample-specific risk estimates calculated for these data may be used to identify locations where deed restrictions on soil movement may be necessary as part of the CMs. The locations with potentially unacceptable risks for trespassers, if soil from the locations are moved and placed on the ground elsewhere at the Facility, are summarized in Appendix W.

Groundwater

Potential exposure of trespassers to constituents in on-Facility groundwater are evaluated indirectly in this risk assessment using exposure estimates for the routine workers that are described in Section 9.3.3.1. This streamlines the risk assessment and is conservative because trespasser exposures would be lower than routine worker exposures. Therefore, the risk and HI estimates for trespassers are expected to be no higher than the estimates discussed in Section 9.5.2.1 and summarized on Table 9.4, which do not exceed the U.S. EPA and IDEM risk limits.

NAPL and Liquid Emulsion

Potential exposure of trespassers to constituents in on-Facility NAPL and liquid emulsion are evaluated indirectly in this risk assessment using exposure estimates for the routine workers that are

described in Section 9.3.3.1. This streamlines the risk assessment and is conservative because trespasser exposures would be lower than routine worker exposures. Therefore, the risk and HI estimates for trespassers are expected to be no higher than the estimates discussed in Section 9.5.2.1 and summarized on Table 9.5, which do not exceed the U.S. EPA and IDEM risk limits.

9.5.3 Risk Characterization for Off-Facility Receptors

9.5.3.1 Residents

Soil

As discussed in Section 9.3.3.2 and Section 9.3.3.3, off-Facility residents could be exposed to constituents in on-Facility soil vapors and particulates that are transported off-Facility by wind. Residents on these parcels also could be exposed to post-remediation soil at a particular parcel.

The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of off-Facility residents to on-Facility soil are calculated using the concentrations discussed in Section 9.5.2.11 for routine worker exposure to soil. Table 9.2 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits.

Soil Removal Action Limit

As discussed in Section 9.3.4, the residential soil exposure concentrations for PCBs at off-Facility parcels is conservatively assumed to be the removal action limit of 1.8 mg/kg. The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of off-Facility residents to soil concentrations at the removal action limit are $8x10^{-6}$ and 0.5, respectively. These upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits.

Groundwater

As discussed above, off-Facility exposure via potable or non-potable groundwater use is not expected because groundwater is not currently used within the well survey area around the Facility. Additionally, interim measures (wet wells and the planned barrier wall) prevent groundwater migration from the Facility. Therefore, as discussed in Section 9.3.3.2 and Section 9.3.3.3, off-Facility residents could only be exposed to constituents in on-Facility groundwater vapors that are transported off-Facility by wind. The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of residents to on-Facility groundwater are based on the highest detected concentration from all on-Facility overburden and shallow bedrock monitoring wells. Table 9.4 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits.

NAPL and Liquid Emulsion

As discussed above, interim measures (wet wells and the planned wall collection trench) prevent NAPL migration from the Facility. Therefore, as discussed in Section 9.3.3.2 and Section 9.3.3.3,

off-Facility residents could only be exposed to constituents in vapor from on-Facility NAPL and liquid emulsion that are transported off-Facility by wind. The upper-bound estimates of media-specific cumulative cancer risk and HI for potential exposure of residents to on-Facility NAPL and liquid emulsion are based on the highest detected concentration from all on-Facility product. Table 9.5 provides a summary of the upper-bound risk estimates for all of the on-Facility areas investigated during the RFI. The table shows that the upper-bound media-specific cumulative risk estimates do not exceed the U.S. EPA and IDEM risk limits.

9.5.3.2 Maintenance Workers

Potential exposure of off-Facility workers to constituents in on-Facility soil, groundwater, and NAPL that are transported off-Facility by wind erosion and/or vapors that migrate off-Facility are evaluated indirectly in this risk assessment using exposure estimates for the off-Facility residents that are described in Sections 9.3.3.2 and 9.3.3.3. This streamlines the risk assessment and is conservative because off-Facility worker exposures would be lower than off-Facility residential exposures. Therefore, the risk and HI estimates for off-Facility workers are expected to be no higher than the estimates discussed in Section 9.5.3.1 and summarized on Table 9.2, Table 9.4 and Table 9.5, which do not exceed the U.S. EPA and IDEM risk limits.

9.5.4 Uncertainty Analysis

9.5.4.1 Exposure Concentrations

As discussed in Section 9.3.4, most exposure concentrations for soil in this risk assessment are based on the highest concentrations detected in soil at each area, and concentrations more representative of the RME (e.g., 95% UCLs) are calculated only when an upper-bound media-specific cumulative cancer risk or HI exceeds the U.S. EPA and IDEM risk limits. This approach streamlines the risk assessment by avoiding calculation of 95% UCLs that would not materially affect risk assessment conclusions regarding the need for CMs.

However, this approach inflates the media-specific cumulative cancer risk and HI estimates that do not exceed the U.S. EPA and IDEM risk limits, since these estimates are entirely based on maximum detected concentrations. As explained in Section 9.3.4, the use of maximum detected concentrations for all constituents introduces more conservatism than necessary for RME estimates because it assumes simultaneous worst case exposure to all constituents constantly, when the RME generally would not have all constituents at worst case concentrations at all times.

The above discussion regarding soil exposure concentrations also applies to groundwater exposure concentrations for the excavation scenario, since maintenance workers and construction workers would not be expected to be exposed to groundwater with the maximum detected concentrations of every constituent during every excavation.

For the groundwater vapor intrusion scenarios, the use of maximum detected concentrations also overstates the RME risk. This is because the groundwater under an individual on-Facility building is unlikely to have the maximum detected concentrations of all constituents. However, these upper-bound estimates can be useful for identifying constituents for which significant risk is possible, so that risk based concentration limits for such constituents can be used to identify specific locations where significant exposures might occur.

Most exposure concentrations that are based on mathematical modeling of constituent transfer from soil or groundwater to air are conservative for the same reasons discussed above, since the model estimates are based on the use of maximum detected concentrations in soil or groundwater. In addition, the model estimates are conservative because they generally do not account for the reduction of constituent concentrations in the soil or groundwater as constituents transfer from these media. As a result, risk estimates that are based on the sum of risk estimates for multiple media are more conservative than necessary for RME estimates. These include almost all of the risk estimates discussed in Section 9.5.2 and Section 9.5.3.

9.5.4.2 Exposure Factors

As discussed in Section 9.3.6, most of the exposure factors used in the risk assessment are high-end (i.e., 90th to 95th percentile) estimates of the magnitude, frequency, and duration of potential exposures. When several such high-end factors are multiplied, the resulting estimates of dose will be higher than the 90th percentile of the distribution of exposures in the potentially exposed population and could be higher than the exposure to the maximally exposed individual, particularly when such exposure factors are combined with exposure concentrations that are based on maximum detected concentrations (as discussed above).

Also, the use of generic default exposure factors for evaluation of potential exposure of workers to soil is more conservative than necessary for RME estimates, which allow the use of site-specific considerations (U.S. EPA 1989). For example, the "fraction contacted" terms used in this evaluation assume that routine workers are exposed to soil for an entire work day at each area, but workers at commercial/industrial sites generally spend only a part of the work day at a particular part of the Facility.

The ingestion rate for estimating exposure of construction workers to soil in this risk assessment is 200 mg/day. As noted in Section 9.3.6.3, this ingestion rate is based on U.S. EPA-compiled soil-to-hand adherence data for construction-related activities (U.S. EPA 1997b), and is believed to be plausible, conservative, and consistent with the expectation that incidental soil ingestion is associated primarily with hand-to-mouth contact. More recently, U.S. EPA guidance (2003) recommends an ingestion rate of 330 mg/day that is based on the variability in the data from a single soil ingestion study that involved a very small number of individuals. This ingestion rate was not used in the risk calculations discussed in Section 9.5.2.3 because it is based on very limited data that might not be appropriate for representing actual exposure. However, using the somewhat higher ingestion rate of 330 mg/day would alter the conclusions of the risk assessment for certain on-Facility AOIs if construction activities involving contact with soil are assumed to occur for 250 days/year. However, as discussed in Section 6.5.2.3, IDEM recommended an exposure frequency of 45 days/year for the evaluation of such exposures. Using IDEM's recommended exposure frequency and the slightly higher ingestion rate of 330 mg/day would not alter the conclusions of the risk assessment.

9.5.4.3 Extrapolated Toxicity Values

As discussed in Section 9.4.3, the dermal toxicity values used in the risk assessment are oral toxicity values that were extrapolated to the dermal route without chemical specific judgment regarding whether such extrapolation might be appropriate for a particular chemical. This is a conservative approach to ensure that potential risk via the dermal route is not overlooked. However, some

constituents might exhibit different degrees of toxicity for the dermal route relative to the oral route. For such constituents, the extrapolation approach used in the risk evaluation could introduce uncertainty.

9.5.4.4 Risk Characterization

The summation of cancer risks and HQs for multiple constituents, as described in Section 9.5.1, is based on U.S. EPA guidance (U.S. EPA 1989) to assume dose additivity, which means that constituents in a mixture are assumed to have no synergistic or antagonistic interactions and each constituent has the same mode of action and elicits the same health effects. In general, this approach can introduce significant uncertainty. However, the majority of the cumulative cancer risk and HI estimates in this risk assessment are dominated by contributions from no more than a few constituents, so that the media-specific cumulative risk estimates are nearly the same as those for the few key constituents.

9.6 Risk Assessment Summary

The significance of potential exposures to concentrations of constituents in soil, groundwater, sediment, NAPL, and liquid emulsion was evaluated based on conservative estimates of the RME under current and reasonably expected future land use at and around the Facility. The evaluation used the RFI data that are discussed in Section 9.2 and methods that are consistent with U.S. EPA risk assessment guidance. The significance of potential exposures was determined by comparing estimates of media-specific cumulative cancer risks and noncancer HIs with a cancer risk limit of 10^{-4} and a HI limit of 1, respectively, which U.S. EPA and IDEM have established as triggers for CMs under RCRA Corrective Action (U.S. EPA 1991b, IDEM 2012).

Based on consideration of current and reasonably expected land use at and around the Facility, the potentially exposed populations evaluated in the risk assessment are:

- On-Facility:
  - Routine workers
  - Maintenance workers
  - Construction workers
  - Trespasser
- Off-Facility:
  - Residents
  - Maintenance workers

The potential exposures evaluated for these receptors are summarized in the CSM presented in Table 9.1. Results of the risk assessment are summarized below and on Table 9.6a and Table 9.6b for each receptor population.

On-Facility Routine Workers

The risk assessment evaluated potential outdoor exposures to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates. It also evaluated potential inhalation exposures to

constituents that volatilize from soil, groundwater, liquid emulsion, and NAPL and migrate into outdoor air or migrate through cracks in building foundations into indoor air.

The conservative estimates of media-specific cumulative cancer risk and HI do not exceed the risk limits at any area for any media, except at AOI 9 and AOI 11 for contact with soil. However, as discussed in Section 9.5.2.1, the samples contributing to the unacceptable risks at AOIs 9 and 11 are from under the building, and therefore, represent soil that is currently inaccessible. To prevent potential exposure if the soil were to be moved and placed on the ground at the Facility, a deed restriction will be put in place as part of the CMs to require appropriate handling of soil under AOI 9 and AOI 11 if soil with high PCB concentrations is moved.

In addition to the risk estimates presented in Table 9.2, the risk assessment calculated risk estimates based on the soil PCBs data collected during renovation of the West Plant building floors per the U.S. EPA approved SIP. These data are for soil that is currently under the building floor, which is not accessible to routine workers. However, certain locations were identified for inclusion in the deed restriction to be put in place as part of the CMs to require appropriate handling of soil if it is moved. These locations are summarized in Appendix T and shown in Appendix W.

The arithmetic mean lead concentrations in soil are below the acceptable level of lead in soil for routine workers.

On-Facility Maintenance Workers

Currently, workers who are involved with occasional maintenance activities at the Facility coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent significant exposure through implementation of health and safety plans. However, the risk assessment evaluated potential exposures under a hypothetical scenario in which maintenance workers do not necessarily coordinate with Facility staff or wear personal protective equipment while working in areas outside of the engineered cap, and are exposed to soil, groundwater, sediment, and surface water during occasional maintenance activities.

The conservative estimates of media-specific cumulative cancer risk and HI do not exceed the risk limits at any area for any media, except at AOI 9 for contact with soil. However, as discussed in Section 9.5.2.2 and above, the samples contributing to these risks at AOI 9 are from PCBs in soil. To protect maintenance workers from potential exposure if Facility staff are not consulted and health and safety procedures are not followed in the future, a deed restriction would need to be put in place to require use of appropriate PPE during subsurface work under AOI 9 in the vicinity of soil with high PCB concentrations.

The maintenance worker risk estimates calculated based on the SIP data identified certain locations where a deed restriction would need to be put in place to require use of appropriate PPE to protect maintenance workers from potential exposure. These locations are summarized in Appendix T and shown in Appendix W.

On-Facility Construction Workers

Currently, workers who are involved with construction activities at the Facility coordinate with Remediation Staff, Facility Environmental Engineering, and/or Industrial Hygiene staff to prevent significant exposure. However, the risk assessment evaluated potential exposures under a

hypothetical scenario in which construction workers do not necessarily coordinate with Facility staff or wear PPE while working in areas outside of the engineered cap and are exposed to soil and groundwater during subsurface construction activities.

The conservative estimates of media-specific cumulative cancer risk and HI do not exceed the risk limits at any area for any media, except at AOI 9 and AOI 11 for contact with soil. However, as discussed in Section 9.5.2.3 and above, the samples contributing to these risks at AOI 9 are from PCBs and manganese in soil. The samples contributing to these risks at AOI 11 are from PCBs in soil. To protect construction workers from potential exposure if Facility staff are not consulted and health and safety procedures are not followed in the future, a deed restriction would need to be put in place to require use of appropriate PPE during subsurface work under AOI 9 and AOI 11 in the vicinity of soil with high PCB or manganese concentrations.

The construction worker risk estimates calculated based on the SIP data identified certain locations where a deed restriction would need to be put in place to require use of appropriate PPE to protect construction workers from potential exposure. These locations are summarized in Appendix T and shown in Appendix W.

On-Facility Trespassers

Potential exposure of trespassers is possible, although some fencing (with signs) and/or security personnel control access to the Facility. These controls make trespassing unlikely and would limit the duration of any unauthorized access as well as the types of activities while on Facility. In addition, the Facility lacks an obvious “attractive nuisance” that could serve to make trespassing more likely. The risk assessment evaluated the significance of potential outdoor exposures of trespassers to soil, groundwater, liquid emulsion, and NAPL.

The conservative estimates of media-specific cumulative cancer risk and HI do not exceed the risk limits at any area for any media, except at AOI 9 and AOI 11 for contact with soil. However, as discussed in Section 9.5.2.4 and above, the samples contributing to the unacceptable risks at AOIs 9 and 11 are from under the building, and therefore, represent soil that is currently inaccessible. To prevent potential exposure if the soil were to be moved and placed on the ground at the Facility, a deed restriction will be put in place as part of the CMs to require appropriate handling of soil under AOI 9 and AOI 11 if soil with high PCB concentrations is moved.

The trespasser risk estimates were calculated based on the SIP data even though these data are for soil that is currently under the building floor, which is not accessible to trespassers. However, certain locations were identified for inclusion in the deed restriction to be put in place as part of the CMs to require appropriate handling of soil if it is moved. These locations are summarized in Appendix T and shown in Appendix W.

Off-Facility Residents

Interim measures (source control system with wet wells and the groundwater collection trench (started in July 2015) trench) prevent groundwater or NAPL migration from the Facility. Therefore, off-Facility residents could only be exposed via inhalation of constituents from the on-Facility soil, groundwater, liquid emulsion, and NAPL if the constituents from areas not covered by the engineered cap were to volatilize and migrate off-Facility in outdoor air. Off-Facility residents also could be exposed to post-remediation soil at a particular parcel.

The conservative estimates of media-specific cumulative cancer risk and HI do not exceed the risk limits at any area for any media.

Off-Facility Maintenance Workers

Off-Facility maintenance worker could be exposed via inhalation of constituents from the on-Facility surface or subsurface soil, groundwater, liquid emulsion, and NAPL if the constituents from areas not covered by the engineered cap were to volatilize and migrate off-Facility in outdoor air. The risk assessment evaluated the significance of potential exposures of off-Facility workers by using the risk estimates for off-Facility resident exposures to these media, which is a conservative and streamlined approach, as shown in Appendix T.

The conservative estimates of media-specific cumulative cancer risk and HI for off-Facility residents do not exceed the risk limits at any area for any media. Since the constituents in these media do not pose a significant risk to off-Facility residents, they also do not pose a significant risk to off-Facility workers.

10. Ecological Risk Assessment (ERA)

10.1 Introduction

During completion of the RFI, an ERA was completed on the creek areas (soil, sediment and surface water) by Exponent (September 26, 2006). The conclusions and recommendations of this report are summarized below (the ERA is included as Appendix X). The ERA was conducted on the Facility and off-Facility (downgradient) areas of significant ecological habitat; which included:

- Area 1: East Plant Area
- Area 2: Eastern Drainage Upstream of Broomsage Road (upper reach of Bailey's Branch and tributaries)
- Area 3: Eastern Drainage, Broomsage Road to Peerless Road (lower reach of Baileys' Branch and upper main channel of Pleasant Run)
- Area 4: Eastern Drainage, Peerless Road to Murdock Trestle (middle reach of Pleasant Run)
- Area 5: Eastern Drainage Downstream of Murdock Trestle (lower reach of Pleasant Run)
- Area 6: Western Drainage.

Area 1 is distinct from the other areas, as it is entirely located within the East Plant Area and as such is the only area discussed in this RFI Report. Areas 2 through 5 consist of portions of surface water drainages downstream of the Facility that have been addressed by the off-Facility RA activities and are discussed in associated construction reports[6].

6 While surface water results are screened for VOCs for the purpose of demonstrating that groundwater contamination is not impacting surface water resources, screening of PCBs in surface water is not necessary for addressing potential ecological concerns for three reasons. First, floodplain soil, sediments and PCB material in bedrock fractures were removed under a U.S. EPA-approved CERCLA Removal Action, to address potential impacts of PCBs on ecological receptors, has already been completed. Second, groundwater sources of PCBs to the creek system have been identified by a seep and spring monitoring program and, where PCBs have been detected, collection systems have been installed and operated to eliminate any potential PCB sources. Third, a cover system was installed to isolate and contain any residual PCBs source in the East Plant Area.

10.2 Habitat and Exposure Evaluation

For the Facility, the ERA Problem Formulation (Exponent, October 15, 2004), found there was no significant ecological habitat within the West Plant Area. The habitat found within the East Plant Area was identified as habitat Area 1 within the ERA. The available habitat within the East Plant Area was limited due to paved and gravel parking area, the process water treatment plant, regularly mowed lawn areas, and the Stormwater Pond. The most significant habitat was the wooded area to the east and northeast of the Stormwater Pond including a small permanent wetland sustained by the seeps and springs that were found in this area. Few species were directly observed but the small foot print of the habitat could have supported a variety of small species (e.g. small mammals, woodland birds, amphibians, and wetlands invertebrate communities). Regular mowing of the grassed areas would have limited the attractiveness of the grassed areas to small mammals and raptors, indirectly. The Stormwater Pond was found to not host an extensive aquatic community, although fish and turtles have been observed. The surrounding rip-rap shoreline and absence of vegetative cover (trees, shrubs etc.) would limit the attractiveness of the pond to birds and mammals.

10.3 Assessment and Measurement Endpoint Evaluation

The ecologic risk questions for the ERA are based on the assessment endpoints, which provide the basis for evaluating the results of the study-area remediation. The ERA was prepared to answer the following five risk questions:

- Do PCB levels that will be present after removal in study-area water, sediment, and fish have the potential to adversely affect reproductive success in piscivorous bird populations?
- Do PCB levels that will be present after removal in study-area water, sediment, and fish have the potential to adversely affect reproductive success in piscivorous mammal populations?
- Do PCB levels that will be present after removal in study-area water, sediment, and small mammals have the potential to adversely affect reproductive success of carnivorous bird populations?
- Do PCB levels that will be present after removal in study-area water, sediment, and soil invertebrates have the potential to adversely affect reproductive success of insectivorous/vermivorous mammal populations?
- Do PCB levels that will be present after removal in study-area water, sediment, and vegetation have the potential to adversely affect reproductive success in herbivorous mammal populations?

Measurement endpoint representative species used in the assessment of each question were the belted king fisher *(Ceryle alcyon)*, mink *(Mustela vison),* red tailed hawk *(Buteo jamaicensis)*, short-tailed shrew *(Blarina breicauda)*, and deer mouse *(Peromyscus maniculatus)*, respectively.

10.4 Risk Assessment Summary

Based on the risk calculations (described within the ERA for the creek RA areas), post-removal dietary exposures for representative receptors in the off-Facility study area fall below reported

Finally, an ecological risk assessment was conducted that demonstrated that the sediment cleanup level of 1 mg/kg is protective of ecological receptors. These three factors eliminate the need for any screening for ecological risk from PCBs.

no-effect levels for PCBs. Risk associated with residual levels of PCBs remaining following RA completion is predicted to be negligible, and the answer to all five risk questions is "no" for the off-Facility watershed. The remediation is predicted to be protective of ecological communities that use the watershed as habitat.

As noted for each terrestrial receptor (described in the ERA), habitat in Area 1 (GM CET Bedford Facility) is covered by the engineered multi-layer Cover System (12-inches of compacted clay overlain by linear low-density polyethylene [LLDPE] liner). Therefore, the post-remedial exposure of terrestrial receptors to PCBs in soil is projected to be non-existent. Furthermore, human use and maintenance of this area, and industrial activities associated with the Facility limit the habitat usage. The habitat features present are sufficient to support herbivorous and insectivorous small mammal populations, which in turn, could provide a limited forage resource for carnivorous wildlife. However, post-remediation PCB exposure to these receptor communities is not predicted to be significant. The engineered Cover System is protective of ecological receptors at the East Plant Area, because exposure pathways have been eliminated by the multi-layer cover. It is anticipated that the Stormwater Pond sediment will be dredged and liner will be installed in 2016/2017 so therefore will have not have potential to exposure after sediment removal activities. U.S. EPA approved the risk findings of the ERA on December 21, 2006.

11. Summary and Conclusions

11.1 RFI Review

The RCRA CA was initiated at the Facility in 2000 and 2001 through a final Performance Based Agreement signed by U.S. EPA and GMC that became effective March 20, 2001. Prior to 2000, GMC effected a series of remedial actions within the 1970s, 1980s, and 1990s to address issues identified during those decades related to the historical use of PCBs.

The first major report submitted as part of the RCRA CA was the CCR that was transmitted to the U.S. EPA and IDEM on May 25, 2001. The CCR discussed all previous environmental data and remediation activities completed before 2001 (e.g. 1970s, 1980s, and 1990s). The CCR also served as the basis for the RFI Work Plan that was submitted to U.S. EPA on October 29, 2001. The RFI Work Plan was supplemented by 13 addenda from 2001 through 2006. The RFI Work Plan addenda were completed to systematically address the AOIs and off-Facility areas not included in the original RFI Work Plan so that sufficient data were collected during the RFI to characterize potential releases and evaluate potential current and future exposures. Initial sampling phases of the RFI included a full suite of constituents which identified the primary chemical of concern to be PCBs, with some metals identified in the screening results.

Since 2001, based on the early RFI results, a series of preventative remedial activities and Interim Measures were conducted under the following two approaches:

1. Off Facility Creek Remedial Activities
    - Upstream Parcels RA
    - Parcel 22 RA
    - Downstream Parcels RA

- Western Tributary IM
- Site Source Control RA

2. On Facility RCRA Interim Measure Activities
    - East Plant Area TSCA Vault (≥50 mg/kg PCBs)
    - East Plant Area Cover System (<50 mg/kg PCBs)
    - AOI 8 Product Recovery
    - AOIs 21-1 and 21-2 Excavation
    - Former AOI 13 UST Closures
    - Site Source Control
    - Groundwater Collection Trench (started in July 2015)

GM is planning to implement additional IMs within 2015 and 2016:

- AOI 8 oil removal
- AOI 10 Stormwater Pond
- Groundwater Collection Trench

Following approval of the RFI, GM will prepare a Corrective Measures Proposal (CMP) to present the final CMs to be applied to the Facility. Based upon a review of the HHRA, the final CM will detail a deed restriction that includes provisions for health and safety plans and operation and maintenance (O&M) provisions for the IM remedial systems.

11.2 Risk Assessment

Baseline HHRA and ERA were conducted to evaluate the health significance of site-related constituent concentrations at all areas where soil, groundwater, and/or product data were collected during the RFI field investigations.

The purpose of the HHRA was to determine whether any of the site-related concentrations at each AOI poses a potentially significant risk under reasonable maximum exposure based on current and reasonably expected future land use which would warrant further CMs. The HHRA and its results are discussed in Section 9.0 of this RFI Report. The ERA is discussed in Section 10.

The baseline HHRA considered the RFI data that are representative of current and potential future exposures to site-related contaminants. Areas where completed soil removals, engineered cover systems, and planned IMs such as the perimeter Groundwater Collection Trench and sediment removal at the Stormwater Pond have been completed or are planned were excluded from the evaluation. In summary, the risk assessment considered the following potentially exposed populations at and around the Facility under current and reasonably expected future land use:

- On-Facility:
    - Routine workers
    - Maintenance workers

  - Trespassers
- Off-Facility:
  - Residents
  - Routine workers
  - Maintenance workers
  - Trespassers

On-Facility, the baseline HHRA determined that only subsurface soil PCB concentrations at AOI 9 (service tunnels) and AOI 11 (ASTs) exceeded U.S. EPA's risk limits for potential future exposures of routine workers and maintenance workers who could contact the soil via incidental ingestion and dermal contact if the existing building is removed and the soil is exposed (e.g. the existing building are the current cover system). Risk estimates for maintenance worker exposure to PCBs in the shallow bedrock groundwater exceeded U.S. EPA's risk limits for potential via incidental ingestion and dermal contact. A deed restriction, which will reference adherence to a Site-specific Health and Safety Plan (HASP) (including a Soil Management Plan for future construction and maintenance activities) or under the direction of personnel expressly qualified to conduct the work (GM Remediation Staff, Facility Environmental Engineering, etc.), and the restriction of groundwater use, will be implemented as part of future CMs to address these potential exposures at the Facility.

Off-Facility, the baseline HHRA determined that no risk estimates exceeded U.S. EPA's risk limits for potential exposure to soil, groundwater, or product.

An ERA was also completed during the RFI for on-Facility and off-Facility properties. This risk assessment was completed assuming that the proposed RAs and IMs/CMs would be completed, as proposed. The ERA evaluated post-removal and IM dietary exposures representative endpoint species for PCBs.

- King Fisher (piscivorous bird populations)
- Mink (piscivorus mammal populations)
- Red Tailed Hawk (carnivorous bird populations)
- Short-Tailed Shrew (insectivorous/vermivorous mammal populations)
- Deer mouse (herbivorous mammal populations)

The ERA determined that following remedial activities in the creek systems and the covering of potential habitat within the East Plant Area, was protective of the model ecological receptors.

11.3 Corrective Measures Proposal (CMP)

GM will develop a CMP to assess any final CMs that are required at the Facility (AOI 9 and 11) with the assumption that GM would operate and maintain the existing IMs and implement any supplemental IMs. The CMP will include deed restrictions on impacted property and the necessity of implementation of HASPs for construction and/or O&M work at the Facility. The following table presents a summary of the current status of each AOI (RA, IM, and/or future CM).

Table 11.1 RCRA Corrective Action Results Summary by AOI

AOI	Description	CERCLA RA[1]	RCRA IM	Summary of Risk	NFA
AOI 1	Mineral Processing	Y	N	N	Y
AOI 2	Waste Storage	Y	N	N	Y
AOI 3	PCB Storage	Y	N	N	Y
AOI 4	North Disposal	Y	$Y^{R,C}$	N	Y
AOI 5	East Sand Disposal	Y	$Y^{R,C}$	N	Y
AOI 6	Sludge Disposal	Y	$Y^{R,C}$	N	Y
AOI 7	North Lagoon	Y	$Y^{R,V,C}$	N	Y
AOI 8	South Lagoons	Y	Y^{O}-Future	N	Y
AOI 9	Service Tunnels	Y	Y^{2}-Future	Y-Future	N^{2}
AOI 10	Stormwater Pond	Y	Y^{S}-Future	N	Y
AOI 11	ASTs	Y	Y^{2}-Future	Y-Future	N^{2}
AOI 12	Hydraulic Fluid Release	Y	N	N	Y
AOI 13	USTs	Y	N	N	Y^{3}
AOI 14	Cows Disposal	Y	N	N	Y
AOI 15	Equipment Storage	Y	N	N	Y
AOI 16	East Substation	Y	N	N	Y
AOI 17	Piston Building Oil	Y	N	N	Y
AOI 18	Henry System	Y	Y^{R}	N	Y
AOI 19	Paint and Thinner	Y	N	N	Y
AOI 20	Northern Piston	Y	N	N	Y
AOI 21	North Ravine	Y	N	N	Y
AOI 21-1	Hourly Lot Valley	Y	Y^{R}	N	Y
AOI 21-2	Office Drainage Valley	Y	$Y^{R,C}$	N	Y
AOI 21-3	Surface Ditches	Y	Y^{R}	N	Y
AOI 21-4	Electrical Sub Valley	Y	N	N	Y
AOI 22	Annex Dock Release	Y	N	N	Y
AOI 23	Filter Cake Release	Y	N	N	Y
AOI 24	Die Lube Release	Y	N	N	Y
AOI 30	Parcel 201 Fill	Y	$Y^{R,C}$	N	Y
Off-Site	Pleasant Run	Y	N	N	N
Groundwater	-	Y	Y^{T}-Future	N	N^{4}
Facility-Wide	-	Y	$Y^{T,4}$-Future	N	N^{4}

[1] – Source Control Systems installed for Facility-wide containment

[2] – Deed restrictions to limit excavation and movement of contaminated soil without a HASP

[3] – Subject to conditions of IDEM NFA letter

[4] – Deed restrictions to limit groundwater use, maintenance of site security, continue operation and maintenance on IM's

[C] – Construction of engineered cover system to reduce infiltration and prohibit direct contact with impacted soil materials

[O] – Oil/NAPL removal

[R] – Removal of ≥50 mg/kg PCB impacted soil

[V] – TSCA Vault construction

[S] – Sediment removal from Stormwater Pond

[T] – Perimeter Groundwater Collection Trench (as an additional groundwater source control)

11.4 Financial Assurance and Operations Maintenance and Monitoring

- The CMP will include a proposed long-term Operations Maintenance and Monitoring Plan (OMMP). The OMMP will be developed through discussions with the U.S. EPA on the need to include both groundwater and surface water locations in the monitoring program.
- The CMP will include provisions for a Financial Assurance mechanism for the operation, maintenance, and inspection of all engineering controls
- The CMP will include a Perimeter Trench Alternatives Review
- Additional monitoring south of AOI 1 will be included in the Long-Term Monitoring Plan of the CMP

12. References

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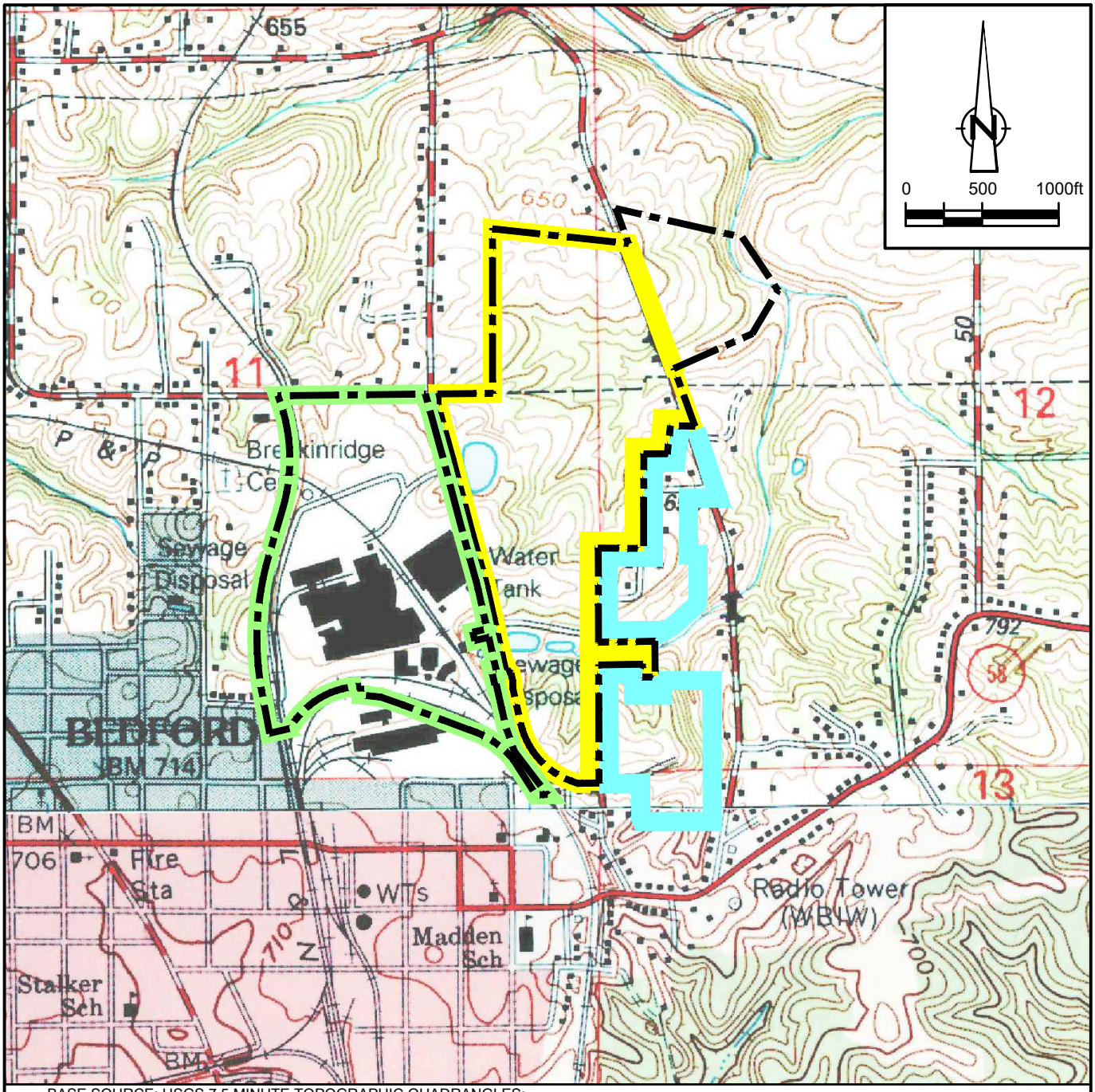


BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES;
BARTLETTSVILLE, INDIANA 1994
BEDFORD EAST, INDIANA 1978
BEDFORD WEST, INDIANA 1993
OOLITIC, INDIANA 1987
GM PROPERTY BOUNDARY SURVEY BY
BLEDSOE RIGGERT GUERRETTAZ
RECEIVED OCTOBER 2007

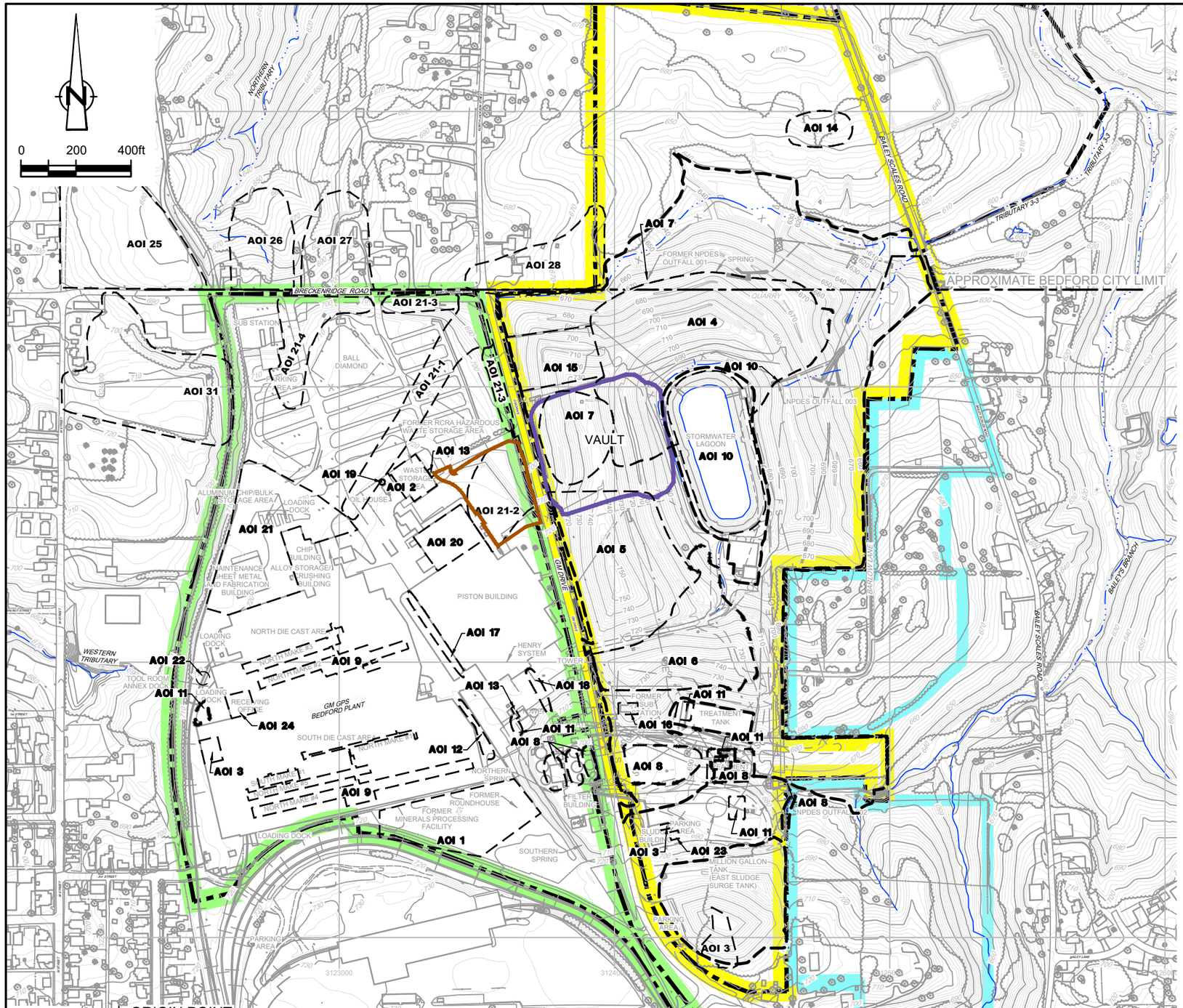
LEGEND

- APPROXIMATE FACILITY BOUNDARY
- GM LLC OWNED RESIDENTIAL PROPERTIES
- EAST PLANT AREA BOUNDARY
- WEST PLANT AREA BOUNDARY

figure 2.1

FACILITY LOCATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE FACILITY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- AOI BOUNDARY
- WEST PLANT COVER LIMIT
- EAST PLANT COVER LIMIT
- WEST PLANT AREA BOUNDARY
- EAST PLANT AREA BOUNDARY
- VAULT LIMIT
- GM LLC OWNED RESIDENTIAL PROPERTIES

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2008.

NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 2.2

FACILITY PLAN
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA002.dwg Plot Date: JAN 09, 2020

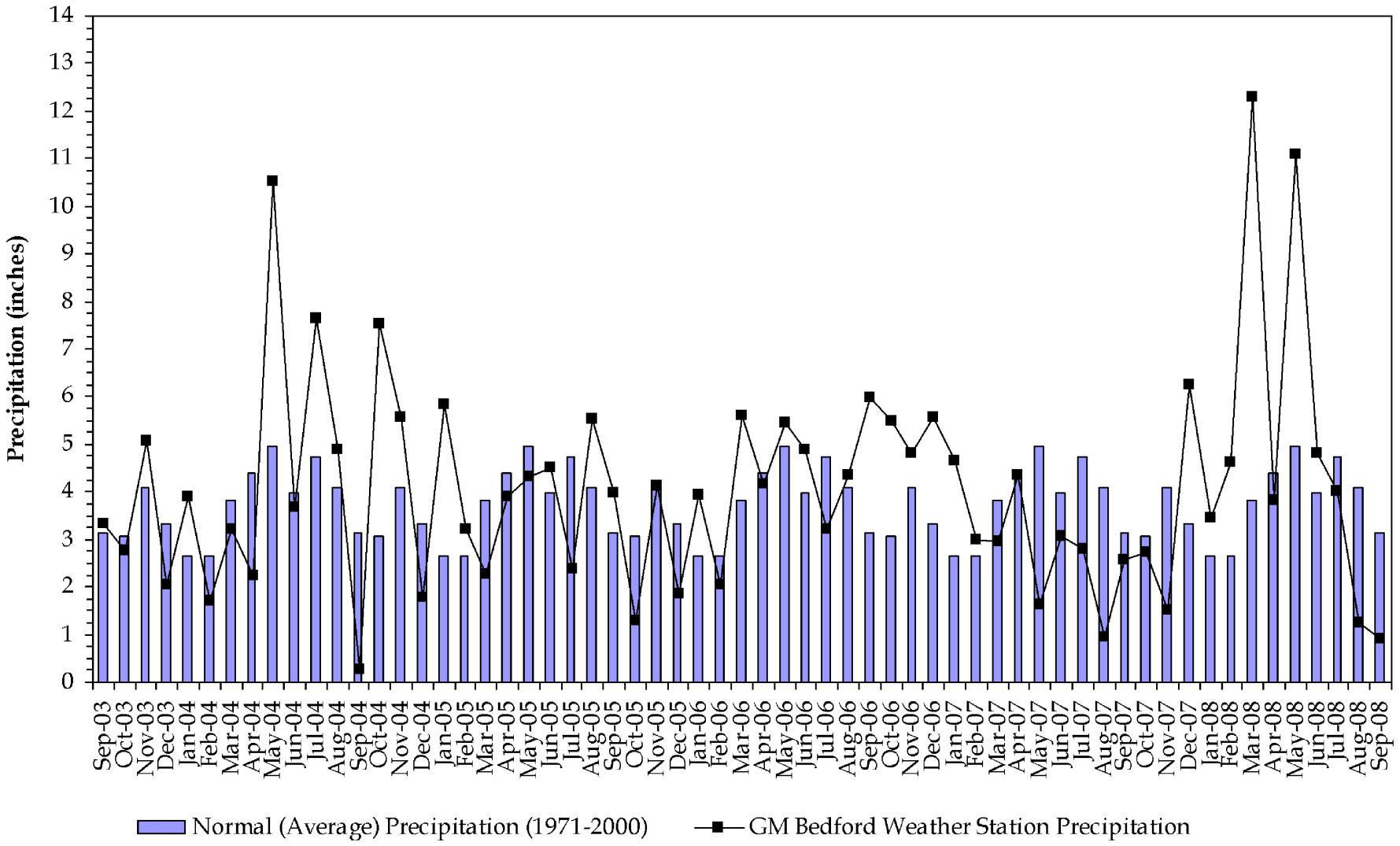
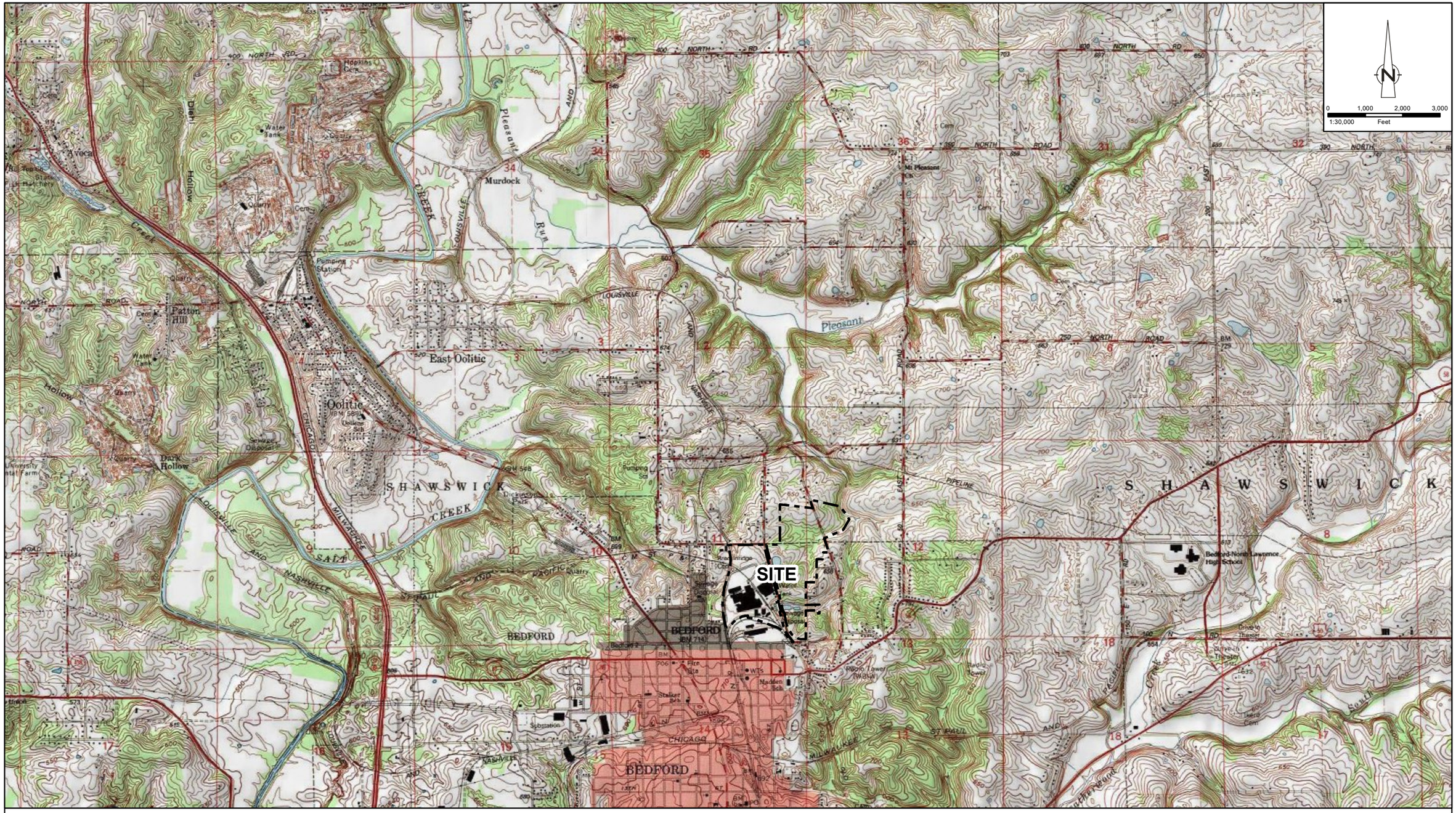


figure 2.3

MONTHLY PRECIPITATION AT THE GM BEDFORD WEATHER STATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

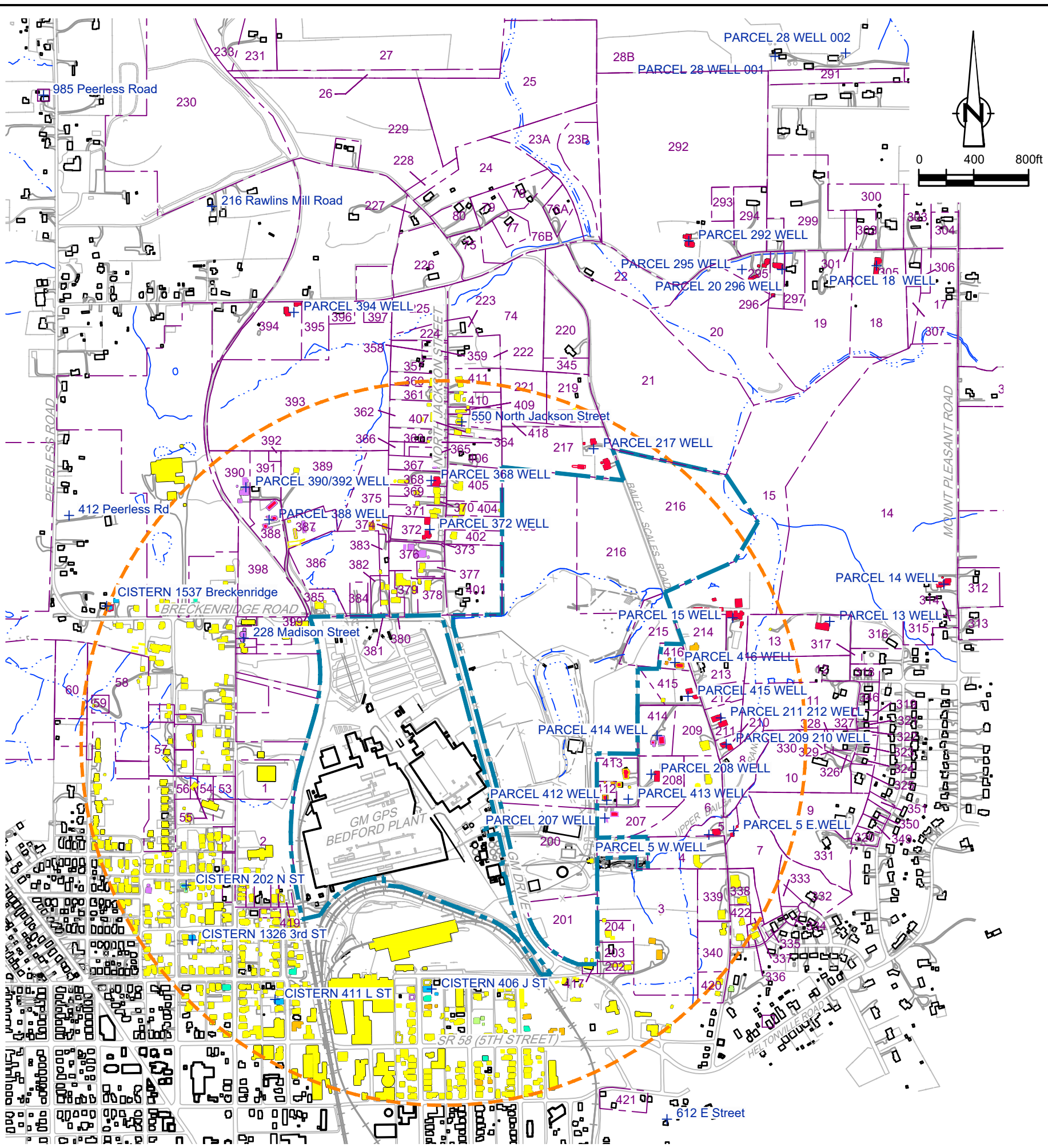


Source: ESRI USA Topo Basemap, Indiana, Accessed 2019;
Coordinate System: NAD 1983 StatePlane Indiana West FIPS 1302 Feet

figure 2.4

TOPOGRAPHY IN THE VICINITY OF THE FACILITY
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001
AND CRA SURVEYS 2002 - 2005

NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

LEGEND

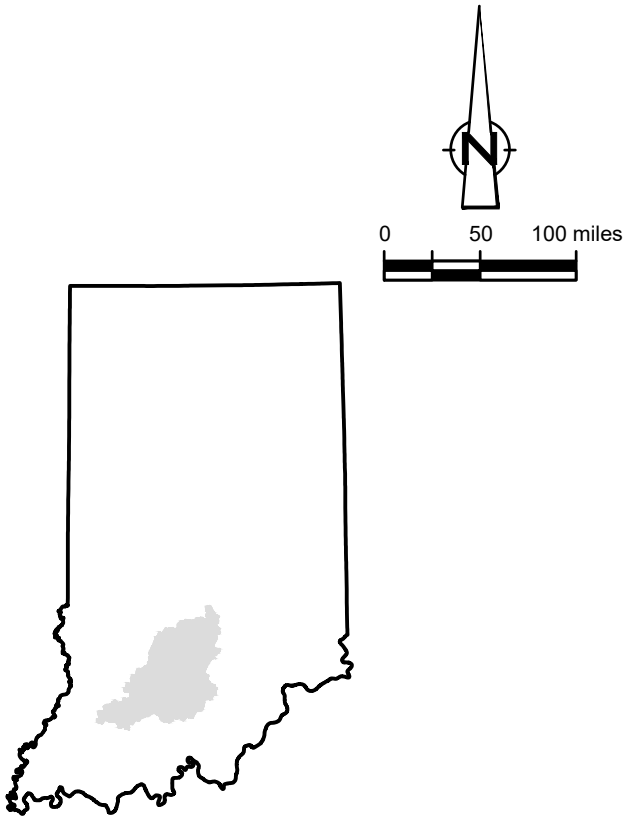
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE SURFACE WATER LOCATION
- 1/2 MILE RADIUS LIMIT
- GROUNDWATER SAMPLE LOCATION

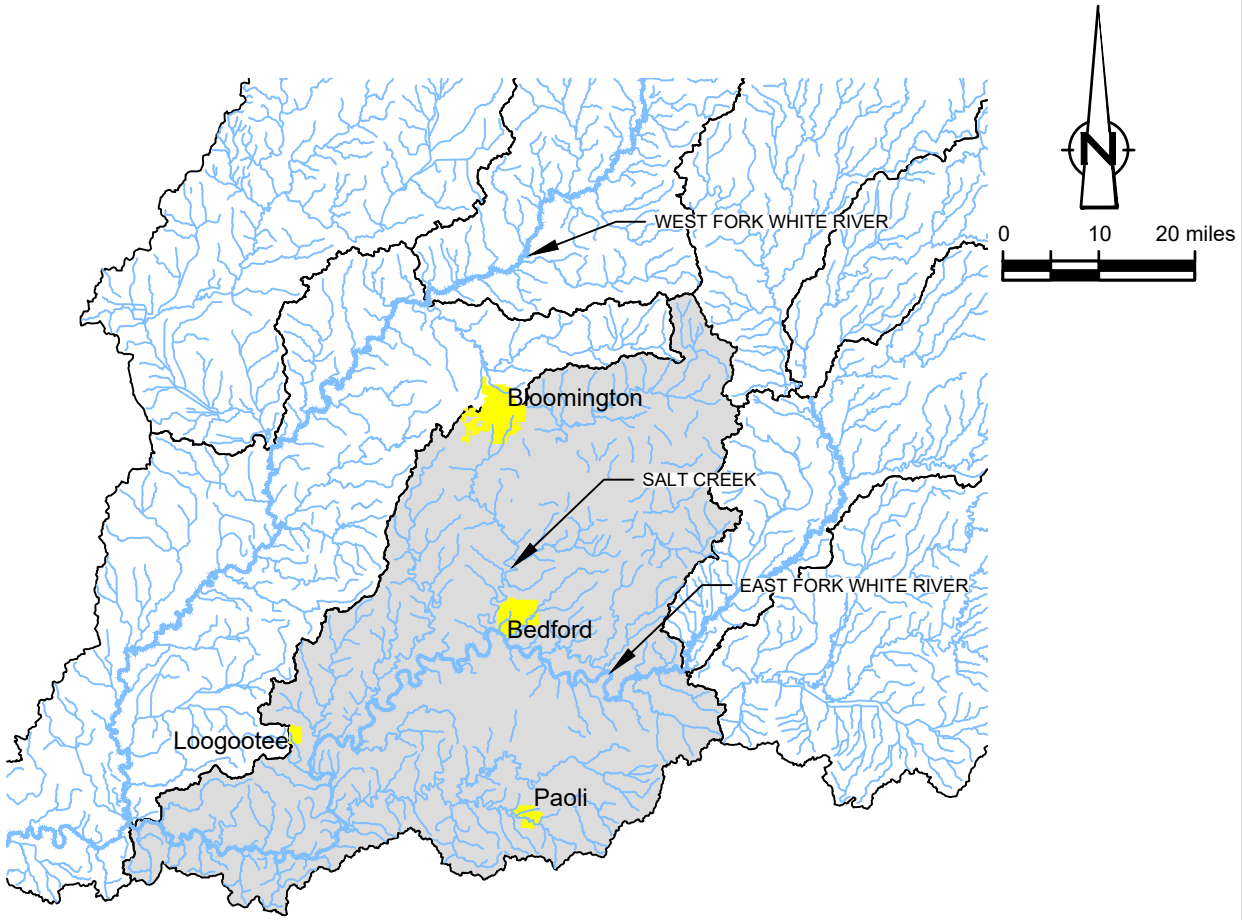
- NO WELL
- CISTERN SAMPLED
- WELL SAMPLED
- CISTERN PRESENT - UNABLE TO SAMPLE
- WELL PRESENT - UNABLE TO SAMPLE
- WELL ABANDONED - FILLED IN
- CISTERN ABANDONED - FILLED IN
- OUTSTANDING

figure 2.5

RESIDENTIAL WELL SURVEY
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



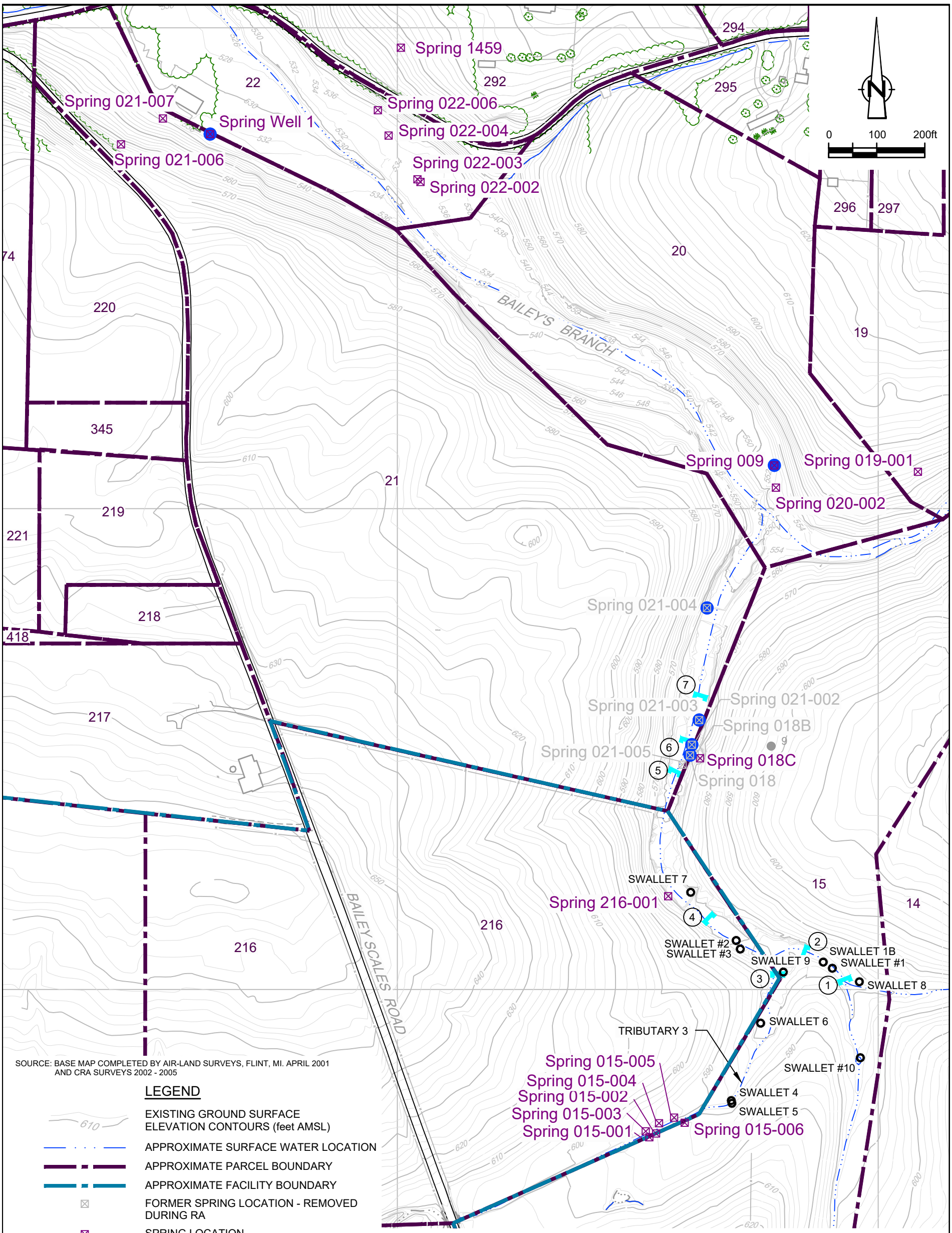


SOURCE: SOURCE: INDIANA GEOLOGICAL SURVEY, INDIANA DEPARTMENT OF TRANSPORTATION

figure 2.6

LOWER EAST FORK WHITE RIVER DRAINAGE BASIN
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 - 2005

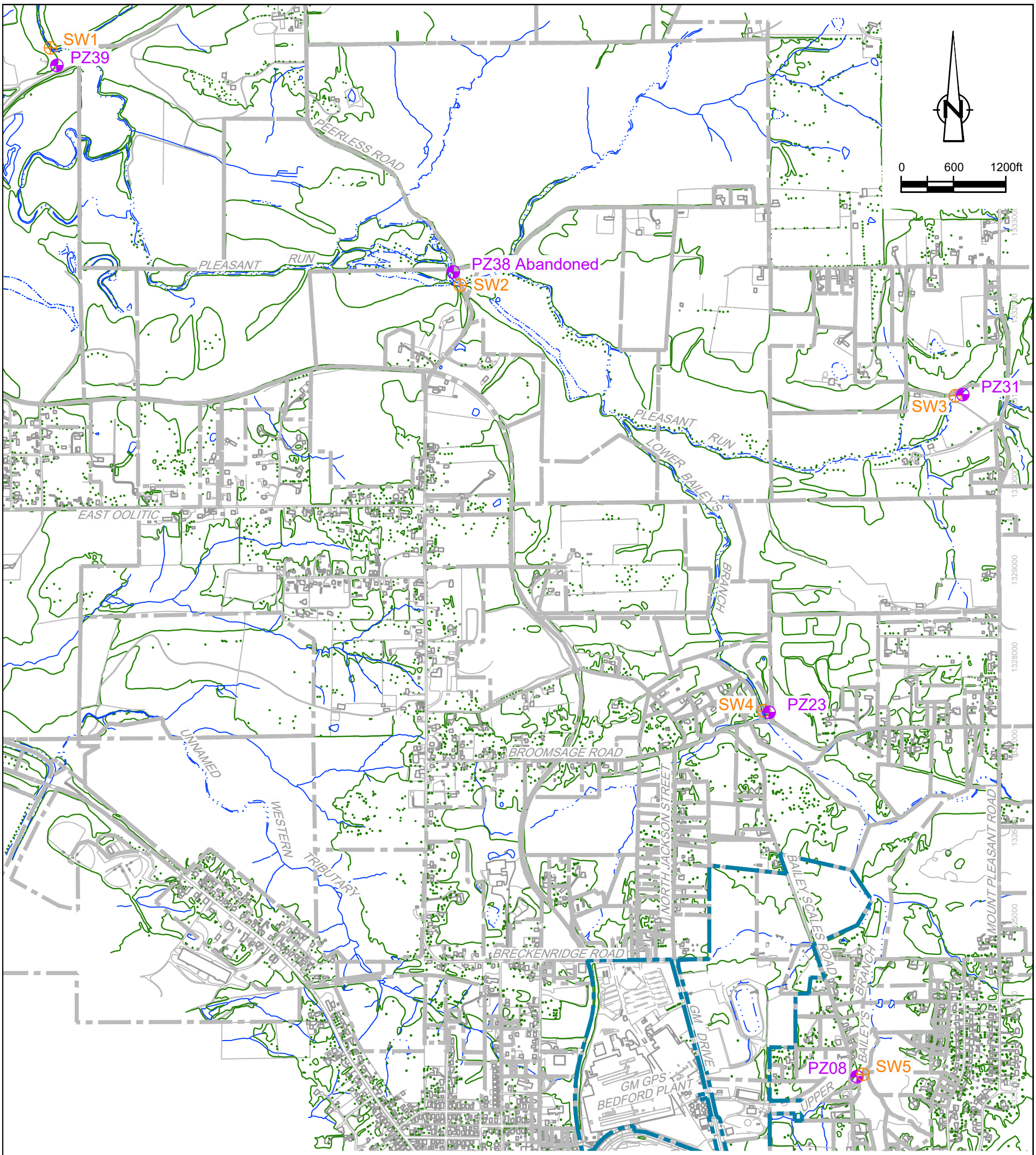
LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- APPROXIMATE FACILITY BOUNDARY
- FORMER SPRING LOCATION - REMOVED DURING RA
- SPRING LOCATION
- SINKHOLE LOCATION
- SWALLET #2 — SWALLET LOCATION
- WEIR PLATE LOCATION
- 1 — WEIR LOCATION NUMBER
- 2004/2005 DYE TRACE SURFACE WATER SAMPLING LOCATION

NOTE: PARCEL 22 BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED MARCH 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 2.7

SPRING 018 AREA
RFI REPORT
GM GPS BEFORD FACILITY
Bedford, Indiana



LEGEND

- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- EXISTING PIEZOMETER
- APPROXIMATE LOCATION OF STREAM GAUGE

NOTE:

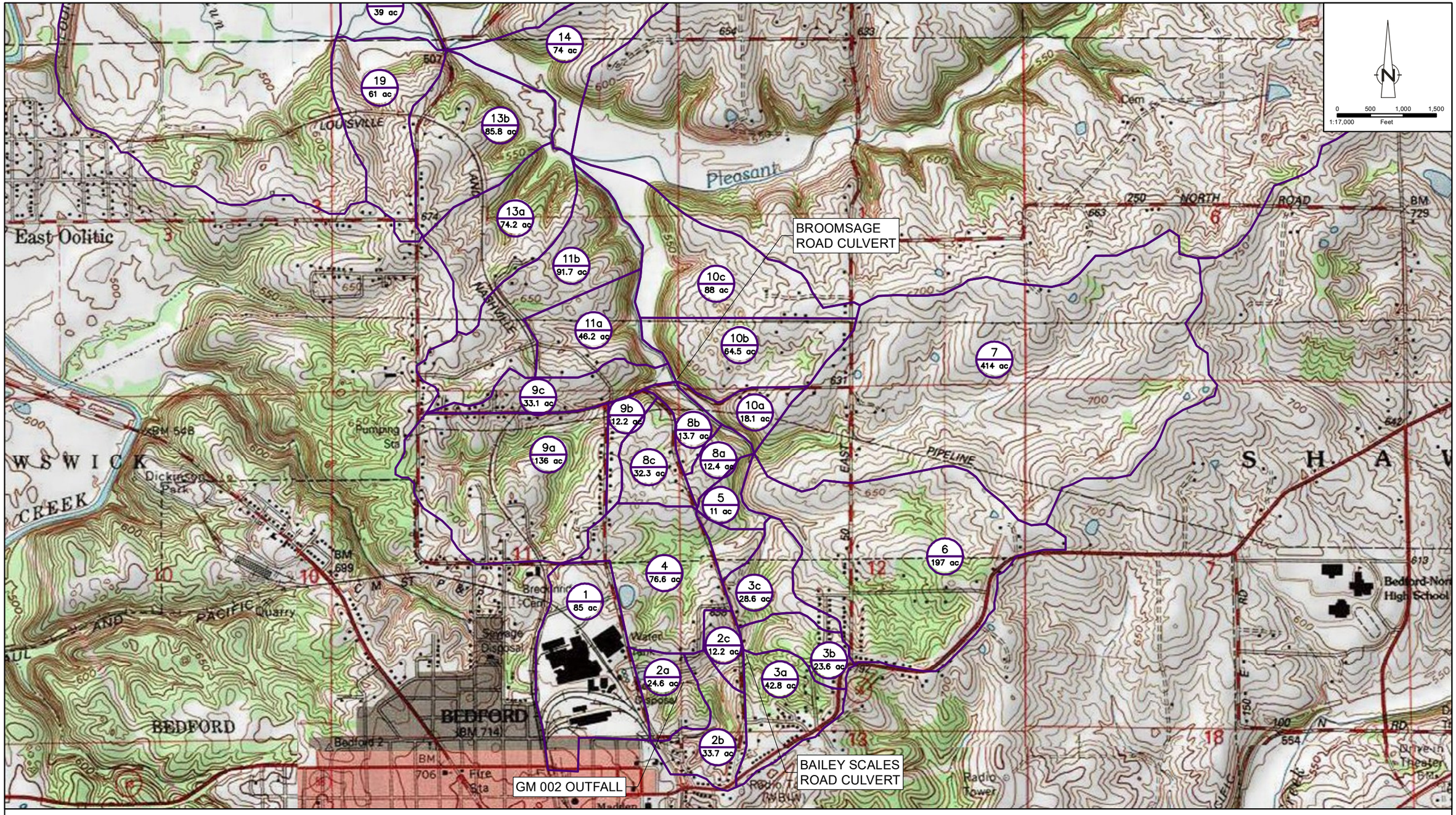
1) GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001. AND CRA SURVEYS 2002 - 2005

figure 2.8

LOCATION OF STREAM GAUGES AND PIEZOMETERS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA012 SEP 29/2015



Source: ESRI USA Topo Basemap, Indiana, Accessed 2019;
Coordinate System: NAD 1983 StatePlane Indiana West FIPS 1302 Feet

LEGEND

SUBCATCHMENT BOUNDARY

2b / 33.7 ac -- SUBCATCHMENT NUMBER / SUBCATCHMENT AREA IN ACRES

figure 2.9

CATCHMENT BOUNDARIES IN PLEASANT RUN/BAILEY'S BRANCH WATERSHED
UPSTREAM PORTION OF BAILEY'S BRANCH CREEK AND PLEASANT RUN WATERSHED
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

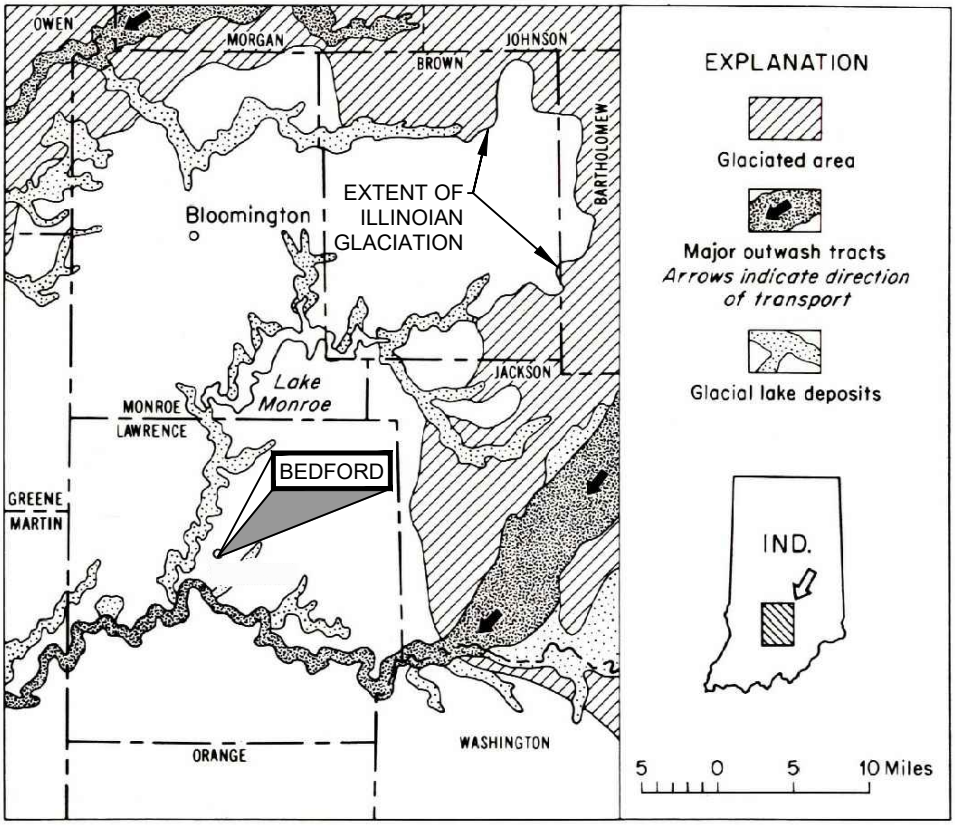


figure 2.10

GLACIAL FEATURES OF SOUTH-CENTRAL INDIANA
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: GRAY, 1974

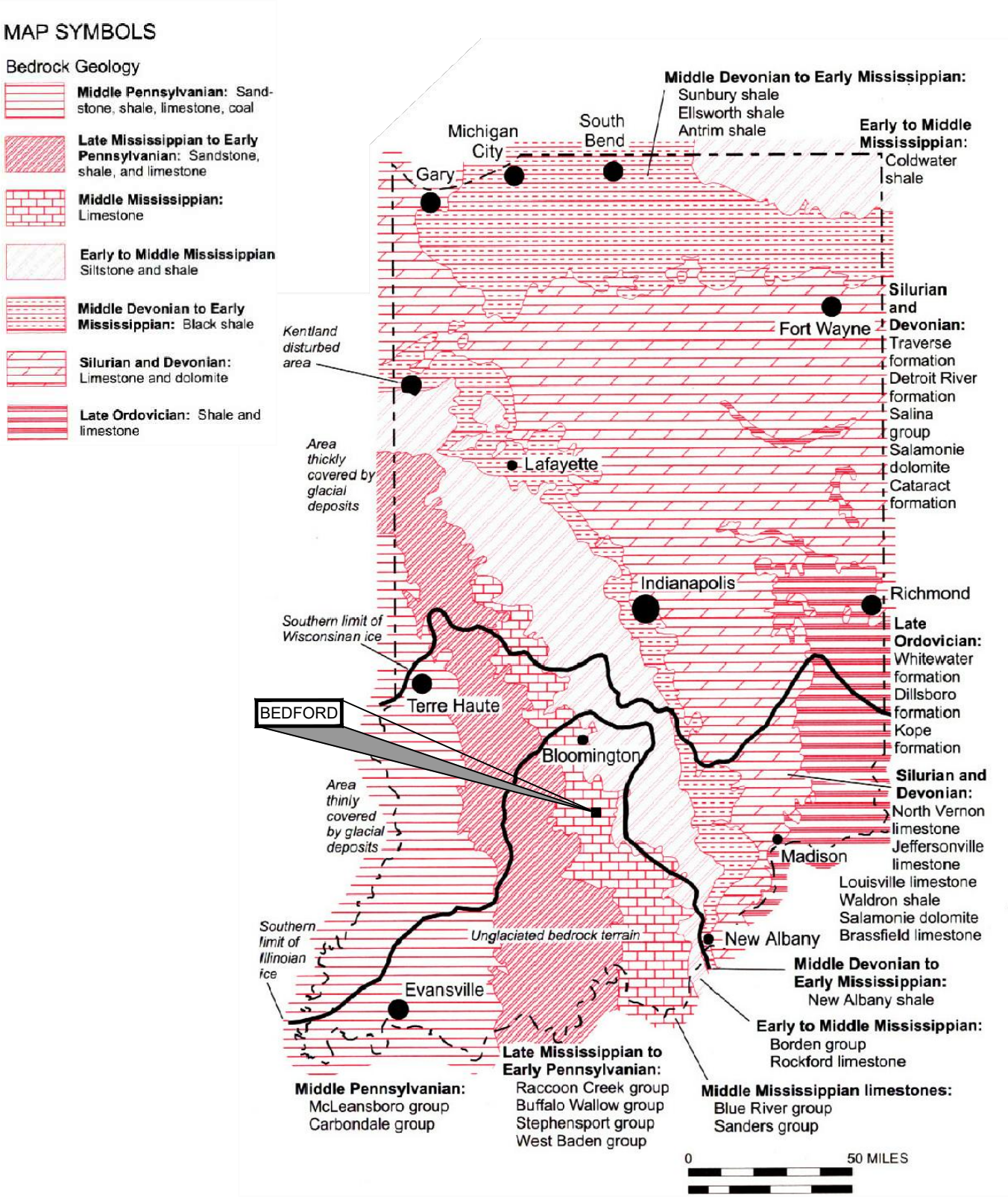
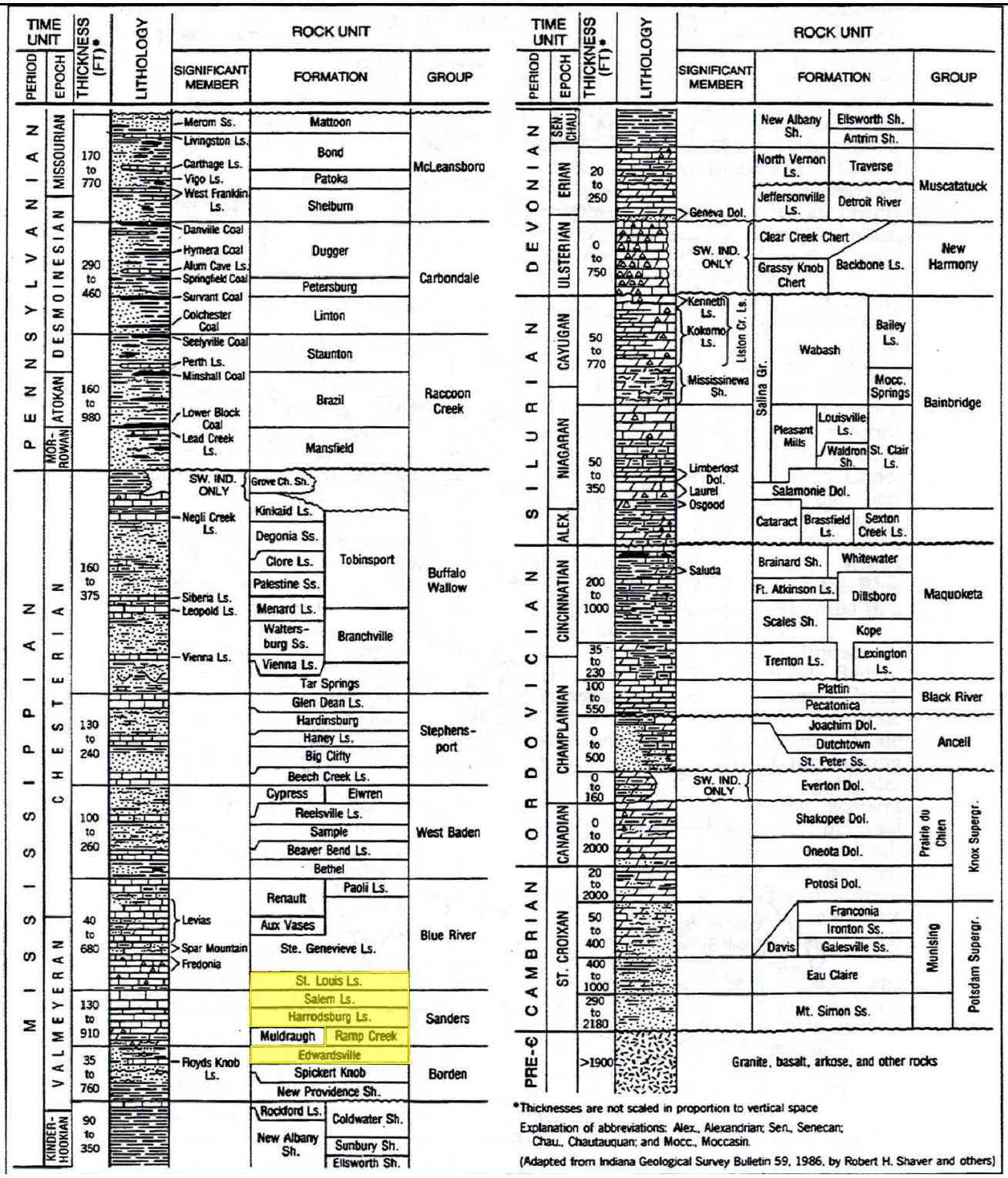


figure 2.11

BEDROCK GEOLOGY OF INDIANA
RFI REPORT
GM GPS 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 2.12

GENERALIZED STRATIGRAPHIC COLUMN
FOR PALEOZOIC ROCKS IN INDIANA
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: HILL, UNDATED

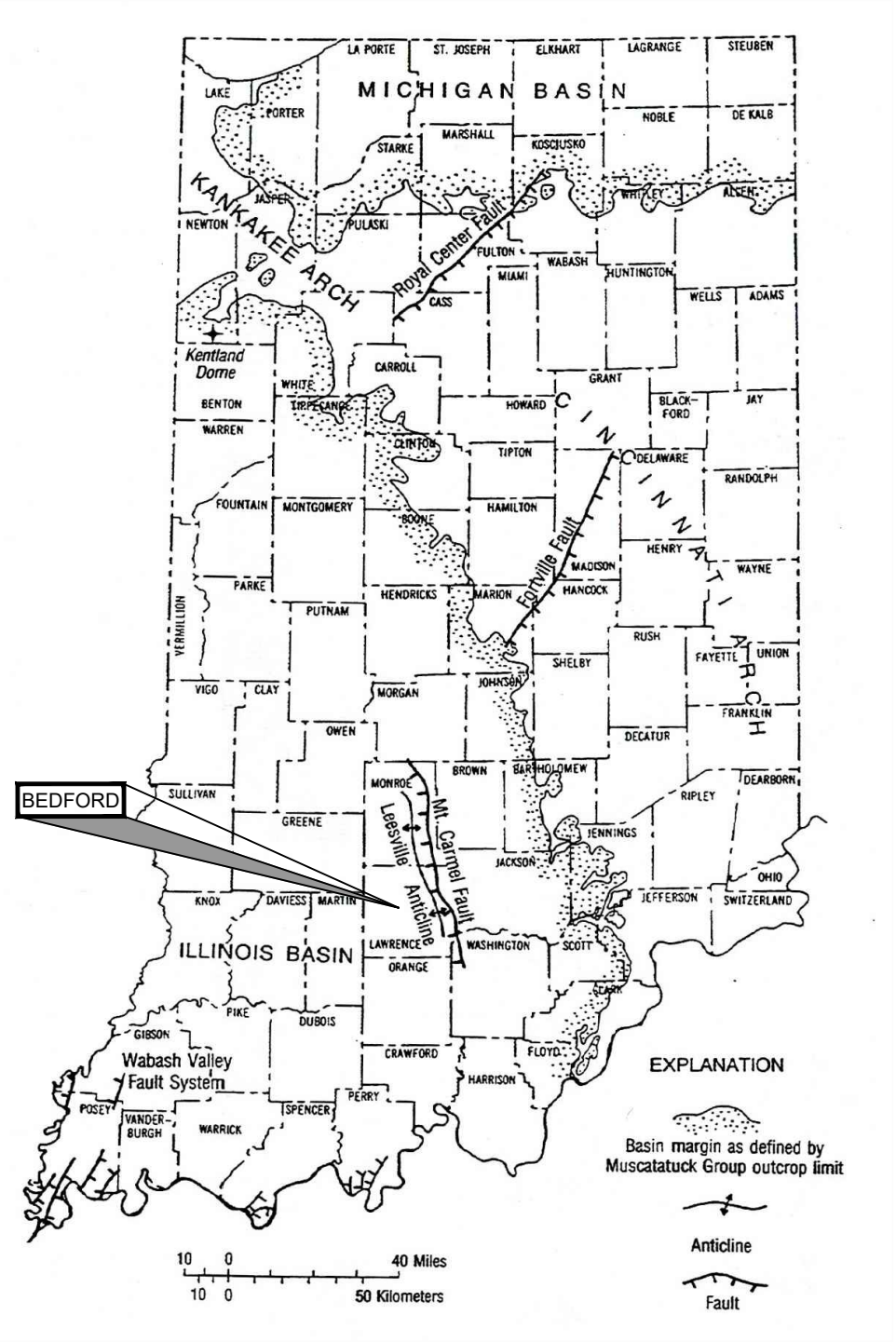


figure 2.13

BEDROCK STRUCTURAL FEATURES OF INDIANA
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: RUPP, 1991

figure 2.14

BASE OF VAULT SHOWING IRREGULAR BEDROCK SURFACE
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

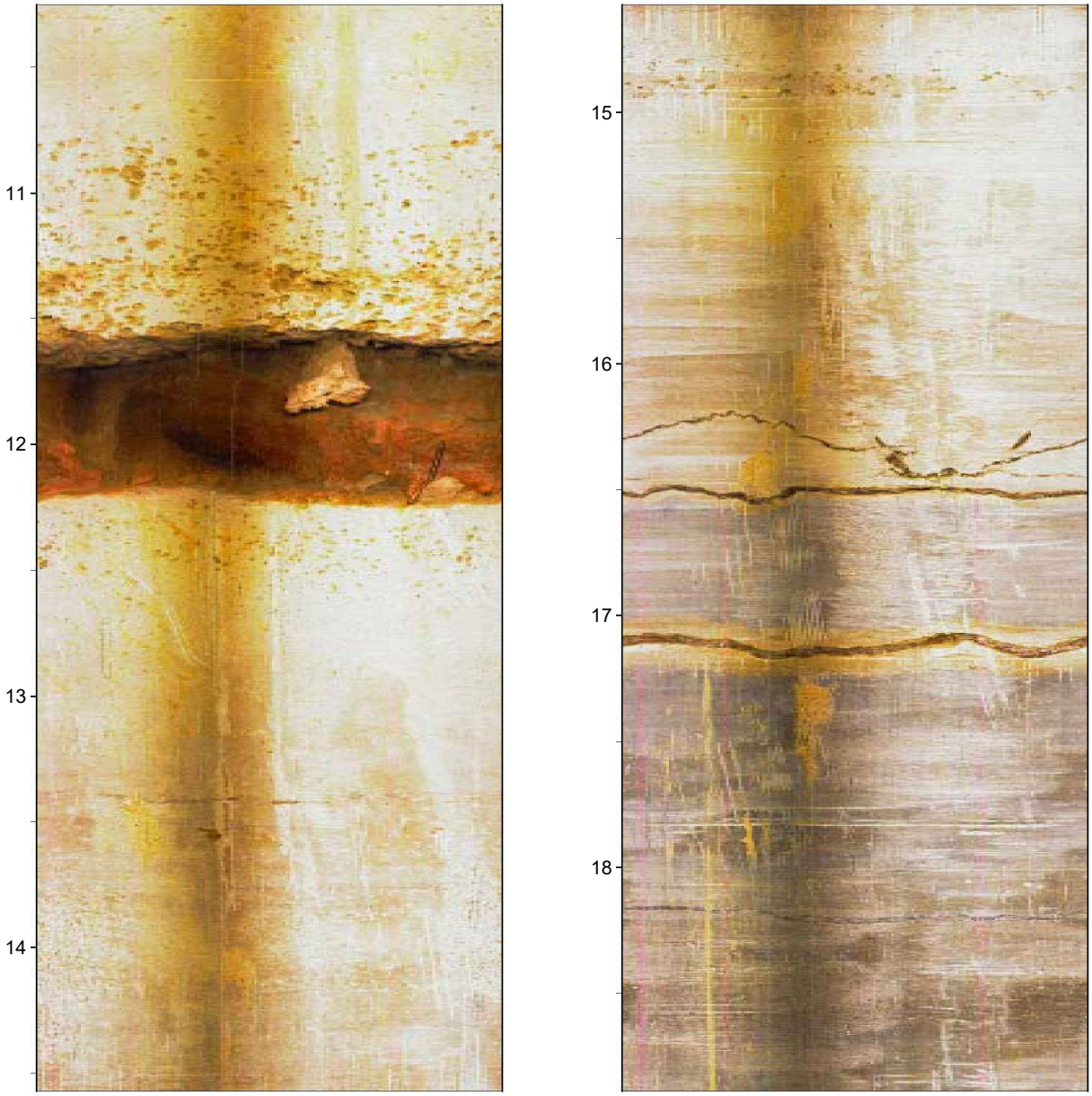


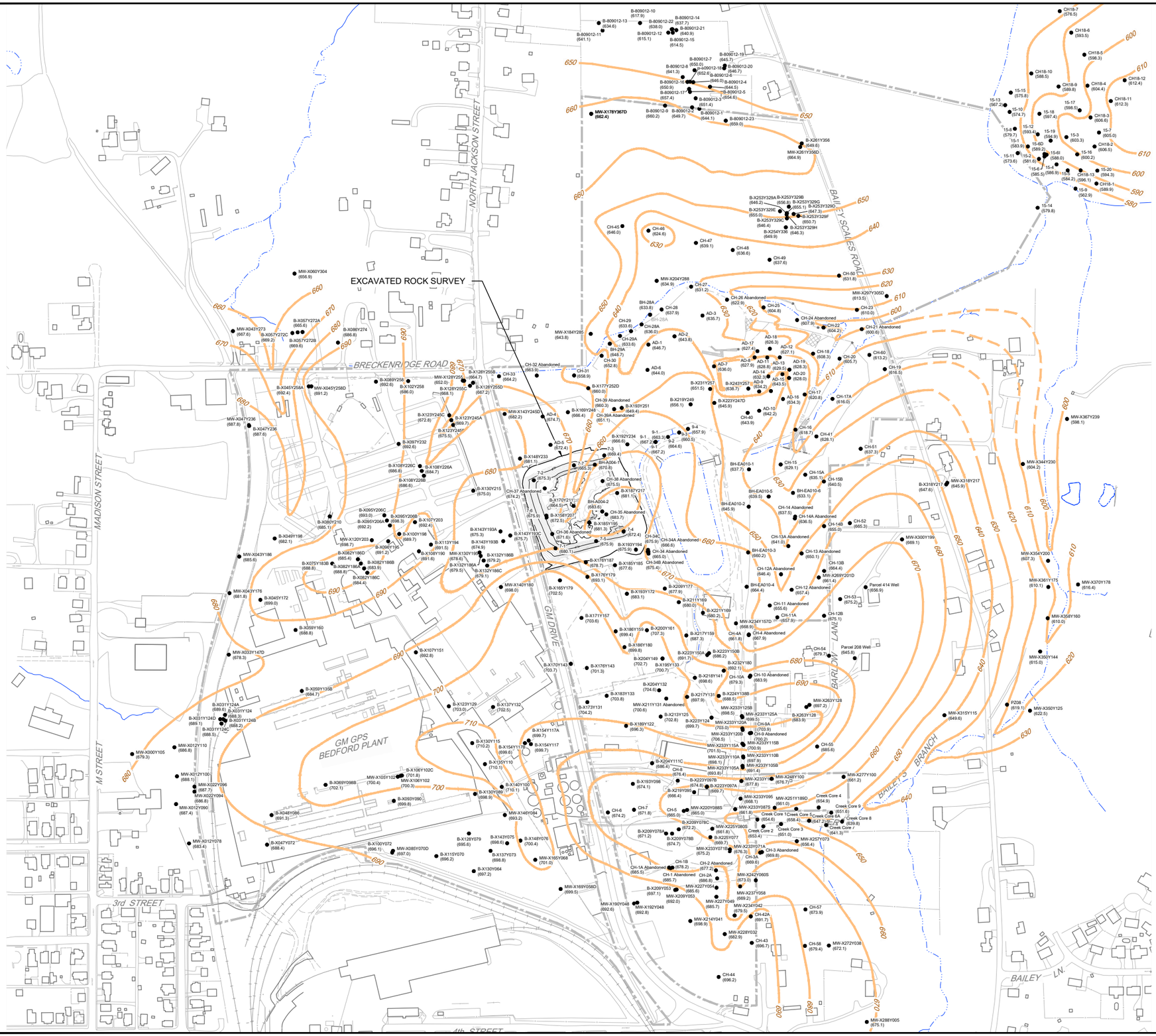
figure 2.15

BIPS IMAGES FROM MW-X143Y245S SHOWING CLAY-FILLED FRACTURE
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: COLOG BOREHOLE GEOPHYSICS & HYDROPHYSICS, DATE LOGGED: JULY 15, 2002

figure 2.16

VERTICAL FRACTURE IN VAULT AREA
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



No	Revision	Date	Initial

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 660 BEDROCK ELEVATION CONTOUR (ft AMSL) (DASHED WHERE UNCERTAIN)

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

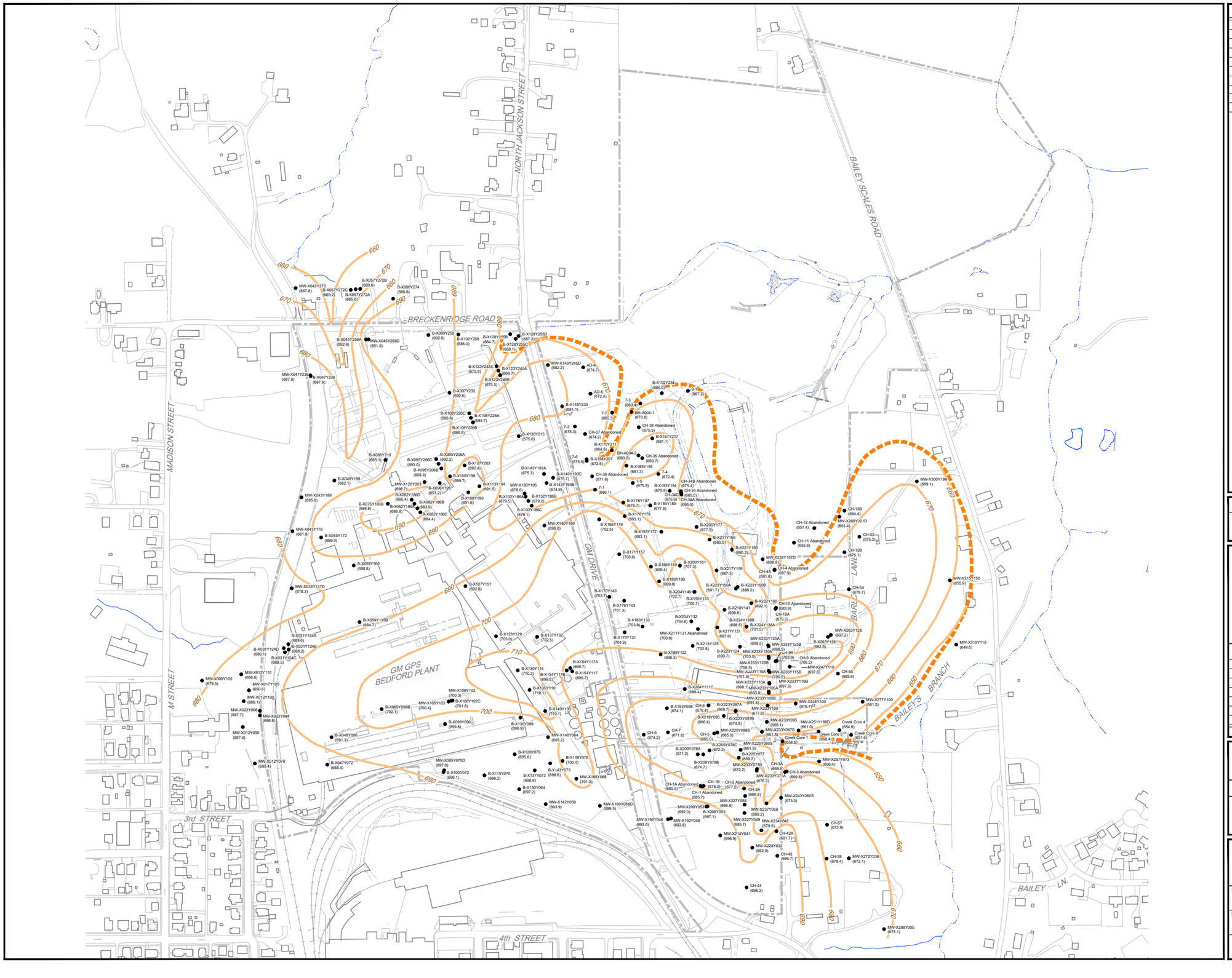
TOP OF BEDROCK CONTOUR MAP

GHD

Source Reference:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale:	Project No:	Report No:	Drawing No:
AS SHOWN	13968-00	267	figure 2.17



Nº	Revision	Date	Initial

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- ST. LOUIS CONTOUR (ft AMSL) (DASHED WHERE UNCERTAIN)
- APPROXIMATE SUBCROP CONTACT BETWEEN ST. LOUIS AND SALEM FORMATIONS

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY BEDFORD, INDIANA

RFI REPORT

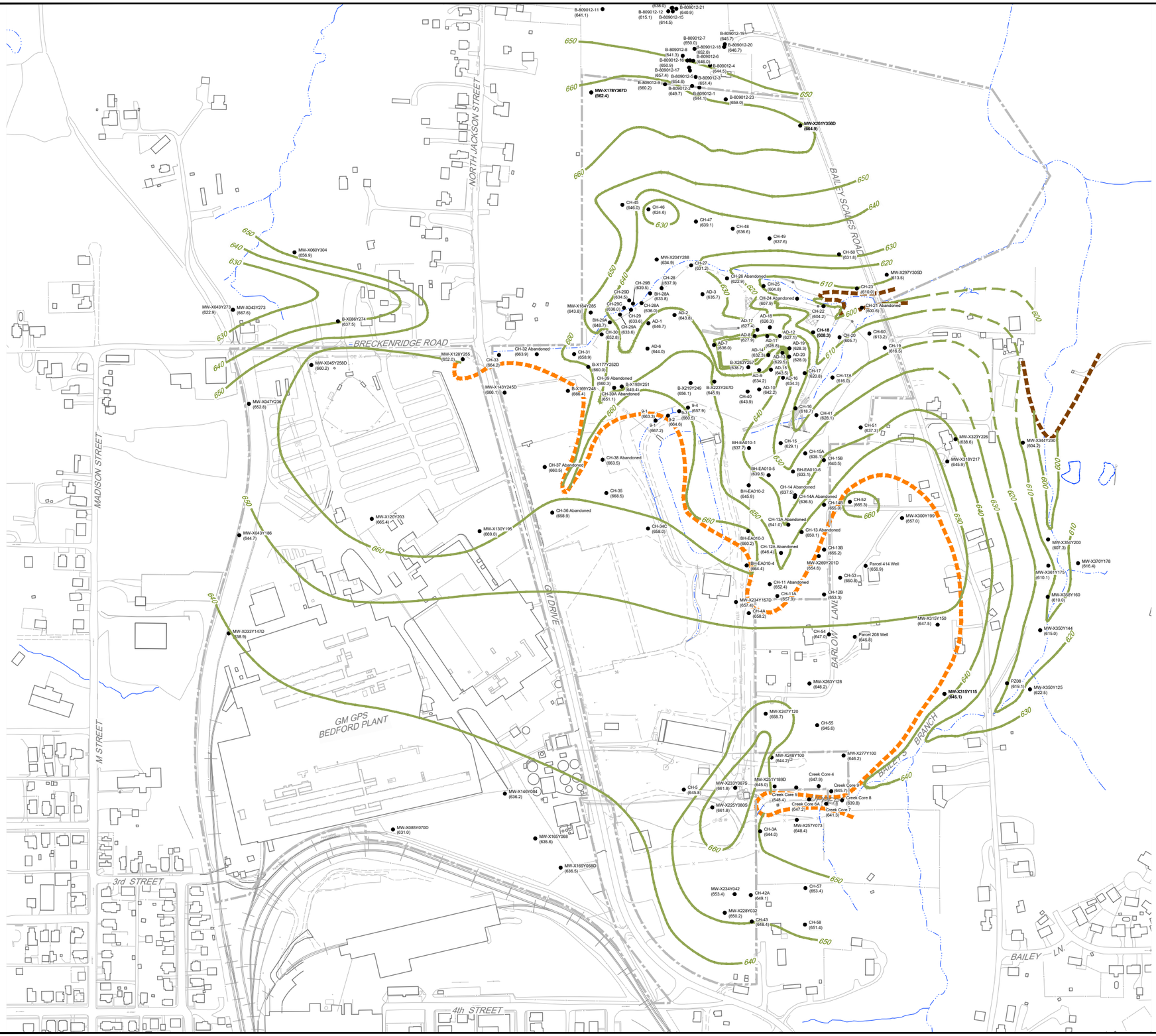
ELEVATION OF THE TOP OF THE ST. LOUIS FORMATION

GHD

Source Reference:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 2.18



No	Revision	Date	Initial

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 660 SALEM CONTOUR (ft AMSL) (DASHED WHERE UNCERTAIN)
- APPROXIMATE SUBCROP CONTACT BETWEEN ST. LOUIS AND SALEM FORMATIONS
- APPROXIMATE SUBCROP CONTACT BETWEEN SALEM AND HARRODSBURG FORMATIONS

NOTES:

1. GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.

2. LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

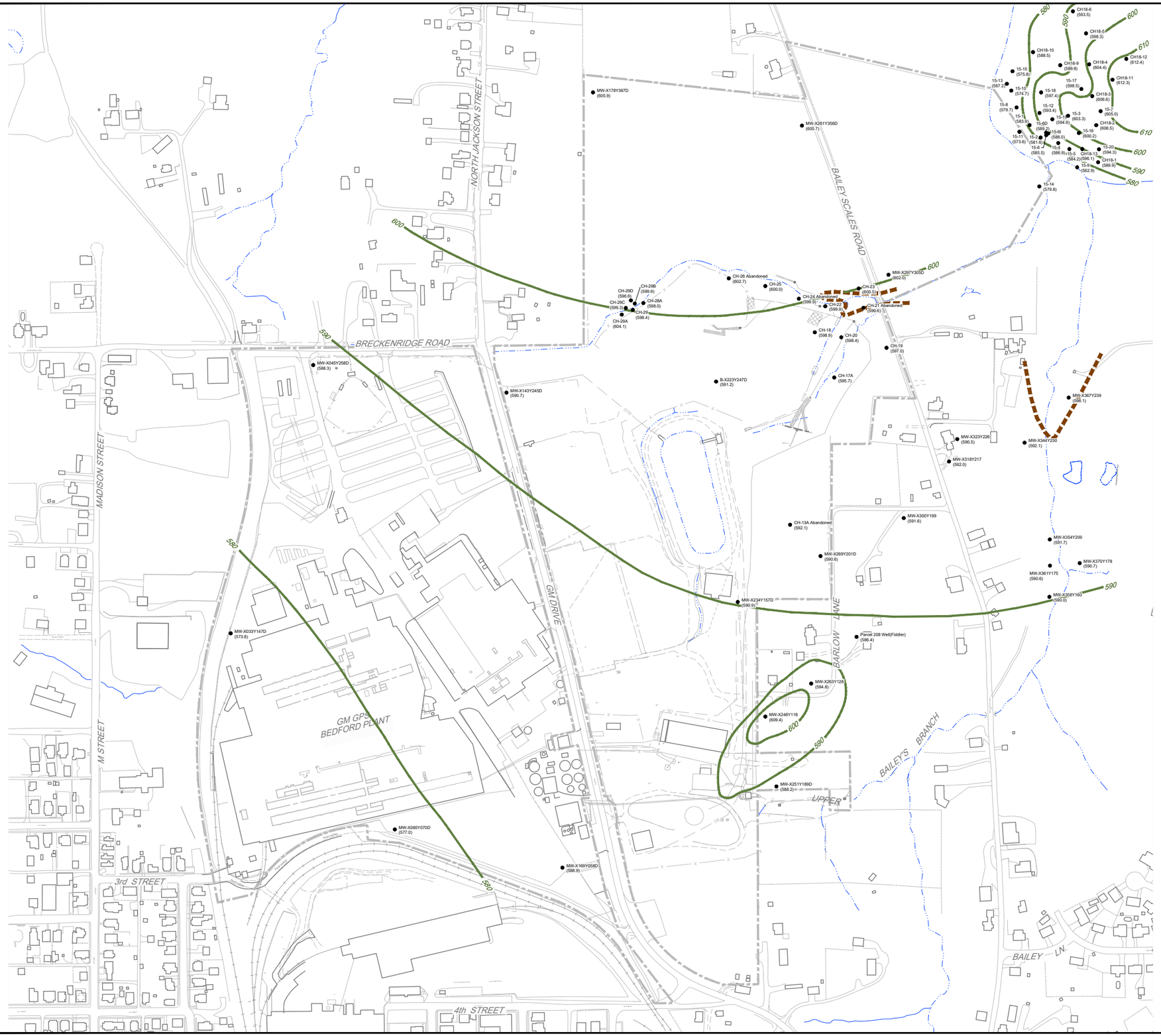
RFI REPORT

SALEM FORMATION STRUCTURE CONTOUR MAP

GHD

Source Reference:
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project No: 13968-00	Report No: 267	Drawing No: figure 2.19



No	Revision	Date	Initial

N

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 580 HARRODSBURG STRUCTURE CONTOUR (ft AMSL)
- APPROXIMATE SUBCROP CONTACT BETWEEN SALEM AND HARRODSBURG FORMATIONS

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

ELEVATION OF THE TOP OF THE HARRODSBURG FORMATION

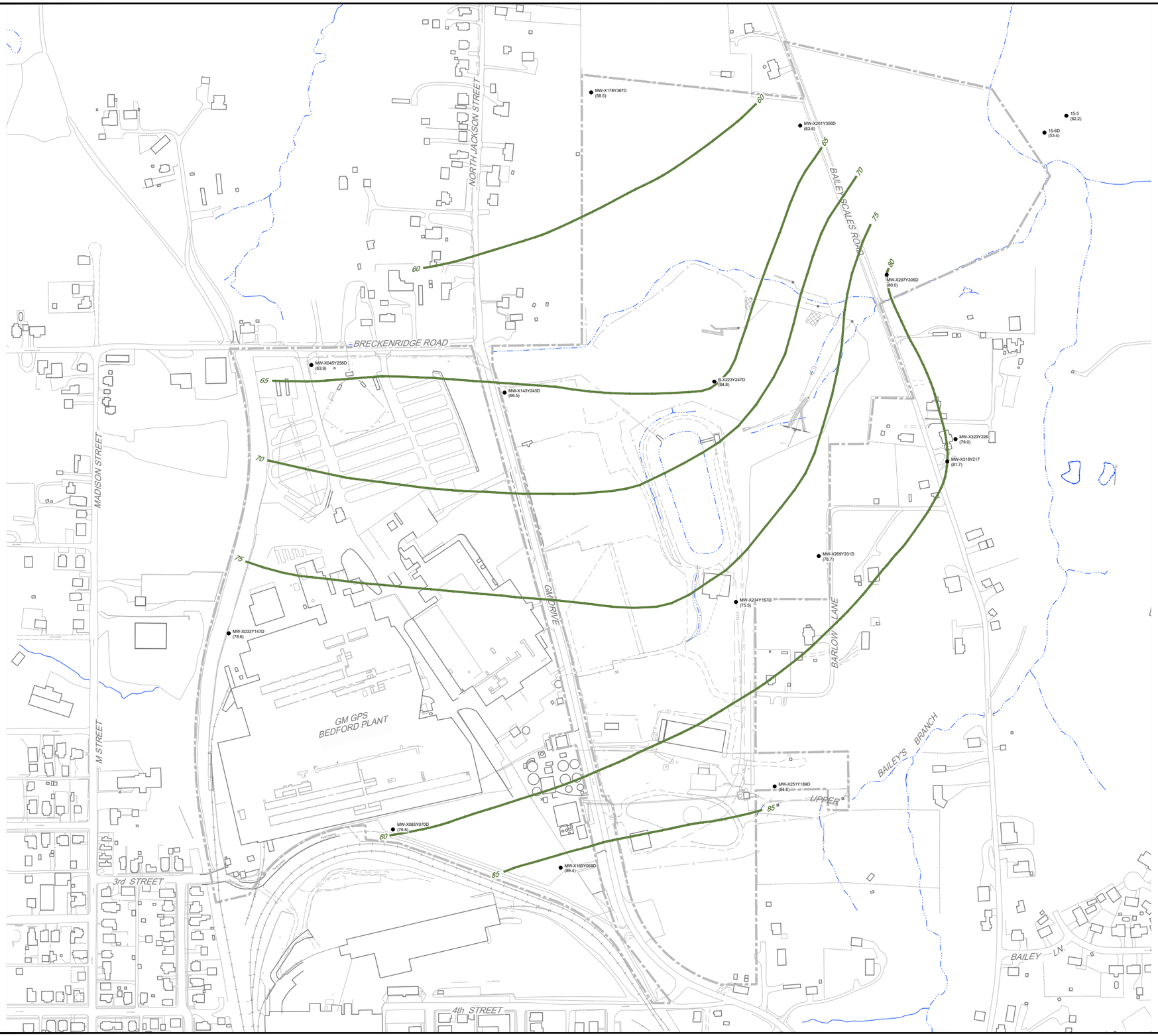
GHD

Source Reference:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project No: 13968-00	Report No: 267	Drawing No: figure 2.20

13968-00(267)GN-WA035 SEP 29/2015



No	Revision	Date	Initial

N

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 70 HARRODSBURG THICKNESS CONTOUR (ft)

NOTE:

1. GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

2. LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION THICKNESS

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY BEDFORD, INDIANA

RFI REPORT

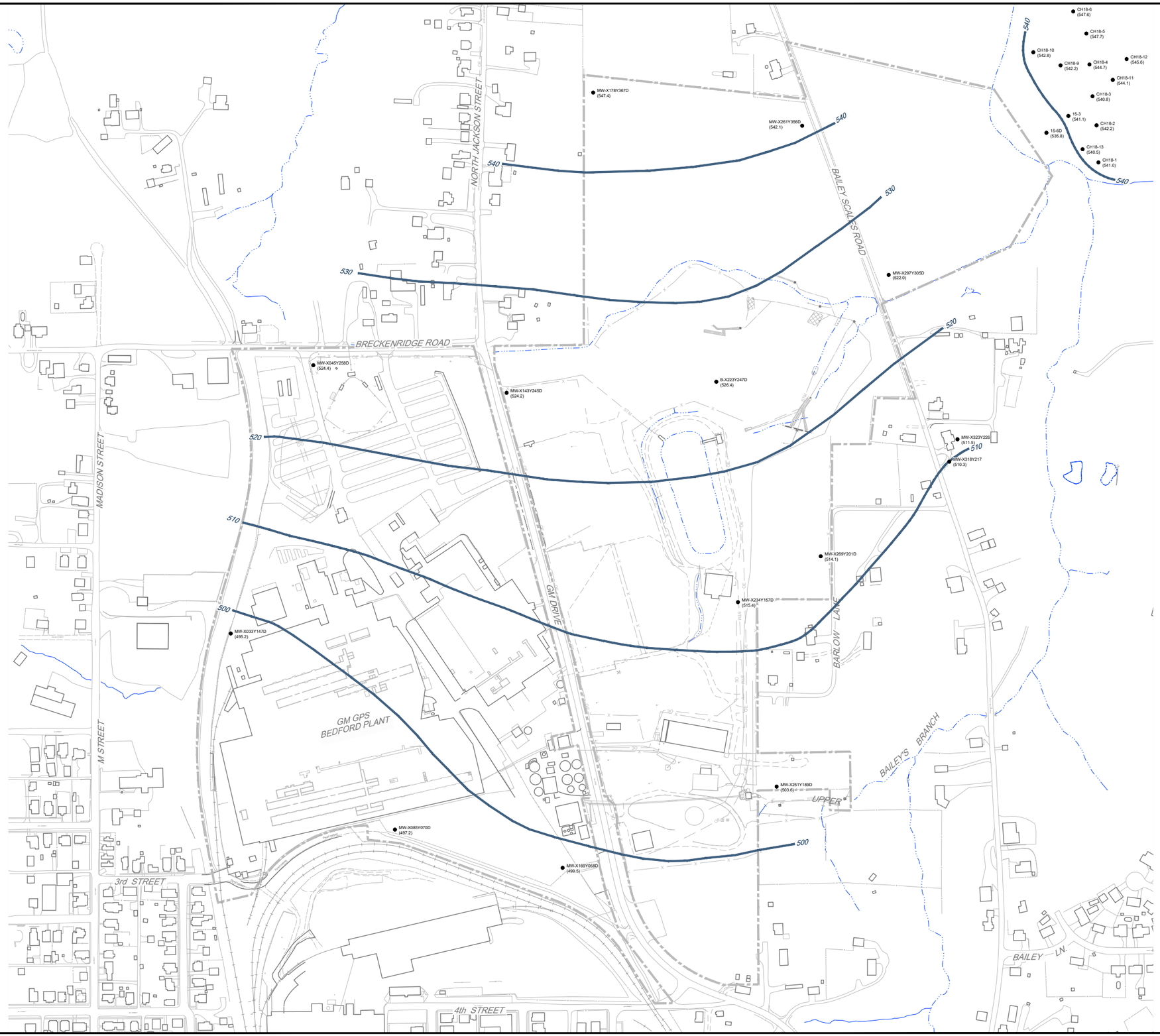
THICKNESS OF THE HARRODSBURG FORMATION

GHD

Source Reference:
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project No: 13968-00	Report No: 267	Drawing No: figure 2.21

13968-00(267)GN-WA036 SEP 29/2015



NO	Revision	Date	Initial

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 530 TOP OF RAMP CREEK CONTOUR (ft AMSL)

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

ELEVATION OF THE TOP OF THE RAMP CREEK FORMATION

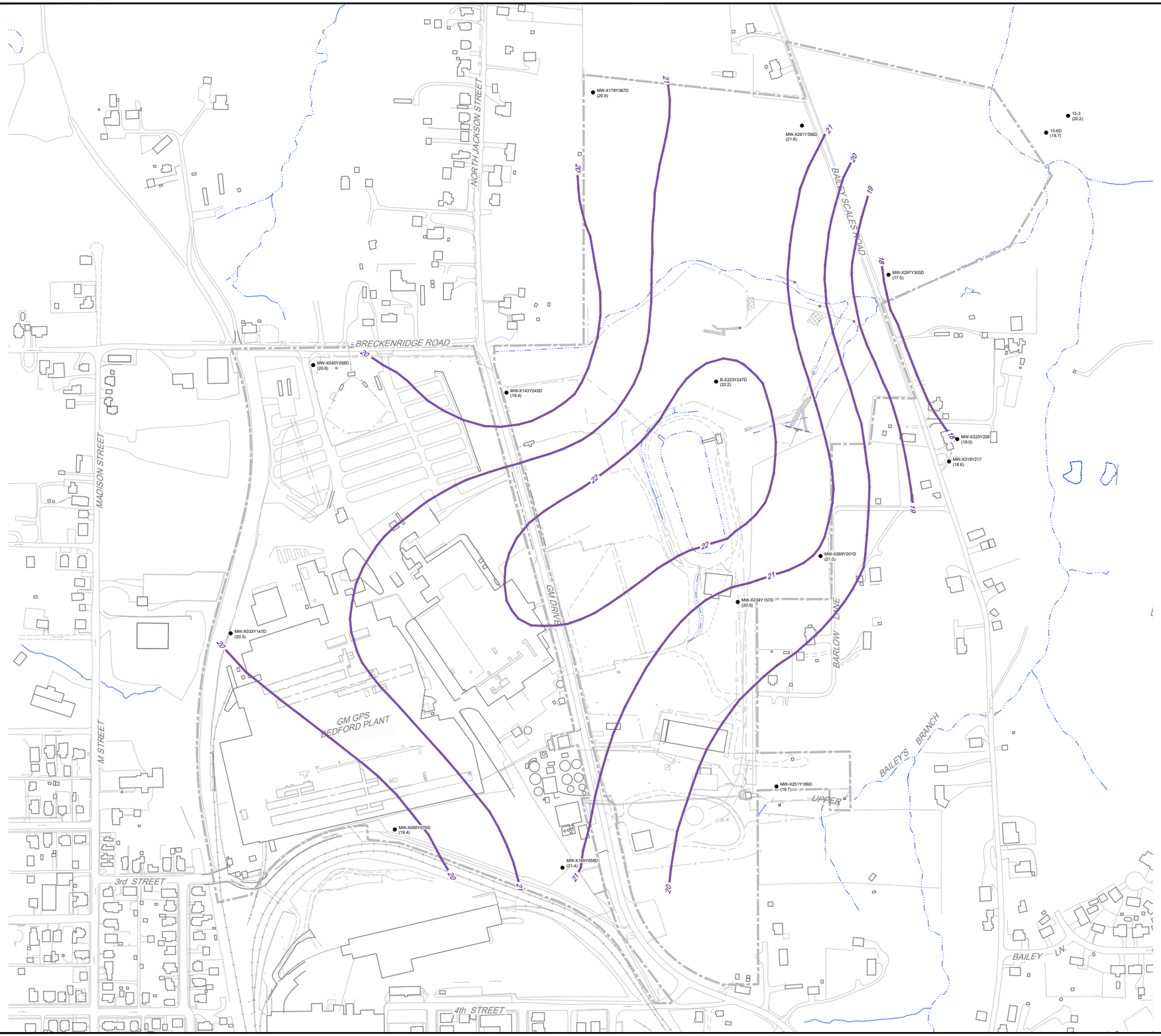
GHD

Source Reference:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 2.22

13968-00(267)GN-WA037 SEP 29/2015



No	Revision	Date	Initial

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 20 RAMP CREEK THICKNESS CONTOUR (ft)

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI FIGURE REPORT

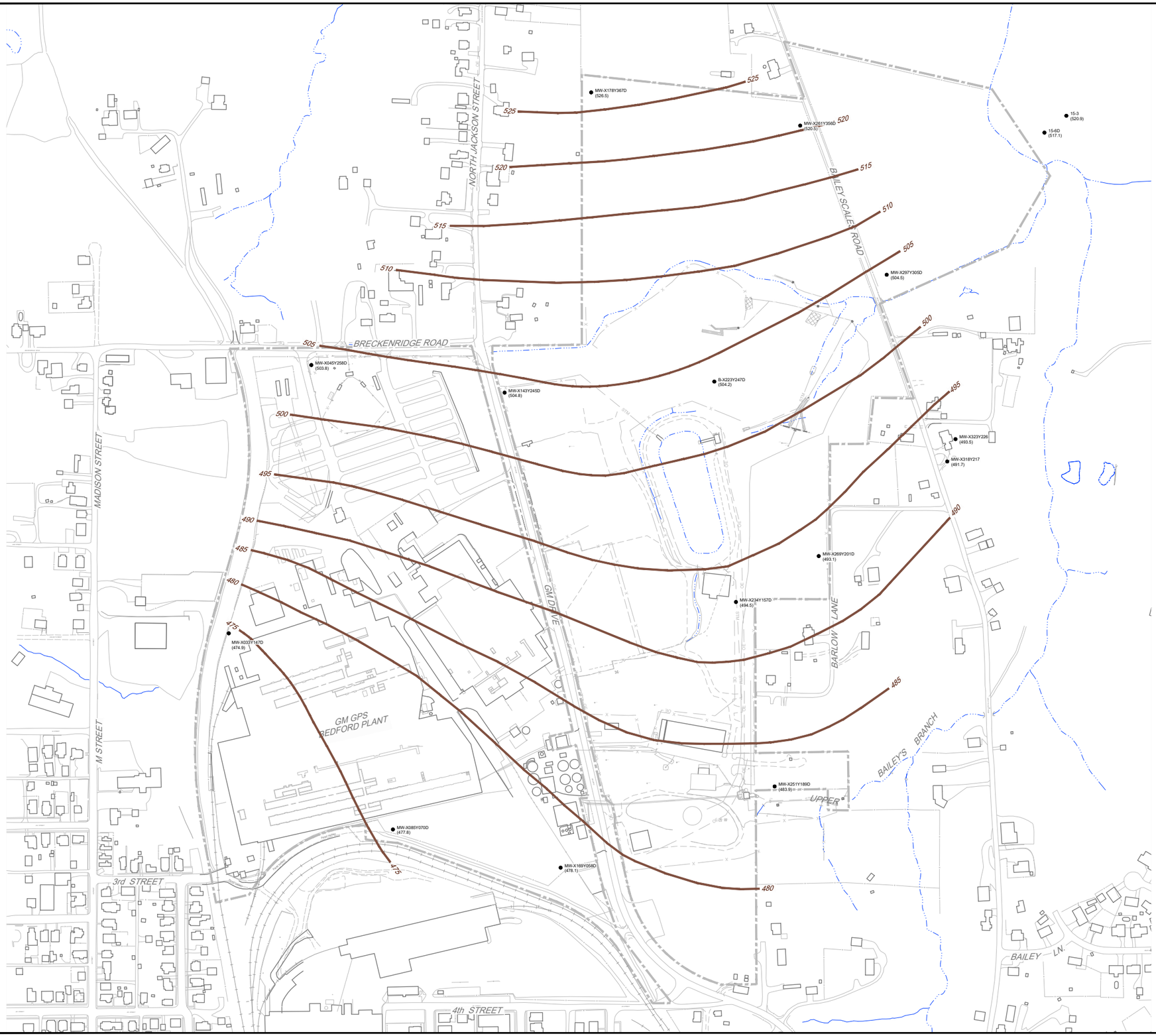
THICKNESS OF THE RAMP CREEK FORMATION

GHD

Source Reference:
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project No: 13968-00	Report No: 267	Drawing No: figure 2.23

13968-00(267)GN-WA038 SEP 29/2015



Nº	Revision	Date	Initial

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 580 EDWARDSVILLE STRUCTURE CONTOUR (ft AMSL)

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

ELEVATION OF THE TOP OF THE EDWARDSVILLE FORMATION

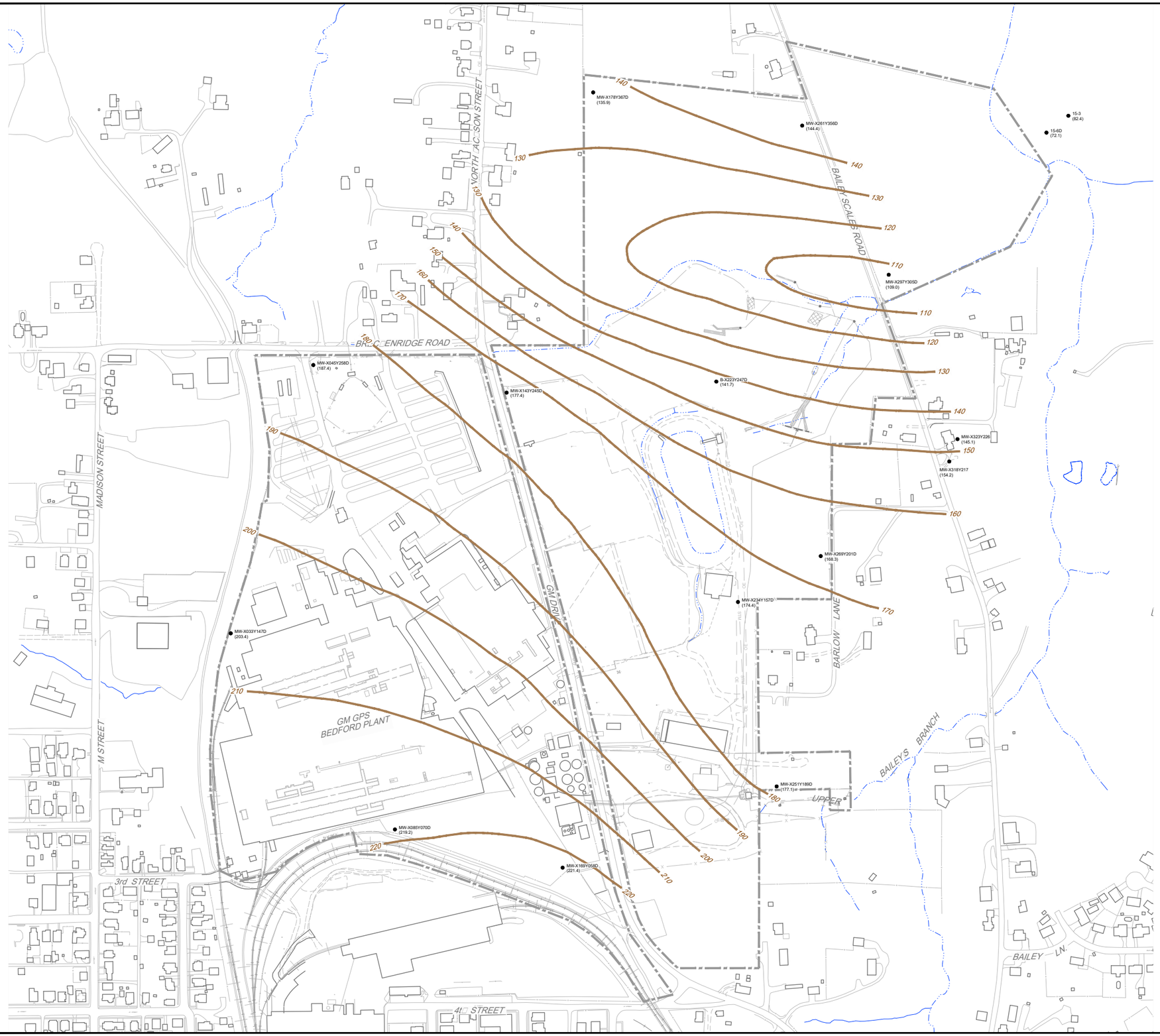
GHD

Source Reference:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 2.24

13968-00(267)GN-WA039 SEP 29/2015



No	Re□□ion	Date	Initia□

0 100 200ft

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRAC□S
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- RFI BORING SAMPLE LOCATION
- 220 LIMESTONE THIC□NESS (ft)

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. AD□UST SCALE ACCORDINGLY.

A□□ro□ed

DRAWING STATUS

Statu□	Date	Initia□

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

LIMESTONE THIC□NESS (ALL FORMATIONS)

GHD

Sour□e Referen□e:

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001. AND CRA SURVEYS 2002 - 2005

Pro□e□t Manager:	Re□le□ed B□:	Date:	
□M.	P.G.	SEPTEMBER 2015	
S□a□e: AS SHOWN	Pro□e□t №: 13968-00	Re□ort №: 267	Dra□ing №: figure 2.25

N:□A□Water□o□Lega□□□CAD□dra□□ing□□13000□□13968□13968-REPORTS□13968-00(267)□13968-00(267)GN□13968-00(267)GN-WA055.d□g P□t Date: DEC 16, 2019

0 100 300ft
N
NORTH JACKSON STREET
BRECKENRIDGE ROAD
BAILEY SCALES ROAD
GM DRIVE
GM GPS BEDFORD PLANT
A
A'
B
B'
C
C'
D
D'
E
E'
F
F'
G
G'
H
H'
I
I'
J
J'
K
K'
L
L'
M
M'
MW-X045Y258D
MW-X047Y236
B-X049Y198
B-X045Y172
B-X059Y160
MW-X033Y147D
MW-X033Y147S
TMW-X033Y147
B-X059Y135B
B-X084Y138B
B-X080Y210
B-X100Y198
MW-X120Y203
B-X096Y195
B-X075Y183B
B-X097Y232
B-X107Y203
B-X108Y190
B-X107Y151
B-X130Y215
MW-X143Y245D
MW-X143Y245S
B-X148Y233
AD-5
B-X169Y248
B-X177Y252D
CH-31 Abandoned
CH-29 Abandoned
B-X170Y211
B-X176Y187
B-X165Y179
BK-X157Y157
B-X176Y179
B-X193Y172
B-X171Y157
B-X186Y180
B-X176Y143
B-X183Y133
B-X173Y134
B-X170Y134
B-X173Y125
B-X173Y131
B-X195Y133
B-X123Y129
B-X137Y132
B-X130Y115
B-X135Y110
B-X140Y100
B-X130Y089
B-X193Y098
B-X106Y102B
MW-X106Y102
MW-X105Y102
B-X069Y098B
B-X093Y090
B-X048Y086
B-X047Y072
MW-X085Y070D
MW-X085Y070S
TMW-X085Y070
B-X115Y070
B-X143Y075
B-X137Y073
B-X148Y076
MW-X169Y058I
MW-X169Y058S
MW-X169Y058D
TMW-X193Y251
B-X193Y251
CH-39A Abandoned
B-X192Y234
B-X187Y217
B-X193Y194
B-X211Y169
B-X200Y161
B-X204Y149
B-X223Y150A
B-X218Y141
B-X204Y132
B-X213Y125
B-X189Y122
B-X204Y111C
CH-8
CH-7
CH-5
MW-X220Y088S
MW-X209Y078S
CH-1B
MW-X209Y053
MW-X190Y048
BK-X212Y042
MW-X214Y041
B-X219Y249
B-X223Y247D
B-X243Y257
TMW-X247Y261 Abandoned
CH-18 Abandoned
CH-23
MW-X297Y305D-1
B-X209Y177
CH-12A Abandoned
MW-X269Y201D
B-X221Y169
B-X223Y150B
CH-54
B-X232Y180
B-X224Y138B
B-X223Y124
B-X219Y095
MW-X225Y080S
TMW-X225Y080
B-X225Y077
MW-X251Y189D
CH-2A
MW-X227Y054
MW-X227Y049

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 FACILITY BOUNDARY
● B-X115Y070	RFI BORING LOCATION USED FOR CROSS-SECTION
A	CROSS-SECTION LOCATION

NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.

figure 2.26

CROSS-SECTION LOCATIONS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

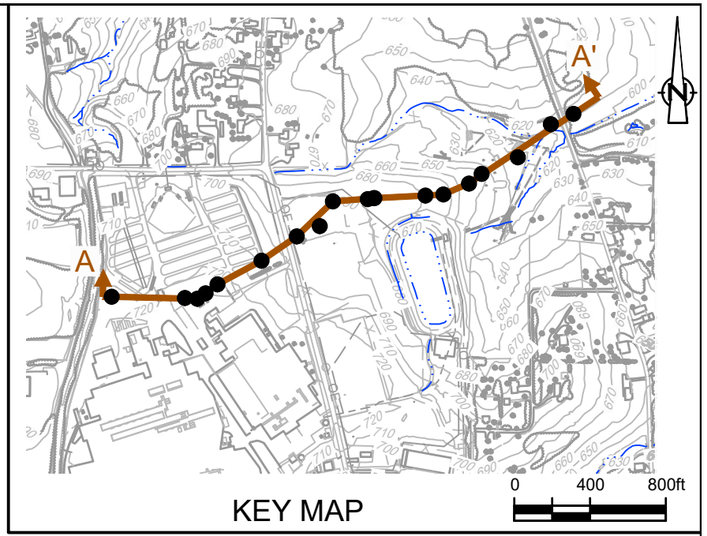
A
WEST

A'
EAST

ELEVATION (ft AMSL)

DISTANCE (ft)

SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



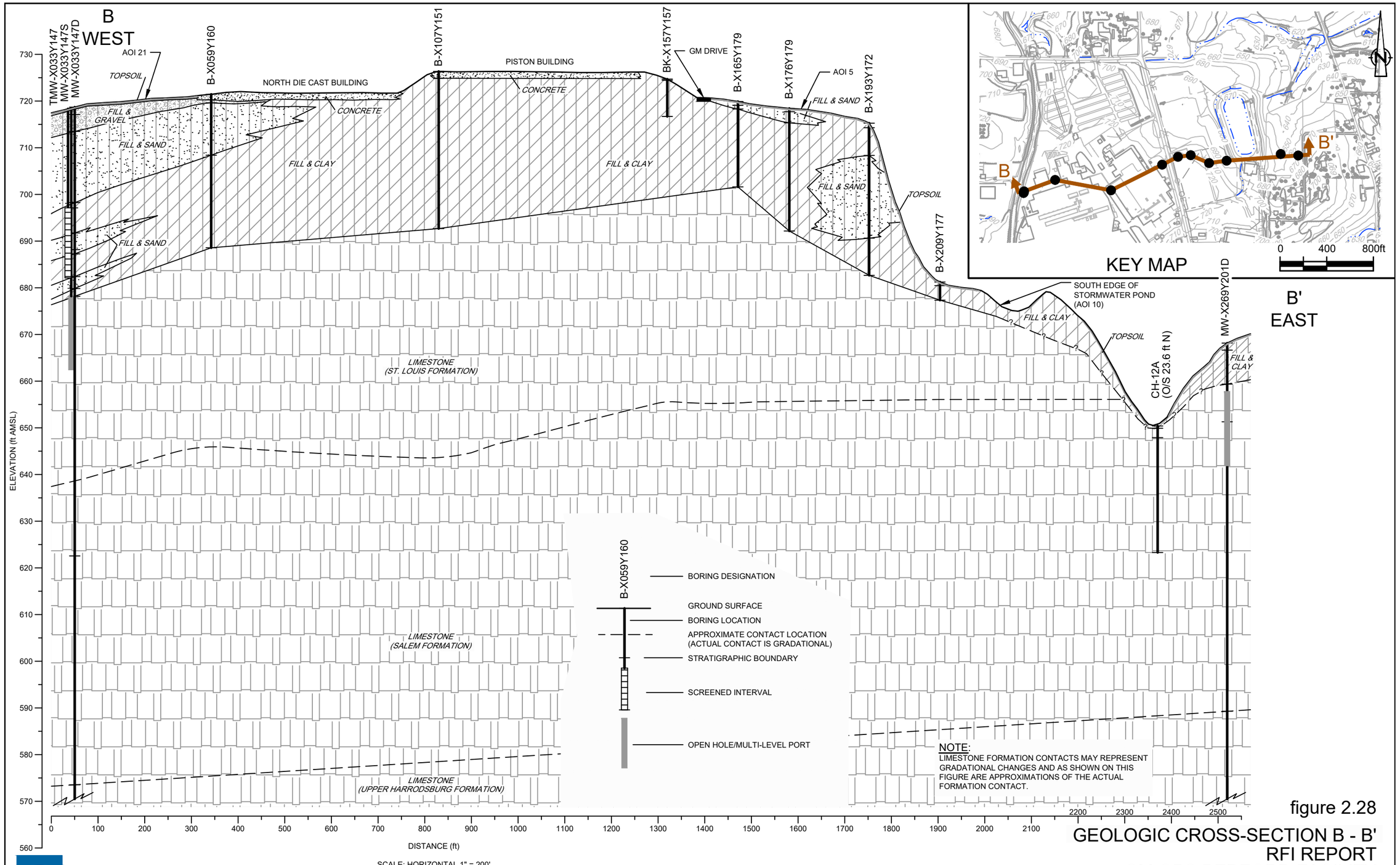
B-X130Y215 — BORING DESIGNATION
GROUND SURFACE
BORING LOCATION
APPROXIMATE CONTACT LOCATION (ACTUAL CONTACT IS GRADATIONAL)
APPROXIMATE STATIC WATER LEVEL
STRATIGRAPHIC BOUNDARY
SCREENED INTERVAL
END OF BOREHOLE

NOTES:
* BORING ADVANCED 30° TO VERTICAL.
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.27
GEOLOGIC CROSS-SECTION A - A'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA041 SEP 29/2015



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

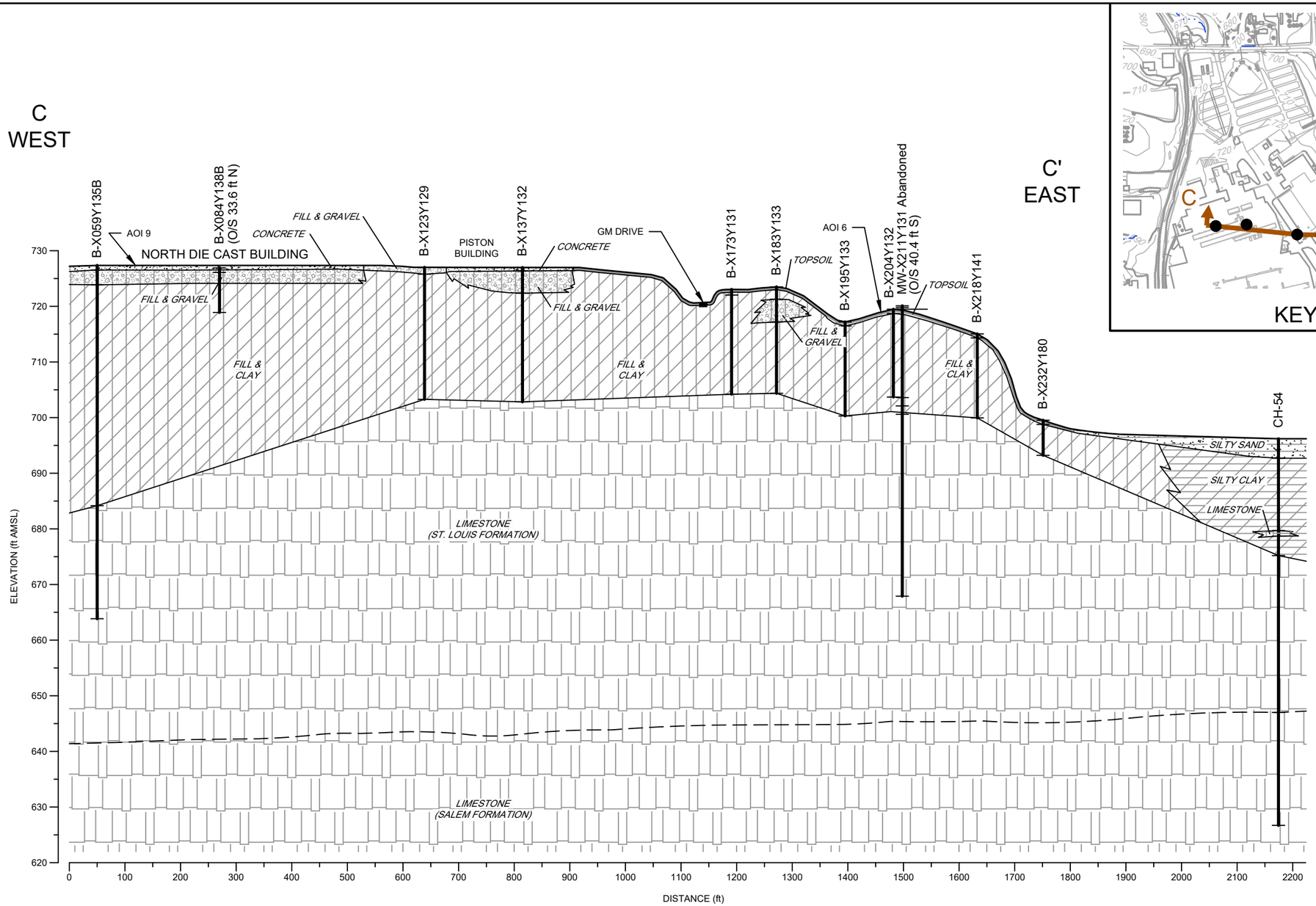
figure 2.28

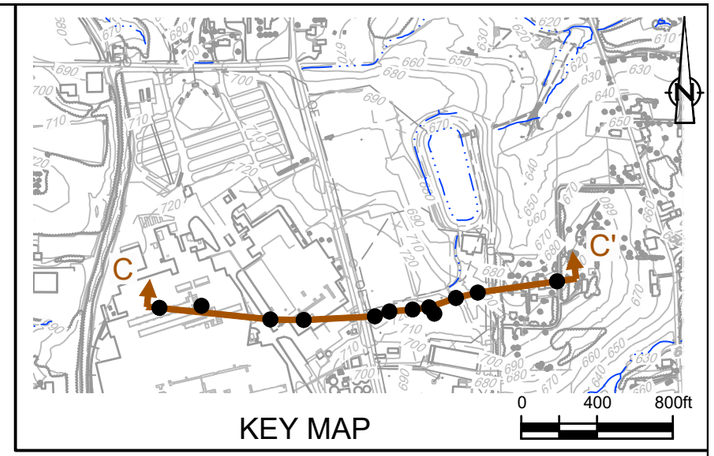
GEOLOGIC CROSS-SECTION B - B'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA042 SEP 29/2015

C
WEST

C'
EAST





B-X123Y129 — BORING DESIGNATION

GROUND SURFACE
BORING LOCATION
APPROXIMATE CONTACT LOCATION (ACTUAL CONTACT IS GRADATIONAL)
STRATIGRAPHIC BOUNDARY

NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'

figure 2.29

GEOLOGIC CROSS-SECTION C - C'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

D
WEST

D'
EAST

B-X048Y086
B-X069Y098B
MW-X105Y102
B-X106Y102B
MW-X106Y102
B-X130Y089
B-X140Y100
B-X193Y098
CH-8 (O/S 42' N)
B-X219Y095
MW-X251Y189D

SOUTH DIE CAST BUILDING
AOI 9
AOI 8
GM DRIVE
CONCRETE

FILL & GRAVEL
FILL & CLAY
FILL & GRAVEL
FILL & CLAY
FILL & CLAY
FILL & GRAVEL
FILL & SAND

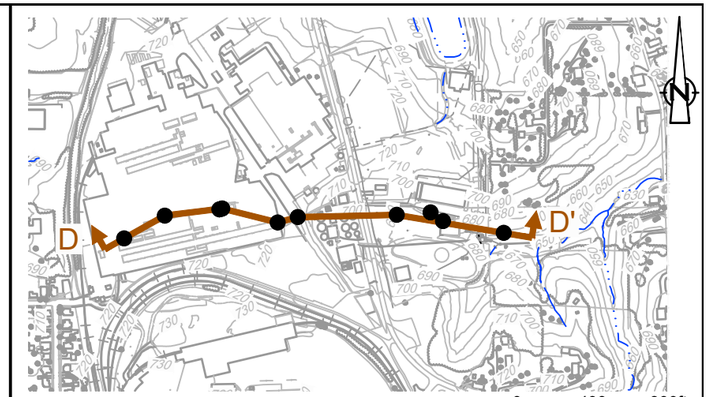
LIMESTONE
(ST. LOUIS FORMATION)
LIMESTONE
(SALEM FORMATION)
LIMESTONE
(UPPER HARRODSBURG FORMATION)

ELEVATION (ft AMSL)
730
720
710
700
690
680
670
660
650
640
630
620
610
600
590
580
570
560

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000

DISTANCE (ft)

SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



KEY MAP

MW-X251Y189D

BORING DESIGNATION
GROUND SURFACE
BORING LOCATION
APPROXIMATE CONTACT LOCATION
(ACTUAL CONTACT IS GRADATIONAL)
STRATIGRAPHIC BOUNDARY
OPEN HOLE/MULTI-LEVEL PORT

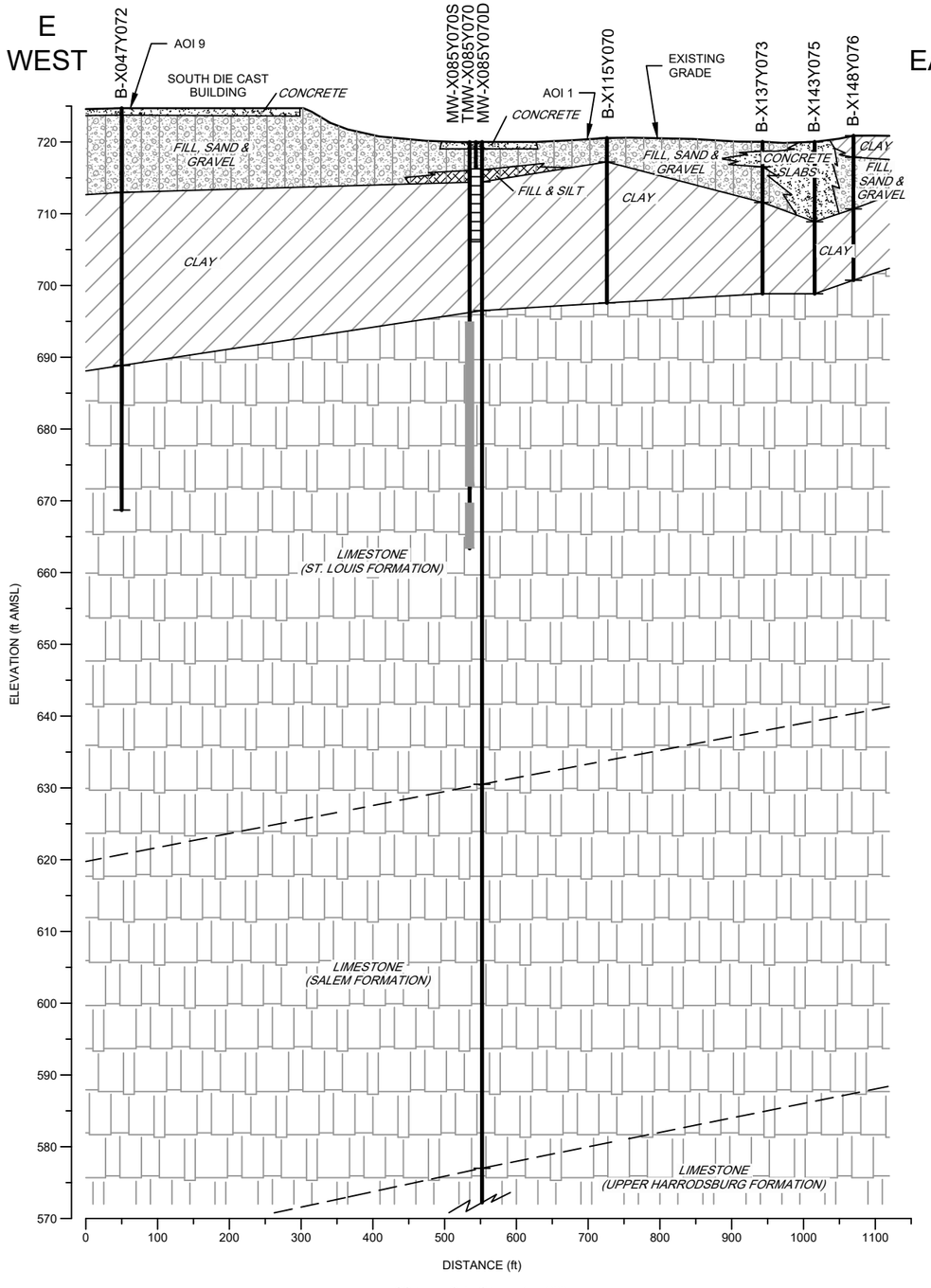
NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

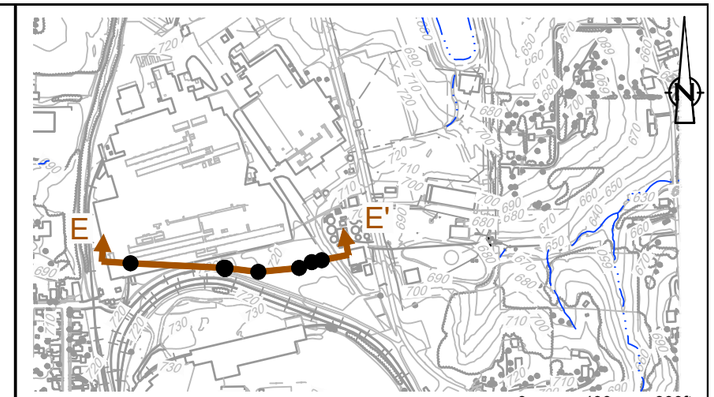
figure 2.30

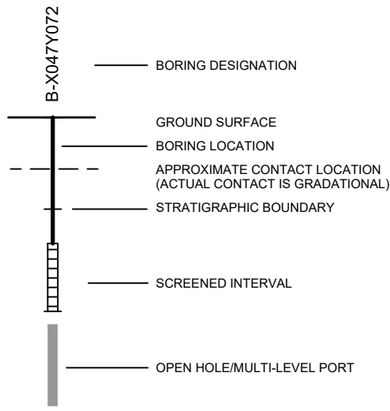
GEOLOGIC CROSS-SECTION D - D'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA044 SEP 29/2015



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



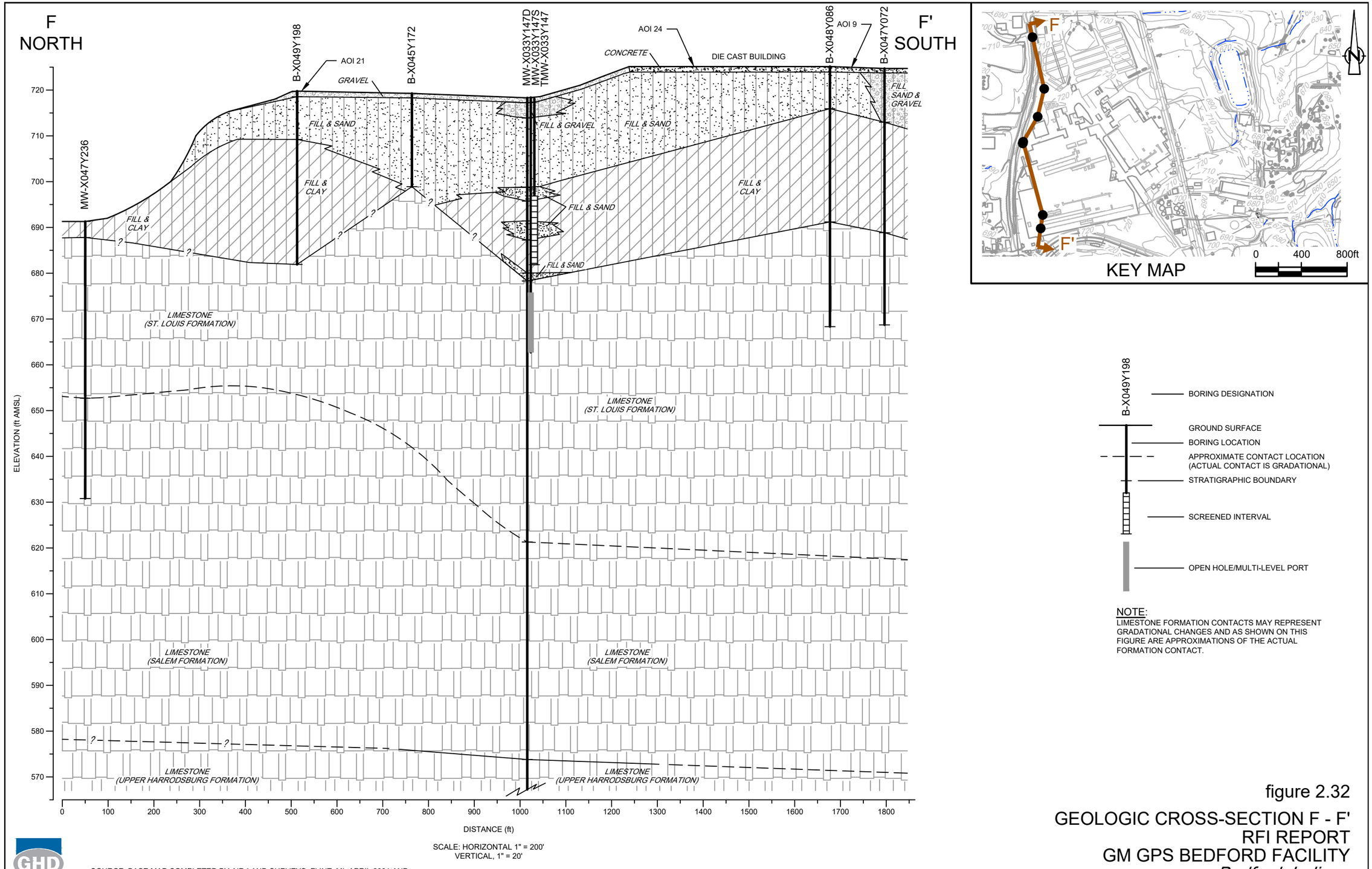


NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.31

GEOLOGIC CROSS-SECTION E - E'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



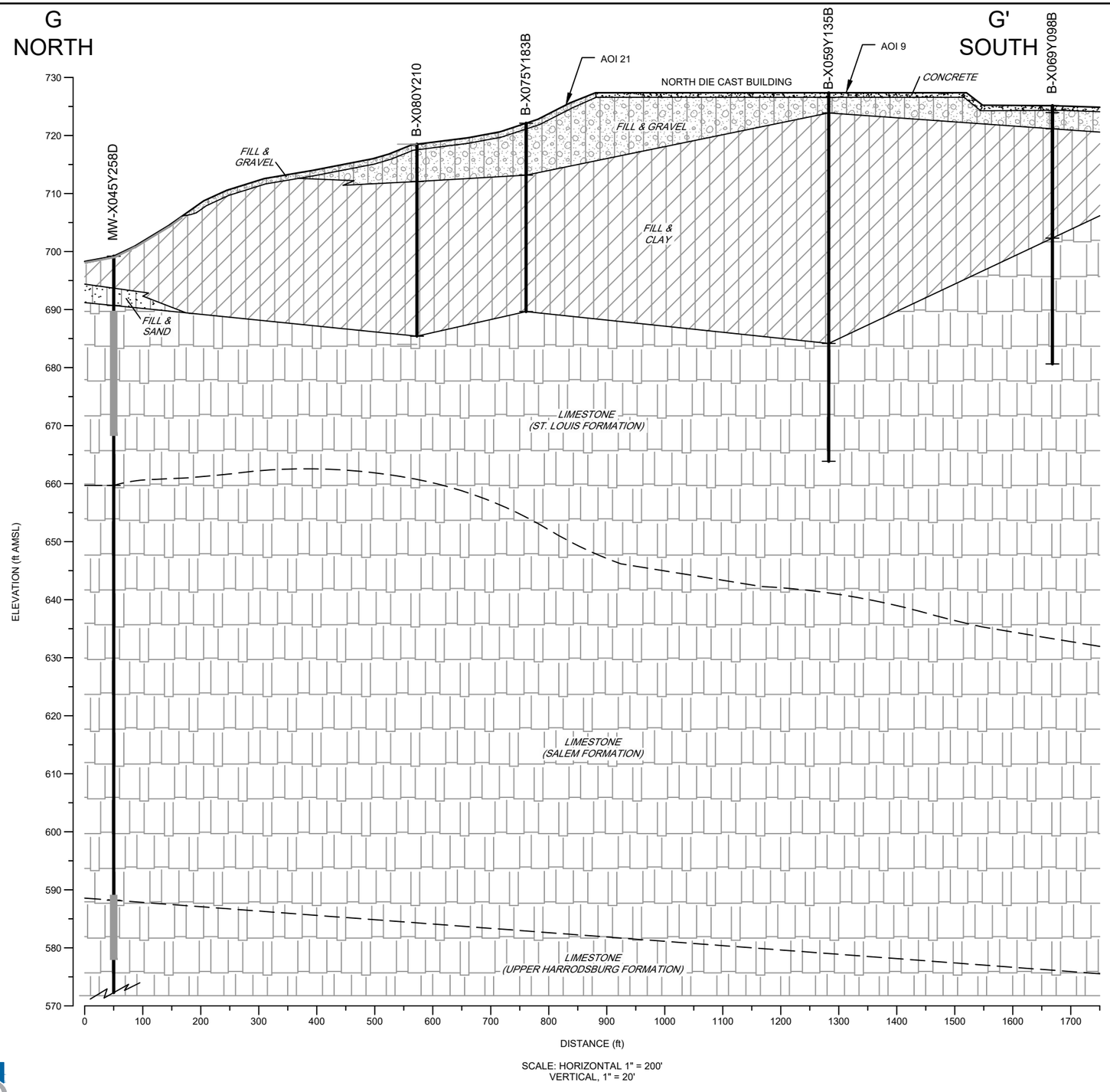
SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'

NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

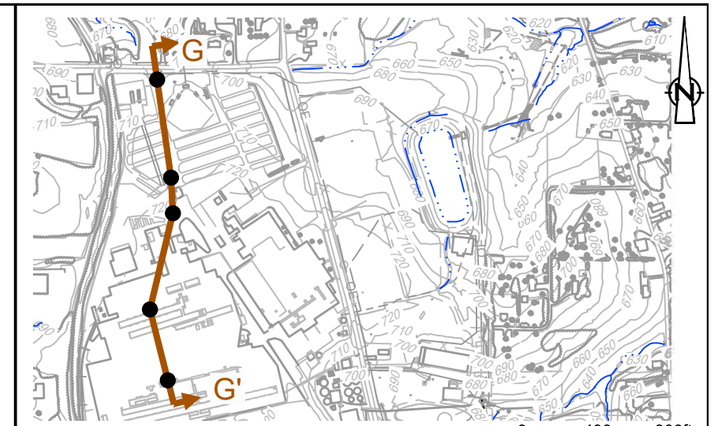
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.32

GEOLOGIC CROSS-SECTION F - F'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



B-X130Y215

BORING DESIGNATION

GROUND SURFACE

BORING LOCATION

APPROXIMATE CONTACT LOCATION
(ACTUAL CONTACT IS GRADATIONAL)

STRATIGRAPHIC BOUNDARY

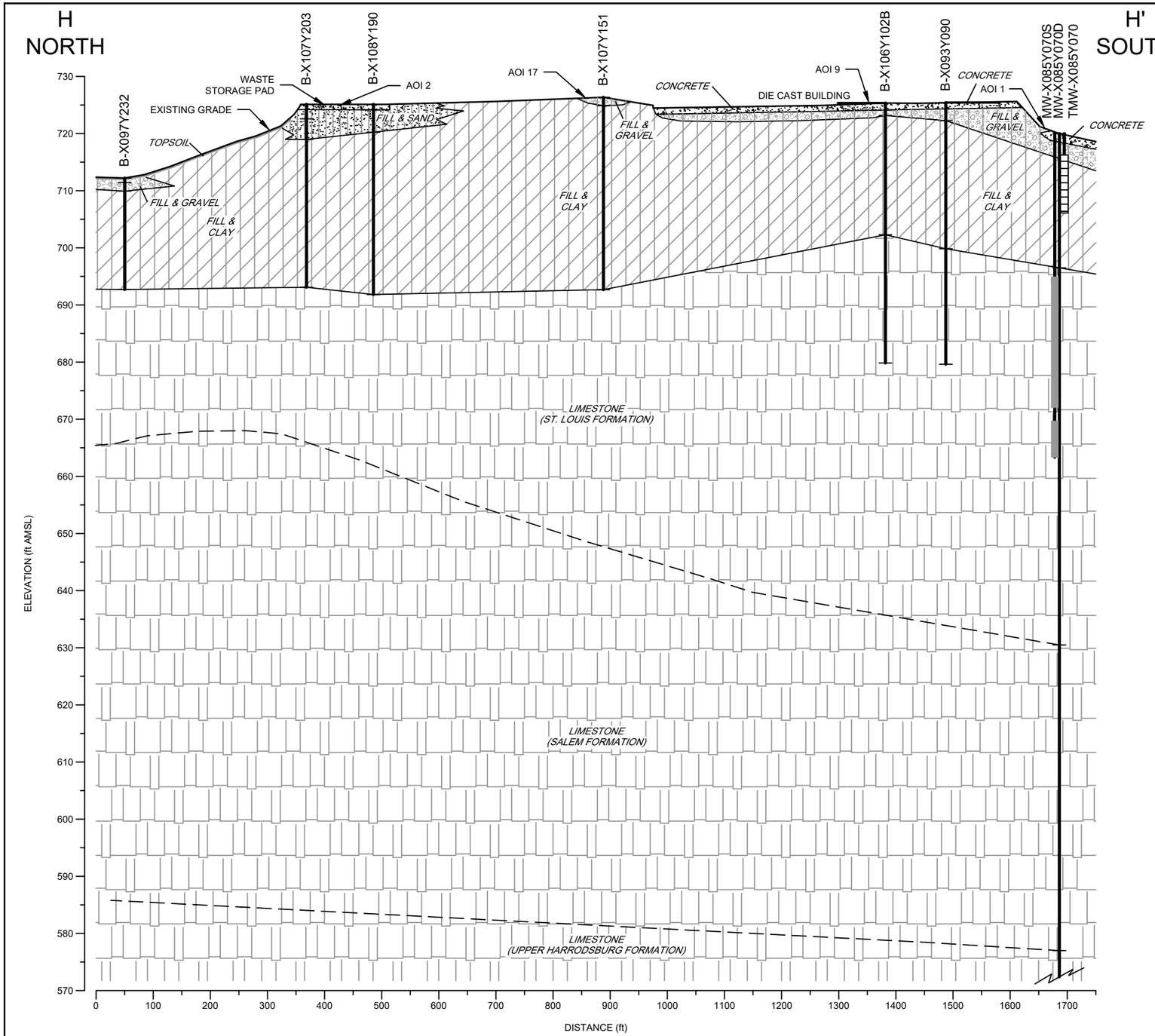
OPEN HOLE/MULTI-LEVEL PORT

NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

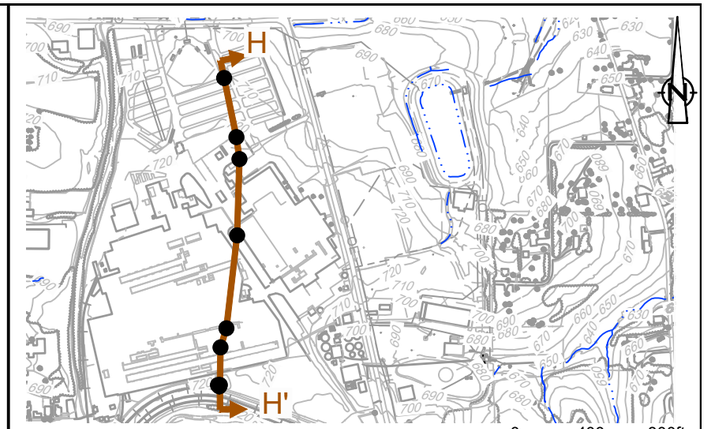
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

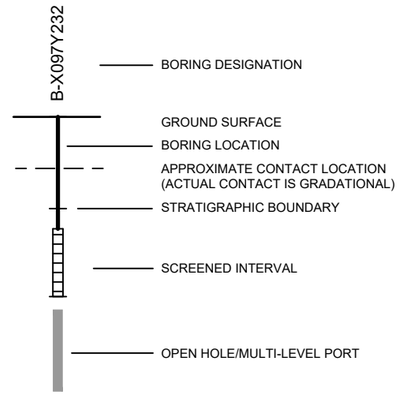
figure 2.33

GEOLOGIC CROSS-SECTION G - G'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



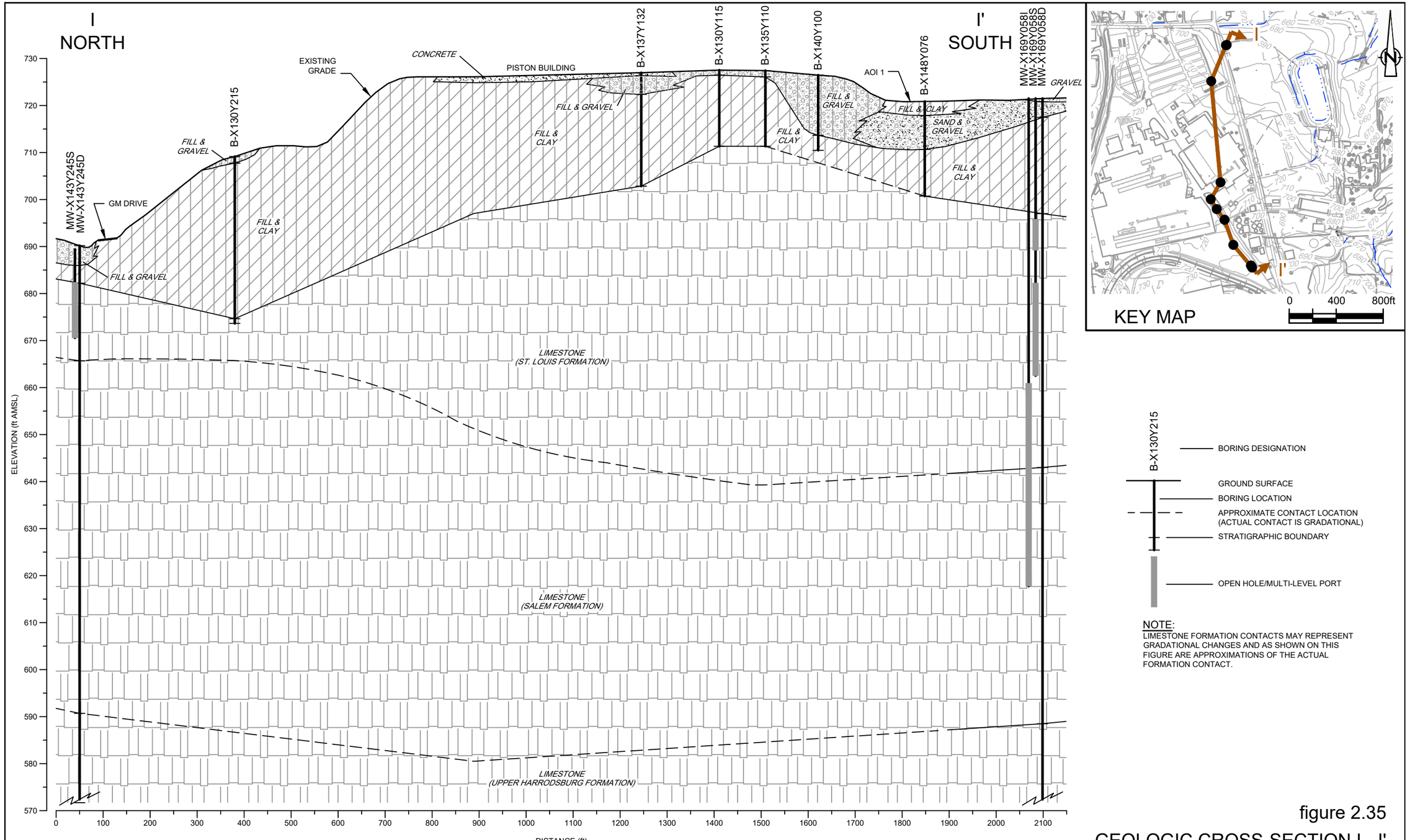


NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.34

GEOLOGIC CROSS-SECTION H - H'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'

NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

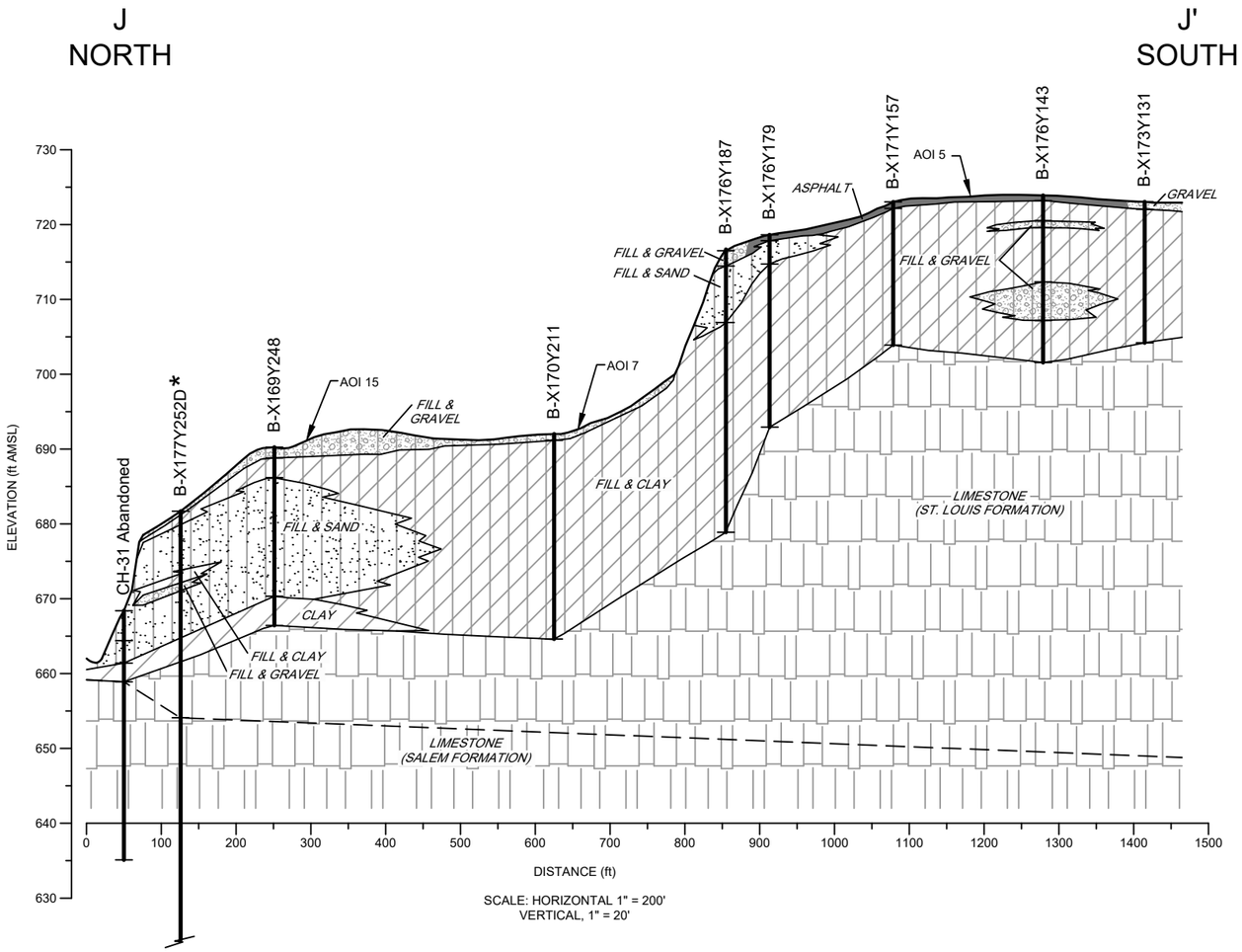
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.35

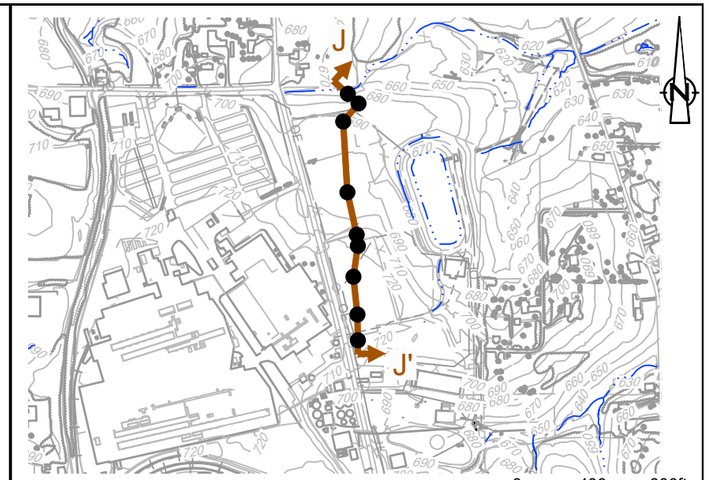
GEOLOGIC CROSS-SECTION I - I'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

J
NORTH

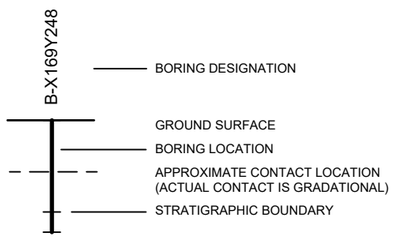
J'
SOUTH



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



KEY MAP



NOTES:

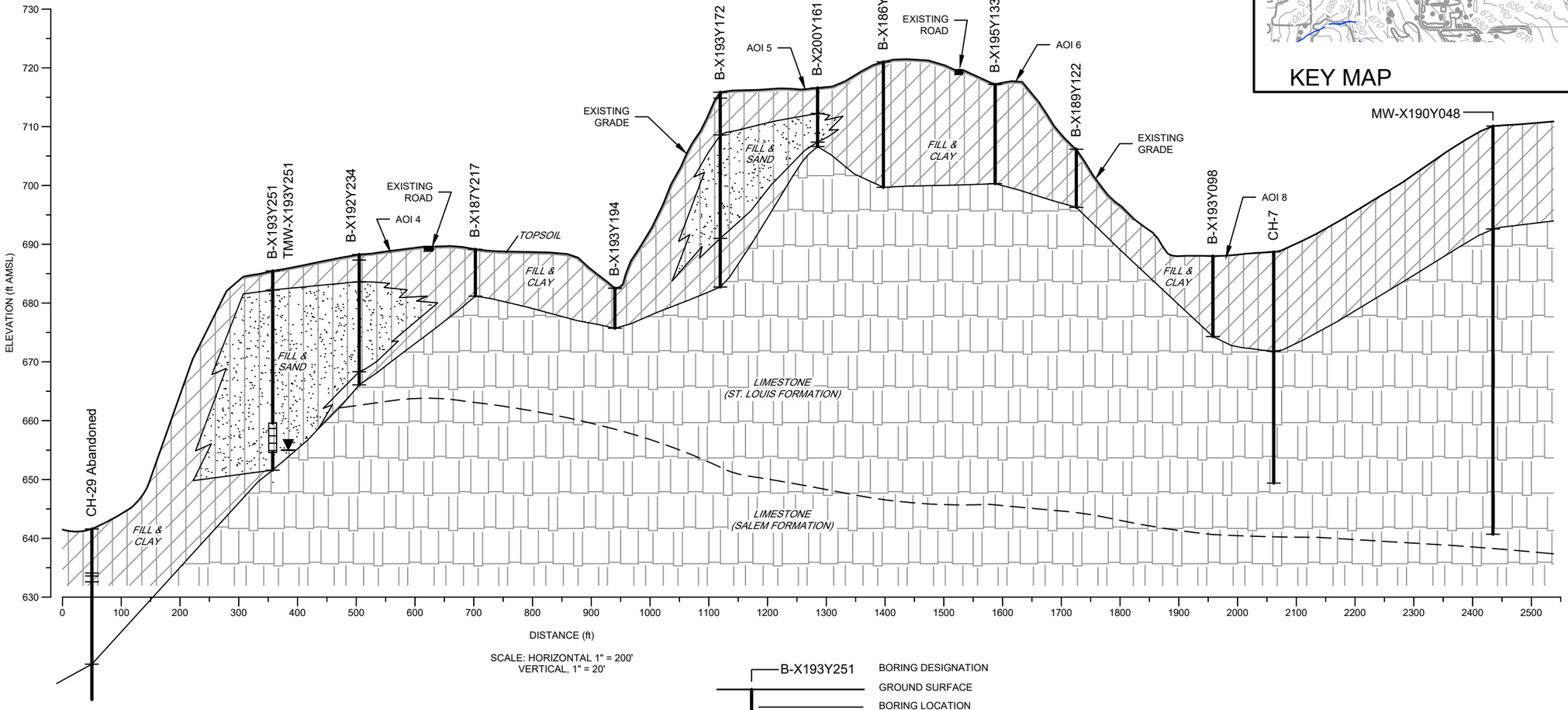
* BORING ADVANCED 30° TO VERTICAL. LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

figure 2.36

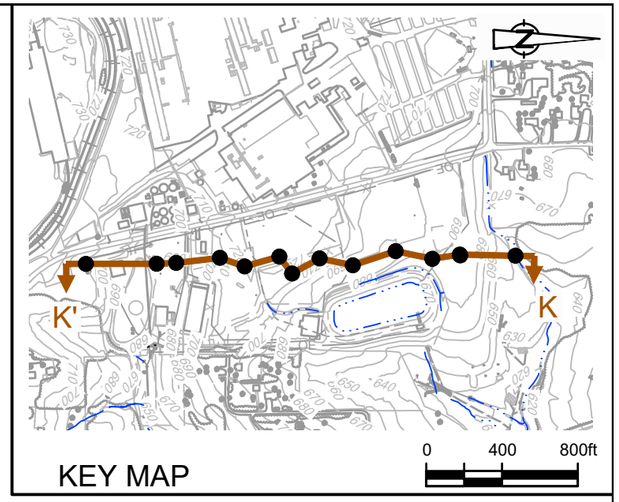
GEOLOGIC CROSS-SECTION J - J'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

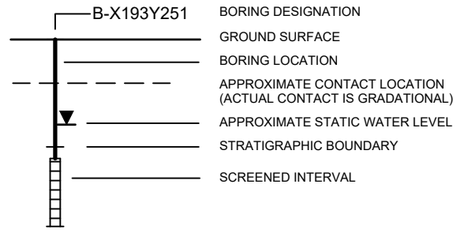
K
NORTH



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



K'
SOUTH

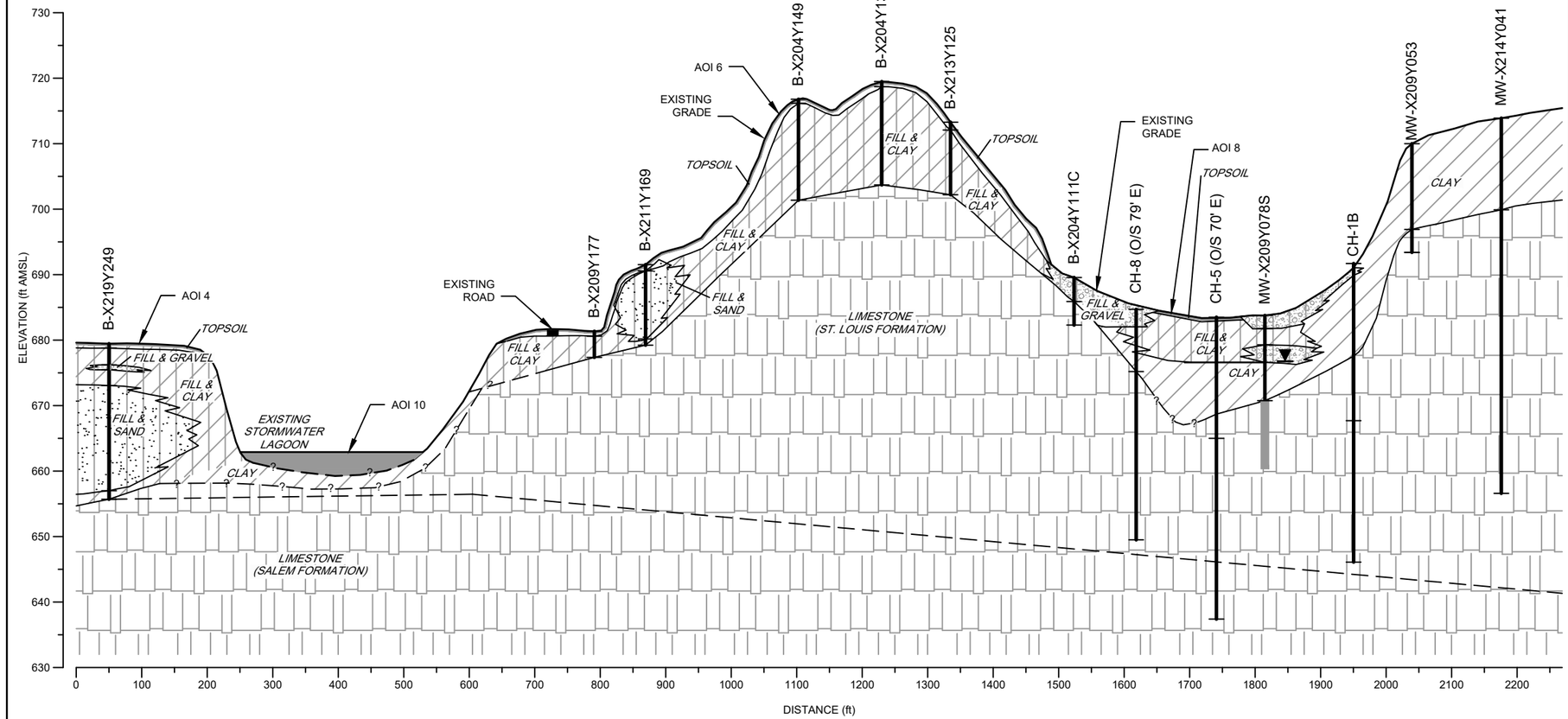


NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

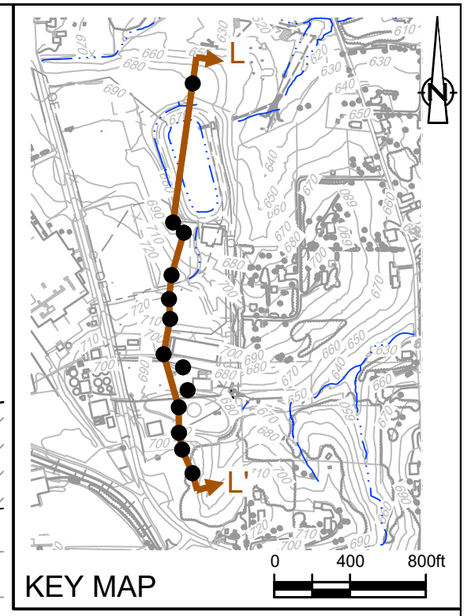
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

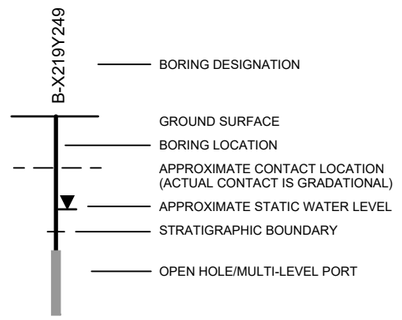
figure 2.37

GEOLOGIC CROSS-SECTION K - K'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



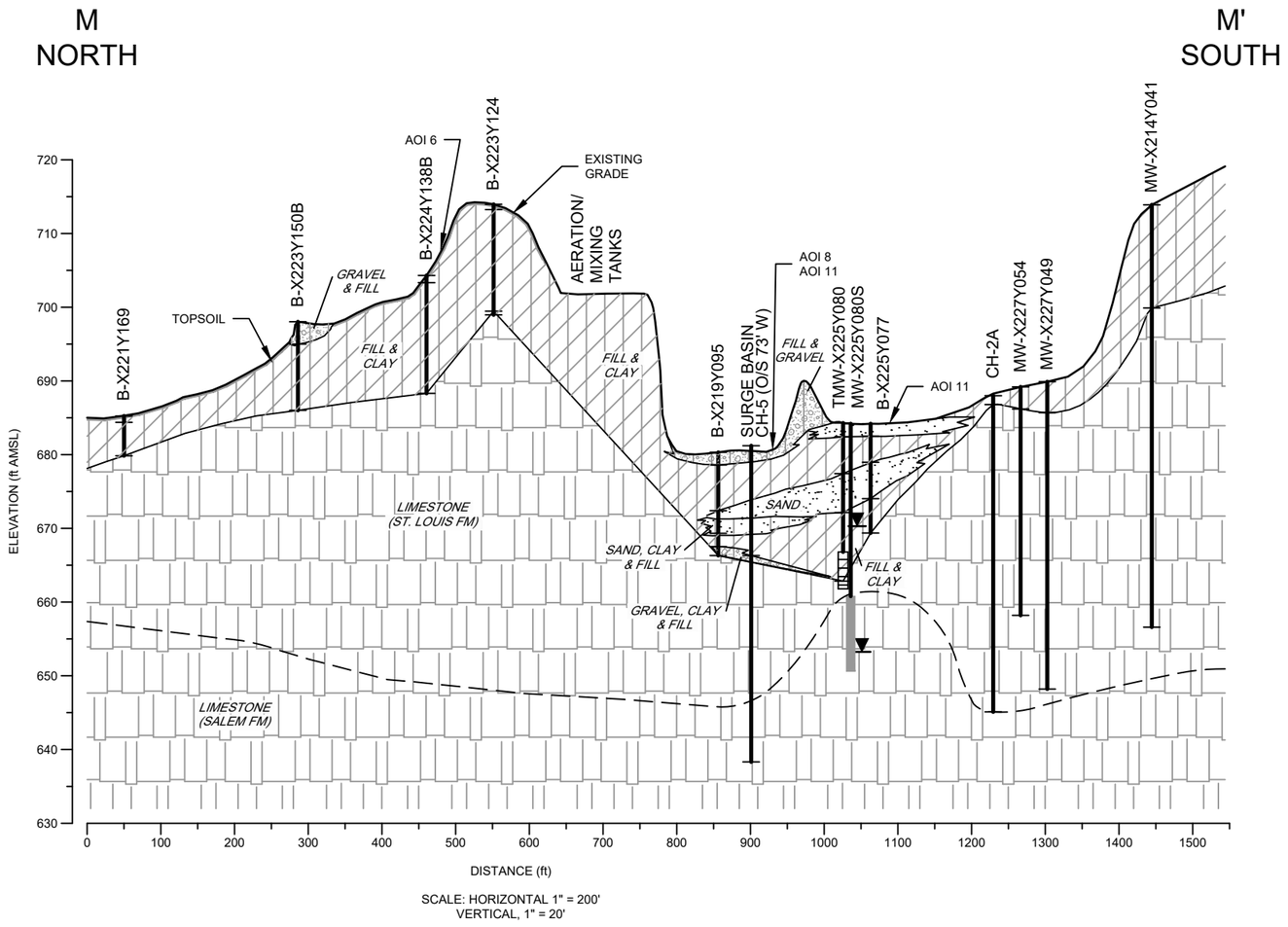


NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

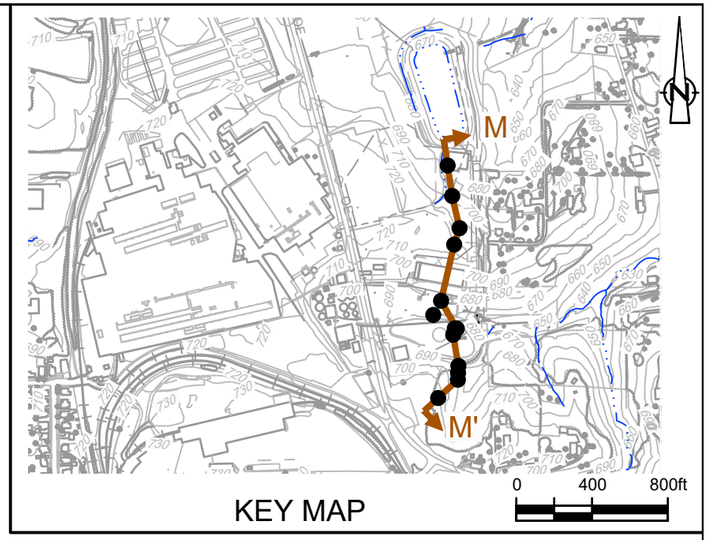
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

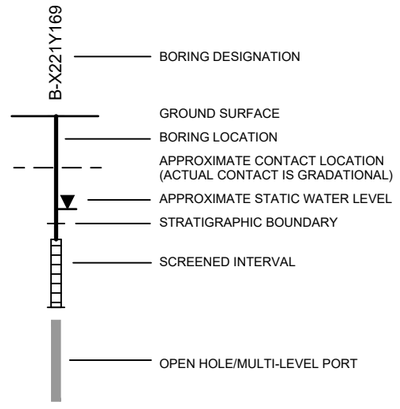
figure 2.38

GEOLOGIC CROSS-SECTION L - L'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SCALE: HORIZONTAL 1" = 200'
VERTICAL, 1" = 20'



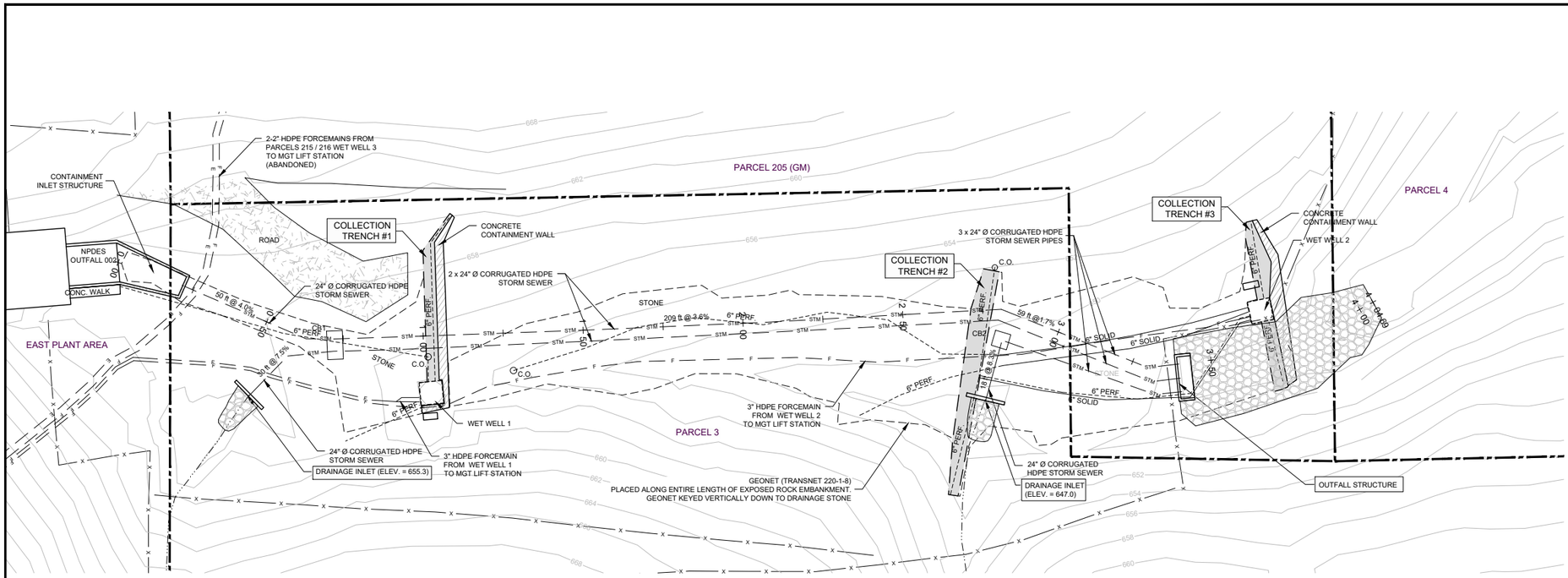


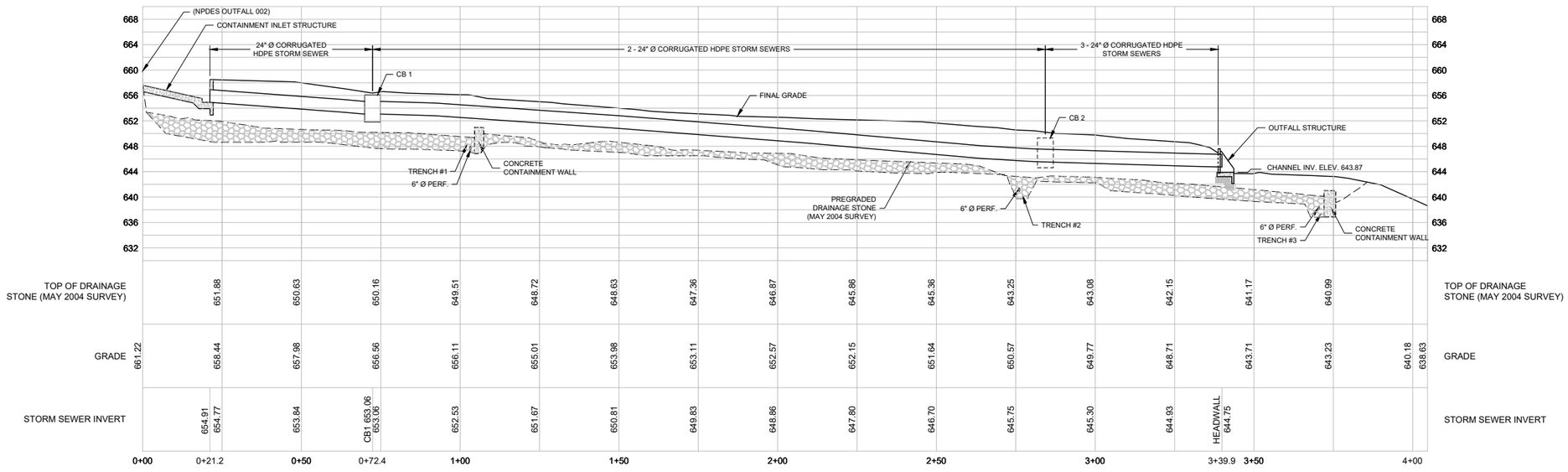
NOTE:
LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

figure 2.39

GEOLOGIC CROSS-SECTION M - M'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana





STORM SEWER PROFILE

HOR. 1" = 20'
VER. 1" = 10'

NΩ	Revision	Date	Initial

LEGEND

- GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE PARCEL BOUNDARY
- ROADS / UNPAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- ORIGINAL 6" DIA. PERFORATED DRAIN PIPE
- ORIGINAL 6" DIA. SOLID WALL DRAIN PIPE
- ORIGINAL CLEANOUT
- WET WELL STRUCTURE
- STORM SEWER
- FORCEMAIN
- CATCHBASIN
- OUTFALL STRUCTURE

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial
AS RECORDED	MARCH 27, 2008	CRH

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

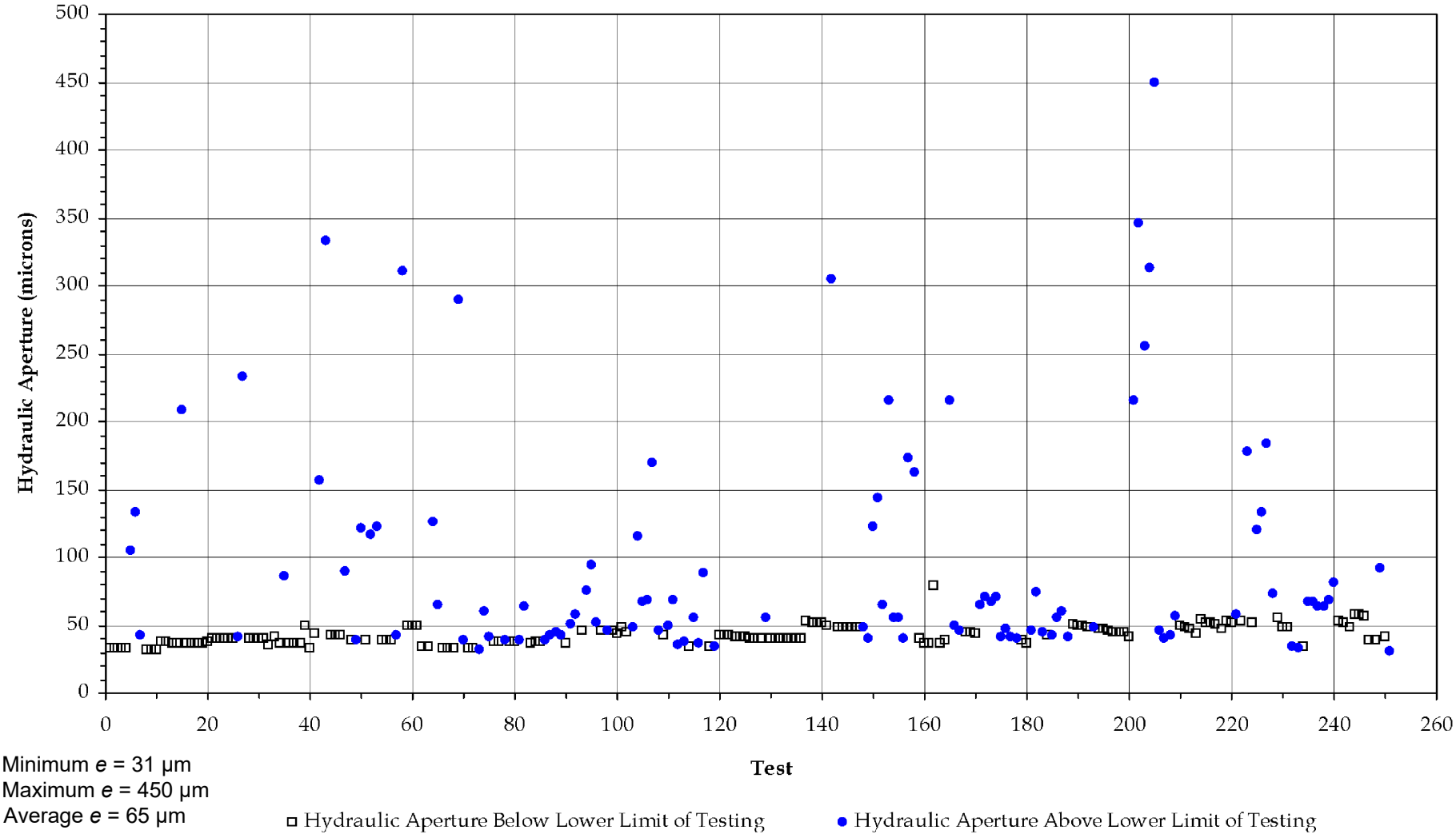
PARCELS 3 AND 205
STORM SEWER PLAN AND PROFILE

GHD

Source Reference:
BASE BY SEVENSON ENVIRONMENTAL SURVEY MAY 13, 2004

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 2.40

13968-00(267)GN-WA127 SEP 29/2015



NOTE: VALUES LESS THAN THE CALCULATED LOWER LIMIT OF TESTING ARE SHOWN EQUAL TO THE LOWER LIMIT OF TESTING VALUE

figure 2.41

CALCULATED HYDRAULIC APERTURE BASED ON STRADDLE PACKER TESTS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

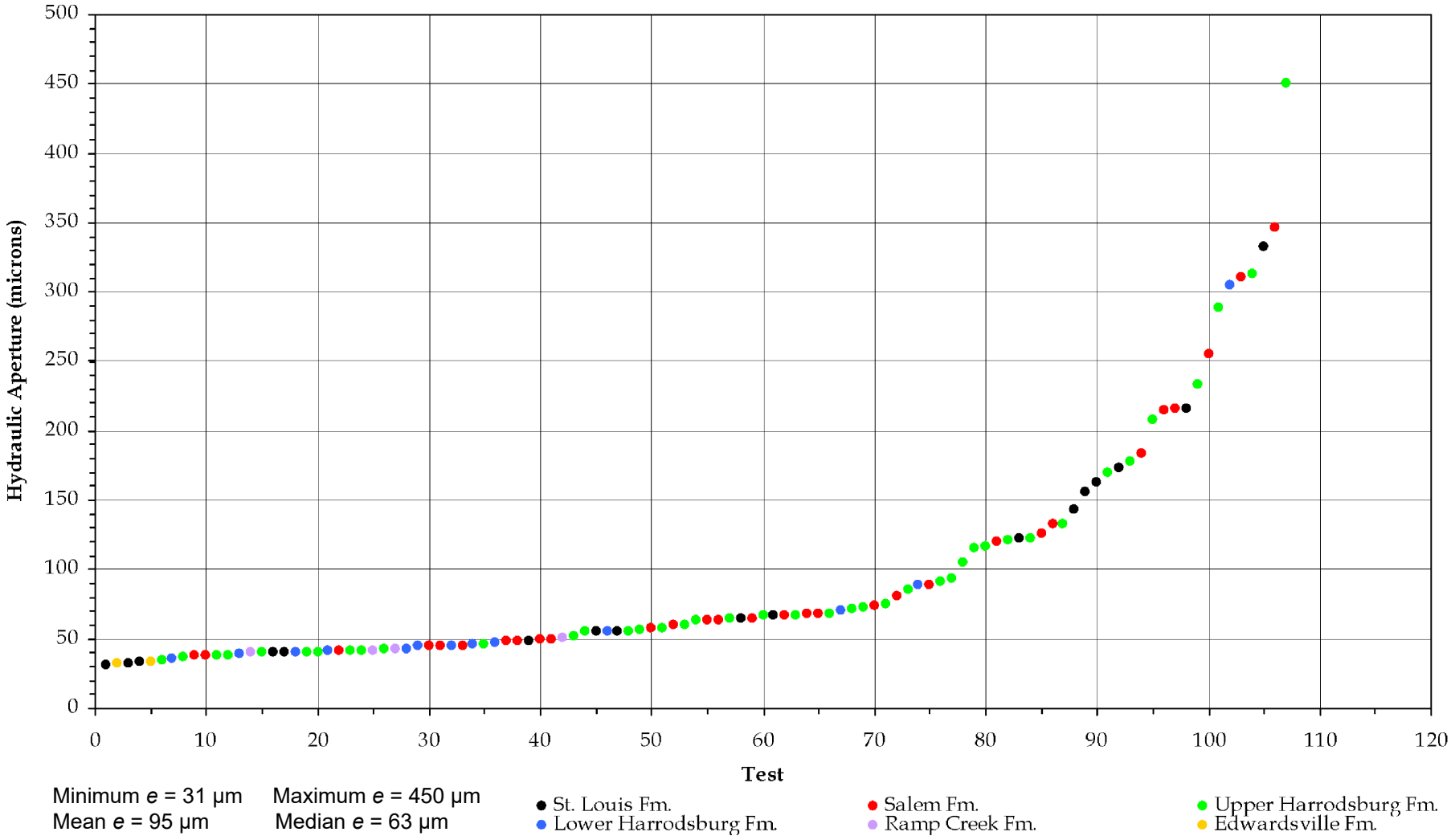
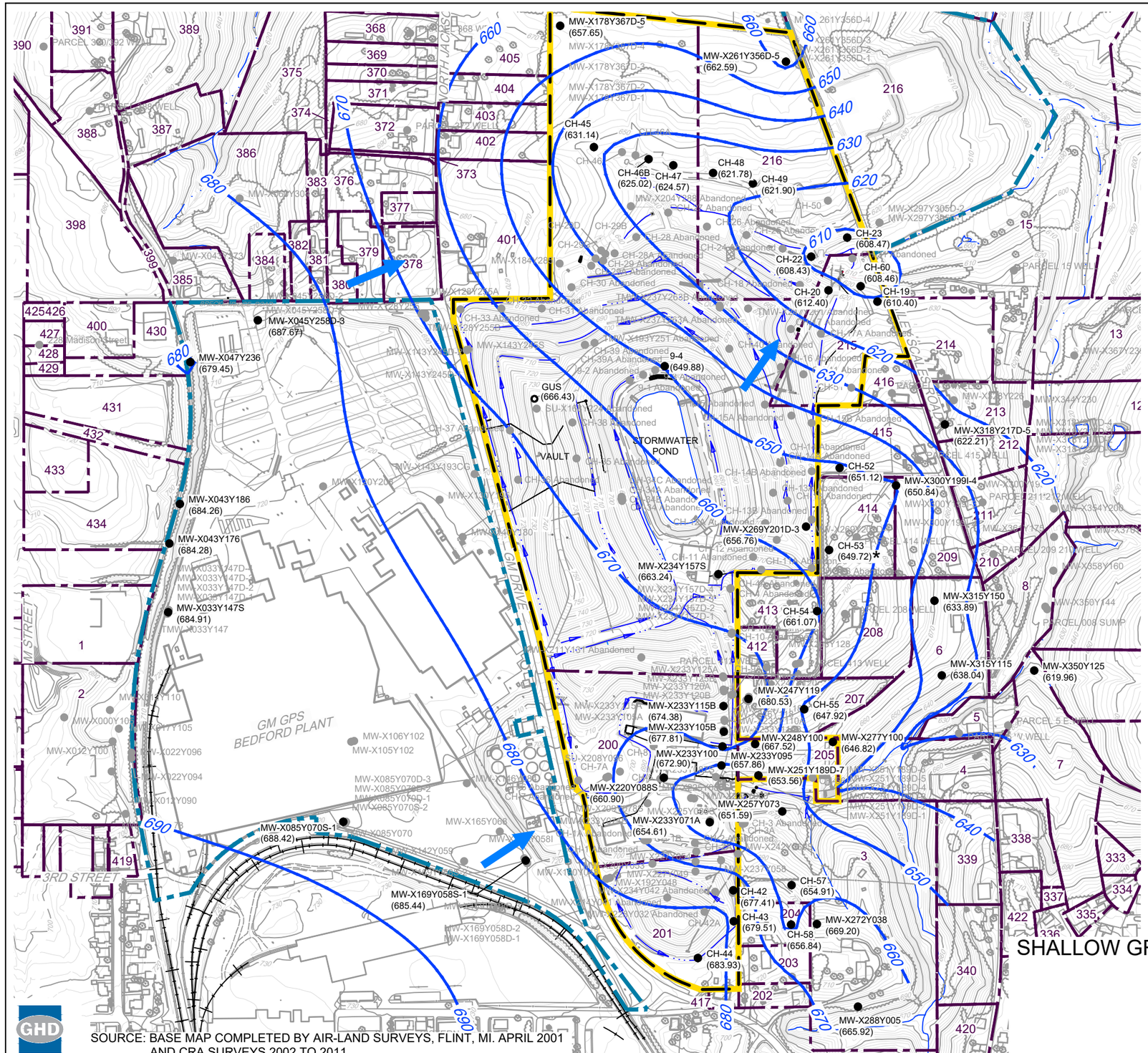


figure 2.42

DISTRIBUTION OF CALCULATED HYDRAULIC APERTURES ABOVE LOWER LIMIT OF TESTING

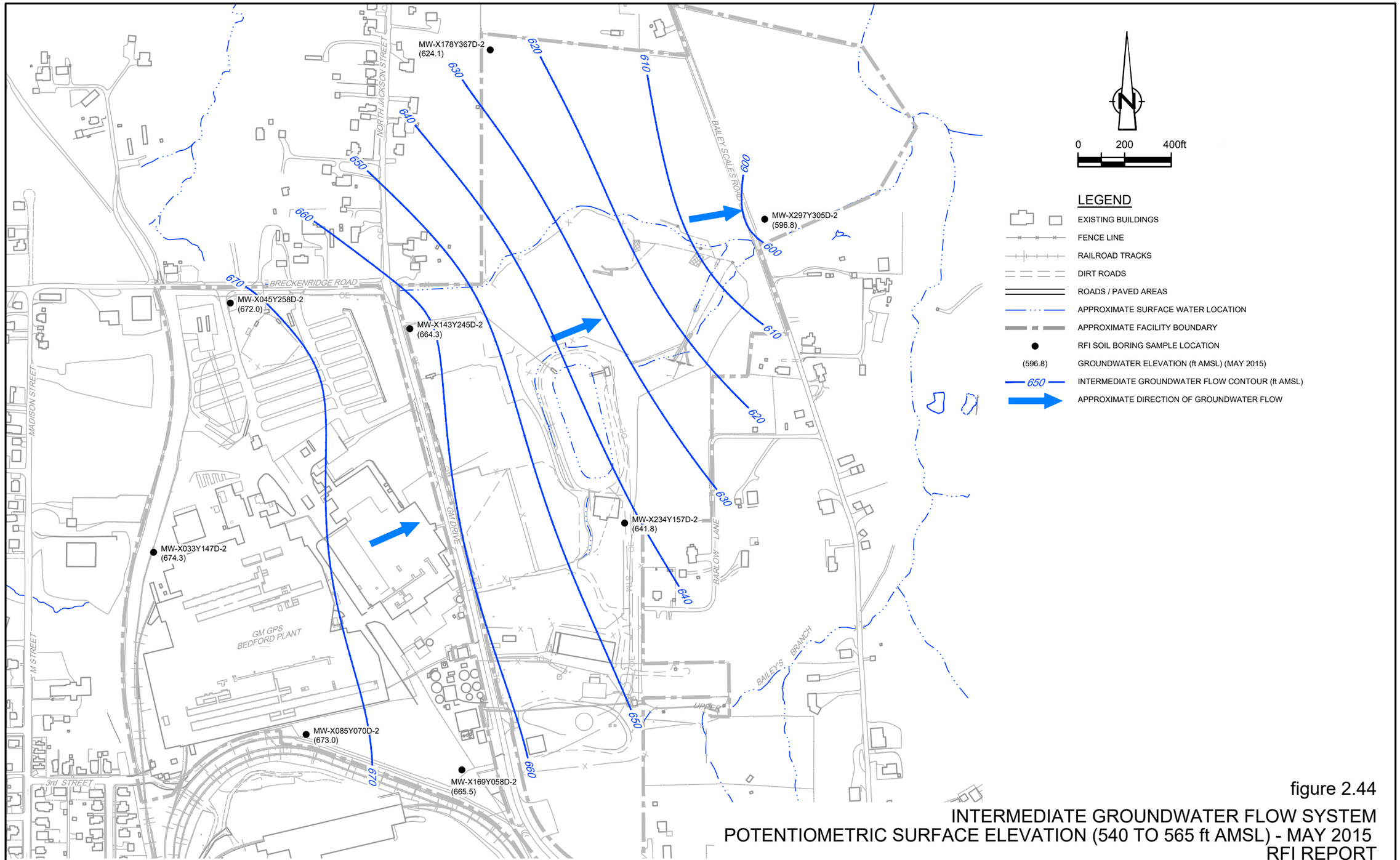
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2011

figure 2.43

SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE
MAY 4 TO 5, 2015
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001
AND CRA SURVEYS 2002 TO 2011

figure 2.44

INTERMEDIATE GROUNDWATER FLOW SYSTEM
POTENTIOMETRIC SURFACE ELEVATION (540 TO 565 ft AMSL) - MAY 2015
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA115 SEP 29/2015

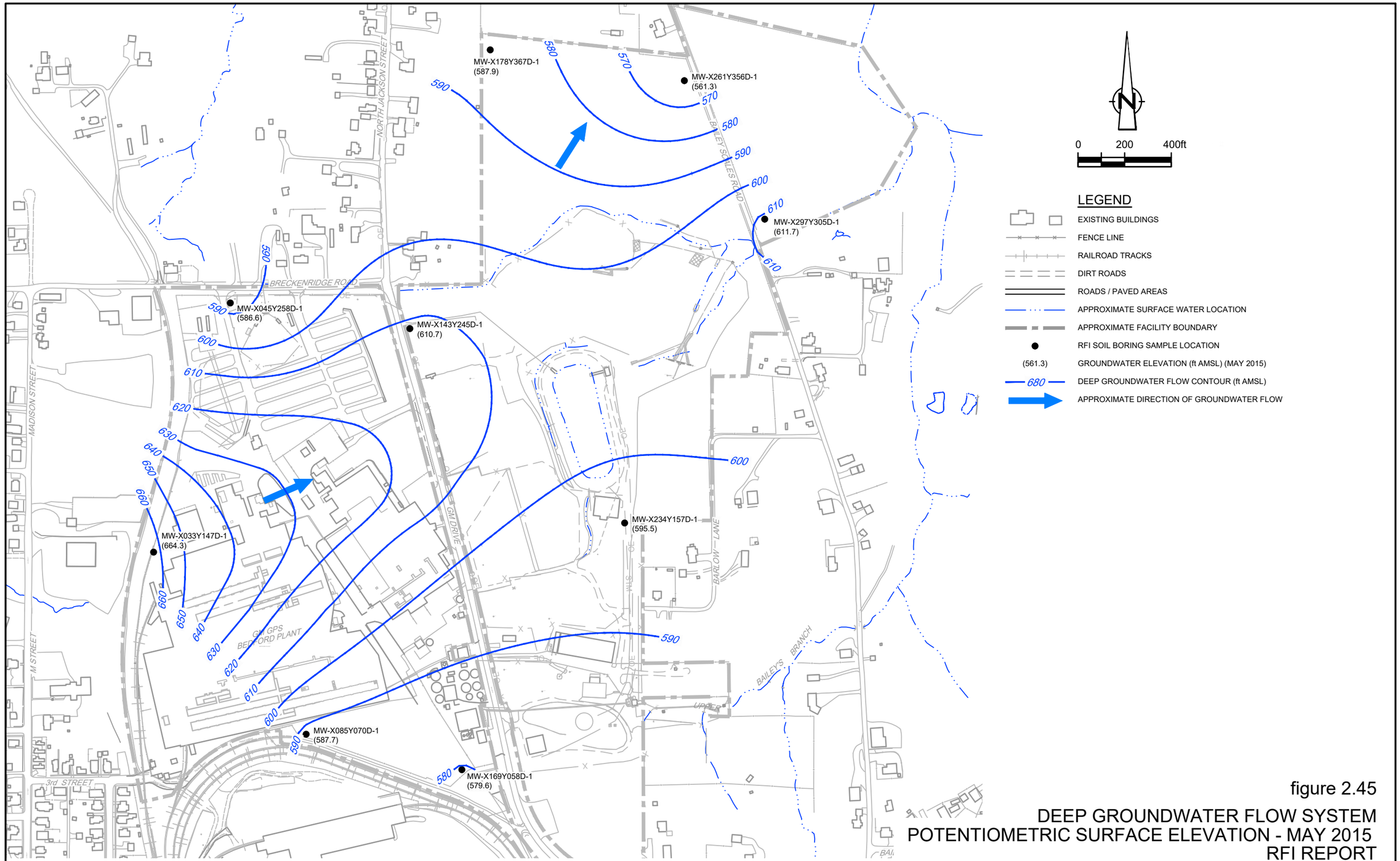
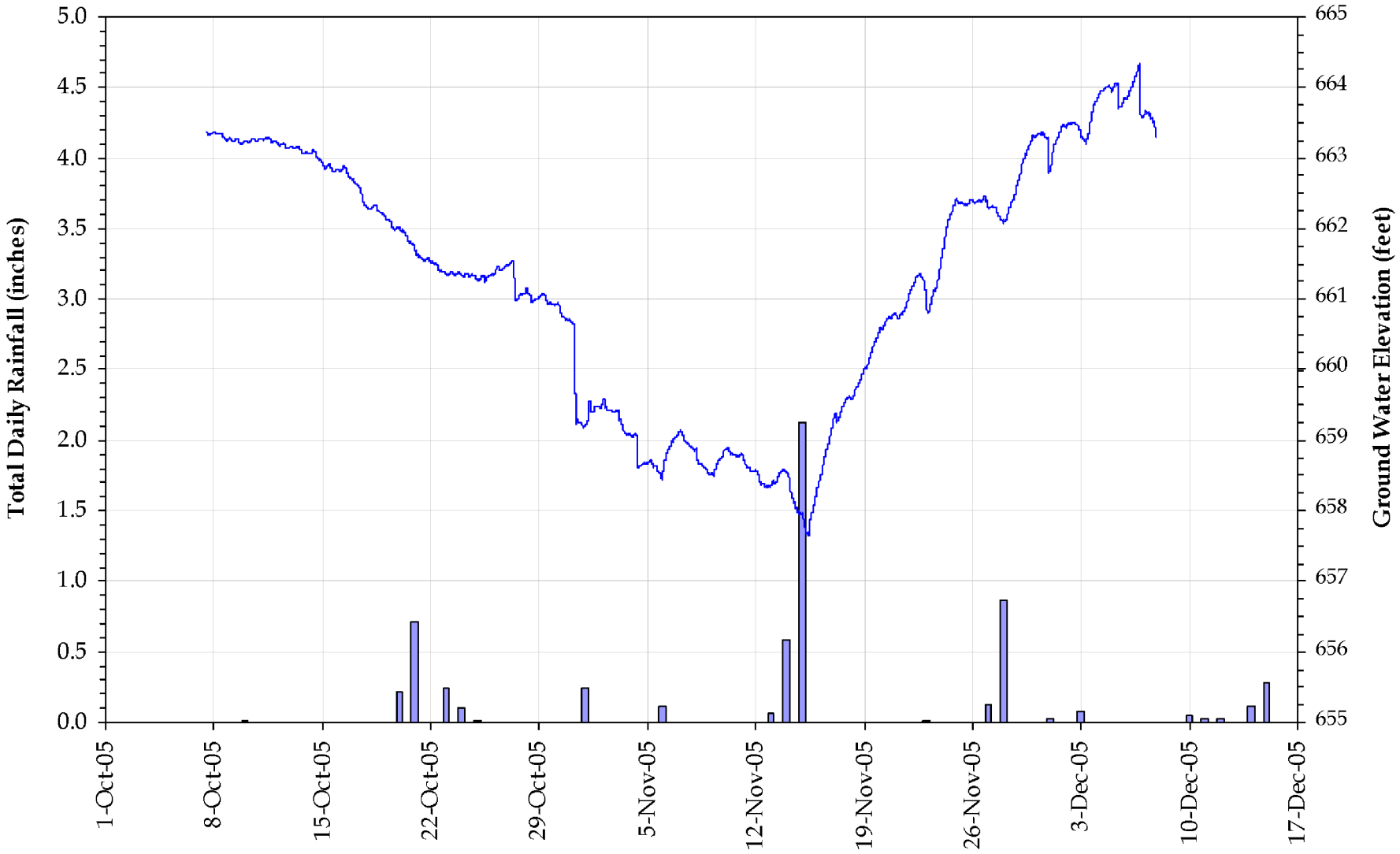


figure 2.45

DEEP GROUNDWATER FLOW SYSTEM
POTENTIOMETRIC SURFACE ELEVATION - MAY 2015
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001
AND CRA SURVEYS 2002 TO 2011

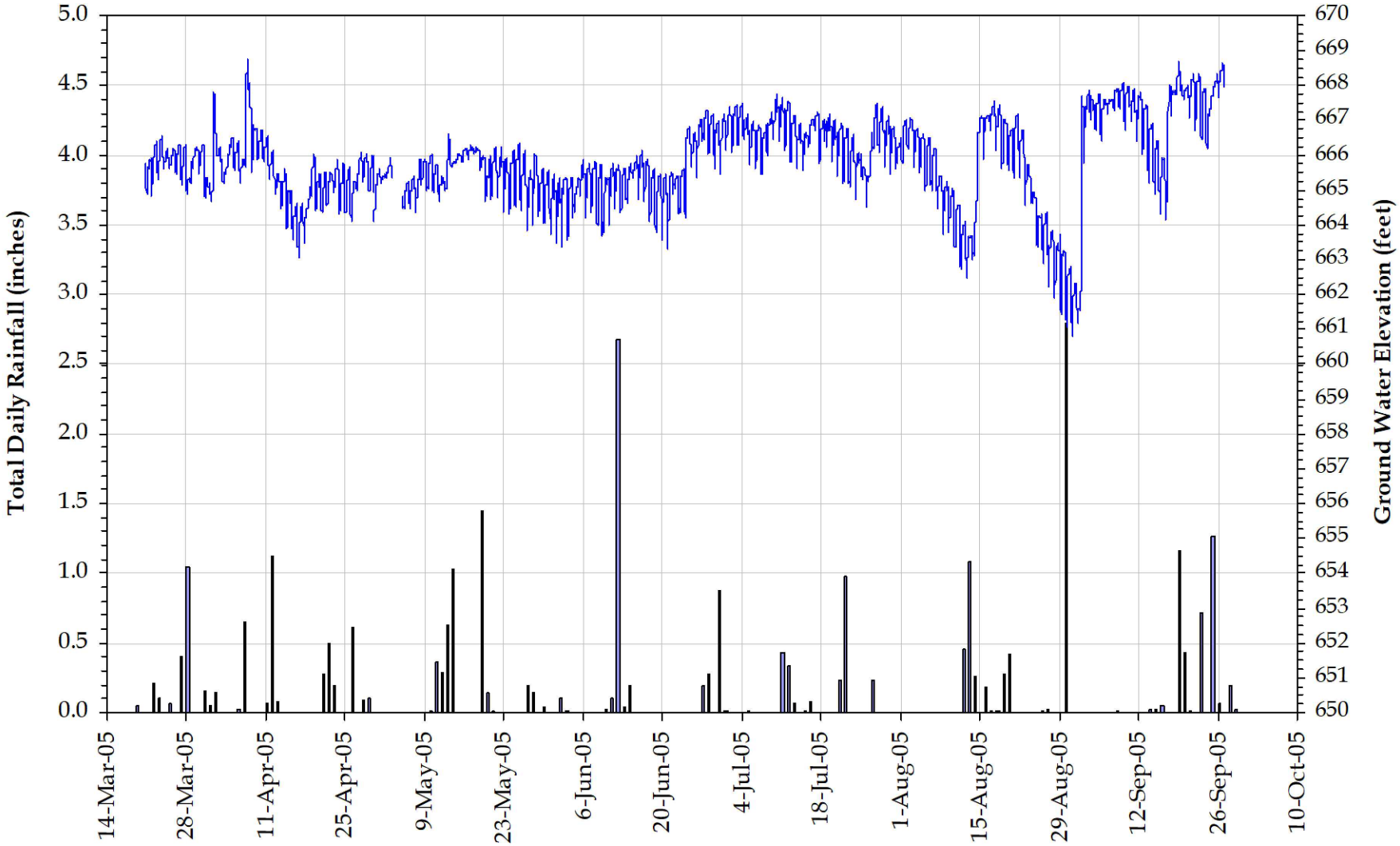
13968-00(267)GN-WA116 SEP 29/2015



NOTE: OVERBURDEN THICKNESS IS 32 FEET. WELL IS COMPLETED 3 TO 21.5 FEET BELOW TOP OF BEDROCK

figure 2.46

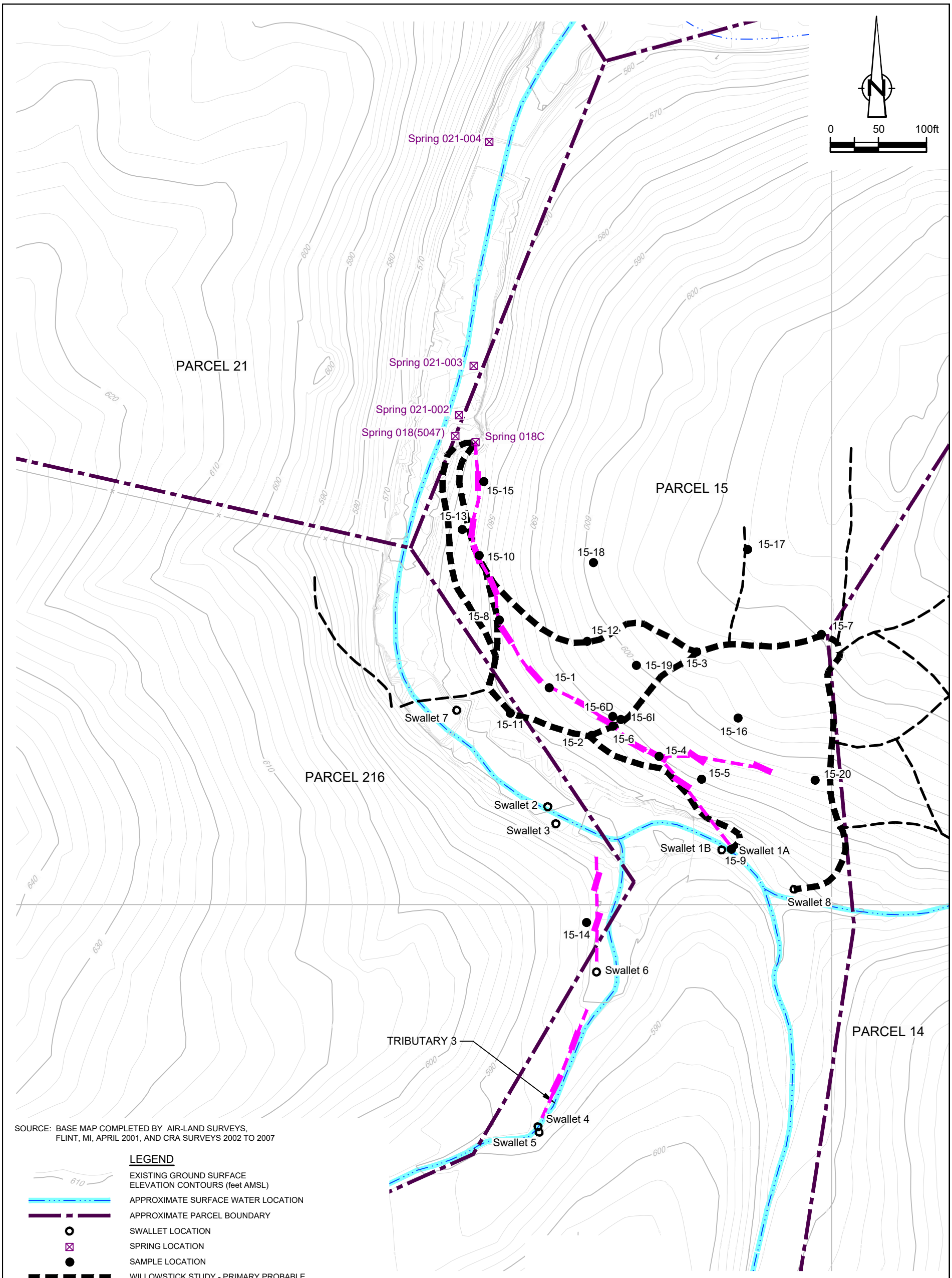
MW-X128Y255 GROUNDWATER ELEVATION AND DAILY PRECIPITATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



NOTE: OVERBURDEN THICKNESS IS 6 FEET. WELL IS COMPLETED 33.4 FEET BELOW TOP OF BEDROCK

figure 2.47

MW-X234Y157S GROUNDWATER ELEVATION AND DAILY PRECIPITATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001, AND CRA SURVEYS 2002 TO 2007

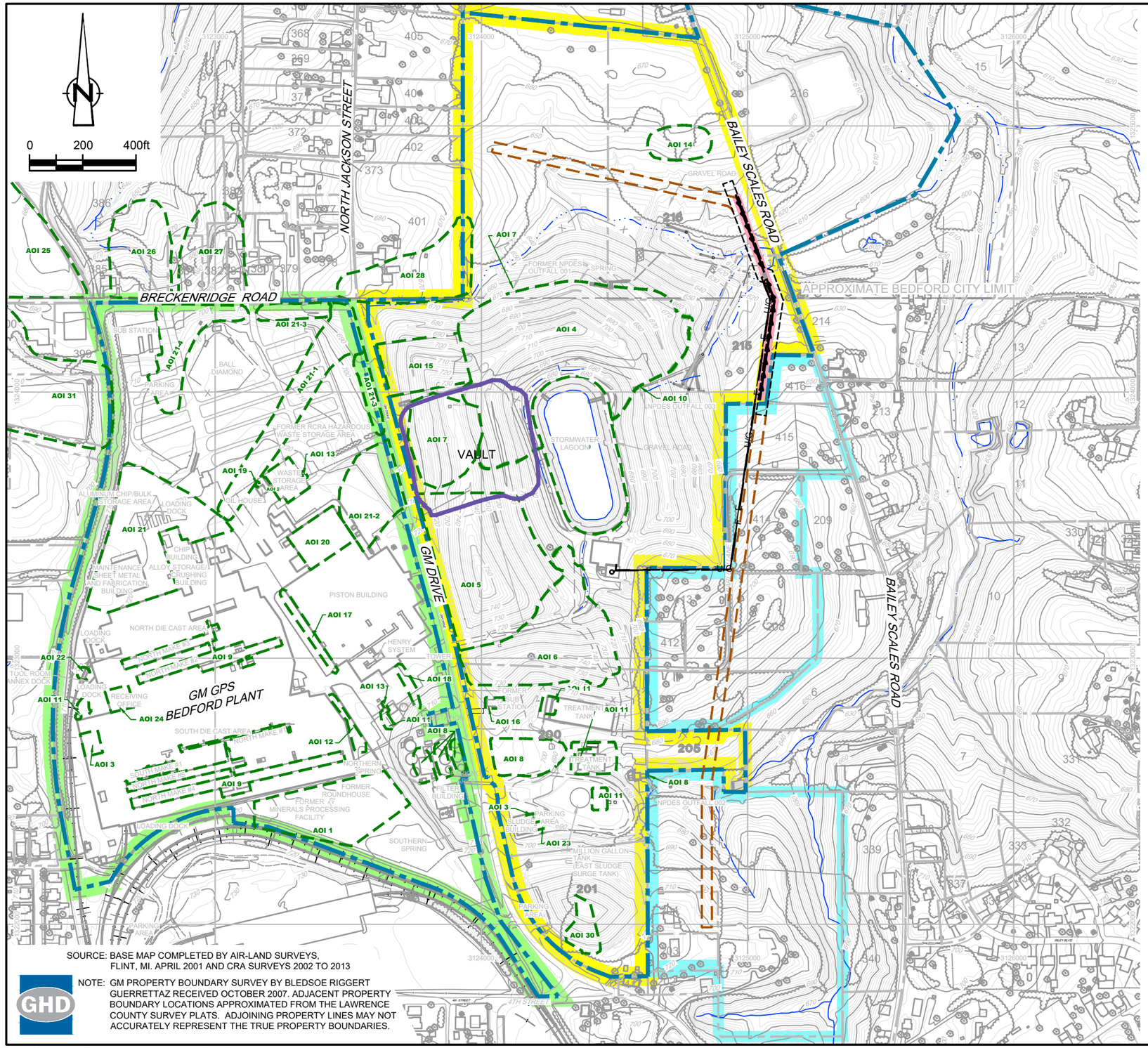
LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- SWALLET LOCATION
- SPRING LOCATION
- SAMPLE LOCATION
- WILLOWSTICK STUDY - PRIMARY PROBABLE GROUNDWATER FLOW PATH
- WILLOWSTICK STUDY - SECONDARY PROBABLE GROUNDWATER FLOW PATH
- GPR STUDY - LOCATION OF SUSPECTED SPRING 018 AND TRIBUTARY 3 CONDUITS
- GPR STUDY - INTERPRETED TREND OF SUSPECTED SPRING 018 AND TRIBUTARY 3 CONDUITS

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

figure 2.48

COMPARISON OF GPR SURVEY AND WILLOWSTICK RESULTS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2013

NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.

LEGEND

- GROUND SURFACE ELEVATION CONTOUR (feet AMSL)
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- SURFACE WATER
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- WEST PLANT AREA BOUNDARY
- EAST PLANT AREA BOUNDARY
- GM LLC OWNED RESIDENTIAL PROPERTIES
- VAULT LIMIT
- AOI BOUNDARY
- PROPOSED FUTURE TRENCH ALIGNMENT
- PROPOSED PILOT TRENCH

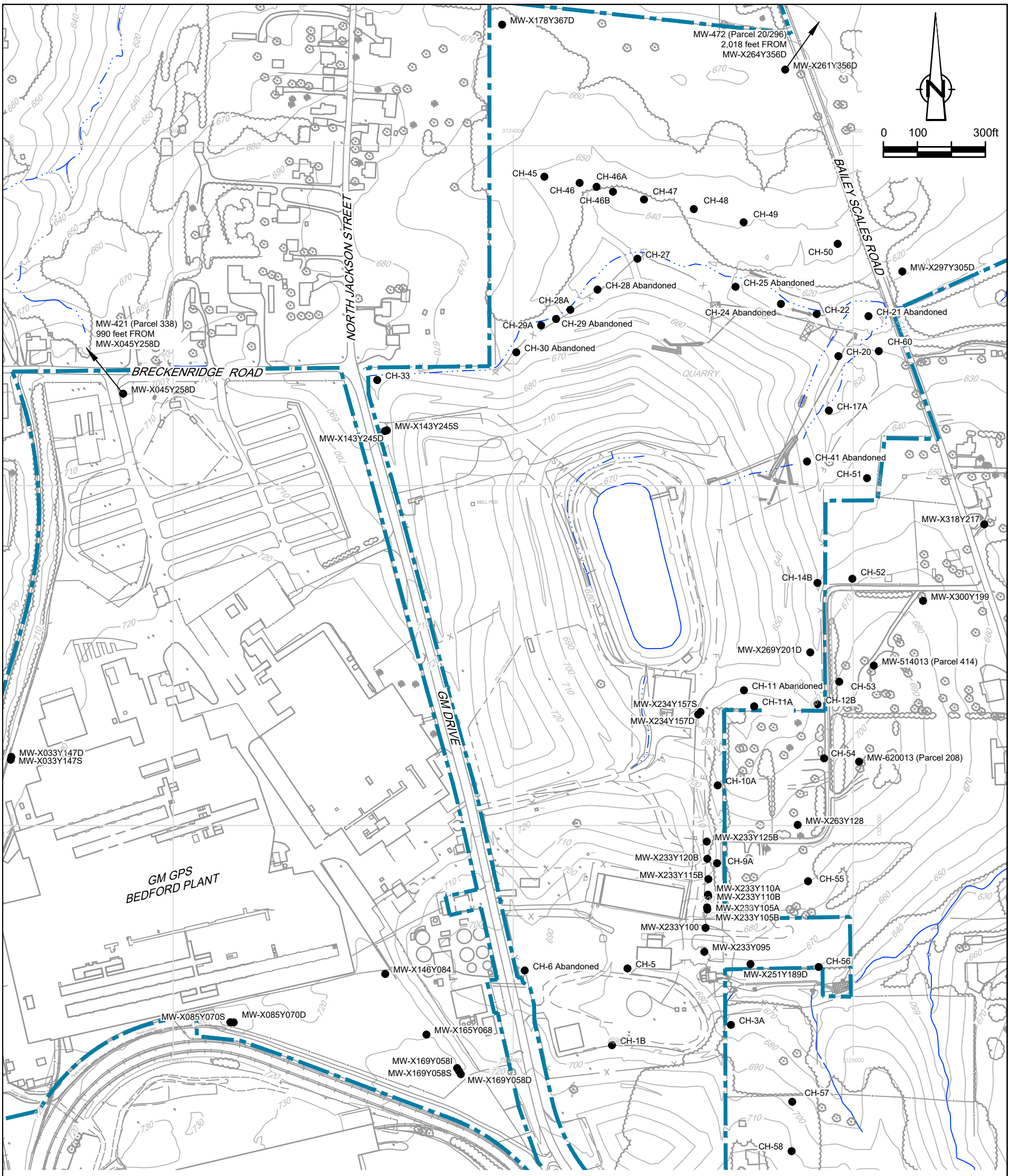
AOI SUMMARY

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 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 30	On-Site Suspected Fill Area - Parcel 201

figure 3.1

AREAS OF INTEREST
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA003 SEP 29/2015



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2006

NOTES:

1) DUE TO PRIVACY CONCERNS, THE LOCATION OF 4 PRIVATE WELLS GEOPHYSICALLY LOGGED ARE NOT SHOWN.
2) GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

LEGEND

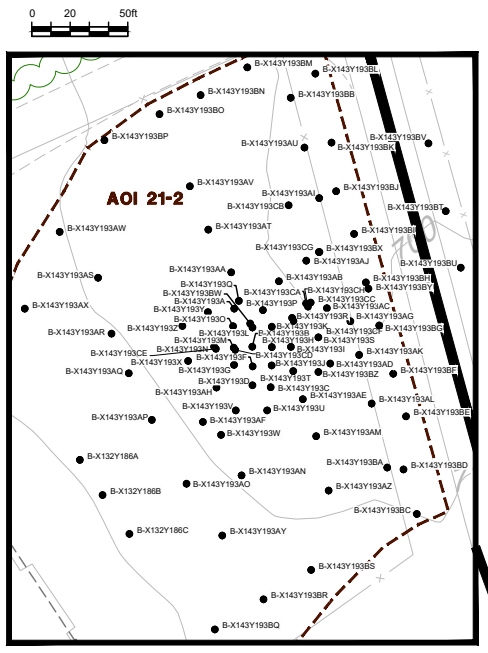
- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- APPROXIMATE FACILITY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- GEOPHYSICALLY LOGGED BOREHOLE LOCATION

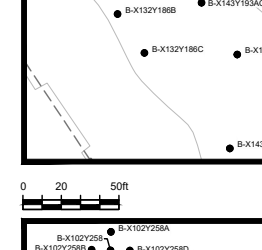
figure 3.2

LOCATION OF GEOPHYSICALLY LOGGED BEDROCK BOREHOLES
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

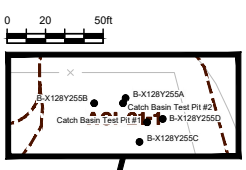
GHD

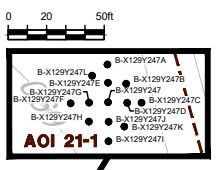
13968-00(267)GN-WA015 SEP 28/2015

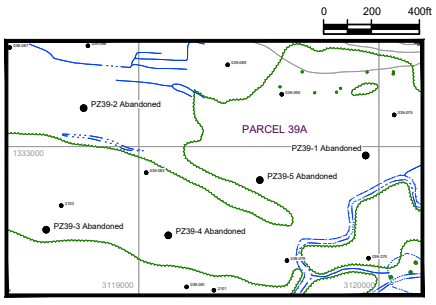




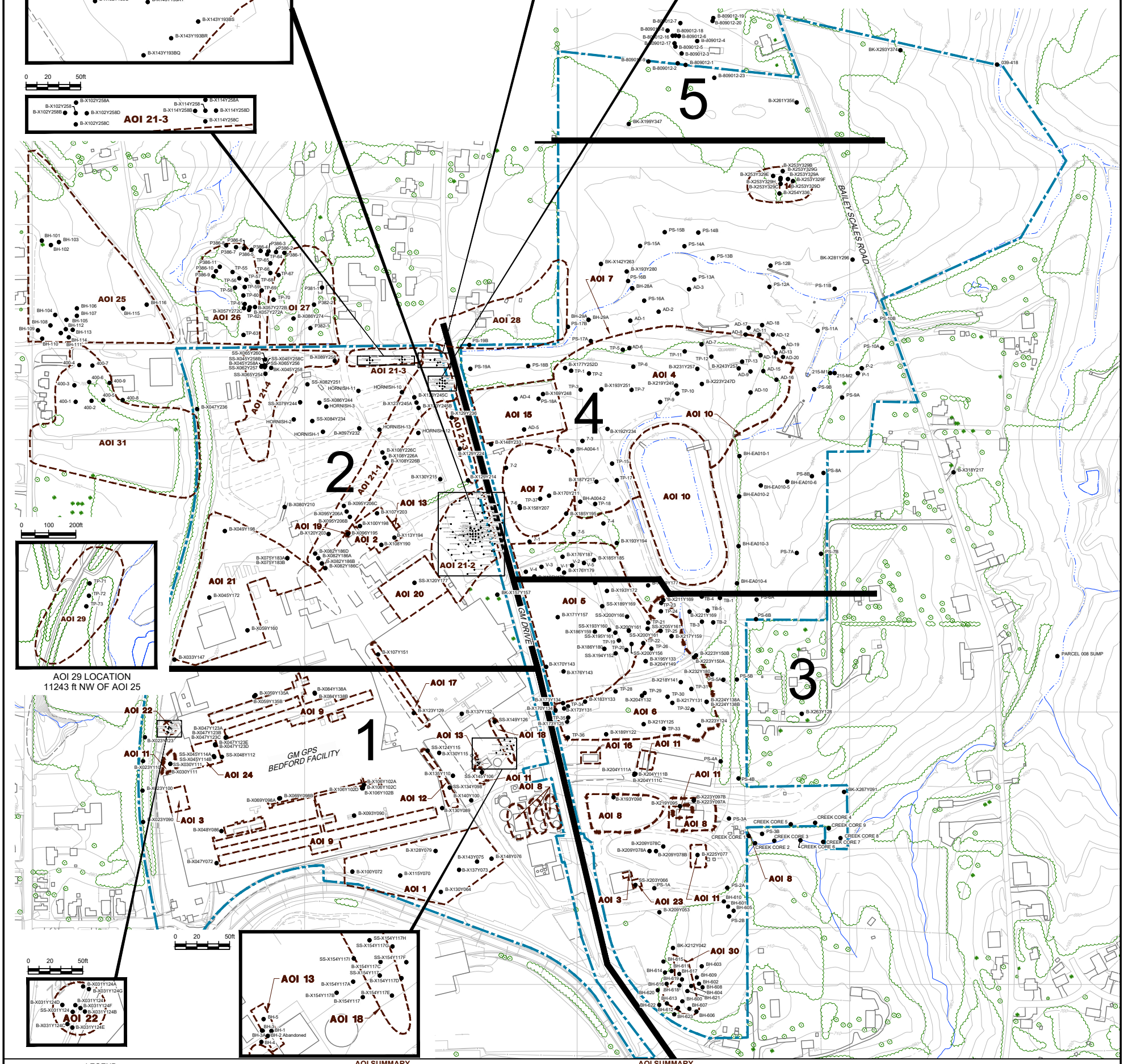
AOI 29 LOCATION
11243 ft NW OF AOI 25







LOCATION OF NEW PIEZOMETERS
IN PARCEL 39A



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 FACILITY BOUNDARY
- AOI BOUNDARY
- BK-X212Y042 SOIL BORING LOCATION

NOTE:
NOT ALL BORING LOCATIONS ARE DEPICTED IN THIS FIGURE. BORINGS LOCATED ON PARCELS 23A, 24, 25, 27, 28A, 28B, 30, 36 TO 39A, 40, 76B, AND 81, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE.

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building

AOI SUMMARY

AOI ID	Description
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

№	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

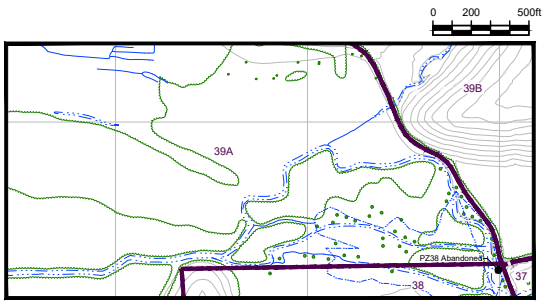
RFI SOIL BORINGS LOCATIONS

GHD

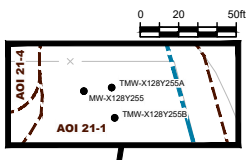
Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001.
AND CRA SURVEYS 2002 TO 2007

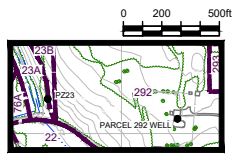
Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project №: 13968-00	Report №: 267	Drawing №: figure 3.3.1

13968-00(267)GN-WA109 SEP 29/2015

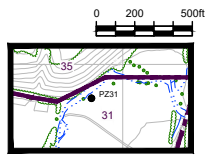


LOCATION OF PIEZOMETER IN PARCEL 38

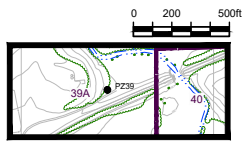




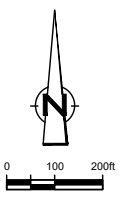
LOCATION OF PIEZOMETER IN PARCEL 23

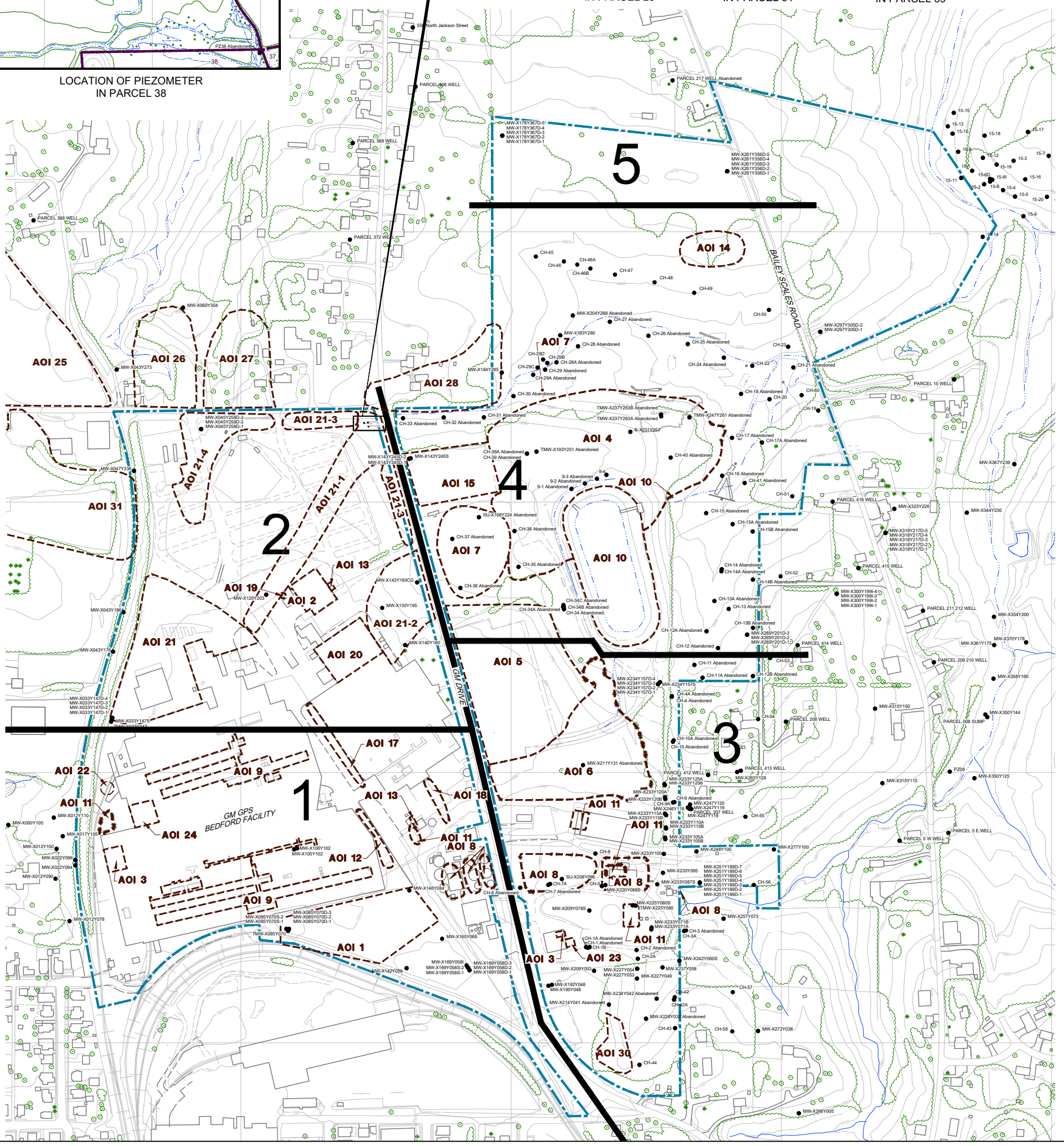


LOCATION OF PIEZOMETER IN PARCEL 31



LOCATION OF PIEZOMETER IN PARCEL 39





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 FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- AOI BOUNDARY
- MW-X233Y095 GROUNDWATER SAMPLE LOCATION

NOTE:
NOT ALL GROUNDWATER SAMPLE LOCATIONS ARE DEPICTED IN THIS FIGURE. LOCATIONS ON PARCELS 13, 14, 18, 28B, 295, 296, 390, 394, 424, AND THE LOCATIONS LISTED BELOW, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

CISTERN 1537 BRECKENRIDGE
412 Peerless Rd
CISTERN 411 L ST
CISTERN 1326 3rd ST
CISTERN 406 J ST
985 Peerless Road
CISTERN 202 N ST
612 E Street
216 Rawlins Mill Road
228 Madison Street

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AOI SUMMARY

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AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
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AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

№	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

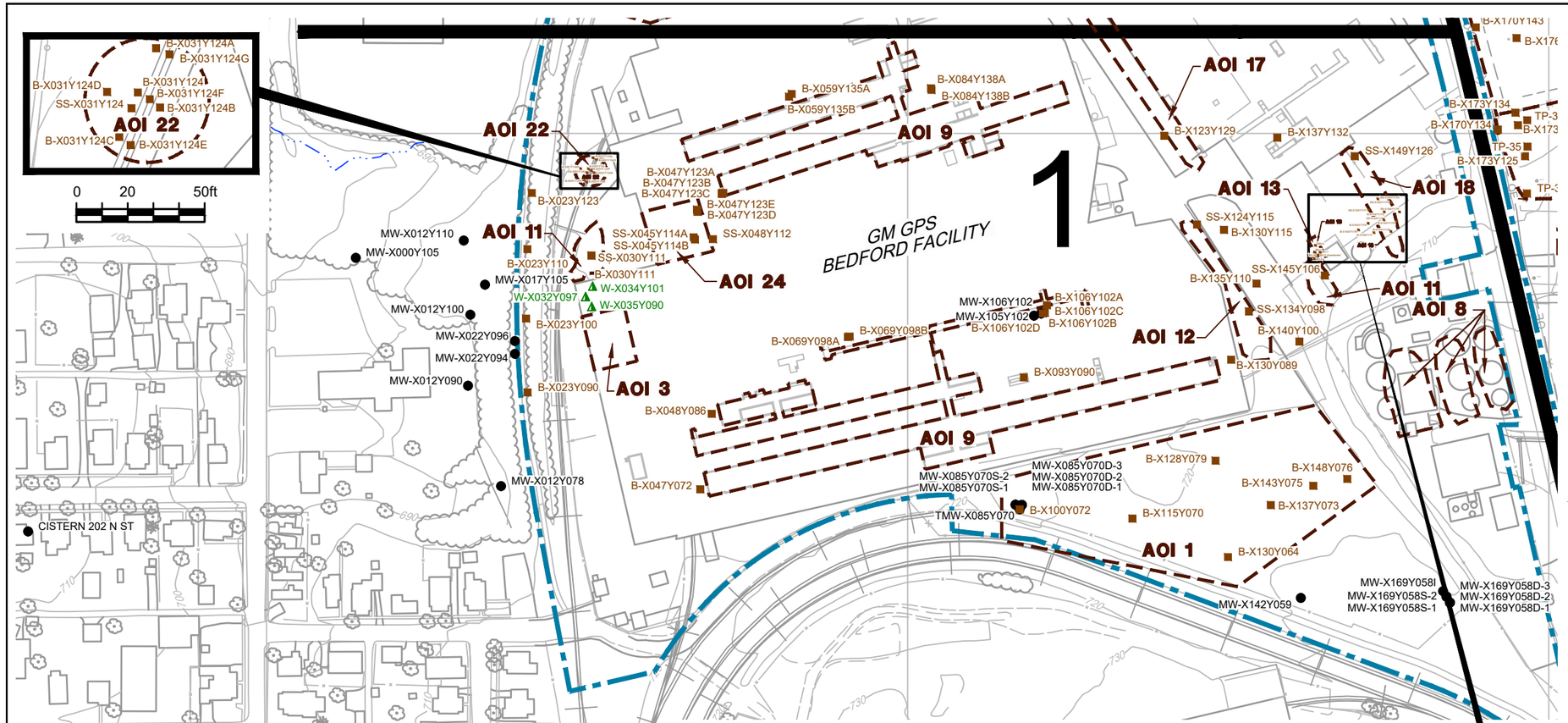
RFI MONITORING WELLS LOCATIONS

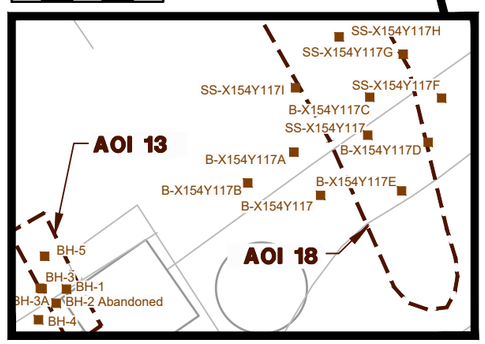
GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2007

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project №: 13968-00	Report №: 267	Drawing №: figure 3.3.2

13968-00(267)GN-WA110 SEP 29/2015





SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

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 FACILITY BOUNDARY
- AOI BOUNDARY
- SOIL BORING LOCATION
- MONITORING WELL AND OPEN COREHOLE LOCATION
- WIPE SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- SEDIMENT 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 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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	Off-Site Suspected Fill Area -Parcel 201
AOI 31	Off-Site Suspected Fill Area -Parcel 400

NOTES:

1) NOT ALL BORING LOCATIONS ARE DEPICTED IN THIS FIGURE. BORINGS LOCATED ON PARCELS 23A, 24, 25, 27, 28A, 28B, 30, 36 TO 39A, 40, 76B, AND 81, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

2) NOT ALL GROUNDWATER SAMPLE LOCATIONS ARE DEPICTED IN THIS FIGURE. LOCATIONS ON PARCELS 13, 14, 18, 28B, 295, 296, 390, 394, AND THE LOCATIONS LISTED BELOW, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

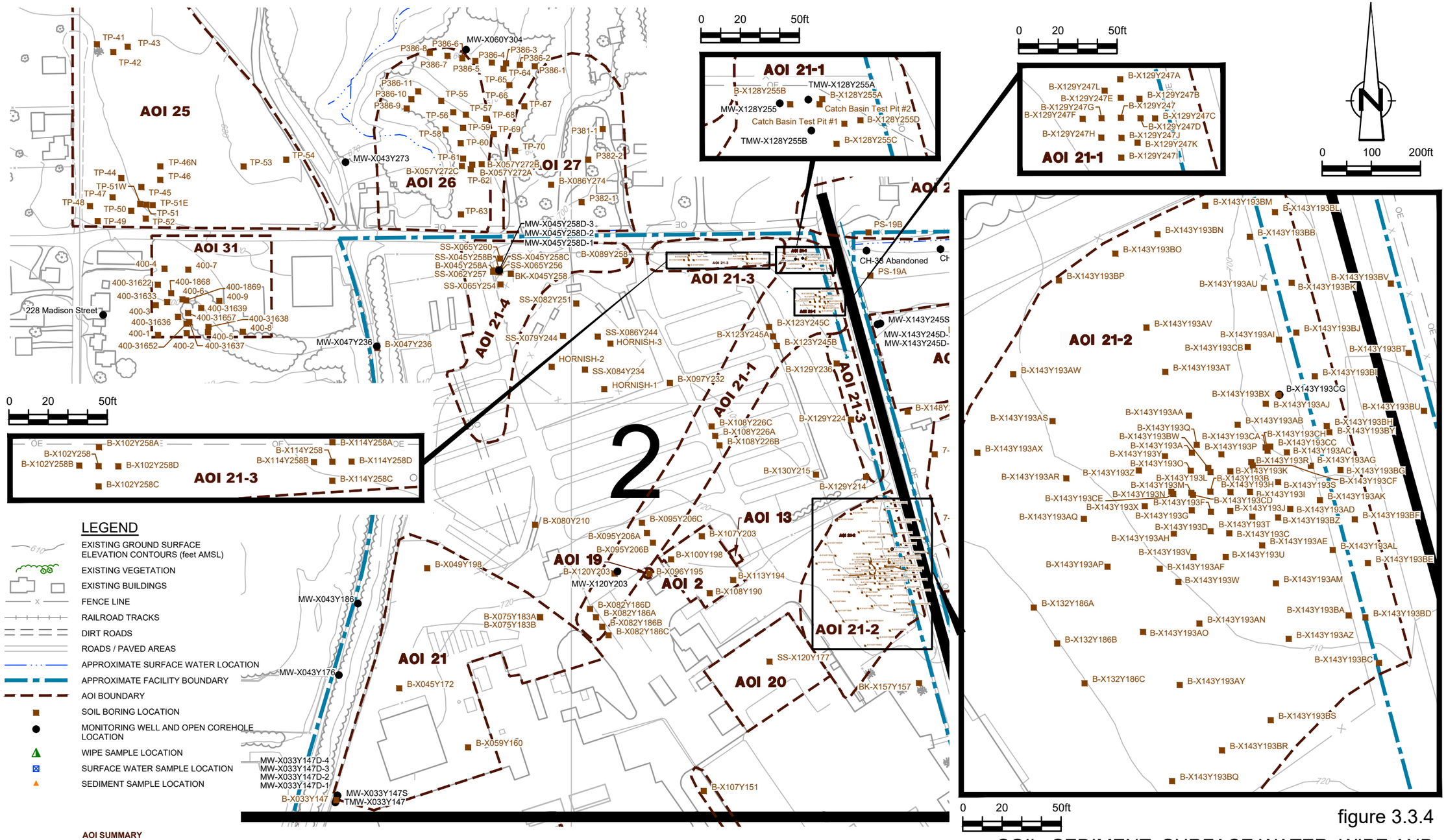
CISTERN 1537 BRECKENRIDGE
412 Peerless Rd
CISTERN 411 L ST
CISTERN 1326 3rd ST
CISTERN 406 J ST
985 Peerless Road
CISTERN 202 N ST
612 E Street
216 Rawlins Mill Road
228 Madison Street

3) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 3.3.3

SOIL, SEDIMENT, SURFACE WATER, WIPE AND GROUNDWATER SAMPLING LOCATIONS - REGION 1
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



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 FACILITY BOUNDARY
- AOI BOUNDARY
- SOIL BORING LOCATION
- MONITORING WELL AND OPEN COREHOLE LOCATION
- WIPE SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION

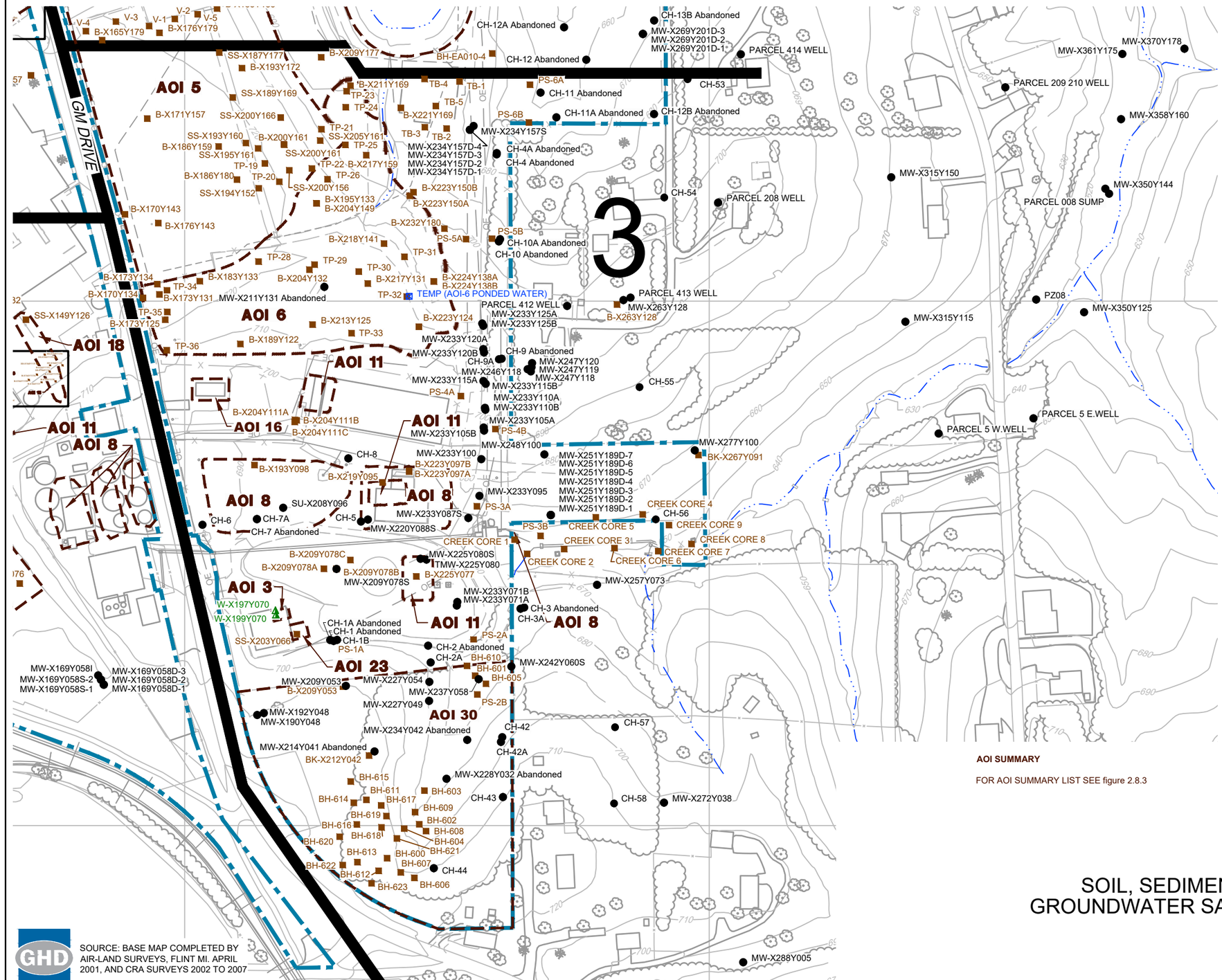
AOI SUMMARY

FOR AOI SUMMARY LIST SEE figure 3.3.3

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

figure 3.3.4

SOIL, SEDIMENT, SURFACE WATER, WIPE AND GROUNDWATER SAMPLING LOCATIONS - REGION 2
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



AOI SUMMARY

FOR AOI SUMMARY LIST SEE figure 2.8.3

NOTES:

1) NOT ALL BORING LOCATIONS ARE DEPICTED IN THIS FIGURE. BORINGS LOCATED ON PARCELS 23A, 24, 25, 27, 28A, 28B, 30, 36 TO 39A, 40, 76B, AND 81, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

2) NOT ALL GROUNDWATER SAMPLE LOCATIONS ARE DEPICTED IN THIS FIGURE. LOCATIONS ON PARCELS 13, 14, 18, 28B, 295, 296, 390, 394, AND THE LOCATIONS LISTED BELOW, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

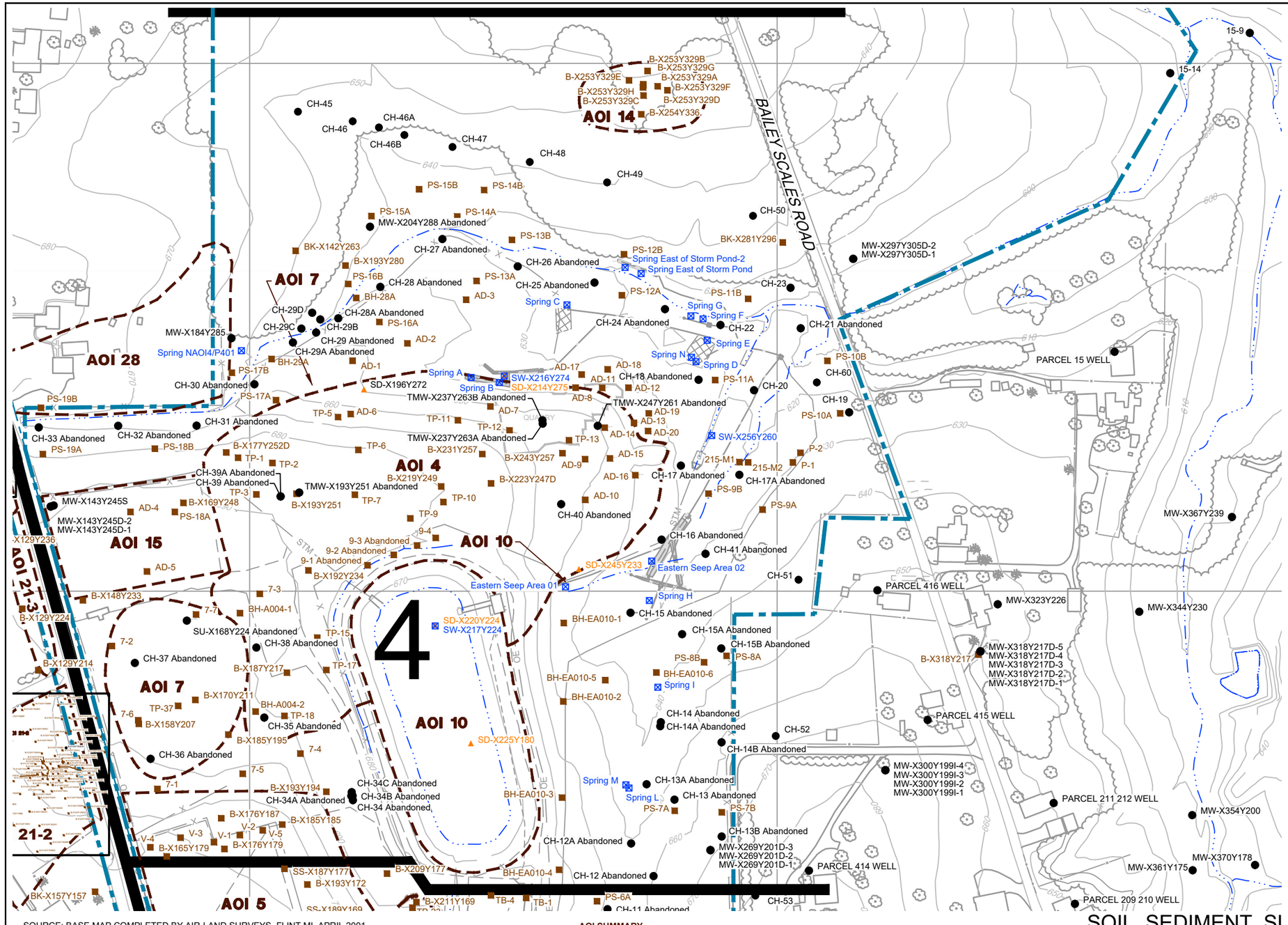
CISTERN 1537 BRECKENRIDGE
412 Peerless Rd
CISTERN 411 L ST
CISTERN 1326 3rd ST
CISTERN 406 J ST
985 Peerless Road
CISTERN 202 N ST
612 E Street
216 Rawlins Mill Road
228 Madison Street

3) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

figure 3.3.5

SOIL, SEDIMENT, SURFACE WATER, WIPE AND GROUNDWATER SAMPLING LOCATIONS - REGION 3
RFI REPORT
GM GPS 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 FACILITY BOUNDARY
- AOI BOUNDARY
- SOIL BORING LOCATION
- MONITORING WELL AND OPEN COREHOLE LOCATION
- WIPE SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION

NOTES:

1) NOT ALL BORING LOCATIONS ARE DEPICTED IN THIS FIGURE. BORINGS LOCATED ON PARCELS 23A, 24, 25, 27, 28A, 28B, 30, 36 TO 39A, 40, 76B, AND 81, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

2) NOT ALL GROUNDWATER SAMPLE LOCATIONS ARE DEPICTED IN THIS FIGURE. LOCATIONS ON PARCELS 13, 14, 18, 28B, 295, 296, 390, 394, AND THE LOCATIONS LISTED BELOW, FALL OUTSIDE THE BOUNDARIES OF THIS FIGURE

CISTERN 1537 BRECKENRIDGE
412 Peerless Rd
CISTERN 411 L ST
CISTERN 1326 3rd ST
CISTERN 406 J ST
985 Peerless Road
CISTERN 202 N ST
612 E Street
216 Rawlins Mill Road
228 Madison Street

3) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

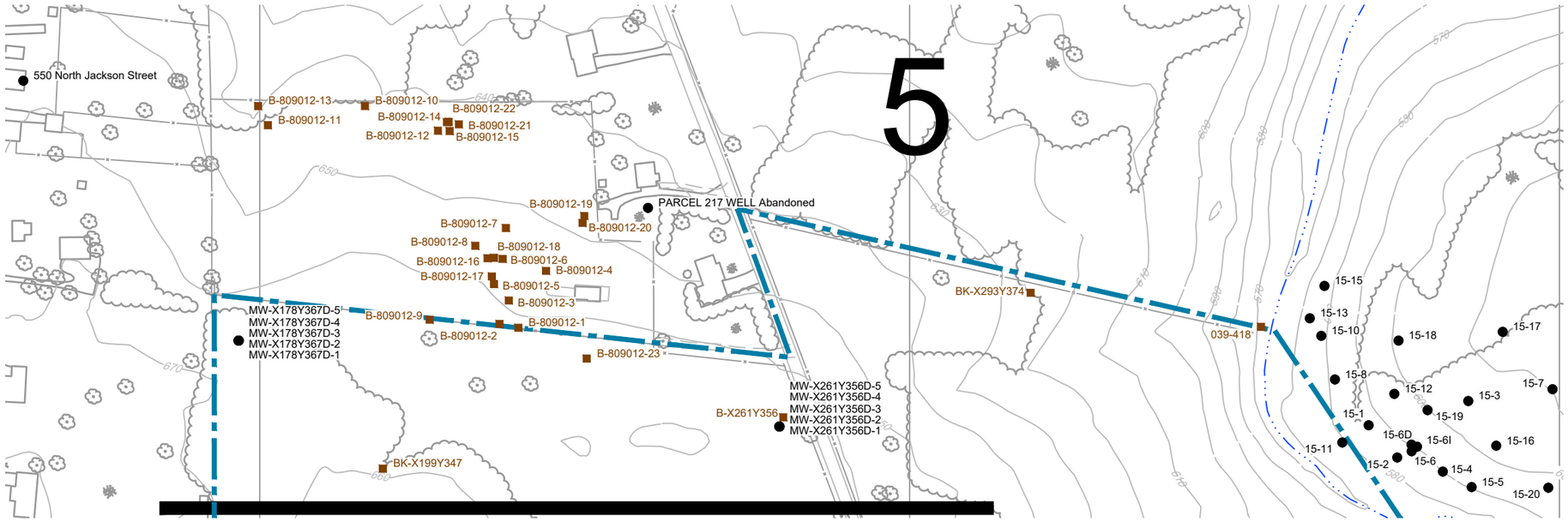
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

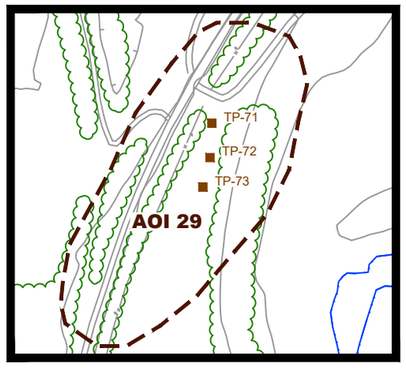
AOI SUMMARY

FOR AOI SUMMARY LIST SEE figure 2.8.3

figure 3.3.6

SOIL, SEDIMENT, SURFACE WATER, WIPE AND GROUNDWATER SAMPLING LOCATIONS - REGION 4
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana





AOI 29 LOCATION
11243 ft NW OF AOI 25

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 FACILITY BOUNDARY
- AOI BOUNDARY
- SOIL BORING LOCATION
- MONITORING WELL AND OPEN COREHOLE LOCATION
- WIPE SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION

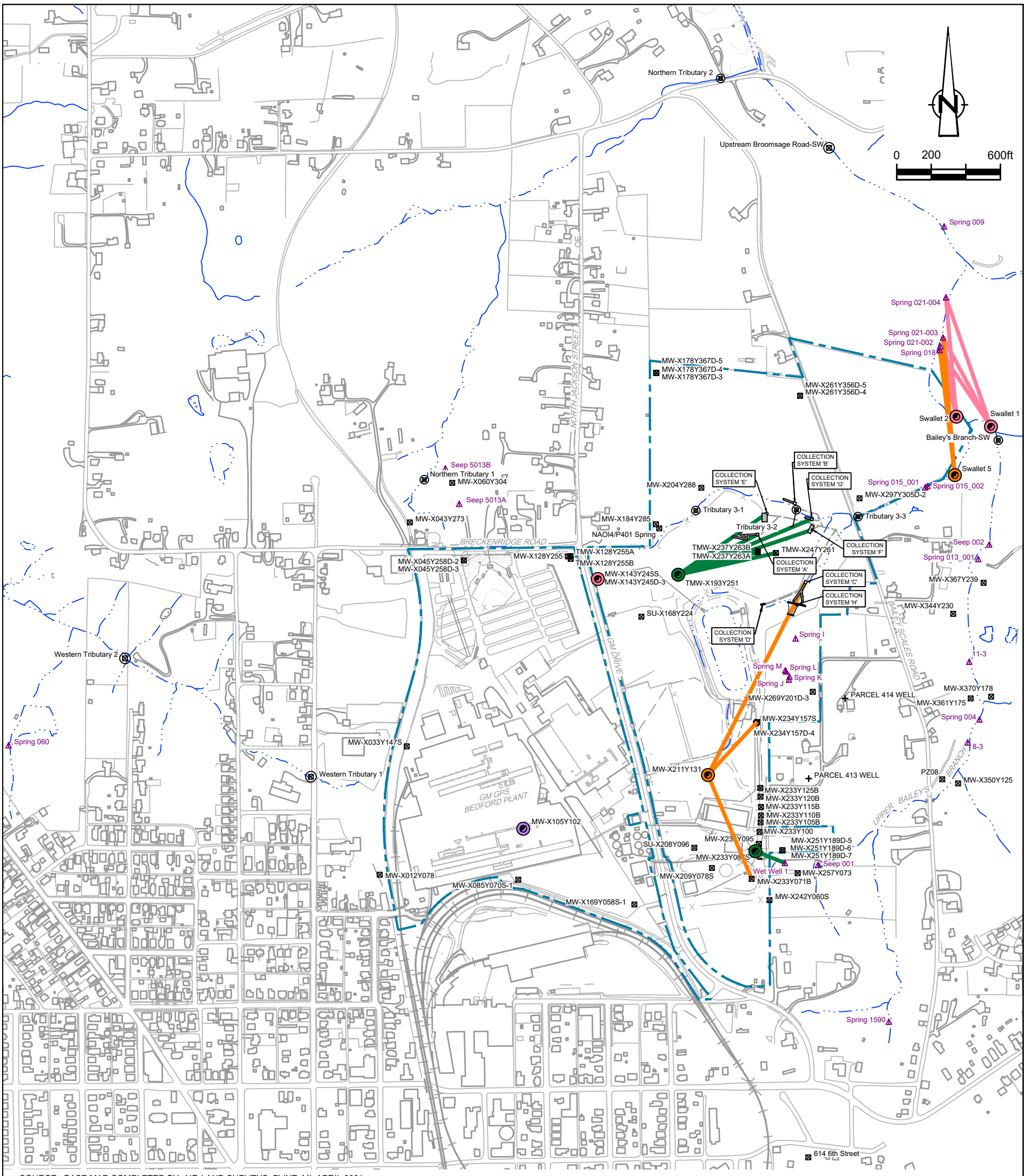
AOI SUMMARY

FOR AOI SUMMARY LIST SEE figure 2.8.3

figure 3.3.7

SOIL, SEDIMENT, SURFACE WATER, WIPE AND GROUNDWATER SAMPLING LOCATIONS - REGION 5
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007



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

LEGEND

- EXISTING BUILDINGS
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- SSC COLLECTION/EXTRACTION TRENCH
- SSC SUMP STRUCTURE
- SPRING SAMPLE LOCATION
- GRAB AND PORT SAMPLE LOCATIONS
- SURFACE WATER SAMPLE LOCATION
- EOSINE DYE INJECTION LOCATION
- FLUORESCEIN DYE INJECTION LOCATION
- PHLOXINE INJECTION WELL
- RHODAMINE DYE INJECTION LOCATION

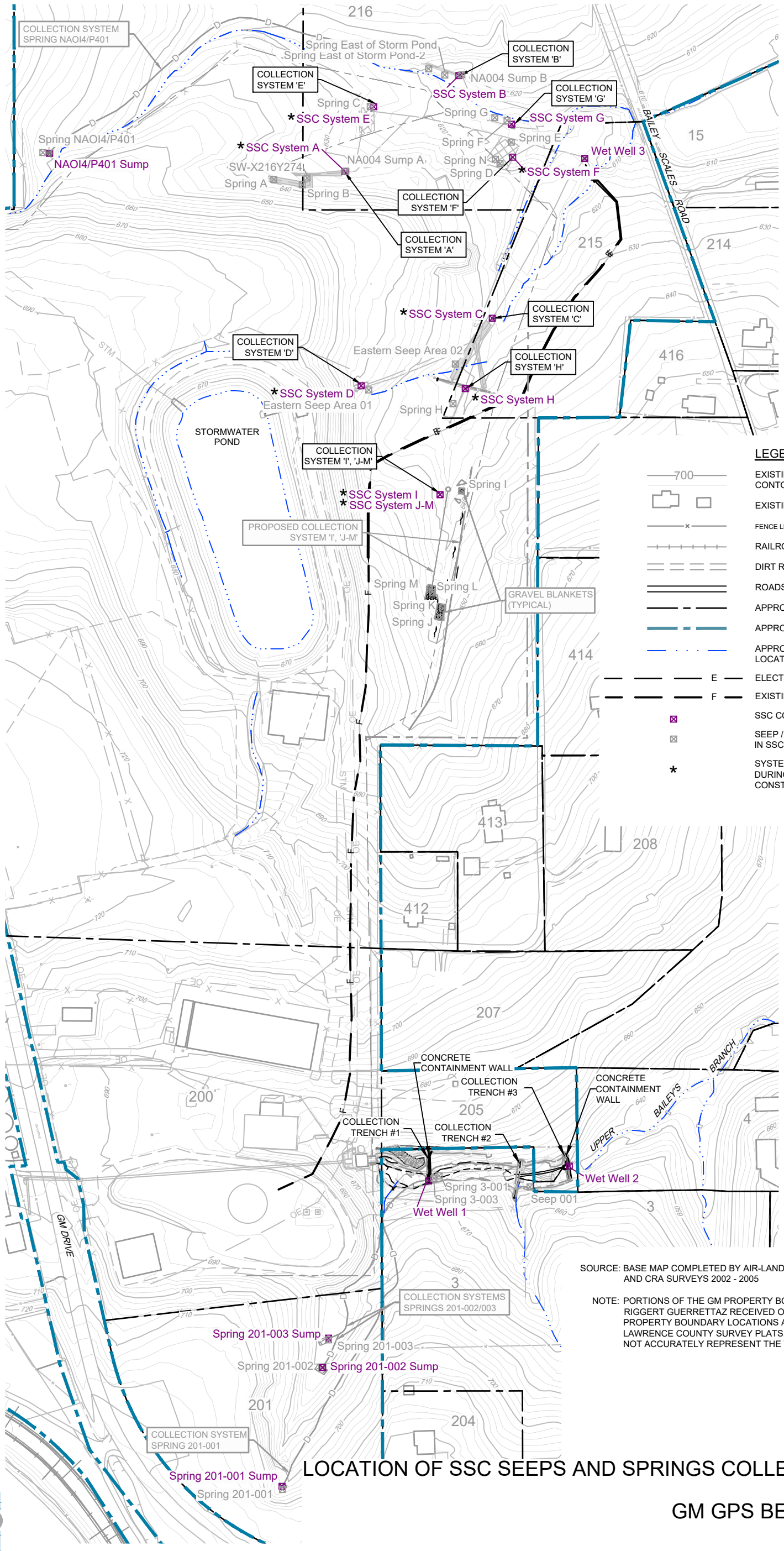
NOTE:

GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 3.4

MONITORING WELL DYE TRACER TESTS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

13968-00(267)GN-WA020 SEP 28/2015



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 - 2005

NOTE: PORTIONS OF THE GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

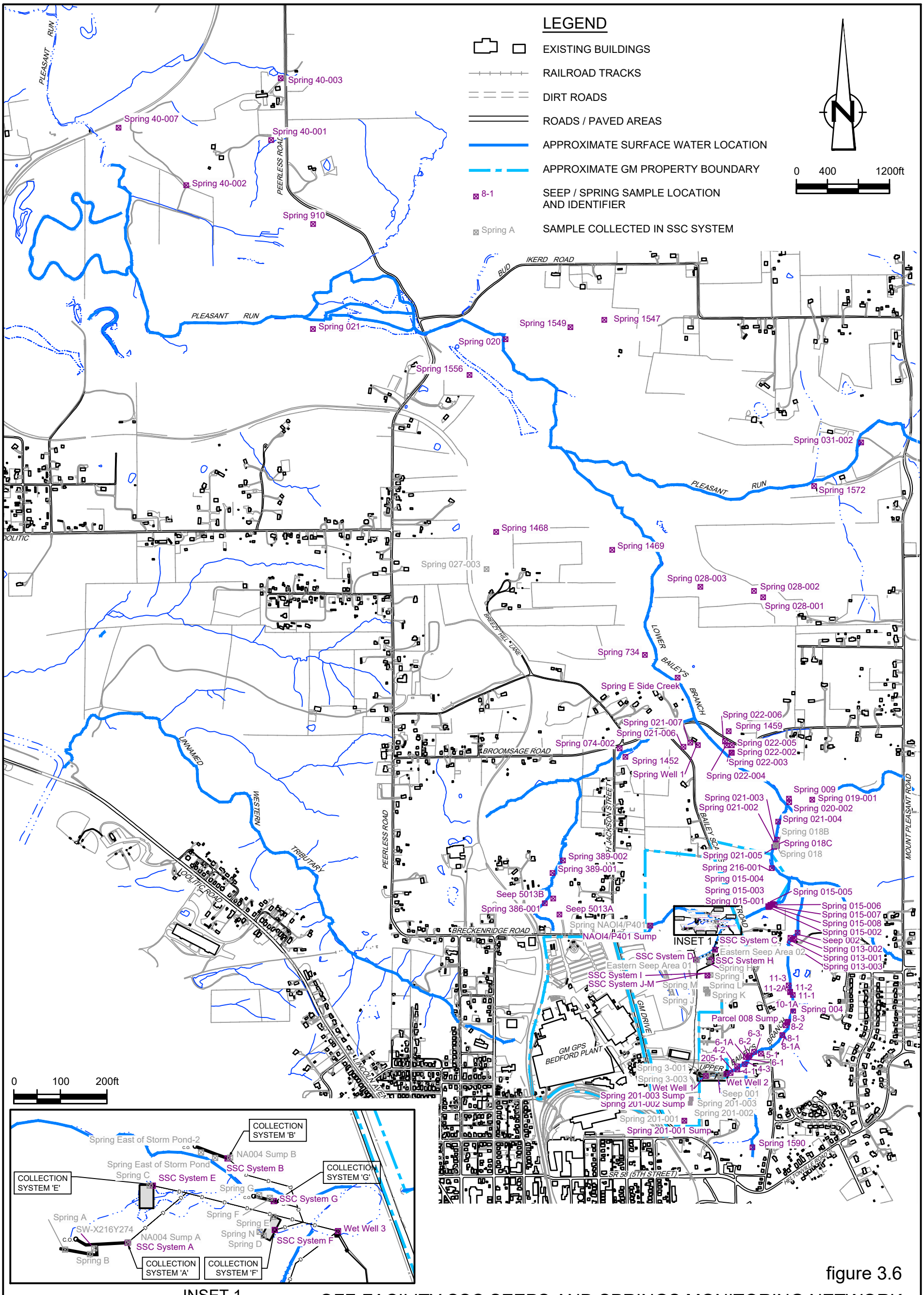
figure 3.5

LOCATION OF SSC SEEPS AND SPRINGS COLLECTION SYSTEMS

RFI REPORT

GM GPS BEDFORD FACILITY

Bedford, Indiana



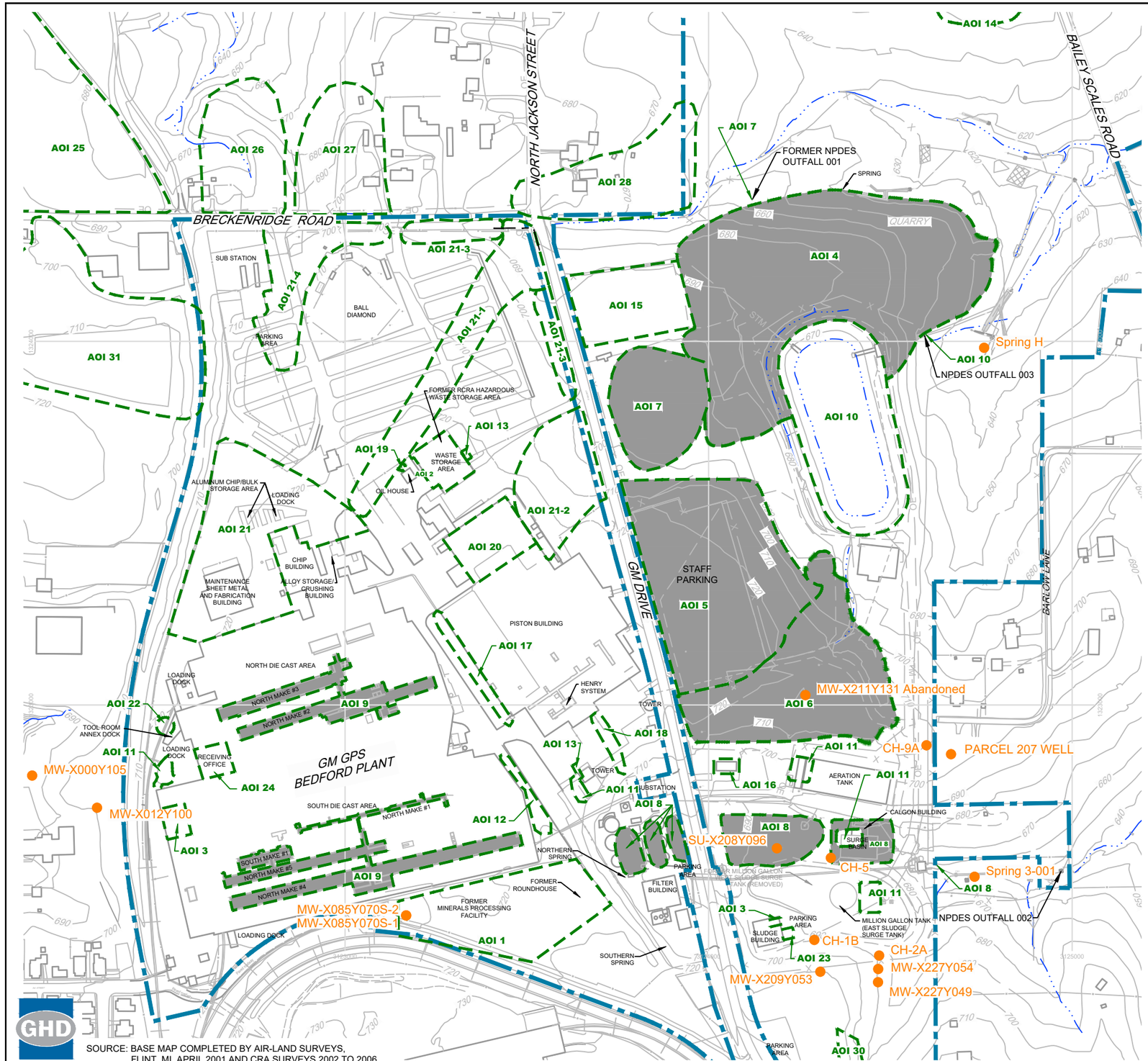
INSET 1

figure 3.6

OFF-FACILITY SSC SEEPS AND SPRINGS MONITORING NETWORK RFI REPORT GM GPS BEDFORD FACILITY

Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2006

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- AOI BOUNDARY
- APPROXIMATE FACILITY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- LOCATION OF DETECTED DNAPL AND/OR PCB-CONTAINING WASTE
- HISTORICAL NAPL PRESENCE

0 100 300ft

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
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AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
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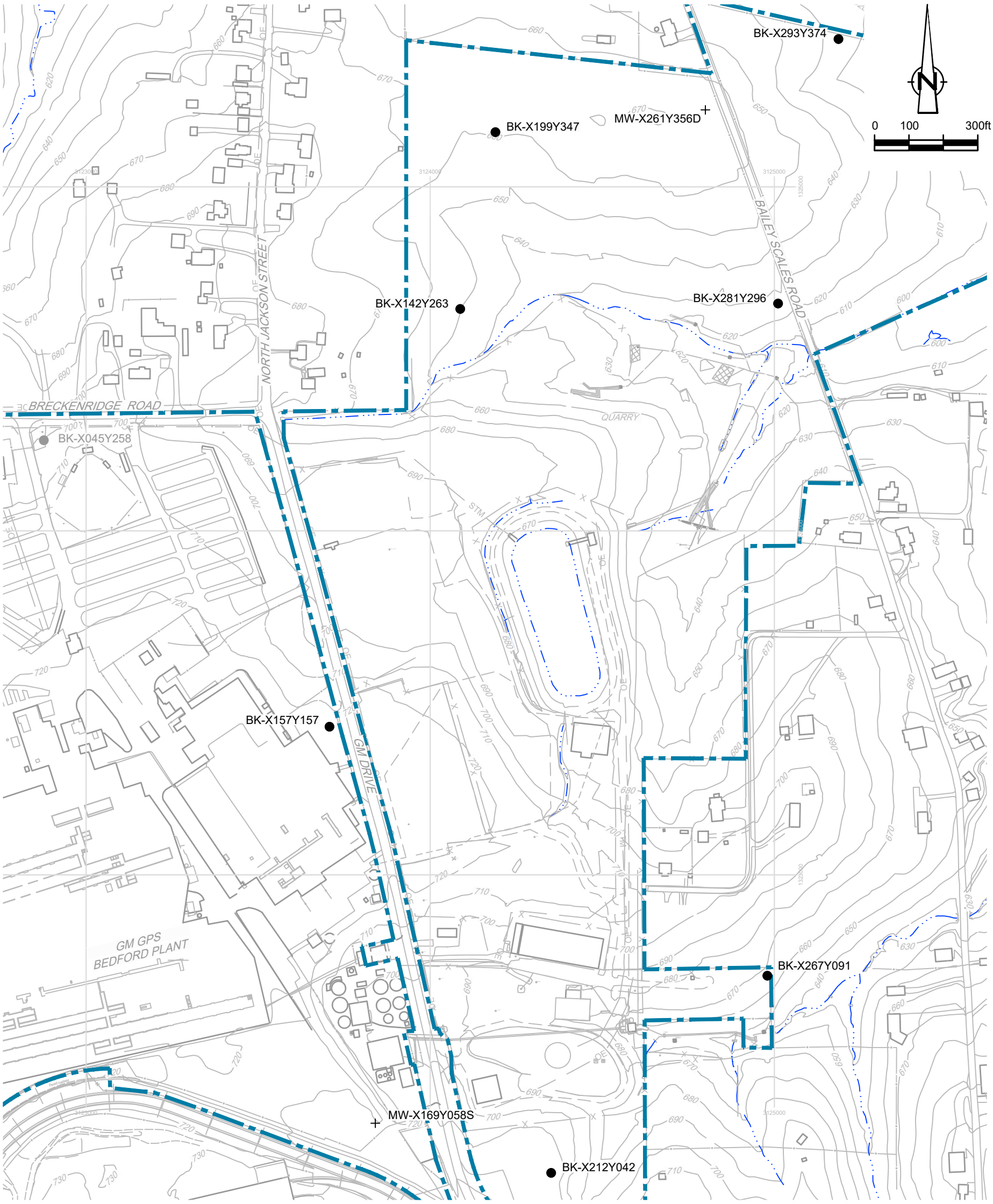
AOI 23	Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 24	Area Affected by the June 2000 Die Lube 5150 Release
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

NOTE: GM PROPERTY BOUNDARY, PARCELS 22, 386 AND 387 BOUNDARY SURVEYS BY BLEDSOE RIGGERT GUERRETTAZ. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

figure 4.1

PCB SOURCE AREAS RFI REPORT GM GPS BEDFORD FACILITY

Bedford, Indiana



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2006

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- APPROXIMATE FACILITY BOUNDARY
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- BK-X045Y258 — BACKGROUND SOIL SAMPLE LOCATION NOT USED
- MW-X261Y356D — MONITORING WELL AND BACKGROUND SOIL SAMPLE LOCATION
- BK-X142Y263 — BACKGROUND SOIL SAMPLE LOCATION

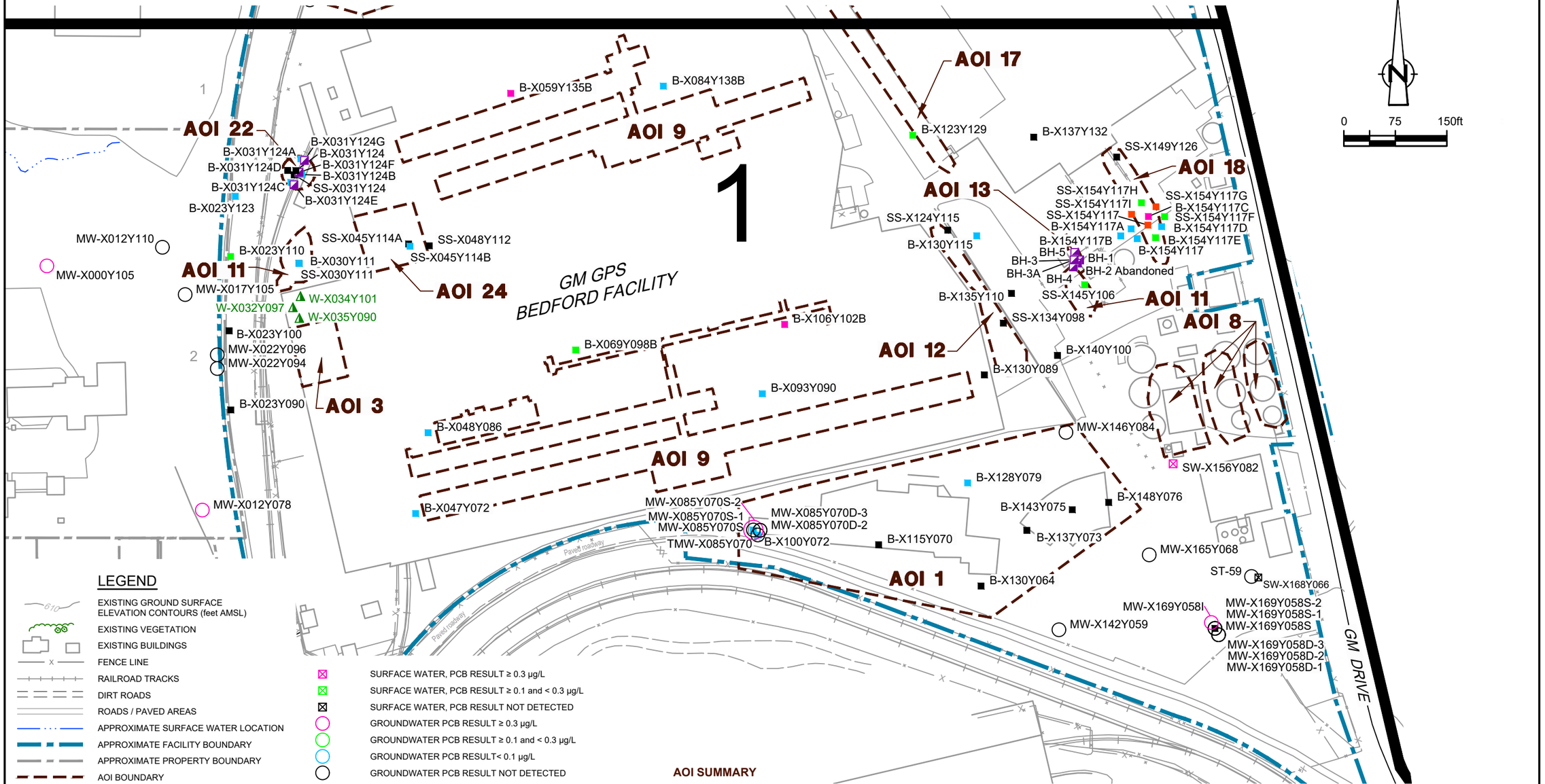
NOTES:

1) GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 6.1

BACKGROUND SOIL SAMPLE LOCATIONS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford Indiana

13968-00(267)GN-WA068 SEP 28/2015



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 FACILITY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- SOIL PCB RESULT ≥ 50 mg/kg
- SOIL PCB RESULT ≥ 10 and < 50 mg/kg
- SOIL PCB RESULT ≥ 1.8 and < 10 mg/kg
- SOIL PCB RESULT < 1.8 mg/kg
- SOIL PCB RESULT NOT DETECTED
- SEDIMENT PCB RESULT ≥ 1 and < 10 mg/kg
- SEDIMENT PCB RESULT < 1 mg/kg
- WIPE SAMPLE PCB RESULT = 0 µg/wipe
- SURFACE WATER, PCB RESULT ≥ 0.3 µg/L
- SURFACE WATER, PCB RESULT ≥ 0.1 and < 0.3 µg/L
- SURFACE WATER, PCB RESULT NOT DETECTED
- GROUNDWATER PCB RESULT ≥ 0.3 µg/L
- GROUNDWATER PCB RESULT ≥ 0.1 and < 0.3 µg/L
- GROUNDWATER PCB RESULT< 0.1 µg/L
- GROUNDWATER PCB RESULT NOT DETECTED
- LIQUID EMULSION/NAPL RESULT ≥ 50 mg/kg
- LIQUID EMULSION/NAPL RESULT ≥ 10 and < 50 mg/kg
- NO PCB SAMPLE

NOTES:
1) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

AOI SUMMARY

AOI ID	Description
AOI 1	Former Railroad Operations and Minerals Processing Facility
AOI 3	PCB Storage Areas
AOI 8	Former South Lagoons and Outfall 002
AOI 9	Service Tunnels
AOI 11	Aboveground Storage Tanks
AOI 12	Area Affected by the Reclaimed Hydraulic Fluid Release
AOI 13	Underground Storage Tanks
AOI 17	Piston Building Oil Accumulations
AOI 18	Area Affected by the Henry System Discharge
AOI 22	Tool Room Annex Dock Release
AOI 24	Area Affected by the June 2000 Die Lube 5150 Release

figure 7.1.1

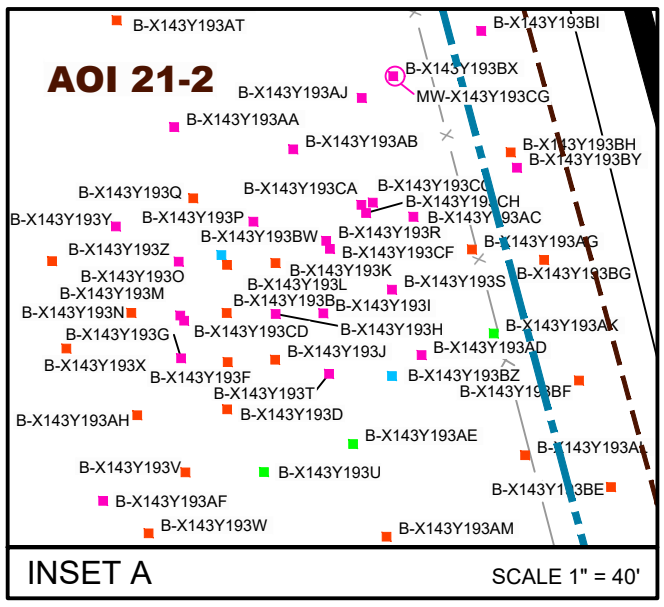
AOIs 1, 3, 8, 9, 11, 12, 13, 17, 18, 22, AND 24
PCB DETECTION SUMMARY - REGION 1
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

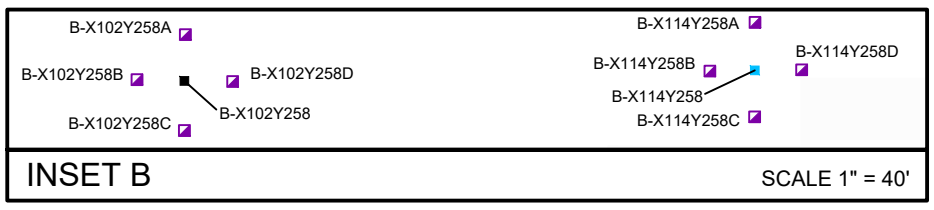
N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA130.dwg Plot Date: MAR 10, 2020

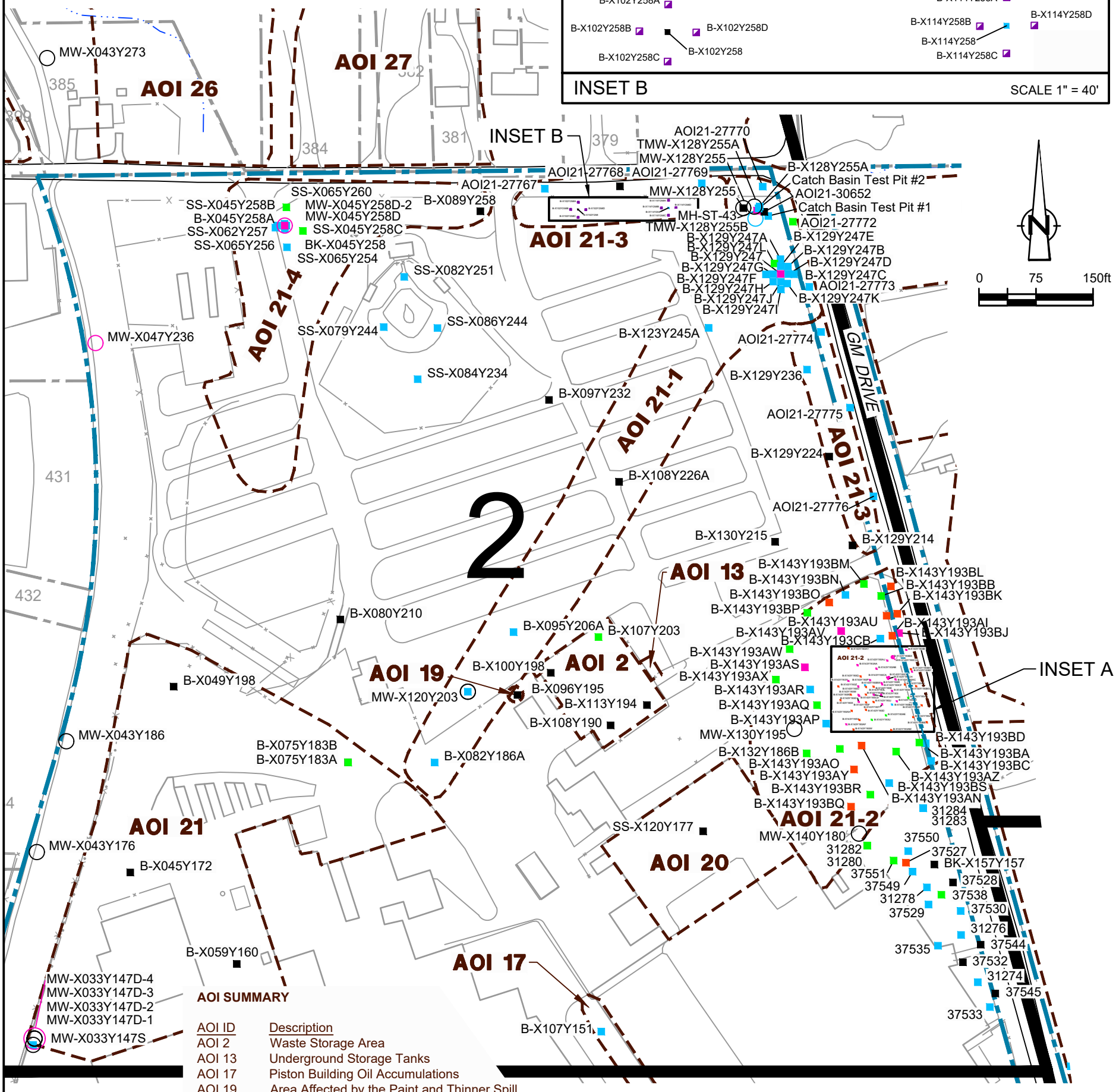
LEGEND

- 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 FACILITY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- SOIL PCB RESULT ≥ 50 mg/kg
- SOIL PCB RESULT ≥ 10 and < 50 mg/kg
- SOIL PCB RESULT ≥ 1.8 and < 10 mg/kg
- SOIL PCB RESULT < 1.8 mg/kg
- SOIL PCB RESULT NOT DETECTED
- SEDIMENT PCB RESULT ≥ 1 and < 10 mg/kg
- SEDIMENT PCB RESULT < 1 mg/kg
- WIPE SAMPLE PCB RESULT = 0 µg/wipe
- SURFACE WATER, PCB RESULT ≥ 0.3 µg/L
- SURFACE WATER, PCB RESULT ≥ 0.1 and < 0.3 µg/L
- SURFACE WATER, PCB RESULT NOT DETECTED
- GROUNDWATER PCB RESULT ≥ 0.3 µg/L
- GROUNDWATER PCB RESULT ≥ 0.1 and < 0.3 µg/L
- GROUNDWATER PCB RESULT< 0.1 µg/L
- GROUNDWATER PCB RESULT NOT DETECTED
- LIQUID EMULSION/NAPL RESULT ≥ 50 mg/kg
- LIQUID EMULSION/NAPL RESULT ≥ 10 and < 50 mg/kg
- NO PCB SAMPLE

NOTES:
1) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.
2) COORDINATES WERE NOT AVAILABLE FOR SAMPLE LOCATION CB-ST-3.







AOI SUMMARY

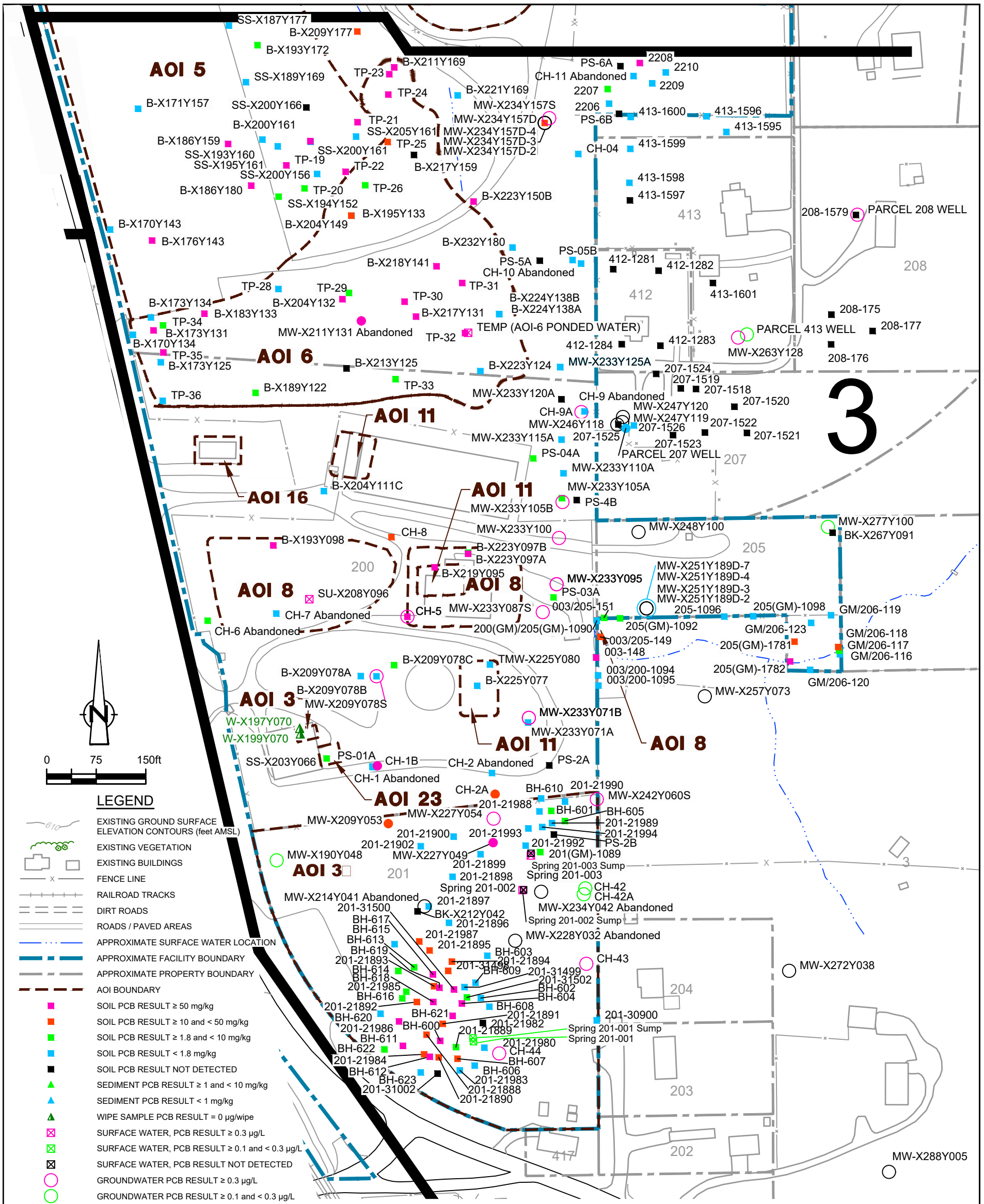
AOI ID	Description
AOI 2	Waste Storage Area
AOI 13	Underground Storage Tanks
AOI 17	Piston Building Oil Accumulations
AOI 19	Area Affected by the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

figure 7.1.2

AOIs 2, 13, 17, 19, 20, 21, 21-1, 21-2, 21-3, AND 21-4
PCB DETECTION SUMMARY - REGION 2
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA130.dwg Plot Date: MAR 10, 2020



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 FACILITY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY
- SOIL PCB RESULT ≥ 50 mg/kg
- SOIL PCB RESULT ≥ 10 and < 50 mg/kg
- SOIL PCB RESULT ≥ 1.8 and < 10 mg/kg
- SOIL PCB RESULT < 1.8 mg/kg
- SOIL PCB RESULT NOT DETECTED
- SEDIMENT PCB RESULT ≥ 1 and < 10 mg/kg
- SEDIMENT PCB RESULT < 1 mg/kg
- WIPE SAMPLE PCB RESULT = 0 µg/wipe
- SURFACE WATER, PCB RESULT ≥ 0.3 µg/L
- SURFACE WATER, PCB RESULT ≥ 0.1 and < 0.3 µg/L
- SURFACE WATER, PCB RESULT NOT DETECTED
- GROUNDWATER PCB RESULT ≥ 0.3 µg/L
- GROUNDWATER PCB RESULT ≥ 0.1 and < 0.3 µg/L
- GROUNDWATER PCB RESULT< 0.1 µg/L
- GROUNDWATER PCB RESULT NOT DETECTED
- LIQUID EMULSION/NAPL RESULT ≥ 50 mg/kg
- LIQUID EMULSION/NAPL RESULT ≥ 10 and < 50 mg/kg
- LIQUID EMULSION/NAPL RESULT < 0.1 mg/kg
- NO PCB SAMPLE

AOI SUMMARY

AOI ID	Description
AOI 3	PCB Storage Areas
AOI 5	Former East Sand Disposal Area
AOI 6	Former Sludge Disposal and Fire Training Area
AOI 8	Former South Lagoons and Outfall 002
AOI 11	Aboveground Storage Tanks
AOI 16	Former East Electrical Substation
AOI 23	Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 30	Off-Site Suspected Fill Area -Parcel 201

NOTES:
1) DETECTIONS SHOWN INCLUDE STREAM INVESTIGATION LOCATIONS BUT DO NOT REFLECT REMOVAL ACTION VERIFICATION SAMPLES COLLECTED.
2) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES.
3) COORDINATES WERE NOT AVAILABLE FOR SAMPLE LOCATION AOI11-4537.

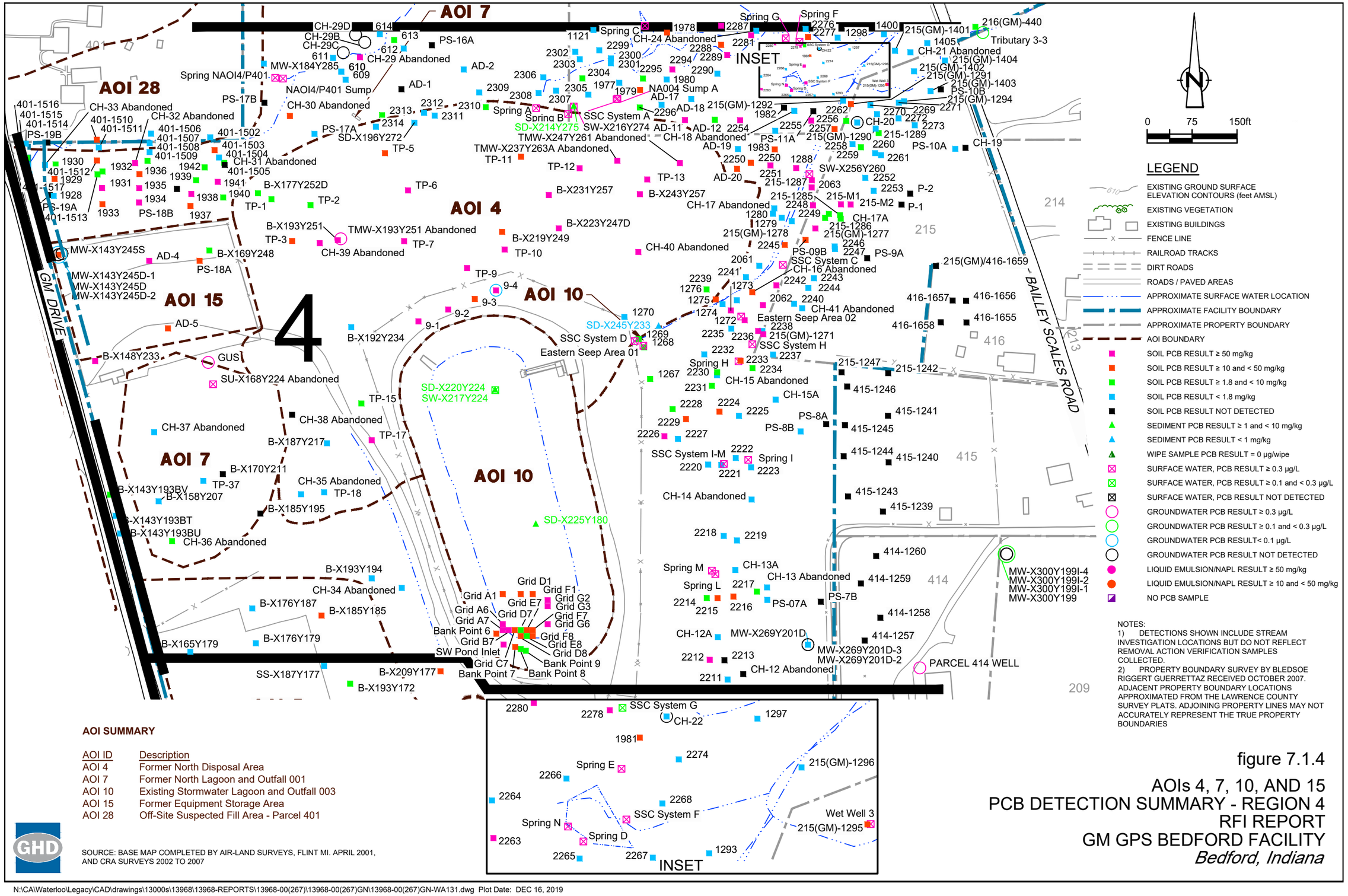
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

figure 7.1.3

AOIs 3, 5, 6, 8, 11, 16, 23, AND 30 PCB DETECTION SUMMARY - REGION 3 RFI REPORT GM GPS BEDFORD FACILITY

Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA130.dwg Plot Date: MAR 10, 2020



NOTES:
1) DETECTIONS SHOWN INCLUDE STREAM INVESTIGATION LOCATIONS BUT DO NOT REFLECT REMOVAL ACTION VERIFICATION SAMPLES COLLECTED.
2) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

AOI SUMMARY

AOI ID	Description
AOI 4	Former North Disposal Area
AOI 7	Former North Lagoon and Outfall 001
AOI 10	Existing Stormwater Lagoon and Outfall 003
AOI 15	Former Equipment Storage Area
AOI 28	Off-Site Suspected Fill Area - Parcel 401

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

figure 7.1.4

AOIs 4, 7, 10, AND 15 PCB DETECTION SUMMARY - REGION 4 RFI REPORT GM GPS BEDFORD FACILITY

Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA131.dwg Plot Date: DEC 16, 2019

MW-X178Y367D-3
MW-X178Y367D-2
MW-X178Y367D

BK-X199Y347

5

B-X261Y356
MW-X261Y356D-3
MW-X261Y356D

B-X253Y329H
AOI 14
B-X254Y336

216

BAILLEY SCALES ROAD

BK-X293Y374

15

021-1116
216-413
216-414
216(GM)-1115
216-411
216-412
216-407
607
216-409
216-408
216-410
015/GM-403
2093
216-405
602
216-406
603
015/GM-402
015-1114
600
601
015/216-483
216(GM)-482
GM/015-484
2069
GM/015-478
606
216(GM)-474
GM/015-475
216(GM)-469
216(GM)-470
216(GM)-464
604
605
216(GM)-459
216(GM)-465
216(GM)-460
216(GM)-454
216(GM)-449
2065
216(GM)-455
216(GM)-450
216(GM)-444
2064
216(GM)-445
216(GM)-439
216(GM)-440
Tributary 3-3

216

15

BK-X281Y296
MW-X297Y305D-2
1407
CH-23
1406
1299

PS-15B
2321
628
PS-14B
2323
2319
627
2317
633
624
2322
623
2324
PS-15A
PS-14A
632
626
2318
2315
638
MW-X204Y288 Abandoned
622
2072
2071
2320
631
2325
621
625
PS-13B
637
BK-X142Y263
2326
2070
636
2291
619
2327
630
2297
2316
B-X193Y280
620
CH-26 Abandoned
2292
635
618
CH-27 Abandoned
629
2293
634
617
CH-28 Abandoned
PS-13A
2298
PS-16B
616
AD-3
615
Spring C
SSC System E
2286
2287
2275
PS-12A
2283
2285
2284
2282
2279
PS-11B
CH-25 Abandoned
CH-25 Abandoned
PS-12B
Spring East of Storm Pond-2
Spring East of Storm Pond
NA004 Sump B
SSC System B

0 75 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 FACILITY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- AOI BOUNDARY

- SOIL PCB RESULT ≥ 50 mg/kg
- SOIL PCB RESULT ≥ 10 and < 50 mg/kg
- SOIL PCB RESULT ≥ 1.8 and < 10 mg/kg
- SOIL PCB RESULT < 1.8 mg/kg
- SOIL PCB RESULT NOT DETECTED
- SEDIMENT PCB RESULT ≥ 1 and < 10 mg/kg
- SEDIMENT PCB RESULT < 1 mg/kg
- WIPE SAMPLE PCB RESULT = 0 µg/wipe
- SURFACE WATER, PCB RESULT ≥ 0.3 µg/L
- SURFACE WATER, PCB RESULT ≥ 0.1 and < 0.3 µg/L
- SURFACE WATER, PCB RESULT NOT DETECTED
- GROUNDWATER PCB RESULT ≥ 0.3 µg/L
- GROUNDWATER PCB RESULT ≥ 0.1 and < 0.3 µg/L
- GROUNDWATER PCB RESULT< 0.1 µg/L
- GROUNDWATER PCB RESULT NOT DETECTED
- LIQUID EMULSION/NAPL RESULT ≥ 50 mg/kg
- LIQUID EMULSION/NAPL RESULT ≥ 10 and < 50 mg/kg
- NO PCB SAMPLE

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001, AND CRA SURVEYS 2002 TO 2007

AOI SUMMARY

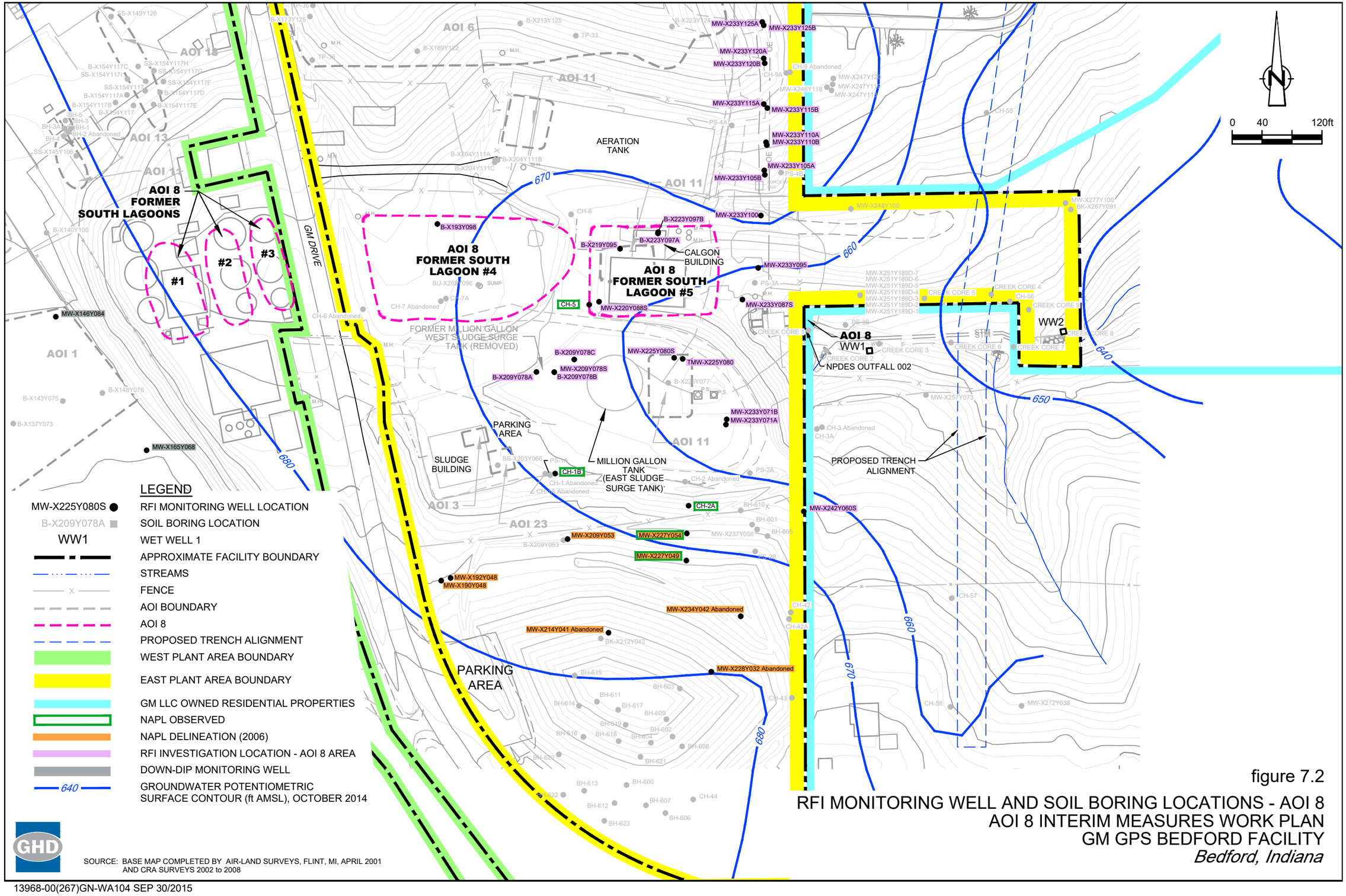
AOI ID	Description
AOI 14	McBride Cows Disposal Area

NOTES:
1) DETECTIONS SHOWN INCLUDE STREAM INVESTIGATION LOCATIONS BUT DO NOT REFLECT REMOVAL ACTION VERIFICATION SAMPLES COLLECTED.
2) PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 7.1.5

AOI 14
PCB DETECTION SUMMARY - REGION 5
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA130.dwg Plot Date: MAR 10, 2020



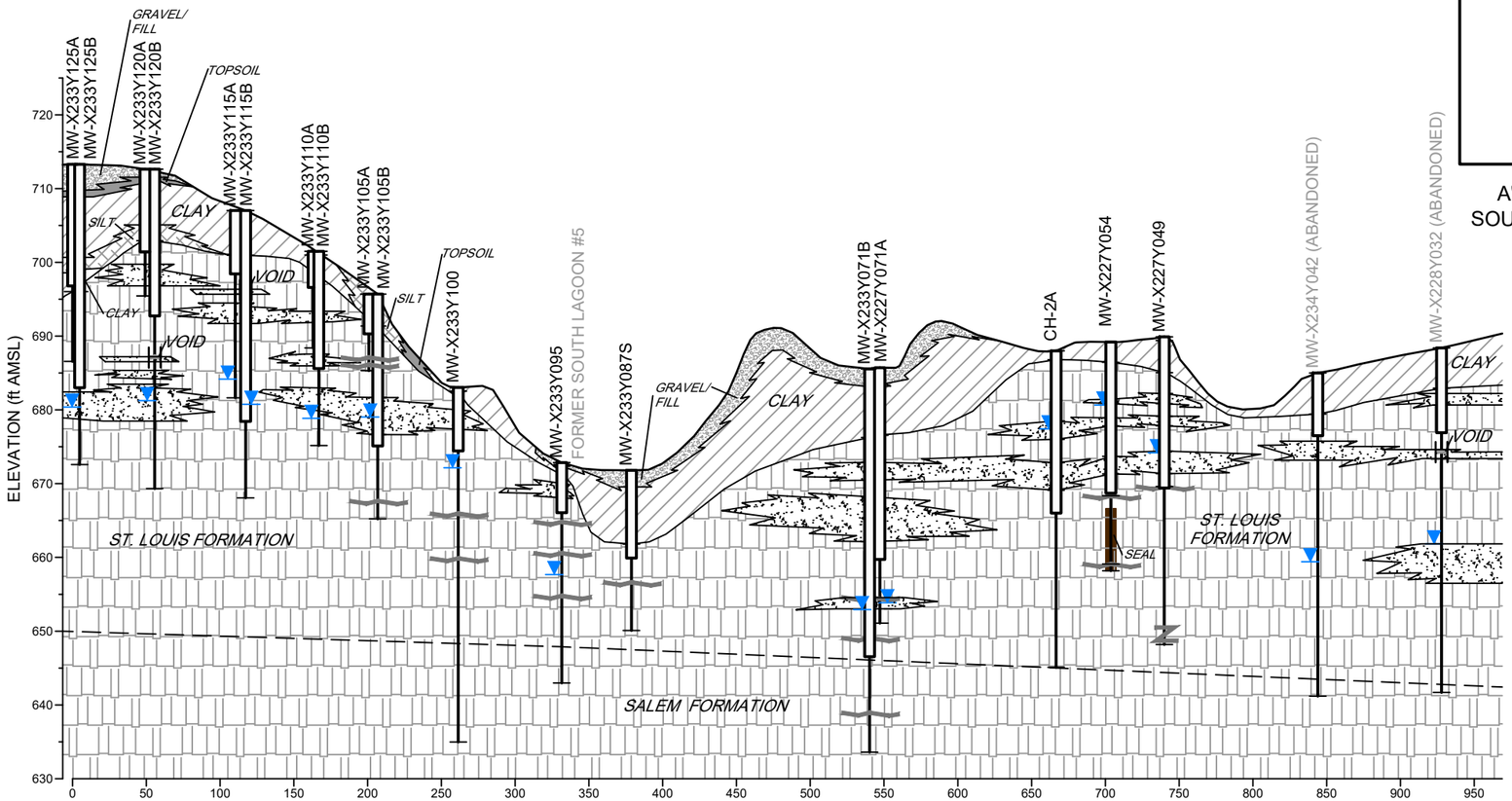
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001
AND CRA SURVEYS 2002 to 2008

figure 7.2

RFI MONITORING WELL AND SOIL BORING LOCATIONS - AOI 8
AOI 8 INTERIM MEASURES WORK PLAN
GM GPS BEDFORD FACILITY
Bedford, Indiana

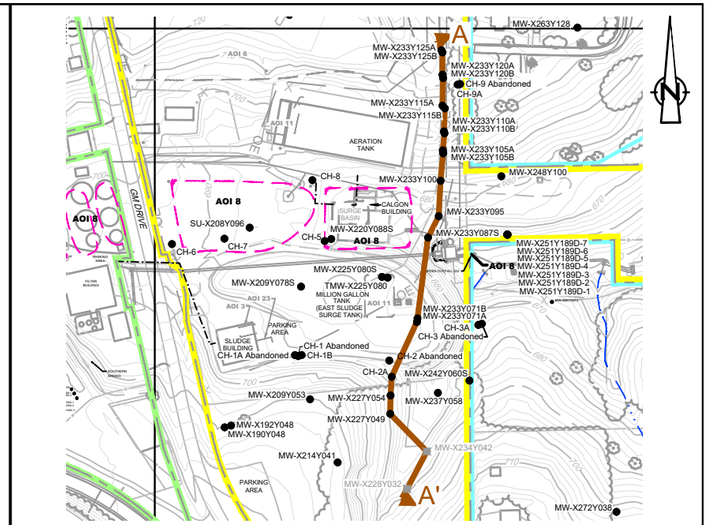
13968-00(267)GN-WA104 SEP 30/2015

A
NORTH



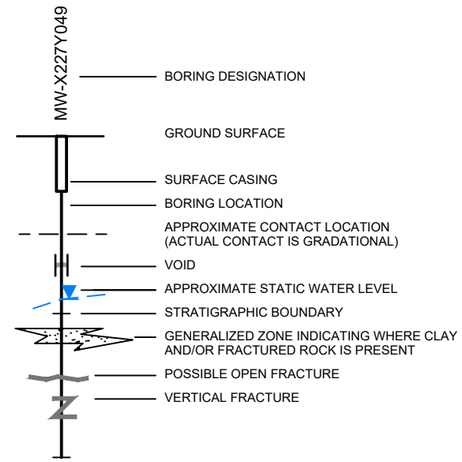
DISTANCE (ft)

SCALE: HORIZONTAL 1" = 100'
VERTICAL, 1" = 20'



KEY MAP

A'
SOUTH



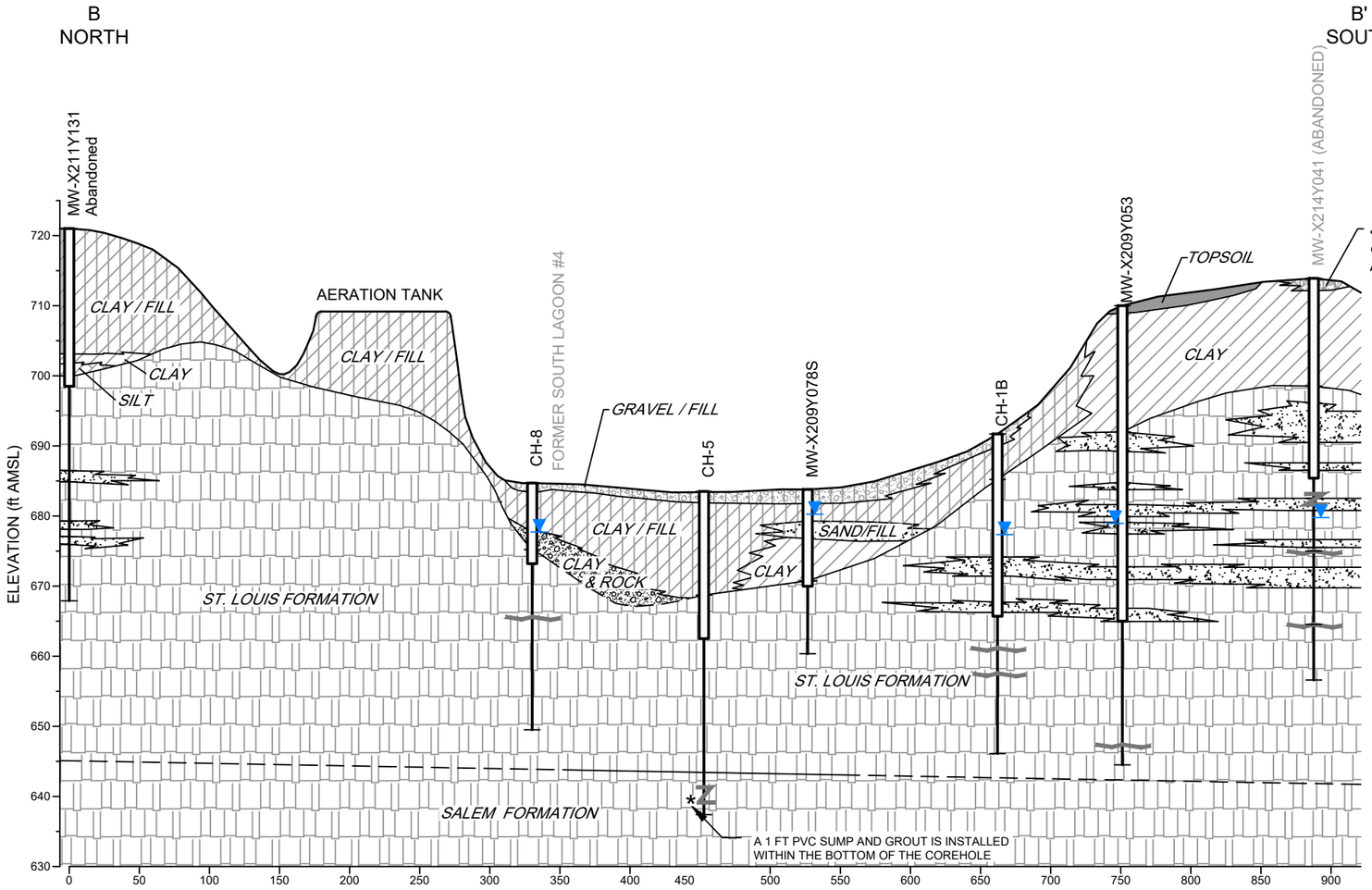
NOTE:
1) LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT (DASHED WHERE INFERRED).

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

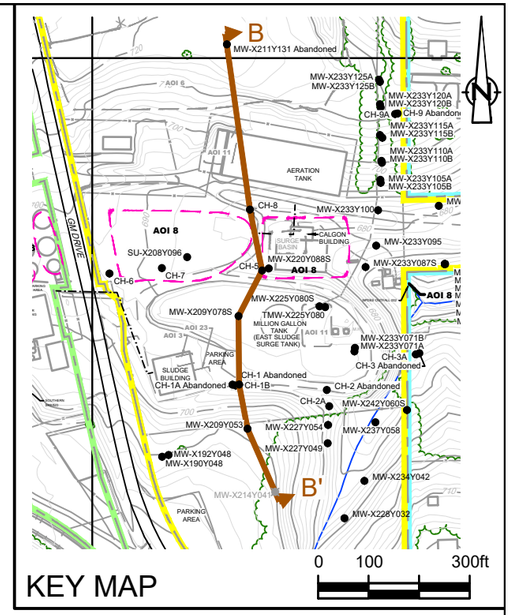
figure 7.3

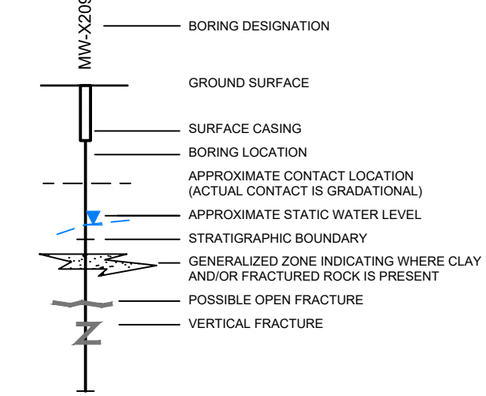
AOI 8 OVERBURDEN GEOLOGIC CROSS-SECTION A-A'
AOI 8 INTERIM MEASURES WORK PLAN
GM CET BEDFORD FACILITY
Bedford, Indiana

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA105.DWG Plot Date: DEC 16, 2019



SCALE: HORIZONTAL 1" = 100'
VERTICAL, 1" = 20'





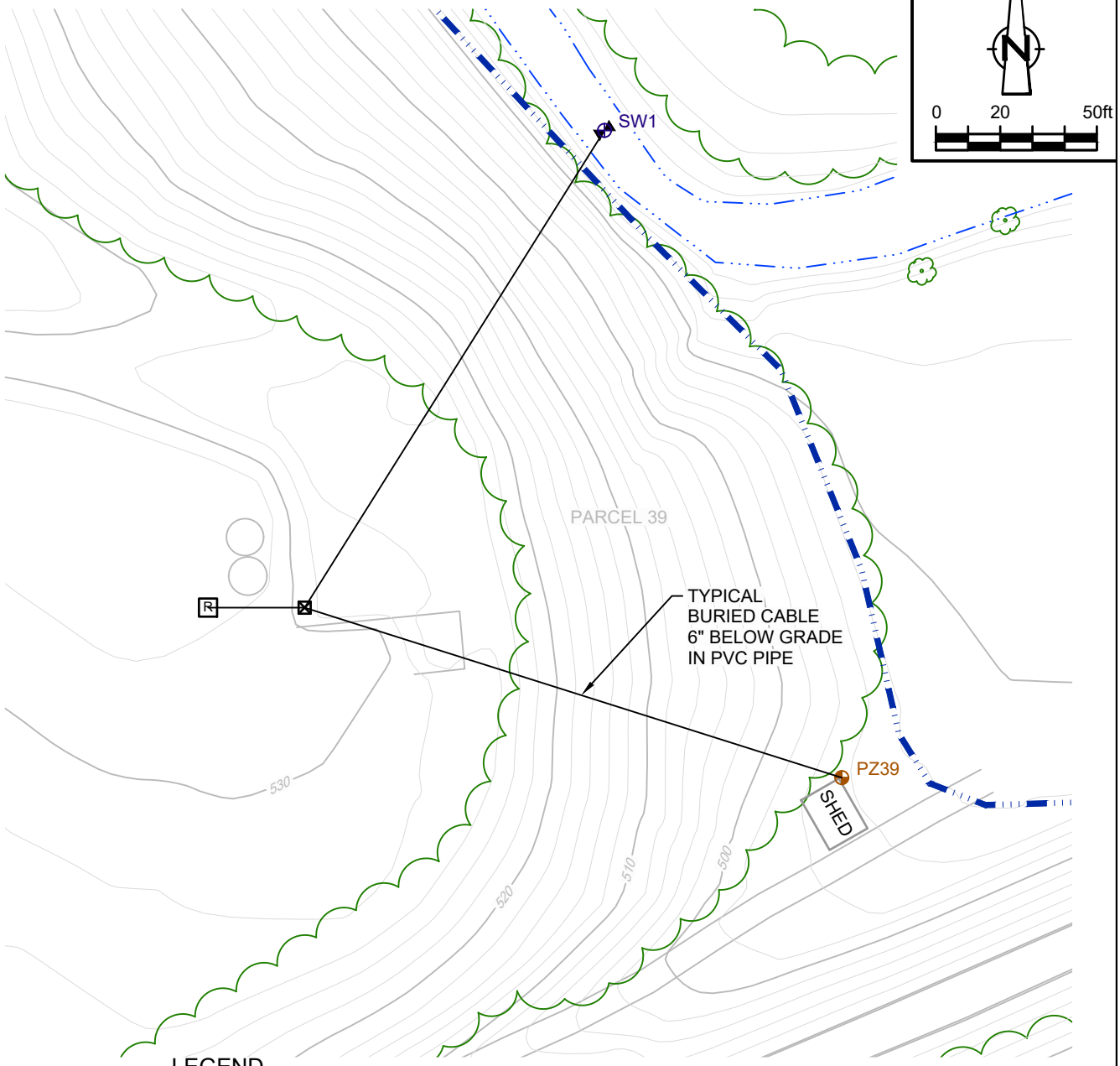
NOTE:
1) LIMESTONE FORMATION CONTACTS MAY REPRESENT GRADATIONAL CHANGES AND AS SHOWN ON THIS FIGURE ARE APPROXIMATIONS OF THE ACTUAL FORMATION CONTACT (DASHED WHERE INFERRED).

figure 7.4

AOI 8 OVERBURDEN GEOLOGIC CROSS-SECTION B-B'
AOI 8 INTERIM MEASURES WORK PLAN
GM GPS BEDFORD FACILITY
Bedford, Indiana

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2005

N:\CA\Waterloo\Legacy\CAD\drawings\13000s\13968\13968-REPORTS\13968-00(267)\13968-00(267)GN\13968-00(267)GN-WA106.DWG Plot Date: DEC 16, 2019



LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) (610)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- ESTIMATED FLOODLINE
- PIEZOMETER LOCATION
- DATA LOGGER
- APPROXIMATE STREAM MONITORING LOCATION
- STREAM FLOW SENSORS
- RAIN GAUGE

figure 7.5

SW1 STREAM MONITORING LOCATON
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

13968-00(267)GN-WA078 SEP 25/2015

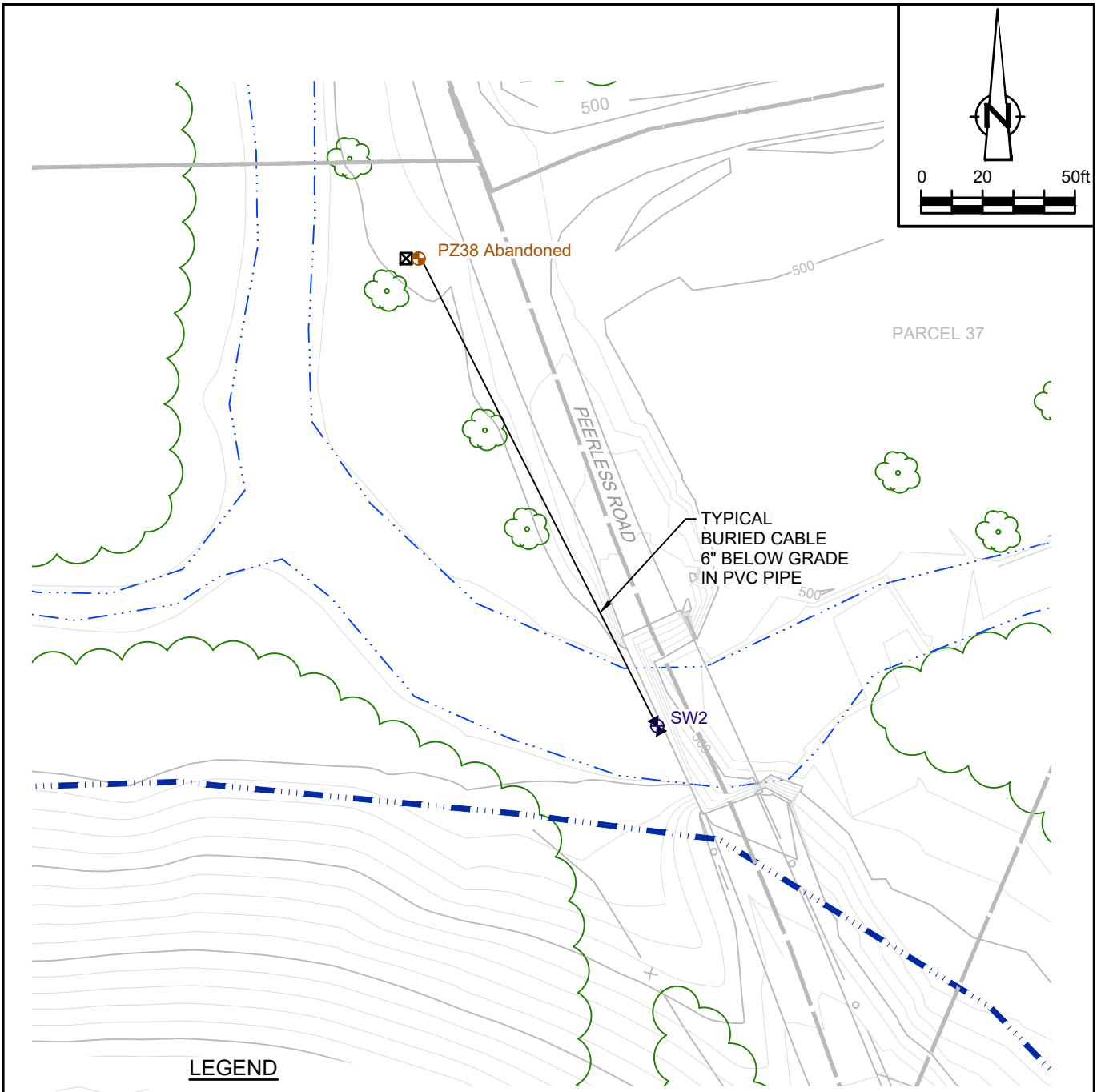
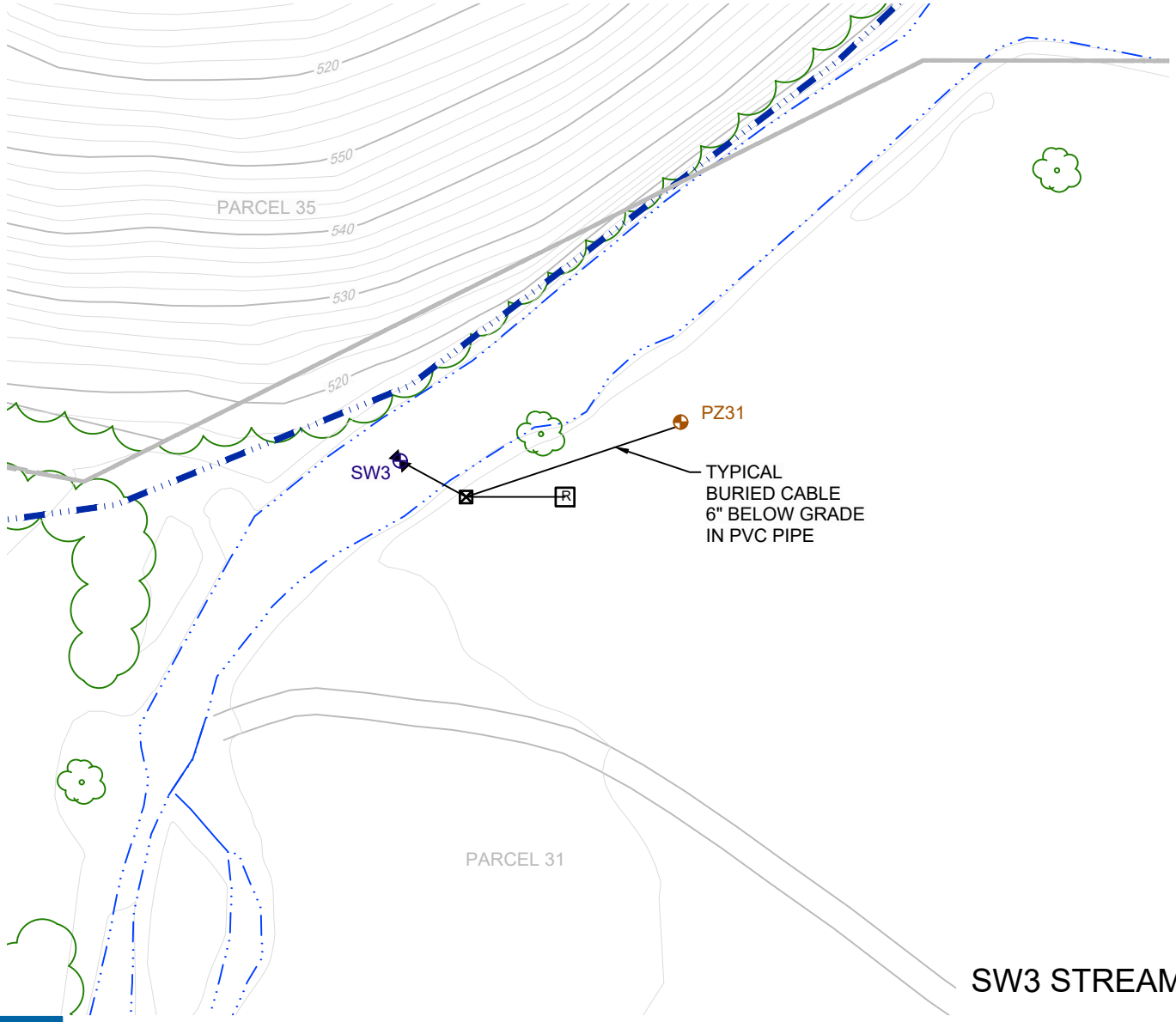


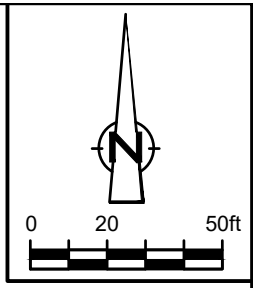
figure 7.6

SW2 STREAM MONITORING LOCATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

13968-00(267)GN-WA078 SEP 25/2015



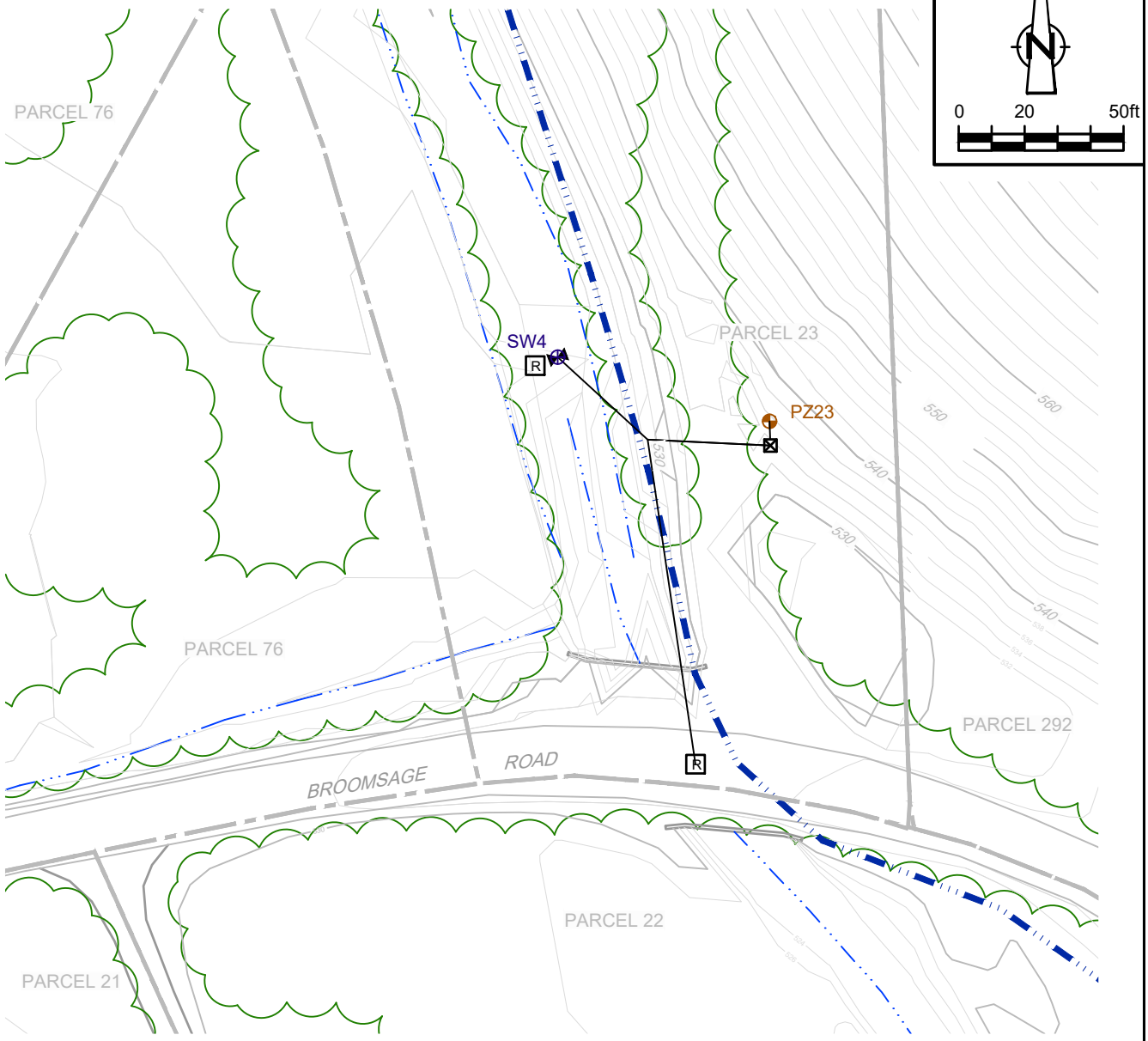


LEGEND

- 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 PARCEL BOUNDARY
- ESTIMATED FLOODLINE
- PIEZOMETER LOCATION
- DATA LOGGER
- APPROXIMATE STREAM MONITORING LOCATION
- STREAM FLOW SENSORS
- RAIN GAUGE

figure 7.7

SW3 STREAM MONITORING LOCATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



LEGEND

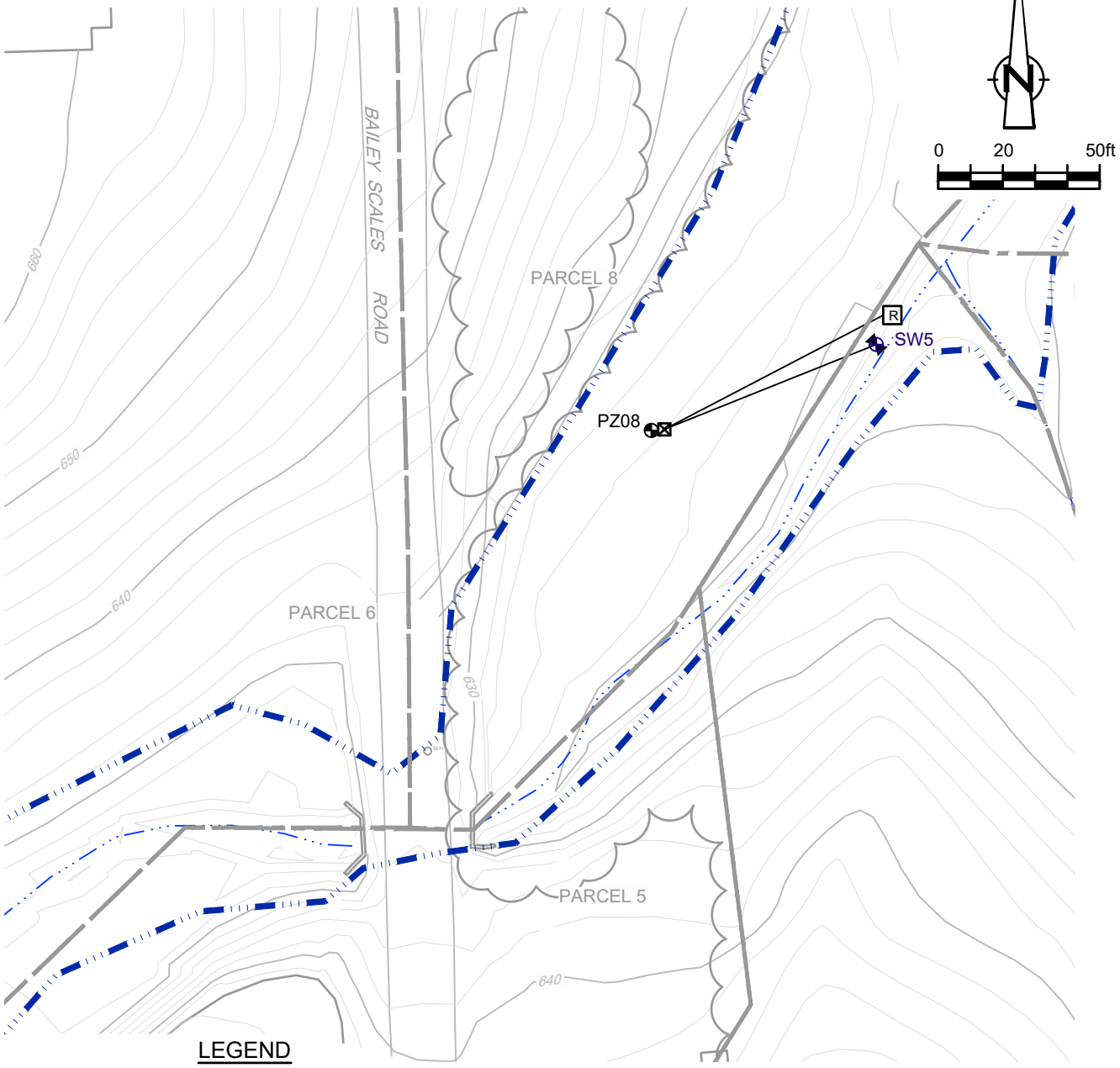
- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) (610)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- ESTIMATED FLOODLINE
- PIEZOMETER LOCATION
- DATA LOGGER
- APPROXIMATE STREAM MONITORING LOCATION
- STREAM FLOW SENSORS
- RAIN GAUGE (R)

figure 7.8

SW4 STREAM MONITORING LOCATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

13968-00(267)GN-WA078 SEP 25/2015



LEGEND

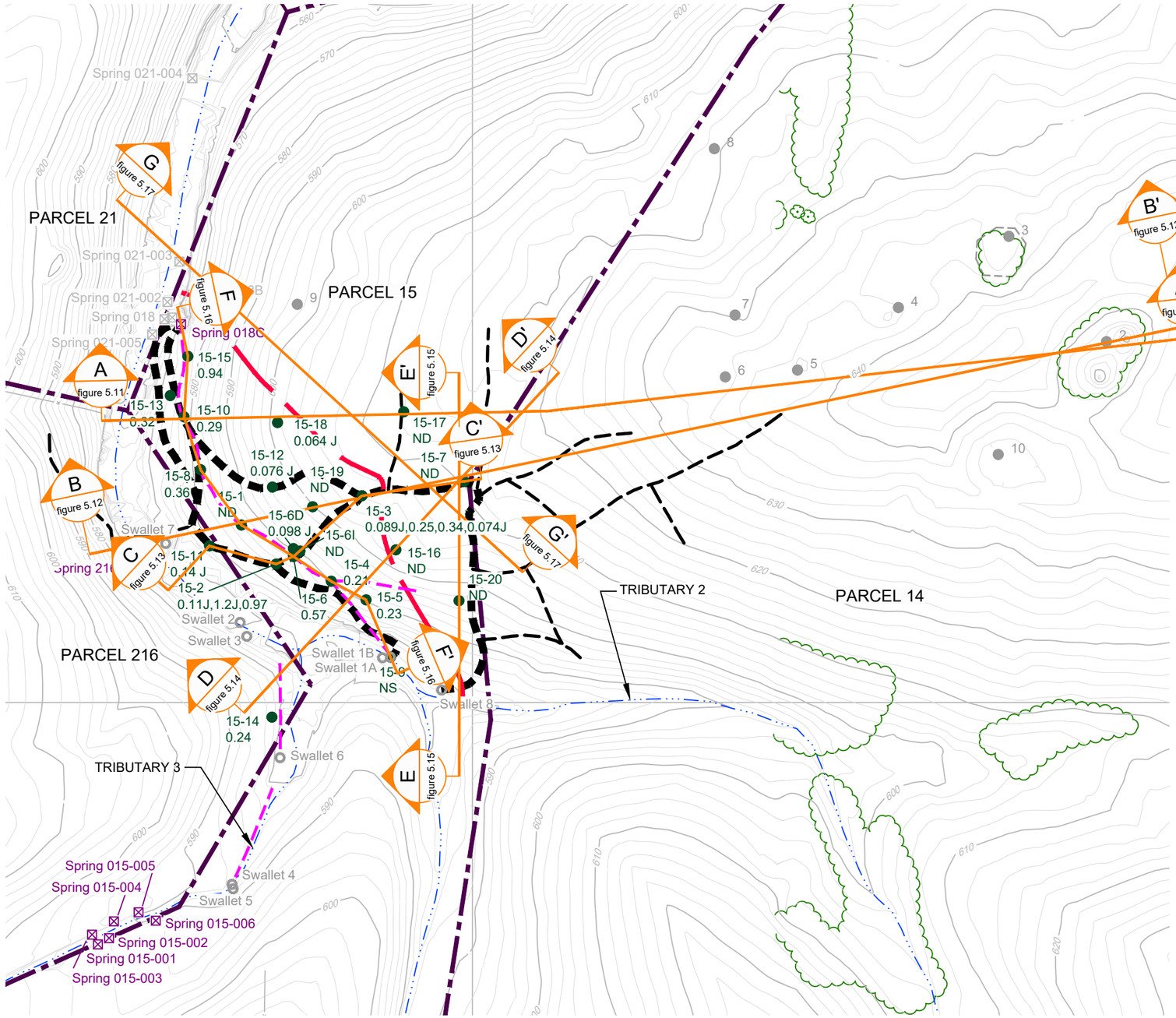
- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL) (610)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- ESTIMATED FLOODLINE
- PIEZOMETER LOCATION
- DATA LOGGER
- APPROXIMATE STREAM MONITORING LOCATION
- STREAM FLOW SENSORS
- RAIN GAUGE (R)

figure 7.9

SW5 STREAM MONITORING LOCATION
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

13968-00(267)GN-WA079 SEP 25/2015



0 50 150ft

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- SWALLET LOCATION
- FORMER SPRING LOCATION
- SPRING LOCATION
- WILLOWSTICK PRIMARY PROBABLE GROUNDWATER FLOW PATH
- WILLOWSTICK SECONDARY PROBABLE GROUNDWATER FLOW PATH
- GPR PROBABLE GROUNDWATER FLOW PATH
- LIMIT OF POTENTIALLY IMPACTED BEDROCK
- SINKHOLE LOCATION
- 15-5 0.23 — SAMPLE LOCATION AND RESULT (APRIL 2007) (µg/L TOTAL PCBs)
- NS — NOT SAMPLED
- ND — NOT DETECTED
- J — ESTIMATED VALUE
- 0.11J,1.2J,0.97 — RESULTS AT DIFFERENT DEPTHS
- A figure 5.11 — CROSS SECTION DIRECTION OF VIEW AND LOCATION

NOTES:
1. PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES
2. GRAB SAMPLES FOR PCBs WERE COLLECTED WITH BAILERS IMMEDIATELY FOLLOWING WELL DEVELOPMENT. SAMPLES MAY NOT BE REPRESENTATIVE OF THE ACTUAL GROUNDWATER QUALITY AT THESE LOCATIONS

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001, AND CRA SURVEYS 2002 TO 2006

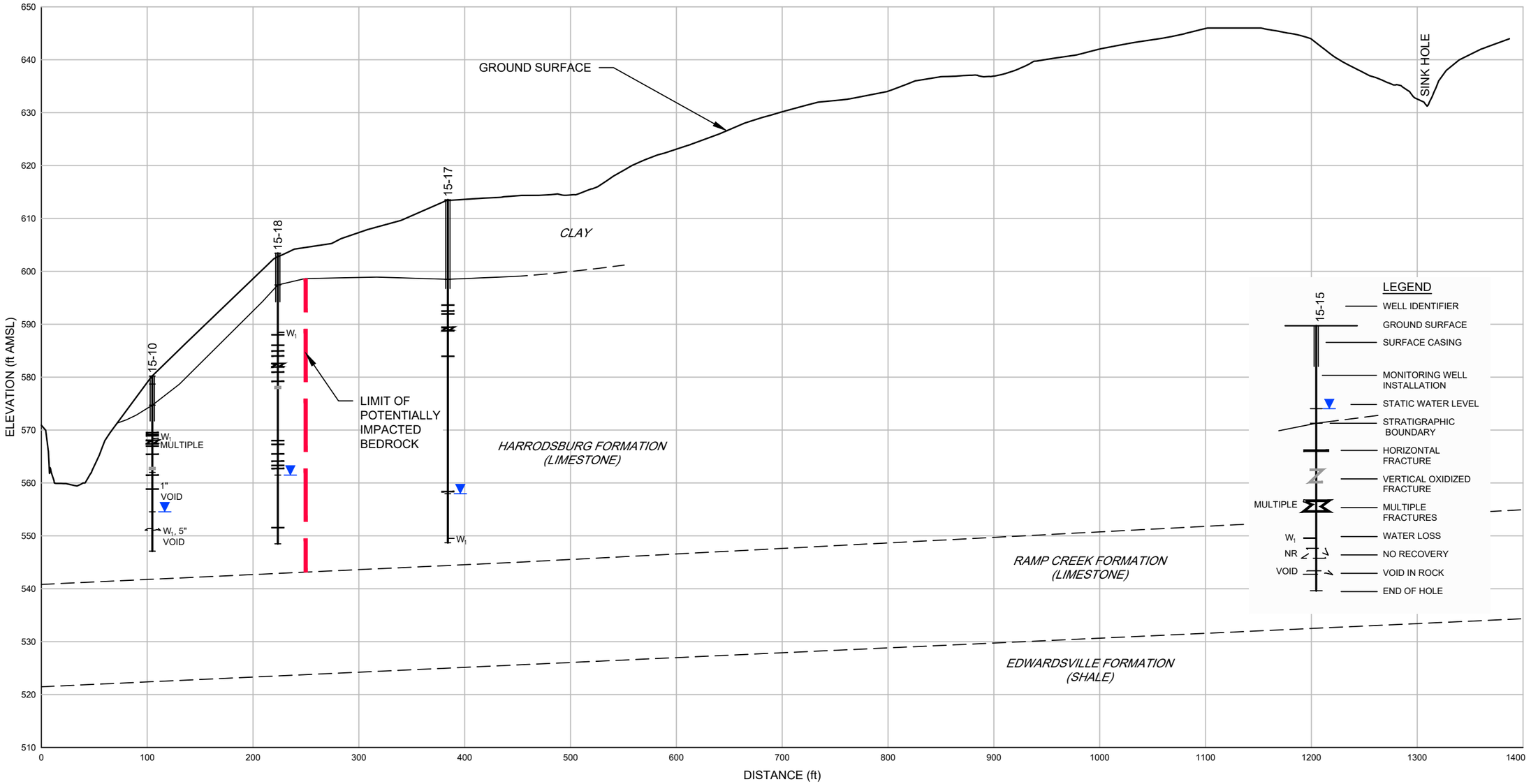
figure 7.10

SPRING 018 AREA CROSS-SECTION LOCATIONS
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

A
WEST

A'
EAST



SCALE: HORIZONTAL - 1" = 100'
VERTICAL - 1" = 20'

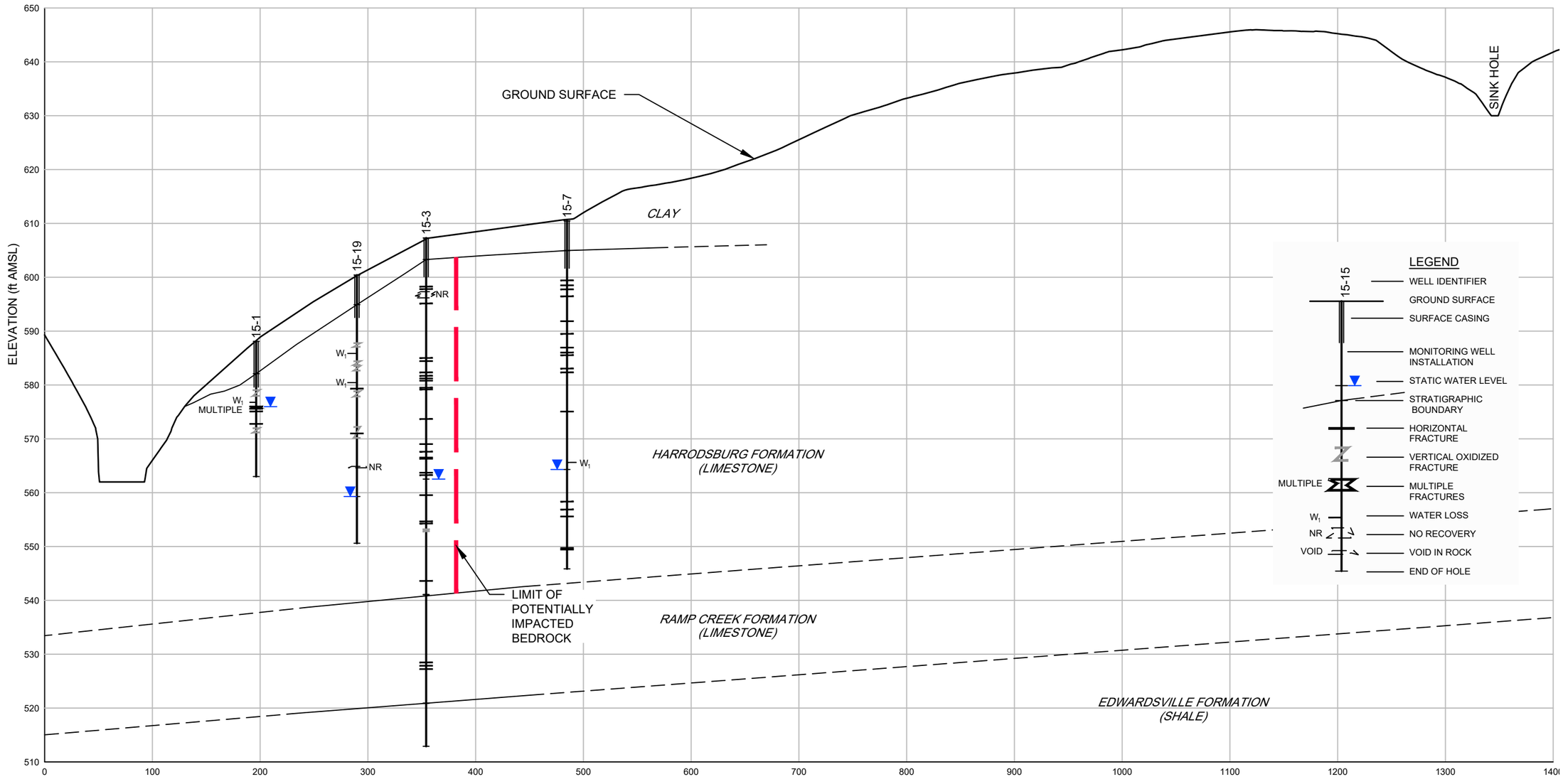
figure 7.11

SPRING 018 AREA CROSS-SECTION A-A'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

B
WEST

B'
EAST



DISTANCE (ft)

SCALE: HORIZONTAL - 1" = 100'
VERTICAL - 1" = 20'

figure 7.12

SPRING 018 AREA CROSS-SECTION B-B'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

C
WEST

C'
EAST

APPROXIMATE BOTTOM OF CREEK

15-11

15-2

15-6

15-6D (O/S 8' N)

15-6I

15-19 (O/S 31' N)

15-3

15-7

CLAY

CLAY

CLAY

1" VOID, W_1

NR

NR

1" VOID

NR

W_1

NR

MULTIPLE

W_1

NR

NR

W_1

W_1

NR

W_1

HARRODSBURG FORMATION
(LIMESTONE)

HARRODSBURG FORMATION
(LIMESTONE)

HARRODSBURG FORMATION
(LIMESTONE)

HARRODSBURG FORMATION
(LIMESTONE)

LIMIT OF POTENTIALLY
IMPACTED BEDROCK

RAMP CREEK FORMATION
(LIMESTONE)

ESWARDSVILLE FORMATION
(SHALE)

ELEVATION (ft AMSL)

610
600
590
580
570
560
550
540
530
520
510

0 50 100 150 200 250 300 350 400 450

DISTANCE (ft)

SCALE: HORIZONTAL - 1" = 50'
VERTICAL - 1" = 10'

LEGEND

15-15 — WELL IDENTIFIER

GROUND SURFACE

SURFACE CASING

MONITORING WELL INSTALLATION

STATIC WATER LEVEL

STRATIGRAPHIC BOUNDARY

HORIZONTAL FRACTURE

VERTICAL OXIDIZED FRACTURE

MULTIPLE — MULTIPLE FRACTURES

W_1 — WATER LOSS

NR — NO RECOVERY

VOID — VOID IN ROCK

figure 7.13

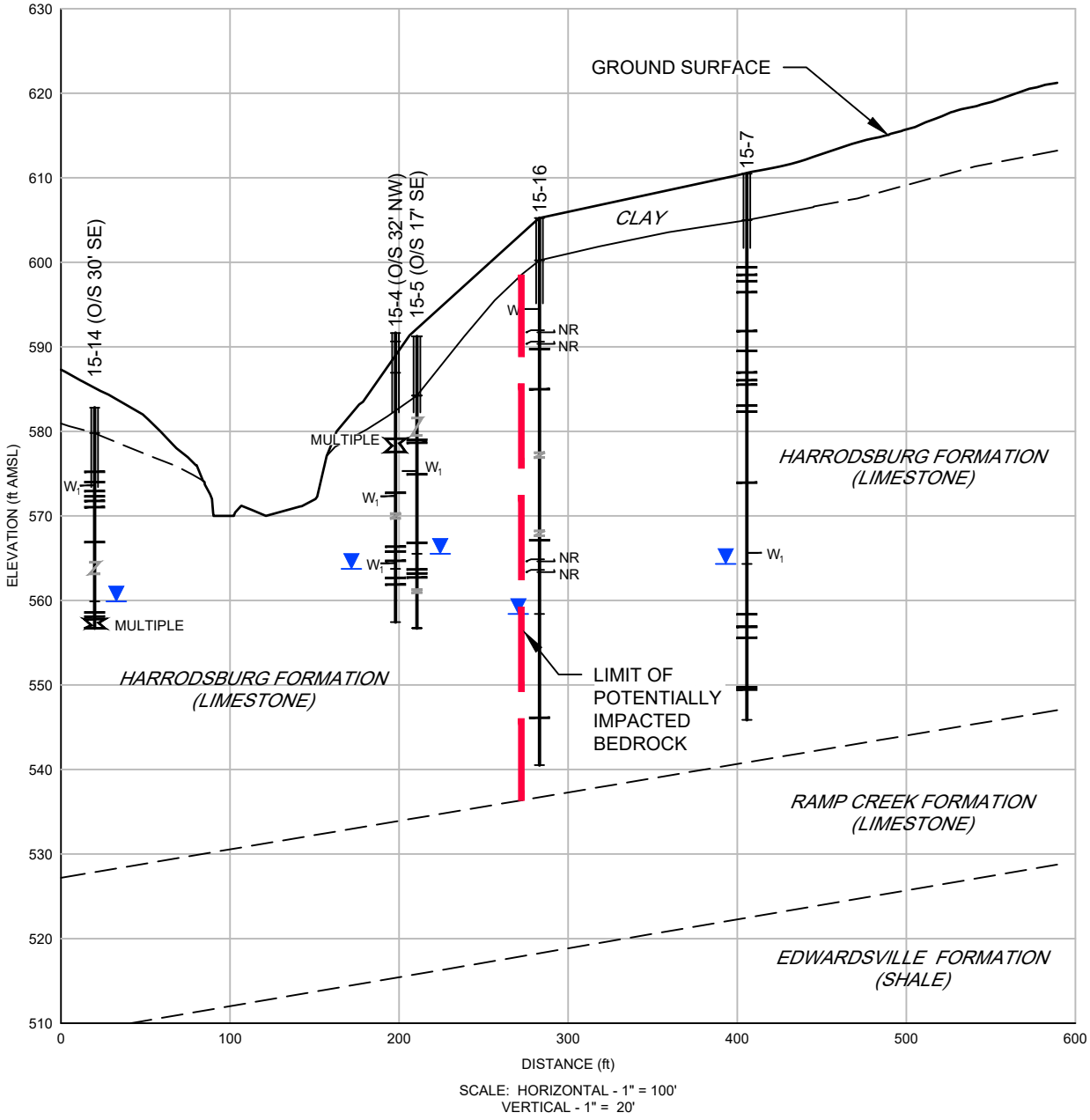
SPRING 018 AREA CROSS-SECTION C-C'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

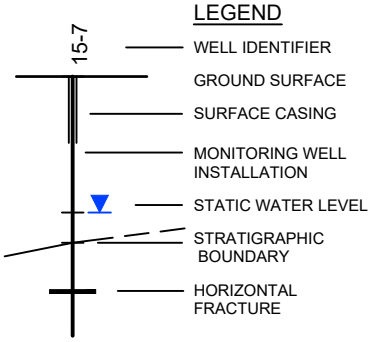
13968-00(267)GN-WA082 SEP 25/2015

D
SOUTHWEST

D'
NORTHEAST



LEGEND



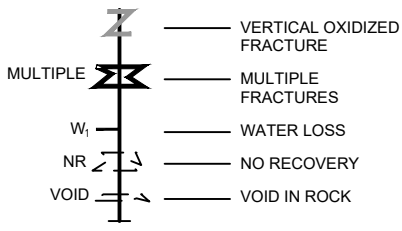
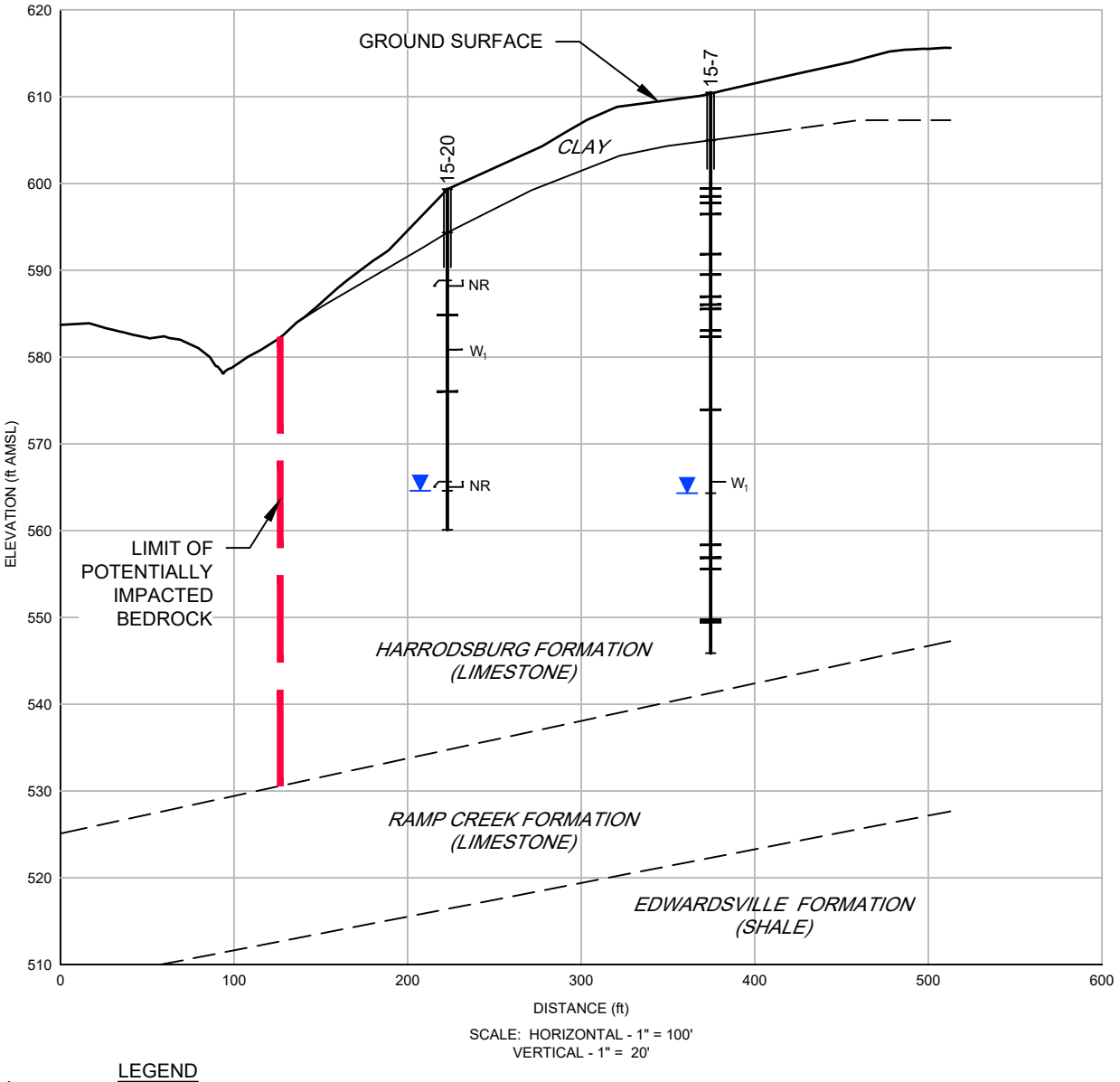


figure 7.14

SPRING 018 AREA CROSS-SECTION D-D'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

E
SOUTH

E'
NORTH



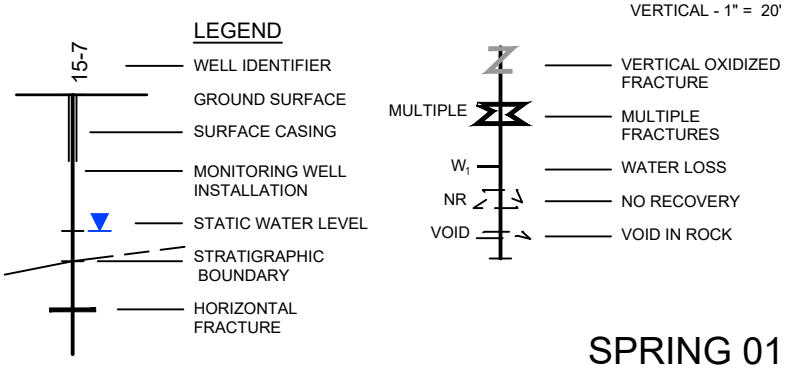


figure 7.15

SPRING 018 AREA CROSS-SECTION E-E'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

F
NORTH

F'
SOUTH

15-15
15-13 (O/S 19' W)
15-10
15-8
15-1
(O/S 9' E) 15-6D
15-6I (O/S 10' E)
15-4
15-5
15-9 (SWALLET 1A)

CLAY
CLAY
CLAY

SPRING 018C

W1, VOID
W1
W1 NR 1" VOID
VOID NR
VOID VOID
W1, 5" VOID
W1 MULTIPLE
W1 4" CLAY
W1 MULTIPLE
W1 MULTIPLE
W1
W1 MULTIPLE
W1
W1
W1
W1
FRACTURE TOP @ 7.4' BGS

HARRODSBURG FORMATION
(LIMESTONE)

RAMP CREEK FORMATION
(LIMESTONE)

ESWARDSVILLE FORMATION
(SHALE)

ELEVATION (ft AMSL)
590
580
570
560
550
540
530
520
510

0 50 100 150 200 250 300 350 400 450
DISTANCE (ft)

SCALE: HORIZONTAL - 1" = 50'
VERTICAL - 1" = 10'

LEGEND

- WELL IDENTIFIER
- GROUND SURFACE
- SURFACE CASING
- MONITORING WELL INSTALLATION
- STATIC WATER LEVEL
- STRATIGRAPHIC BOUNDARY
- HORIZONTAL FRACTURE
- VERTICAL OXIDIZED FRACTURE
- MULTIPLE FRACTURES
- WATER LOSS
- NO RECOVERY
- VOID IN ROCK

figure 7.16

SPRING 018 AREA CROSS-SECTION F-F'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

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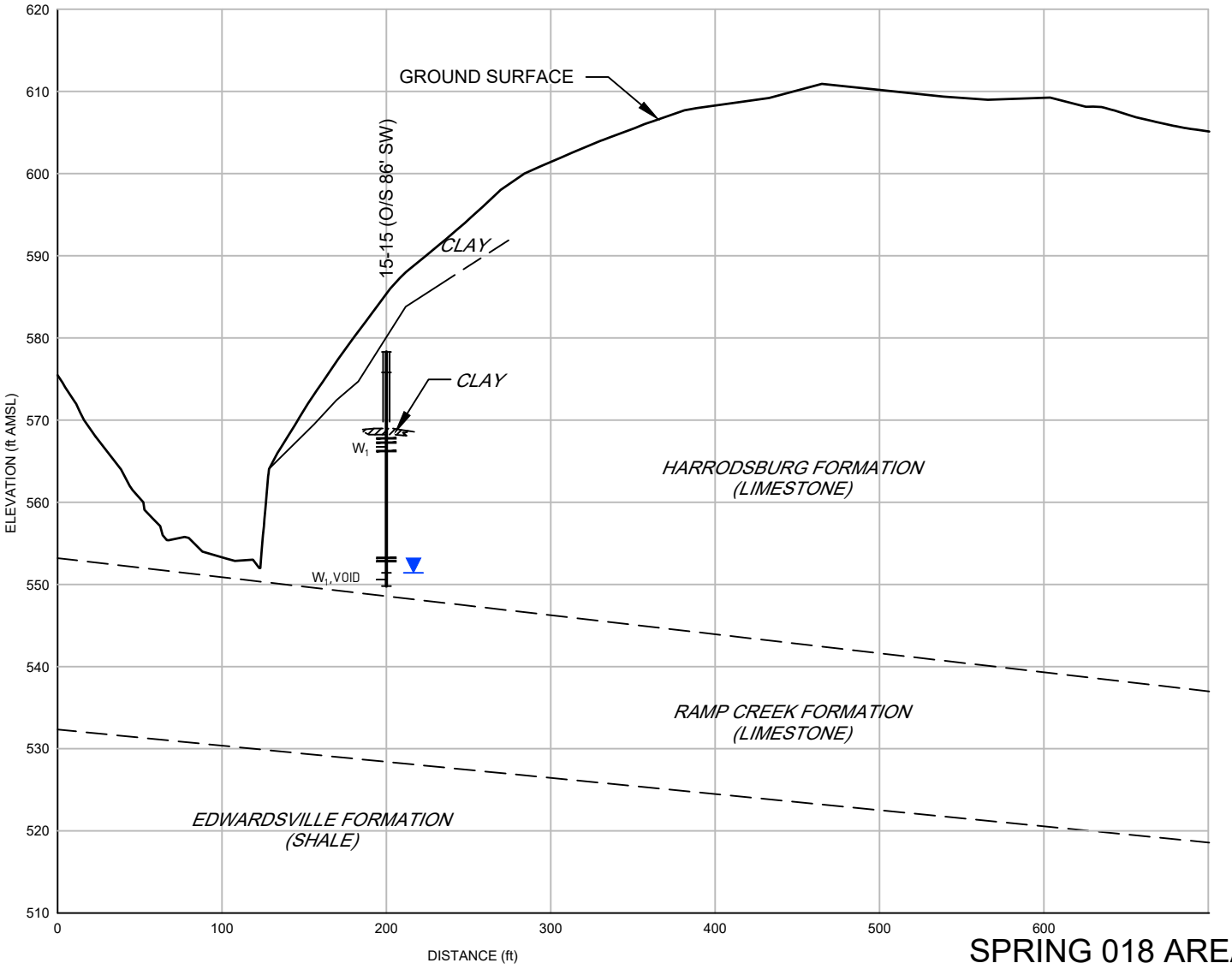
G
NORTHWEST

G'
SOUTHEAST



SCALE: HORIZONTAL - 1" = 100'
VERTICAL - 1" = 20'

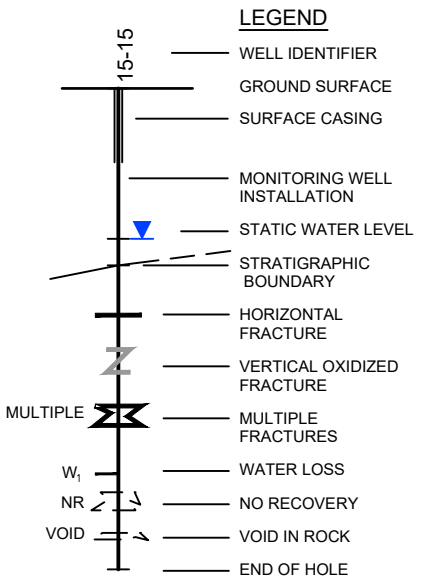
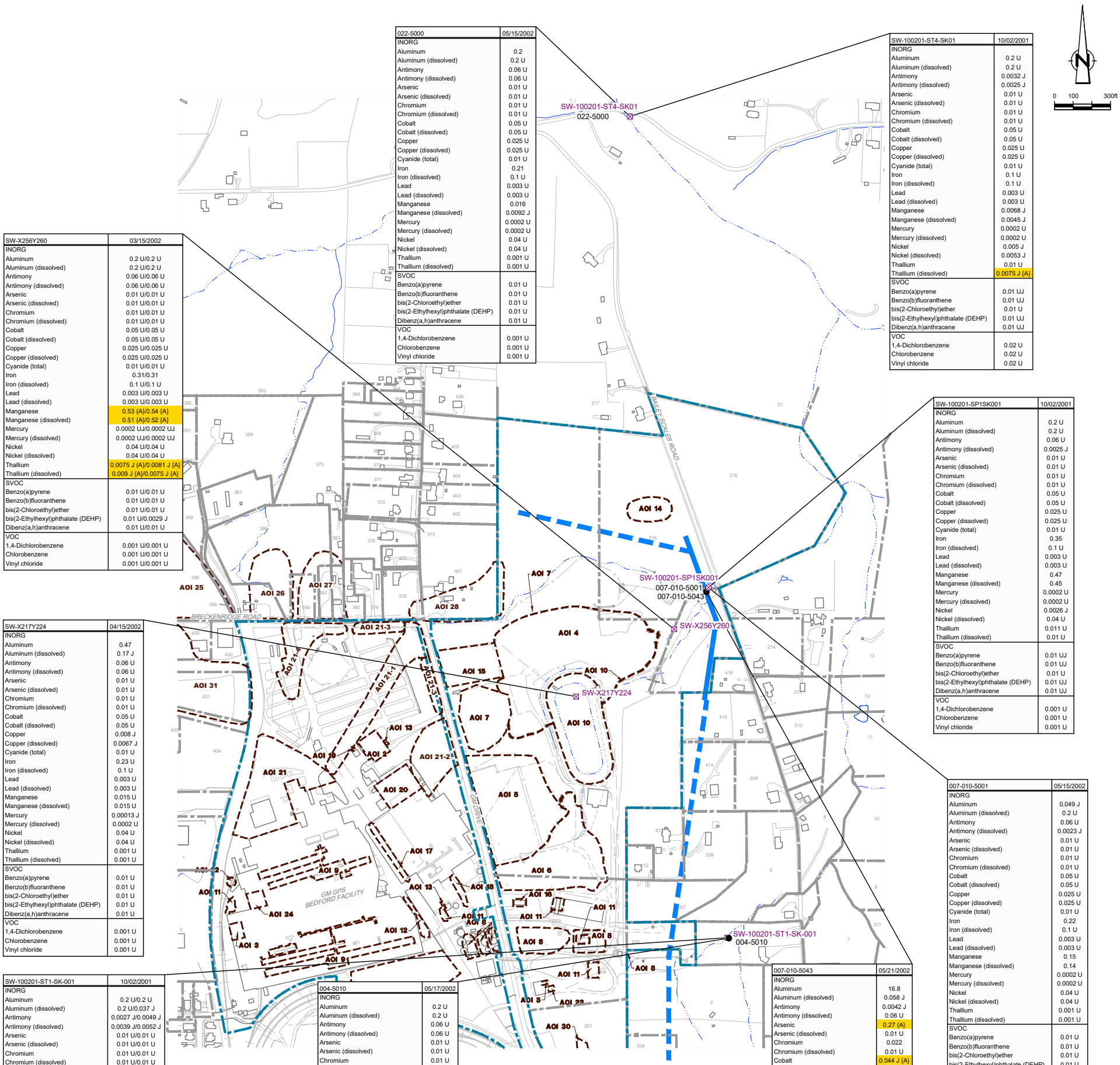


figure 7.17

SPRING 018 AREA CROSS-SECTION G-G'
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD

13968-00(267)GN-WA083 SEP 25/2015



022-5000	05/15/2002
INORG	
Aluminum	0.2
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.21
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.016
Manganese (dissolved)	0.0092 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

SW-100201-ST4-SK01	10/02/2001
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.0032 J
Antimony (dissolved)	0.0025 J
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.1 U
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0068 J
Manganese (dissolved)	0.0045 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.005 J
Nickel (dissolved)	0.0053 J
Thallium	0.01 U
Thallium (dissolved)	0.0075 J {A}
SVOC	
Benzo(a)pyrene	0.01 UJ
Benzo(b)fluoranthene	0.01 UJ
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 UJ
Dibenz(a,h)anthracene	0.01 UJ
VOC	
1,4-Dichlorobenzene	0.02 U
Chlorobenzene	0.02 U
Vinyl chloride	0.02 U

SW-X256Y260	03/15/2002
INORG	
Aluminum	0.2 U/0.2 U
Aluminum (dissolved)	0.2 U/0.2 U
Antimony	0.06 U/0.06 U
Antimony (dissolved)	0.06 U/0.06 U
Arsenic	0.01 U/0.01 U
Arsenic (dissolved)	0.01 U/0.01 U
Chromium	0.01 U/0.01 U
Chromium (dissolved)	0.01 U/0.01 U
Cobalt	0.05 U/0.05 U
Cobalt (dissolved)	0.05 U/0.05 U
Copper	0.025 U/0.025 U
Copper (dissolved)	0.025 U/0.025 U
Cyanide (total)	0.01 U/0.01 U
Iron	0.31/0.31
Iron (dissolved)	0.1 U/0.1 U
Lead	0.003 U/0.003 U
Lead (dissolved)	0.003 U/0.003 U
Manganese	0.53 {A}/0.54 {A}
Manganese (dissolved)	0.51 {A}/0.52 {A}
Mercury	0.0002 UJ/0.0002 UJ
Mercury (dissolved)	0.0002 UJ/0.0002 UJ
Nickel	0.04 U/0.04 U
Nickel (dissolved)	0.04 U/0.04 U
Thallium	0.0075 J {A}/0.0081 J {A}
Thallium (dissolved)	0.009 J {A}/0.0075 J {A}
SVOC	
Benzo(a)pyrene	0.01 U/0.01 U
Benzo(b)fluoranthene	0.01 U/0.01 U
bis(2-Chloroethyl)ether	0.01 U/0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.0029 J
Dibenz(a,h)anthracene	0.01 U/0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

SW-100201-SP1SK001	10/02/2001
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.0025 J
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.35
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.47
Manganese (dissolved)	0.45
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0026 J
Nickel (dissolved)	0.04 U
Thallium	0.011 U
Thallium (dissolved)	0.01 U
SVOC	
Benzo(a)pyrene	0.01 UJ
Benzo(b)fluoranthene	0.01 UJ
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 UJ
Dibenz(a,h)anthracene	0.01 UJ
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

SW-X217Y224	04/15/2002
INORG	
Aluminum	0.47
Aluminum (dissolved)	0.17 J
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.008 J
Copper (dissolved)	0.0067 J
Cyanide (total)	0.01 U
Iron	0.23 U
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.00013 J
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

007-010-5001	05/15/2002
INORG	
Aluminum	0.049 J
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.0023 J
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.22
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.15
Manganese (dissolved)	0.14
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

SW-100201-ST1-SK-001	10/02/2001
INORG	
Aluminum	0.2 U/0.2 U
Aluminum (dissolved)	0.2 U/0.037 J
Antimony	0.0027 J/0.0049 J
Antimony (dissolved)	0.0039 J/0.0052 J
Arsenic	0.01 U/0.01 U
Arsenic (dissolved)	0.01 U/0.01 U
Chromium	0.01 U/0.01 U
Chromium (dissolved)	0.01 U/0.01 U
Cobalt	0.05 U/0.05 U
Cobalt (dissolved)	0.05 U/0.05 U
Copper	0.025 U/0.025 U
Copper (dissolved)	0.025 U/0.025 U
Cyanide (total)	0.0018 J/0.01 U
Iron	0.1 U/0.1 U
Iron (dissolved)	0.1 U/0.1 U
Lead	0.0048/0.004
Lead (dissolved)	0.0045/0.0049
Manganese	0.015/0.014 J
Manganese (dissolved)	0.014 J/0.014 J
Mercury	0.0002 U/0.0002 U
Mercury (dissolved)	0.0002 U/0.0002 U
Nickel	0.0082 J/0.0082 J
Nickel (dissolved)	0.0079 J/0.008 J
Thallium	0.01 U/0.01 U
Thallium (dissolved)	0.01 U/0.01 U
SVOC	
Benzo(a)pyrene	0.01 UJ/0.01 UJ
Benzo(b)fluoranthene	0.01 UJ/0.01 UJ
bis(2-Chloroethyl)ether	0.01 U/0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 UJ/0.01 UJ
Dibenz(a,h)anthracene	0.01 UJ/0.01 UJ
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

004-5010	05/17/2002
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.17
Iron (dissolved)	0.13
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.081
Manganese (dissolved)	0.081
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0027 J
Nickel (dissolved)	0.0026 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 UJ
Benzo(b)fluoranthene	0.01 UJ
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 UJ
VOC	
1,4-Dichlorobenzene	0.001 UJ
Chlorobenzene	0.001 UJ
Vinyl chloride	0.001 UJ

007-010-5043	05/21/2002
INORG	
Aluminum	16.8
Aluminum (dissolved)	0.058 J
Antimony	0.0042 J
Antimony (dissolved)	0.06 U
Arsenic	0.27 {A}
Arsenic (dissolved)	0.01 U
Chromium	0.022
Chromium (dissolved)	0.01 U
Cobalt	0.044 J {A}
Cobalt (dissolved)	0.0018 J
Copper	0.37
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	538 {A}
Iron (dissolved)	0.1
Lead	0.035 {A}
Lead (dissolved)	0.003 U
Manganese	29.4 {A}
Manganese (dissolved)	1.3 {A}
Mercury	0.00012 J
Mercury (dissolved)	0.0002 U
Nickel	0.048
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.00051 J
Chlorobenzene	0.00034 J
Vinyl chloride	0.001 U

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

AOI SUMMARY

AOI ID	Description
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

TMW-X128Y255A	7/14/2004	SAMPLE LOCATION IDENTIFIER
	Groundwater	DATE SAMPLE TAKEN
	mg/L	SAMPLE DESCRIPTION
Metals		RESULT UNIT
Aluminum	0.24	CONCENTRATION in mg/L
Aluminum (Dissolved)	0.2 U	CHEMICAL NAME

2.2 {A}	RESULT EXCEEDS THE DRINKING WATER CRITERIA
4.7/4.7	PARENT SAMPLE VALUE/DUPLICATE SAMPLE VALUE
J	THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY
NS	NOT SAMPLED
U	THE ANALYTE WAS ANALYZED FOR, BUT WAS QUALIFIED NOT DETECTED ABOVE THE SAMPLE REPORT LIMIT
UJ	THE SAMPLE REPORTING LIMIT VALUE IS AN ESTIMATE AND MAY BE INACCURATE OR IMPRECISE

NOTES:

1 GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

Chemical Name	Drinking Water Criteria (mg/L)
	{A}
Metals	
Aluminum	37
Aluminum (Dissolved)	37
Antimony	0.006
Antimony (Dissolved)	0.006
Arsenic	0.01
Arsenic (Dissolved)	0.01
Chromium III (Trivalent)	0.1
Chromium III (Trivalent) (Dissolved)	0.1
Chromium Total	0.1
Chromium Total (Dissolved)	0.1
Chromium VI (Hexavalent)	0.1
Chromium VI (Hexavalent) (Dissolved)	0.1
Iron	11
Iron (Dissolved)	11
Lead	0.015
Lead (Dissolved)	0.015
Manganese	0.88
Manganese (Dissolved)	0.88
Thallium	0.002
Thallium (Dissolved)	0.002
SVOCs	
bis(2-Ethylhexyl)phthalate	0.006
VOCs	
Chlorobenzene	0.1
Vinyl chloride	0.002

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- AOI BOUNDARY
- PROPOSED PILOT TRENCH
- PROPOSED FUTURE TRENCH ALIGNMENT
- SURFACE WATER SAMPLE LOCATION
- GROUNDWATER SAMPLE LOCATION

SCALE VERIFICATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS OVERBURDEN NON-PCB SAMPLE RESULTS

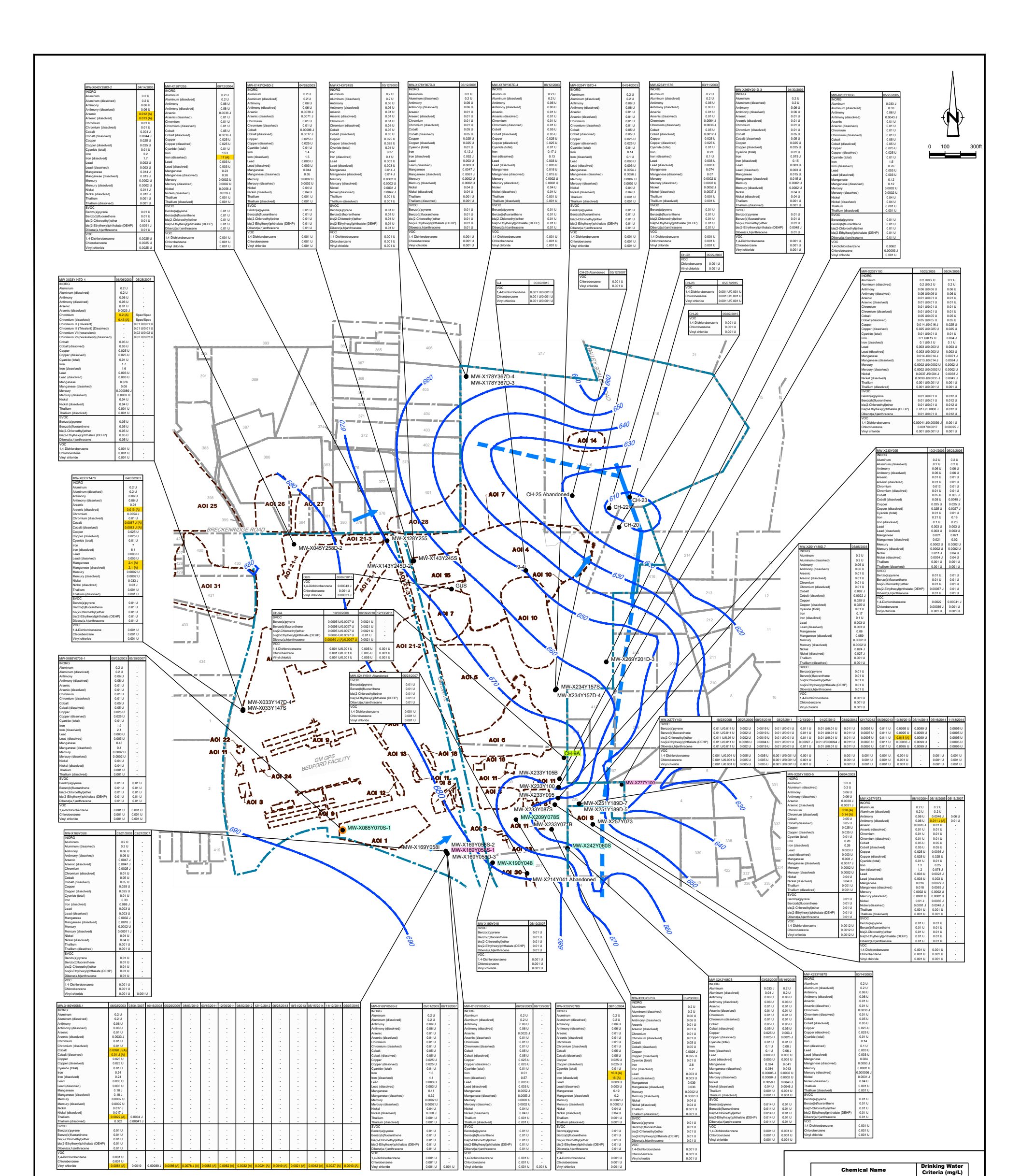
GHD

Source Reference:

BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.18

13968-00(267)GN-WA084 SEP 29/2015



MW-X045Y258D-2	04/14/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.012 (A)
Arsenic (dissolved)	0.013 (A)
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.004 J
Cobalt (dissolved)	0.0044 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	2.2
Iron (dissolved)	1.7
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.014 J
Manganese (dissolved)	0.012 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.011 J
Nickel (dissolved)	0.013 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.0031 J
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.0025 U
Chlorobenzene	0.0025 U
Vinyl chloride	0.0025 U

MW-X128Y255	08/12/2004
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0038 J
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.0016 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	13.3
Iron (dissolved)	17 (A)
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.23
Manganese (dissolved)	0.26
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0056 J
Nickel (dissolved)	0.029 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X143Y245D-2	04/28/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0071 J
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.00098 J
Cobalt (dissolved)	0.0017 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	1.4
Iron (dissolved)	1.5
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.044
Manganese (dissolved)	0.05
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X143Y245S	03/12/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.37
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.014 J
Manganese (dissolved)	0.014 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0033 J
Nickel (dissolved)	0.0042 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X178Y367D-3	06/12/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.12 J
Iron (dissolved)	0.092 J
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0047 J
Manganese (dissolved)	0.0061 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X178Y367D-4	08/12/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.17 J
Iron (dissolved)	0.13
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X234Y157D-4	04/24/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.14
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0054 J
Manganese (dissolved)	0.0056 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X234Y157S	03/11/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.0084 J
Chromium (dissolved)	0.0036 J
Cobalt	0.05 U
Cobalt (dissolved)	0.0012 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.23
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.074
Manganese (dissolved)	0.07
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0052 J
Nickel (dissolved)	0.0037 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X269Y201D-3	04/30/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.075 J
Iron (dissolved)	0.15
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.0045 J
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.0062
Chlorobenzene	0.00039 J
Vinyl chloride	0.001 U

MW-X233Y105B	05/25/2005
INORG	
Aluminum	0.033 J
Aluminum (dissolved)	0.033 J
Antimony	0.06 U
Antimony (dissolved)	0.0043 J
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	1.5
Iron (dissolved)	0.76
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.12
Manganese (dissolved)	0.12
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.00062
Chlorobenzene	0.00039 J
Vinyl chloride	0.001 U

MW-X033Y147D-4	06/06/2003	05/25/2007
INORG		
Aluminum	0.2 U	-
Aluminum (dissolved)	0.2 U	-
Antimony	0.06 U	-
Antimony (dissolved)	0.06 U	-
Arsenic	0.01 U	-
Arsenic (dissolved)	0.023 J	-
Chromium	0.2 [A]	Spec/Spec
Chromium (dissolved)	0.43 [A]	Spec/Spec
Chromium III (Trivalent)	-	0.01 U/0.01 U
Chromium III (Trivalent) (Dissolved)	-	0.01 U/0.01 U
Chromium VI (hexavalent)	-	0.02 U/0.02 U
Chromium VI (hexavalent) (dissolved)	-	0.02 U/0.02 U
Cobalt	0.05 U	-
Cobalt (dissolved)	0.05 U	-
Copper	0.025 U	-
Copper (dissolved)	0.025 U	-
Cyanide (total)	0.01 U	-
Iron	1.7	-
Iron (dissolved)	1.6	-
Lead	0.003 U	-
Lead (dissolved)	0.003 U	-
Manganese	0.076	-
Manganese (dissolved)	0.06	-
Mercury	0.000089 J	-
Mercury (dissolved)	0.0002 U	-
Nickel	0.04 U	-
Nickel (dissolved)	0.04 U	-
Thallium	0.001 U	-
Thallium (dissolved)	0.001 U	-
SVOC		
Benzo(a)pyrene	0.05 U	-
Benzo(b)fluoranthene	0.05 U	-
bis(2-Chloroethyl)ether	0.05 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.05 U	-
Dibenz(a,h)anthracene	0.05 U	-
VOC		
1,4-Dichlorobenzene	0.001 U	-
Chlorobenzene	0.001 U	-
Vinyl chloride	0.001 U	-

MW-X033Y147S	04/03/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01
Arsenic (dissolved)	0.013 (A)
Chromium	0.0054 J
Chromium (dissolved)	0.01 U
Cobalt	0.0087 J (A)
Cobalt (dissolved)	0.0083 J (A)
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	7
Iron (dissolved)	6.1
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	2.4 (A)
Manganese (dissolved)	2.1 (A)
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.033 J
Nickel (dissolved)	0.03 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X085Y070S-1	05/02/2003	05/29/2007
INORG		
Aluminum	0.2 U	-
Aluminum (dissolved)	0.2 U	-
Antimony	0.06 U	-
Antimony (dissolved)	0.06 U	-
Arsenic	0.01 U	-
Arsenic (dissolved)	0.01 U	-
Chromium	0.01 U	-
Chromium (dissolved)	0.01 U	-
Cobalt	0.05 U	-
Cobalt (dissolved)	0.05 U	-
Copper	0.025 U	-
Copper (dissolved)	0.025 U	-
Cyanide (total)	0.01 U	-
Iron	1.9	-
Iron (dissolved)	2.1	-
Lead	0.003 U	-
Lead (dissolved)	0.003 U	-
Manganese	0.43	-
Manganese (dissolved)	0.4	-
Mercury	0.0002 U	-
Mercury (dissolved)	0.0002 U	-
Nickel	0.04 U	-
Nickel (dissolved)	0.04 U	-
Thallium	0.001 U	-
Thallium (dissolved)	0.001 U	-
SVOC		
Benzo(a)pyrene	0.01 U	0.01 U
Benzo(b)fluoranthene	0.01 U	0.01 U
bis(2-Chloroethyl)ether	0.01 U	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U	0.01 U
Dibenz(a,h)anthracene	0.01 U	0.01 U
VOC		
1,4-Dichlorobenzene	0.001 U	0.001 U
Chlorobenzene	0.001 U	0.001 U
Vinyl chloride	0.001 U	0.001 U

MW-X169Y058I	03/21/2003	03/27/2007
INORG		
Aluminum	0.2 U	-
Aluminum (dissolved)	0.2 U	-
Antimony	0.06 U	-
Antimony (dissolved)	0.06 U	-
Arsenic	0.0047 J	-
Arsenic (dissolved)	0.0047 J	-
Chromium	0.0025 J	-
Chromium (dissolved)	0.01 U	-
Cobalt	0.05 U	-
Cobalt (dissolved)	0.05 U	-
Copper	0.025 U	-
Copper (dissolved)	0.025 U	-
Cyanide (total)	0.01 U	-
Iron	0.33	-
Iron (dissolved)	0.088 J	-
Lead	0.003 U	-
Lead (dissolved)	0.003 U	-
Manganese	0.0032 J	-
Manganese (dissolved)	0.0018 J	-
Mercury	0.0002 U	-
Mercury (dissolved)	0.00011 J	-
Nickel	0.04 U	-
Nickel (dissolved)	0.04 U	-
Thallium	0.001 U	-
Thallium (dissolved)	0.001 U	-
SVOC		
Benzo(a)pyrene	0.01 U	-
Benzo(b)fluoranthene	0.01 U	-
bis(2-Chloroethyl)ether	0.01 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U	-
Dibenz(a,h)anthracene	0.01 U	-
VOC		
1,4-Dichlorobenzene	0.001 U	-
Chlorobenzene	0.001 U	-
Vinyl chloride	0.001 U	0.001 U

GUS	05/07/2015
VOC	
1,4-Dichlorobenzene	0.00043 J
Chlorobenzene	0.001 U
Vinyl chloride	0.00031 J

CH-9A	10/30/2008	08/09/2010	12/13/2011
SVOC			
Benzo(a)pyrene	0.0095 U/0.0097 U	0.0021 U	-
Benzo(b)fluoranthene	0.0095 U/0.0097 U	0.0021 U	-
bis(2-Chloroethyl)ether	0.0095 U/0.0097 U	0.0021 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.0095 U/0.0097 U	0.01 U	-
Dibenz(a,h)anthracene	0.0039 J (A)/0.0097 U	0.0021 U	-
VOC			
1,4-Dichlorobenzene	0.001 U/0.001 U	0.005 U	0.001 U
Chlorobenzene	0.001 U/0.001 U	0.005 U	0.001 U
Vinyl chloride	0.001 U/0.001 U	0.005 U	0.001 U

MW-X214Y041 Abandoned	05/23/2007
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

9-4	05/07/2015
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

CH-2S Abandoned	03/12/2007
VOC	
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

CH-22	05/22/2007
VOC	
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

CH-23	05/07/2015
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

CH-20	05/07/2015
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X277Y100	10/23/2006	05/27/2009	08/03/2010	03/25/2011	12/13/2011	01/27/2012	08/02/2012	12/17/2012	06/26/2013	10/30/2013	05/14/2014	05/16/2014	11/13/2014
SVOC													
Benzo(a)pyrene	0.01 U/0.011 U	0.002 U	0.0019 U	0.01 U/0.01 U	0.011 U	0.01 U/0.01 U	0.011 U	0.0095 U	0.011 U	0.0095 U	0.0099 U	-	0.0095 U
Benzo(b)fluoranthene	0.01 U/0.011 U	0.002 U	0.0019 U	0.01 U/0.01 U	0.011 U	0.01 U/0.01 U	0.011 U	0.0095 U	0.011 U	0.0095 U	0.0099 U	-	0.0095 U
bis(2-Chloroethyl)ether	0.01 U/0.011 U	0.002 U	0.0019 U	0.01 U/0.01 U	0.011 U	0.01 U/0.01 U	0.011 U	0.0095 U	0.011 U	0.0095 U	0.0099 U	-	0.0095 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.011 U	0.0098 U	0.0094 U	0.01 U/0.01 U	0.00097 J	0.01 U/0.00094 J	0.011 U	0.0095 U	0.011 U	0.0033 J	0.0099 U	-	0.0095 U
Dibenz(a,h)anthracene	0.01 U/0.011 U	0.002 U	0.0019 U	0.01 U/0.01 U	0.011 U	0.01 U/0.01 U	0.011 U	0.0095 U	0.011 U	0.0095 U	0.0099 U	-	0.0095 U
VOC													
1,4-Dichlorobenzene	0.001 U/0.001 U	0.005 U	0.005 U	0.001 U/0.001 U	0.001 U	-	0.001 U	0.001 U	0.001 U	0.001 U	-	0.001 U	0.001 U
Chlorobenzene	0.001 U/0.001 U	0.005 U	0.005 U	0.001 U/0.001 U	0.001 U	-	0.001 U	0.001 U	0.001 U	0.001 U	-	0.001 U	0.001 U
Vinyl chloride	0.001 U/0.001 U	0.005 U	0.005 U	0.001 U/0.001 U	0.001 U	-	0.001 U	0.001 U	0.001 U	0.001 U	-	0.001 U	0.001 U

MW-X251Y189D-7	05/05/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.002 J
Cobalt (dissolved)	0.0022 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.17
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.06
Manganese (dissolved)	0.059
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.024 J
Nickel (dissolved)	0.027 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X251Y189D-5	06/04/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0038 J
Arsenic (dissolved)	0.003 U
Chromium	0.28 (A)
Chromium (dissolved)	0.14 (A)
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.28
Iron (dissolved)	0.26
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.008 J
Manganese (dissolved)	0.0077 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.0012 U
Chlorobenzene	0.0012 U
Vinyl chloride	0.0012 U

MW-X233Y100	10/22/2003	05/24/2005
INORG		
Aluminum	0.2 U/0.2 U	0.2 U
Aluminum (dissolved)	0.2 U/0.2 U	0.2 U
Antimony	0.06 U/0.06 U	0.06 U
Antimony (dissolved)	0.06 U/0.06 U	0.06 U
Arsenic	0.01 U/0.01 U	0.01 U
Arsenic (dissolved)	0.01 U/0.01 U	0.01 U
Chromium	0.01 U/0.01 U	0.01 U
Chromium (dissolved)	0.01 U/0.01 U	0.01 U
Cobalt	0.05 U/0.05 U	0.05 U
Cobalt (dissolved)	0.05 U/0.05 U	0.05 U
Copper	0.025 U/0.025 U	0.025 U
Copper (dissolved)	0.025 U/0.025 U	0.025 U
Cyanide (total)	0.01 U/0.01 U	0.01 U
Iron	0.1 U/0.19 U	0.094 J
Iron (dissolved)	0.1 U/0.1 U	0.1 U
Lead	0.003 U/0.003 U	0.003 U
Lead (dissolved)	0.003 U/0.003 U	0.003 U
Manganese	0.014 J/0.014 J	0.0071 J
Manganese (dissolved)	0.013 J/0.014 J	0.0094 J
Mercury	0.0002 U/0.0002 U	0.0002 U
Mercury (dissolved)	0.0002 U/0.0002 U	0.0002 U
Nickel	0.0037 J/0.004 J	0.0038 J
Nickel (dissolved)	0.0038 J/0.0035 J	0.0042 J
Thallium	0.001 U/0.001 U	0.001 U
Thallium (dissolved)	0.001 U/0.001 U	0.001 U
SVOC		
Benzo(a)pyrene	0.01 U/0.01 U	0.012 U
Benzo(b)fluoranthene	0.01 U/0.01 U	0.012 U
bis(2-Chloroethyl)ether	0.01 U/0.01 U	0.012 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.0008 J	0.012 U
Dibenz(a,h)anthracene	0.01 U/0.01 U	0.012 U
VOC		
1,4-Dichlorobenzene	0.00041 J/0.00039 J	0.001 U
Chlorobenzene	0.0017/0.0017	0.00025 J
Vinyl chloride	0.001 U/0.001 U	0.001 U

MW-X257Y073	08/10/2004	05/18/2005	05/15/2007
INORG			
Aluminum	0.2 U	0.2 U	-
Aluminum (dissolved)	0.2 U	0.2 U	-
Antimony	0.06 U	0.0046 J	0.06 U
Antimony (dissolved)	0.06 U	0.011 J (A)	0.01 U
Arsenic	0.0036 J	0.01 U	-
Arsenic (dissolved)	0.01 U	0.01 U	-
Chromium	0.01 U	0.01 U	-
Chromium (dissolved)	0.01 U	0.01 U	-
Cobalt	0.05 U	0.05 U	-
Cobalt (dissolved)	0.05 U	0.05 U	-
Copper	0.025 U	0.0036 J	-
Copper (dissolved)	0.025 U	0.025 U	-
Cyanide (total)	0.01 U	0.01 U	-
Iron	1.2	0.25	-
Iron (dissolved)	1.2	0.078 J	-
Lead	0.003 U	0.0028 J	-
Lead (dissolved)	0.003 U	0.003 U	-
Manganese	0.016	0.0079 J	-
Manganese (dissolved)	0.018	0.0069 J	-
Mercury	0.0002 U	0.0002 U	-
Mercury (dissolved)	0.0002 U	0.0002 U	-
Nickel	0.01 J	0.0086 J	-
Nickel (dissolved)	0.0091 J	0.0048 J	-
Thallium	0.001 U	0.001 U	-
Thallium (dissolved)	0.001 U	0.001 U	-
SVOC			
Benzo(a)pyrene	0.01 U	0.01 U	-
Benzo(b

MW-X033Y147D-3	06/13/2003	05/30/2007
INORG		
Aluminum	0.2 U	-
Aluminum (dissolved)	0.2 U	-
Antimony	0.06 U	-
Antimony (dissolved)	0.06 U	-
Arsenic	0.0035 J	-
Arsenic (dissolved)	0.0031 J	-
Chromium	0.21 {A}	Spec
Chromium (dissolved)	0.19 {A}	Spec
Chromium III (Trivalent)	-	0.0042 J
Chromium III (Trivalent) (Dissolved)	-	0.0053 J
Chromium VI (hexavalent)	-	0.02 U
Chromium VI (hexavalent) (dissolved)	-	0.02 U
Cobalt	0.05 U	-
Cobalt (dissolved)	0.05 U	-
Copper	0.025 U	-
Copper (dissolved)	0.025 U	-
Cyanide (total)	0.01 U	-
Iron	1.7 J	-
Iron (dissolved)	1.8	-
Lead	0.003 U	-
Lead (dissolved)	0.003 U	-
Manganese	0.042 J	-
Manganese (dissolved)	0.044 J	-
Mercury	0.0002 U	-
Mercury (dissolved)	0.0002 U	-
Nickel	0.04 U	-
Nickel (dissolved)	0.04 U	-
Thallium	0.001 U	0.001 U
Thallium (dissolved)	0.001 U	0.001 U
SVOC		
Benzo(a)pyrene	0.013 U	-
Benzo(b)fluoranthene	0.013 U	-
bis(2-Chloroethyl)ether	0.013 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.013 U	-
Dibenz(a,h)anthracene	0.013 U	-
VOC		
1,4-Dichlorobenzene	0.005 U	-
Chlorobenzene	0.005 U	-
Vinyl chloride	0.005 U	0.001 U

MW-X033Y147D-2	06/12/2003	05/30/2007
INORG		
Aluminum	0.2 U	-
Aluminum (dissolved)	0.2 U	-
Antimony	0.06 U	-
Antimony (dissolved)	0.06 U	-
Arsenic	0.01 U	-
Arsenic (dissolved)	0.01 U	-
Chromium	0.01 U	Spec/Spec
Chromium (dissolved)	0.01 U	Spec/Spec
Chromium III (Trivalent)	-	0.031/0.031
Chromium III (Trivalent) (Dissolved)	-	0.023/0.023
Chromium VI (hexavalent)	-	0.02 U/0.02 U
Chromium VI (hexavalent) (dissolved)	-	0.02 U/0.02 U
Cobalt	0.05 U	-
Cobalt (dissolved)	0.05 U	-
Copper	0.025 U	-
Copper (dissolved)	0.025 U	-
Cyanide (total)	0.01 U	-
Iron	1.5 J	-
Iron (dissolved)	1.3	-
Lead	0.003 U	-
Lead (dissolved)	0.003 U	-
Manganese	0.01 J	-
Manganese (dissolved)	0.01 J	-
Mercury	0.0002 U	-
Mercury (dissolved)	0.0002 U	-
Nickel	0.04 U	-
Nickel (dissolved)	0.04 U	-
Thallium	0.001 U	-
Thallium (dissolved)	0.001 U	-
SVOC		
Benzo(a)pyrene	0.01 U	-
Benzo(b)fluoranthene	0.01 U	-
bis(2-Chloroethyl)ether	0.01 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U	-
Dibenz(a,h)anthracene	0.01 U	-
VOC		
1,4-Dichlorobenzene	0.001 U	-
Chlorobenzene	0.001 U	-
Vinyl chloride	0.001 U	-

MW-X085Y070D-3	06/10/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.16
Iron (dissolved)	0.16
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X169Y058D-2	06/03/2003
INORG	
Aluminum	0.2 U/0.2 U
Aluminum (dissolved)	0.2 U/0.2 U
Antimony	0.06 U/0.06 U
Antimony (dissolved)	0.06 U/0.06 U
Arsenic	0.01 U/0.01 U
Arsenic (dissolved)	0.01 U/0.01 U
Chromium	0.01 U/0.01 U
Chromium (dissolved)	0.01 U/0.01 U
Cobalt	0.05 U/0.05 U
Cobalt (dissolved)	0.05 U/0.05 U
Copper	0.025 U/0.025 U
Copper (dissolved)	0.025 U/0.025 U
Cyanide (total)	0.01 U/0.01 U
Iron	0.19/0.16
Iron (dissolved)	0.21/0.19
Lead	0.003 U/0.003 U
Lead (dissolved)	0.003 U/0.003 U
Manganese	0.015 U/0.015 U
Manganese (dissolved)	0.015 U/0.015 U
Mercury	0.0002 U/0.0002 U
Mercury (dissolved)	0.0002 U/0.0002 U
Nickel	0.04 U/0.04 U
Nickel (dissolved)	0.04 U/0.04 U
Thallium	0.001 U/0.001 U
Thallium (dissolved)	0.001 U/0.001 U
SVOC	
Benzo(a)pyrene	0.01 U/0.01 U
Benzo(b)fluoranthene	0.01 U/0.01 U
bis(2-Chloroethyl)ether	0.01 U/0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.01 U
Dibenz(a,h)anthracene	0.01 U/0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

MW-X178Y367D-2	06/11/2003
INORG	
Aluminum	0.2 U/0.2 U
Aluminum (dissolved)	0.2 U/0.2 U
Antimony	0.06 U/0.06 U
Antimony (dissolved)	0.06 U/0.06 U
Arsenic	0.01 U/0.01 U
Arsenic (dissolved)	0.01 U/0.01 U
Chromium	0.01 U/0.01 U
Chromium (dissolved)	0.01 U/0.01 U
Cobalt	0.0011 J/0.00087 J
Cobalt (dissolved)	0.00087 J/0.00087 J
Copper	0.025 U/0.025 U
Copper (dissolved)	0.025 U/0.0027 J
Cyanide (total)	0.01 U/0.01 U
Iron	0.16/0.19
Iron (dissolved)	0.15/0.14
Lead	0.003 U/0.003 U
Lead (dissolved)	0.003 U/0.003 U
Manganese	0.013 J/0.014 J
Manganese (dissolved)	0.014 J/0.013 J
Mercury	0.0002 U/0.0002 U
Mercury (dissolved)	0.0002 U/0.0002 U
Nickel	0.0041 J/0.0042 J
Nickel (dissolved)	0.0041 J/0.0041 J
Thallium	0.001 U/0.001 U
Thallium (dissolved)	0.001 U/0.001 U
SVOC	
Benzo(a)pyrene	0.01 U/0.01 U
Benzo(b)fluoranthene	0.01 U/0.01 U
bis(2-Chloroethyl)ether	0.01 U/0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.01 U
Dibenz(a,h)anthracene	0.01 U/0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U

MW-X261Y356D-3	06/10/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0023 J
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.087 J
Iron (dissolved)	0.089 J
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0079 J
Manganese (dissolved)	0.0085 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X261Y356D-2	06/11/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0029 J
Arsenic (dissolved)	0.003 J
Chromium	0.059
Chromium (dissolved)	0.13 {A}
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	4.8
Iron (dissolved)	4.1
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.028
Manganese (dissolved)	0.025
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.016 J
Nickel (dissolved)	0.014 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X297Y305D-2	10/23/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.004 J
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.1 U
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.017
Manganese (dissolved)	0.018
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0025 J
Nickel (dissolved)	0.003 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X269Y201D-2	04/29/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0043 J
Arsenic (dissolved)	0.0039 J
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.001 J
Cobalt (dissolved)	0.0012 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.32
Iron (dissolved)	0.28
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.01 J
Manganese (dissolved)	0.0096 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0047 J
Nickel (dissolved)	0.0045 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X234Y157D-3	04/16/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.0027 J
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	1.4
Iron (dissolved)	1.3
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.011 J
Manganese (dissolved)	0.012 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

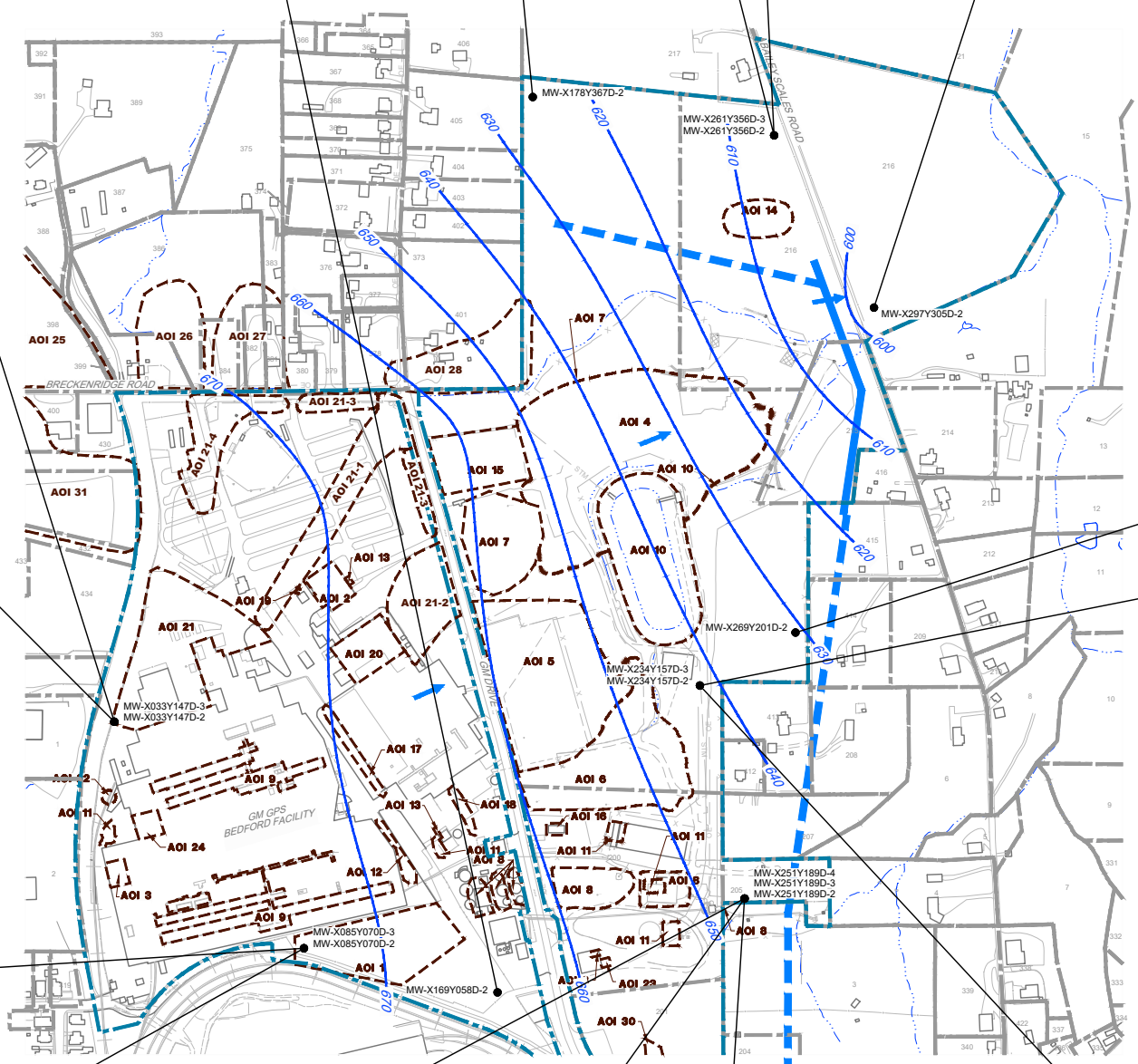
MW-X085Y070D-2	06/10/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.22 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0025 J
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.31
Iron (dissolved)	0.23
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.011 J
Manganese (dissolved)	0.01 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.003 J
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X251Y189D-4	06/09/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.13
Iron (dissolved)	0.095 J
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X251Y189D-3	05/15/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.0075 J
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.056 J
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.015 U
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X251Y189D-2	04/23/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.23
Iron (dissolved)	0.13
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0038 J
Manganese (dissolved)	0.0041 J
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X234Y157D-2	04/29/2003
INORG	
Aluminum	0.75/0.2 U
Aluminum (dissolved)	0.2 U/0.2 U
Antimony	0.06 U/0.06 U
Antimony (dissolved)	0.06 U/0.06 U
Arsenic	0.01 U/0.01 U
Arsenic (dissolved)	0.01 U/0.01 U
Chromium	0.01 U/0.01 U
Chromium (dissolved)	0.01 U/0.01 U
Cobalt	0.05 U/0.05 U
Cobalt (dissolved)	0.05 U/0.05 U
Copper	0.025 U/0.025 U
Copper (dissolved)	0.025 U/0.025 U
Cyanide (total)	0.01 U/0.01 U
Iron	0.34/0.26
Iron (dissolved)	0.23/0.23
Lead	0.003 U/0.003 U
Lead (dissolved)	0.003 U/0.003 U
Manganese	0.0054 J/0.0053 J
Manganese (dissolved)	0.0044 J/0.004 J
Mercury	0.0002 U/0.0002 U
Mercury (dissolved)	0.0002 U/0.0002 U
Nickel	0.04 U/0.04 U
Nickel (dissolved)	0.04 U/0.04 U
Thallium	0.001 U/0.001 U
Thallium (dissolved)	0.001 U/0.001 U
SVOC	
Benzo(a)pyrene	0.01 U/0.01 U
Benzo(b)fluoranthene	0.01 U/0.01 U
bis(2-Chloroethyl)ether	0.01 U/0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U/0.0069 J {A}
Dibenz(a,h)anthracene	0.01 U/0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U/0.001 U
Chlorobenzene	0.001 U/0.001 U
Vinyl chloride	0.001 U/0.001 U



MW-X085Y070D-2	06/10/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.22 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0025 J

SAMPLE LOCATION IDENTIFIER
DATE SAMPLE TAKEN
CONCENTRATION in mg/L
CHEMICAL NAME

0.13 {A} — RESULT EXCEEDS THE DRINKING WATER CRITERIA

0.2 U/0.75 — PARENT SAMPLE VALUE/DUPLICATE SAMPLE VALUE

J — THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY

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

NS — NOT SAMPLED

NOTES:

1 GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

2 WHERE CHROMIUM TOTAL RESULTS WERE SPECIATED, THE DATABOX SHOWS "SPEC"

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

AOI SUMMARY

AOI ID	Description
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

Chemical Name	Drinking Water Criteria (mg/L)
	{A}
Metals	
Aluminum	37
Aluminum (Dissolved)	37
Antimony	0.006
Antimony (Dissolved)	0.006
Arsenic	0.01
Arsenic (Dissolved)	0.01
Chromium III (Trivalent)	0.1
Chromium III (Trivalent) (Dissolved)	0.1
Chromium Total	0.1
Chromium Total (Dissolved)	0.1
Chromium VI (Hexavalent)	0.1
Chromium VI (Hexavalent) (Dissolved)	0.1
Iron	11
Iron (Dissolved)	11
Lead	0.015
Lead (Dissolved)	0.015
Manganese	0.88
Manganese (Dissolved)	0.88
Thallium	0.002
Thallium (Dissolved)	0.002
SVOCs	
bis(2-Ethylhexyl)phthalate	0.006
VOCs	
Chlorobenzene	0.1
Vinyl chloride	0.002

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- AOI BOUNDARY
- 580 — INTERMEDIATE GROUNDWATER FLOW CONTOUR (ft AMSL) (MAY 2015)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- PROPOSED PILOT TRENCH
- PROPOSED FUTURE TRENCH ALIGNMENT
- MW-X085Y070D-2 — GROUNDWATER SAMPLE LOCATION

SCALE VERIFICATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS INTERMEDIATE BEDROCK NON-PCB SAMPLE RESULTS

GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

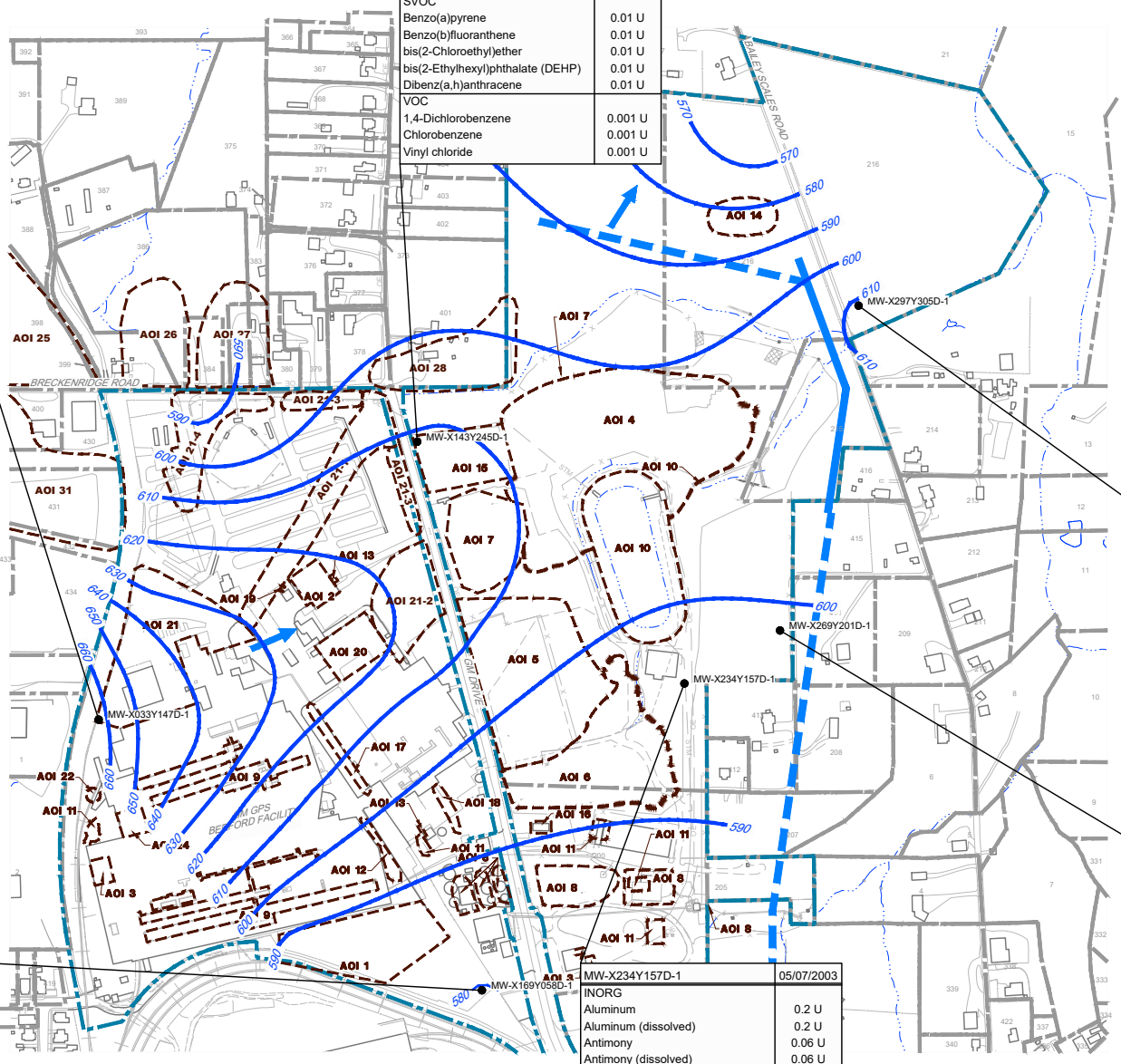
Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.20

13968-00(267)GN-WA086 SEP 30/2015

MW-X033Y147D-1	06/12/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.15 {A}
Chromium (dissolved)	0.12 {A}
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.17 J
Iron (dissolved)	0.21
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.02
Manganese (dissolved)	0.018
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X143Y245D-1	05/29/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.0017 J
Cobalt (dissolved)	0.002 J
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.1 U
Iron (dissolved)	0.1 U
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.038
Manganese (dissolved)	0.04
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.011 J
Nickel (dissolved)	0.012 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X297Y305D-1	10/24/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.0072 J
Arsenic (dissolved)	0.006 J
Chromium	1.3 {A}
Chromium (dissolved)	1.1 {A}
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.037
Copper (dissolved)	0.015 J
Cyanide (total)	0.01 U
Iron	0.94
Iron (dissolved)	0.77
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.038
Manganese (dissolved)	0.031
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.022 J
Nickel (dissolved)	0.018 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U



MW-X169Y058D-1	05/28/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.81
Iron (dissolved)	0.6
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.0076 J
Manganese (dissolved)	0.015 U
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X234Y157D-1	05/07/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.01 U
Chromium	0.01 U
Chromium (dissolved)	0.01 U
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.18
Iron (dissolved)	0.1
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.013 J
Manganese (dissolved)	0.017
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.04 U
Nickel (dissolved)	0.04 U
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

MW-X269Y201D-1	05/07/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U
Antimony (dissolved)	0.06 U
Arsenic	0.01 U
Arsenic (dissolved)	0.0038 J
Chromium	0.01 U
Chromium (dissolved)	0.0076 J
Cobalt	0.05 U
Cobalt (dissolved)	0.05 U
Copper	0.025 U
Copper (dissolved)	0.025 U
Cyanide (total)	0.01 U
Iron	0.35
Iron (dissolved)	0.32
Lead	0.003 U
Lead (dissolved)	0.003 U
Manganese	0.016
Manganese (dissolved)	0.016
Mercury	0.0002 U
Mercury (dissolved)	0.0002 U
Nickel	0.0052 J
Nickel (dissolved)	0.0062 J
Thallium	0.001 U
Thallium (dissolved)	0.001 U
SVOC	
Benzo(a)pyrene	0.01 U
Benzo(b)fluoranthene	0.01 U
bis(2-Chloroethyl)ether	0.01 U
bis(2-Ethylhexyl)phthalate (DEHP)	0.01 U
Dibenz(a,h)anthracene	0.01 U
VOC	
1,4-Dichlorobenzene	0.001 U
Chlorobenzene	0.001 U
Vinyl chloride	0.001 U

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
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AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road

AOI SUMMARY

AOI ID	Description
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

MW-X269Y201D-1	05/07/2003
INORG	
Aluminum	0.2 U
Aluminum (dissolved)	0.2 U
Antimony	0.06 U

SAMPLE LOCATION IDENTIFIER
DATE SAMPLE TAKEN
CONCENTRATION in mg/L
CHEMICAL NAME

1.1 {A} — RESULT EXCEEDS THE DRINKING WATER CRITERIA
J — THE ASSOCIATED VALUE IS AN ESTIMATED QUANTITY
U — THE ANALYTE WAS ANALYZED FOR, BUT WAS QUALIFIED NOT DETECTED ABOVE THE SAMPLE REPORT LIMIT
NS — NOT SAMPLED

NOTES:
1 GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

Chemical Name	Drinking Water Criteria (mg/L)
	{A}
Metals	
Aluminum	37
Aluminum (Dissolved)	37
Antimony	0.006
Antimony (Dissolved)	0.006
Arsenic	0.01
Arsenic (Dissolved)	0.01
Chromium III (Trivalent)	0.1
Chromium III (Trivalent) (Dissolved)	0.1
Chromium Total	0.1
Chromium Total (Dissolved)	0.1
Chromium VI (Hexavalent)	0.1
Chromium VI (Hexavalent) (Dissolved)	0.1
Iron	11
Iron (Dissolved)	11
Lead	0.015
Lead (Dissolved)	0.015
Manganese	0.88
Manganese (Dissolved)	0.88
Thallium	0.002
Thallium (Dissolved)	0.002
SVOCs	
bis(2-Ethylhexyl)phthalate	0.006
VOCs	
Chlorobenzene	0.1
Vinyl chloride	0.002

LEGEND
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PARCEL BOUNDARY
- AOI BOUNDARY
- 580 — DEEP GROUNDWATER FLOW CONTOUR (ft AMSL) (MAY 2015)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- PROPOSED PILOT TRENCH
- PROPOSED FUTURE TRENCH ALIGNMENT
- MW-X269Y201D-1 — GROUNDWATER SAMPLE LOCATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS
DEEP BEDROCK
NON-PCB SAMPLE RESULTS

GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	S.D.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.21

13968-00(267)GN-WA087 SEP 30/2015

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 the Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Area - Parcels 381 & 382
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

NOTES:

1 GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

2 SAMPLE RESULT UP TO JANUARY 2008

3 FUTURE MONITORING OF TRIBUTARY 3-3 WILL OCCUR ONCE THE COVER SYSTEM HAS BEEN SUCCESSFULLY CONSTRUCTED AND THE SURFACE WATER IS NO LONGER BEING COLLECTED

4 AFTER THE FIRST YEAR OF SEMI-ANNUAL MONITORING, THE MONITORING LOCATIONS AND FREQUENCIES WILL BE RE-EVALUATED WITH USEPA TO DETERMINE IF MODIFICATIONS TO THE PLAN WOULD BE APPROPRIATE FOR THE PURPOSES OF THIS CA750 DETERMINATION

LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY [1]
- APPROXIMATE PARCEL BOUNDARY [1]
- AOI BOUNDARY
- HISTORICAL NAPL PRESENCE
- GRAVITY DRAIN SYSTEM
- PROPOSED PILOT TRENCH
- PROPOSED FUTURE TRENCH ALIGNMENT

- TMW-X085Y070 — ALL SAMPLE RESULTS LESS THAN 0.5 µg/L PCBs
- TMW-X193Y251 — MOST RECENT SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- SU-X208Y096 — HISTORICAL SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- Spring K — NO SPRING SAMPLE
- Spring 1572 — SPRING SAMPLE RESULT LESS THAN 0.5 µg/L PCBs [2]
- Spring A — MOST RECENT SPRING SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- Spring H — HISTORICAL SPRING SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- TMW-X033Y147 — NO SAMPLE COLLECTED - INSUFFICIENT PARAMETER STABILIZATION
- TMW-X225Y080 — NO SAMPLE COLLECTED - LOCATION DRY
- CA750 SURFACE WATER SAMPLING LOCATION - PCBs
- SURFACE WATER MONITORING LOCATION NOT SAMPLED
- ALL SURFACE WATER MONITORING LOCATION SAMPLE RESULT LESS THAN 0.5 µg/L PCBs

SCALE VERIFICATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS OVERBURDEN PCB DELINEATION AND NAPL RESULTS

GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.22

13968-00(267)GN-WA088 SEP 29/2015

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
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AOI 20	Northern Portion of the Piston Building
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AOI 30	On-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400

0 100 200ft

BROOMSAGE ROAD
BAILEY'S BRANCH
NORTH JACKSON STREET
BRECKENRIDGE ROAD
BAILEY SALES ROAD
GM DRIVE
GM GPS BEDFORD FACILITY

PARCEL 295 WELL
PARCEL 20/296 WELL
550 North Jackson Street
PARCEL 217 WELL
PARCEL 368 WELL
PARCEL 390/392 WELL
PARCEL 388 WELL
PARCEL 372 WELL
MW-X178Y367D-5
MW-X178Y367D-4
MW-X178Y367D-3
MW-X261Y356D-5
MW-X261Y356D-4
MW-X060Y304 652.68
MW-X204Y288 631.43
MW-X043Y273 665.98
MW-X128Y255
MW-X045Y258D-3 685.90
MW-X045Y258D-2
228 Madison Street
MW-X047Y236 679.96
MW-X143Y245D-2
MW-X143Y245S
MW-X120Y203
B-X143Y193CG
MW-X043Y186
MW-X043Y176 686.28
MW-X033Y147D-4
MW-X033Y147S
MW-X012Y110 676.36
MW-X017Y105
MW-X012Y100
MW-X000Y105 674.71
MW-X022Y096 683.05
MW-X022Y094
MW-X012Y090 676.51
MW-X012Y078 679.68
MW-X085Y070S-2
MW-X085Y070S-1 683.80
MW-X105Y102
MW-X106Y102
MW-X169Y058I
MW-X169Y058D-3
MW-X169Y058S-2
MW-X169Y058S-1
MW-X190Y048
MW-X192Y048
MW-X214Y041 Abandoned 682.31
MW-X228Y032 Abandoned 681.61
MW-X234Y042 Abandoned 679.56
MW-X269Y201D-3
MW-X234Y157S 665.95
MW-X234Y157D-4
MW-X209Y053
MW-X211Y131 Abandoned
PARCEL 412 WELL
PARCEL 413 WELL
MW-X263Y128
MW-X233Y125A
MW-X233Y125B 680.38
MW-X233Y120A
MW-X233Y120B 681.10
MW-X233Y115A 684.22
MW-X233Y115B
MW-X233Y110A
MW-X233Y110B 678.93
MW-X233Y105A
MW-X233Y105B
MW-X233Y100 672.84
MW-X233Y095 657.80
MW-X220Y088S 660.79
MW-X233Y087S
MW-X209Y078S
MW-X225Y080S 653.78
MW-X233Y071B
MW-X233Y071A 653.89
MW-X242Y060S 655.31
MW-X227Y058 653.86
MW-X227Y054
MW-X227Y049
MW-X248Y100 668.28
MW-X251Y189D-7 654.40
MW-X251Y189D-6
MW-X251Y189D-5
MW-X257Y073 648.25
MW-X277Y100 649.75
MW-X272Y038 668.18
MW-X315Y115
MW-X315Y150
MW-X288Y005 663.77
MW-X367Y239 600.05
MW-X344Y230 602.38
MW-X318Y217
MW-X300Y199I-4
MW-X300Y199I-3
MW-X300Y199I-2
MW-X354Y200
MW-X361Y175 611.72
MW-X370Y178 613.10
MW-X358Y160
MW-X350Y144 615.74
MW-X350Y125 620.48
PZ08 619.21
PARCEL 5 E.WELL
PARCEL 5 W.WELL
PARCEL 207 WELL
PARCEL 414 WELL
PARCEL 209 210 WELL
PARCEL 211 212 WELL
PARCEL 208 WELL
PARCEL 415 WELL
PARCEL 416 WELL
Wet Well 1
Wet Well 2
Wet Well 3
SSC System H
CH-29D
CH-29B
CH-29C
CH-1B
CH-2A
CH-9A
CH-10A 677.66
CH-42
CH-42A
CH-43
CH-44
9-4
AOI 1
AOI 2
AOI 3
AOI 4
AOI 5
AOI 6
AOI 7
AOI 8
AOI 9
AOI 10
AOI 11
AOI 12
AOI 13
AOI 14
AOI 15
AOI 16
AOI 17
AOI 18
AOI 19
AOI 20
AOI 21
AOI 21-1
AOI 21-2
AOI 21-3
AOI 21-4
AOI 22
AOI 23
AOI 24
AOI 25
AOI 26
AOI 27
AOI 28
AOI 30
AOI 31

NOTE:

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LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY[2]
- APPROXIMATE PARCEL BOUNDARY [1]
- AOI BOUNDARY
- HISTORICAL NAPL PRESENCE
- 680 SHALLOW GROUNDWATER FLOW CONTOUR (ft AMSL) (MAY 21015)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW

- MW-X012Y078 — ALL SAMPLE RESULTS LESS THAN 0.5 µg/L PCBs
- MW-X000Y105 — MOST RECENT SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- MW-X209Y053 — HISTORICAL SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs
- CA750 GROUNDWATER SAMPLING LOCATION - PCBs
- CA750 NAPL AND GROUNDWATER GAUGING LOCATION
- LOCATION TO BE MONITORED FOR NAPL PRESENCE AND SAMPLED FOR PCBs IF NAPL/SHEEN NOT PRESENT
- 679.68 — GROUNDWATER ELEVATION (ft AMSL)

- PROPOSED PILOT TRENCH
- PROPOSED FUTURE TRENCH ALIGNMENT
- PZ08 — NO SAMPLE COLLECTED - INSUFFICIENT PARAMETER STABILIZATION
- MW-X225Y080S — NO SAMPLE COLLECTED - LOCATION DRY
- MW-X105Y102 — NO SAMPLE COLLECTED - DYE INJECTION LOCATION
- CH-5 — NO SAMPLE COLLECTED - NAPL PRESENT
- MW-X192Y048 — NEW LOCATION - NO SAMPLE ATTEMPT MADE TO DATE

SCALE VERIFICATION

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

0 10 30ft

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS SHALLOW BEDROCK PCB DELINEATION AND NAPL RESULTS

GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.23

13968-00(267)GN-WA089 SEP 30/2015

AOI SUMMARY

AOI ID	Description
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AOI 3	PCB Storage Areas
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BROOMSAGE ROAD
BAILEY'S BRANCH
NORTH JACKSON STREET
BAILEY SCALES ROAD
BRECKENRIDGE ROAD
GM DRIVE
GM GPS BEDFORD FACILITY
PROPOSED WET WELL
PARCEL 208 WELL
MW-X178Y367D-2
MW-X261Y356D-3
MW-X261Y356D-2
559.10
MW-X297Y305D-2
593.20
MW-X318Y217
MW-X300Y199I-1
MW-X269Y201D-2
MW-X234Y157D-3
MW-X234Y157D-2
641.30
MW-X033Y147D-3
MW-X033Y147D-2
MW-X251Y189D-4
MW-X251Y189D-3
MW-X251Y189D-2
MW-X085Y070D-3
MW-X085Y070D-2
668.90
MW-X169Y058D-2
661.10
0 100 200ft

NOTE:

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LEGEND

- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY [1]
- APPROXIMATE PARCEL BOUNDARY [1]
- AOI BOUNDARY
- PROPOSED FUTURE TRENCH ALIGNMENT
- PROPOSED PILOT TRENCH

580 — INTERMEDIATE GROUNDWATER FLOW CONTOUR (ft AMSL) (MAY 2015)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

MW-X085Y070D-2 — ALL SAMPLE RESULTS LESS THAN 0.5 µg/L PCBs

MW-X178Y367D-2 — HISTORICAL SAMPLE RESULT GREATER THAN 0.5 µg/L PCBs

668.90 — GROUNDWATER ELEVATION (ft AMSL)

CA750 GROUNDWATER SAMPLING LOCATION - PCBs

SCALE VERIFICATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS INTERMEDIATE BEDROCK PCB DELINEATION AND NAPL RESULTS

GHD

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001. AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 267	Drawing Nº: figure 7.24

13968-00(267)GN-WA090 SEP 30/2015

AOI SUMMARY

AOI ID	Description
AOI 1	Former Railroad Operations and Minerals Processing Facility
AOI 2	Waste Storage Area
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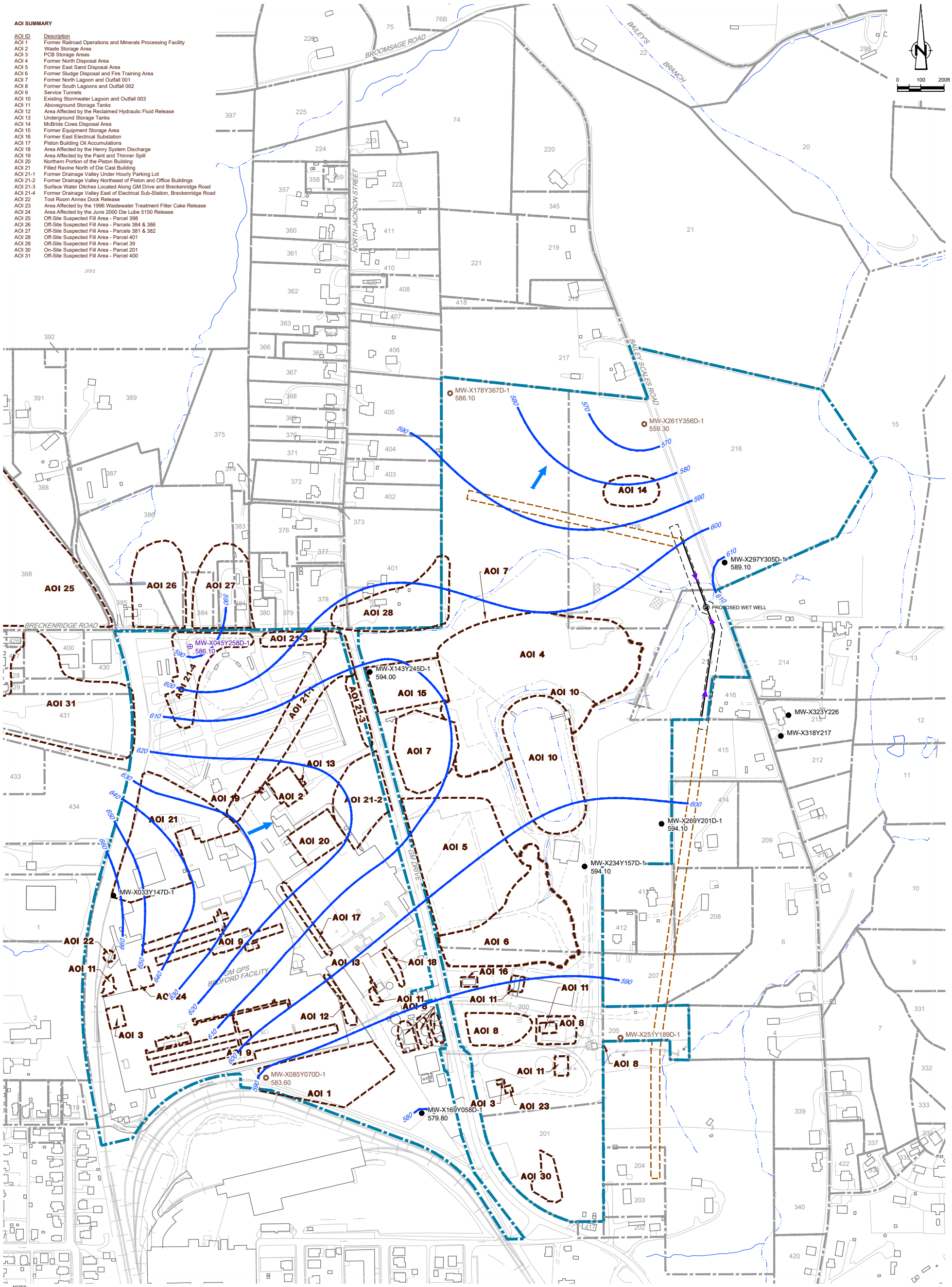

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- PROPOSED PILOT TRENCH

- 580 — DEEP GROUNDWATER FLOW CONTOUR (ft AMSL) (MAY 2015)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
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- MW-X045Y258D-1 — NO SAMPLE COLLECTED - INSUFFICIENT PARAMETER STABILIZATION
- MW-X251Y189D-1 — NO SAMPLE COLLECTED - LOCATION DRY
- 579.80 — GROUNDWATER ELEVATION (ft AMSL)

SCALE VERIFICATION

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

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

GROUNDWATER SAMPLE LOCATIONS
DEEP BEDROCK
PCB DELINEATION AND NAPL RESULTS

GHD

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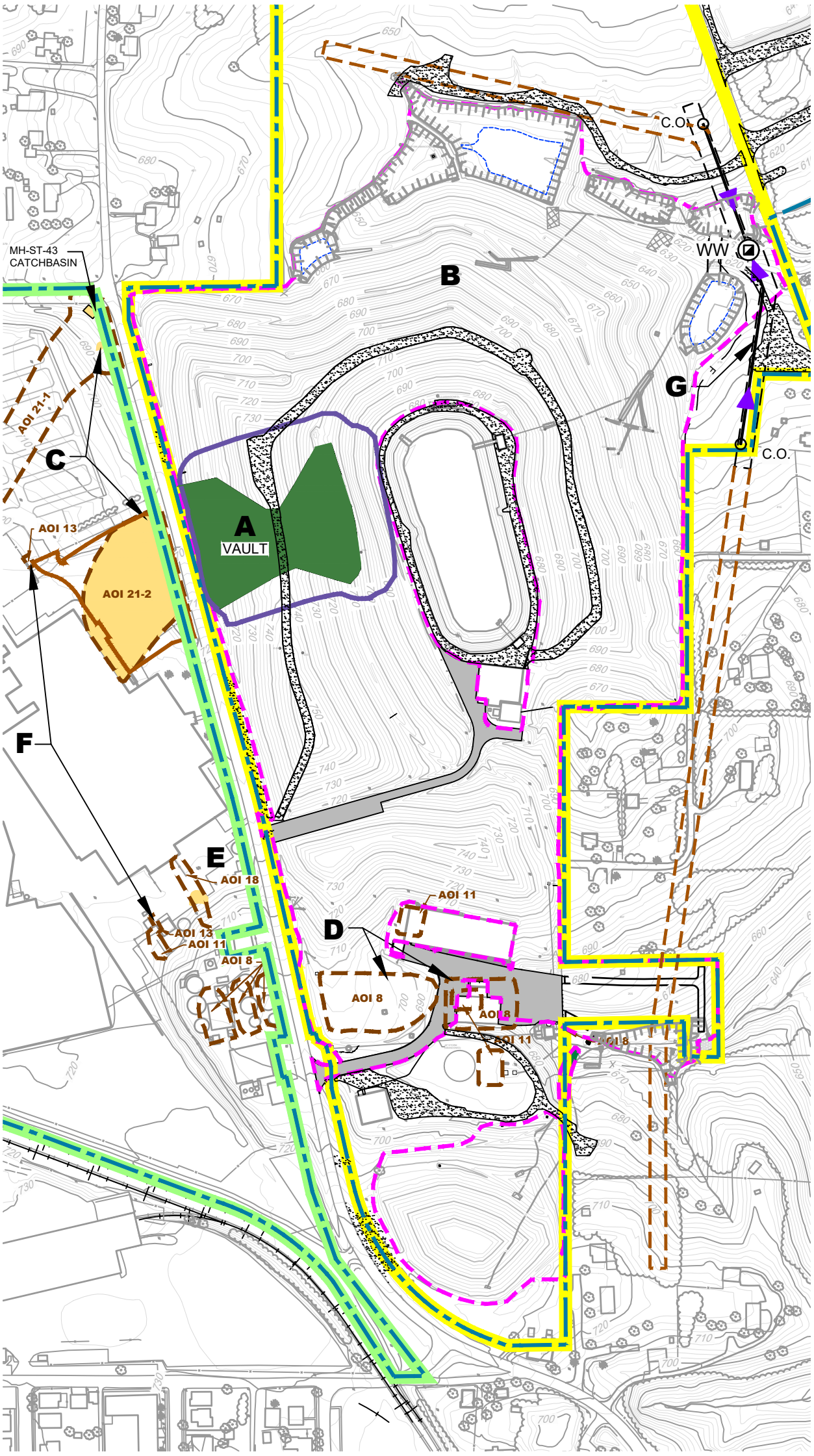
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT MI. APRIL 2001.
AND CRA SURVEYS 2002 TO 2005

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project №: 13968-00	Report №: 267	Drawing №: figure 7.25

13968-00(267)GN-WA091 SEP 30/2015



0 100 300ft

LEGEND

- GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- EXISTING RAILROAD TRACKS
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE FACILITY BOUNDARY
- WEST PLANT AREA BOUNDARY
- EAST PLANT AREA BOUNDARY
- VAULT LIMIT
- FINAL VAULT COVER SYSTEM AT SURFACE
- WEST PLANT COVER LIMIT
- SOIL EXCAVATIONS AT AOIs 18, 21-1, AND 21-2
- EAST PLANT COVER LIMIT
- PAVED COVER SURFACE
- GRAVEL
- FUTURE TRENCH ALIGNMENT
- PROPOSED GROUNDWATER COLLECTION TRENCH AND FLOW DIRECTION
- WW — PROPOSED WET WELL
- C.O. — PROPOSED TEMPORARY CLEANOUT

AOI SUMMARY

AOI ID	Description
AOI 8	Former South Lagoons and Outfall 002
AOI 13	Underground Storage Tanks
AOI 18	Area Affected by the Henry System Discharge
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings

RCRA CA INTERIM MEASURES

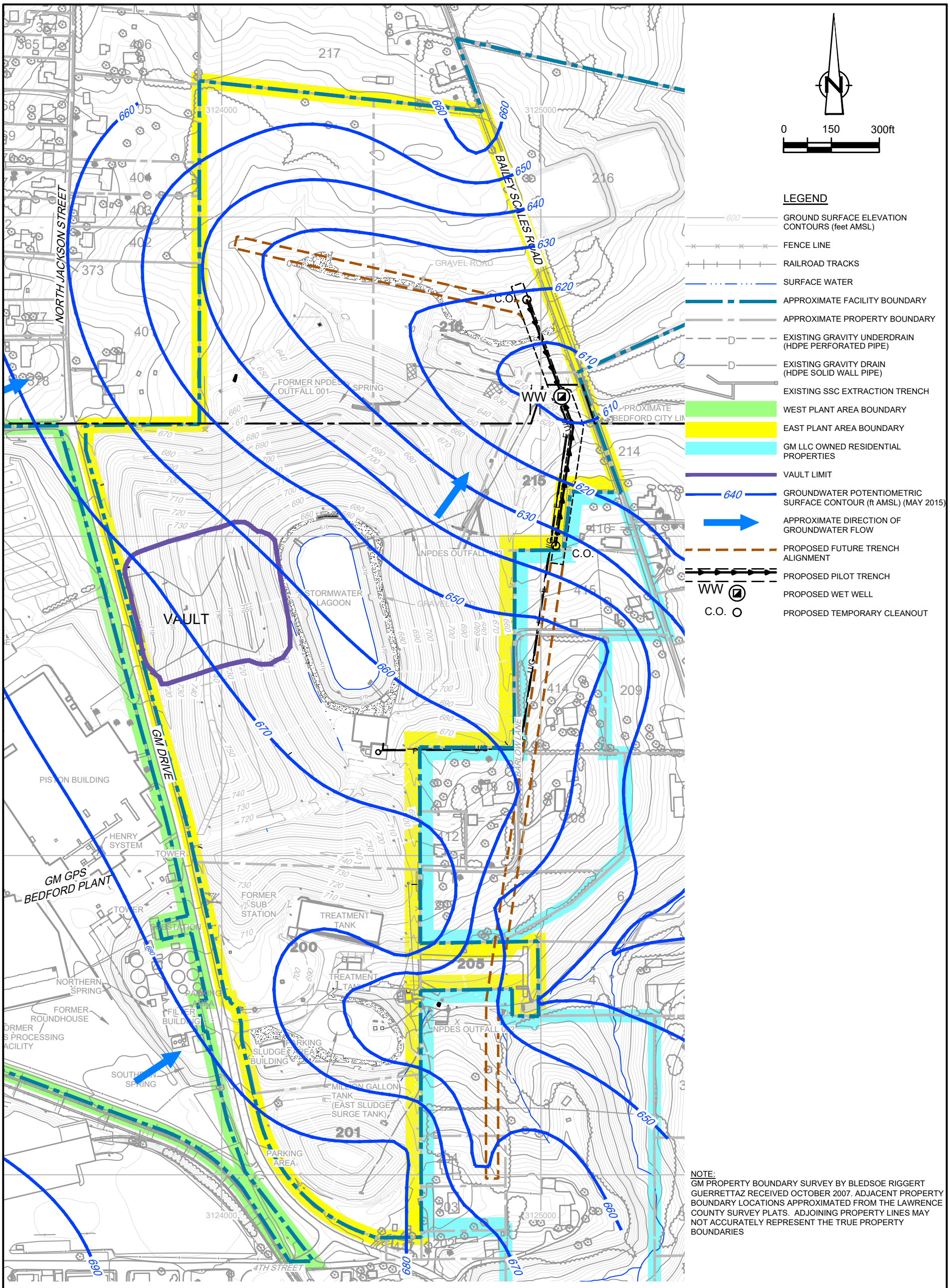
A	VAULT
B	COVER SYSTEM
C	SOIL EXCAVATION AND COVER SYSTEM AT AOIs 21-1 AND 21-2
D	AOI 8 PRODUCT RECOVERY
E	SOIL EXCAVATION AND COVER SYSTEM AT AOI 18
F	USTs CLOSED
G	GROUNDWATER COLLECTION TRENCH

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2013

NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 8.1

SUMMARY OF ON-SITE REMEDIATION RCRA CA IM ACTIVITIES
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana



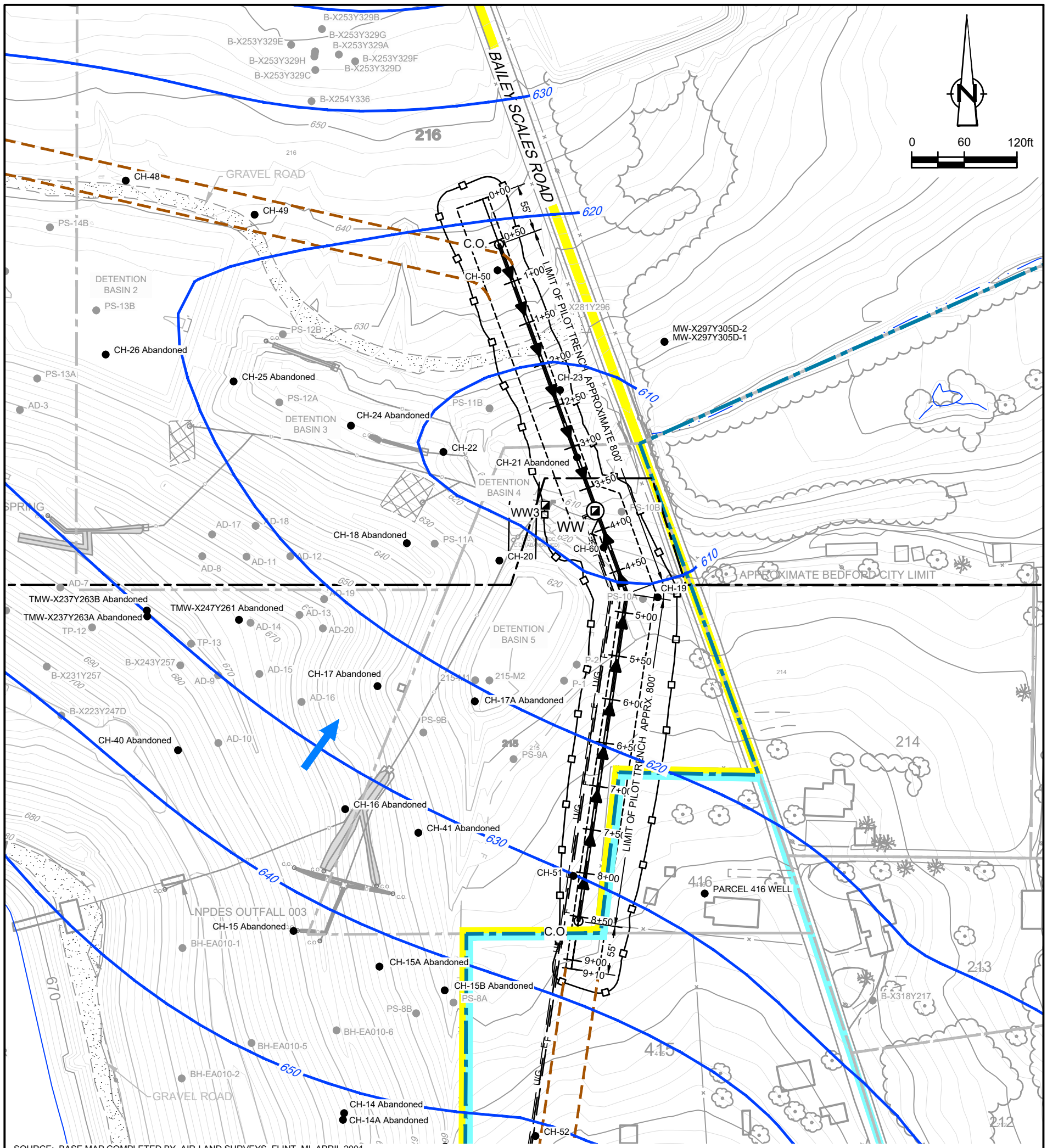
NOTE:
GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

figure 8.2

PERIMETER TRENCH GROUNDWATER COLLECTION SYSTEM ALIGNMENT
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

LEGEND

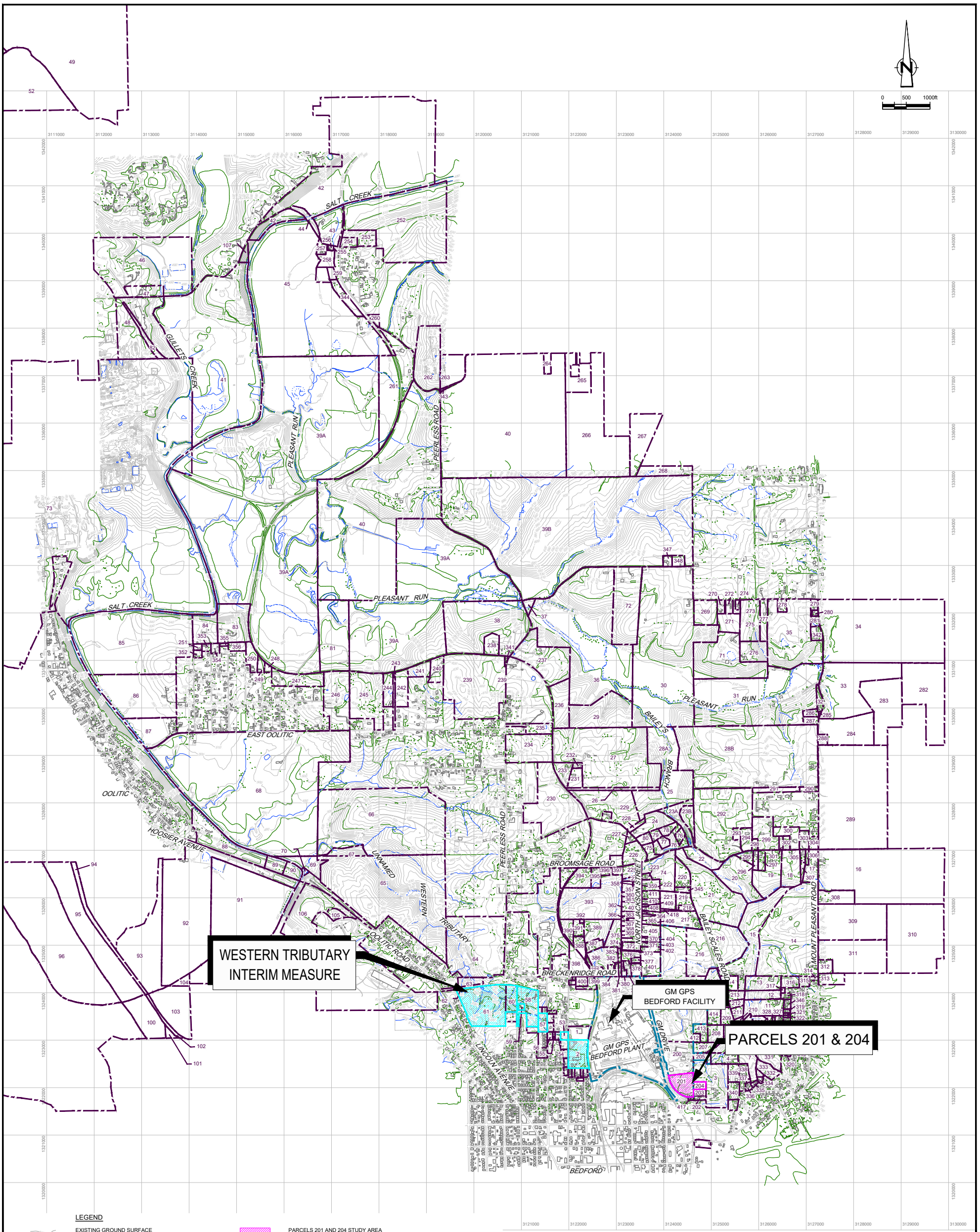
- GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- FENCE LINE
- SURFACE WATER
- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING SSC EXTRACTION TRENCH
- EXISTING BOREHOLE LOCATION
- EXISTING WET WELL LOCATION
- EXISTING COREHOLE AND MONITORING WELL LOCATION
- EAST PLANT AREA BOUNDARY
- GM LLC OWNED RESIDENTIAL PROPERTIES
- PROPOSED FUTURE TRENCH ALIGNMENT
- GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (ft AMSL) (MAY 2015)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- PROPOSED PILOT TRENCH
- PROPOSED SILT FENCE
- PROPOSED WET WELL
- PROPOSED TEMPORARY CLEANOUT

NOTE:
GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

figure 8.3

PROPOSED GROUNDWATER COLLECTION SYSTEM PILOT TRENCH ALIGNMENT
RFI REPORT
GM GPS BEDFORD FACILITY
Bedford, Indiana

GHD



№	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

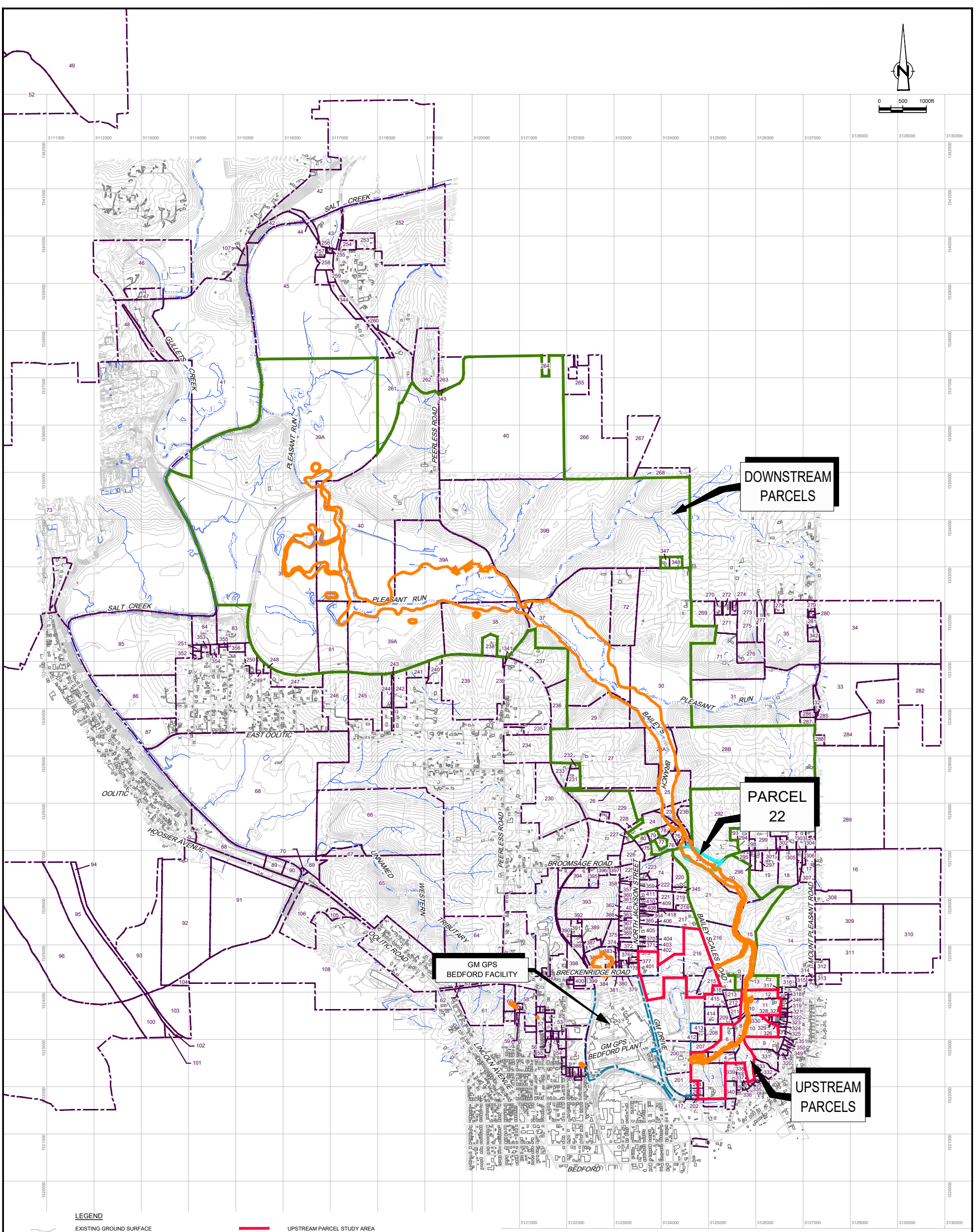
OFF-SITE RCRA REMEDIATION PARCELS

GHD

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

Project Manager:	Reviewed By:	Date:	
J.D.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project №: 13968-00	Report №: 267	Drawing №: figure 8.4

13968-00(267)GN-WA099 SEP 30/2015



LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING BUILDINGS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PARCEL BOUNDARY
- APPROXIMATE FACILITY BOUNDARY
- UPSTREAM PARCEL STUDY AREA
- PARCEL 22 STUDY AREA
- DOWNSTREAM PARCEL STUDY AREA
- OFF-SITE RESIDENTIAL CLEAN-UP EXCAVATION LIMITS

NOTE: GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

№	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

GM GPS BEDFORD FACILITY
BEDFORD, INDIANA

RFI REPORT

CERCLA REMOVAL ACTION EXCAVATION

GHD

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

Project Manager:	Reviewed By:	Date:	
J.D.	P.G.	SEPTEMBER 2015	
Scale: AS SHOWN	Project №: 13968-00	Report №: 267	Drawing №: figure 8.5

13968-00(267)GN-WA132 SEP 28/2015

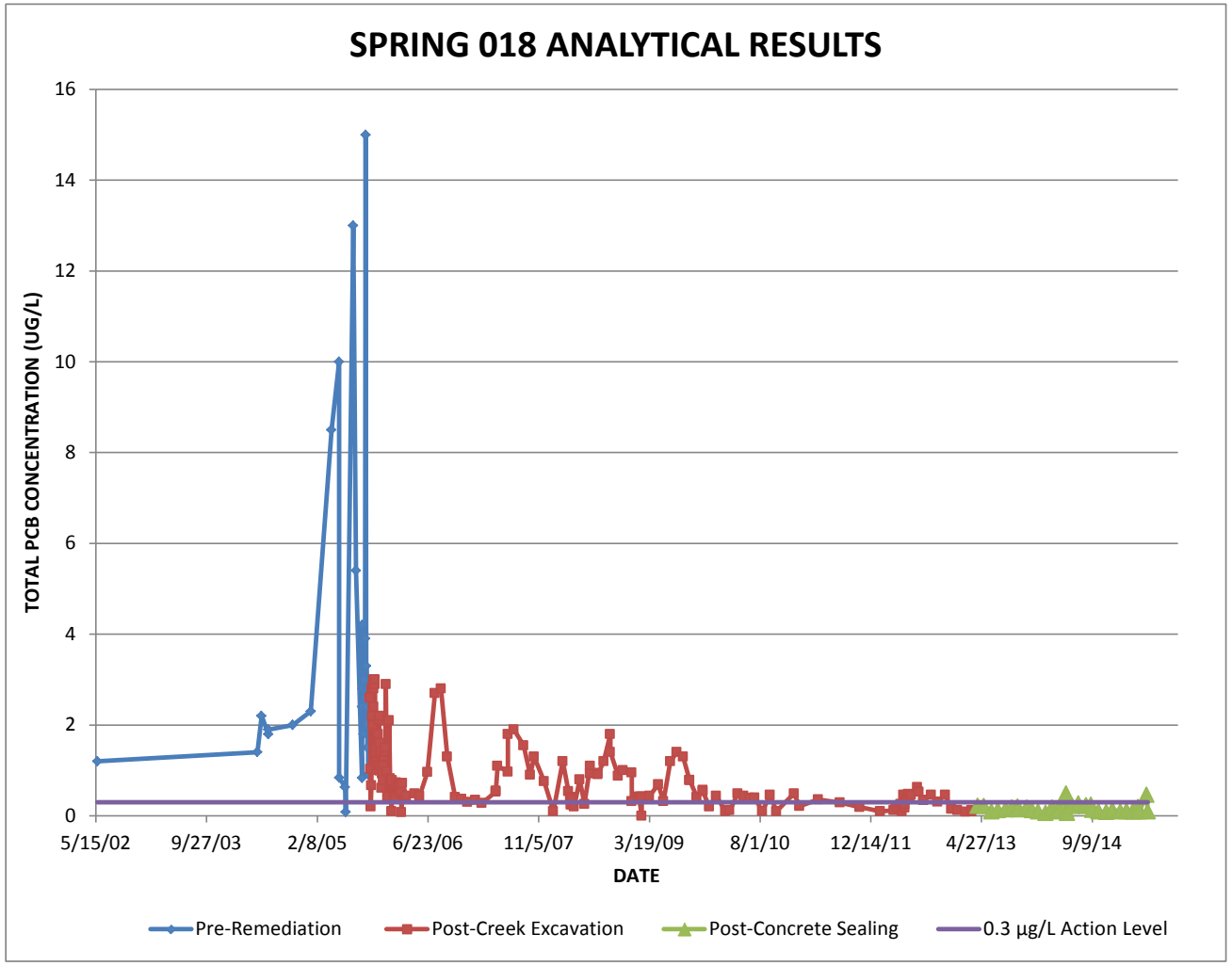


figure 8.6

SPRING 018 ANALYTICAL RESULTS

RFI REPORT

GM GPS BEDFORD FACILITY

Bedford, Indiana

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
7-1	704.6	24.5	0.0	704.6	24.5	680.1	24.5	24.5	680.1	--	--	--	--	--	--	--	--
7-2	696.3	21.0	0.0	696.3	21.0	675.3	21.0	21.0	675.3	--	--	--	--	--	--	--	--
7-3	691.9	22.5	0.0	691.9	22.5	669.4	22.5	22.5	669.4	--	--	--	--	--	--	--	--
7-4	691.9	19.5	0.0	691.9	19.5	672.4	19.5	19.5	672.4	--	--	--	--	--	--	--	--
7-5	697.9	22.0	0.0	697.9	22.0	675.9	22.0	22.0	675.9	--	--	--	--	--	--	--	--
7-6	696.9	21.0	0.0	696.9	21.0	675.9	21.0	21.0	675.9	--	--	--	--	--	--	--	--
7-7	691.3	26.0	0.0	691.3	26.0	665.3	26.0	26.0	665.3	--	--	--	--	--	--	--	--
9-1	678.4	51.8	0.0	678.4	11.2	667.2	11.2	--	--	--	--	--	11.2	667.2	--	--	--
9-2	678.6	52.8	0.0	678.6	14.0	664.6	14.0	--	--	--	--	--	14.0	664.6	--	--	--
9-3	680.3	52.3	0.0	680.3	19.8	660.5	19.8	--	--	--	--	--	19.8	660.5	--	--	--
9-4	679.2	54.1	0.0	679.2	21.3	657.9	21.3	--	--	--	--	--	21.3	657.9	--	--	--
15-1	588.1	25.1	0.0	588.1	6.0	582.1	6.0	--	--	--	--	--	--	--	--	--	--
15-2	585.6	43.1	0.0	585.6	4.0	581.6	4.0	--	--	--	--	--	--	--	--	--	--
15-3	607.3	94.4	0.0	607.3	4.0	603.3	4.0	--	--	--	--	--	--	--	--	--	--
15-4	591.6	34.2	0.0	591.6	4.7	586.9	4.7	--	--	--	--	--	--	--	--	--	--
15-5	591.2	34.5	0.0	591.2	7.0	584.2	7.0	--	--	--	--	--	--	--	--	--	--
15-6	590.0	37.5	0.0	590.0	4.5	585.5	4.5	--	--	--	--	--	--	--	--	--	--
15-6I	592.0	49.5	0.0	592.0	4.0	587.96	4.0	--	--	--	--	--	--	--	--	--	--
15-6D	591.7	77.0	0.0	591.7	2.5	589.2	2.5	--	--	--	--	--	--	--	--	--	--
15-7	610.5	64.6	0.0	610.5	5.5	605.0	5.5	--	--	--	--	--	--	--	--	--	--
15-8	585.4	28.0	0.0	585.4	5.7	579.7	5.7	--	--	--	--	--	--	--	--	--	--
15-9	570.3	9.1	0.0	570.3	7.4	562.9	7.4	--	--	--	--	--	--	--	--	--	--
15-10	580.2	33.1	0.0	580.2	5.5	574.7	5.5	--	--	--	--	--	--	--	--	--	--
15-11	578.1	22.5	0.0	578.1	4.5	573.6	4.5	--	--	--	--	--	--	--	--	--	--
15-12	598.4	44.9	0.0	598.4	5.0	593.4	5.0	--	--	--	--	--	--	--	--	--	--
15-13	575.2	24.3	0.0	575.2	8.0	567.2	8.0	--	--	--	--	--	--	--	--	--	--
15-14	582.8	26.1	0.0	582.8	3.0	579.8	3.0	--	--	--	--	--	--	--	--	--	--
15-15	578.3	28.5	0.0	578.3	2.5	575.8	2.5	--	--	--	--	--	--	--	--	--	--
15-16	605.2	64.7	0.0	605.2	5.0	600.2	5.0	--	--	--	--	--	--	--	--	--	--
15-17	613.5	64.9	0.0	613.5	15.0	598.5	15.0	--	--	--	--	--	--	--	--	--	--
15-18	603.4	55.0	0.0	603.4	6.0	597.4	6.0	--	--	--	--	--	--	--	--	--	--
15-19	600.4	49.8	0.0	600.4	5.5	594.9	5.5	--	--	--	--	--	--	--	--	--	--
15-20	599.3	39.2	0.0	599.3	5.0	594.3	5.0	--	--	--	--	--	--	--	--	--	--
AD-1	651.7	5.0	0.0	651.7	5.0	646.7	5.0	--	--	--	--	--	5.0	646.7	--	--	--
AD-2	647.3	3.5	0.0	647.3	3.5	643.8	3.5	--	--	--	--	--	3.5	643.8	--	--	--
AD-3	638.7	3.0	0.0	638.7	3.0	635.7	3.0	--	--	--	--	--	3.0	635.7	--	--	--
AD-4	691.7	17.0	0.0	691.7	17.0	674.7	17.0	17.0	674.7	--	--	--	--	--	--	--	--
AD-5	693.9	21.5	0.0	693.9	21.5	672.4	21.5	21.5	672.4	--	--	--	--	--	--	--	--
AD-6	663.5	19.5	0.0	663.5	19.5	644.0	19.5	--	--	--	--	--	19.5	644.0	--	--	--
AD-7	651.0	15.0	0.0	651.0	15.0	636.0	15.0	--	--	--	--	--	15.0	636.0	--	--	--
AD-8	635.9	8.0	0.0	635.9	8.0	627.9	8.0	--	--	--	--	--	8.0	627.9	--	--	--
AD-9	653.2	19.0	0.0	653.2	19.0	634.2	19.0	--	--	--	--	--	19.0	634.2	--	--	--
AD-10	649.2	7.0	0.0	649.2	7.0	642.2	7.0	--	--	--	--	--	7.0	642.2	--	--	--
AD-11	633.3	4.5	0.0	633.3	4.5	628.8	4.5	--	--	--	--	--	4.5	628.8	--	--	--
AD-12	630.9	3.8	0.0	630.9	3.8	627.1	3.8	--	--	--	--	--	3.8	627.1	--	--	--
AD-13	635.0	5.5	0.0	635.0	5.5	629.5	5.5	--	--	--	--	--	5.5	629.5	--	--	--
AD-14	649.3	17.0	0.0	649.3	17.0	632.3	17.0	--	--	--	--	--	17.0	632.3	--	--	--
AD-15	648.5	5.0	0.0	648.5	5.0	643.5	5.0	--	--	--	--	--	5.0	643.5	--	--	--
AD-16	639.8	5.5	0.0	639.8	5.5	634.3	5.5	--	--	--	--	--	5.5	634.3	--	--	--
AD-17	632.5	5.1	0.0	632.5	5.1	627.4	5.1	--	--	--	--	--	5.1	627.4	--	--	--
AD-18	632.4	6.1	0.0	632.4	6.1	626.3	6.1	--	--	--	--	--	6.1	626.3	--	--	--
AD-19	632.0	3.7	0.0	632.0	3.7	628.3	3.7	--	--	--	--	--	3.7	628.3	--	--	--
AD-20	631.1	3.1	0.0	631.1	3.1	628.0	3.1	--	--	--	--	--	3.1	628.0	--	--	--
B-809012-1	661.1	17.0	0.0	661.1	17.0	644.1	17.0	--	--	--	--	--	17.0	644.1	--	--	--
B-809012-10	645.4	27.5	0.0	645.4	27.5	617.9	27.5	--	--	--	--	--	27.5	617.9	--	--	--
B-809012-11	643.6	2.5	0.0	643.6	2.5	641.1	2.5	--	--	--	--	--	2.5	641.1	--	--	--
B-809012-12	643.1	28.0	0.0	643.1	28.0	615.1	28.0	--	--	--	--	--	28.0	615.1	--	--	--
B-809012-13	639.5	4.9	0.0	639.5	4.9	634.6	4.9	--	--	--	--	--	4.9	634.6	--	--	--
B-809012-14	642.1	4.4	0.0	642.1	4.4	637.7	4.4	--	--	--	--	--	4.4	637.7	--	--	--
B-809012-15	642.4	27.9	0.0	642.4	27.9	614.5	27.9	--	--	--	--	--	27.9	614.5	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
7-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15-1	6.0	582.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15-2	4.0	581.6	27.9	557.7	23.9	27.9	557.7	--	--	--	--	--	--	--	--	--	--
15-3	4.0	603.3	45.9	561.4	41.9	45.9	561.4	66.2	541.1	20.3	66.2	541.1	86.4	520.9	20.2	86.4	520.9
15-4	4.7	586.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15-5	7.0	584.2	31.5	559.7	24.5	31.5	559.7	--	--	--	--	--	--	--	--	--	--
15-6	4.5	585.5	31.3	558.7	26.8	31.3	558.7	--	--	--	--	--	--	--	--	--	--
15-6I	4.0	587.96	33.3	558.66	29.3	33.3	558.66	--	--	--	--	--	--	--	--	--	--
15-6D	2.5	589.2	33.0	558.7	30.5	33.0	558.7	55.9	535.8	22.9	55.9	535.8	74.6	517.1	18.7	74.6	517.0
15-7	5.5	605.0	53.0	557.5	47.5	53.0	557.5	--	--	--	--	--	--	--	--	--	--
15-8	5.7	579.7	26.6	558.8	20.9	26.6	558.8	--	--	--	--	--	--	--	--	--	--
15-9	7.4	562.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15-10	5.5	574.7	18.2	562.0	12.7	18.2	562.0	--	--	--	--	--	--	--	--	--	--
15-11	4.5	573.6	21.8	556.3	17.3	21.8	556.3	--	--	--	--	--	--	--	--	--	--
15-12	5.0	593.4	40.6	557.8	35.6	40.6	557.8	--	--	--	--	--	--	--	--	--	--
15-13	8.0	567.2	13.0	562.2	5.0	13.0	562.2	--	--	--	--	--	--	--	--	--	--
15-14	3.0	579.8	24.6	558.2	21.6	24.6	558.2	--	--	--	--	--	--	--	--	--	--
15-15	2.5	575.8	18.7	559.6	16.2	18.7	559.6	--	--	--	--	--	--	--	--	--	--
15-16	5.0	600.2	48.1	557.1	43.1	48.1	557.1	--	--	--	--	--	--	--	--	--	--
15-17	15.0	598.5	50.7	562.8	35.7	50.7	562.8	--	--	--	--	--	--	--	--	--	--
15-18	6.0	597.4	42.4	561.0	36.4	42.4	561.0	--	--	--	--	--	--	--	--	--	--
15-19	5.5	594.9	42.1	558.3	36.6	42.1	558.3	--	--	--	--	--	--	--	--	--	--
15-20	5.0	594.3	38.2	561.1	33.2	38.2	561.1	--	--	--	--	--	--	--	--	--	--
AD-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AD-20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
B-809012-16	658.9	8.0	0.0	658.9	8.0	650.9	8.0	--	--	--	--	--	8.0	650.9	--	--	--
B-809012-17	660.4	3.0	0.0	660.4	3.0	657.4	3.0	--	--	--	--	--	3.0	657.4	--	--	--
B-809012-18	658.6	6.0	0.0	658.6	6.0	652.6	6.0	--	--	--	--	--	6.0	652.6	--	--	--
B-809012-19	647.7	2.0	0.0	647.7	2.0	645.7	2.0	--	--	--	--	--	2.0	645.7	--	--	--
B-809012-2	661.2	11.5	0.0	661.2	11.5	649.7	11.5	--	--	--	--	--	11.5	649.7	--	--	--
B-809012-20	648.7	2.0	0.0	648.7	2.0	646.7	2.0	--	--	--	--	--	2.0	646.7	--	--	--
B-809012-21	642.9	2.0	0.0	642.9	2.0	640.9	2.0	--	--	--	--	--	2.0	640.9	--	--	--
B-809012-22	642.0	4.0	0.0	642.0	4.0	638.0	4.0	--	--	--	--	--	4.0	638.0	--	--	--
B-809012-23	666.0	7.0	0.0	666.0	7.0	659.0	7.0	--	--	--	--	--	7.0	659.0	--	--	--
B-809012-3	659.9	8.5	0.0	659.9	8.5	651.4	8.5	--	--	--	--	--	8.5	651.4	--	--	--
B-809012-4	656.5	12.0	0.0	656.5	12.0	644.5	12.0	--	--	--	--	--	12.0	644.5	--	--	--
B-809012-5	660.6	6.0	0.0	660.6	6.0	654.6	6.0	--	--	--	--	--	6.0	654.6	--	--	--
B-809012-6	658.0	12.0	0.0	658.0	12.0	646.0	12.0	--	--	--	--	--	12.0	646.0	--	--	--
B-809012-7	654.0	4.0	0.0	654.0	4.0	650.0	4.0	--	--	--	--	--	4.0	650.0	--	--	--
B-809012-8	657.3	16.0	0.0	657.3	16.0	641.3	16.0	--	--	--	--	--	16.0	641.3	--	--	--
B-809012-9	664.2	4.0	0.0	664.2	4.0	660.2	4.0	--	--	--	--	--	4.0	660.2	--	--	--
B-X031Y124	721.5	34.0	0.0	721.5	33.2	688.3	33.2	--	--	--	--	--	33.2	688.3	--	--	--
B-X031Y124A	721.6	32.4	0.0	721.6	32.0	689.6	32.0	32.0	689.6	--	--	--	--	--	--	--	--
B-X031Y124B	721.7	34.0	0.0	721.7	33.5	688.2	33.5	33.5	688.2	--	--	--	--	--	--	--	--
B-X031Y124C	721.5	33.3	0.0	721.5	33.0	688.5	33.0	33.0	688.5	--	--	--	--	--	--	--	--
B-X031Y124D	721.1	32.9	0.0	721.1	32.0	689.1	32.0	32.0	689.1	--	--	--	--	--	--	--	--
B-X045Y172	719.0	20.0	0.0	719.0	20.0	699.0	20.0	20.0	699.0	--	--	--	--	--	--	--	--
B-X045Y258A	698.5	6.5	0.0	698.5	6.1	692.4	6.1	6.1	692.4	--	--	--	--	--	--	--	--
B-X047Y072	724.2	56.0	0.0	724.2	35.8	688.4	35.8	35.8	688.4	--	--	--	--	--	--	--	--
B-X047Y123	726.7	(A-E = Refusal on Concrete)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X047Y236	691.1	11.5	0.0	691.1	3.5	687.6	3.5	3.5	687.6	--	--	--	--	--	--	--	--
B-X048Y086	724.3	56.8	0.0	724.3	33.0	691.3	33.0	33.0	691.3	--	--	--	--	--	--	--	--
B-X049Y198	719.6	38.0	0.0	719.6	37.5	682.1	37.5	37.5	682.1	--	--	--	--	--	--	--	--
B-X057Y272A	694.0	28.4	0.0	694.0	28.4	665.6	28.4	28.4	665.6	--	--	--	--	--	--	--	--
B-X057Y272B	693.6	24.0	0.0	693.6	24.0	669.6	24.0	24.0	669.6	--	--	--	--	--	--	--	--
B-X057Y272C	693.7	24.5	0.0	693.7	24.5	669.2	24.5	24.5	669.2	--	--	--	--	--	--	--	--
B-X059Y135B	727.2	63.5	0.0	727.2	42.5	684.7	42.5	42.5	684.7	--	--	--	--	--	--	--	--
B-X059Y160	721.8	33.0	0.0	721.8	33.0	688.8	33.0	33.0	688.8	--	--	--	--	--	--	--	--
B-X069Y098B	724.1	44.5	0.0	724.1	22.0	702.1	22.0	22.0	702.1	--	--	--	--	--	--	--	--
B-X075Y183B	721.3	32.5	0.0	721.3	32.5	688.8	32.5	32.5	688.8	--	--	--	--	--	--	--	--
B-X080Y210	718.1	34.5	0.0	718.1	33.0	685.1	33.0	33.0	685.1	--	--	--	--	--	--	--	--
B-X082Y186A	722.8	34.0	0.0	722.8	34.0	688.8	34.0	34.0	688.8	--	--	--	--	--	--	--	--
B-X082Y186B	723.1	39.2	0.0	723.1	39.2	683.9	39.2	39.2	683.9	--	--	--	--	--	--	--	--
B-X082Y186C	723.4	39.0	0.0	723.4	39.0	684.4	39.0	39.0	684.4	--	--	--	--	--	--	--	--
B-X082Y186D	722.5	37.1	0.0	722.5	37.1	685.4	37.1	37.1	685.4	--	--	--	--	--	--	--	--
B-X084Y138B	726.9	(A-B = Refusal on Concrete)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X086Y274	693.3	57.7	0.0	693.3	6.5	686.8	6.5	6.5	686.8	--	--	--	--	--	--	--	--
B-X089Y258	702.6	10.0	0.0	702.6	10.0	692.6	10.0	10.0	692.6	--	--	--	--	--	--	--	--
B-X093Y090	724.3	45.8	0.0	724.3	24.5	699.8	24.5	24.5	699.8	--	--	--	--	--	--	--	--
B-X095Y206A	721.6	29.4	0.0	721.6	29.4	692.2	29.4	29.4	692.2	--	--	--	--	--	--	--	--
B-X095Y206B	722.3	24.0	0.0	722.3	24.0	698.3	24.0	24.0	698.3	--	--	--	--	--	--	--	--
B-X095Y206C	721.3	28.3	0.0	721.3	28.3	693.0	28.3	28.3	693.0	--	--	--	--	--	--	--	--
B-X096Y195	723.2	32.0	0.0	723.2	32.0	691.2	32.0	32.0	691.2	--	--	--	--	--	--	--	--
B-X097Y232	712.1	20.0	0.0	712.1	19.5	692.6	19.5	19.5	692.6	--	--	--	--	--	--	--	--
B-X100Y072	720.1	26.0	0.0	720.1	24.0	696.1	24.0	24.0	696.1	--	--	--	--	--	--	--	--
B-X100Y198	724.7	36.0	0.0	724.7	35.0	689.7	35.0	35.0	689.7	--	--	--	--	--	--	--	--
B-X102Y258	696.0	10.0	0.0	696.0	10.0	686.0	10.0	10.0	686.0	--	--	--	--	--	--	--	--
B-X102Y258A	695.4	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258B	696.3	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258C	696.7	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258D	695.3	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X106Y102C	724.3	45.5	0.0	724.3	22.5	701.8	22.5	22.5	701.8	--	--	--	--	--	--	--	--
B-X107Y151	726.3	33.5	0.0	726.3	33.5	692.8	33.5	33.5	692.8	--	--	--	--	--	--	--	--
B-X107Y203	724.4	32.5	0.0	724.4	32.0	692.4	32.0	32.0	692.4	--	--	--	--	--	--	--	--
B-X108Y190	724.6	33.0	0.0	724.6	33.0	691.6	33.0	33.0	691.6	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
B-809012-16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-809012-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X031Y124	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X031Y124A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X031Y124B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X031Y124C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X031Y124D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X045Y172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X045Y258A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X047Y072	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X047Y123	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X047Y236	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X048Y086	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X049Y198	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X057Y272A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X057Y272B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X057Y272C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X059Y135B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X059Y160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X069Y098B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X075Y183B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X080Y210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X082Y186A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X082Y186B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X082Y186C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X082Y186D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X084Y138B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X086Y274	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X089Y258	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X093Y090	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X095Y206A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X095Y206B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X095Y206C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X096Y195	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X097Y232	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X100Y072	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X100Y198	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X102Y258D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X106Y102C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X107Y151	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X107Y203	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X108Y190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
B-X108Y226A	714.2	29.5	0.0	714.2	29.5	684.7	29.5	29.5	684.7	--	--	--	--	--	--	--	--
B-X108Y226B	715.1	28.5	0.0	715.1	28.5	686.6	28.5	28.5	686.6	--	--	--	--	--	--	--	--
B-X108Y226C	713.6	26.8	0.0	713.6	26.8	686.8	26.8	26.8	686.8	--	--	--	--	--	--	--	--
B-X113Y194	724.5	34.0	0.0	724.5	33.0	691.5	33.0	33.0	691.5	--	--	--	--	--	--	--	--
B-X114Y258	689.2	10.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X115Y070	720.2	24.0	0.0	720.2	24.0	696.2	24.0	24.0	696.2	--	--	--	--	--	--	--	--
B-X123Y129	726.5	23.5	0.0	726.5	23.5	703.0	23.5	23.5	703.0	--	--	--	--	--	--	--	--
B-X123Y245A	704.1	34.4	0.0	704.1	34.4	669.7	34.4	34.4	669.7	--	--	--	--	--	--	--	--
B-X123Y245B	704.0	28.5	0.0	704.0	28.5	675.5	28.5	28.5	675.5	--	--	--	--	--	--	--	--
B-X123Y245C	704.0	31.2	0.0	704.0	31.2	672.8	31.2	31.2	672.8	--	--	--	--	--	--	--	--
B-X128Y079	719.6	24.0	0.0	719.6	24.0	695.6	24.0	24.0	695.6	--	--	--	--	--	--	--	--
B-X128Y255A	683.5	20.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y255B	683.7	19.0	0.0	683.7	19.0	664.7	19.0	19.0	664.7	--	--	--	--	--	--	--	--
B-X128Y255C	683.6	15.5	0.0	683.6	15.5	668.1	15.5	15.5	668.1	--	--	--	--	--	--	--	--
B-X128Y255D	683.5	16.3	0.0	683.5	16.3	667.2	16.3	16.3	667.2	--	--	--	--	--	--	--	--
B-X129Y214	697.2	10.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X129Y236	692.1	10.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X129Y247	685.4	10.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X130Y064	719.2	22.0	0.0	719.2	22.0	697.2	22.0	22.0	697.2	--	--	--	--	--	--	--	--
B-X130Y089	724.4	45.5	0.0	724.4	25.5	698.9	25.5	25.5	698.9	--	--	--	--	--	--	--	--
B-X130Y115	726.2	16.0	0.0	726.2	16.0	710.2	16.0	16.0	710.2	--	--	--	--	--	--	--	--
B-X130Y215	709.5	35.5	0.0	709.5	34.5	675.0	34.5	34.5	675.0	--	--	--	--	--	--	--	--
B-X132Y186A	720.2	40.7	0.0	720.2	40.7	679.5	40.7	40.7	679.5	--	--	--	--	--	--	--	--
B-X132Y186B	720.1	40.9	0.0	720.1	40.9	679.2	40.9	40.9	679.2	--	--	--	--	--	--	--	--
B-X132Y186C	720.3	41.2	0.0	720.3	41.2	679.1	41.2	41.2	679.1	--	--	--	--	--	--	--	--
B-X135Y110	726.1	16.0	0.0	726.1	16.0	710.1	16.0	16.0	710.1	--	--	--	--	--	--	--	--
B-X137Y073	719.3	20.5	0.0	719.3	20.5	698.8	20.5	20.5	698.8	--	--	--	--	--	--	--	--
B-X137Y132	726.5	24.0	0.0	726.5	24.0	702.5	24.0	24.0	702.5	--	--	--	--	--	--	--	--
B-X140Y100	726.1	16.0	0.0	726.1	16.0	710.1	16.0	16.0	710.1	--	--	--	--	--	--	--	--
B-X143Y075	719.6	21.5	0.0	719.6	21.0	698.6	21.0	21.0	698.6	--	--	--	--	--	--	--	--
B-X143Y193A	703.8	28.5	0.0	703.8	28.5	675.3	28.5	28.5	675.3	--	--	--	--	--	--	--	--
B-X143Y193B	704.3	29.4	0.0	704.3	29.4	674.9	29.4	29.4	674.9	--	--	--	--	--	--	--	--
B-X143Y193C	705.2	29.5	0.0	705.2	29.5	675.7	29.5	29.5	675.7	--	--	--	--	--	--	--	--
B-X148Y076	720.4	20.0	0.0	720.4	20.0	700.4	20.0	20.0	700.4	--	--	--	--	--	--	--	--
B-X148Y233	695.6	15.0	0.0	695.6	14.5	681.1	14.5	14.5	681.1	--	--	--	--	--	--	--	--
B-X154Y117	724.7	25.3	0.0	724.7	25.0	699.7	25.0	25.0	699.7	--	--	--	--	--	--	--	--
B-X154Y117A	724.7	25.3	0.0	724.7	25.0	699.7	25.0	25.0	699.7	--	--	--	--	--	--	--	--
B-X154Y117B	724.6	25.4	0.0	724.6	25.0	699.6	25.0	25.0	699.6	--	--	--	--	--	--	--	--
B-X154Y117C	724.9	4.9	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117D	722.3	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117E	721.2	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X158Y207	696.5	24.0	0.0	696.5	24.0	672.5	24.0	24.0	672.5	--	--	--	--	--	--	--	--
B-X165Y179	720.5	18.0	0.0	720.5	18.0	702.5	18.0	18.0	702.5	--	--	--	--	--	--	--	--
B-X169Y248	690.9	25.0	0.0	690.9	24.5	666.4	24.5	--	--	--	--	--	24.5	666.4	--	--	--
B-X170Y134	723.0	8.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X170Y143	725.2	21.5	0.0	725.2	21.5	703.7	21.5	21.5	703.7	--	--	--	--	--	--	--	--
B-X170Y211	692.5	28.0	0.0	692.5	28.0	664.5	28.0	28.0	664.5	--	--	--	--	--	--	--	--
B-X171Y157	723.6	20.0	0.0	723.6	20.0	703.6	20.0	20.0	703.6	--	--	--	--	--	--	--	--
B-X173Y125	722.9	8.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X173Y131	723.2	20.0	0.0	723.2	19.5	703.7	19.5	19.0	704.2	--	--	--	--	--	--	--	--
B-X173Y134	723.2	8.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X176Y143	724.3	23.0	0.0	724.3	23.0	701.3	23.0	23.0	701.3	--	--	--	--	--	--	--	--
B-X176Y179	719.1	26.0	0.0	719.1	26.0	693.1	26.0	26.0	693.1	--	--	--	--	--	--	--	--
B-X176Y187	716.7	38.0	0.0	716.7	38.0	678.7	38.0	38.0	678.7	--	--	--			--	--	--
B-X177Y252D	681.7	53.6	0.0	681.7	21.7	660.0	21.7	--	--	--	--	--	21.7	660.0	--	--	--
B-X183Y133	722.6	19.0	0.0	722.6	18.8	703.8	18.8	18.8	703.8	--	--	--	--	--	--	--	--
B-X185Y185	713.1	35.5	0.0	713.1	35.5	677.6	35.5	35.5	677.6	--	--	--	--	--	--	--	--
B-X185Y195	693.8	13.0	0.0	693.8	12.5	681.3	12.5	12.5	681.3	--	--	--	--	--	--	--	--
B-X186Y159	722.4	23.0	0.0	722.4	23.0	699.4	23.0	23.0	699.4	--	--	--	--	--	--	--	--
B-X186Y180	721.8	22.0	0.0	721.8	22.0	699.8	22.0	22.0	699.8	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
B-X108Y226A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X108Y226B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X108Y226C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X113Y194	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X114Y258	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X115Y070	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X123Y129	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X123Y245A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X123Y245B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X123Y245C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y079	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y255A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y255B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y255C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X128Y255D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X129Y214	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X129Y236	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X129Y247	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X130Y064	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X130Y089	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X130Y115	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X130Y215	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X132Y186A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X132Y186B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X132Y186C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X135Y110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X137Y073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X137Y132	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X140Y100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X143Y075	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X143Y193A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X143Y193B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X143Y193C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X148Y076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X148Y233	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X154Y117E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X158Y207	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X165Y179	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X169Y248	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X170Y134	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X170Y143	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X170Y211	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X171Y157	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X173Y125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X173Y131	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X173Y134	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X176Y143	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X176Y179	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X176Y187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X177Y252D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X183Y133	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X185Y185	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X185Y195	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X186Y159	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X186Y180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
B-X187Y217	689.1	8.0	0.0	689.1	8.0	681.1	8.0	8.0	681.1	--	--	--	--	--	--	--	--
B-X189Y122	706.1	10.0	0.0	706.1	9.8	696.3	9.8	9.8	696.3	--	--	--	--	--	--	--	--
B-X192Y234	688.6	22.0	0.0	688.6	22.0	666.6	22.0	22.0	666.6	--	--	--	--	--	--	--	--
B-X193Y098	688.1	14.0	0.0	688.1	14.0	674.1	14.0	14.0	674.1	--	--	--	--	--	--	--	--
B-X193Y172	716.1	33.5	0.0	716.1	33.0	683.1	33.0	33.0	683.1	--	--	--	--	--	--	--	--
B-X193Y194	682.9	7.0	0.0	682.9	7.0	675.9	7.0	7.0	675.9	--	--	--	--	--	--	--	--
B-X193Y251	685.4	34.0	0.0	685.4	34.0	651.4	34.0	--	--	--	--	--	36.0	649.4	--	--	--
B-X195Y133	717.7	17.5	0.0	717.7	17.0	700.7	17.0	17.0	700.7	--	--	--	--	--	--	--	--
B-X195Y161	720.0	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X200Y156	718.3	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X200Y161	717.3	11.5	0.0	717.3	10.0	707.3	10.0	10.0	707.3	--	--	--	--	--	--	--	--
B-X200Y166	714.8	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y111A	690.6	4.0	0.0	690.6	4.0	686.6	4.0	--	--	--	--	--	--	--	--	--	--
B-X204Y111B	690.4	4.0	0.0	690.4	4.0	686.4	4.0	--	--	--	--	--	--	--	--	--	--
B-X204Y111C	690.4	7.5	0.0	690.4	4.0	686.4	4.0	4.0	686.4	--	--	--	--	--	--	--	--
B-X204Y132	720.1	16.5	0.0	720.1	15.5	704.6	15.5	15.5	704.6	--	--	--	--	--	--	--	--
B-X204Y149	717.7	16.0	0.0	717.7	15.0	702.7	15.0	15.0	702.7	--	--	--	--	--	--	--	--
B-X205Y161	701.6	4.0	(Did not reach bedrock)		--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y053	710.2	16.6	0.0	710.2	13.1	697.1	13.1	13.1	697.1	--	--	--	--	--	--	--	--
B-X209Y078A	684.7	13.5	0.0	684.7	13.5	671.2	13.5	13.5	671.2	--	--	--	--	--	--	--	--
B-X209Y078B	687.2	12.5	0.0	687.2	12.5	674.7	12.5	12.5	674.7	--	--	--	--	--	--	--	--
B-X209Y078C	684.7	12.5	0.0	684.7	12.5	672.2	12.5	12.5	672.2	--	--	--	--	--	--	--	--
B-X209Y177	681.9	4.5	0.0	681.9	4.0	677.9	4.0	4.0	677.9	--	--	--	--	--	--	--	--
B-X211Y169	692.5	12.5	0.0	692.5	12.5	680.0	12.5	12.5	680.0	--	--	--	--	--	--	--	--
B-X213Y125	714.3	11.5	0.0	714.3	11.5	702.8	11.5	11.5	702.8	--	--	--	--	--	--	--	--
B-X217Y131	717.9	30.0	0.0	717.9	20.0	697.9	20.0	20.0	697.9	--	--	--	--	--	--	--	--
B-X217Y159	694.3	8.0	0.0	694.3	7.0	687.3	7.0	7.0	687.3	--	--	--	--	--	--	--	--
B-X218Y141	714.1	15.5	0.0	714.1	15.5	698.6	15.5	15.5	698.6	--	--	--	--	--	--	--	--
B-X219Y095	680.4	14.0	0.0	680.4	14.0	666.4	14.0	14.0	666.4	--	--	--	--	--	--	--	--
B-X219Y249	679.6	24.0	0.0	679.6	23.5	656.1	23.5	--	--	--	--	--	23.5	656.1	--	--	--
B-X221Y169	685.2	5.5	0.0	685.2	5.0	680.2	5.0	5.0	680.2	--	--	--	--	--	--	--	--
B-X223Y097A	679.7	10.0	0.0	679.7	10.0	669.7	10.0	10.0	669.7	--	--	--	--	--	--	--	--
B-X223Y097B	679.8	6.0	0.0	679.8	5.0	674.8	5.0	5.0	674.8	--	--	--	--	--	--	--	--
B-X223Y124	714.2	15.0	0.0	714.2	14.5	699.7	14.5	14.5	699.7	--	--	--	--	--	--	--	--
B-X223Y150A	696.2	4.5	0.0	696.2	4.5	691.7	4.5	4.5	691.7	--	--	--	--	--	--	--	--
B-X223Y150B	698.2	12.0	0.0	698.2	12.0	686.2	12.0	12.0	686.2	--	--	--	--	--	--	--	--
B-X223Y247D	676.2	173.2	0.0	676.2	30.3	645.9	30.3	--	--	--	--	--	30.3	645.9	85.0	591.2	54.7
B-X224Y138A	704.5	3.0	0.0	704.5	3.0	701.5	3.0	3.0	701.5	--	--	--	--	--	--	--	--
B-X224Y138B	704.5	16.0	0.0	704.5	16.0	688.5	16.0	16.0	688.5	--	--	--	--	--	--	--	--
B-X225Y077	684.7	15.0	0.0	684.7	15.0	669.7	15.0	15.0	669.7	--	--	--	--	--	--	--	--
B-X231Y257	675.5	24.0	0.0	675.5	24.0	651.5	24.0	24.0	651.5	--	--	--	--	--	--	--	--
B-X232Y180	698.6	7.0	0.0	698.6	6.5	692.1	6.5	6.5	692.1	--	--	--	--	--	--	--	--
B-X243Y257	654.7	17.0	0.0	654.7	16.0	638.7	16.0	--	--	--	--	--	16.0	638.7	--	--	--
B-X253Y329A	659.2	13.0	0.0	659.2	13.0	646.2	13.0	13.0	646.2	--	--	--	--	--	--	--	--
B-X253Y329B	661.8	6.0	0.0	661.8	5.0	656.8	5.0	5.0	656.8	--	--	--	--	--	--	--	--
B-X253Y329C	658.4	12.0	0.0	658.4	12.0	646.4	12.0	12.0	646.4	--	--	--	--	--	--	--	--
B-X253Y329D	659.8	12.5	0.0	659.8	12.5	647.3	12.5	12.5	647.3	--	--	--	--	--	--	--	--
B-X253Y329E	659.5	5.0	0.0	659.5	4.5	655.0	4.5	4.5	655.0	--	--	--	--	--	--	--	--
B-X253Y329F	659.2	8.5	0.0	659.2	8.5	650.7	8.5	8.5	650.7	--	--	--	--	--	--	--	--
B-X253Y329G	659.6	5.0	0.0	659.6	4.5	655.1	4.5	4.5	655.1	--	--	--	--	--	--	--	--
B-X253Y329H	659.3	13.0	0.0	659.3	13.0	646.3	13.0	13.0	646.3	--	--	--	--	--	--	--	--
B-X254Y336	653.4	4.0	0.0	653.4	3.5	649.9	3.5	3.5	649.9	--	--	--	--	--	--	--	--
B-X261Y356	668.1	18.5	0.0	668.1	18.5	649.6	18.5	18.5	649.6	--	--	--	--	--	--	--	--
B-X263Y128	705.4	21.5	0.0	705.4	21.5	683.9	21.5	21.5	683.9	--	--	--	--	--	--	--	--
B-X318Y217	650.5	16.0	0.0	650.5	2.9	647.6	2.9	2.9	647.6	--	--	--	--	--	--	--	--
CH-1 Abandoned	692.2	10.0	0.0	692.2	6.5	685.7	6.5	6.5	685.7	--	--	--	--	--	--	--	--
CH-1A Abandoned	692.0	18.0	0.0	692.0	6.5	685.5	6.5	6.5	685.5	--	--	--	--	--	--	--	--
CH-1B	691.7	45.6	0.0	691.7	13.5	678.2	13.5	13.5	678.2	--	--	--	--	--	--	--	--
CH-2 Abandoned	688.7	22.1	0.0	688.7	11.5	677.2	11.5	11.5	677.2	--	--	--	--	--	--	--	--
CH-2A	688.0	42.9	0.0	688.0	1.2	686.8	1.2	1.2	686.8	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
B-X187Y217	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X189Y122	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X192Y234	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X193Y098	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X193Y172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X193Y194	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X193Y251	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X195Y133	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X195Y161	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X200Y156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X200Y161	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X200Y166	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y111A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y111B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y111C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y132	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X204Y149	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X205Y161	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y053	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y078A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y078B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y078C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X209Y177	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X211Y169	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X213Y125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X217Y131	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X217Y159	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X218Y141	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X219Y095	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X219Y249	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X221Y169	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y097A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y097B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y124	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y150A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y150B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X223Y247D	85.0	591.2	129.3	546.9	44.3	129.3	546.9	149.8	526.4	20.5	149.8	526.4	172.0	504.2	22.2	172.0	504.2
B-X224Y138A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X224Y138B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X225Y077	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X231Y257	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X232Y180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X243Y257	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X253Y329H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X254Y336	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X261Y356	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X263Y128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-X318Y217	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-1 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-1A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-1B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-2 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-2A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
CH-3 Abandoned	673.3	20.2	0.0	673.3	3.5	669.8	3.5	3.5	669.8	--	--	--	--	--	--	--	--
CH-3A	673.1	43.8	0.0	673.1	3.5	669.6	3.5	3.5	669.6	29.1	644.0	25.6	29.1	644.0	--	--	--
CH-4 Abandoned	677.2	15.7	0.0	677.2	9.3	667.9	9.3	9.3	667.9	--	--	--	--	--	--	--	--
CH-4A Abandoned	676.8	34.8	0.0	676.8	15.0	661.8	15.0	15.0	661.8	18.6	658.2	3.6	18.6	658.2	--	--	--
CH-5	683.5	46.1	0.0	683.5	18.5	665.0	18.5	18.5	665.0	37.7	645.8	19.2	37.7	645.8	--	--	--
CH-6	690.5	40.3	0.0	690.5	16.3	674.2	16.3	16.3	674.2	--	--	--	--	--	--	--	--
CH-7 Abandoned	688.7	39.3	0.0	688.7	16.9	671.8	16.9	16.9	671.8	--	--	--	--	--	--	--	--
CH-7A	688.7	46.5	0.0	688.7	19.2	669.5	19.2	19.2	669.5	--	--	--	--	--	--	--	--
CH-8	684.7	35.2	0.0	684.7	8.3	676.4	8.3	8.3	676.4	--	--	--	--	--	--	--	--
CH-9 Abandoned	710.2	30.5	0.0	710.2	10.0	700.2	10.0	10.0	700.2	--	--	--	--	--	--	--	--
CH-9A	709.9	48.4	0.0	709.9	6.0	703.9	6.0	6.0	703.9	--	--	--	--	--	--	--	--
CH-10 Abandoned	693.9	14.0	0.0	693.9	10.0	683.9	10.0	10.0	683.9	--	--	--	--	--	--	--	--
CH-10A Abandoned	693.3	26.5	0.0	693.3	14.0	679.3	14.0	14.0	679.3	--	--	--	--	--	--	--	--
CH-11 Abandoned	659.0	27.1	0.0	659.0	3.4	655.6	3.4	3.4	655.6	6.6	652.4	3.2	6.6	652.4	--	--	--
CH-11A Abandoned	664.8	29.6	0.0	664.8	6.9	657.9	6.9	--	--	--	--	--	6.9	657.9	--	--	--
CH-12 Abandoned	660.4	6.0	0.0	660.4	3.0	657.4	3.0	3.0	657.4	--	--	--	--	--	--	--	--
CH-12A Abandoned	650.4	27.1	0.0	650.4	4.0	646.4	4.0	--	--	--	--	--	4.0	646.4	--	--	--
CH-12B Abandoned	681.3	29.6	0.0	681.3	6.2	675.1	6.2	6.2	675.1	28.0	653.3	21.8	28.0	653.3	--	--	--
CH-13 Abandoned	653.6	6.5	0.0	653.6	3.5	650.1	3.5	--	--	--	--	--	3.5	650.1	--	--	--
CH-13A Abandoned	645.1	58.7	0.0	645.1	4.1	641.0	4.1	--	--	--	--	--	4.1	641.0	53.0	592.1	48.9
CH-13B Abandoned	668.7	27.5	0.0	668.7	4.3	664.4	4.3	4.3	664.4	13.5	655.2	9.2	13.5	655.2	--	--	--
CH-14 Abandoned	641.5	12.1	0.0	641.5	4.0	637.5	4.0	--	--	--	--	--	4.0	637.5	--	--	--
CH-14A Abandoned	642.0	28.1	0.0	642.0	5.5	636.5	5.5	--	--	--	--	--	5.5	636.5	--	--	--
CH-14B Abandoned	660.0	30.6	0.0	660.0	5.0	655.0	5.0	--	--	--	--	--	5.0	655.0	--	--	--
CH-15 Abandoned	633.6	28.5	0.0	633.6	4.5	629.1	4.5	--	--	--	--	--	4.5	629.1	--	--	--
CH-15A Abandoned	637.3	25.9	0.0	637.3	2.2	635.1	2.2	--	--	--	--	--	2.2	635.1	--	--	--
CH-15B Abandoned	643.7	26.3	0.0	643.7	3.2	640.5	3.2	--	--	--	--	--	3.2	640.5	--	--	--
CH-16 Abandoned	632.9	36.4	0.0	632.9	14.2	618.7	14.2	--	--	--	--	--	14.2	618.7	--	--	--
CH-17 Abandoned	628.8	20.8	0.0	628.8	8.0	620.8	8.0	--	--	--	--	--	8.0	620.8	--	--	--
CH-17A Abandoned	621.0	28.4	0.0	621.0	5.0	616.0	5.0	--	--	--	--	--	5.0	616.0	25.3	595.7	20.3
CH-18 Abandoned	625.5	39.7	0.0	625.5	17.2	608.3	17.2	--	--	--	--	--	17.2	608.3	26.6	598.9	9.4
CH18-1	590.9	51.4	0.0	590.9	1.0	589.9	1.0	--	--	--	--	--	--	--	--	--	--
CH18-2	609.0	68.3	0.0	609.0	2.5	606.5	2.5	--	--	--	--	--	--	--	--	--	--
CH18-3	614.1	74.0	0.0	614.1	7.5	606.6	7.5	--	--	--	--	--	--	--	--	--	--
CH18-4	614.4	80.9	0.0	614.4	10.0	604.4	10.0	--	--	--	--	--	--	--	--	--	--
CH18-5	609.3	71.6	0.0	609.3	11.0	598.3	11.0	--	--	--	--	--	--	--	--	--	--
CH18-6	596.0	60.7	0.0	596.0	2.5	593.5	2.5	--	--	--	--	--	--	--	--	--	--
CH18-7	580.5	46.4	0.0	580.5	4.0	576.5	4.0	--	--	--	--	--	--	--	--	--	--
CH18-8	562.1	22.8	0.0	562.1	4.0	558.1	4.0	--	--	--	--	--	--	--	--	--	--
CH18-9	606.8	66.1	0.0	606.8	17.0	589.8	17.0	--	--	--	--	--	--	--	--	--	--
CH18-10	592.0	52.8	0.0	592.0	3.5	588.5	3.5	--	--	--	--	--	--	--	--	--	--
CH18-11	617.8	77.6	0.0	617.8	5.5	612.3	5.5	--	--	--	--	--	--	--	--	--	--
CH18-12	620.4	81.1	0.0	620.4	8.0	612.4	8.0	--	--	--	--	--	--	--	--	--	--
CH18-13	596.0	55.8	0.0	596.0	0.0	596.0	0.0	--	--	--	--	--	--	--	--	--	--
CH-19	625.0	31.7	0.0	625.0	8.5	616.5	8.5	--	--	--	--	--	8.5	616.5	28.0	597.0	19.5
CH-20	619.2	38.0	0.0	619.2	13.5	605.7	13.5	--	--	--	--	--	13.5	605.7	20.8	598.4	7.3
CH-21 Abandoned	612.1	45.5	0.0	612.1	11.5	600.6	11.5	--	--	--	--	--	11.5	600.6	12.5	599.6	1.0
CH-22	613.4	32.6	0.0	613.4	9.2	604.2	9.2	--	--	--	--	--	9.2	604.2	13.5	599.9	4.3
CH-23	613.5	26.9	0.0	613.5	3.5	610.0	3.5	--	--	--	--	--	3.5	610.0	13.0	600.5	9.5
CH-24 Abandoned	617.4	32.7	0.0	617.4	9.5	607.9	9.5	--	--	--	--	--	9.5	607.9	17.5	599.9	8.0
CH-25 Abandoned	622.8	40.9	0.0	622.8	18.0	604.8	18.0	--	--	--	--	--	18.0	604.8	22.8	600.0	4.8
CH-26 Abandoned	627.9	27.6	0.0	627.9	5.0	622.9	5.0	--	--	--	--	--	5.0	622.9	25.2	602.7	20.2
CH-27 Abandoned	633.2	26.0	0.0	633.2	2.0	631.2	2.0	--	--	--	--	--	2.0	631.2	--	--	--
CH-28 Abandoned	638.9	24.7	0.0	638.9	1.0	637.9	1.0	--	--	--	--	--	1.0	637.9	--	--	--
BH-28A	638.3	4.5	0.0	638.3	4.5	633.8	4.5	--	--	--	--	--	4.5	633.8	--	--	--
CH-28A Abandoned	641.0	48.6	0.0	641.0	5.0	636.0	5.0	--	--	--	--	--	5.0	636.0	43.0	598.0	38.0
CH-29 Abandoned	641.6	71.2	0.0	641.6	8.0	633.6	8.0	--	--	--	--	--	8.0	633.6	43.2	598.4	35.2
BH-29A	650.1	1.4	0.0	650.1	1.4	648.7	1.4	--	--	--	--	--	1.4	648.7	--	--	--
CH-29A Abandoned	644.4	43.2	0.0	644.4	10.8	633.6	10.8	--	--	--	--	--	10.8	633.6	40.3	604.1	29.5
CH-29B	641.4	50.4	0.0	641.4	1.9	639.5	1.9	--	--	--	--	--	1.9	639.5	41.5	599.9	39.6

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
CH-3 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-3A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-4 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-4A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-7 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-7A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-9 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-10 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-10A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-11 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-11A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-12 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-12A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-12B Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-13 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-13A Abandoned	53.0	592.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-13B Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-14 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-14A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-14B Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-15 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-15A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-15B Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-16 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-17 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-17A Abandoned	25.3	595.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-18 Abandoned	26.6	598.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH18-1	1.0	589.9	30.2	560.7	29.2	30.2	560.7	49.9	541.0	19.7	49.9	541.0	--	--	--	--	--
CH18-2	2.5	606.5	52.1	556.9	49.6	52.1	556.9	66.8	542.2	14.7	66.8	542.2	--	--	--	--	--
CH18-3	7.5	606.6	49.8	564.3	42.3	49.8	564.3	73.3	540.8	23.5	73.3	540.8	--	--	--	--	--
CH18-4	10.0	604.4	48.9	565.5	38.9	48.9	565.5	69.7	544.7	20.8	69.7	544.7	--	--	--	--	--
CH18-5	11.0	598.3	40.0	569.3	29.0	40.0	569.3	61.6	547.7	21.6	61.6	547.7	--	--	--	--	--
CH18-6	2.5	593.5	24.9	571.1	22.4	24.9	571.1	48.4	547.6	23.5	48.4	547.6	--	--	--	--	--
CH18-7	4.0	576.5	32.8	547.7	28.8	--	--	--	--	--	32.8	547.7	--	--	--	--	--
CH18-8	4.0	558.1	13.8	548.3	9.8	--	--	--	--	--	13.8	548.3	--	--	--	--	--
CH18-9	17.0	589.8	42.3	564.5	25.3	42.3	564.5	64.6	542.2	22.3	64.6	542.2	--	--	--	--	--
CH18-10	3.5	588.5	26.7	565.3	23.2	26.7	565.3	49.2	542.8	22.5	49.2	542.8	--	--	--	--	--
CH18-11	5.5	612.3	50.9	566.9	45.4	50.9	566.9	73.7	544.1	22.8	73.7	544.1	--	--	--	--	--
CH18-12	8.0	612.4	51.1	569.3	43.1	51.1	569.3	74.8	545.6	23.7	74.8	545.6	--	--	--	--	--
CH18-13	0.0	596.0	34.9	561.1	34.9	34.9	561.1	55.5	540.5	20.6	55.5	540.5	--	--	--	--	--
CH-19	28.0	597.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-20	20.8	598.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-21 Abandoned	12.5	599.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-22	13.5	599.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-23	13.0	600.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-24 Abandoned	17.5	599.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-25 Abandoned	22.8	600.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-26 Abandoned	25.2	602.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-27 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-28 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-28A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-28A Abandoned	43.0	598.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-29 Abandoned	43.2	598.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-29A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-29A Abandoned	40.3	604.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-29B	41.5	599.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
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Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
CH-29C	643.3	50.1	0.0	643.3	7.3	636.0	7.3	--	--	--	--	--	7.3	636.0	44.0	599.3	36.7
CH-29D	643.5	52.3	0.0	643.5	9.0	634.5	9.0	--	--	--	--	--	9.0	634.5	46.9	596.6	37.9
CH-30 Abandoned	656.8	26.6	0.0	656.8	4.0	652.8	4.0	--	--	--	--	--	4.0	652.8	--	--	--
CH-31 Abandoned	668.4	33.3	0.0	668.4	9.5	658.9	9.5	--	--	--	--	--	9.5	658.9	--	--	--
CH-32 Abandoned	669.4	28.5	0.0	669.4	5.5	663.9	5.5	--	--	--	--	--	5.5	663.9	--	--	--
CH-33 Abandoned	669.7	25.2	0.0	669.7	5.5	664.2	5.5	--	--	--	--	--	5.5	664.2	--	--	--
CH-34 Abandoned	682.0	19.0	0.0	682.0	17.0	665.0	17.0	17.0	665.0	--	--	--	--	--	--	--	--
CH-34A Abandoned	681.6	20.0	0.0	681.6	15.0	666.6	15.0	15.0	666.6	--	--	--	--	--	--	--	--
CH-34B Abandoned	681.4	15.0	0.0	681.4	6.0	675.4	6.0	6.0	675.4	--	--	--	--	--	--	--	--
CH-34C Abandoned	681.9	42.0	0.0	681.9	6.0	675.9	6.0	6.0	675.9	23.9	658.0	17.9	23.9	658.0	--	--	--
CH-35 Abandoned	690.7	30.3	0.0	690.7	7.0	683.7	7.0	7.0	683.7	--	--	--	--	--	--	--	--
CH-36 Abandoned	699.6	49.8	0.0	699.6	28.0	671.6	28.0	28.0	671.6	40.7	658.9	12.7	40.7	658.9	--	--	--
CH-37 Abandoned	695.2	43.2	0.0	695.2	21.0	674.2	21.0	21.0	674.2	34.7	660.5	13.7	34.7	660.5	--	--	--
CH-38 Abandoned	690.5	37.5	0.0	690.5	15.0	675.5	15.0	15.0	675.5	27.0	663.5	12.0	27.0	663.5	--	--	--
CH-39 Abandoned	688.3	37.0	0.0	688.3	28.0	660.3	28.0	--	--	--	--	--	28.0	660.3	--	--	--
CH-39A Abandoned	686.9	55.6	0.0	686.9	35.8	651.1	35.8	--	--	--	--	--	35.8	651.1	--	--	--
CH-40 Abandoned	651.9	30.3	0.0	651.9	8.0	643.9	8.0	--	--	--	--	--	8.0	643.9	--	--	--
CH-41 Abandoned	631.1	26.2	0.0	631.1	3.0	628.1	3.0	--	--	--	--	--	3.0	628.1	--	--	--
CH-42	697.0	24.7	0.0	697.0	10.5	686.5	10.5	10.5	686.5			--	--	--	--	--	--
CH-42A	697.7	55.3	0.0	697.7	11.0	686.7	11.0	11.0	686.7	48.5	649.1	--	48.5	649.1	--	--	--
CH-43	709.2	66.3	0.0	709.2	12.5	696.7	12.5	12.5	696.7	60.8	648.4	48.3	60.8	648.4	--	--	--
CH-44	710.7	60.0	0.0	710.7	14.5	696.2	14.5	14.5	696.2	--	--	--	--	--	--	--	--
CH-45	648.0	39.7	0.0	648.0	2.0	646.0	2.0	--	--	--	--	--	2.0	646.0	--	--	--
CH-46	642.6	40.0	0.0	642.6	18.0	624.6	18.0	--	--	--	--	--	18.0	624.6	--	--	--
CH-46A	643.7	34.4	0.0	643.7	1.5	642.2	1.5	--	--	--	--	--	1.5	642.2	--	--	--
CH-46B	645.0	35.4	0.0	645.0	5.0	640.0	5.0	--	--	--	--	--	5.0	640.0	--	--	--
CH-47	644.6	35.2	0.0	644.6	5.5	639.1	5.5	--	--	--	--	--	5.5	639.1	--	--	--
CH-48	642.1	35.0	0.0	642.1	5.5	636.6	5.5	--	--	--	--	--	5.5	636.6	--	--	--
CH-49	641.1	34.2	0.0	641.1	3.5	637.6	3.5	--	--	--	--	--	3.5	637.6	--	--	--
CH-50	634.8	34.2	0.0	634.8	3.0	631.8	3.0	--	--	--	--	--	3.0	631.8	--	--	--
CH-51	644.3	39.9	0.0	644.3	7.0	637.3	7.0	--	--	--	--	--	7.0	637.3	--	--	--
CH-52	668.3	55.0	0.0	668.3	3.0	665.3	3.0	--	--	--	--	--	3.0	665.3	--	--	--
CH-53	681.2	61.0	0.0	681.2	6.0	675.2	6.0	6.0	675.2	30.4	650.8	24.4	30.4	650.8	--	--	--
CH-54	696.2	69.5	0.0	696.2	21.0	675.2	21.0	21.0	675.2	49.2	647.0	28.2	49.2	647.0	--	--	--
CH-55	690.6	56.0	0.0	690.6	17.0	673.6	17.0	17.0	673.6	45.0	645.6	28.0	45.0	645.6	--	--	--
CH-56	659.0	39.3	0.0	659.0	18.0	641.0	18.0	--	--	--	--	--	18.0	641.0	--	--	--
CH-57	696.9	55.5	0.0	696.9	23.0	673.9	23.0	23.0	673.9	43.5	653.4	20.5	43.5	653.4	--	--	--
CH-58	710.4	70.0	0.0	710.4	31.0	679.4	31.0	31.0	679.4	59.0	651.4	28.0	59.0	651.4	--	--	--
CH-60	620.2	30.0	0.0	620.2	7.0	613.2	7.0	--	--	--	--	--	7.0	613.2	--	--	--
Creek Core 1	654.6	10.0	0.0	654.6	0.0	654.6	0.0	0.0	654.6	--	--	--	--	--	--	--	--
Creek Core 2	653.4	10.0	0.0	653.4	0.0	653.4	0.0	0.0	653.4	--	--	--	--	--	--	--	--
Creek Core 3	651.0	10.0	0.0	651.0	0.0	651.0	0.0	0.0	651.0	--	--	--	--	--	--	--	--
Creek Core 4	658.4	26.5	0.0	658.4	3.5	654.9	3.5	3.5	654.9	10.5	647.9	7.0	10.5	647.9	--	--	--
Creek Core 5	660.0	26.5	0.0	660.0	1.6	658.4	1.6	1.6	658.4	11.6	648.4	10.0	11.6	648.4	--	--	--
Creek Core 6A	647.2	9.5	0.0	647.2	0.0	647.2	0.0	--	--	--	--	--	0.0	647.2	--	--	--
Creek Core 7	645.3	9.0	0.0	645.3	4.0	641.3	4.0	--	--	--	--	--	4.0	641.3	--	--	--
Creek Core 8	643.8	9.5	0.0	643.8	4.0	639.8	4.0	--	--	--	--	--	4.0	639.8	--	--	--
Creek Core 9	653.1	21.0	0.0	653.1	1.5	651.6	1.5	1.5	651.6	7.4	645.7	5.9	7.4	645.7	--	--	--
BH-A004-1	691.3	20.5	0.0	691.3	20.5	670.8	20.5	20.5	670.8	--	--	--	--	--	--	--	--
BH-A004-2	690.8	7.2	0.0	690.8	7.2	683.6	7.2	7.2	683.6	--	--	--	--	--	--	--	--
BH-EA010-1	642.3	4.6	0.0	642.3	4.6	637.7	4.6	--	--	--	--	--	4.6	637.7	--	--	--
BH-EA010-2	651.1	5.2	0.0	651.1	5.2	645.9	5.2	--	--	--	--	--	5.2	645.9	--	--	--
BH-EA010-3	665.8	5.6	0.0	665.8	5.6	660.2	5.6	--	--	--	--	--	5.6	660.2	--	--	--
BH-EA010-4	671.3	6.9	0.0	671.3	6.9	664.4	6.9	--	--	--	--	--	6.9	664.4	--	--	--
BH-EA010-5	643.4	3.9	0.0	643.4	3.9	639.5	3.9	--	--	--	--	--	3.9	639.5	--	--	--
BH-EA010-6	637.1	4.0	0.0	637.1	4.0	633.1	4.0	--	--	--	--	--	4.0	633.1	--	--	--
Parcel 414 Well	688.9	103.0	0.0	688.9	--	--	--	--	--	32.0	656.9	--	32.0	656.9	--	--	--
Parcel 208 Well	706.6	157.5	0.0	706.6	--	--	--	--	--	60.8	645.8	--	60.8	645.8	120.2	586.4	56.0
MW-X000Y105	687.2	25.0	0.0	687.2	7.9	679.3	7.9	7.9	679.3	--	--	--	--	--	--	--	--
MW-X012Y078	699.7	31.1	0.0	699.7	16.3	683.4	16.3	16.3	683.4	--	--	--	--	--	--	--	--

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Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
CH-29C	44.0	599.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-29D	46.9	596.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-30 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-31 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-32 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-33 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-34 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-34A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-34B Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-34C Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-35 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-36 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-37 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-38 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-39 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-39A Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-40 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-41 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-42A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-46A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-46B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CH-60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek Core 9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-A004-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-A004-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH-EA010-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Parcel 414 Well	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Parcel 208 Well	120.2	586.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X000Y105	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X012Y078	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
MW-X012Y090	698.8	55.1	0.0	698.8	11.4	687.4	11.4	11.4	687.4	--	--	--	--	--	--	--	--
MW-X012Y100	705.1	50.8	0.0	705.1	17.0	688.1	17.0	17.0	688.1	--	--	--	--	--	--	--	--
MW-X012Y110	703.1	49.0	0.0	703.1	16.3	686.8	16.3	16.3	686.8	--	--	--	--	--	--	--	--
MW-X017Y105	708.1	52.6	0.0	708.1	17.5	690.6	17.5	17.5	690.6	--	--	--	--	--	--	--	--
MW-X022Y094	707.8	55.5	0.0	707.8	21.0	686.8	21.0	21.0	686.8	--	--	--	--	--	--	--	--
MW-X022Y096	707.4	32.5	0.0	707.4	19.7	687.7	19.7	19.7	687.7	--	--	--	--	--	--	--	--
MW-X033Y147D	718.3	248.8	0.0	718.3	40.0	678.3	40.0	40.0	678.3	79.4	638.9	39.4	79.4	638.9	144.5	573.8	65.1
MW-X043Y176	698.3	34.5	0.0	698.3	16.5	681.8	16.5	16.5	681.8	--	--	--	--	--	--	--	--
MW-X043Y186	697.6	59.4	0.0	697.6	12.0	685.6	12.0	12.0	685.6	52.9	644.7	40.9	52.9	644.7	--	--	--
MW-X043Y273	673.1	57.7	0.0	673.1	5.5	667.6	5.5	--	--	--	--	--	5.5	667.6	--	--	--
MW-X045Y258D	699.2	203.0	0.0	699.2	8.0	691.2	8.0	8.0	691.2	39.0	660.2	31.0	39.0	660.2	110.9	588.3	71.9
MW-X047Y236	691.3	60.5	0.0	691.3	3.5	687.8	3.5	3.5	687.8	38.5	652.8	35.0	38.5	652.8	--	--	--
MW-X060Y304	659.4	36.6	0.0	659.4	2.5	656.9	2.5	--	--	--	--	--	2.5	656.9	--	--	--
MW-X085Y070D	720.0	243.5	0.0	720.0	23.0	697.0	23.0	23.0	697.0	89.0	631.0	66.0	89.0	631.0	143.0	577.0	54.0
MW-X105Y102	723.8	56.2	0.0	723.8	23.4	700.4	23.4	23.4	700.4	--	--	--	--	--	--	--	--
MW-X106Y102	723.7	60.5	0.0	723.7	23.4	700.3	23.4	23.4	700.3	--	--	--	--	--	--	--	--
MW-X120Y203	721.7	64.6	0.0	721.7	23.0	698.7	23.0	23.0	698.7	--	--	--	--	--	--	--	--
MW-X128Y255	684.0	55.5	0.0	684.0	32.0	652.0	32.0	--	--	--	--	--	32.0	652.0	--	--	--
MW-X142Y059	720.8	54.0	0.0	720.8	26.9	693.9	26.9	26.9	693.9	--	--	--	--	--	--	--	--
MW-X143Y245D	690.2	193.5	0.0	690.2	8.0	682.2	8.0	8.0	682.2	24.1	666.1	16.1	24.1	666.1	99.5	590.7	75.4
MW-X146Y084	720.2	110.2	0.0	720.2	27.0	693.2	27.0	27.0	693.2	84.0	636.2	57.0	84.0	636.2	--	--	--
MW-X165Y068	720.5	110.1	0.0	720.5	19.0	701.0	19.0	19.5	701.0	84.9	635.6	65.4	84.9	635.6	--	--	--
MW-X169Y058D	721.5	244.1	0.0	721.5	22.0	699.5	22.0	22.0	699.5	85.0	636.5	63.0	85.0	636.5	132.6	588.9	47.6
MW-X178Y367D	666.9	143.0	0.0	666.9	4.5	662.4	4.5	--	--	--	--	--	4.5	662.4	61.0	605.9	56.5
MW-X184Y285	652.3	31.0	0.0	652.3	8.5	643.8	8.5	--	--	--	--	--	8.5	643.8	--	--	--
MW-X190Y048	710.1	69.4	0.0	710.1	17.5	692.6	17.5	17.5	692.6	--	--	--	--	--	--	--	--
MW-X192Y048	710.3	19.9	0.0	710.3	17.5	692.8	17.5	17.5	692.8	--	--	--	--	--	--	--	--
MW-X204Y288 Abandoned	640.4	32.7	0.0	640.4	5.5	634.9	5.5	--	--	--	--	--	5.5	634.9	--	--	--
MW-X209Y078	684.9	23.4	0.0	684.9	12.5	672.4	12.5	--	--	--	--	--	--	--	--	--	--
MW-X209Y053	710.0	65.5	0.0	710.0	18.0	692.0	18.0	18.0	692.0	--	--	--	--	--	--	--	--
MW-X211Y131 Abandoned	720.1	52.2	0.0	720.1	19.5	700.6	19.5	19.5	700.6	--	--	--	--	--	--	--	--
MW-X214Y041	713.9	57.3	0.0	713.9	15.0	698.9	15.0	15.0	698.9	--	--	--	--	--	--	--	--
MW-X220Y088S	682.0	23.8	0.0	682.0	17.0	665.0	17.0	17.0	665.0	--	--	--	--	--	--	--	--
MW-X225Y080S	684.3	33.6	0.0	684.3	22.5	661.8	22.5	22.5	661.8	--	--	--	--	--	--	--	--
MW-X227Y049	689.9	41.7	0.0	689.9	4.2	685.7	4.2	4.2	685.7	--	--	--	--	--	--	--	--
MW-X227Y054	689.2	31.0	0.0	689.2	3.6	685.6	3.6	3.6	685.6	--	--	--	--	--	--	--	--
MW-X233Y071A	685.7	34.6	0.0	685.7	9.4	676.3	9.4	9.4	676.3	--	--	--	--	--	--	--	--
MW-X233Y071B	685.6	52.0	0.0	685.6	10.4	675.2	10.4	10.4	675.2	--	--	--	--	--	--	--	--
MW-X233Y087S	671.8	21.7	0.0	671.8	10.0	661.8	10.0	10.0	661.8	--	--	--	--	--	--	--	--
MW-X233Y095	672.9	30.1	0.0	672.9	4.8	668.1	4.8	4.8	668.1	--	--	--	--	--	--	--	--
MW-X233Y100	683.0	48.1	0.0	683.0	5.2	677.8	5.2	5.2	677.8	--	--	--	--	--	--	--	--
MW-X233Y105A	696.4	11.1	0.0	696.4	2.6	693.8	2.6	2.6	693.8	--	--	--	--	--	--	--	--
MW-X233Y105B	695.7	30.5	0.0	695.7	4.3	691.4	4.3	4.3	691.4	--	--	--	--	--	--	--	--
MW-X233Y110A	701.4	13.0	0.0	701.4	3.3	698.1	3.3	3.3	698.1	--	--	--	--	--	--	--	--
MW-X233Y110B	701.2	26.0	0.0	701.2	3.3	697.9	3.3	3.3	697.9	--	--	--	--	--	--	--	--
MW-X233Y115A	707.6	26.0	0.0	707.6	6.1	701.5	6.1	6.1	701.5	--	--	--	--	--	--	--	--
MW-X233Y115B	707.0	39.0	0.0	707.0	6.1	700.9	6.1	6.1	700.9	--	--	--	--	--	--	--	--
MW-X233Y120A	712.7	17.1	0.0	712.7	9.7	703.0	9.7	9.7	703.0	--	--	--	--	--	--	--	--
MW-X233Y120B	712.6	43.3	0.0	712.6	6.1	706.5	6.1	6.1	706.5	--	--	--	--	--	--	--	--
MW-X233Y125A	714.3	2.7	0.0	714.3	14.8	699.5	14.8	14.8	699.5	--	--	--	--	--	--	--	--
MW-X233Y125B	713.3	40.7	0.0	713.3	14.8	698.5	14.8	14.8	698.5	--	--	--	--	--	--	--	--
MW-X234Y157D	674.9	182.3	0.0	674.9	6.0	668.9	6.0	6.0	668.9	17.5	657.4	11.5	17.5	657.4	84.0	590.9	66.5
MW-X237Y058	675.6	30.0	0.0	675.6	6.4	669.2	6.4	6.4	669.2	--	--	--	--	--	--	--	--
MW-X242Y060S	682.5	34.6	0.0	682.5	9.5	673.0	9.5	9.5	673.0	--	--	--	--	--	--	--	--
MW-X246Y118	707.8	133.0	0.0	707.8	9.5	698.3	9.5	9.5	698.3	49.4	658.4	39.9	49.4	658.4	98.4	609.4	49.0
MW-X247Y118	706.8	23.0	0.0	706.8	9.0	697.8	9.0	9.0	697.8	--	--	--	--	--	--	--	--
MW-X247Y119	707.5	36.5	0.0	707.5	9.0	698.5	9.0	9.0	698.5	--	--	--	--	--	--	--	--
MW-X247Y120	708.1	59.1	0.0	708.1	9.9	698.2	9.9	9.9	698.2	49.4	658.7	39.5	49.4	658.7	--	--	--
MW-X248Y100	683.2	41.7	0.0	683.2	6.5	676.7	6.5	6.5	676.7	39.0	644.2	32.5	39.0	644.2	--	--	--
MW-X251Y189D	663.5	183.5	0.0	663.5	2.5	661.0	2.5	2.5	661.0	18.5	645.0	16.0	18.5	645.0	75.3	588.2	53.2

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
MW-X012Y090	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X012Y100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X012Y110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X017Y105	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X022Y094	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X022Y096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X033Y147D	144.5	573.8	200.5	517.8	56.0	200.5	517.8	223.1	495.2	22.6	223.1	495.2	243.4	474.9	20.3	243.4	474.9
MW-X043Y176	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X043Y186	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X043Y273	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X045Y258D	110.9	588.3	151.9	547.3	41.0	151.9	547.3	174.8	524.4	22.9	174.8	524.4	195.4	503.8	20.6	195.4	503.8
MW-X047Y236	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X060Y304	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X085Y070D	143.0	577.0	198.0	522.0	55.0	198.0	522.0	222.8	497.2	24.8	222.8	497.2	242.2	477.8	19.4	242.2	477.8
MW-X105Y102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X106Y102	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X120Y203	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X128Y255	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X142Y059	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X143Y245D	99.5	590.7	143.6	546.6	44.1	143.6	546.6	166.0	524.2	22.4	166.0	524.2	185.4	504.8	19.4	185.4	504.8
MW-X146Y084	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X165Y068	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X169Y058D	132.6	588.9	193.5	528.0	60.9	193.5	528.0	222.0	499.5	28.5	222.0	499.5	243.4	478.1	21.4	243.4	478.1
MW-X178Y367D	61.0	605.9	97.2	569.7	36.2	97.2	569.7	119.5	547.4	22.3	119.5	547.4	140.4	526.5	20.9	140.4	526.5
MW-X184Y285	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X190Y048	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X192Y048	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X204Y288 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X209Y078	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X209Y053	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X211Y131 Abandoned	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X214Y041	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X220Y088S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X225Y080S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X227Y049	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X227Y054	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y071A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y071B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y087S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y095	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y105A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y105B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y110A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y110B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y115A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y115B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y120A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y120B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y125A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X233Y125B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X234Y157D	84.0	590.9	133.5	541.4	49.5	133.5	541.4	159.5	515.4	26.0	159.5	515.4	180.4	494.5	20.9	180.4	494.5
MW-X237Y058	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X242Y060S	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X246Y118	98.4	609.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X247Y118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X247Y119	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X247Y120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X248Y100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X251Y189D	75.3	588.2	129.0	534.5	53.7	129.0	534.5	159.9	503.6	30.9	159.9	503.6	179.6	483.9	19.7	179.6	483.9

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Surveyed Ground Elevation (ft amsl)	Total Depth (ft bgs)	Overburden					St. Louis Formation					Salem Formation				
			Ground Surface		Bottom of Overburden			Top of Bedrock Surface		Bottom of Formation			Top of Formation		Bottom of Formation		
			Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)
MW-X257Y073	666.4	46.8	0.0	666.4	10.0	656.4	10.0	10.0	656.4	18.0	648.4	8.0	18.0	648.4	--	--	--
MW-X261Y356D	668.9	154.5	0.0	668.9	4.0	664.9	4.0	--	--	--	--	--	4.0	664.9	63.2	605.7	59.2
MW-X263Y128	705.4	118.6	0.0	705.4	8.2	697.2	8.2	8.2	697.2	46.7	658.7	38.5	57.2	648.2	--	--	--
MW-X269Y201D	669.4	182.5	0.0	669.4	8.0	661.4	8.0	8.0	661.4	14.8	654.6	6.8	14.8	654.6	78.8	590.6	47.0
MW-X272Y038	703.0	59.5	0.0	703.0	30.9	672.1	30.9	30.9	672.1	--	--	--	--	--	--	--	--
MW-X277Y100	668.2	41.9	0.0	668.2	7.0	661.2	7.0	7.0	661.2	22.0	646.2	15.0	22.0	646.2	--	--	--
MW-X288Y005	692.8	50.6	0.0	692.8	17.7	675.1	17.7	17.7	675.1	--	--	--	--	--	--	--	--
MW-X297Y305D	614.5	114.8	0.0	614.5	1.0	613.5	1.0	--	--	--	--	--	1.0	613.5	12.5	602.0	11.5
MW-X300Y199I	677.3	103.8	0.0	677.3	8.2	669.1	8.2	8.2	669.1	20.3	657.0	12.1	20.3	657.0	85.7	591.6	65.4
MW-X315Y115	653.4	47.0	0.0	653.4	3.8	649.6	3.8	3.8	649.6	8.3	645.1	4.5	8.3	645.1	--	--	--
MW-X315Y150	670.8	47.8	0.0	670.8	14.9	655.9	14.9	14.9	655.9	23.3	647.5	8.4	23.3	647.5	--	--	--
MW-X318Y217D	649.8	159.1	0.0	649.8	3.9	645.9	3.9	--	--	--	--	--	3.9	645.9	57.8	592.0	53.9
MW-X323Y226	647.5	159.1	0.0	647.5	8.9	638.6	8.9	--	--	--	--	--	8.9	638.6	57.0	590.5	48.1
MW-X344Y230	608.0	20.0	0.0	608.0	3.8	604.2	3.8	--	--	--	--	--	3.8	604.2	15.9	592.1	12.1
MW-X350Y125	622.8	20.7	0.0	622.8	0.3	622.5	0.3	--	--	--	--	--	0.3	622.5	--	--	--
MW-X350Y144	619.2	27.5	0.0	619.2	4.2	615.0	4.2	--	--	--	--	--	4.2	615.0	--	--	--
MW-X354Y200	613.8	29.1	0.0	613.8	6.5	607.3	6.5	--	--	--	--	--	6.5	607.3	22.1	591.7	15.6
MW-X358Y160	615.5	28.2	0.0	615.5	5.5	610.0	5.5	--	--	--	--	--	5.5	610.0	25.5	590.0	20.0
MW-X361Y175	611.6	33.4	0.0	611.6	1.5	610.1	1.5	--	--	--	--	--	1.5	610.1	21.0	590.6	19.5
MW-X367Y239	600.1	19.6	0.0	600.1	2.0	598.1	2.0	--	--	--	--	--	--	--	--	--	--
MW-X370Y178	617.9	29.8	0.0	617.9	1.5	616.4	1.5	--	--	--	--	--	1.5	616.4	27.2	590.7	25.7
PZ08	621.4	12.3	0.0	621.4	2.3	619.1	2.3	--	--	--	--	--	2.3	619.1	--	--	--

Notes:
amsl = above mean sea level
bgs = below ground surface
ft = feet
- - = information not applicable/not available

Table 2.1

Summary of Stratigraphic Contacts and Formation Thicknesses
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well/Boring ID	Upper Harrodsburg Formation					Lower Harrodsburg Formation					Ramp Creek Formation					Edwardsville Formation	
	Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation		Bottom of Formation			Top of Formation	
	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Thickness (ft)	Depth (ft bgs)	Elevation (ft amsl)
MW-X257Y073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X261Y356D	63.2	605.7	100.5	568.4	37.3	100.5	568.4	126.8	542.1	26.3	126.8	542.1	148.4	520.5	21.6	148.4	520.5
MW-X263Y128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X269Y201D	78.8	590.6	129.0	540.4	50.2	128.8	540.6	155.3	514.1	26.5	155.3	514.1	176.3	493.1	21.0	176.3	493.1
MW-X272Y038	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X277Y100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X288Y005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X297Y305D	12.5	602.0	63.2	551.3	50.7	63.2	551.3	92.5	522.0	29.3	92.5	522.0	110.0	504.5	17.5	110.0	504.5
MW-X300Y199I	85.7	591.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X315Y115	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X315Y150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X318Y217D	57.8	592.0	103.0	546.8	45.2	103.0	546.8	139.5	510.3	36.5	139.5	510.3	158.1	491.7	18.6	158.1	491.7
MW-X323Y226	57.0	590.5	101.3	546.2	44.3	101.3	546.2	136.0	511.5	34.7	136.0	511.5	154.0	493.5	18.0	154.0	493.5
MW-X344Y230	15.9	592.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X350Y125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X350Y144	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X354Y200	22.1	591.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X358Y160	25.5	590.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X361Y175	21.0	590.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X367Y239	2.0	598.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-X370Y178	27.2	590.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
amsl = above mean sea level
bgs = below ground surface
ft = feet
- - = information not applicable/n

Table 2.2

Soil Geotechnical Testing Results
RFI Final Report
GM GPS Bedford Facility Bedford, Indiana

Well/Boring Location	Sample ID	Laboratory ID	Parent Sample ID	Depth (ft bgs)		Sample Type	Classification	Bulk Density (pcf)	Moisture Content (%)	Atterberg Limits			Permeability (cm/sec)	Maximum Dry Density (pcf)	Optimum Moisture (%)
				Top	Bottom					LL	PL	PI			
BK-X142Y263	S-012302-MO-004	S-012302-MO-004	NA	0	2	Remolded	Silty CLAY, Trace Sand, CL	120.5	23.8	42	21	21	1.43E-08	101.2	20.6
BK-X212Y042	S-010223-MO-002	S-012302-MO-002	NA	0	2	Remolded	Silty CLAY, Trace Sand, CL	125.1	22.1	36	19	17	1.34E-08	107	18.3
BK-X267Y091	S-010223-MO-003	S-012302-MO-003	NA	0	2	Remolded	Silty CLAY, Trace Sand, CL	124.4	22.2	37	20	17	1.28E-08	104.9	19.8
BK-X281Y296	S-010223-MO-001	S-012302-MO-001	NA	0	2	Remolded	Silty CLAY, Trace Sand, CL	124.7	21.7	39	19	20	1.49E-08	106.8	19.2
BK-X281Y296	S-010223-MO-005	S-012302-MO-005	S-010223-MO-001	0	2	Remolded	Silty CLAY, Trace Sand, CL	125.3	21.4	38	19	19	1.32E-09	106.2	19.5
B-X177Y252D	S-031203-MG-245	S-031203-MG-245	NA	18	20	SS	SAND, Trace Gravel, Some Silt, SM	NT	NT	NT	NT	NT	NT	NT	NT
B-X177Y252D	S-031203-MG-246	S-031203-MG-246	NA	22	24	SS	Silty CLAY, Some Sand, Trace Gravel, CL	NT	NT	NT	NT	NT	NT	NT	NT
B-X223Y247D	S-031203-MG-247	S-031203-MG-247	NA	28	30	SS	Clayey SAND, Trace Gravel, SC	NT	NT	NT	NT	NT	NT	NT	NT
B-X033Y147	MW-X033Y147S	MW-X033Y147	NA	25	27	ST	Silty CLAY, Trace Sand, CL	117.8	31.7	NT	NT	NT	8.74E-08	NT	NT
B-X033Y147	S-021202-KMV-001	S-021202-KMV-001	NA	1	3	SS	SAND, Trace Gravel, Some Silt, SM	NT	NT	NT	NT	NT	NT	NT	NT
MW-X045Y258	S-013002-KMV-001	S-013002-KMV-001	NA	0	2	SS	Clayey SAND, Trace Gravel, SC	NT	NT	NT	NT	NT	NT	NT	NT
MW-X045Y258D	MW-X045Y258D	MW-X045Y258	NA	4	6	ST	Silty CLAY, Trace Sand, CL	122.6	24.2	NT	NT	NT	3.76R-08	NT	NT
MW-X085Y070S	MW-X085Y070S	MW-X085Y070	NA	6	8	ST	Silty CLAY, Trace Sand, Trace Gravel, CL	128.8	20.3	NT	NT	NT	1.71E-08	NT	NT
MW-X085Y070S	S-020402-KMV-001	S-020402-KMV-001	NA	0	2	SS	SAND, Some Gravel, Little Silt, SW-SM	NT	NT	NT	NT	NT	NT	NT	NT
MW-X143Y245D	S-010702-KMV-001	S-010702-KMV-001	NA	0	2	SS	SAND, Little Gravel, Little Silt, SP-SM	NT	NT	NT	NT	NT	NT	NT	NT
MW-X169Y058S	S-020602-MG-001	S-020602-MG-001	NA	3	4	SS	CLAY, Trace Sand, CH	118.5	26.4	53	17	36	6.88E-08	NT	NT
MW-X178Y367D	MW-X178Y367D	MW-X178Y367	NA	2	3	ST	Silty CLAY, Trace Sand, CL	122.9	25.1	NT	NT	NT	2.62E-08	NT	NT
MW-X178Y367D	S-010902-KMV-001	S-010902-KMV-001	NA	0	2	SS	Silty CLAY, Some Sand, Trace Gravel, CL	NT	NT	NT	NT	NT	NT	NT	NT
MW-X234Y157	S-012502-KMV-001	S-012502-KMV-001	NA	0	2	SS	Silty CLAY, Trace Sand, Trace Gravel, CL	119.1	28.2	49	19	30	6.38E-08	NT	NT
B-X261Y356	S-011102-KMV-001	S-011102-KMV-001	NA	0	2	SS	Silty CLAY, Some Sand, CL	NT	NT	NT	NT	NT	NT	NT	NT
MW-X261Y356D	S-012102-KMV-001	S-012102-KMV-001	NA	0	2	SS	CLAY, Trace Sand, CH	120.7	24.6	50	18	32	6.50E-08	NT	NT
MW-X269Y201D	S-012202-KMV-001	S-012202-KMV-001	NA	0	2	SS	Silty CLAY, Trace Sand, CL	122.7	24.8	45	18	27	7.33E-08	NT	NT
-	S-041505-JL-1146	S-041505-JL-1146	NA	10	12	-	Silty CLAY	NT	30.6	69	35	34	NT	NT	NT
-	S-041505-JL-1167	S-041505-JL-1167	NA	10	12	-	Silty CLAY, Trace Sand	NT	25.4	47	22	26	NT	NT	NT
-	S-041505-JL-1154	S-041505-JL-1154	NA	-	-	-	Silty CLAY, with Gravel, Trace Sand	96.3	25.7	51	25	27	NT	NT	NT
CH 36	S-060305-JL-1259	S-060305-JL-1259	NA	25	27	-	SILT and CLAY, Trace Sand	90.6	29.5	67	32	36	7.97E-09	NT	NT
CH 37	S-060605-JL-1260	S-060605-JL-1260	NA	17	19	-	SILT and CLAY, Trace Sand and Gravel	98.5	24.5	49	26	23	8.09E-09	NT	NT
CH 35	S-060605-JL-1261	S-060605-JL-1261	NA	4	6	-	Clayey SILT, Trace Sand	94.6	12.2	35	21	15	1.76E-07	NT	NT
CH 38	S-060605-JL-1262	S-060605-JL-1262	NA	12	14	-	Silty, CLAY, Trace Sand	NT	27.2	75	33	42	NT	NT	NT
PB -1	S-020805-KMV-1066	S-020805-KMV-1066	NA	9	11	ST	Silt, with clay & sand, trace gravel	NT	24.8	31	25	6	NT	NT	NT
-	S-121405-JC-1101	S-121405-JC-1101	NA	-	-	-	Clayey SILT and SAND, Trace Gravel	NT	NT	NT	NT	NT	NT	NT	NT
PB-2	S-020805-KMV-1073	S-020805-KMV-1073	NA	9	11	ST	-	NT	101.6	NT	NT	NT	NT	NT	NT
-	S-041405-JL-1160	S-041405-JL-1160	NA	-	-	-	-	NT	14.2	NT	NT	NT	NT	NT	NT

Notes:

cm/sec = centimeter per second
CH = organic clay, organic silt, low plasticity
CL = Inorganic clay
ft bgs = feet below ground surface
LL = Liquid Limit
NA = Not Available
NT = Not Tested
pcf = pounds per cubic foot
PI = Plasticity Index
PL = Plastic Limit
SC = clayey sand, sand-clay mixtures
SM = silty sand, sand-silt mixtures
SS = Split Spoon
ST = Shelby Tube
% = Percent

Table 2.3

Bedrock Core Geotechnical Results
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Sample ID	Laboratory ID	Location ID	Sample Date	Sample Interval (ft bgs)		Porosity (%)		Grain Density (g/cm^3)	Bulk Density (g/cm^3)	TOC (wt%)	Permeability to Air (milliDarcies)	Median Pore Throat Radius (Microns)	Formation
				Top	Bottom	Conventional	HPMI[1]						
RC-121802-KMV-550	550	MW-X269Y201D	18-Dec-02	12.33	12.58	13.33	10.5	2.739	2.405	0.24	0.271	0.109	St. Louis
RC-121802-KMV-551	551	MW-X045Y258D	18-Dec-02	28.17	28.42	8.02	8.0	2.692	2.503	0.41	0.007	0.049	St. Louis
RC-121802-KMV-552	552	MW-X033Y147D	18-Dec-02	90.42	90.58	12.45	12.5	2.774	2.449	0.30	0.055	0.080	St. Louis
RC-121802-KMV-553	553	MW-X169Y058I	18-Dec-02	68.17	68.33	3.53	3.4	2.702	2.631	0.23	0.003	0.009	St. Louis
RC-121802-KMV-554	554	MW-X269Y201D	18-Dec-02	38.00	38.25	12.03	11.9	2.701	2.391	0.04	3.96	0.303	Salem
RC-121802-KMV-555	555	MW-X178Y367D	18-Dec-02	12.83	13.00	7.56	7.6	2.695	2.516	0.07	0.156	0.114	Salem
RC-121802-KMV-556	556	MW-X045Y258D	18-Dec-02	65.00	65.17	7.41	7.3	2.700	2.521	0.08	0.145	0.129	Salem
RC-121802-KMV-557	557	MW-X033Y147D	18-Dec-02	108.00	108.17	8.40	8.2	2.697	2.497	0.08	0.363	0.177	Salem
RC-121802-KMV-558	558	MW-X169Y058I	18-Dec-02	94.33	94.50	10.31	9.9	2.695	2.444	0.10	0.544	0.394	Salem
RC-121802-KMV-559	559	MW-X269Y201D	18-Dec-02	85.33	85.50	5.50	5.0	2.689	2.571	0.03	0.747	0.061	Harrodsburg
RC-121802-KMV-560	560	MW-X178Y367D	18-Dec-02	64.58	64.75	4.10	3.7	2.685	2.593	0.06	0.008	0.044	Harrodsburg
RC-121802-KMV-561	561	MW-X045Y258D	18-Dec-02	113.33	113.50	4.61	3.9	2.660	2.562	0.09	0.140	0.043	Harrodsburg
RC-121802-KMV-562	562	MW-X033Y147D	18-Dec-02	148.00	148.17	9.75	9.0	2.691	2.456	0.06	0.848	0.255	Harrodsburg
RC-121802-KMV-563	563	MW-X169Y058D	18-Dec-02	134.50	134.67	5.99	5.5	2.699	2.558	<0.02	0.088	0.058	Harrodsburg
RC-121802-KMV-564	564	MW-X269Y201D	18-Dec-02	164.58	164.75	22.12	21.8	2.821	2.218	0.12	1.22	0.260	Ramp Creek
RC-121802-KMV-565	565	MW-X178Y367D	18-Dec-02	124.50	124.67	21.28	21.3	2.834	2.255	0.07	1.37	0.240	Ramp Creek
RC-121802-KMV-566	566	MW-X045Y258D	18-Dec-02	182.50	182.67	24.17	23.9	2.841	2.171	0.05	2.52	0.308	Ramp Creek
RC-121802-KMV-567	567	MW-X033Y147D	18-Dec-02	231.08	231.25	23.75	23.8	2.836	2.182	0.06	3.36	0.500	Ramp Creek
RC-121802-KMV-568	568	MW-X169Y058D	18-Dec-02	231.33	231.50	24.00	24.0	2.849	2.184	0.04	5.32	0.408	Ramp Creek

Notes:

ft bgs = feet below ground surface
[1] HPMI = High Pressure Mercury Injection
TOC = Total Organic Carbon
gl/cm^3 = grams per cubic centimeter
wt% = weight percent

Fractures Per Foot in Rock Trenches Near Outfall #002
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Trench	Depth		Number of Horizontal Features	Comment
	Top (ft bgs)	Bottom (ft bgs)		
Test Trench 1/NW	0	1	6	surface elev. = 657.1 ft amsl
	1	2	6	-
	2	3	5	-
	3	4	4	-
	4	5	5	-
	5	6	3	-
	6	7	3	-
	7	8	5	-
	8	9	0	-
	9	10	0	-
	10	11	0	-
	11	11.7	0	bottom elev. = 645.4 ft amsl
Test Trench 1/NE	0	2	11	surface elev. = 655.2 ft amsl
	2	3	4	-
	3	4	2	-
	4	5	1	-
	5	6	0	-
	6	7	0	-
	7	8	0	-
	8	8.8	0	bottom elev. = 646.4 ft amsl
Test Trench 2/SW	1	2	3	surface elev. = 649.5 ft amsl
	2	3	2	-
	3	4	2	-
	4	5	0	-
	5	6	0	-
	6	7	0	-
	7	8	0	-
	8	9	0	-
	9	10	0	-
	10	11.2	0	bottom elev. = 638.3 ft amsl
Test Trench 2/NE	1.8	3	9	surface elev. = 648.8 ft amsl
	3	4	2	-
	4	5	2	-
	5	6	2	-
	6	7	0	-
	7	8	1	-
	8	9	1	-
	9	9.5	0	bottom elev. = 639.3 ft amsl
Test Trench 3/NW	2	3	2	surface elev. = 647.2 ft amsl
	3	4	1	-
	4	5	1	-
	5	6	1	-
	6	7	1	-
	7	8	0	-
	8	9	0	bottom elev. = 638.2 ft amsl
Test Trench 3/S	3	4	3	surface elev. = 645.3 ft amsl
	4	5	2	-
	5	6	1	-
	6	7	1	-
	7	8	0	-
	8	9	0	bottom elev. = 636.3 ft amsl

Notes:

elev. = elevation
ft amsl = feet above mean sea level
ft bgs = feet below ground surface

Summary of Single-Well Response Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Hydraulic Conductivity (cm/s)	Analytical Method
MW-X033Y147S	5.99E-05	Bouwer and Rice (1976), Bouwer (1988)
	8.93E-05	Hvorslev (1951)
MW-X085Y070S	2.63E-04	Bouwer and Rice (1976), Bouwer (1988)
	1.41E-04	Hvorslev (1951)
TMW-X033Y147	1.69E-06	Bouwer and Rice (1976), Bouwer (1988)
TMW-X085Y070	1.03E-07	Bouwer and Rice (1976), Bouwer (1988)
TMW-X193Y251	1.76E-04	Bouwer and Rice (1976), Bouwer (1988)

Notes:

cm/s = centimeters per second

Table 2.6a

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Open Hole Completions				
MW-X000Y105	3122139.2	1322805.9	675.7	662.2
MW-X012Y078	3122365.7	1322450.1	681.7	670.6
MW-X012Y090	3122314.1	1322606.8	684.3	643.7
MW-X012Y100	3122317.8	1322717.4	680.1	654.3
MW-X012Y110	3122307.6	1322833.0	684.6	654.1
MW-X017Y105	3122340.6	1322764.1	675.6	655.5
MW-X022Y094	3122387.5	1322656.4	672.8	652.3
MW-X022Y096	3122387.3	1322676.4	685.2	674.9
MW-X033Y147S	3122522.2	1323193.5	676.1	663.1
MW-X043Y176	3122527.0	1323446.9	697.3	663.8
MW-X043Y186	3122565.8	1323592.5	679.6	638.2
MW-X043Y273	3122540.6	1324490.2	665.6	617.4
MW-X047Y236	3122604.2	1324115.8	681.3	630.8
MW-X060Y304	3122785.8	1324719.2	653.4	624.8
MW-X105Y102	3123197.0	1322715.9	689.1	668.1
MW-X106Y102	3123208.1	1322719.1	691.3	663.8
MW-X120Y203	3123093.6	1323657.6	678.4	657.5
MW-X128Y255	3123455.8	1324293.1	649.0	630.5
MW-X142Y059	3123613.2	1322275.8	692.8	666.8
MW-X143Y245S	3123628.5	1324162.2	680.3	670.3
MW-X184Y285	3123965.4	1324479.3	641.3	623.3
MW-X190Y048	3124138.3	1322210.8	666.3	640.7
MW-X204Y288 Abandoned	3124228.1	1324690.5	630.9	612.4
MW-X209Y078	3124289.3	1322489.3	671.1	661.5
MW-X209Y078S	3124289.3	1322489.3		
MW-X211Y131 Abandoned	3124266.3	1323027.1	697.6	669.9
MW-X214Y041 Abandoned	3124361.9	1322141.2	685.4	656.6
MW-X220Y088S	3124349.2	1322583.5	663.5	658.2
MW-X225Y080S	3124449.6	1322508.6	660.8	650.6
MW-X227Y049	3124465.8	1322237.6	669.4	648.2
MW-X227Y054	3124466.5	1322273.9	668.7	658.2
MW-X233Y071A	3124518.7	1322419.4	659.7	651.1
MW-X233Y071B	3124519.8	1322426.3	646.6	633.6
MW-X233Y087S	3124540.8	1322586.4	659.9	650.1
MW-X233Y095	3124561.9	1322628.7	666.1	642.8
MW-X233Y100	3124565.5	1322698.7	674.4	634.9
MW-X233Y105A	3124569.9	1322758.9	691.0	685.3
MW-X233Y105B	3124570.7	1322753.0	675.1	665.2
MW-X233Y110A	3124572.4	1322796.5	696.5	688.4
MW-X233Y110B	3124573.2	1322792.7	685.3	675.2

Table 2.6a

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells				
Well ID	**Easting**	**Northing**	**Monitored Interval (ft. AMSL)**	
			Top	**Bottom**
Open Hole Completions (cont'd)				
MW-X233Y115A	3124569.4	1322847.5	699.0	681.6
MW-X233Y115B	3124574.0	1322842.2	678.4	668.0
MW-X233Y120A	3124569.2	1322908.5	701.5	696.4
MW-X233Y120B	3124570.6	1322902.1	692.7	669.3
MW-X233Y125A	3124567.3	1322957.2	697.8	689.2
MW-X233Y125B	3124569.2	1322952.9	683.0	672.6
MW-X234Y157S	3124550.7	1323333.9	666.5	637.9
MW-X237Y058	3124560.3	1322279.0	666.1	645.6
MW-X242Y060S	3124622.7	1322303.3	671.2	647.9
MW-X247Y118	3124659.9	1322865.9	694.8	683.8
MW-X247Y119	3124661.2	1322874.0	682.0	671.0
MW-X248Y100	3124685.7	1322707.6	672.7	641.5
MW-X257Y073	3124786.0	1322459.0	650.4	621.6
MW-X272Y038	3124913.7	1322043.5	669.7	643.5
MW-X277Y100	3124972.4	1322715.3	657.7	626.3
MW-X288Y005	3125064.8	1321739.3	668.3	642.2
MW-X315Y115	3125373.9	1322960.6	647.4	606.4
MW-X315Y150	3125346.9	1323236.1	653.3	623.0
MW-X344Y230	3125686.4	1323961.0	601.3	590.0
MW-X350Y125	3125714.6	1322978.8	618.8	604.1
MW-X350Y144	3125755.1	1323214.3	612.6	591.7
MW-X354Y200	3125786.8	1323575.6	605.3	584.7
MW-X358Y160	3125785.1	1323346.9	608.0	587.3
MW-X361Y175	3125787.6	1323471.2	608.6	580.2
MW-X367Y239	3125862.1	1324140.5	596.1	582.5
MW-X370Y178	3125905.9	1323481.2	614.1	590.1
PZ08	3125623.2	1323002.9	616.1	611.8

Notes:

1. Abandoned coreholes are no longer used for water level monitoring.
ft amsl = feet above mean sea level

Table 2.6b

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Open Hole Completions				
CH-1 Abandoned	3124283.8	1322351.9	692.2	682.2
CH-1A Abandoned	3124277.4	1322353.7	677	674
CH-1B	3124290.6	1322353.9	665.7	646.1
CH-2 Abandoned	3124464.1	1322343.0	675.7	666.6
CH-2A	3124468.8	1322310.9	672.9	652
CH-3 Abandoned	3124647.1	1322415.8	664.3	653.1
CH-3A	3124640.2	1322413.4	651.1	630.3
CH-4 Abandoned	3124594.7	1323279.8	666.7	661.5
CH-4A Abandoned	3124594.9	1323282.2	662.3	642.0
CH-5	3124336.1	1322579.5	666.2	641.1
CH-6 Abandoned	3124033.8	1322573.5	671.5	650.2
CH-7 Abandoned	3124137.8	1322584.2	669.5	649.4
CH-7A	3124144.9	1322587.6	667.7	642.2
CH-8	3124311.9	1322700.0	673.2	649.5
CH-9 Abandoned	3124604.2	1322890.2	695.2	679.7
CH-9A	3124599.3	1322889.1	671.9	661.5
CH-10 Abandoned	3124598.9	1323113.8	693.9	679.9
CH-10A Abandoned	3124601.3	1323118.1	677.3	666.8
CH-11 Abandoned	3124678.4	1323397.7	653.0	631.9
CH-11A Abandoned	3124708.5	1323350.5	655.8	635.2
CH-12 Abandoned	3124765.6	1323460.3	660.4	654.4
CH-12A Abandoned	3124723.2	1323522.1	644.4	623.3
CH-12B Abandoned	3124894.7	1323356.6	672.4	651.7
CH-13 Abandoned	3124805.3	1323605.0	653.6	647.1
CH-13A Abandoned	3124752.4	1323634.1	637.1	586.4
CH-14 Abandoned	3124779.5	1323751.7	635.5	629.4
CH-14A Abandoned	3124778.2	1323744.1	634.6	613.9
CH-13B Abandoned	3124894.8	1323535.1	662.2	641.2
CH-14B Abandoned	3124894.7	1323713.6	650.0	629.4
CH-15 Abandoned	3124721.9	1323959.1	625.6	605.1
CH-15A Abandoned	3124819.7	1323918.5	632.3	611.4
CH-15B Abandoned	3124894.0	1323891.5	637.7	617.4
CH-16 Abandoned	3124780.7	1324097.7	617.4	596.5
CH-17 Abandoned	3124817.4	1324237.8	618.8	608.0
CH-17A Abandoned	3124928.3	1324220.5	613.6	592.6
CH-18 Abandoned	3124850.8	1324400.5	606.5	585.8
CH-19	3125136.5	1324338.9	614.0	593.3
CH-20	3124956.2	1324380.7	602.2	581.2
CH-21 Abandoned	3125044.6	1324498.2	598.1	566.6
CH-22	3124892.5	1324504.4	601.4	580.8
CH-23	3125025.3	1324574.9	607.5	586.6
CH-24 Abandoned	3124787.3	1324534.3	605.4	584.7
CH-25 Abandoned	3124653.7	1324584.7	602.8	581.9
CH-26 Abandoned	3124508.1	1324615.2	620.9	600.3
CH-27 Abandoned	3124365.2	1324667.1	627.7	607.2
CH-28 Abandoned	3124247.6	1324576.5	634.9	614.2
CH-28A Abandoned	3124167.9	1324517.0	633.5	592.4
CH-29 Abandoned	3124125.9	1324490.0	613.1	570.4
CH-29A Abandoned	3124081.9	1324471.1	631.9	601.2

Table 2.6b

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Open Hole Completions (cont'd)				
CH-29B	3124133.8	1324514.8	636.3	591.0
CH-29C	3124098.0	1324497.5	633.3	593.2
CH-29D	3124118.4	1324527.5	632.0	591.2
CH-30 Abandoned	3124008.9	1324391.9	650.3	630.2
CH-31 Abandoned	3123899.3	1324313.7	655.9	635.1
CH-32 Abandoned	3123750.6	1324313.2	661.4	640.9
CH-33 Abandoned	3123600.1	1324310.3	661.2	644.5
CH-34 Abandoned	3124195.7	1323604.1	682.0	663.0
CH-34A Abandoned	3124192.6	1323611.9	681.6	661.6
CH-34B Abandoned	3124195.1	1323612.4	667.0	666.4
CH-34C Abandoned	3124193.5	1323619.1	659.9	639.9
CH-35 Abandoned	3124027.6	1323760.5	679.7	660.4
CH-36 Abandoned	3123812.2	1323682.3	660.6	649.8
CH-37 Abandoned	3123782.3	1323864.0	672.2	652.0
CH-38 Abandoned	3124012.6	1323893.1	673.5	653.0
CH-39 Abandoned	3124058.6	1324179.6	688.3	651.3
CH-39A Abandoned	3124058.7	1324179.4	647.9	631.3
CH-40 Abandoned	3124590.4	1324164.8	640.9	621.6
CH-41 Abandoned	3124864.0	1324070.8	625.6	604.9
CH-42	3124605.3	1322168.4	686.2	680.5
CH-42A	3124602.9	1322159.5	677.0	651.7
CH-43	3124606.8	1322054.2	697.8	648.0
CH-44	3124475.0	1321918.5	699.2	656.7
CH-45	3124091.4	1324908.4	644.0	608.3
CH-46	3124195.3	1324890.2	622.1	602.6
CH-46A	3124244.9	1324878.6	640.2	609.3
CH-46B	3124293.3	1324864.3	638.0	609.6
CH-47	3124384.4	1324841.6	637.1	609.4
CH-48	3124530.9	1324813.2	634.6	607.1
CH-49	3124677.6	1324774.4	634.6	606.9
CH-50	3124954.2	1324711.1	629.8	600.6
CH-51	3125040.5	1324021.7	635.3	604.4
CH-52	3124997.3	1323725.7	663.3	613.3
CH-53	- -	- -	669.2	620.2
CH-54	- -	- -	673.2	626.7
CH-55	- -	- -	671.6	634.6
CH-56	- -	- -	639.0	619.7
CH-57	- -	- -	671.9	641.4
CH-58	- -	- -	667.8	640.4
CH-60	3125075.0	1324395.6	611.2	590.2
Waterloo System Monitoring Well-Port Number				
MW-X045Y258D-3	3122853.0	1324270.2	689.3	668.1
MW-X085Y070S-1	3123168.1	1322421.2	669.7	664.3
MW-X085Y070S-2	3123168.1	1322421.2	695.3	672.7
MW-X085Y070D	3123177.92	1322420.87	- -	- -
MW-X169Y058S-2	3123840.4	1322277.9	695.1	688.7
MW-X178Y367D-5	3123967.3	1325355.8	658.9	647.0

Table 2.6b

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Waterloo System Monitoring Well-Port Number (cont'd)				
MW-X251Y189D-5	3124697.8	1322592.2	592.5	583.0
MW-X251Y189D-6	3124697.8	1322592.2	608.0	600.5
MW-X251Y189D-7	3124697.8	1322592.2	658.5	642.0
MW-X261Y356D-4	3124799.6	1325223.6	637.4	624.9
MW-X261Y356D-5	3124799.6	1325223.6	662.9	654.4
MW-X269Y201D-3	3124873.5	1323509.4	658.7	642.0
Waterloo System Monitoring Well-Port Number (Not Used to Generate Water Level Contours)				
MW-X033Y147D-4	3122524.0	1323201.8	586.4	575.9
MW-X045Y258D-2	3122853.0	1324270.2	588.1	577.6
MW-X143Y245D-2	3123622.5	1324160.3	592.2	581.7
MW-X169Y058S-1	3123840.4	1322277.9	681.7	662.1
MW-X169Y058D-3	3123845.7	1322268.6	595.5	576.0
MW-X178Y367D-3	3123967.3	1325355.8	614.5	604.0
MW-X178Y367D-4	3123967.3	1325355.8	629.0	617.5
MW-X234Y157D-4	3124543.8	1323326.6	595.6	584.1
MW-X143Y193	3123652.093	1323703.163	- -	- -
MW-X193Y280	3124181.7	1324617.09	- -	- -
MW-X209Y053	3124307.17	1322266.31	661.8	641.3
MW-X227Y053	3124466.46	1322273.86	- -	- -
MW-X228Y032 Abandoned	3124499.12	1322089.11	676.9	641.7
MW-X234Y042 Abandoned	3124538.47	1322163.19	676.5	641.2
MW-X246Y118	3124653.66	1322870.14	644.8	574.8
MW-X247Y120	3124662.157	1322881.69	669.6	649
MW-X251Y189D	3124697.8	1322592.16	489.5	480
MW-X261Y356D	3124799.63	1325223.59	527.9	514.4
MW-X263Y128	3124836.36	1323001.84	667.4	586.8
MW-X269Y201D	3124873.5	1323509.36	498.5	486.7
MW-X297Y305D	3125144.13	1324629.7	525.5	499.7
MW-X300Y199	3125205.08	1323660.88		
MW-X300Y199I-1	3125205.11	1323660.62	577.1	573.5
MW-X300Y199I-2	3125205.11	1323660.62	592.6	580.1
MW-X300Y199I-3	3125205.11	1323660.62	628.1	618.6
MW-X300Y199I-4	3125205.11	1323660.62	665.6	631.1
MW-X318Y217	3125385.23	1323886.05		
MW-X318Y217D-1	3125385.88	1323886.05	513.3	490.7
MW-X318Y217D-2	3125385.88	1323886.05	533.8	521.3
MW-X318Y217D-3	3125385.88	1323886.05	554.3	536.8
MW-X318Y217D-4	3125385.88	1323886.05	574.8	564.3
MW-X318Y217D-5	3125385.88	1323886.05	631.3	604.8
MW-X323Y226	3125418.08	1323975.22	636.5	488.4
PZ23	3124615.49	1327179.48	526.2	520.2
PZ31	3126837.39	1330823.31	515.9	507.9
PZ38 Abandoned	3120994.17	1332230.02	496.54	487.54
PZ39	3116448.01	1334597.97	486.84	476.84
TMW-X033Y147	3122519.84	1323187.79	697	682
TMW-X085Y070	3123174.67	1322413.98	716.21	706.21
TMW-X128Y255A	3123470.29	1324295.01	661.8	651.8

Table 2.6b

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Shallow Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Waterloo System Monitoring Well-Port Number (Not Used to Generate Water Level Contours) (cont'd)				
TMW-X128Y255B	3123471.83	1324279.26	678.3	668.3
MW-X192Y048	3124150.89	1322214.34	692.4	690.4
TMW-X193Y251 Abandoned	3124093.86	1324186.87	659.5	654.5
TMW-X225Y080	3124460.92	1322507.06	666.8	661.8
TMW-X237Y263A Abandoned	3124555.44	1324317.26	620.8	610.8
TMW-X237Y263B Abandoned	3124554.95	1324323.88	631.1	621.1
TMW-X247Y261 Abandoned	3124659.77	1324313.27	634.8	624.8
15-1	3125706.26	1325225.55	579.6	563
15-10	3125633.45	1325363.08	- -	- -
15-11	3125665.73	1325199.06	569.6	555.6
15-12	3125745.72	1325273.77	590.2	553.5
15-13	3125615.85	1325390.08	565.2	550.9
15-14	3125745.09	1324981.39	575.8	556.7
15-15	3125638.23	1325439.93	569.8	549.8
15-16	3125902.65	1325194.06	595.1	540.5
15-17	3125912.61	1325369.39	596.7	548.6
15-18	3125752.23	1325355.73	594.2	549
15-19	3125796.92	1325248.78	592.5	550.6
15-2	3125750.34	1325175.93	577.5	542.5
15-20	3125982.84	1325129.38	590.3	560.1
15-3	3125859.59	1325262.77	600.1	512.9
15-4	3125820.46	1325154.13	582.2	557.4
15-5	3125864.76	1325130.36	582.2	556.7
15-6	3125772.46	1325185.58	582.3	552.5
15-6D	3125772.35	1325195.71	539.7	514.7
15-6I	3125780.72	1325192.53	- -	- -
15-7	3125989.32	1325281.06	601.7	545.9
15-8	3125654.44	1325295.93	577	557.4
15-9	3125895.84	1325057.63	562.8	561.8
9-1 Abandoned	3124223.49	1324049.04	664.4	626.6
9-2 Abandoned	3124273.18	1324068.82	660.6	625.8
9-3 Abandoned	3124317.55	1324086.55	658.1	628
9-4	3124352.74	1324100.87	655.2	625.1
B-X231Y257	3124440.99	1324259.92	- -	- -

Notes:

1. Abandoned coreholes are no longer used for water level monitoring.
ft amsl = feet above mean sea level
-- = Not Available

Table 2.6c

Summary of Monitoring Locations and Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Intermediate Bedrock Flow System Monitoring Wells				
Well ID	**Easting**	**Northing**	**Monitored Interval (ft. AMSL)**	
			Top	**Bottom**
Waterloo System Monitoring Well-Port Number (560 to 575 ft amsl zone)				
MW-X033Y147D-3	3122524.0	1323201.8	568.9	559.4
MW-X085Y070D-3	3123177.9	1322420.9	572.1	562.6
MW-X178Y367D-2	3123967.3	1325355.8	575.0	564.5
MW-X234Y157D-3	3124543.8	1323326.6	581.1	571.6
MW-X251Y189D-3	3124697.8	1322592.2	570.5	566.0
MW-X251Y189D-4	3124697.8	1322592.2	580.0	573.5
MW-X261Y356D-3	3124799.6	1325223.6	573.9	564.4
MW-X269Y201D-2	3124873.5	1323509.4	573.0	565.5
Waterloo System Monitoring Well-Port Number (540 to 565 ft amsl zone)				
MW-X033Y147D-2	3122524.0	1323201.8	552.4	541.9
MW-X085Y070D-2	3123177.9	1322420.9	550.6	540.1
MW-X169Y058D-2	3123845.7	1322268.6	563.0	540.5
MW-X234Y157D-2	3124543.8	1323326.6	560.6	551.1
MW-X251Y189D-2	3124697.8	1322592.2	560.0	554.5
MW-X261Y356D-2	3124799.6	1325223.6	550.4	539.9
MW-X297Y305D-2	3125144.1	1324629.7	556.0	545.5

Notes:

ft amsl = feet above mean sea level

Table 2.6d

Summary Of Monitoring Locations And Hydrostratigraphic Units
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Deep Bedrock Flow System Monitoring Wells

Well ID	Easting	Northing	Monitored Interval (ft. AMSL)	
			Top	Bottom
Waterloo System Monitoring Well-Port Number				
MW-X033Y147D-1	3122524.0	1323201.8	504.9	470.2
MW-X045Y258D-1	3122853.0	1324270.2	520.6	495.7
MW-X085Y070D-1	3123177.9	1322420.9	488.1	476.5
MW-X143Y245D-1	3123622.5	1324160.3	522.7	496.6
MW-X169Y058D-1	3123845.7	1322268.6	487.5	477.4
MW-X178Y367D-1	3123967.3	1325355.8	535.5	523.4
MW-X234Y157D-1	3124543.8	1323326.6	503.1	492.6
MW-X251Y189D-1	3124697.8	1322592.2	489.5	480.0
MW-X261Y356D-1	3124799.6	1325223.6	527.9	514.4
MW-X269Y201D-1	3124873.5	1323509.4	498.5	486.7
MW-X297Y305D-1	3125144.1	1324629.7	525.5	499.7

Notes:

ft amsl = feet above mean sea level

Table 3.1

Areas of Interest
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Area of Interest (AOI)	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 the Paint Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 21-1	Former Drainage Valley Under Hourly Parking Lot
AOI 21-2	Former Drainage Valley Northeast of Piston and Office Buildings
AOI 21-3	Surface Water Ditches Located Along GM Drive and Breckenridge Road
AOI 21-4	Former Drainage Valley East of Electrical Sub-Station, Breckenridge Road
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
AOI 25	Off-Site Suspected Fill Area - Parcel 398
AOI 26	Off-Site Suspected Fill Area - Parcels 384 & 386
AOI 27	Off-Site Suspected Fill Areas - Parcel 382 & 384
AOI 28	Off-Site Suspected Fill Area - Parcel 401
AOI 29	Off-Site Suspected Fill Area - Parcel 39
AOI 30	Off-Site Suspected Fill Area - Parcel 201
AOI 31	Off-Site Suspected Fill Area - Parcel 400 - No longer part of RFI

Table 3.2

Summary of Geophysically Logged Boreholes
RFI Final Report
GM Powertrain Bedford Facility
Bedford, Indiana

Well/Boring ID	Geophysical Subcontractor	Date Logged	Interval Logged		Comments
			From (ft AMSL)	To (ft AMSL)	
MW-X033Y147D[1]	COLOG	7/18/02	659	470	- -
MW-X033Y147S[1]	COLOG	4/15/02	678	663	- -
MW-X045Y258D	COLOG	5/14/02	689	496	- -
MW-X085Y070D	COLOG	7/16/02	657	477	- -
MW-X085Y070S	COLOG	4/22/02	695	657	- -
MW-X143Y245D	COLOG	4/2/02	667	497	- -
MW-X143Y245S	COLOG	7/15/02	680	670	- -
MW-X146Y084	COLOG	2/14/11	645	610	- -
MW-X165Y068	COLOG	2/14/11	666	610	- -
MW-X169Y058D	COLOG	7/26/02	619.5	479.9	- -
MW-X169Y058I	COLOG	7/17/02	663.4	620.0	- -
MW-X169Y058S	COLOG	4/23/02	697.9	664.9	- -
MW-X178Y367D	COLOG	5/1/02	661.3	525.8	- -
MW-X234Y157D	COLOG	7/17/02	635.3	492.6	- -
MW-X234Y157S	COLOG	7/17/02	666.5	635.5	- -
MW-X251Y189D	COLOG	4/23/02	658.5	480.0	- -
MW-X261Y356D	COLOG	4/29/02	662.9	514.4	- -
MW-X269Y201D	COLOG	4/29/02	658.7	486.7	- -
MW-421 (Parcel 388)	COLOG	7/17/02	0.0	89.5	Private well
MW-472 (Parcel 20/296)	COLOG	7/25/02	0.0	196.0	Private well
MW-514013 (Parcel 414)	COLOG	5/8/02	0.0	103.0	Private well, no BIPS - cloudy water
MW-620013 (Parcel 208)	COLOG	4/24/02	0.0	157.0	Private well
MW-X233Y095	COLOG	6/24/03	666.1	642.8	- -
MW-X233Y100	COLOG	6/23/03	674.4	634.9	- -
MW-X233Y105A	COLOG	6/26/03	691.0	685.3	- -
MW-X233Y105B	COLOG	6/24/03	675.1	665.2	- -
MW-X233Y110A	COLOG	6/30/03	696.5	688.4	- -
MW-X233Y110B	COLOG	6/26/03	685.3	675.2	- -
MW-X233Y115	COLOG	6/30/03	0.0	27.5	- -
MW-X233Y120	COLOG	6/30/03	0.0	20.5	- -
MW-X233Y125	COLOG	6/30/03	0.0	26.0	- -
MW-X297Y305D	COLOG	6/25/03	611.5	499.7	- -
CH-1B	COLOG	7/21/05	665.7	646.1	No BIPS
CH-5	COLOG	7/21/05	666.2	641.1	No BIPS
CH-6 Abandoned	COLOG	7/22/05	671.5	650.2	No BIPS
CH-11 Abandoned	COLOG	7/25/05	653.0	631.9	No BIPS
CH-20	COLOG	8/5/05	602.2	581.2	No BIPS
CH-21 Abandoned	COLOG	8/8/05	598.1	566.6	No BIPS
CH-24 Abandoned	COLOG	8/8/05	605.4	584.7	No BIPS
CH-25 Abandoned	COLOG	8/9/05	602.8	581.9	No BIPS
CH-28 Abandoned	COLOG	8/9/05	634.9	614.2	No BIPS
CH-29 Abandoned	COLOG	8/10/05	613.1	570.4	No BIPS
CH-30 Abandoned	COLOG	8/10/05	650.3	630.2	No BIPS
CH-41 Abandoned	COLOG	8/4/05	640.9	621.6	No BIPS

Table 3.2

Summary of Geophysically Logged Boreholes
RFI Final Report
GM Powertrain Bedford Facility
Bedford, Indiana

Well/Boring ID	Geophysical Subcontractor	Date Logged	Interval Logged (ft AMSL)	To (ft AMSL)	Comments
CH-45	COLOG	12/17/12	644.0	608.3	- -
CH-46	COLOG	12/18/12	621.9	602.4	- -
CH-46A	COLOG	12/19/12	640.2	609.3	- -
CH-46B	COLOG	12/18/12	638.0	609.6	- -
CH-47	COLOG	12/18/12	637.1	609.4	- -
CH-48	COLOG	12/18/12	634.6	607.1	- -
CH-49	COLOG	12/19/12	634.6	606.9	- -
CH-50	COLOG	1/7/13	629.8	600.6	- -
CH-51	COLOG	12/19/12	635.3	604.4	- -
CH-52	COLOG	12/20/12	663.3	613.3	- -
CH-53	COLOG	1/2/13	669.2	620.2	- -
CH-54	COLOG	2/20/12	673.2	626.7	- -
CH-55	COLOG	1/7/13	671.6	634.6	- -
CH-56	COLOG	1/3/13	638.0	618.7	- -
CH-57	COLOG	1/8/13	671.9	641.4	- -
CH-58	COLOG	1/8/13	667.8	640.4	- -
CH-60	COLOG	1/2-3/13	611.2	590.2	- -
CH-2A	CRA	8/15/05	688.0	645.1	- -
CH-3A	CRA	8/26/06 to 8/31/06	650.1	629.3	- -
CH-9A	CRA	8/26/06 to 8/31/06	672.1	664.6	- -
CH-10A	CRA	8/27/06 to 8/31/06	676.5	666.8	- -
CH-11A	CRA	8/27/06	656.0	635.2	- -
CH-12B	CRA	8/23/06 to 8/27/06	672.4	651.7	- -
CH-14B	CRA	8/26/06 to 8/31/06	650.2	630.6	- -
CH-17A	CRA	8/22/06 to 8/25/06	614.2	594.8	- -
CH-21	CRA	8/21/06 to 8/23/06	598.3	568.3	- -
CH-22	CRA	8/20/06 to 8/23/06	601.5	582.1	- -
CH-24	CRA	8/20/06 to 8/24/06	604.9	586.1	- -
CH-27	CRA	8/25/06	628.0	608.2	- -
CH-28A	CRA	8/20/06 to 8/24/06	633.6	593.8	- -
CH-29	CRA	8/18/06 to 8/24/06	614.2	575.5	- -
CH-29A	CRA	8/18/06 to 8/24/06	632.9	603.1	- -
CH-33	CRA	8/26/06	661.5	645.1	- -
MW-X318Y217 (Parcel 213)	CRA	8/28/06 to 8/31/06	632.1	493.3	- -
MW-X263Y128 (Parcel 413)	CRA	8/17/06 to 8/28/06	667.3	587.7	- -
MW-X300Y199	CRA	8/29/06	667.3	574.5	- -

Notes:

[1] = ground elevation at time of drilling (surface has been subsequently raised).
amsl = above mean sea level
bgs = below ground surface
CRA = Conestoga-Rovers & Associates
ft = feet

Table 3.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
AD-1	3124195.1	1324436.6	6/2/05	651.7	-	-	5.0	Overburden borehole	-	-
AD-2	3124299.0	1324469.5	6/2/05	647.3	-	-	3.5	Overburden borehole	-	-
AD-3	3124410.4	1324552.1	6/2/05	638.7	-	-	3.0	Overburden borehole	-	-
AD-4	3123774.0	1324150.1	6/7/05	691.7	-	-	17.0	Overburden borehole	-	-
AD-5	3123805.3	1324037.3	6/7/05	693.9	-	-	21.5	Overburden borehole	-	-
AD-6	3124191.5	1324335.7	6/7/05	663.5	-	-	19.5	Overburden borehole	-	-
AD-7	3124456.4	1324350.0	6/8/05	651.0	-	-	15.0	Overburden borehole	-	-
AD-8	3124618.0	1324385.7	6/8/05	635.9	-	-	8.0	Overburden borehole	-	-
AD-9	3124636.0	1324250.0	6/8/05	653.2	-	-	19.0	Overburden borehole	-	-
AD-10	3124636.3	1324173.1	6/8/05	649.2	-	-	7.0	Overburden borehole	-	-
AD-11	3124668.3	1324385.1	6/14/05	633.3	-	-	4.5	Overburden borehole	-	-
AD-12	3124718.2	1324385.6	6/14/05	630.9	-	-	3.8	Overburden borehole	-	-
AD-13	3124728.7	1324318.8	6/14/05	635.0	-	-	5.5	Overburden borehole	-	-
AD-14	3124672.9	1324309.9	6/14/05	649.3	-	-	17.0	Overburden borehole	-	-
AD-15	3124683.0	1324251.7	6/14/05	648.5	-	-	5.0	Overburden borehole	-	-
AD-16	3124731.1	1324219.8	6/14/05	639.8	-	-	5.5	Overburden borehole	-	-
AD-17	3124629.2	1324410.5	6/21/05	632.5	-	628.0	5.1	Overburden borehole	-	4.5
AD-18	3124678.7	1324420.3	6/21/05	632.4	-	626.5	6.1	Overburden borehole	-	5.9
AD-19	3124756.7	1324336.8	6/21/05	632.0	-	628.5	3.7	Overburden borehole	-	3.5
AD-20	3124755.3	1324303.6	6/21/05	631.1	-	628.6	3.1	Overburden borehole	-	2.5
B-809012-1	3124398.0	1325375.7	4/8/02	661.1	-	644.1	17.0	Overburden borehole	-	17
B-809012-2	3124369.1	1325381.5	4/8/02	661.2	-	649.7	11.5	Overburden borehole	-	11.5
B-809012-3	3124383.3	1325417.5	4/8/02	659.9	-	651.4	8.5	Overburden borehole	-	8.5
B-809012-4	3124440.5	1325463.2	4/8/02	656.5	-	644.5	12.0	Overburden borehole	-	12
B-809012-5	3124360.5	1325442.9	4/9/02	660.6	-	654.6	6.0	Overburden borehole	-	6
B-809012-6	3124373.7	1325481.7	4/9/02	658.0	-	646.0	12.0	Overburden borehole	-	12
B-809012-7	3124378.8	1325529.2	4/9/02	654.0	-	650.0	4.0	Overburden borehole	-	4
B-809012-8	3124331.7	1325501.8	4/9/02	657.3	-	641.3	16.0	Overburden borehole	-	16
B-809012-9	3124261.5	1325388.1	4/10/02	664.2	-	660.2	4.0	Overburden borehole	-	4
B-809012-10	3124161.8	1325717.1	4/10/02	645.4	-	617.9	27.5	Overburden borehole	-	27.5
B-809012-11	3124012.6	1325687.4	4/10/02	643.6	-	641.1	2.5	Overburden borehole	-	2.5
B-809012-12	3124274.3	1325678.9	4/10/02	643.1	-	615.1	28.0	Overburden borehole	-	28
B-809012-13	3123997.5	1325716.9	9/3/02	639.5	-	634.6	4.9	Overburden borehole	-	4.9
B-809012-14	3124288.0	1325692.1	9/4/02	642.1	-	637.7	4.4	Overburden borehole	-	4.4
B-809012-15	3124292.2	1325678.6	9/4/02	642.4	-	614.5	27.9	Overburden borehole	-	27.9
B-809012-16	3124350.5	1325482.7	9/4/02	658.9	-	-	8.0	Overburden borehole	-	-
B-809012-17	3124357.2	1325454.7	9/5/02	660.4	-	656.4	4.0	Overburden borehole	-	4
B-809012-18	3124360.6	1325483.3	9/5/02	658.6	-	652.6	6.0	Overburden borehole	-	6
B-809012-19	3124499.5	1325547.7	9/5/02	647.7	-	645.7	2.0	Overburden borehole	-	2

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
B-809012-20	3124496.8	1325537.0	9/5/02	648.7	-	646.7	2.0	Overburden borehole	-	2
B-809012-21	3124306.5	1325688.8	9/5/02	642.9	-	640.9	2.0	Overburden borehole	-	2
B-809012-22	3124290.5	1325692.6	9/5/02	642.0	-	638.0	4.0	Overburden borehole	-	4
B-809012-23	3124503.2	1325328.2	9/6/02	666.0	-	659.0	7.0	Overburden borehole	-	7
BH-1	3123643.4	1322814.7	9/1/05	725.7	-	710.2	15.5	Overburden borehole	-	15.5
BH-2	3123640.0	1322810.0	9/7/05	725.5	-	706.9	20.0	Overburden borehole	-	18.6
BH-3	3123635.4	1322814.8	9/1/05	725.3	-	710.3	15.0	Overburden borehole	-	15
BH-3A	3123634.7	1322815.0	2/8/06	725.5	-	-	12.0	Overburden borehole	-	-
BH-4	3123634.2	1322804.5	2/8/06	725.2	-	-	12.0	Overburden borehole	-	-
BH-5	3123636.2	1322825.5	2/8/06	725.5	-	-	12.0	Overburden borehole	-	-
BH-28A	3124201.9	1324555.7	12/14/05	638.3	-	633.8	4.5	Overburden borehole	-	4.5
BH-29A	3124041.5	1324440.0	12/14/05	650.1	-	648.7	1.4	Overburden borehole	-	1.4
BH-101	3122035.2	1324730.5	9/2/04	690.6	-	-	12.0	Overburden borehole	-	-
BH-102	3122068.5	1324714.2	9/2/04	687.7	-	-	12.0	Overburden borehole	-	-
BH-103	3122097.7	1324725.2	9/2/04	685.8	-	-	12.0	Overburden borehole	-	-
BH-104	3122084.5	1324458.0	9/1/04	691.9	-	682.3	12.0	Overburden borehole	-	9.6
BH-105	3122125.5	1324439.8	9/2/04	690.5	-	-	12.0	Overburden borehole	-	
BH-106	3122164.0	1324481.8	9/1/04	688.0	-	682.0	8.5	Overburden borehole	-	6
BH-107	3122163.8	1324454.4	8/31/04	688.0	-	678.0	12.0	Overburden borehole	-	10
BH-108	3122066.9	1324419.0	9/1/04	694.6	-	-	12.0	Overburden borehole	-	-
BH-109	3122021.0	1324401.3	9/2/04	697.4	-	-	12.0	Overburden borehole	-	-
BH-110	3122036.7	1324370.7	9/1/04	699.1	-	-	12.0	Overburden borehole	-	-
BH-111	3122104.9	1324391.3	9/1/04	693.6	-	-	12.0	Overburden borehole	-	-
BH-112	3122123.1	1324405.3	9/2/04	693.6	-	-	12.0	Overburden borehole	-	-
BH-113	3122148.6	1324402.9	9/2/04	691.0	-	679.8	12.0	Overburden/bedrock borehole	-	11.2
BH-114	3122134.4	1324375.6	9/1/04	693.0	-	686.0	8.0	Overburden/bedrock borehole	-	7
BH-115	3122333.4	1324481.6	8/31/04	681.0	-	-	12.0	Overburden borehole	-	-
BH-116	3122420.1	1324495.5	8/31/04	680.3	-	-	12.0	Overburden borehole	-	-
BH-600	3124386.0	1321938.0	3/21/07	713.6	-	-	10.0	Overburden borehole	-	-
BH-601	3124554.0	1322286.0	3/28/07	676.1	-	-	4.0	Overburden borehole	-	-
BH-602	3124439.0	1321989.0	3/21/07	696.3	-	-	4.0	Overburden borehole	-	-
BH-603	3124457.0	1322067.0	3/27/07	685.8	-	-	5.0	Overburden borehole	-	-
BH-604	3124419.0	1321994.0	3/27/07	698.0	-	-	8.0	Overburden borehole	-	-
BH-605	3124574.0	1322270.0	3/28/07	676.3	-	-	6.0	Overburden borehole	-	-
BH-606	3124438.0	1321900.0	3/26/07	715.1	-	-	10.0	Overburden borehole	-	-
BH-607	3124412.0	1321911.0	3/26/07	708.9	-	-	8.0	Overburden borehole	-	-
BH-608	3124460.0	1321989.0	3/21/07	697.4	-	-	4.0	Overburden borehole	-	-

Table 3.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
BH-609	3124439.0	1322026.0	3/27/07	689.6	-	-	6.0	Overburden borehole	-	-
BH-610	3124538.0	1322305.0	3/28/07	675.2	-	-	4.0	Overburden borehole	-	-
BH-611	3124329.3	1321930.1	4/13/07	717.6	-	695.1	22.5	Overburden borehole	-	22.5
BH-612	3124369.9	1321913.6	4/13/07	716.7	-	694.1	22.6	Overburden borehole	-	22.6
BH-613	3124346.4	3124346.4	4/13/07	714.4	-	693.4	22.7	Overburden borehole	-	21
BH-614	3124322.3	1322043.5	11/19/07	715.3	-	-	20.0	Overburden borehole	-	-
BH-615	3124316.7	1322083.9	11/19/07	715.5	-	-	19.5	Overburden borehole	-	-
BH-616	3124328.3	1322002.0	11/19/07	715.5	-	-	19.0	Overburden borehole	-	-
BH-617	3124374.7	1322038.2	11/19/07	712.4	-	-	21.5	Overburden borehole	-	-
BH-618	3124375.3	1321996.4	11/19/07	712.9	-	-	20.5	Overburden borehole	-	-
BH-619	3124384.6	1322018.1	11/20/07	711.1	-	-	19.0	Overburden borehole	-	-
BH-620	3124295.5	1321978.7	11/20/07	717.3	-	-	20.0	Overburden borehole	-	-
BH-621	3124404.5	1321975.4	11/20/07	709.7	-	-	23.0	Overburden borehole	-	-
BH-622	3124301.4	1321924.7	11/20/07	718.9	-	-	22.5	Overburden borehole	-	-
BH-623	3124356.3	1321889.8	11/20/07	718.8	-	-	22.5	Overburden borehole	-	-
BH-A004-1	3123981.7	1323958.3	11/4/04	691.3	-	670.8	20.5	Overburden borehole	-	20.5
BH-A004-2	3124011.3	1323772.0	11/4/04	690.8	-	683.6	7.2	Overburden borehole	-	7.2
BH-EA010-1	3124595.5	1323939.6	11/4/04	642.3	-	637.7	4.6	Overburden borehole	-	4.6
BH-EA010-2	3124594.6	1323791.2	11/4/04	651.1	-	645.9	5.2	Overburden borehole	-	5.2
BH-EA010-3	3124592.3	1323609.0	11/4/04	665.8	-	660.2	5.6	Overburden borehole	-	5.6
BH-EA010-4	3124586.5	1323472.3	11/4/04	671.3	-	664.4	6.9	Overburden borehole	-	6.9
BH-EA010-5	3124674.1	1323831.5	11/4/04	643.4	-	639.5	3.9	Overburden borehole	-	3.9
BH-EA010-6	3124770.9	1323846.0	11/4/04	637.1	-	633.1	4.0	Overburden borehole	-	4
BK-X142Y263	3124087.2	1324644.9	1/24/02	651.0	-	-	2.0	Overburden borehole	-	-
BK-X157Y157	3123707.1	1323430.6	6/6/02	724.7	-	-	8.0	Overburden borehole	-	-
BK-X199Y347	3124189.4	1325158.8	6/6/02	662.3	-	657.8	4.5	Overburden borehole	-	4.5
BK-X212Y042	3124351.5	1322133.6	1/23/02	713.0	-	-	2.0	Overburden borehole	-	-
BK-X267Y091	3124979.5	1322706.6	1/23/02	666.2	-	-	2.0	Overburden borehole	-	-
BK-X281Y296	3125010.7	1324660.8	1/23/02	627.1	-	-	2.0	Overburden borehole	-	-
BK-X293Y374	3125186.2	1325429.6	6/6/02	626.5	-	620.0	6.5	Overburden borehole	-	6.5
								Overburden borehole	-	-
B-X023Y090	3122407.1	1322596.2	4/12/07	708.4	-	685.5	22.9	Overburden borehole	-	22.9
B-X023Y100	3122404.8	1322711.5	4/12/07	706.6	-	685.7	20.9	Overburden borehole	-	20.9
B-X023Y110	3122406.9	1322819.6	3/29/07	705.0	-	686.5	18.5	Overburden borehole	-	18.5
B-X023Y123	3122413.8	1322907.2	3/29/07	703.9	-	687.9	16.0	Overburden borehole	-	16
B-X030Y111	3122506.6	1322809.5	4/12/07	720.6	-	693.3	27.3	Overburden borehole	-	27.3
B-X031Y124	3122502.0	1322944.8	11/4/03	721.5	-	688.3	34.0	Overburden borehole	-	33.2

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
B-X031Y124A	3122509.1	1322962.0	11/5/03	721.6	-	689.6	32.4	Overburden borehole	-	32
B-X031Y124B	3122510.7	1322939.0	11/5/03	721.7	-	688.2	34.0	Overburden borehole	-	33.5
B-X031Y124C	3122494.7	1322927.5	11/5/03	721.5	-	688.5	33.3	Overburden borehole	-	33
B-X031Y124D	3122490.0	1322945.0	11/6/03	721.1	-	689.1	32.9	Overburden borehole	-	32
B-X031Y124E	3122499.2	1322924.3	12/3/03	720.9	-	716.9	4.0	Overburden borehole	-	4
B-X031Y124F	3122506.6	1322942.2	12/3/03	720.9	-	-	4.0	Overburden borehole	-	-
B-X031Y124G	3122514.4	1322959.6	12/3/03	721.1	-	-	4.0	Overburden borehole	-	-
B-X033Y147	3122522.0	1323192.4	4/15/02	718.5	-	681.5	63	Overburden/bedrock borehole	-	37
B-X045Y172	3122649.9	1323420.1	1/31/02	719.0	-	699.0	20.0	Overburden borehole	-	20
B-X045Y258A	3122842.9	1324270.2	10/21/04	698.5	-	692.4	6.5	Overburden borehole	-	6.1
B-X047Y072	3122676.5	1322445.2	5/3/02	724.2	-	688.2	56.0	Overburden/bedrock borehole	-	36
B-X047Y123A	3122712.5	1322907.4	5/13/02	726.7	-	-	1.5	Overburden borehole	-	-
B-X047Y123B	3122710.4	1322906.5	5/13/02	726.7	-	-	1.5	Overburden borehole	-	-
B-X047Y123C	3122709.9	1322905.6	5/17/02	726.7	-	-	1.5	Overburden borehole	-	-
B-X047Y123D	3122671.9	1322877.8	5/16/02	726.7	-	-	7.9	Overburden borehole	-	-
B-X047Y123E	3122671.3	1322881.2	5/17/02	726.7	-	-	4.0	Overburden borehole	-	-
B-X047Y236	3122605.1	1324112.3	11/23/05	691.1	-	687.6	11.5	Overburden/bedrock borehole	-	3.5
B-X048Y086	3122694.5	1322562.9	6/7/02	724.3	-	691.3	56.8	Overburden/bedrock borehole	-	33
B-X049Y198	3122706.9	1323664.4	1/29/02	719.6	-	681.6	38.0	Overburden borehole	-	38
B-X057Y272A	3122798.4	1324485.4	4/7/04	694.0	-	665.6	28.4	Overburden borehole	-	28.4
B-X057Y272B	3122817.6	1324486.6	4/7/04	693.6	-	669.6	24.0	Overburden borehole	-	24
B-X057Y272C	3122777.3	1324482.6	4/7/04	693.7	-	669.2	24.5	Overburden borehole	-	24.5
B-X059Y135A	3122819.1	1323061.6	7/8/02	727.2	-	-	3.0	Overburden borehole	-	-
B-X059Y135B	3122814.9	1323057.2	7/11/02	727.2	-	684.2	63.5	Overburden/bedrock borehole	-	43
B-X059Y160	3122790.0	1323300.0	2/1/02	721.8	-	688.8	33.0	Overburden borehole	-	33
B-X069Y098A	3122906.7	1322682.6	2/11/02	724.1	-	-	1.5	Overburden borehole	-	-
B-X069Y098B	3122909.5	1322683.4	4/15/02	724.1	-	702.1	44.5	Overburden/bedrock borehole	-	22
B-X075Y183A	3122936.3	1323564.7	1/29/02	721.5	-	-	16.0	Overburden borehole	-	-
B-X075Y183B	3122936.3	1323564.7	1/29/02	721.3	-	688.8	32.5	Overburden borehole	-	32.5
B-X080Y210	3122926.2	1323752.6	2/14/02	718.1	-	685.1	34.5	Overburden/bedrock borehole	-	33
B-X082Y186A	3123050.0	1323564.6	4/5/04	722.8	-	688.8	34.0	Overburden borehole	-	34
B-X082Y186B	3123062.9	1323545.2	4/5/04	723.1	-	683.9	39.2	Overburden borehole	-	39.2
B-X082Y186C	3123075.6	1323527.8	4/5/04	723.4	-	684.4	39.0	Overburden borehole	-	39
B-X082Y186D	3123038.1	1323581.6	4/5/04	722.5	-	685.4	37.1	Overburden borehole	-	37.1
B-X084Y138A	3123036.5	1323070.2	5/29/02	726.9	-	-	8.0	Overburden borehole	-	-
B-X084Y138B	3123037.1	1323067.9	5/29/02	726.9	-	-	8.0	Overburden borehole	-	-
B-X086Y274	3122958.9	1324444.5	5/10/04	693.3	-	686.8	57.7	Overburden/bedrock borehole	-	6.5
B-X089Y258	3123110.2	1324289.0	4/13/04	702.6	-	-	10.0	Overburden borehole	-	
B-X093Y090	3123181.2	1322619.7	5/7/02	724.3	-	699.3	45.8	Overburden/bedrock borehole	-	25
B-X095Y206A	3123153.8	1323736.0	4/5/04	721.6	-	692.2	29.4	Overburden borehole	-	29.4

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
B-X095Y206B	3123165.7	1323716.3	4/6/04	722.3	-	698.3	24.0	Overburden borehole	-	24
B-X095Y206C	3123143.6	1323756.7	4/6/04	721.3	-	693.0	28.3	Overburden borehole	-	28.3
B-X096Y195	3123158.9	1323653.4	1/25/02	723.2	-	691.2	32.0	Overburden borehole	-	32
B-X097Y232	3123200.4	1324041.1	2/14/02	712.1	-	692.6	20.0	Overburden borehole	-	19.5
B-X100Y072	3123174.8	1322413.9	3/5/02	720.1	-	694.1	26.0	Overburden borehole	-	26
B-X100Y198	3123202.7	1323682.4	1/23/02	724.7	-	689.7	36.0	Overburden borehole	-	35
B-X102Y258	3123238.7	1324291.3	4/13/04	696.0	-	-	10.0	Overburden borehole	-	-
B-X102Y258A	3123238.9	1324301.0	10/22/04	695.4	-	-	4.0	Overburden borehole	-	-
B-X102Y258B	3123228.8	1324291.6	10/22/04	696.3	-	-	4.0	Overburden borehole	-	-
B-X102Y258C	3123238.7	1324281.0	10/22/04	696.7	-	-	4.0	Overburden borehole	-	-
B-X102Y258D	3123248.7	1324291.2	10/22/04	695.3	-	-	4.0	Overburden borehole	-	-
B-X106Y102A	3123213.7	1322720.6	2/12/02	724.2	-	-	1.5	Overburden borehole	-	-
B-X106Y102B	3123213.7	1322720.6	2/12/02	724.3	-	701.8	22.5	Overburden borehole	-	22.5
B-X106Y102C	3123213.7	1322720.6	4/25/02	724.3	-	701.8	45.5	Overburden/bedrock borehole	-	22.5
B-X106Y102D	3123213.7	1322720.6	7/8/05	724.3	-	700.2	28.5	Overburden/bedrock borehole	-	24.1
B-X107Y151	3123269.2	1323211.1	1/15/02	726.3	-	692.8	33.5	Overburden borehole	-	33.5
B-X107Y203	3123265.4	1323729.5	1/23/02	724.4	-	692.4	32.5	Overburden borehole	-	32
B-X108Y190	3123281.4	1323613.5	1/27/02	724.6	-	691.6	33.0	Overburden borehole	-	33
B-X108Y226A	3123292.5	1323933.5	4/2/04	714.2	-	684.7	29.5	Overburden borehole	-	29.5
B-X108Y226B	3123301.2	1323914.1	4/2/04	715.1	-	686.6	28.5	Overburden borehole	-	28.5
B-X108Y226C	3123285.4	1323952.8	4/2/04	713.6	-	686.8	26.8	Overburden borehole	-	26.8
B-X113Y194	3123329.1	1323640.1	1/24/02	724.5	-	691.5	34.0	Overburden borehole	-	33
B-X114Y258	3123357.5	1324293.5	4/13/04	689.2	-	-	10.0	Overburden borehole	-	-
B-X114Y258A	3123357.5	1324303.5	10/22/04	688.5	-	-	4.0	Overburden borehole	-	-
B-X114Y258B	3123348.1	1324293.4	10/22/04	689.8	-	-	4.0	Overburden borehole	-	-
B-X114Y258C	3123357.5	1324283.9	10/22/04	689.9	-	-	4.0	Overburden borehole	-	-
B-X114Y258D	3123367.3	1324293.6	10/22/04	688.5	-	-	4.0	Overburden borehole	-	-
B-X115Y070	3123350.6	1322399.6	3/6/02	720.2	-	696.2	24.0	Overburden borehole	-	24
B-X120Y203	3123087.6	1323653.5	9/19/05	722.1	-	691.6	45.1	Overburden/bedrock borehole	-	30.5
B-X123Y129	3123400.3	1322996.3	1/17/02	726.5	-	703.0	23.5	Overburden borehole	-	23.5
B-X123Y245A	3123410.2	1324135.9	4/1/04	704.1	-	669.7	34.4	Overburden borehole	-	34.4
B-X123Y245B	3123418.1	1324116.5	4/1/04	704.0	-	675.5	28.5	Overburden borehole	-	28.5
B-X123Y245C	3123402.2	1324155.2	4/11/04	704.0	-	672.8	31.2	Overburden borehole	-	31.2
B-X128Y079	3123480.3	1322489.8	3/7/02	719.6	-	696.6	24.0	Overburden borehole	-	23
B-X128Y255A	3123477.4	1324295.3	4/13/04	683.5	-	-	20.0	Overburden borehole	-	-
B-X128Y255B	3123461.1	1324292.7	4/15/04	683.7	-	664.7	32.2	Overburden/bedrock borehole	-	19
B-X128Y255C	3123484.7	1324272.6	5/13/04	683.6	-	668.1	15.5	Overburden borehole	-	15.5
B-X128Y255D	3123496.8	1324284.5	5/13/04	683.5	-	667.2	16.3	Overburden borehole	-	16.3
B-X129Y214	3123599.3	1323850.0	4/14/04	697.2	-	-	10.0	Overburden borehole	-	-
B-X129Y224	3123568.8	1323966.7	4/14/04	-	-	-	6.0	Overburden borehole	-	6

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
B-X129Y236	3123539.7	1324080.9	4/14/04	692.1	-	-	10.0	Overburden borehole	-	-
B-X129Y247	3123505.0	1324206.7	4/14/04	685.4	-	-	10.0	Overburden borehole	-	-
B-X129Y247A	3123504.7	1324226.3	10/25/04	684.7	-	-	10.0	Overburden borehole	-	-
B-X129Y247B	3123514.5	1324216.3	10/25/04	684.6	-	-	10.0	Overburden borehole	-	-
B-X129Y247C	3123522.4	1324206.4	10/25/04	684.8	-	-	10.0	Overburden borehole	-	-
B-X129Y247D	3123515.0	1324206.4	10/25/04	684.9	-	-	10.0	Overburden borehole	-	-
B-X129Y247E	3123505.0	1324216.8	10/25/04	685.0	-	-	10.0	Overburden borehole	-	-
B-X129Y247F	3123485.6	1324206.1	10/25/04	687.3	-	-	10.0	Overburden borehole	-	-
B-X129Y247G	3123495.2	1324206.4	10/25/04	686.2	-	-	10.0	Overburden borehole	-	-
B-X129Y247H	3123495.1	1324196.6	10/26/04	687.1	-	-	10.0	Overburden borehole	-	-
B-X129Y247I	3123505.2	1324186.4	10/26/04	686.4	-	-	10.0	Overburden borehole	-	-
B-X129Y247J	3123505.3	1324196.5	10/26/04	685.7	-	-	10.0	Overburden borehole	-	-
B-X129Y247K	3123513.5	1324194.0	10/26/04	685.0	-	-	10.0	Overburden borehole	-	-
B-X129Y247L	3123496.7	1324220.5	10/26/04	685.4	-	-	10.0	Overburden borehole	-	-
B-X130Y064	3123499.7	1322339.6	3/7/02	719.2	-	697.2	22.0	Overburden borehole	-	22
B-X130Y089	3123504.6	1322647.2	4/30/02	724.4	-	698.9	45.5	Overburden/bedrock borehole	-	25.5
B-X130Y115	3123493.5	1322849.7	7/15/02	726.2	-	-	16.0	Overburden borehole	-	-
B-X130Y215	3123497.6	1323854.7	2/13/02	709.5	-	675.0	35.5	Overburden borehole	-	34.5
B-X132Y186A	3123527.3	1323594.9	4/8/04	720.2	-	679.5	40.7	Overburden borehole	-	40.7
B-X132Y186B	3123539.1	1323576.7	4/8/04	720.1	-	679.2	40.9	Overburden borehole	-	40.9
B-X132Y186C	3123553.1	1323556.4	4/8/04	720.3	-	679.1	41.2	Overburden borehole	-	41.2
B-X135Y110	3123544.1	1322765.9	7/15/02	726.1	-	-	16.0	Overburden borehole	-	-
B-X137Y073	3123566.5	1322420.7	3/7/02	719.3	-	698.8	20.5	Overburden borehole	-	20.5
B-X137Y132	3123576.5	1322993.5	2/15/02	726.5	-	702.5	24.0	Overburden borehole	-	24
B-X140Y100	3123611.1	1322675.6	7/15/02	726.1	-	-	16.0	Overburden borehole	-	-
B-X143Y075	3123632.7	1322450.8	3/13/02	719.6	-	698.1	21.5	Overburden borehole	-	21.5
B-X143Y193A	3123607.6	1323673.7	4/7/04	703.8	-	675.3	28.5	Overburden borehole	-	28.5
B-X143Y193AA	3123606.1	1323692.6	11/22/04	702.6	-	-	16.0	Overburden borehole	-	-
B-X143Y193AB	3123630.9	1323687.9	11/23/04	700.9	-	-	16.0	Overburden borehole	-	-
B-X143Y193AC	3123655.9	1323673.9	11/29/04	699.7	-	-	24.0	Overburden borehole	-	-
B-X143Y193AD	3123657.6	1323645.1	11/23/04	702.2	-	-	16.0	Overburden borehole	-	-
B-X143Y193AE	3123643.4	1323626.6	11/23/04	704.5	-	-	16.0	Overburden borehole	-	-
B-X143Y193AF	3123591.3	1323614.7	11/23/04	710.6	-	-	24.0	Overburden borehole	-	-
B-X143Y193AG	3123668.1	1323667.1	11/30/04	699.7	-	-	4.1	Overburden borehole	-	-
B-X143Y193AH	3123598.4	1323632.6	11/30/04	708.3	-	-	28.0	Overburden borehole	-	-
B-X143Y193AI	3123651.9	1323731.2	12/8/04	699.1	-	-	4.0	Overburden borehole	-	-
B-X143Y193AJ	3123645.2	1323698.6	12/9/04	698.8	-	-	4.0	Overburden borehole	-	-
B-X143Y193AK	3123672.7	1323649.6	12/9/04	701.2	-	-	4.0	Overburden borehole	-	-
B-X143Y193AL	3123679.2	1323624.2	12/9/04	703.7	-	-	2.0	Overburden borehole	-	-
B-X143Y193AM	3123650.3	1323607.3	12/9/04	706.4	-	-	16.0	Overburden borehole	-	-

Table 3.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
B-X143Y193AN	3123611.4	1323586.8	12/9/04	711.6	-	-	20.0	Overburden borehole	-	-
B-X143Y193AO	3123582.8	1323582.5	12/6/04	714.7	-	-	24.0	Overburden borehole	-	-
B-X143Y193AP	3123564.8	1323615.8	12/7/04	713.4	-	-	32.0	Overburden borehole	-	-
B-X143Y193AQ	3123552.7	1323640.0	12/8/04	712.4	-	-	24.0	Overburden borehole	-	-
B-X143Y193AR	3123543.8	1323660.7	12/8/04	711.4	-	-	16.0	Overburden borehole	-	-
B-X143Y193AS	3123536.8	1323689.8	12/8/04	709.7	-	-	12.0	Overburden borehole	-	-
B-X143Y193AT	3123594.1	1323714.8	12/8/04	702.9	-	-	12.0	Overburden borehole	-	-
B-X143Y193AU	3123644.2	1323757.5	12/16/04	698.7	-	-	2.0	Overburden borehole	-	-
B-X143Y193AV	3123584.6	1323737.4	12/21/04	703.5	-	-	8.0	Overburden borehole	-	-
B-X143Y193AW	3123516.8	1323713.6	12/21/04	710.6	-	-	8.0	Overburden borehole	-	-
B-X143Y193AX	3123498.6	1323673.7	12/21/04	714.0	-	-	16.0	Overburden borehole	-	-
B-X143Y193AY	3123601.4	1323555.6	12/21/04	714.9	-	-	16.0	Overburden borehole	-	-
B-X143Y193AZ	3123656.8	1323579.0	12/16/04	709.4	-	-	12.0	Overburden borehole	-	-
B-X143Y193B	3123617.1	1323653.9	4/7/04	704.3	-	674.9	29.4	Overburden borehole	-	29.4
B-X143Y193BA	3123687.3	1323590.9	12/16/04	707.8	-	-	2.5	Overburden borehole	-	-
B-X143Y193BB	3123637.1	1323783.5	12/22/04	699.5	-	-	2.0	Overburden borehole	-	-
B-X143Y193BC	3123702.7	1323566.8	1/19/05	711.4	-	-	12.0	Overburden borehole	-	-
B-X143Y193BD	3123695.8	1323589.9	1/19/05	708.1	-	-	12.0	Overburden borehole	-	-
B-X143Y193BE	3123697.1	1323617.6	1/19/05	704.5	-	-	16.0	Overburden borehole	-	-
B-X143Y193BF	3123690.4	1323639.8	1/19/05	702.2	-	-	16.0	Overburden borehole	-	-
B-X143Y193BG	3123683.2	1323664.9	1/19/05	700.1	-	-	20.0	Overburden borehole	-	-
B-X143Y193BH	3123676.2	1323687.3	1/19/05	699.2	-	-	20.0	Overburden borehole	-	-
B-X143Y193BI	3123670.1	1323712.6	1/20/05	698.4	-	-	16.0	Overburden borehole	-	-
B-X143Y193BJ	3123660.7	1323734.8	1/20/05	698.3	-	-	10.0	Overburden borehole	-	-
B-X143Y193BK	3123658.3	1323760.1	1/20/05	698.4	-	-	12.0	Overburden borehole	-	-
B-X143Y193BL	3123649.9	1323796.1	1/20/05	698.8	-	-	8.0	Overburden borehole	-	-
B-X143Y193BM	3123614.4	1323799.3	1/24/05	702.0	-	-	12.0	Overburden borehole	-	-
B-X143Y193BN	3123590.1	1323784.9	1/24/05	704.0	-	-	10.0	Overburden borehole	-	-
B-X143Y193BO	3123568.7	1323775.0	1/24/05	706.2	-	-	10.0	Overburden borehole	-	-
B-X143Y193BP	3123540.0	1323761.4	1/25/05	709.4	-	-	10.0	Overburden borehole	-	-
B-X143Y193BQ	3123597.6	1323506.7	1/25/05	719.0	-	-	16.0	Overburden borehole	-	-
B-X143Y193BR	3123622.9	1323522.3	1/25/05	716.3	-	-	12.0	Overburden borehole	-	-
B-X143Y193BS	3123647.7	1323537.6	1/25/05	715.0	-	-	12.0	Overburden borehole	-	-
B-X143Y193BT	3123717.8	1323724.4	1/25/05	699.5	-	-	16.0	Overburden borehole	-	-
B-X143Y193BU	3123725.6	1323695.0	1/25/05	700.4	-	-	16.0	Overburden borehole	-	-
B-X143Y193BV	3123708.8	1323759.7	1/25/05	698.7	-	-	12.0	Overburden borehole	-	-
B-X143Y193BW	3123616.0	1323665.9	2/9/06	703.5	-	-	24.0	Overburden borehole	-	-
B-X143Y193BX	3123651.8	1323703.2	2/9/06	698.6	-	-	24.0	Overburden borehole	-	-
B-X143Y193BY	3123677.5	1323684.1	2/10/06	699.1	-	-	24.0	Overburden borehole	-	-
B-X143Y193BZ	3123651.5	1323640.7	2/9/06	702.8	-	-	24.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
B-X143Y193C	3123626.6	1323632.8	4/8/04	705.2	-	675.7	29.5	Overburden borehole	-	29.5
B-X143Y193CA	3123645.1	1323676.4	2/10/06	700.2	-	-	24.0	Overburden borehole	-	-
B-X143Y193CB	3123636.0	1323727.5	2/22/06	699.6	-	679.6	22.0	Overburden/bedrock borehole	-	20
B-X143Y193CC	3123647.5	1323676.8	2/22/06	700.0	-	675.1	24.9	Overburden borehole	-	24.9
B-X143Y193CD	3123608.1	1323652.2	1/15/08	705.1	-	-	12.0	Overburden borehole	-	-
B-X143Y193CE	3123598.1	1323652.7	1/15/08	706.3	-	-	8.0	Overburden borehole	-	-
B-X143Y193CF	3123638.5	1323667.2	1/15/08	701.7	-	676.7	27.9	Overburden borehole	-	25
B-X143Y193CG	3123652.0	1323703.1	1/16/08	698.7	700.29	673.2	31.5	Overburden/bedrock borehole	-	25.5
B-X143Y193CH	3123646.0	1323674.6	1/15/08	700.3	-	-	25.5	Overburden borehole	-	-
B-X143Y193D	3123617.1	1323633.8	10/26/04	706.0	-	-	10.0	Overburden borehole	-	-
B-X143Y193F	3123617.3	1323643.6	10/27/04	705.0	-	-	10.0	Overburden borehole	-	-
B-X143Y193G	3123607.6	1323644.4	10/27/04	705.9	-	-	10.0	Overburden borehole	-	-
B-X143Y193H	3123627.3	1323653.6	10/27/04	703.5	-	-	10.0	Overburden borehole	-	-
B-X143Y193I	3123637.2	1323653.8	10/27/04	702.8	-	-	10.0	Overburden borehole	-	-
B-X143Y193J	3123627.1	1323644.1	10/27/04	704.0	-	-	10.0	Overburden borehole	-	-
B-X143Y193K	3123627.2	1323664.2	10/27/04	702.7	-	-	10.0	Overburden borehole	-	-
B-X143Y193L	3123617.1	1323663.9	10/27/04	703.5	-	-	10.0	Overburden borehole	-	-
B-X143Y193M	3123607.4	1323653.3	10/27/04	705.1	-	-	10.0	Overburden borehole	-	-
B-X143Y193N	3123597.2	1323653.9	10/28/04	706.3	-	698.3	10.0	Overburden borehole	-	8
B-X143Y193O	3123607.0	1323664.5	10/28/04	704.4	-	-	10.0	Overburden borehole	-	-
B-X143Y193P	3123622.6	1323672.9	10/28/04	702.4	-	-	10.0	Overburden borehole	-	-
B-X143Y193Q	3123610.1	1323677.7	11/16/04	703.2	-	-	16.0	Overburden borehole	-	-
B-X143Y193R	3123637.8	1323668.9	11/16/04	701.6	-	-	20.0	Overburden borehole	-	-
B-X143Y193S	3123651.5	1323658.7	11/17/04	701.5	-	-	24.0	Overburden borehole	-	-
B-X143Y193T	3123638.4	1323641.2	11/17/04	703.4	-	-	20.0	Overburden borehole	-	-
B-X143Y193U	3123624.8	1323620.7	11/17/04	706.4	-	-	20.0	Overburden borehole	-	-
B-X143Y193V	3123608.4	1323620.7	11/18/04	708.3	-	-	20.0	Overburden borehole	-	-
B-X143Y193W	3123600.8	1323608.0	11/18/04	710.4	-	-	20.0	Overburden borehole	-	-
B-X143Y193X	3123583.6	1323646.5	11/18/04	708.5	-	-	20.0	Overburden borehole	-	-
B-X143Y193Y	3123594.0	1323671.9	11/19/14	705.4	-	-	20.0	Overburden borehole	-	-
B-X143Y193Z	3123580.7	1323664.6	11/22/04	707.2	-	-	20.0	Overburden borehole	-	-
B-X148Y076	3123685.6	1322461.4	3/8/02	720.4	-	700.4	20.0	Overburden borehole	-	20
B-X148Y233	3123683.8	1323982.8	2/22/02	695.6	-	681.1	15.0	Overburden borehole	-	14.5
B-X154Y117	3123727.2	1322845.6	11/12/03	724.7	-	699.7	25.3	Overburden borehole	-	25
B-X154Y117A	3123718.4	1322859.8	11/12/03	724.7	-	699.7	25.3	Overburden borehole	-	25
B-X154Y117B	3123703.2	1322849.7	11/10/03	724.6	-	699.6	25.4	Overburden borehole	-	25
B-X154Y117C	3123743.4	1322877.9	12/1/04	724.9	-	-	4.9	Overburden borehole	-	4.9
B-X154Y117D	3123762.7	1322863.1	12/2/04	722.3	-	-	4.0	Overburden borehole	-	-
B-X154Y117E	3123753.9	1322847.0	12/2/04	721.2	-	-	4.0	Overburden borehole	-	-
B-X158Y207	3123789.8	1323748.7	3/6/02	696.5	-	672.5	24.0	Overburden borehole	-	24

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
B-X165Y179	3123842.7	1323497.6	1/9/02	720.5	-	702.5	18.0	Overburden borehole	-	18
B-X169Y248	3123874.5	1324167.3	2/21/02	690.9	-	666.4	25.0	Overburden borehole	-	24.5
B-X170Y134	3123920.7	1323006.2	6/3/02	723.0	-	715.0	8.0	Overburden borehole	-	8
B-X170Y143	3123886.3	1323165.4	3/21/02	725.2	-	703.7	21.5	Overburden borehole	-	21.5
B-X170Y211	3123896.9	1323794.1	2/6/02	692.5	-	664.5	28.0	Overburden borehole	-	28
B-X171Y157	3123928.6	1323348.1	3/22/02	723.6	-	703.6	20.0	Overburden borehole	-	20
B-X173Y125	3123962.9	1322964.5	6/3/02	722.9	-	-	8.0	Overburden borehole	-	-
B-X173Y131	3123952.0	1323012.8	3/14/02	723.2	-	703.2	20.0	Overburden borehole	-	20
B-X173Y134	3123947.9	1323032.3	6/3/02	723.2	-	-	8.0	Overburden borehole	-	-
B-X176Y143	3123949.8	1323148.8	1/9/02	724.3	-	701.3	23.0	Overburden borehole	-	23
B-X176Y179	3123952.1	1323511.7	2/22/02	719.1	-	693.1	26.0	Overburden borehole	-	26
B-X176Y187	3123946.1	1323569.8	2/21/02	716.7	-	678.7	38.0	Overburden borehole	-	38
B-X177Y252D	3123955.6	1324262.9	3/3/03	681.7	-	657.2	61.9	Overburden/bedrock borehole	Angle hole	24.5
B-X183Y133	3124028.9	1323038.0	1/11/02	722.6	-	703.8	19.0	Overburden borehole	-	18.8
B-X185Y185	3124061.7	1323557.9	1/10/02	713.1	-	677.6	35.5	Overburden borehole	-	35.5
B-X185Y195	3123959.7	1323728.2	3/15/02	693.8	-	681.3	13.0	Overburden borehole	-	12.5
B-X186Y159	3124064.8	1323294.9	3/20/02	722.4	-	699.4	23.0	Overburden borehole	-	23
B-X186Y180	3124099.8	1323231.7	3/21/02	721.8	-	699.8	22.0	Overburden borehole	-	22
B-X187Y217	3124070.7	1323845.6	3/6/02	689.1	-	681.1	8.0	Overburden borehole	-	8
B-X189Y122	3124106.3	1322918.2	1/15/02	706.1	-	696.3	10.0	Overburden borehole	-	9.8
B-X192Y234	3124111.4	1324039.4	3/5/02	688.6	-	666.6	22.0	Overburden borehole	-	22
B-X193Y098	3124133.2	1322687.3	1/7/02	688.1	-	674.1	14.0	Overburden borehole	-	14
B-X193Y172	3124109.4	1323444.4	3/18/02	716.1	-	683.1	33.5	Overburden borehole	-	33
B-X193Y194	3124145.4	1323620.1	2/21/02	682.9	-	675.9	7.0	Overburden borehole	-	7
B-X193Y251	3124088.9	1324184.6	3/4/02	685.4	-	651.4	34.0	Overburden borehole	-	34
B-X193Y280	3124181.8	1324617.1	5/24/04	-	-	#VALUE!	8.0	Overburden/bedrock borehole	-	2.2
B-X195Y133	3124251.5	1323186.3	3/11/02	717.7	-	700.7	17.5	Overburden borehole	-	17
B-X200Y161	3124189.2	1323299.2	1/10/02	717.3	-	705.8	11.5	Overburden/bedrock borehole	-	11.5
B-X204Y111A	3124210.5	1322773.4	1/8/02	690.6	-	686.6	4.0	Overburden borehole	-	4
B-X204Y111B	3124213.6	1322772.7	1/8/02	690.4	-	686.4	4.0	Overburden borehole	-	4
B-X204Y111C	3124209.7	1322769.6	1/8/02	690.4	-	686.4	7.5	Overburden borehole	-	4
B-X204Y132	3124237.8	1323060.0	1/11/02	720.1	-	704.6	16.5	Overburden borehole	-	15.5
B-X204Y149	3124251.2	1323186.4	1/10/02	717.7	-	702.7	16.0	Overburden borehole	-	15
B-X209Y053	3124301.7	1322264.9	7/31/06	710.2	-	697.1	16.6	Overburden/bedrock borehole	-	13.1
B-X209Y078A	3124265.5	1322489.6	7/16/02	684.8	-	671.3	13.5	Overburden borehole	-	13.5
B-X209Y078B	3124289.3	1322489.3	7/16/02	684.9	-	672.4	12.5	Overburden borehole	-	12.5
B-X209Y078C	3124316.0	1322506.3	7/16/02	684.7	-	672.2	12.5	Overburden borehole	-	12.5
B-X209Y177	3124260.3	1323465.0	3/14/02	681.9	-	677.4	4.5	Overburden borehole	-	4.5
B-X211Y169	3124316.1	1323410.8	1/14/02	692.5	-	680.0	12.5	Overburden borehole	-	12.5
B-X213Y125	3124243.9	1322955.2	2/25/02	714.3	-	702.8	11.5	Overburden borehole	-	11.5

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
B-X217Y131	3124349.2	1323033.6	3/15/05	717.9	-	697.9	30.0	Overburden/bedrock borehole	-	20
B-X217Y159	3124346.1	1323278.3	2/27/02	694.3	-	687.3	8.0	Overburden/bedrock borehole	-	7
B-X218Y141	3124380.1	1323109.8	1/11/02	714.1	-	698.6	15.5	Overburden borehole	-	15.5
B-X219Y095	3124377.3	1322654.2	1/8/02	680.4	-	666.4	14.0	Overburden borehole	-	14
B-X219Y249	3124363.2	1324198.5	2/26/02	679.6	-	656.1	24.0	Overburden borehole	-	23.5
B-X221Y169	3124412.2	1323368.4	2/27/02	685.2	-	679.7	5.5	Overburden borehole	-	5.5
B-X223Y097A	3124428.0	1322674.7	1/8/02	679.7	-	669.7	10.0	Overburden borehole	-	10
B-X223Y097B	3124428.1	1322676.3	1/8/02	679.8	-	674.3	6.0	Overburden borehole	-	5.5
B-X223Y124	3124446.6	1322951.1	1/14/02	714.2	-	699.7	15.0	Overburden borehole	-	14.5
B-X223Y150A	3124429.2	1323200.6	2/27/02	698.2	-	693.7	4.5	Overburden borehole	-	4.5
B-X223Y150B	3124436.2	1323207.7	2/27/02	698.2	-	686.2	12.0	Overburden borehole	-	12
B-X223Y247D	3124457.6	1324204.3	2/4/03	676.2	-	641.2	200.0	Overburden/bedrock borehole	Angle hole	35
B-X224Y138A	3124475.0	1323037.5	2/25/02	704.5	-	701.5	3.0	Overburden borehole	-	3
B-X224Y138B	3124475.0	1323037.5	2/25/02	704.5	-	688.5	16.0	Overburden borehole	-	16
B-X225Y077	3124441.7	1322475.0	1/4/02	684.6	-	669.6	15.0	Overburden borehole	-	15
B-X231Y257	3124441.0	1324259.9	2/11/05	675.5	-	651.5	24.0	Overburden borehole	-	24
B-X232Y180	3124495.1	1323138.1	3/18/02	698.7	-	692.2	7.0	Overburden borehole	-	6.5
B-X243Y257	3124593.0	1324261.4	3/5/02	654.7	-	638.7	17.0	Overburden borehole	-	16
B-X253Y329A	3124746.1	1324957.6	1/21/02	659.2	-	646.2	13.0	Overburden borehole	-	13
B-X253Y329B	3124754.2	1324985.7	1/21/02	661.8	-	656.8	6.0	Overburden borehole	-	5
B-X253Y329C	3124746.7	1324939.1	1/21/02	658.4	-	646.7	12.0	Overburden borehole	-	11.7
B-X253Y329D	3124773.5	1324956.7	1/21/02	659.8	-	647.3	12.5	Overburden borehole	-	12.5
B-X253Y329E	3124719.2	1324967.9	1/22/02	659.5	-	655.0	5.0	Overburden borehole	-	4.5
B-X253Y329F	3124792.0	1324949.0	1/22/02	659.2	-	655.2	8.5	Overburden borehole	-	4
B-X253Y329G	3124746.5	1324960.4	1/22/02	659.6	-	657.6	5.0	Overburden borehole	-	2
B-X253Y329H	3124745.6	1324954.5	1/22/02	659.3	-	651.3	13.0	Overburden borehole	-	8
B-X254Y336	3124742.4	1324903.6	1/22/02	653.4	-	649.9	4.0	Overburden borehole	-	3.5
B-X261Y356	3124805.6	1325237.8	1/11/02	668.1	-	649.6	18.5	Overburden borehole	-	18.5
B-X263Y128	3124824.3	1322993.4	5/22/06	705.4	-	697.2	21.5	Overburden/bedrock borehole	-	8.2
B-X318Y217	3125381.2	1323879.9	6/8/06	650.5	-	647.6	16.0	Overburden/bedrock borehole	-	2.9
CATCH BASIN TEST PIT 1	3123488.6	1324282.8	5/10/04	682.9	-	-	5.5	Test Pit	-	-
CATCH BASIN TEST PIT 2	3123476.1	1324292.7	5/10/04	683.4	-	-	7.5	Test Pit	-	-
CH-1 Abandoned	3124283.8	1322351.9	5/29/05	692.2	-	686.3	10.0	Overburden/bedrock borehole	-	5.9
CH-1A Abandoned	3124277.4	1322353.7	6/7/05	692.0	-	686.1	18.0	Overburden/bedrock borehole	-	5.9
CH-1B	3124290.6	1322353.9	6/13/05	691.7	693.75	685.8	45.6	Bedrock monitoring well	-	5.9
CH-2 Abandoned	3124464.1	1322343.0	5/26/05	688.7	-	677.2	22.1	Overburden/bedrock borehole	-	11.5
CH-2A	3124468.8	1322310.9	8/15/05	688.0	-	686.8	42.9	Bedrock monitoring well	-	1.2
CH-3 Abandoned	3124647.1	1322415.8	6/9/05	673.3	-	669.8	20.2	Overburden/bedrock borehole	-	3.5

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
CH-3A	3124640.2	1322413.4	8/17/05	673.1	675.40	669.6	43.8	Bedrock monitoring well	-	3.5
CH-4 Abandoned	3124594.7	1323279.8	8/5/05	677.2	680.02 Aband.	673.4	15.7	Overburden/bedrock borehole	-	3.8
CH-4A Abandoned	3124594.9	1323282.2	8/22/05	676.8	679.6 Aband.	673.0	34.8	Bedrock monitoring well	-	3.8
CH-5	3124336.1	1322579.5	6/6/05	683.5	684.69	665.0	46.1	Bedrock monitoring well	-	18.5
CH-6	3124033.8	1322573.5	6/1/05	690.5	692.08	674.2	40.3	Bedrock monitoring well	-	16.3
CH-7 Abandoned	3124137.8	1322584.2	6/1/05	688.7	690.28 Aband.	671.8	39.3	Bedrock monitoring well	-	16.9
CH-7A	3124144.9	1322587.6	5/14/07	688.7	691.26	670.7	46.5	Bedrock monitoring well	-	18
CH-8	3124311.9	1322700.0	6/2/05	684.7	688.11	675.2	35.2	Bedrock monitoring well	-	9.5
CH-9 Abandoned	3124604.2	1322890.2	8/18/05	710.2	711.41 Aband.	700.2	30.5	Overburden/bedrock borehole	-	10
CH-9A	3124599.3	1322889.1	8/29/05	709.9	712.14	703.9	48.4	Bedrock monitoring well	-	6
CH-10 Abandoned	3124598.9	1323113.8	-	693.9	695.00 Aband.	683.9	14.0	Overburden/bedrock borehole	-	10
CH-10A Abandoned	3124601.3	1323118.1	8/29/05	693.3	-	683.3	26.5	Bedrock monitoring well	-	10
CH-11 Abandoned	3124678.4	1323397.7	6/17/05	659.0	661.45 Aband.	655.6	27.1	Overburden/bedrock borehole	-	3.4
CH-11A Abandoned	3124708.5	1323350.5	1/31/06	664.8	666.81 Aband.	657.9	29.6	Bedrock monitoring well	-	6.9
CH-12 Abandoned	3124765.6	1323460.3	4/8/05	660.4	662.97 Aband.	657.4	6.0	Overburden/bedrock borehole	-	3
CH-12A Abandoned	3124723.2	1323522.1	6/20/05	650.4	653.09 Aband.	646.4	27.1	Overburden/bedrock borehole	-	4
CH-12B Abandoned	3124894.7	1323356.6	1/31/06	681.3	683.19 Aband.	675.1	29.6	Bedrock monitoring well	-	6.2
CH-13 Abandoned	3124805.3	1323605.0	3/29/05	653.6	655.92 Aband.	650.1	6.5	Overburden/bedrock borehole	-	3.5
CH-13A Abandoned	3124752.4	1323634.1	8/3/05	645.1	647.25 Aband.	641.0	58.7	Overburden/bedrock borehole	-	4.1
CH-13B Abandoned	3124894.8	1323535.1	2/1/06	668.7	670.89 Aband.	664.4	27.5	Bedrock monitoring well	-	4.3
CH-14 Abandoned	3124779.5	1323751.7	6/16/05	641.5	644.11 Aband.	637.5	12.1	Overburden/bedrock borehole	-	4
CH-14A Abandoned	3124778.2	1323744.1	8/4/05	642.0	644.42 Aband.	636.5	28.1	Overburden/bedrock borehole	-	5.5
CH-14B Abandoned	3124894.7	1323713.6	2/2/06	660.0	662.04 Aband.	655.0	30.6	Bedrock monitoring well	-	5
CH-15 Abandoned	3124721.9	1323959.1	6/10/05	633.6	636.16 Aband.	629.1	28.5	Bedrock monitoring well	-	4.5
CH-15A Abandoned	3124819.7	1323918.5	8/5/05	637.3	639.89 Aband.	635.1	25.9	Bedrock monitoring well	-	2.2
CH-15B Abandoned	3124894.0	1323891.5	1/17/06	643.7	646.13 Aband.	640.5	26.3	Bedrock monitoring well	-	3.2
CH-16 Abandoned	3124780.7	1324097.7	6/13/05	632.9	635.37 Aband.	618.7	36.4	Bedrock monitoring well	-	14.2
CH-17 Abandoned	3124817.4	1324237.8	6/9/05	628.8	631.59 Aband.	620.8	20.8	Bedrock monitoring well	-	8
CH-17A Abandoned	3124928.3	1324220.5	8/8/05	621.0	624.41 Aband.	618.7	28.4	Bedrock monitoring well	-	2.3
CH-18 Abandoned	3124850.8	1324400.5	6/8/05	625.5	627.4 Aband.	608.3	39.7	Bedrock monitoring well	-	17.2
CH-19	3125136.5	1324338.9	6/15/05	625.0	627.79	616.5	31.7	Bedrock monitoring well	-	8.5
CH-20	3124956.2	1324380.7	6/7/05	619.2	621.77	605.7	38.0	Bedrock monitoring well	-	13.5
CH-21 Abandoned	3125044.6	1324498.2	6/6/05	612.1	614.47 Aband.	600.6	45.5	Overburden/bedrock borehole	-	11.5
CH-22	3124892.5	1324504.4	6/1/05	613.4	615.90	604.2	32.6	Bedrock monitoring well	-	9.2
CH-23	3125025.3	1324574.9	6/1/05	613.5	616.33	610.0	26.9	Bedrock monitoring well	-	3.5
CH-24 Abandoned	3124787.3	1324534.3	5/27/05	617.4	619.74 Aband.	607.9	32.7	Overburden/bedrock borehole	-	9.5
CH-25 Abandoned	3124653.7	1324584.7	5/26/05	622.8	625.77 Aband.	604.8	40.9	Bedrock monitoring well	-	18
CH-26 Abandoned	3124508.1	1324615.2	5/24/05	627.9	630.35 Aband.	622.9	27.6	Overburden/bedrock borehole	-	5
CH-27 Abandoned	3124365.2	1324667.1	5/24/05	633.2	635.83 Aband.	631.2	26.0	Bedrock monitoring well	-	2
CH-28 Abandoned	3124247.6	1324576.5	5/23/05	638.9	641.59 Aband.	637.9	24.7	Bedrock monitoring well	-	1

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
CH-28A Abandoned	3124167.9	1324517.0	1/6/06	641.0	642.99 Aband.	636.0	48.6	Bedrock monitoring well	-	5
CH-29 Abandoned	3124125.9	1324490.0	5/18/05	641.6	645 Aband.	618.6	71.2	Bedrock monitoring well	-	23
CH-29A Abandoned	3124081.9	1324471.1	1/4/06	644.4	646.13 Aband.	633.6	43.2	Bedrock monitoring well	-	10.8
CH-29B	3124133.8	1324514.8	4/23/07	641.4	644.09	639.5	50.4	Bedrock monitoring well	-	1.9
CH-29C	3124098.0	1324497.5	4/19/07	643.3	645.45	636.0	50.1	Bedrock monitoring well	-	7.3
CH-29D	3124118.4	1324527.5	4/27/07	643.5	645.59	634.5	52.3	Bedrock monitoring well	-	9
CH-30 Abandoned	3124008.9	1324391.9	5/23/05	656.8	659.16 Aband.	652.8	26.6	Bedrock monitoring well	-	4
CH-31 Abandoned	3123899.3	1324313.7	8/11/05	668.4	671.15 Aband.	658.9	33.3	Bedrock monitoring well	-	9.5
CH-32 Abandoned	3123750.6	1324313.2	8/10/05	669.4	672.46 Aband.	663.9	28.5	Overburden/bedrock borehole	-	5.5
CH-33 Abandoned	3123600.1	1324310.3	8/9/05	669.7	672.3 Aband.	664.2	25.2	Bedrock monitoring well	-	5.5
CH-34 Abandoned	3124195.7	1323604.1	4/5/05	682.0	-	667.0	19.0	Overburden/bedrock borehole	-	15
CH-34A Abandoned	3124192.6	1323611.9	6/28/05	681.6	-	666.6	20.0	Overburden/bedrock borehole	-	15
CH-34B Abandoned	3124195.1	1323612.4	7/29/05	681.4	684.59 Aband.	675.4	15.0	Overburden/bedrock borehole	-	6
CH-34C Abandoned	3124193.5	1323619.1	8/8/05	681.9	684.45 Aband.	675.9	42.0	Bedrock monitoring well	-	6
CH-35 Abandoned	3124027.6	1323760.5	5/24/05	690.7	693.33 Aband.	683.7	30.3	Overburden/bedrock borehole	-	7
CH-36 Abandoned	3123812.2	1323682.3	5/19/05	699.6	-	671.6	49.8	Overburden/bedrock borehole	-	28
CH-37 Abandoned	3123782.3	1323864.0	5/19/05	695.2	697.54 Aband.	674.2	-	Overburden/bedrock borehole	-	21
CH-38 Abandoned	3124012.6	1323893.1	5/25/05	690.5	692.19 Aband.	675.5	37.5	Overburden/bedrock borehole	-	15
CH-39 Abandoned	3124058.6	1324179.6	5/11/05	688.3	689.53 Aband.	660.3	37.0	Overburden/bedrock borehole	-	28
CH-39A Abandoned	3124058.7	1324179.4	5/25/05	686.9	689.53 Aband.	651.1	55.6	Overburden/bedrock borehole	-	35.8
CH-40 Abandoned	3124590.4	1324164.8	6/10/05	651.9	654.56 Aband.	643.9	30.3	Bedrock monitoring well	-	8
CH-41Abandoned	3124864.0	1324070.8	6/14/05	631.1	633.78 Aband.	628.1	26.2	Bedrock monitoring well	-	3
CH-42	3124605.3	1322168.4	1/16/08	697.0	699.02	686.5	24.7	Bedrock monitoring well	-	10.5
CH-42A	3124602.9	1322159.5	1/28/08	697.7	699.30	691.7	55.3	Bedrock monitoring well	-	6
CH-43	3124606.8	1322054.2	1/18/08	709.2	710.81	696.7	66.3	Bedrock monitoring well	-	12.5
CH-44	3124475.0	1321918.6	1/21/08	710.7	712.52	696.2	60.0	Bedrock monitoring well	-	14.5
CH-45	3124091.4	1324908.4	8/14/12	648.0	650.60	646.0	39.7	Bedrock monitoring well	-	2
CH-46	3124195.3	1324890.2	7/10/12	642.6	645.10	624.6	40.0	Bedrock monitoring well	-	18
CH-46A	3124244.9	1324878.6	9/12/12	643.7	646.20	642.2	34.4	Bedrock monitoring well	-	1.7
CH-46B	3124293.3	1324864.3	9/12/12	645.0	647.50	640.0	35.4	Bedrock monitoring well	-	5
CH-47	3124384.4	1324841.6	7/10/12	644.6	646.60	639.1	35.2	Bedrock monitoring well	-	5.5
CH-48	3124530.9	1324813.2	7/11/12	642.1	644.20	636.6	35.0	Bedrock monitoring well	-	5.5
CH-49	3124677.6	1324774.4	8/23/12	641.1	643.80	637.6	34.2	Bedrock monitoring well	-	3.5
CH-50	3124954.2	1324711.1	7/13/12	634.8	637.60	631.8	34.2	Bedrock monitoring well	-	3
CH-51	3125040.5	1324021.7	7/16/12	644.3	646.70	637.3	39.9	Bedrock monitoring well	-	7
CH-52	3124997.3	1323725.7	8/28/12	668.3	671.00	665.3	55.0	Bedrock monitoring well	-	3
CH-53	3124958.7	1323423.1	8/29/12	681.2	683.40	675.2	61.0	Bedrock monitoring well	-	6
CH-54	3124914.2	1323197.5	8/30/12	696.2	698.60	675.2	69.5	Bedrock monitoring well	-	21
CH-55	3124867.1	1322836.0	7/23/12	690.6	692.70	673.6	56.0	Bedrock monitoring well	-	17
CH-56	3124898.1	1322583.8	7/25/12	659.0	662.00	641.0	39.3	Bedrock monitoring well	-	18

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
CH-57	3124820.4	1322187.4	7/26/12	696.9	699.60	673.9	55.5	Bedrock monitoring well	-	23
CH-58	3124818.6	1322042.1	8/6/12	710.4	713.50	679.4	70.0	Bedrock monitoring well	-	31
CH-60	3125075.0	1324395.6	9/10/12	620.2	622.10	613.2	30.0	Bedrock monitoring well	-	7
CH18-1	3125982.3	1325042.5	12/1/11	590.9	592.90	589.9	51.4	Bedrock monitoring well	-	1
CH18-2	3125966.4	1325216.8	11/28/11	609.0	610.50	606.5	68.3	Bedrock monitoring well	-	2.5
CH18-3	3125955.0	1325341.3	11/15/11	614.1	616.20	606.6	74.0	Bedrock monitoring well	-	7.5
CH18-4	3125943.6	1325465.8	11/7/11	614.4	616.20	604.4	80.9	Bedrock monitoring well	-	10
CH18-5	3125932.3	1325590.2	11/16/11	609.3	611.00	598.3	71.6	Bedrock monitoring well	-	11
CH18-6	3125882.8	1325677.1	11/22/11	596.0	597.80	593.5	60.7	Bedrock monitoring well	-	2.5
CH18-7	3125833.3	1325764.0	11/18/11	580.5	582.30	576.5	46.4	Bedrock monitoring well	-	4
CH18-8	3125783.8	1325850.9	11/17/11	562.1	564.10	558.1	22.8	Bedrock monitoring well	-	4
CH18-9	3125819.3	1325452.6	11/8/11	606.8	608.20	589.8	66.1	Bedrock monitoring well	-	17
CH18-10	3125717.1	1325524.5	12/5/11	592.0	593.60	588.5	52.8	Bedrock monitoring well	-	3.5
CH18-11	3126037.3	1325407.2	11/14/11	617.8	619.90	612.3	77.6	Bedrock monitoring well	-	5.5
CH18-12	3126091.5	1325491.3	11/9/11	620.4	622.20	612.4	81.1	Bedrock monitoring well	-	8
CH18-13	3125923.8	1325129.9	11/29/11	596.1	-	596.1	55.8	Bedrock monitoring well	-	0
CREEK CORE 1	3124629.0	1322545.2	10/16/03	654.6	-	654.6	10.0	Bedrock borehole	-	0
CREEK CORE 2	3124653.0	1322518.1	10/17/03	653.4	-	653.4	10.0	Bedrock borehole	-	0
CREEK CORE 3	3124723.3	1322527.3	10/17/03	651.0	-	651.0	10.0	Bedrock borehole	-	0
CREEK CORE 4	3124873.2	1322593.3	10/21/03	658.4	-	658.4	26.5	Bedrock borehole	-	0
CREEK CORE 5	3124783.8	1322587.8	10/22/03	660.0	-	660.0	26.5	Bedrock borehole	-	0
CREEK CORE 6A	3124819.4	1322529.0	10/23/03	647.2	-	647.2	9.5	Bedrock borehole	-	0
CREEK CORE 7	3124902.9	1322523.2	10/23/03	645.3	-	645.3	9.0	Bedrock borehole	-	0
CREEK CORE 8	3124966.3	1322536.9	10/23/03	643.8	-	643.8	9.5	Bedrock borehole	-	0
CREEK CORE 9	3124923.3	1322572.8	10/23/03	653.1	-	653.1	21.0	Bedrock borehole	-	0
HORNISH-1	3123066.9	1324028.8	5/2/06	714.8	-	-	6.0	Overburden borehole	-	-
HORNISH-2	3122960.0	1324074.1	5/2/06	713.6	-	-	6.0	Overburden borehole	-	-
HORNISH-3	3123079.3	1324121.2	5/2/06	713.5	-	-	6.0	Overburden borehole	-	-
HORNISH-10	3123357.1	1324173.8	2/14/07	704.7	-	-	5.0	Overburden borehole	-	-
HORNISH-11	3123197.1	1324178.9	2/14/07	709.3	-	-	4.0	Overburden borehole	-	-
HORNISH-12	3123417.0	1324024.5	2/14/07	705.1	-	-	3.0	Overburden borehole	-	-
HORNISH-13	3123274.4	1324036.3	2/14/07	710.4	-	-	5.0	Overburden borehole	-	-
MW-X000Y105	3122139.2	1322805.9	7/7/06	687.2	689.56	678.3	25.0	Bedrock monitoring well	-	8.9
MW-X012Y078	3122365.7	1322450.1	5/17/04	699.7	702.40	683.4	31.1	Bedrock monitoring well	-	16.3
MW-X012Y090	3122314.1	1322606.8	6/29/06	698.8	701.18	687.3	55.1	Bedrock monitoring well	-	11.5
MW-X012Y100	3122317.8	1322717.4	9/12/05	705.1	707.08	688.1	50.8	Bedrock monitoring well	-	17

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
MW-X012Y110	3122307.6	1322833.0	7/6/06	703.1	705.68	686.7	49.0	Bedrock monitoring well	-	16.4
MW-X017Y105	3122340.6	1322764.1	4/10/07	708.1	710.45	690.6	52.6	Bedrock monitoring well	-	17.5
MW-X022Y094	3122387.5	1322656.4	9/19/06	707.8	709.80	686.8	55.5	Bedrock monitoring well	-	21
MW-X022Y096	3122387.3	1322676.4	7/5/06	707.4	709.71	686.3	32.5	Bedrock monitoring well	-	21.1
MW-X033Y147D	3122524.0	1323201.8	6/20/02	718.3	718.10	681.3	248.8	Bedrock monitoring well	-	37
MW-X033Y147D-1	3122524.0	1323201.8	6/20/02	719.0	718.20	681.3	248.8	Waterloo System	-	-
MW-X033Y147D-2	3122524.0	1323201.8	6/20/02	719.0	718.20	681.3	248.8	Waterloo System	-	-
MW-X033Y147D-3	3122524.0	1323201.8	6/20/02	719.0	718.20	681.3	248.8	Waterloo System	-	-
MW-X033Y147D-4	3122524.0	1323201.8	6/20/02	719.0	718.20	681.3	248.8	Waterloo System	-	-
MW-X033Y147S	3122522.2	1323193.5	11/13/02	718.5	718.82	681.5	56.0	Bedrock monitoring well	-	37
MW-X043Y176	3122527.0	1323446.9	1/10/06	698.3	701.02	681.8	34.5	Bedrock monitoring well	-	16.5
MW-X043Y186	3122565.8	1323592.5	12/7/05	697.6	699.96	685.6	59.4	Bedrock monitoring well	-	12
MW-X043Y273	3122540.6	1324490.2	5/4/04	673.1	-	667.6	57.7	Bedrock monitoring well	-	5.5
MW-X045Y258D	3122853.0	1324270.2	5/14/02	699.2	702.35	691.2	203.5	Bedrock monitoring well	-	8
MW-X045Y258D-1	3122853.0	1324270.2	5/14/02	699.2	702.35	691.2	203.5	Waterloo System	-	-
MW-X045Y258D-2	3122853.0	1324270.2	5/14/02	699.2	702.35	691.2	203.5	Waterloo System	-	-
MW-X045Y258D-3	3122853.0	1324270.2	5/14/02	699.2	702.35	691.2	203.5	Waterloo System	-	-
MW-X047Y236	3122604.2	1324115.8	12/7/05	691.3	693.69	687.8	60.5	Bedrock monitoring well	-	3.5
MW-X060Y304	3122785.8	1324719.2	5/18/04	659.4	-	656.9	36.6	Bedrock monitoring well	-	2.5
MW-X085Y070D	3123177.9	1322420.9	7/8/02	720.0	723.68	697.0	243.5	Bedrock monitoring well	-	23
MW-X085Y070D-1	3123177.9	1322420.9	7/8/02	720.0	723.68	697.0	243.5	Waterloo System	-	-
MW-X085Y070D-2	3123177.9	1322420.9	7/8/02	720.0	723.68	697.0	243.5	Waterloo System	-	-
MW-X085Y070D-3	3123177.9	1322420.9	7/8/02	720.0	723.68	697.0	243.5	Waterloo System	-	-
MW-X085Y070S	3123168.1	1322421.2	4/22/02	720.3	722.79	697.3	63.2	Bedrock monitoring well	-	23
MW-X085Y070S-1	3123168.1	1322421.2	4/22/02	720.3	722.79	697.3	63.2	Waterloo System	-	-
MW-X085Y070S-2	3123168.1	1322421.2	4/22/02	720.3	722.79	697.3	63.2	Waterloo System	-	-
MW-X105Y102	3123197.0	1322715.9	7/10/06	724.3	723.77	700.3	56.2	Bedrock monitoring well	-	24
MW-X106Y102	3123208.1	1322719.1	7/18/05	724.3	723.71	700.3	60.5	Bedrock monitoring well	-	24
MW-X120Y203	3123093.6	1323657.6	9/26/05	722.1	721.70	699.1	64.6	Bedrock monitoring well	-	23
MW-X128Y255	3123455.8	1324293.1	5/6/04	684.0	686.45	-	55.5	Bedrock monitoring well	-	-
MW-X130Y195	3123522.8	1323608.7	11/3/10	718.1	720.80	678.6	51.4	Bedrock monitoring well	-	39
MW-X140Y180	3123607.8	1323471.1	11/10/10	722.0	724.60	698.0	41.5	Bedrock monitoring well	-	24.5
MW-X142Y059	3123613.2	1322275.8	5/7/07	720.8	722.86	698.8	54	Bedrock monitoring well	-	22
MW-X143Y245D	3123622.5	1324160.3	4/2/02	690.2	694.06	682.2	193.5	Bedrock monitoring well	-	8
MW-X143Y245D-1	3123622.5	1324160.3	4/2/02	690.2	694.06	682.2	193.5	Waterloo System	-	-
MW-X143Y245D-2	3123622.5	1324160.3	4/2/02	690.2	694.06	682.2	193.5	Waterloo System	-	-
MW-X143Y245S	3123628.5	1324162.2	6/11/02	690.4	692.90	681.9	27.6	Bedrock monitoring well	-	8.5
MW-X146Y084	3123623.4	1322563.4	10/5/10	720.2	722.50	693.2	110.2	Bedrock monitoring well	-	26.5
MW-X165Y068	3123744.7	1322385.0	10/21/10	720.5	723.00	701.0	110.1	Bedrock monitoring well	-	19
MW-X169Y058D	3123845.7	1322268.6	7/24/02	721.5	725.07	699.5	244.1	Bedrock monitoring well	-	22

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
MW-X169Y058D-1	3123845.7	1322268.6	7/24/02	721.5	725.07	699.5	244.1	Waterloo System	-	-
MW-X169Y058D-2	3123845.7	1322268.6	7/24/02	721.5	725.07	699.5	244.1	Waterloo System	-	-
MW-X169Y058D-3	3123845.7	1322268.6	7/24/02	721.5	725.07	699.5	244.1	Waterloo System	-	-
MW-X169Y058I	3123835.1	1322286.3	6/28/02	721.3	723.90	699.3	103.9	Bedrock monitoring well	-	22
MW-X169Y058S	3123840.4	1322277.9	4/18/02	721.1	723.90	699.1	63.5	Bedrock monitoring well	-	22
MW-X169Y058S-1	3123840.4	1322277.9	4/18/02	721.1	723.90	699.1	63.5	Waterloo System	-	-
MW-X169Y058S-2	3123840.4	1322277.9	4/18/02	721.1	723.90	699.1	63.5	Waterloo System	-	-
MW-X178Y367D	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Bedrock monitoring well	-	4.5
MW-X178Y367D-1	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Waterloo System	-	-
MW-X178Y367D-2	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Waterloo System	-	-
MW-X178Y367D-3	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Waterloo System	-	-
MW-X178Y367D-4	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Waterloo System	-	-
MW-X178Y367D-5	3123967.3	1325355.8	5/1/02	666.9	670.57	662.4	143.5	Waterloo System	-	-
MW-X184Y285	3123965.4	1324479.3	5/18/04	652.3	-	643.8	31.0	Bedrock monitoring well	-	8.5
MW-X190Y048	3124138.3	1322210.8	10/9/06	710.1	712.23	692.6	69.4	Bedrock monitoring well	-	17.5
MW-X192Y048	3124150.9	1322214.3	10/2/06	710.3	712.30	692.8	19.9	Bedrock monitoring well	-	17.5
MW-X204Y288 Abandoned	3124228.1	1324690.5	5/19/04	640.4	-	634.9	32.7	Bedrock monitoring well	-	5.5
MW-X209Y053	3124307.2	1322266.3	8/29/06	710.0	711.83	692.0	65.5	Bedrock monitoring well	-	18
MW-X209Y078S	3124289.3	1322489.3	8/12/02	684.9	669.43	672.4	23.4	Bedrock monitoring well	-	12.5
MW-X211Y131 Abandoned	3124266.3	1323027.1	8/1/05	720.1	-	700.6	52.2	Bedrock monitoring well	-	19.5
MW-X214Y041 Abandoned	3124361.9	1322141.2	10/10/06	713.9	716.34 Abandoned	691.4	57.3	Bedrock monitoring well	-	22.5
MW-X220Y088S	3124349.2	1322583.5	8/15/02	682.0	687.16	665.0	23.8	Bedrock monitoring well	-	17
MW-X225Y080S	3124449.6	1322508.6	8/13/02	684.3	684.50	661.8	33.6	Bedrock monitoring well	-	22.5
MW-X227Y049	3124465.8	1322237.6	9/11/06	689.9	692.24	671.7	41.7	Bedrock monitoring well	-	18.2
MW-X227Y053	3124466.5	1322273.9	7/31/06	689.2	691.45	-	31.0	Bedrock monitoring well	-	-
MW-X227Y054	3124466.5	1322273.9	7/31/06	689.2	-	691.5	31	Bedrock monitoring well	-	3
MW-X228Y032 Abandoned	3124499.1	1322089.1	12/6/06	688.4	690.72 Aband.	682.9	46.7	Bedrock monitoring well	-	5.5
MW-X233Y071A	3124518.7	1322419.4	11/3/03	685.7	-	676.3	40.0	Bedrock monitoring well	Angle hole	9.4
MW-X233Y071B	3124519.8	1322426.3	11/10/03	685.6	-	676.2	60.0	Bedrock monitoring well	Angle hole	9.4
MW-X233Y087S	3124540.8	1322586.4	8/16/02	671.8	686.79	661.8	21.7	Bedrock monitoring well	-	10
MW-X233Y095	3124561.9	1322628.7	4/29/03	672.9	-	668.2	34.5	Bedrock monitoring well	Angle hole	4.7
MW-X233Y100	3124565.5	1322698.7	4/30/03	683.0	-	682.0	55.5	Bedrock monitoring well	Angle hole	1
MW-X233Y105A	3124569.9	1322758.9	5/2/03	696.4	-	693.8	12.8	Bedrock monitoring well	Angle hole	2.6
MW-X233Y105B	3124570.7	1322753.0	5/19/03	695.7	-	693.1	35.2	Bedrock monitoring well	Angle hole	2.6
MW-X233Y110A	3124572.4	1322796.5	5/8/03	701.4	-	698.1	15.0	Bedrock monitoring well	Angle hole	3.3
MW-X233Y110B	3124573.2	1322792.7	5/21/03	701.2	-	697.9	30.0	Bedrock monitoring well	Angle hole	3.3
MW-X233Y115A	3124569.4	1322847.5	5/14/03	707.6	-	701.6	30.0	Bedrock monitoring well	Angle hole	6
MW-X233Y115B	3124574.0	1322842.2	5/17/03	707.0	-	701.0	45.0	Bedrock monitoring well	Angle hole	6
MW-X233Y120A	3124569.2	1322908.5	5/15/03	712.7	-	703.1	19.8	Bedrock monitoring well	Angle hole	9.6
MW-X233Y120B	3124570.6	1322902.1	11/19/03	712.6	-	703.0	50.0	Bedrock monitoring well	Angle hole	9.6

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
MW-X233Y125A	3124567.3	1322957.2	5/16/03	714.3	-	699.5	32.0	Bedrock monitoring well	Angle hole	14.8
MW-X233Y125B	3124569.2	1322952.9	11/24/03	713.3	-	698.5	47.0	Bedrock monitoring well	Angle hole	14.8
MW-X234Y042 Abandoned	3124538.4	1322163.1	12/5/06	685.0	687.26 Aband.	-	43.8	Bedrock monitoring well	-	-
MW-X234Y157D	3124543.8	1323326.6	6/26/02	674.9	678.42	668.9	182.3	Bedrock monitoring well	-	6
MW-X234Y157D-1	3124543.8	1323326.6	6/26/02	674.9	678.42	668.9	180.4	Waterloo System	-	6
MW-X234Y157D-2	3124543.8	1323326.6	6/26/02	674.9	678.42	668.9	180.4	Waterloo System	-	6
MW-X234Y157D-3	3124543.8	1323326.6	6/26/02	674.9	678.42	668.9	180.4	Waterloo System	-	6
MW-X234Y157D-4	3124543.8	1323326.6	6/26/02	674.9	678.42	668.9	180.4	Waterloo System	-	6
MW-X234Y157S	3124550.7	1323333.9	6/18/02	674.9	677.25	668.9	39.4	Bedrock monitoring well	-	6
MW-X237Y058	3124560.3	1322279.0	8/7/06	675.6	678.25	-	30.0	Bedrock monitoring well	-	6.4
MW-X242Y060S	3124622.7	1322303.3	11/12/03	682.5	-	673.0	40.0	Bedrock monitoring well	Angle hole	9.5
MW-X246Y118	3124653.7	1322870.1	3/6/07	707.8	707.59	698.3	133.0	Bedrock monitoring well	-	9.5
MW-X247Y118	3124659.9	1322865.9	1/22/07	706.8	706.73	697.8	23.0	Bedrock monitoring well	-	9
MW-X247Y119	3124661.2	1322874.0	1/29/07	707.5	707.43	698.5	36.5	Bedrock monitoring well	-	9
MW-X247Y120	3124662.2	1322881.7	2/14/07	708.1	707.79	698.2	59.1	Bedrock monitoring well	-	9.9
MW-X248Y100	3124685.7	1322707.6	7/19/06	683.2	685.30	-	41.7	Bedrock monitoring well	-	6.5
MW-X251Y189D	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Bedrock monitoring well	-	2.5
MW-X251Y189D-1	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-2	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-3	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-4	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-5	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-6	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X251Y189D-7	3124697.8	1322592.2	3/18/02	663.5	666.16	661.0	183.5	Waterloo System	-	-
MW-X257Y073	3124786.0	1322459.0	4/27/04	666.4	-	656.4	46.8	Bedrock monitoring well	-	10
MW-X261Y356D	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Bedrock monitoring well	-	4
MW-X261Y356D-1	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Waterloo System	-	-
MW-X261Y356D-2	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Waterloo System	-	-
MW-X261Y356D-3	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Waterloo System	-	-
MW-X261Y356D-4	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Waterloo System	-	-
MW-X261Y356D-5	3124799.6	1325223.6	4/26/02	668.9	672.59	664.9	154.5	Waterloo System	-	-
MW-X263Y128	3124836.4	1323001.8	6/6/06	705.4	707.54	697.2	118.6	Bedrock monitoring well	-	8.2
MW-X269Y201D	3124873.5	1323509.4	4/10/02	669.4	670.39	661.4	182.5	Bedrock monitoring well	-	8
MW-X269Y201D-1	3124873.5	1323509.4	4/10/02	669.4	670.39	661.4	182.5	Waterloo System	-	-
MW-X269Y201D-2	3124873.5	1323509.4	4/10/02	669.4	670.39	661.4	182.5	Waterloo System	-	-
MW-X269Y201D-3	3124873.5	1323509.4	4/10/02	669.4	670.39	661.4	182.5	Waterloo System	-	-
MW-X272Y038	3124913.7	1322043.5	7/25/06	703.0	705.21	685.2	59.5	Bedrock monitoring well	-	17.8
MW-X277Y100	3124972.4	1322715.3	7/17/06	668.2	670.28	661.2	41.9	Bedrock monitoring well	-	7
MW-X288Y005	3125064.8	1321739.3	7/28/06	692.8	694.80	675.1	50.6	Bedrock monitoring well	-	17.7
MW-X297Y305D	3125144.1	1324629.7	6/23/03	614.5	-	614.2	114.8	Bedrock monitoring well	-	0.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
MW-X297Y305D-1	3125144.1	1324629.7	6/23/03	614.7	-	614.2	-	Waterloo System	-	-
MW-X297Y305D-2	3125144.1	1324629.7	6/23/03	614.7	-	614.2	-	Waterloo System	-	-
MW-X300Y199I	3125205.1	1323660.9	5/25/06	677.3	678.98	669.1	103.8	Bedrock monitoring well	-	8.2
MW-X300Y199I-1	3125205.1	1323660.9	5/25/06	677.3	678.98	669.1	103.8	Waterloo System	-	-
MW-X300Y199I-2	3125205.1	1323660.9	5/25/06	677.3	678.98	669.1	103.8	Waterloo System	-	-
MW-X300Y199I-3	3125205.1	1323660.9	5/25/06	677.3	678.98	669.1	103.8	Waterloo System	-	-
MW-X300Y199I-4	3125205.1	1323660.9	5/25/06	677.3	678.98	669.1	103.8	Waterloo System	-	-
MW-X315Y115	3125373.9	1322960.6	3/20/07	653.4	655.80	649.6	47.0	Bedrock monitoring well	-	3.8
MW-X315Y150	3125346.9	1323236.1	3/21/07	670.8	670.45	663.8	47.8	Bedrock monitoring well	-	7
MW-X318Y217D	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Bedrock monitoring well	-	3.9
MW-X318Y217D-1	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Waterloo System	-	-
MW-X318Y217D-2	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Waterloo System	-	-
MW-X318Y217D-3	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Waterloo System	-	-
MW-X318Y217D-4	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Waterloo System	-	-
MW-X318Y217D-5	3125385.2	1323886.1	6/22/06	649.8	652.06	645.9	159.1	Waterloo System	-	-
MW-X323Y226	3125418.1	1323975.2	5/23/07	647.5	648.11	638.6	159.1	Bedrock monitoring well	-	8.9
MW-X344Y230	3125686.4	1323961.0	5/6/04	608.0	-	604.2	20.0	Bedrock monitoring well	-	3.8
MW-X350Y125	3125714.6	1322978.8	5/5/04	622.8	-	622.5	20.7	Bedrock monitoring well	-	0.3
MW-X350Y144	3125755.1	1323214.3	5/10/06	619.2	621.62	615.0	27.5	Bedrock monitoring well	-	4.2
MW-X354Y200	3125786.8	1323575.6	5/8/06	613.8	616.36	607.3	29.1	Bedrock monitoring well	-	6.5
MW-X358Y160	3125785.1	1323346.9	5/9/06	615.5	618.14	610.0	28.2	Bedrock monitoring well	-	5.5
MW-X361Y175	3125787.6	1323471.2	5/4/04	611.6	-	610.1	33.4	Bedrock monitoring well	-	1.5
MW-X367Y239	3125862.1	1324140.5	5/11/04	600.1	-	598.1	19.6	Bedrock monitoring well	-	2
MW-X370Y178	3125905.9	1323481.2	5/10/04	617.9	-	616.4	29.8	Bedrock monitoring well	-	1.5
P-1	3125029.8	1324244.0	6/22/05	630.2	-	625.3	5.3	Overburden borehole	-	4.9
P-2	3125044.3	1324262.2	6/22/05	630.4	-	626.1	4.3	Overburden borehole	-	4.3
P027A	3123378.5	1329472.1	12/3/03	596.7	-	587.7	9.0	Overburden borehole	-	9
P027B	3123128.5	1329386.1	12/3/03	611.4	-	595.4	16.3	Overburden borehole	-	16
P027C	3122884.9	1329204.3	12/3/03	625.9	-	605.9	20.1	Overburden borehole	-	20
P027D	3122693.7	1329078.5	12/3/03	635.8	-	629.8	6.0	Overburden borehole	-	6
P030-2144	3123277.5	1330590.2	10/1/02	504.7	-	-	10.0	Overburden borehole	-	-
P030-2145	3123466.8	1330692.8	10/1/02	504.5	-	-	10.0	Overburden borehole	-	-
P030-2146	3123664.1	1330523.0	10/1/02	505.8	-	-	10.0	Overburden borehole	-	-
P030-2147	3123859.8	1330717.0	10/1/02	505.1	-	-	10.0	Overburden borehole	-	-
P030-2148	3124027.5	1330669.8	10/1/02	505.4	-	-	10.0	Overburden borehole	-	-
P030-2149	3124147.7	1330434.7	10/1/02	506.5	-	-	10.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
P037-2100	3121201.5	1332219.4	7/29/02	499.8	-	-	4.0	Overburden borehole	-	-
P039-2101	3119312.6	1332401.6	7/30/02	496.2	-	-	20.0	Overburden borehole	-	-
P039-2102	3119464.7	1332348.2	7/30/02	496.1	-	-	4.0	Overburden borehole	-	-
P039-2103	3118676.7	1332753.7	7/30/02	495.1	-	-	20.0	Overburden borehole	-	-
P039-2107	3116414.6	1333173.7	8/1/02	491.9	-	-	20.0	Overburden borehole	-	-
P381-1	3123063.7	1324558.0	10/21/04	694.5	-	689.6	4.9	Overburden borehole	-	4.9
P382-1	3123020.8	1324409.1	10/21/04	700.9	-	693.7	7.4	Overburden borehole	-	7.2
P382-2	3123034.4	1324495.5	10/21/04	692.7	-	688.5	4.3	Overburden borehole	-	4.2
P386-1	3122925.5	1324685.7	10/20/04	672.7	-	665.7	7.7	Overburden borehole	-	7
P386-2	3122895.0	1324688.5	10/20/04	670.9	-	663.4	8.2	Overburden borehole	-	7.5
P386-3	3122867.1	1324691.4	10/20/04	665.6	-	658.9	6.7	Overburden borehole	-	6.7
P386-4	3122838.3	1324693.0	10/20/04	663.4	-	661.4	2.0	Overburden borehole	-	2
P386-5	3122804.8	1324696.5	10/20/04	661.8	-	660.3	1.5	Overburden borehole	-	1.5
P386-6	3122778.2	1324701.8	10/20/04	660.5	-	657.7	3.0	Overburden borehole	-	2.8
P386-7	3122748.0	1324706.6	10/20/04	659.6	-	655.2	4.4	Overburden borehole	-	4.4
P386-8	3122712.0	1324712.9	10/20/04	655.8	-	652.8	3.0	Overburden borehole	-	3
P386-9	3122665.2	1324599.7	10/21/04	686.0	-	677.3	8.7	Overburden borehole	-	8.7
P386-10	3122674.6	1324618.6	10/21/04	686.4	-	656.9	29.5	Overburden borehole	-	29.5
P386-11	3122688.5	1324634.5	10/21/04	684.4	-	670.3	14.1	Overburden borehole	-	14.1
PARCEL 008 SUMP	3125762.2	1323204.7	6/8/06	618.8	621.47	614.3	6.5	Bedrock monitoring well	-	4.5
PB-1	3121037.1	1332058.7	2/8/05	501.1	-	486.1	17.4	Overburden/bedrock borehole	-	15
PB-2	3121028.8	1332121.2	2/8/05	500.3	-	474.3	27.0	Overburden/bedrock borehole	-	26
PB-3	3121008.4	1332131.1	2/9/05	500.1	-	472.1	28.0	Overburden borehole	-	28
PB-4	3121021.8	1332064.6	2/9/05	501.1	-	486.6	14.5	Overburden borehole	-	14.5
PB-5	3120965.7	1332186.4	2/22/05	499.8	-	471.9	27.9	Overburden borehole	-	27.9
PB-6	3120996.4	1332177.9	2/22/05	499.2	-	470.2	29.0	Overburden borehole	-	29
PB-7	3120956.4	1332110.6	2/21/05	499.8	-	471.3	28.5	Overburden borehole	-	28.5
PB-8	3121061.6	1332042.5	2/22/05	503.8	-	488.8	15.0	Overburden borehole	-	15
PB-9	3121044.1	1332042.9	2/22/05	502.9	-	489.9	13.0	Overburden borehole	-	13
PB-10	3120979.8	1332163.0	2/23/05	500.2	-	470.7	29.5	Overburden borehole	-	29.5
PB-11	3121110.8	1332124.0	2/24/05	499.4	-	473.4	27.5	Overburden borehole	-	26
PB-12	3121134.6	1332072.8	2/25/05	498.0	-	474.1	24.5	Overburden borehole	-	23.9
PS-1A	3124283.0	1322352.9	3/22/05	692.2	-	688.7	4.0	Overburden borehole	-	3.5

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
PS-2A	3124550.8	1322354.5	3/22/05	688.6	-	-	4.0	Overburden borehole	-	-
PS-2B	3124557.8	1322249.9	3/22/05	675.4	-	-	4.0	Overburden borehole	-	-
PS-3A	3124557.2	1322608.8	3/16/05	671.3	-	-	4.0	Overburden borehole	-	-
PS-3B	3124678.5	1322552.5	3/16/05	658.4	-	-	4.0	Overburden borehole	-	-
PS-4A	3124526.6	1322819.0	3/16/05	704.7	-	-	4.0	Overburden borehole	-	-
PS-4B	3124592.3	1322756.0	3/22/05	695.7	-	692.7	4.0	Overburden borehole	-	3
PS-5A	3124536.5	1323118.2	3/16/05	700.2	-	-	4.0	Overburden borehole	-	-
PS-5B	3124586.0	1323119.2	3/22/05	695.6	-	-	4.0	Overburden borehole	-	-
PS-6A	3124658.4	1323412.7	3/16/05	662.7	-	658.7	4.0	Overburden borehole	-	4
PS-6B	3124656.3	1323340.5	3/16/05	665.6	-	662.1	4.0	Overburden borehole	-	3.5
PS-7A	3124805.8	1323584.0	3/17/05	654.8	-	-	4.0	Overburden borehole	-	-
PS-7B	3124895.0	1323581.0	3/17/05	666.6	-	-	4.0	Overburden borehole	-	-
PS-8A	3124904.0	1323877.5	3/17/05	646.2	-	-	4.0	Overburden borehole	-	-
PS-8B	3124861.5	1323865.4	3/17/05	644.5	-	-	4.0	Overburden borehole	-	-
PS-9A	3124972.4	1324154.6	3/17/05	632.4	-	-	4.0	Overburden borehole	-	-
PS-9B	3124869.7	1324184.9	3/21/05	623.6	-	-	4.0	Overburden borehole	-	-
PS-10A	3125119.5	1324337.0	3/17/05	626.3	-	-	4.0	Overburden borehole	-	-
PS-10B	3125095.4	1324436.4	3/18/05	609.3	-	-	4.0	Overburden borehole	-	-
PS-11A	3124882.5	1324400.0	3/21/05	623.0	-	-	4.0	Overburden borehole	-	-
PS-11B	3124945.0	1324553.9	3/21/05	615.4	-	612.4	3.0	Overburden borehole	-	3
PS-12A	3124705.7	1324560.7	3/21/05	620.6	-	--	4.0	Overburden borehole	-	-
PS-12B	3124709.7	1324638.4	3/21/05	625.9	-	622.9	3.0	Overburden borehole	-	3
PS-13A	3124430.1	1324587.9	3/21/05	633.0	-	629.0	4.0	Overburden borehole	-	4
PS-13B	3124497.3	1324665.6	3/21/05	627.7	-	-	4.0	Overburden borehole	-	-
PS-14A	3124393.6	1324710.0	3/21/05	632.3	-	-	3.5	Overburden borehole	-	-
PS-14B	3124444.6	1324760.1	3/21/05	635.1	-	-	3.0	Overburden borehole	-	-
PS-15A	3124230.9	1324710.7	3/21/05	642.5	-	-	4.0	Overburden borehole	-	-
PS-15B	3124321.3	1324761.5	3/21/05	634.4	-	631.7	3.0	Overburden borehole	-	2.7
PS-16A	3124245.8	1324510.0	3/21/05	645.2	-	641.4	4.0	Overburden borehole	-	3.8
PS-16B	3124186.9	1324582.0	3/18/05	639.2	-	-	4.0	Overburden borehole	-	-
PS-17A	3124049.9	1324362.0	3/18/05	662.1	-	-	4.0	Overburden borehole	-	-
PS-17B	3123966.4	1324414.0	3/18/05	655.2	-	-	4.0	Overburden borehole	-	-
PS-18A	3123858.2	1324150.2	3/22/05	691.9	-	-	4.0	Overburden borehole	-	-
PS-18B	3123820.3	1324270.0	3/18/05	680.2	-	-	4.0	Overburden borehole	-	-
PS-19A	3123608.1	1324259.8	3/18/05	679.1	-	-	4.0	Overburden borehole	-	-
PS-19B	3123604.4	1324347.5	3/22/05	677.5	-	-	4.0	Overburden borehole	-	-
PZ08	3125623.2	1323002.9	4/29/03	624.1	627.10	619.1	12.3	Bedrock piezometer	-	5
PZ23	3124615.5	1327179.5	5/1/03	535.2	537.80	527.7	15.0	Bedrock piezometer	-	7.5
PZ31	3126837.4	1330823.3	4/23/03	515.9	518.50	509.4	8.0	Bedrock piezometer	-	6.5

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
PZ38 Abandoned	3120994.2	1332230.0	4/24/03	500.5	503.3 Aband.	-	14.0	Overburden piezometer	-	-
PZ39	3116448.0	1334598.0	4/28/03	494.8	497.60	478.3	18.0	Bedrock piezometer	-	16.5
PZ39-1 Abandoned	3119944.6	1332962.3	9/8/04	497.3	499.4 Aband.	-	13.0	Overburden piezometer	-	-
PZ39-2 Abandoned	3118769.9	1333159.7	9/8/04	495.5	497.3 Aband.	-	13.0	Overburden piezometer	-	-
PZ39-3 Abandoned	3118613.6	1332653.6	9/9/04	495.6	497.4 Aband.	-	13.0	Overburden piezometer	-	-
PZ39-4 Abandoned	3119122.4	1332629.8	9/8/04	496.7	498.5 Aband.	-	13.0	Overburden piezometer	-	-
PZ39-5 Abandoned	3119503.9	1332860.1	9/8/04	496.3	498.0 Aband.	-	13.0	Overburden piezometer	-	-
SS-X030Y111	3122506.7	1322809.6	1/21/02	720.7	-	-	4.0	Overburden borehole	-	-
SS-X031Y124	3122499.5	1322938.7	1/18/02	721.1	-	-	4.0	Overburden borehole	-	-
SS-X045Y114A	3122666.2	1322838.0	1/31/02	726.7	-	724.2	2.5	Overburden borehole	-	2.5
SS-X045Y114B	3122668.1	1322834.7	2/4/02	726.7	-	-	12.0	Overburden borehole	-	-
SS-X048Y112	3122696.2	1322835.2	1/31/02	726.9	-	-	4.0	Overburden borehole	-	-
SS-X120Y177	3123403.0	1323474.3	1/31/02	726.7	-	-	4.0	Overburden borehole	-	-
SS-X124Y115	3123451.3	1322858.0	1/18/02	724.3	-	-	4.0	Overburden borehole	-	-
SS-X134Y098	3123532.3	1322722.5	1/18/02	721.9	-	-	4.0	Overburden borehole	-	-
SS-X145Y106	3123650.7	1322778.5	1/28/02	723.4	-	-	4.0	Overburden borehole	-	-
SS-X149Y126	3123697.3	1322964.5	1/28/02	726.2	-	-	4.0	Overburden borehole	-	-
SS-X154Y117	3123742.8	1322865.4	1/28/02	724.7	-	-	3.0	Overburden borehole	-	-
SS-X187Y177	3124066.0	1323474.0	7/18/02	718.0	-	-	2.0	Overburden borehole	-	-
SS-X189Y169	3124091.8	1323388.4	7/18/02	720.0	-	-	2.0	Overburden borehole	-	-
SS-X193Y160	3124116.8	1323301.5	7/18/02	721.0	-	-	2.0	Overburden borehole	-	-
SS-X194Y152	3124141.2	1323215.2	7/18/02	720.9	-	-	2.0	Overburden borehole	-	-
SS-X195Y161	3124140.0	1323291.2	6/3/02	720.0	-	-	4.0	Overburden borehole	-	-
SS-X200Y156	3124199.5	1323249.5	6/3/02	718.3	-	-	4.0	Overburden borehole	-	-
SS-X200Y166	3124183.2	1323350.1	6/3/02	714.8	-	-	4.0	Overburden borehole	-	-
SS-X203Y066	3124213.9	1322365.0	1/9/02	692.3	-	-	4.0	Overburden borehole	-	-
SS-X205Y161	3124258.5	1323306.0	6/3/02	701.6	-	-	4.0	Overburden borehole	-	-
TB-1	3124524.1	1323418.9	3/22/05	679.8	-	671.3	9.0	Overburden borehole	-	8.5
TB-2	3124499.4	1323329.0	3/22/05	684.7	-	673.2	11.5	Overburden borehole	-	11.5
TB-3	3124457.8	1323331.7	3/22/05	686.1	-	677.1	9.0	Overburden borehole	-	9
TB-4	3124457.4	1323423.6	3/22/05	680.6	-	677.4	4.5	Overburden borehole	-	3.2
TB-5	3124478.8	1323372.0	3/22/05	683.1	-	678.1	5.0	Overburden borehole	-	5
TMW-X033Y147	3122519.8	1323187.8	6/11/02	718.5	718.30	685.5	36.5	Overburden monitoring well	-	33
TMW-X085Y070	3123174.7	1322414.0	2/19/02	720.1	722.80	-	14	Overburden monitoring well	-	-
TMW-X128Y255A	3123470.3	1324295.0	4/14/04	683.8	686.20	-	32.0	Overburden monitoring well	-	-
TMW-X128Y255B	3123471.8	1324279.3	5/13/04	683.9	686.30	668.3	15.6	Overburden monitoring well	-	15.6
TMW-X193Y251 Abandoned	3124093.9	1324186.9	4/2/02	720.1	689.7 Aband.	-	31.0	Overburden monitoring well	-	-

Table 3.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
TMW-X225Y080	3124460.9	1322507.1	8/8/02	684.3	686.70	-	22.5	Overburden monitoring well	-	-
TMW-X237Y263A Abandoned	3124555.4	1324317.3	2/15/05	655.8	659.06 Aband.	610.8	45.0	Overburden monitoring well	-	45
TMW-X237Y263B Abandoned	3124555.0	1324323.9	2/15/05	655.1	659.19 Aband.	621.1	34.0	Overburden monitoring well	-	34
TMW-X247Y261 Abandoned	3124659.8	1324313.3	2/16/05	650.8	653.69 Aband.	624.3	26.5	Overburden monitoring well	-	26.5
TP-1	3123978.0	1324252.8	6/16/04	792.3	-	-	12.0	Test Pit	-	-
TP-2	3124043.3	1324243.0	6/16/04	792.5	-	-	12.0	Test Pit	-	-
TP-3	3124012.7	1324183.3	6/16/04	796.1	-	-	12.0	Test Pit	-	-
TP-5	3124167.5	1324329.9	6/16/04	774.4	-	-	10.0	Test Pit	-	-
TP-6	3124206.0	1324267.7	6/15/04	789.8	-	-	9.0	Test Pit	-	-
TP-7	3124199.5	1324182.8	6/16/04	793.2	-	-	9.0	Test Pit	-	-
TP-9	3124304.7	1324138.0	6/15/04	789.7	-	-	12.0	Test Pit	-	-
TP-10	3124367.4	1324169.0	6/15/04	787.4	-	-	11.5	Test Pit	-	-
TP-11	3124394.7	1324323.8	6/16/04	770.4	-	-	3.0	Test Pit	-	-
TP-12	3124492.6	1324304.7	6/15/04	767.9	-	-	12.0	Test Pit	-	-
TP-13	3124605.3	1324286.1	6/15/04	763.0	-	-	f	Test Pit	-	-
TP-15	3124128.2	1323912.0	6/17/04	793.9	-	-	9.0	Test Pit	-	-
TP-17	3124145.4	1323850.7	7/1/04	794.7	-	785.7	9.0	Test Pit	-	9
TP-18	3124066.0	1323763.7	6/17/04	797.9	-	792.9	5.0	Test Pit	-	5
TP-19	3124152.9	1323262.5	6/23/04	828.8	-	-	8.0	Test Pit	-	-
TP-20	3124180.5	1323227.7	6/22/04	828.2	-	-	4.0	Test Pit	-	-
TP-21	3124260.7	1323327.8	6/21/04	806.5	-	-	8.0	Test Pit	-	-
TP-22	3124242.7	1323252.8	6/21/04	822.4	-	-	12.0	Test Pit	-	-
TP-23	3124308.8	1323400.4	6/17/04	805.3	-	-	12.0	Test Pit	-	-
TP-24	3124307.2	1323369.7	6/17/04	804.6	-	-	10.0	Test Pit	-	-
TP-25	3124306.3	1323297.9	6/21/04	805.0	-	-	3.5	Test Pit	-	-
TP-26	3124272.3	1323232.4	6/21/04	819.8	-	-	12.0	Test Pit	-	-
TP-28	3124140.9	1323075.4	6/23/04	828.7	-	-	12.0	Test Pit	-	-
TP-29	3124247.7	1323069.5	6/23/04	828.6	-	-	12.0	Test Pit	-	-
TP-30	3124331.8	1323056.2	6/22/04	826.6	-	-	12.0	Test Pit	-	-
TP-31	3124419.1	1323084.5	6/24/04	824.1	-	-	12.0	Test Pit	-	-
TP-32	3124423.3	1323008.6	6/24/04	824.0	-	-	12.0	Test Pit	-	-
TP-33	3124318.2	1322938.9	6/23/04	824.8	-	-	12.0	Test Pit	-	-
TP-34	3123966.4	1323020.4	6/25/04	831.9	-	-	5.5	Test Pit	-	-
TP-35	3123966.8	1322979.4	6/25/04	831.5	-	-	12.0	Test Pit	-	-
TP-36	3123965.9	1322906.3	6/24/04	820.9	-	-	12.0	Test Pit	-	-
TP-37	3123864.4	1323782.8	7/1/04	no survey	-	-	12.0	Test Pit	-	-
TP-55	3122735.3	1324615.2	6/9/04	798.9	-	-	8.0	Test Pit	-	-
TP-56	3122759.8	1324592.0	6/9/04	792.4	-	-	12.0	Test Pit	-	-
TP-57	3122785.4	1324587.0	6/9/04	788.7	-	-	12.0	Test Pit	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
TP-58	3122744.1	1324557.4	6/10/04	800.3	-	-	10.5	Test Pit	-	-
TP-59	3122779.8	1324560.2	6/10/04	798.6	-	-	12.0	Test Pit	-	-
TP-60	3122774.9	1324529.1	6/10/04	801.5	-	-	11.0	Test Pit	-	-
TP-61	3122779.8	1324497.8	6/14/04	802.3	-	-	12.0	Test Pit	-	-
TP-62	3122795.5	1324476.0	6/14/04	802.1	-	-	12.0	Test Pit	-	-
TP-63	3122775.4	1324384.1	6/14/04	802.2	-	-	6.5	Test Pit	-	-
TP-64	3122862.1	1324680.3	6/8/04	774.1	-	-	3.8	Test Pit	-	-
TP-65	3122873.9	1324647.2	6/8/04	778.2	-	771.2	7.0	Test Pit	-	7
TP-66	3122873.9	1324611.9	6/8/04	781.0	-	775.0	6.0	Test Pit	-	6
TP-67	3122904.3	1324604.2	6/8/04	782.2	-	776.2	6.0	Test Pit	-	6
TP-68	3122826.4	1324578.7	6/9/04	782.6	-	-	3.0	Test Pit	-	-
TP-69	3122842.3	1324547.7	6/9/04	785.8	-	-	6.0	Test Pit	-	-
TP-70	3122885.4	1324513.5	6/8/06	788.2	-	784.2	4.0	Test Pit	-	4
TP-72	3115722.9	1333782.0	6/30/04	616.4	-	-	12.0	Test Pit	-	-
TP-73	3115713.4	1333743.2	6/30/04	616.2	-	-	12.0	Test Pit	-	-
V-1	3123932.3	1323524.5	1/23/06	719.2	-	-	16.0	Overburden borehole	-	-
V-2	3123981.3	1323538.0	1/23/06	717.9	-	-	20.0	Overburden borehole	-	-
V-3	3123868.9	1323533.0	1/23/06	720.0	-	-	12.0	Overburden borehole	-	-
V-4	3123811.7	1323514.8	1/23/06	720.8	-	-	8.0	Overburden borehole	-	-
V-5	3124024.8	1323547.0	1/23/06	716.2	-	-	12.0	Overburden borehole	-	-
7-1	3123825.1	1323625.4	4/14/05	704.6	-	680.1	24.5	Overburden borehole	-	24.5
7-2	3123738.8	1323896.2	4/14/05	696.3	-	675.3	21.0	Overburden borehole	-	21
7-3	3124019.2	1323995.1	4/15/05	691.9	-	669.4	22.5	Overburden borehole	-	22.5
7-4	3124096.3	1323692.3	4/15/05	691.9	-	672.4	19.5	Overburden borehole	-	19.5
7-5	3123986.9	1323654.0	4/15/05	697.9	-	675.9	22.0	Overburden borehole	-	22
7-6	3123788.8	1323755.5	4/19/05	696.9	-	675.9	21.0	Overburden borehole	-	21
7-7	3123898.5	1323955.8	4/20/05	691.3	-	665.3	26.0	Overburden borehole	-	26
9-1 Abandoned	3124223.5	1324049.0	7/26/05	678.4	-	667.2	51.8	Bedrock monitoring well	-	11.2
9-2 Abandoned	3124273.2	1324068.8	7/25/05	678.6	-	662.6	52.8	Bedrock monitoring well	-	16
9-3 Abandoned	3124317.6	1324086.6	7/21/05	680.3	-	660.3	52.3	Bedrock monitoring well	-	20
9-4	3124352.7	1324100.9	7/19/05	679.2	-	657.9	54.1	Bedrock monitoring well	-	21.3
15-1	3125706.3	1325225.6	4/5/07	588.1	589.08	586.1	25.1	Bedrock monitoring well	-	2
15-2	3125750.3	1325175.9	3/14/07	585.6	587.52	584.1	43.1	Bedrock monitoring well	-	1.5
15-3	3125859.6	1325262.8	3/5/07	607.3	608.66	603.3	94.4	Bedrock monitoring well	-	4
15-4	3125820.5	1325154.1	3/13/07	591.6	593.19	590.6	34.2	Bedrock monitoring well	-	1
15-5	3125864.8	1325130.4	3/12/07	591.2	592.88	586.7	34.5	Bedrock monitoring well	-	4.5

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
15-6	3125772.5	1325185.6	3/19/07	590.0	592.17	588.5	37.5	Bedrock monitoring well	-	1.5
15-6I	3125780.7	1325192.5	5/7/07	592.0	593.05	588.0	49.5	Bedrock monitoring well	-	4
15-6D	3125772.4	1325195.7	5/6/07	591.7	593.48	589.2	77.0	Bedrock monitoring well	-	2.5
15-7	3125989.3	1325281.1	2/26/07	610.5	610.76	605.7	64.6	Bedrock monitoring well	-	4.8
15-8	3125654.4	1325295.9	4/4/07	585.4	587.46	581.9	28.0	Bedrock monitoring well	-	3.5
15-9	3125895.8	1325057.6	4/18/07	570.3	573.05	570.3	9.1	Bedrock monitoring well	-	0
15-10	3125633.5	1325363.1	4/13/07	580.2	582.32	578.7	33.1	Bedrock monitoring well	-	1.5
15-11	3125665.7	1325199.1	4/10/07	578.1	580.39	576.1	22.5	Bedrock monitoring well	-	2
15-12	3125745.7	1325273.8	3/21/07	598.4	598.86	594.9	44.9	Bedrock monitoring well	-	3.5
15-13	3125615.9	1325390.1	4/12/07	575.2	577.37	573.7	24.3	Bedrock monitoring well	-	1.5
15-14	3125745.1	1324981.4	5/30/07	582.8	584.63	579.8	26.1	Bedrock monitoring well	-	3
15-15	3125638.2	1325439.9	4/3/07	578.3	580.64	576.8	28.5	Bedrock monitoring well	-	1.5
15-16	3125902.7	1325194.1	5/15/07	605.2	606.59	601.7	64.7	Bedrock monitoring well	-	3.5
15-17	3125912.6	1325369.4	5/18/07	613.5	614.92	598.5	64.9	Bedrock monitoring well	-	15
15-18	3125752.2	1325355.7	5/22/07	603.4	604.85	598.4	55.0	Bedrock monitoring well	-	5
15-19	3125796.9	1325248.8	5/16/07	600.4	601.98	595.4	49.8	Bedrock monitoring well	-	5
15-20	3125982.8	1325129.4	6/5/07	599.3	600.99	597.3	39.2	Bedrock monitoring well	-	2
023-204	3124332.1	1327557.7	8/26/04	521.7	-	516.5	5.2	Overburden borehole	-	5.2
023-205	3124277.7	1327688.5	8/26/04	521.1	-	515.7	5.4	Overburden borehole	-	5.4
023-206	3124191.2	1327747.1	8/27/04	520.2	-	514.2	6.0	Overburden borehole	-	6
023-207	3124225.0	1327958.8	8/27/04	518.9	-	512.6	6.3	Overburden borehole	-	6.3
024-203	3124163.7	1327600.8	8/26/04	521.0	-	515.3	5.7	Overburden borehole	-	5.7
025-208	3124095.8	1328101.1	8/27/04	516.8	-	509.6	7.2	Overburden borehole	-	7.2
025-209	3124071.8	1328297.3	8/27/04	514.5	-	507.5	7.0	Overburden borehole	-	7
025-210	3124258.7	1328305.6	8/27/04	514.9	-	508.9	6.0	Overburden borehole	-	6
025-211	3124254.7	1328508.3	8/27/04	514.5	-	506.5	8.0	Overburden borehole	-	8
025-212	3124347.3	1328557.3	8/27/04	516.9	-	-	9.7	Overburden borehole	-	-
025-213	3124104.9	1328529.2	8/27/04	514.3	-	506.3	8.0	Overburden borehole	-	8
027-1-7	3122915.8	1329244.3	3/24/05	623.9	-	616.4	7.5	Overburden borehole	-	7.5
027-1-8	3122593.8	1329204.3	3/24/05	619.9	-	609.4	10.5	Overburden borehole	-	10.5
027-1-9	3122307.5	1329343.6	3/24/05	620.7	-	611.7	9.0	Overburden borehole	-	9
027-1-10	3122301.6	1329169.3	3/24/05	630.8	-	625.8	5.0	Overburden borehole	-	5
027-2-3	3122843.7	1328787.6	3/23/05	631.0	-	622.5	8.5	Overburden borehole	-	8.5
027-2-4	3122683.4	1328675.8	3/23/05	647.6	-	637.1	10.5	Overburden borehole	-	10.5
027-2-5	3122520.3	1328645.4	3/23/05	656.0	-	-	13.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
027-2-6	3122525.7	1328786.6	3/24/05	653.1	-	646.6	6.5	Overburden borehole	-	6.5
027-3-1	3123289.3	1328728.5	3/23/05	624.3	-	618.8	5.5	Overburden borehole	-	5.5
027-3-2	3123190.7	1328650.4	3/23/05	631.5	-	-	6.0	Overburden borehole	-	-
028-214	3124343.7	1328891.1	8/30/04	512.6	-	-	10.0	Overburden borehole	-	-
028-215	3124420.8	1328822.9	8/30/04	515.6	-	-	10.0	Overburden borehole	-	-
028-216	3124289.1	1328689.7	8/30/04	514.5	-	-	10.0	Overburden borehole	-	-
028-217	3124077.8	1328855.8	8/30/04	513.0	-	503.1	9.9	Overburden borehole	-	9.9
028-218	3124185.6	1328902.0	8/30/04	512.3	-	-	10.0	Overburden borehole	-	-
028-219	3124263.1	1329141.3	8/30/04	510.8	-	-	10.0	Overburden borehole	-	-
028-220	3124182.4	1329357.6	8/30/04	509.1	-	-	10.0	Overburden borehole	-	-
028-221	3123936.7	1329642.6	8/30/04	508.3	-	-	10.0	Overburden borehole	-	-
028-240	3124054.3	1329152.5	2/9/04	511.6	-	-	10.0	Overburden borehole	-	-
028-241	3123971.4	1329306.7	2/9/04	509.0	-	-	10.0	Overburden borehole	-	-
028-242	3123760.7	1329512.5	2/9/04	507.9	-	-	10.0	Overburden borehole	-	-
029-231	3123074.1	1330342.7	8/31/04	504.7	-	-	10.0	Overburden borehole	-	-
030-222	3124084.5	1329654.6	8/30/04	506.4	-	497.0	9.4	Overburden borehole	-	9.4
030-223	3123936.7	1329642.6	8/30/04	507.1	-	-	10.0	Overburden borehole	-	-
030-224	3123781.2	1329813.3	8/31/04	506.4	-	-	10.0	Overburden borehole	-	-
030-225	3123750.8	1330028.4	8/31/04	505.6	-	-	10.0	Overburden borehole	-	-
030-226	3124014.3	1329905.5	8/31/04	506.4	-	-	10.0	Overburden borehole	-	-
030-227	3123874.5	1330128.1	8/31/04	506.5	-	-	10.0	Overburden borehole	-	-
030-228	3123529.8	1330034.7	8/31/04	505.9	-	-	10.0	Overburden borehole	-	-
030-229	3123538.5	1330249.5	8/31/04	506.3	-	-	10.0	Overburden borehole	-	-
030-230	3123302.7	1330367.2	8/31/04	505.7	-	-	10.0	Overburden borehole	-	-
030-232	3123764.1	1330335.4	1/9/04	506.6	-	-	10.0	Overburden borehole	-	-
036-233	3123235.0	1330508.7	9/1/04	505.6	-	-	10.0	Overburden borehole	-	-
036-234	3123119.3	1330571.3	1/9/04	504.9	-	-	10.0	Overburden borehole	-	-
036-235	3123006.3	1330724.0	9/1/04	504.2	-	-	10.0	Overburden borehole	-	-
036-236	3123147.8	1330775.8	9/2/04	504.3	-	-	10.0	Overburden borehole	-	-
036-237	3122987.6	1331010.3	9/2/04	503.3	-	493.3	10.0	Overburden borehole	-	10
036-238	3122878.8	1331314.9	2/9/04	502.8	-	-	10.0	Overburden borehole	-	-
036-239	3123048.5	1331219.9	1/9/04	502.8	-	-	10.0	Overburden borehole	-	-
036-245	3121548.1	1332264.3	9/3/04	499.8	-	-	10.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
036-246	3122478.3	1331743.5	9/7/04	502.8	-	-	10.0	Overburden borehole	-	-
036-247	3122377.6	1331654.6	7/9/04	502.0	-	-	10.0	Overburden borehole	-	-
036-248	3121309.3	1331878.4	9/7/04	503.1	-	-	10.0	Overburden borehole	-	-
036-249	3121281.0	1332097.2	9/8/04	499.7	-	-	10.0	Overburden borehole	-	-
036-250	3121648.8	1332185.1	10/9/04	501.0	-	-	10.0	Overburden borehole	-	-
036-251	3121564.6	1332050.1	9/8/04	500.1	-	-	10.0	Overburden borehole	-	-
036-252	3121607.4	1331836.5	8/9/04	500.2	-	-	10.0	Overburden borehole	-	-
036-253	3121760.4	1331960.4	9/8/04	500.6	-	-	10.0	Overburden borehole	-	-
036-254	3122023.2	1331979.6	9/8/04	500.5	-	-	10.0	Overburden borehole	-	-
036-255	3121967.2	1331725.7	9/8/04	501.4	-	-	10.0	Overburden borehole	-	-
036-256	3122274.2	1331303.3	9/8/04	501.7	-	-	10.0	Overburden borehole	-	-
036-257	3122646.8	1331238.2	9/8/04	503.0	-	-	10.0	Overburden borehole	-	-
036-258	3122641.0	1330877.9	9/8/04	503.8	-	-	10.0	Overburden borehole	-	-
036-110002	3121225.0	1331988.8	3/1/05	500.0	-	-	4.0	Overburden borehole	-	-
036-110003	3121272.4	1331975.1	3/2/05	499.3	-	-	4.0	Overburden borehole	-	-
036-110004	3121319.1	1331946.3	3/2/05	500.0	-	-	4.0	Overburden borehole	-	-
036-110005	3121352.4	1331900.7	3/2/05	500.5	-	-	4.0	Overburden borehole	-	-
036-110006	3121405.2	1331854.6	3/2/05	501.5	-	-	4.0	Overburden borehole	-	-
036-110007	3121467.1	1331802.3	3/2/05	500.8	-	-	4.0	Overburden borehole	-	-
036-110008	3121538.8	1331799.7	3/2/05	499.9	-	-	4.0	Overburden borehole	-	-
036-110009	3121609.9	1331779.9	3/2/05	500.4	-	-	4.0	Overburden borehole	-	-
036-110010	3121684.3	1331754.4	3/3/05	500.4	-	-	4.0	Overburden borehole	-	-
036-110011	3121711.9	1331795.3	3/3/05	500.3	-	-	4.0	Overburden borehole	-	-
036-110012	3121740.2	1331837.4	3/3/05	500.6	-	-	4.0	Overburden borehole	-	-
036-110013	3121768.9	1331880.9	3/3/05	500.6	-	-	4.0	Overburden borehole	-	-
036-110014	3121794.4	1331924.6	3/3/05	500.4	-	-	4.0	Overburden borehole	-	-
036-110015	3121821.0	1331966.4	3/3/05	500.5	-	-	4.0	Overburden borehole	-	-
036-110016	3121848.4	1332009.8	3/3/05	500.6	-	-	4.0	Overburden borehole	-	-
036-110017	3121877.8	1332055.3	3/3/05	500.1	-	-	4.0	Overburden borehole	-	-
036-110018	3121754.4	1331681.4	3/8/05	500.4	-	-	4.0	Overburden borehole	-	-
036-110019	3121823.8	1331615.3	3/8/05	500.0	-	-	4.0	Overburden borehole	-	-
036-110020	3121899.6	1331562.5	3/8/05	500.2	-	-	4.0	Overburden borehole	-	-
036-110021	3121962.4	1331482.3	3/8/05	500.2	-	-	4.0	Overburden borehole	-	-
036-110022	3122028.0	1331422.7	3/8/05	500.5	-	-	4.0	Overburden borehole	-	-
036-110023	3122092.5	1331364.2	3/8/05	501.0	-	-	4.0	Overburden borehole	-	-
036-110024	3122147.4	1331293.5	3/8/05	501.7	-	-	4.0	Overburden borehole	-	-
036-110025	3122210.0	1331218.3	3/8/05	501.2	-	-	4.0	Overburden borehole	-	-
036-110026	3122252.5	1331133.0	3/8/05	501.9	-	-	4.0	Overburden borehole	-	-
036-110027	3122288.3	1331041.4	3/8/05	502.3	-	-	4.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
036-110028	3122336.6	1330937.2	3/9/05	502.8	-	-	4.0	Overburden borehole	-	-
036-110029	3122379.7	1330867.9	3/9/05	503.7	-	-	4.0	Overburden borehole	-	-
036-110030	3122450.1	1330796.7	3/9/05	503.6	-	-	4.0	Overburden borehole	-	-
036-110031	3122509.5	1330722.3	3/9/05	504.1	-	-	4.0	Overburden borehole	-	-
036-110032	3122596.9	1330638.5	3/9/05	504.1	-	-	4.0	Overburden borehole	-	-
037-244	3121091.6	1332193.1	3/9/04	499.3	-	-	10.0	Overburden borehole	-	-
037-11000	3121149.4	1332065.0	3/1/05	498.1	-	-	4.0	Overburden borehole	-	-
037-11001	3121185.6	1332045.6	3/1/05	498.2	-	-	4.0	Overburden borehole	-	-
038-259	3120944.4	1332086.5	9/9/04	494.4	-	-	10.0	Overburden borehole	-	-
038-260	3120631.7	1332139.1	9/9/04	497.0	-	-	10.0	Overburden borehole	-	-
038-261	3120308.2	1332146.3	9/9/04	498.8	-	-	10.0	Overburden borehole	-	-
038-263	3120067.3	1332027.9	9/9/04	498.9	-	-	10.0	Overburden borehole	-	-
39-1-1	3116399.9	1331576.8	5/2/05	500.2	-	477.3	22.9	Overburden borehole	-	22.9
39-1-2	3116113.6	1331868.4	5/3/05	495.1	-	482.1	13.0	Overburden borehole	-	13
39-1-3	3115811.9	1331454.7	5/3/05	498.5	-	484.5	14.0	Overburden borehole	-	14
39-1-4	3115834.3	1332334.1	5/4/05	497.0	-	483.6	13.4	Overburden borehole	-	13.4
39-2-1	3114967.5	1332857.3	5/4/05	497.1	-	477.1	20.0	Overburden borehole	-	20
39-2-2	3115101.4	1333277.2	5/4/05	496.9	-	482.5	14.4	Overburden borehole	-	14.4
39-2-3	3115240.9	1333798.1	3/30/05	496.2	-	-	25.0	Overburden borehole	-	-
39-2-4	3114660.7	1333529.6	5/5/05	497.4	-	475.4	22.0	Overburden borehole	-	22
39-3-4	3116534.7	1333253.9	3/31/05	491.7	-	-	25.0	Overburden borehole	-	-
39-3-5	3116206.3	1333132.8	3/31/05	490.8	-	-	25.0	Overburden borehole	-	-
39-4-1	3116484.0	1334151.8	5/6/05	488.8	-	473.3	15.5	Overburden borehole	-	15.5
39-4-2	3116077.7	1333786.5	5/6/05	490.4	-	-	25.0	Overburden borehole	-	-
39-5-1	3116976.5	1335404.1	5/9/05	491.7	-	473.2	18.5	Overburden borehole	-	18.5
39-5-2	3117256.3	1335720.7	5/10/05	493.3	-	477.8	15.5	Overburden borehole	-	15.5
39-5-3	3117098.1	1335980.9	5/9/05	494.3	-	475.3	19.0	Overburden borehole	-	19
39-5-4	3117535.7	1336035.0	5/10/05	496.3	-	-	25.0	Overburden borehole	-	-
39-6-1	3114955.5	1334922.3	3/29/05	507.6	-	483.6	24.0	Overburden borehole	-	24
39-6-2	3114769.4	1335159.9	3/30/05	507.9	-	-	25.0	Overburden borehole	-	-
39-6-3	3114400.6	1335006.0	5/5/05	496.1	-	-	25.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
39-7-1	3117576.9	1331214.5	5/12/05	517.9	-	-	28.0	Overburden borehole	-	-
39-7-2	3117581.5	1331485.9	5/13/05	514.3	-	-	25.0	Overburden borehole	-	-
39-7-3	3117834.9	1331245.7	5/13/05	516.2	-	-	25.0	Overburden borehole	-	-
039-075	3120063.7	1333131.3	9/7/04	496.5	-	-	12.0	Overburden borehole	-	-
039-076	3120271.0	1333004.2	9/7/04	498.2	-	-	12.0	Overburden borehole	-	-
039-079	3119616.8	1332525.0	9/8/04	496.6	-	-	12.0	Overburden borehole	-	-
039-081	3119198.8	1332415.2	9/8/04	497.7	-	-	12.0	Overburden borehole	-	-
039-082	3119030.4	1332890.8	9/8/04	495.5	-	-	12.0	Overburden borehole	-	-
039-085	3118835.4	1332363.7	9/9/04	512.0	-	-	12.0	Overburden borehole	-	-
039-086	3118388.4	1332390.6	9/9/04	495.7	-	-	12.0	Overburden borehole	-	-
039-087	3118461.8	1333412.2	9/9/04	492.4	-	-	12.0	Overburden borehole	-	-
039-088	3118787.6	1333419.2	9/9/04	514.0	-	-	12.0	Overburden borehole	-	-
039-089	3119369.9	1333339.8	9/9/04	501.5	-	-	12.0	Overburden borehole	-	-
039-090	3119595.2	1333217.2	9/9/04	496.5	-	-	12.0	Overburden borehole	-	-
039-262	3120254.2	1332371.2	9/9/04	507.1	-	-	10.0	Overburden borehole	-	-
039-264	3118652.2	1332185.6	9/9/04	499.0	-	-	10.0	Overburden borehole	-	-
039-265	3117908.3	1332016.4	9/9/04	518.8	-	-	10.0	Overburden borehole	-	-
039-266	3120835.0	1332514.1	9/13/04	513.5	-	-	10.0	Overburden borehole	-	-
039-267	3120625.6	1332714.5	9/13/04	500.8	-	-	10.0	Overburden borehole	-	-
039-268	3120675.9	1332419.3	9/13/04	501.6	-	-	10.0	Overburden borehole	-	-
039-269	3120188.1	1332589.4	9/13/04	506.0	-	-	10.0	Overburden borehole	-	-
039-270	3119956.6	1332534.8	9/13/04	502.3	-	-	10.0	Overburden borehole	-	-
039-271	3120498.3	1332493.5	9/13/04	500.2	-	-	10.0	Overburden borehole	-	-
039-272	3118716.9	1331853.5	9/14/04	504.0	-	-	10.0	Overburden borehole	-	-
039-273	3118598.4	1331900.9	9/14/04	522.3	-	-	10.0	Overburden borehole	-	-
039-417	3116446.0	1332571.0	11/9/04	506.7	-	-	10.0	Overburden borehole	-	-
039-418	3125540.9	1325377.0	11/9/04	491.4	-	-	10.0	Overburden borehole	-	-
039-419	3116595.0	1332845.0	11/9/04	491.6	-	-	10.0	Overburden borehole	-	-
039-887	NA	NA	12/13/04	492.5	-	-	10.0	Overburden borehole	-	-
039-888	3120358.4	1332348.6	12/13/04	491.4	-	-	10.0	Overburden borehole	-	-
039-889	3120351.5	1332475.1	12/14/04	488.7	-	-	10.0	Overburden borehole	-	-
039-890	3120345.1	1332592.7	12/14/04	489.4	-	-	10.0	Overburden borehole	-	-
040-1	3118317.0	1333419.8	4/10/06	494.1	494.12	-	12.0	Overburden borehole	-	-
040-2	3118341.9	1333446.3	4/10/06	493.4	493.41	-	12.0	Overburden borehole	-	-
040-3	3118277.8	1333381.3	4/10/06	493.4	493.35	-	12.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
040-4	3118341.9	1333047.5	4/10/06	493.5	493.49	-	12.0	Overburden borehole	-	-
040-5	3118296.6	1333069.9	4/10/06	493.6	493.61	-	12.0	Overburden borehole	-	-
040-6	3118234.5	1333108.4	4/10/06	493.5	493.46	-	12.0	Overburden borehole	-	-
040-7	3118309.3	1332880.4	4/10/06	492.8	492.83	-	12.0	Overburden borehole	-	-
040-8	3118255.1	1332842.0	4/11/06	492.8	492.82	-	12.0	Overburden borehole	-	-
040-9	3118192.7	1332771.9	4/11/06	493.1	493.10	-	12.0	Overburden borehole	-	-
040-10	3118359.5	1332714.0	4/11/06	494.2	494.18	-	12.0	Overburden borehole	-	-
040-11	3118316.5	1332672.9	4/11/06	493.3	493.26	-	12.0	Overburden borehole	-	-
040-12	3118298.2	1332582.5	4/11/06	494.4	494.44	-	12.0	Overburden borehole	-	-
040-13	3118261.1	1332529.9	4/11/06	493.5	493.49	-	12.0	Overburden borehole	-	-
040-14	3118137.0	1332615.3	4/11/06	493.0	492.95	-	12.0	Overburden borehole	-	-
040-15	3118054.8	1332797.3	4/11/06	492.2	492.20	-	12.0	Overburden borehole	-	-
040-16	3117928.5	1332713.6	4/11/06	491.8	491.77	-	12.0	Overburden borehole	-	-
040-17	3117977.2	1332807.3	4/12/06	492.7	492.70	-	12.0	Overburden borehole	-	-
040-18	3117907.5	1332792.2	4/12/06	491.2	491.15	-	12.0	Overburden borehole	-	-
040-19	3117798.3	1332872.7	4/12/06	491.9	491.93	-	12.0	Overburden borehole	-	-
040-20	3117759.6	1332872.9	4/12/06	492.5	492.45	-	12.0	Overburden borehole	-	-
040-21	3117732.2	1332891.4	4/12/06	492.3	492.32	-	12.0	Overburden borehole	-	-
040-22	3117766.6	1332928.2	4/12/06	491.7	491.73	-	12.0	Overburden borehole	-	-
040-23	3117801.9	1332965.1	4/12/06	492.0	492.01	-	12.0	Overburden borehole	-	-
040-24	3117721.3	1333026.8	4/12/06	491.7	491.70	-	12.0	Overburden borehole	-	-
040-25	3117856.8	1333064.8	4/12/06	492.8	492.77	-	12.0	Overburden borehole	-	-
040-26	3117919.2	1333013.0	4/13/06	492.2	492.19	-	12.0	Overburden borehole	-	-
040-27	3117680.6	1333217.4	4/13/06	491.5	491.53	-	12.0	Overburden borehole	-	-
040-28	3117962.4	1333390.3	4/13/06	492.3	492.31	-	12.0	Overburden borehole	-	-
040-29	3117794.5	1333528.4	4/13/06	491.4	491.38	-	12.0	Overburden borehole	-	-
040-30	3117733.5	1333483.2	4/13/06	491.3	491.32	-	12.0	Overburden borehole	-	-
040-31	3118102.7	1333003.5	4/13/06	491.3	493.07	-	12.0	Overburden borehole	-	-
040-32	3118308.6	1333196.9	4/17/06	493.8	493.76	-	12.0	Overburden borehole	-	-
040-33	3118345.6	1333257.2	4/17/06	494.7	494.68	-	12.0	Overburden borehole	-	-
040-34	3118346.8	1333089.2	4/17/06	495.3	495.31	-	12.0	Overburden borehole	-	-
040-35	3118113.6	1333231.5	4/17/06	493.2	493.20	-	12.0	Overburden borehole	-	-
040-36	3118323.7	1333660.2	4/17/06	494.1	494.13	-	12.0	Overburden borehole	-	-
040-37	3117632.5	1333612.0	4/17/06	491.8	491.80	-	12.0	Overburden borehole	-	-
040-38	3117594.1	1333547.3	4/17/06	491.1	491.13	-	12.0	Overburden borehole	-	-
040-39	3117554.7	1333483.1	4/17/06	491.2	491.22	-	12.0	Overburden borehole	-	-
040-40	3117525.4	1333553.6	4/18/06	490.9	490.86	-	12.0	Overburden borehole	-	-
040-41	3117552.2	1333550.5	4/18/06	490.4	490.40	-	12.0	Overburden borehole	-	-
040-42	3117488.7	1333649.2	4/18/06	490.4	490.35	-	12.0	Overburden borehole	-	-
040-43	3117467.1	1333739.4	4/18/06	489.5	489.54	-	12.0	Overburden borehole	-	-

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation			Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
				Ground (ft amsl)	TOC (ft amsl)	Top of Rock (ft amsl)				
040-44	3117470.8	1333367.7	4/18/06	491.5	491.47	-	12.0	Overburden borehole	-	-
040-45	3117442.2	1333332.0	4/18/06	490.0	490.02	-	12.0	Overburden borehole	-	-
040-46	3117397.3	1333385.4	4/18/06	489.5	489.51	-	12.0	Overburden borehole	-	-
040-47	3117385.5	1333359.2	4/18/06	489.8	489.82	-	12.0	Overburden borehole	-	-
040-48	3117353.6	1333373.5	4/18/06	490.4	490.44	-	12.0	Overburden borehole	-	-
040-49	3117325.9	1333456.7	4/19/06	489.2	489.24	-	12.0	Overburden borehole	-	-
040-50	3117305.5	1333502.9	4/19/06	489.0	489.04	-	12.0	Overburden borehole	-	-
040-51	3117395.9	1333098.8	4/19/06	491.5	491.52	-	12.0	Overburden borehole	-	-
040-52	3117587.3	1333032.2	4/19/06	491.4	491.44	-	12.0	Overburden borehole	-	-
040-53	3117651.2	1333200.7	4/19/06	490.2	490.24	-	12.0	Overburden borehole	-	-
040-54	3117715.3	1333898.3	4/21/06	491.2	491.17	-	2.0	Overburden borehole	-	-
040-55	3118138.3	1333459.6	4/21/06	492.8	492.79	-	2.0	Overburden borehole	-	-
040-56	3118077.7	1332951.8	4/21/06	493.9	493.87	-	2.0	Overburden borehole	-	-
040-57	3118138.3	1332454.1	4/21/06	494.4	494.39	-	2.0	Overburden borehole	-	-
040-58	3117836.0	1332442.7	4/21/06	493.9	493.90	-	2.0	Overburden borehole	-	-
040-59	3117821.0	1333328.2	4/21/06	492.6	492.55	-	2.0	Overburden borehole	-	-
040-60	3117656.8	1333647.3	4/21/06	491.2	491.21	-	2.0	Overburden borehole	-	-
040-61	3117528.6	1333152.6	4/21/06	492.7	492.73	-	2.0	Overburden borehole	-	-
040-62	3117629.6	1332634.3	4/21/06	493.1	493.13	-	2.0	Overburden borehole	-	-
040-63	3117180.3	1333102.0	4/24/06	491.9	491.94	-	2.0	Overburden borehole	-	-
040-64	3117004.9	1333101.2	4/24/06	492.4	492.44	-	2.0	Overburden borehole	-	-
040-65	3116860.1	1333152.8	4/24/06	492.0	491.96	-	2.0	Overburden borehole	-	-
040-66	3116813.0	1333336.0	4/24/06	492.2	492.15	-	2.0	Overburden borehole	-	-
040-67	3117011.1	1333363.0	4/24/06	491.7	491.66	-	2.0	Overburden borehole	-	-
040-68	3117194.1	1332540.0	4/24/06	492.4	492.40	-	2.0	Overburden borehole	-	-
040-69	3117243.8	1332346.3	4/24/06	493.0	493.02	-	2.0	Overburden borehole	-	-
040-70	3116802.8	1332660.5	4/24/06	491.8	491.79	-	2.0	Overburden borehole	-	-
040-71	3116829.1	1332499.1	4/24/06	491.7	491.74	-	2.0	Overburden borehole	-	-
040-72	3116961.5	1333783.5	4/25/06	490.2	-	-	2.0	Overburden borehole	-	-
040-73	3116809.8	1333859.4	4/25/06	490.3	-	-	2.0	Overburden borehole	-	-
040-74	3116935.8	1334076.3	4/25/06	489.5	-	-	2.0	Overburden borehole	-	-
040-75	3116795.4	1334367.3	4/25/06	489.1	-	-	2.0	Overburden borehole	-	-
040-76	3116797.7	1334609.6	4/25/06	487.8	-	-	2.0	Overburden borehole	-	-
040-77	3117045.2	1333918.5	4/25/06	489.9	-	-	2.0	Overburden borehole	-	-
040-78	3117133.1	1333802.6	4/25/06	489.8	-	-	2.0	Overburden borehole	-	-
040-79	3117430.5	1334121.9	4/25/06	491.3	-	-	2.0	Overburden borehole	-	-
040-80	3117317.8	1332533.3	4/26/06	492.8	-	-	8.0	Overburden borehole	-	-
040-81	3117441.1	1332483.5	4/26/06	493.6	-	-	8.0	Overburden borehole	-	-
040-82	3117401.1	1332614.0	4/26/06	493.6	-	-	8.0	Overburden borehole	-	-
040-83	3117372.4	1332553.1	4/26/06	493.7	-	-	8.0	Overburden borehole	-	-

Table 3.3

Well Construction Details
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Borehole	Easting (feet)	Northing (feet)	Installation Date	Elevation Ground (ft amsl)	Elevation TOC (ft amsl)	Elevation Top of Rock (ft amsl)	Borehole Total Depth (ft bgs)	Borehole/Well Type	Comment	Top of Rock (ft bgs)
040-84	3117353.9	1332573.9	4/26/06	493.1	-	-	8.0	Overburden borehole	-	-
040-85	3117326.7	1332598.0	4/26/06	493.6	-	-	8.0	Overburden borehole	-	-
040-86	3118335.1	1332666.0	4/27/06	493.2	-	-	4.0	Overburden borehole	-	-
040-87	3118325.9	1332670.1	4/27/06	493.1	-	-	4.0	Overburden borehole	-	-
040-88	3118379.2	1332652.4	4/27/06	492.3	-	-	4.0	Overburden borehole	-	-
040-89	3118311.1	1332654.4	4/27/06	493.3	-	-	4.0	Overburden borehole	-	-
040-90	3118314.0	1332663.0	4/27/06	493.3	-	-	4.0	Overburden borehole	-	-
040-91	3118307.0	1332675.3	4/27/06	493.5	-	-	4.0	Overburden borehole	-	-
040-92	3118297.4	1332679.2	4/27/06	493.5	-	-	4.0	Overburden borehole	-	-
040-93	3118318.2	1332683.0	4/27/06	493.3	-	-	4.0	Overburden borehole	-	-
040-94	3118322.1	1332692.2	4/27/06	493.5	-	-	4.0	Overburden borehole	-	-
040-95	3116882.2	1334651.7	4/27/06	488.9	-	-	2.0	Overburden borehole	-	-
040-96	3117099.2	1334752.7	4/27/06	506.9	-	-	2.0	Overburden borehole	-	-
076-243	3124494.6	1327138.8	3/9/04	526.6	-	-	6.8	Overburden borehole	-	-
081-416	3117247.6	1331841.3	11/9/04	492.7	-	-	10.0	Overburden borehole	-	-
400-1	3122159.4	1324138.8	3/6/08	704.2	-	686.3	17.9	Overburden borehole	-	17.9
400-2	3122217.7	1324142.4	3/5/08	704.8	-	-	12.0	Overburden borehole	-	-
400-3	3122154.8	1324199.4	3/6/08	701.4	-	-	12.0	Overburden borehole	-	-
400-4	3122172.7	1324273.7	3/6/08	698.5	-	-	8.0	Overburden borehole	-	-
400-5	3122260.8	1324144.6	3/5/08	704.7	-	686.7	18.3	Overburden borehole	-	18
400-6	3122209.1	1324211.3	3/6/08	700.1	-	-	12.0	Overburden borehole	-	-
400-7	3122220.8	1324271.8	3/6/08	694.4	-	672.7	21.7	Overburden borehole	-	21.7
400-8	3122331.9	1324145.3	3/6/08	694.5	-	692.5	2.0	Overburden borehole	-	2
400-9	3122284.0	1324208.2	3/6/08	693.4	-	-	8.0	Overburden borehole	-	-
215-M1	3124928.7	1324244.5	6/22/05	620.3	-	616.3	4.0	Overburden borehole	-	4
215-M2	3124944.9	1324244.2	6/22/05	620.6	-	617.2	3.4	Overburden borehole	-	3.4

Notes:

amsl = above mean sea level
bgs = below ground surface
ft = feet
TOC = Top of Casing
- = Not Applicable

Table 3.4

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X033Y147D	78.0	68.0	640.3	650.3	< 8.1E-07
	90.0	80.0	628.3	638.3	< 8.1E-07
	103.0	93.0	615.3	625.3	< 8.1E-07
	130.0	120.0	588.3	598.3	< 8.1E-07
	163.0	153.0	555.3	565.3	2.7E-05
	180.0	170.0	538.3	548.3	5.5E-05
	197.0	187.0	521.3	531.3	1.8E-06
	214.0	204.0	504.3	514.3	< 7.9E-07
	237.0	227.0	481.3	491.3	< 7.9E-07
	248.8	243.0	469.5	475.3	< 1.2E-06
	248.8	60.5	469.5	657.8	6.8E-06
MW-X045Y258D	30.0	20.0	669.2	679.2	< 1.3E-06
	47.0	37.0	652.2	662.2	< 1.2E-06
	65.0	55.0	634.2	644.2	< 1.2E-06
	85.0	75.0	614.2	624.2	< 1.2E-06
	95.0	85.0	604.2	614.2	< 1.2E-06
	121.0	111.0	578.2	588.2	2.1E-04
	140.0	130.0	559.2	569.2	< 1.2E-06
	152.0	142.0	547.2	557.2	< 1.2E-06
	167.0	157.0	532.2	542.2	< 1.2E-06
	180.0	170.0	519.2	529.2	< 1.2E-06
	203.5	190.0	495.7	509.2	< 9.1E-07
	203.5	10.0	495.7	689.2	1.5E-05
MW-X085Y070D	70.0	60.0	650.0	660.0	< 1.5E-06
	80.0	70.0	640.0	650.0	< 1.5E-06
	89.0	79.0	631.0	641.0	< 1.4E-06
	98.0	88.0	622.0	632.0	< 1.4E-06
	124.0	114.0	596.0	606.0	< 1.4E-06
	158.0	148.0	562.0	572.0	1.6E-06
	180.0	170.0	540.0	550.0	3.0E-04
	196.0	186.0	524.0	534.0	< 1.4E-06
	206.0	196.0	514.0	524.0	< 1.4E-06
	227.0	217.0	493.0	503.0	< 1.4E-06
	240.0	230.0	480.0	490.0	< 1.4E-06
	243.5	240.0	476.5	480.0	< 3.0E-06
	243.5	60.0	476.5	660.0	< 1.6E-05
MW-X143Y245S	27.6	20.0	662.7	670.3	< 2.1E-06

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X143Y245D	85.0	75.0	605.3	615.3	< 1.2E-06
	109.0	99.0	581.3	591.3	1.5E-05
	132.0	122.0	558.3	568.3	< 1.1E-06
	151.0	141.0	539.3	549.3	< 1.1E-06
	166.0	156.0	524.3	534.3	< 1.1E-06
	179.0	169.0	511.3	521.3	< 2.8E-06
	192.0	188.0	498.3	502.3	< 2.1E-06
MW-X169Y058S	40.0	30.0	681.1	691.1	< 1.9E-06
	45.0	35.0	676.1	686.1	8.9E-05
	54.0	44.0	667.1	677.1	8.6E-04
MW-X169Y058I	66.0	56.0	655.1	665.1	< 1.9E-06
	76.0	66.0	645.1	655.1	< 1.7E-06
	90.0	80.0	631.1	641.1	< 1.7E-06
	103.9	96.0	617.2	625.1	2.1E-05
	103.9	64.0	617.2	657.1	4.9E-06
MW-X169Y058D	119.0	109.0	602.5	612.5	< 1.3E-06
	136.0	126.0	585.5	595.5	1.3E-06
	146.0	136.0	575.5	585.5	4.2E-05
	158.0	148.0	563.5	573.5	< 1.3E-06
	169.0	159.0	552.5	562.5	3.7E-05
	181.0	171.0	540.5	550.5	4.3E-05
	191.0	181.0	530.5	540.5	< 1.3E-06
	202.0	192.0	519.5	529.5	< 1.3E-06
	232.0	222.0	489.5	499.5	< 1.3E-06
	244.1	240.0	477.4	481.5	4.2E-06
B-X177Y252D	21.7	13	660.0	668.7	< 3.6E-06
	29.5	20.8	652.2	660.9	8.0E-04
	37.3	28.6	644.4	653.1	< 3.3E-06
	45.9	37.3	635.8	644.4	< 3.3E-06
	53.7	45.1	628.0	636.6	< 3.2E-06
	53.7	21.7	628.0	660.0	4.0E-04

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X178Y367D	27.0	17.0	639.9	649.9	< 9.2E-07
	37.0	27.0	629.9	639.9	< 9.0E-07
	48.0	38.0	618.9	628.9	4.6E-05
	63.0	53.0	603.9	613.9	6.4E-06
	74.0	64.0	592.9	602.9	< 8.3E-07
	83.0	73.0	583.9	593.9	< 8.3E-07
	92.0	82.0	574.9	584.9	< 8.3E-07
	102.0	92.0	564.9	574.9	5.7E-04
	112.0	102.0	554.9	564.9	1.4E-06
	123.0	113.0	543.9	553.9	< 8.3E-07
	134.0	124.0	532.9	542.9	< 8.3E-07
	143.5	138.0	523.4	528.9	1.4E-06
	143.5	6.0	523.4	660.9	2.6E-05
B-X223Y247D	39.9	31.2	636.3	645.0	5.7E-06
	47.7	39.0	628.5	637.2	1.9E-06
	55.5	46.8	620.7	629.4	< 1.5E-06
	63.3	54.6	612.9	621.6	< 1.4E-06
	71.1	62.4	605.1	613.8	1.5E-06
	78.9	70.2	597.3	606.0	< 1.4E-06
	86.7	78.0	589.5	598.2	< 1.4E-06
	94.5	85.8	581.7	590.4	1.5E-06
	102.3	93.6	573.9	582.6	6.7E-06
	110.0	101.4	566.2	574.8	< 1.4E-06
	117.9	109.2	558.3	567.0	< 1.4E-06
	125.7	117.0	550.5	559.2	< 1.4E-06
	133.5	124.8	542.7	551.4	1.5E-06
	141.3	132.7	534.9	543.5	2.1E-06
	149.1	140.5	527.1	535.7	2.4E-06
	156.9	148.3	519.3	527.9	2.1E-06
	164.7	156.1	511.5	520.1	< 1.4E-06
	173.4	163.9	502.8	512.3	3.2E-06
	173.4	31.2	502.8	645.0	1.6E-06
MW-X234Y157S	29.0	19.0	655.9	645.9	4.4E-06
MW-X234Y157D	74.0	64.0	600.9	610.9	< 2.3E-06
	90.0	80.0	584.9	594.9	1.0E-05
	104.0	94.0	570.9	580.9	1.9E-05
	125.0	115.0	549.9	559.9	3.2E-06
	140.0	130.0	534.9	544.9	< 2.2E-06
	152.0	142.0	522.9	532.9	2.2E-06
	177.0	167.0	497.9	507.9	< 2.2E-06
	182.3	176.0	492.6	498.9	< 3.1E-06

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X251Y189D	28.0	18.0	635.5	645.5	< 2.6E-06
	54.0	44.0	609.5	619.5	< 2.2E-06
	64.0	54.0	599.5	609.5	2.7E-06
	83.0	73.0	580.5	590.5	3.6E-05
	92.0	82.0	571.5	581.5	6.9E-06
	103.0	93.0	560.5	570.5	7.5E-06
	114.0	104.0	549.5	559.5	1.1E-04
	140.0	130.0	523.5	533.5	2.3E-06
	183.0	174.0	480.5	489.5	< 2.0E-06
MW-X261Y356D	32.0	22.0	636.9	646.9	2.9E-06
	45.0	35.0	623.9	633.9	7.4E-06
	69.0	59.0	599.9	609.9	1.0E-06
	80.0	70.0	588.9	598.9	1.2E-06
	93.0	83.0	575.9	585.9	< 9.0E-07
	106.0	96.0	562.9	572.9	4.0E-06
	121.0	111.0	547.9	557.9	1.1E-06
	130.0	120.0	538.9	548.9	1.6E-05
	145.0	135.0	523.9	533.9	< 9.0E-07
	154.5	146.0	514.4	522.9	1.1E-06
	154.5	10.0	514.4	658.9	9.2E-07
MW-X269Y201D	31.0	21.0	638.2	648.2	< 1.8E-06
	37.0	27.0	632.2	642.2	< 1.7E-06
	46.0	36.0	623.2	633.2	< 1.7E-06
	52.0	42.0	617.2	627.2	< 1.7E-06
	58.0	48.0	611.2	621.2	< 1.7E-06
	70.0	60.0	599.2	609.2	< 1.7E-06
	78.0	68.0	591.2	601.2	< 1.5E-06
	86.0	76.0	583.2	593.2	< 1.5E-06
	95.0	85.0	574.2	584.2	< 1.5E-06
	102.0	92.0	567.2	577.2	4.1E-06
	110.0	100.0	559.2	569.2	< 1.6E-06
	118.0	108.0	551.2	561.2	< 1.5E-06
	125.0	115.0	544.2	554.2	< 1.5E-06
	134.0	124.0	535.2	545.2	< 1.5E-06
	142.0	132.0	527.2	537.2	< 1.6E-06
	167.0	157.0	502.2	512.2	< 1.5E-06
	182.5	173.0	486.7	496.2	< 1.6E-06
	182.5	11.6	486.7	657.6	< 1.8E-06

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X297Y305D	24.0	14.0	590.5	600.5	< 3.5E-06
	33.0	23.0	581.5	591.5	< 3.3E-06
	42.0	32.0	572.5	582.5	< 3.3E-06
	51.0	41.0	563.5	573.5	< 3.3E-06
	60.0	50.0	554.5	564.5	< 2.9E-06
	69.0	59.0	545.5	555.5	6.6E-04
	78.0	68.0	536.5	546.5	< 2.6E-06
	87.0	77.0	527.5	537.5	< 2.6E-06
	96.0	86.0	518.5	528.5	< 2.6E-06
	105.0	95.0	509.5	519.5	< 2.6E-06
	114.8	104.0	499.7	510.5	< 2.4E-06
MW-X105Y102	38.0	33.0	686.3	691.3	5.4E-06
	48.3	43.3	676.0	681.0	3.1E-06
	52.3	47.3	672.0	677.0	8.6E-05
	56.3	51.3	668.0	673.0	1.4E-04
	56.3	34.0	668.0	690.3	7.8E-05
MW-X233Y095	19.5	15.2	653.4	657.7	1.5E-05
	22.9	18.6	650.0	654.3	5.5E-04
	26.4	22.1	646.5	650.8	9.1E-06
	29.9	25.5	643.0	647.4	9.2E-06
	29.9	5.6	643.0	667.3	1.6E-04
MW-X242Y060S	32.9	28.6	649.6	653.9	3.5E-06
	32.9	11.3	649.6	671.2	1.9E-03
MW-X106Y102	46.0	36.0	678.3	688.3	1.2E-04
	55.0	45.0	669.3	679.3	1.0E-04
	60.5	54.0	663.8	670.3	< 2.4E-06
MW-X263Y128	72.6	62.6	632.7	642.7	< 1.2E-06
	81.6	71.6	623.7	633.7	< 1.2E-06
	90.6	80.6	614.7	624.7	< 1.2E-05
	99.6	89.6	605.7	615.7	< 1.1E-06
	118.6	98.6	586.7	606.7	< 7.1E-07
	118.6	38.0	586.7	667.3	2.2E-07

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
MW-X318Y217	35.0	25.0	614.8	624.8	2.3E-04
	38.1	28.1	611.7	621.7	2.8E-06
	47.1	37.1	602.7	612.7	2.2E-06
	56.1	46.1	593.7	603.7	< 2.1E-06
	65.1	55.1	584.7	594.7	< 2.0E-06
	74.1	64.1	575.7	585.7	< 1.9E-06
	83.1	73.1	566.7	576.7	6.2E-06
	92.1	82.1	557.7	567.7	8.4E-06
	101.1	91.1	548.7	558.7	7.0E-06
	110.1	100.1	539.7	549.7	8.1E-06
	119.1	109.1	530.7	540.7	1.6E-06
	128.1	118.1	521.7	531.7	2.4E-06
	137.1	127.1	512.7	522.7	1.6E-06
	146.1	136.1	503.7	513.7	1.5E-06
	155.1	145.1	494.7	504.7	< 1.4E-06
	159.1	154.1	490.7	495.7	< 2.3E-06
	159.1	18.0	490.7	631.8	3.6E-07
MW-X300Y199	38.1	28.1	639.2	649.2	2.2E-06
	49.8	39.8	627.5	637.5	9.4E-06
	58.5	48.5	618.8	628.8	2.1E-06
	67.8	57.8	609.5	619.5	< 1.8E-06
	76.8	66.8	600.5	610.5	1.7E-06
	85.8	75.8	591.5	601.5	3.9E-06
	94.8	84.8	582.5	592.5	5.2E-06
	103.8	93.8	573.5	583.5	1.6E-06
	103.8	9.5	573.5	667.8	4.8E-06
CH-33	13.0	8.5	656.7	661.2	< 6.7E-06
	17.0	12.0	652.7	657.7	< 5.8E-06
	21.0	16.0	648.7	653.7	< 5.6E-06
	25.5	20.0	644.2	649.7	< 5.0E-06
	25.5	8.5	644.2	661.2	< 2.3E-06
CH-29A	17.0	12.0	627.4	632.4	5.3E-06
	21.0	16.0	623.4	628.4	< 5.0E-06
	25.0	20.0	619.4	624.4	< 4.7E-06
	29.0	24.0	615.4	620.4	< 4.5E-06
	33.0	28.0	611.4	616.4	< 4.3E-06
	37.0	32.0	607.4	612.4	< 4.2E-06
	41.0	36.0	603.4	608.4	< 4.0E-06
	43.0	40.0	601.4	604.4	< 5.5E-06
	43.2	12.0	601.2	632.4	< 1.2E-06

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
CH-29	33.5	28.5	609.9	614.9	4.7E-04
	38.0	33.0	605.4	610.4	1.9E-03
	42.0	37.0	601.4	606.4	7.8E-04
	46.0	41.0	597.4	602.4	1.4E-03
	50.0	45.0	593.4	598.4	4.3E-03
	54.0	49.0	589.4	594.4	4.6E-06
	63.0	53.0	580.4	590.4	1.5E-06
	67.0	57.0	576.4	586.4	1.7E-06
	71.0	66.0	572.4	577.4	8.4E-06
CH-27	12.0	7.0	621.2	626.2	< 5.8E-06
	16.0	11.0	617.2	622.2	< 5.4E-06
	24.0	19.0	609.2	614.2	< 4.9E-06
	26.0	23.0	607.2	610.2	< 6.6E-06
	26.0	5.5	607.2	627.7	< 2.0E-06
CH-24	18.7	13.7	598.7	603.7	< 7.2E-06
	22.7	17.7	594.7	599.7	< 6.7E-06
	26.7	21.7	590.7	595.7	< 6.4E-06
	30.7	25.7	586.7	591.7	< 6.2E-06
	32.7	29.7	584.7	587.7	< 8.3E-06
	32.7	12.0	584.7	605.4	< 2.3E-06
CH-22	18.5	13.5	595.4	600.4	< 7.1E-06
	22.5	17.5	591.4	596.4	< 6.3E-06
	26.5	21.5	587.4	592.4	8.8E-06
	30.5	25.5	583.4	588.4	< 7.0E-06
	32.5	29.5	581.4	584.4	4.4E-04
	32.5	12.0	581.4	601.9	1.1E-04
CH-17A	12.4	7.4	608.6	613.6	< 6.38-e-6
	16.5	11.5	604.5	609.5	8.1E-05
	20.5	15.5	600.5	605.5	1.1E-04
	24.5	19.5	596.5	601.5	2.9E-04
	28.5	23.5	592.5	597.5	1.8E-05
	28.5	7.4	592.5	613.6	3.5E-05
CH-14B	30.6	9.0	629.4	651.0	< 1.9E-06
	26.6	21.6	633.4	638.4	< 5.3E-06
	30.6	25.6	629.4	634.4	< 5.3E-06
CH-9A	44.4	39.4	665.5	670.5	1.8E-06
	48.4	43.4	661.5	666.5	1.6E-06
	48.4	38.0	661.5	671.9	< 8.8E-07

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID	Depth Intervals		Interval Elevations		Average Hydraulic Conductivity (cm/s)
	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft amsl)	Top (ft amsl)	
CH-3A	28.0	23.0	647.4	652.4	1.4E-05
	32.0	27.0	643.4	648.4	1.4E-05
	36.0	31.0	639.4	644.4	1.2E-05
	40.0	35.0	635.4	640.4	1.2E-05
	44.0	39.0	631.4	636.4	1.5E-05
	43.8	23.0	631.6	652.4	6.0E-06
CH-12B	21.6	16.6	659.7	664.7	< 6.8E-06
	25.6	20.6	655.7	660.7	< 6.6E-06
	29.6	24.6	651.7	656.7	< 5.4E-06
	29.6	8.0	651.7	673.3	< 2.3E-06
CH-11A	21.6	16.6	643.2	648.2	< 9.0E-06
	25.6	20.6	639.2	644.2	< 9.0E-06
	29.6	24.6	635.2	640.2	< 8.6E-06
	29.6	8.0	635.2	656.8	< 3.2E-06
CH-28A	38.5	33.5	602.5	607.5	N/A
	42.5	37.5	598.5	603.5	< 2.7E-06
	46.5	41.5	594.5	599.5	< 2.6E-06
	48.5	45.5	592.5	595.5	5.9E-05
CH-10A	22.5	16.0	670.8	677.3	< 2.6E-06
MW-X209Y053	65.5	60.5	644.5	649.5	1.4E-06

Notes:

amsl = above mean sea level
bgs = below ground surface
cm/s = centimeter per second
ft = feet

Table 3.5

Summary of Straddle Packer Test Data
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well ID		Total Elapsed Time (Minutes)	Total Percent of Recovery	Hydraulic Conductivity (Bouwer & Rice Method) (cm/sec)	Hydraulic Conductivity (Hvorslev Method) (cm/sec)	Vertical Zone Tested
MW-X033Y147S		1117	96%	5.99E-05	8.93E-05	Shallow Bedrock
MW-X043Y186		1114	94%	2.38E-06	2.26E-06	Shallow Bedrock
MW-X047Y236		99	1%	-	-	Shallow Bedrock
MW-X085Y070S		18	84%	2.63E-04	1.41E-04	Shallow Bedrock
MW-X209Y078S	Test 1	195	8%	-	-	Shallow Bedrock
	Test 2	305	7%	-	-	Shallow Bedrock
MW-X233Y071B		1366	14%	2.07E-07	-	Shallow Bedrock
MW-X233Y087S	Test 1	27	100%	3.49E-04	4.22E-04	Shallow Bedrock
	Test 2	34	100%	2.79E-04	3.94E-04	Shallow Bedrock
	Test 3	42	96%	2.68E-04	3.44E-04	Shallow Bedrock
	AVG			2.99E-04	3.87E-04	
MW-X233Y095	Test 1	223	91%	1.77E-05	2.40E-05	Shallow Bedrock
	Test 2	428	84%	5.66E-06	8.15E-06	Shallow Bedrock
	AVG			1.17E-05	1.61E-05	
MW-X233Y100	Test 1	29	88%	9.38E-05	1.17E-04	Shallow Bedrock
	Test 2	38	86%	4.70E-05	6.86E-05	Shallow Bedrock
	Test 3	40	83%	4.49E-05	5.84E-05	Shallow Bedrock
	AVG			6.19E-05	8.13E-05	
MW-X233Y105B		350	53%	5.28E-06	-	Shallow Bedrock
MW-X233Y115B		5740	51%	2.06E-07	-	Shallow Bedrock
MW-X242Y060		1403	88%	4.75E-06	4.41E-06	Shallow Bedrock
TMW-X033Y147		1053	57%	1.69E-06	-	Unconsolidated
TMW-X085Y070		8723	99%	1.03E-07	-	Unconsolidated
TMW-X193Y251		75	100%	1.76E-04	-	Unconsolidated

NOTES:

1. cm/sec = centimeters per second
2. Bouwer and Rice Method after Bouwer, H., 1989, The Bouwer and Rice Slug Test – An Update, Ground Water, vol. 27, No. 3, pp. 304 309, and Bouwer, H. and R.C. Rice, 1976, A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resources Research vol. 12, pp 423 428
3. Hvorslev Method after Hvorslev, M.J., 1951, Time Lag and Soil Permeability in Ground Water Observations, U.S. Army Corps of Engineers, Waterways Experimentation Station, Bulletin 36.

Table 5.1

CERCLA Removal Action Sampling Summary
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Parcel	Interim Measure	Delineation and Verification Samples Collected	Quantity of Soil Excavated (tons) [1]	Quantity of Soil Backfilled (tons) [1]
3	Upstream Parcels	93	3,534	1,371
4	Upstream Parcels	170	1,289	844
5	Upstream Parcels	56	897	550
6	Upstream Parcels	54	1,600	876
7	Upstream Parcels	18	307	124
8	Upstream Parcels	102	1,861	1,606
10	Upstream Parcels	60	556	370
11	Upstream Parcels	148	1,007	1,520
12	Upstream Parcels	29	63	307
205	Upstream Parcels	56	1,203	836
215	Upstream Parcels	80	1,873	2589
216 (West of Bailey Scales Road)	Upstream Parcels	116	6,499	5,769
401	Upstream Parcels	67	7,479	8,340
Area North of AOI4	Upstream Parcels	178	9,775	13,902
22	Parcel 22	72	23,449	23,449
13	Downstream Parcels	41 [2]	1,240	- -
15	Downstream Parcels	116 [2]	9,719	- -
20	Downstream Parcels	93 [2]	22,638	- -
21	Downstream Parcels	42 [2]	5,798	- -
216 (East of Bailey Scales Road)	Downstream Parcels	72 [2]	4,214	- -
292	Downstream Parcels	11 [2]	- -	- -
23	Downstream Parcels	67 [2]	12,522	- -
24	Downstream Parcels	15 [2]	4,585	- -
76	Downstream Parcels	29 [2]	12,071	- -
78	Downstream Parcels	14 [2]	2,844	- -
25	Downstream Parcels	81 [2]	40,717	- -
27	Downstream Parcels	20 [2]	- -	- -
28	Downstream Parcels	127 [2]	101,050	- -
29	Downstream Parcels	3 [2]	- -	- -
30	Downstream Parcels	178 [2]	- -	- -
36	Downstream Parcels	252 [2]	- -	- -
72	Downstream Parcels	14 [2]	- -	- -
37	Downstream Parcels	41 [2]	- -	- -
38	Downstream Parcels	62 [2]	- -	- -
39	Downstream Parcels	202 [2]	- -	- -
40	Downstream Parcels	250 [2]	- -	- -
81	Downstream Parcels	20 [2]	- -	- -

Notes:

1. Quantities of Soil Excavated and Backfilled were calculated using Autodesk LandDesktop®.
2. Only delineation samples collected are included in this total. Verification sampling is currently in progress.

- - Final numbers not available at time of printing
AOI Area of Interest

Table 5.2

Off-Site RCRA Interim Measures Summary
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Parcel	Interim Measure	Delineation and Verification Samples Collected	Quantity of Soil Excavated (tons) [1]	Quantity of Soil Backfilled (tons) [1]
2	Western Tributary	58	221	221[2]
53	Western Tributary	28	4	10
57	Western Tributary	21	9	9
58	Western Tributary	9	469	336
60/61	Western Tributary	34	189	138
382/384/385/386	Northern Tributary	246	73,591	21,020
387/389	Northern Tributary	13	17	21
393	Northern Tributary	66	117	142
3	Parcels 201 and 204	6	- -	- -
201	Parcels 201 and 204	173	2,002	1,617
203	Parcels 201 and 204	1	- -	- -
204	Parcels 201 and 204	33	28	28[2]
364	Parcel 364 Corrective Measure	25	- -	- -
396	Parcel 396 Corrective Measure	25	- -	- -

Notes:

1. Quantities of Soil Excavated and Backfilled were calculated using Autodesk LandDesktop®.
2. Restored to pre-excavation
- - Information not available

Table 6.1: Metal Concentrations in Background Soil from 0 to 2 ft bgs
GM GPS Bedford Facility, Bedford, Indiana

	Al	As	Ba	Be	Cd	Cr	Co	Cu	Fe	Mn	Hg	Ni	V	Zn
Sample ID	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
S-012402-MO-004	12600	8.5	118.0	0.47 J	0.11 J	28.3 J	12.2	34.9 J	18300	1200 J	0.04 J	20.8	29.5	50.4
S-060602-MG-229	13100	7.6	28.6	0.43 J	0.03 U	43.6	2.4 J	11.5	32600	42	0.01 U	11.6	69.8	55.2
S-060602-MG-225	17700	11.5	67.7	0.27 J	0.03 U	19.8	7.1	14.8	24500	246	0.05 J	13.0	38.8	45.7
S-010223-MO-002	10700	5.9	43.2	0.18 J	0.03 U	14.7	8.7	12.3	17000	271 J	0.01 U	10.6	27.1	30.2 J
S-010223-MO-003	10200	6.8	45.5	0.24 J	0.06 J	16.0	7.3	15.3	16200	161 J	0.01 U	18.2	23.0	39.5 J
S-010223-MO-001*	12650	11.5	65.7	0.31 J	0.07 J	20.0	10.2	13.5	22800	517 J	0.01 U	12.3	39.1	43.2 J
S-060602-MG-227	11200	9.9	93.9	0.38 J	0.11 J	21.6	10.5	10.9	19400	918	0.03 J	12.0	32.6	41.5
S-020602-MG-099	9680	8.0	44.2 J	0.03 U	0.13 J	28.9	6.1 J	9.6	20000	193 J	0.05 J	7.7	31.2	26.0
S-042204-JC-076	12300	6.8	39.7	0.02 U	0.19 J	21.6	13.0	8.5	18300	379	0.00 U	9.9	28.9	35.6
S-012102-KMV-509*	15650	10.5	91.4	0.37 J	0.05 J	19.4	10.1	20.9	23900	511	0.05 J	14.8	34.1	49.5
S-042204-DD-015	11900	8.1	88.0	0.38 J	0.46 J	14.4	9.1	10.6	16800	872	0.04 J	12.2	26.2	48.5
S-042704-DD-017	20200	14.8	118.0	1.20	0.95	37.0	11.7	17.0	31500	783	0.17	26.8	51.4	65.8
S-042304-DD-016	11000	12.2	87.3	0.59 J	1.30	23.2	11.6	13.7 J	20800	966	0.08 J	21.2	31.0	72.4 J
S-042704-DD-013	1820	2.3	18.0 J	0.02 U	0.32 J	5.5	2.1 J	4.3	7560	302	0.00 U	3.0 J	5.5 J	15.0
S-042704-DD-014	21700	18.7	105.0	1.10	1.10	40.2	11.1	26.6	32800	568	0.12 J	30.4	55.1	84.6
Count	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
Detected	**15**	**15**	**15**	**12**	**12**	**15**	**15**	**15**	**15**	**15**	**9**	**15**	**15**	**15**
Minimum	1820	2.3	18	0.02	0.03	5.5	2.1	4.3	7560	42	0.00	3.0	6	15
Median	12300	8.5	68	0.37	0.11	21.6	10.1	13.5	20000	511	0.04	12.3	31	46
Maximum	21700	18.7	118	1.20	1.30	43.6	13.0	34.9	32800	1200	0.17	30.4	70	85
Bootstrap 95% UCL	**14805**	**11.3**	**83.8**	**0.570**	**0.552**	**28.2**	**10.0**	**18.9**	**24368**	**676**	**0.0705**	**18.3**	**41.8**	**54.8**

Notes:

1. Concentrations for Sample IDs with * represent average of duplicate samples.
2. Concentrations for nondetects (U-qualified data) are 0.5 the quantitation limits.
3. UCLs were not calculated for antimony, selenium, silver, and thallium because of the low number of detected concentrations.

Abbreviation:

UCL - Upper Confidence Limit

Data Qualifiers:

U - analyte not detected

J - analyte detected but concentration estimated

Table 6.2: Cancer Risks and Hazard Quotients for Background Metals in Soil
GM GPS Bedford Facility, Bedford, Indiana

Chemical	Background Conc (mg/kg)	Routine Worker				Construction Worker		Maintenance Worker		Off-Site Resident		Trespasser	
		Outdoor Activities		Vapor Intrusion		Outdoor Activities		Outdoor Activities		Outdoor Air Inhalation		Outdoor Activities	
		Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ	Risk	HQ
Aluminum	1.48E+04	NC	7E-03	NC	NC	NC	6E-03	NC	6E-02	NC	8E-04	NC	5E-04
Arsenic	1.13E+01	3E-06	2E-02	NC	NC	3E-07	5E-03	4E-07	1E-02	5E-09	2E-04	8E-08	1E-03
Barium	8.38E+01	NC	2E-04	NC	NC	NC	4E-05	NC	7E-04	NC	NC	NC	1E-05
Beryllium	5.70E-01	3E-11	1E-04	NC	NC	3E-10	7E-05	2E-10	8E-04	1E-10	8E-06	5E-13	9E-06
Cadmium	5.52E-01	2E-11	3E-04	NC	NC	2E-10	1E-04	2E-10	1E-03	1E-10	2E-05	4E-13	2E-05
Chromium (total)	2.82E+01	2E-06	4E-03	NC	NC	3E-07	1E-03	4E-07	1E-02	4E-08	8E-05	6E-08	3E-04
Cobalt	1.00E+01	2E-09	1E-02	NC	NC	2E-08	6E-03	1E-08	1E-02	9E-09	5E-04	3E-11	1E-03
Copper	1.89E+01	NC	2E-04	NC	NC	NC	5E-05	NC	8E-04	NC	NC	NC	1E-05
Iron	2.44E+04	NC	1E-02	NC	NC	NC	4E-03	NC	6E-02	NC	NC	NC	1E-03
Manganese	6.76E+02	NC	3E-03	NC	NC	NC	2E-02	NC	2E-01	NC	4E-03	NC	2E-04
Mercury	7.05E-02	NC	6E-04	NC	1E-03	NC	1E-04	NC	2E-03	NC	2E-03	NC	4E-05
Nickel	1.83E+01	1E-10	4E-04	NC	NC	9E-10	4E-04	7E-10	3E-03	5E-10	6E-05	2E-12	3E-05
Vanadium	4.18E+01	NC	4E-03	NC	NC	NC	1E-03	NC	1E-02	NC	1E-04	NC	3E-04
Zinc	5.48E+01	NC	8E-05	NC	NC	NC	2E-05	NC	3E-04	NC	NC	NC	6E-06
	Sum:	5E-06	7E-02	NC	1E-03	6E-07	4E-02	9E-07	3E-01	5E-08	7E-03	1E-07	5E-03
Note:													
NC - Risk and HI estimates were not calculated for chemicals with inadequate toxicity or physical/chemical parameters.													

Table 7.1.1

Matrix Detection Summary – Sediment
GM GPS Bedford Facility
Bedford, Indiana

Area:	A004	A010
PCBs		
Aroclor-1016 (PCB-1016)	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND
Aroclor-1242 (PCB-1242)	ND	16-24
Aroclor-1248 (PCB-1248)	18	5.3-6.2
Aroclor-1254 (PCB-1254)	ND	ND
Aroclor-1260 (PCB-1260)	1.8	0.35-1.8
Total PCBs	19.8	5.65-25.8
Volatile Organic Compounds (VOCs)		
1,1,1-Trichloroethane	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
1,1-Dichloroethane	ND	ND
1,1-Dichloroethene	ND	ND
1,2,4-Trichlorobenzene	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND
1,2-Dichlorobenzene	ND	ND
1,2-Dichloroethane	ND	ND
1,2-Dichloropropane	ND	ND
1,3-Dichlorobenzene	0.0031	ND
1,4-Dichlorobenzene	0.0055	ND
2-Butanone (Methyl ethyl ketone) (MEK)	ND	0.013
2-Hexanone	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND
Acetone	ND	ND
Benzene	ND	0.016-0.02
Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane (Methyl bromide)	ND	ND
Carbon disulfide	ND	0.0031
Carbon tetrachloride	ND	ND
Chlorobenzene	ND	ND
Chloroethane	ND	ND
Chloroform (Trichloromethane)	ND	ND
Chloromethane (Methyl chloride)	ND	ND
cis-1,2-Dichloroethene	ND	ND
cis-1,3-Dichloropropene	ND	ND
Cyclohexane	ND	ND
Dibromochloromethane	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	0.0041
Ethylbenzene	ND	ND
Isopropyl benzene	ND	0.011-0.013
Methyl acetate	0.041	0.011-0.053
Methyl cyclohexane	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND
Methylene chloride	ND	ND
Styrene	ND	ND
Tetrachloroethene	ND	ND
Toluene	ND	0.0029-0.0032
trans-1,2-Dichloroethene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND
Vinyl chloride	ND	ND
Xylenes (total)	ND	ND
Semi-Volatile Organic Compounds (SVOCs)		
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND
2,4,5-Trichlorophenol	ND	ND
2,4,6-Trichlorophenol	ND	ND
2,4-Dichlorophenol	ND	ND
2,4-Dimethylphenol	ND	ND
2,4-Dinitrophenol	ND	ND
2,4-Dinitrotoluene	ND	ND
2,6-Dinitrotoluene	ND	ND
2-Chloronaphthalene	ND	ND
2-Chlorophenol	ND	ND
2-Methylnaphthalene	ND	ND
2-Methylphenol	ND	ND
2-Nitroaniline	ND	ND
2-Nitrophenol	ND	ND
3,3'-Dichlorobenzidine	ND	ND
3-Nitroaniline	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND
4-Bromophenyl phenyl ether	ND	ND
4-Chloro-3-methylphenol	ND	ND
4-Chloroaniline	ND	ND
4-Chlorophenyl phenyl ether	ND	ND
4-Methylphenol	ND	ND
4-Nitroaniline	ND	ND

Table 7.1.1

Matrix Detection Summary – Sediment
GM GPS Bedford Facility
Bedford, Indiana

Area:	**A004**	**A010**
4-Nitrophenol	ND	ND
Acenaphthene	ND	ND
Acenaphthylene	ND	ND
Acetophenone	ND	ND
Anthracene	ND	ND
Atrazine	ND	ND
Benzaldehyde	ND	ND
Benzo(a)anthracene	ND	0.2-0.33
Benzo(a)pyrene	ND	0.28-0.43
Benzo(b)fluoranthene	ND	0.36-0.63
Benzo(g,h,i)perylene	ND	0.19-0.27
Benzo(k)fluoranthene	ND	0.16-0.26
Biphenyl (1,1-Biphenyl)	ND	ND
bis(2-Chloroethoxy)methane	ND	ND
bis(2-Chloroethyl)ether	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ND	0.31-0.37
Butyl benzylphthalate (BBP)	ND	ND
Caprolactam	ND	ND
Carbazole	ND	ND
Chrysene	ND	0.28-0.45
Dibenz(a,h)anthracene	ND	ND
Dibenzofuran	ND	ND
Diethyl phthalate	ND	ND
Dimethyl phthalate	ND	ND
Di-n-butylphthalate (DBP)	ND	ND
Di-n-octyl phthalate (DnOP)	ND	ND
Fluoranthene	ND	0.44-0.81
Fluorene	ND	ND
Hexachlorobenzene	ND	ND
Hexachlorobutadiene	ND	ND
Hexachlorocyclopentadiene	ND	ND
Hexachloroethane	ND	ND
Indeno(1,2,3-cd)pyrene	ND	0.14-0.24
Isophorone	ND	ND
Naphthalene	ND	ND
Nitrobenzene	ND	ND
N-Nitrosodi-n-propylamine	ND	ND
N-Nitrosodiphenylamine	ND	ND
Pentachlorophenol	ND	ND
Phenanthrene	ND	0.26-0.46
Phenol	ND	ND
Pyrene	ND	0.47-0.76
Inorganics (Metals & General Chemistry)		
Metals		
Aluminum	4970	12300-29100
Antimony	ND	0.8-1.2
Arsenic	11.6	3.8-25.1
Barium	112	45.9-184
Beryllium	ND	0.29-0.33
Cadmium	ND	1.1-1.9
Chromium	15.7	15.5-47.7
Cobalt	26.6	6.2-37.8
Copper	93.1	48.1-886
Iron	39600	9600-49000
Lead	16.3	18.2-91
Manganese	6840	115-13800
Mercury	ND	0.11-0.36
Nickel	30.8	24.2-59.6
Selenium	ND	0.45-0.71
Silver	1.0	1.9-3.9
Thallium	ND	1.3-1.7
Vanadium	9.0	12.1-75
Zinc	68.0	84.3-908
General Chemistry		
Cyanide (amenable)	ND	3.5-3.8
Cyanide (total)	ND	0.49-4.1

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.
All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.2

Matrix Detection Summary – Surface Water
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A004	A006	A007	A008	A010
PCBs						
Aroclor-1016 (PCB-1016)	ND	ND	ND	0.59	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	0.97-0.97	3.8-4.6	ND	0.51-0.58	2900-8200	0.22-180
Aroclor-1248 (PCB-1248)	1.6-1.6	2.4-4.6	0.61	ND	ND	21-53
Aroclor-1254 (PCB-1254)	ND	ND	ND	ND	ND	ND
Aroclor-1260 (PCB-1260)	ND	ND	ND	ND	ND	ND
Total PCBs	0.97-1.6	2.4-4.6	0.61	0.51-0.59	2900-8200	0.22-180
PCBs, dissolved						
Aroclor-1016 (PCB-1016) (dissolved)	ND	ND	-	0.066		ND
Aroclor-1221 (PCB-1221) (dissolved)	ND	ND	-	ND		10-51
Aroclor-1232 (PCB-1232) (dissolved)	ND	ND	-	ND		ND
Aroclor-1242 (PCB-1242) (dissolved)	ND	ND	-	ND		13-13
Aroclor-1248 (PCB-1248) (dissolved)	ND	ND	-	ND		ND
Aroclor-1254 (PCB-1254) (dissolved)	ND	ND	-	ND		ND
Aroclor-1260 (PCB-1260) (dissolved)	ND	ND	-	ND		ND
Total PCBs (dissolved)	ND	ND	-	0.066		10-51
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	ND	ND	-	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	-	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	-	ND	ND	ND
1,1-Dichloroethane	ND	ND	-	ND	0.69-0.78	ND
1,1-Dichloroethene	ND	ND	-	ND	ND	ND
1,2,4-Trichlorobenzene	0.83	ND	-	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	-	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	-	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	-	ND	0.22-0.27	ND
1,2-Dichloroethane	ND	ND	-	ND	ND	ND
1,2-Dichloropropane	ND	ND	-	ND	ND	ND
1,3-Dichlorobenzene	ND	0.15	-	ND	2.6-2.8	0.81-0.9
1,4-Dichlorobenzene	ND	0.27-0.29	-	ND	5.5-6	1.5-1.6
2-Butanone (Methyl ethyl ketone) (MEK)	ND	ND	-	ND	ND	ND
2-Hexanone	ND	ND	-	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	-	ND	ND	ND
Acetone	ND	ND	-	3.2	1.4-1.4	ND
Benzene	ND	ND	-	ND	0.16-0.19	ND
Bromodichloromethane	0.28-1.3	ND	-	ND	ND	ND
Bromoform	ND	ND	-	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	-	ND	ND	ND
Carbon disulfide	ND	0.37	-	ND	ND	ND
Carbon tetrachloride	ND	ND	-	ND	ND	ND
Chlorobenzene	ND	0.18-0.29	-	ND	7.2-7.9	0.48-0.49
Chloroethane	ND	ND	-	ND	ND	ND
Chloroform (Trichloromethane)	1.4-17	ND	-	ND	ND	ND
Chloromethane (Methyl chloride)	ND	ND	-	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	-	ND	ND	1.2-1.9
cis-1,3-Dichloropropene	ND	ND	-	ND	ND	ND
Cyclohexane	ND	ND	-	ND	ND	ND
Dibromochloromethane	0.3	ND	-	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	-	ND	ND	ND
Ethylbenzene	ND	ND	-	ND	ND	ND
Isopropyl benzene	ND	ND	-	ND	ND	ND
Methyl acetate	ND	ND	-	ND	ND	ND
Methyl cyclohexane	ND	ND	-	ND	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	-	ND	ND	ND
Methylene chloride	ND	ND	-	ND	ND	ND
Styrene	ND	ND	-	ND	ND	ND
Tetrachloroethene	ND	ND	-	ND	ND	ND
Toluene	ND	ND	-	ND	0.19-0.28	ND
trans-1,2-Dichloroethene	ND	ND	-	ND	ND	0.15-0.28
trans-1,3-Dichloropropene	ND	ND	-	ND	ND	ND
Trichloroethene	ND	ND	-	ND	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	-	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	-	ND	ND	ND
Vinyl chloride	ND	ND	-	ND	ND	0.56-0.71
Xylenes (total)	ND	ND	-	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	-	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	-	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	-	ND	ND	ND
2,4-Dichlorophenol	ND	ND	-	ND	ND	ND
2,4-Dimethylphenol	ND	ND	-	ND	1.2-1.5	ND
2,4-Dinitrophenol	ND	ND	-	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	-	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	-	ND	ND	ND
2-Chloronaphthalene	ND	ND	-	ND	ND	ND
2-Chlorophenol	ND	ND	-	ND	ND	ND
2-Methylnaphthalene	ND	ND	-	ND	ND	ND
2-Methylphenol	ND	ND	-	ND	ND	ND
2-Nitroaniline	ND	ND	-	ND	ND	ND
2-Nitrophenol	ND	ND	-	ND	ND	ND
3,3'-Dichlorobenzidine	ND	ND	-	ND	ND	ND
3-Nitroaniline	ND	ND	-	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	-	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	-	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	-	ND	ND	ND
4-Chloroaniline	ND	ND	-	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	-	ND	ND	ND
4-Methylphenol	ND	ND	-	ND	ND	ND
4-Nitroaniline	ND	ND	-	ND	ND	ND
4-Nitrophenol	ND	ND	-	ND	ND	ND
Acenaphthene	ND	ND	-	ND	ND	ND
Acenaphthylene	ND	ND	-	ND	ND	ND
Acetophenone	ND	ND	-	ND	ND	ND

Table 7.1.2

Matrix Detection Summary – Surface Water
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A004	A006	A007	A008	A010
Anthracene	ND	ND	-	ND	ND	ND
Atrazine	ND	ND	-	ND	ND	ND
Benzaldehyde	ND	ND	-	ND	ND	ND
Benzo(a)anthracene	ND	ND	-	ND	ND	ND
Benzo(a)pyrene	ND	ND	-	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	-	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	-	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	-	ND	ND	ND
Biphenyl (1,1-Biphenyl)	ND	ND	-	ND	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	-	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	-	ND	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	8-9.8	2.9	-	ND	15-16	ND
Butyl benzylphthalate (BBP)	ND	ND	-	ND	ND	ND
Caprolactam	ND	ND	-	ND	ND	ND
Carbazole	ND	ND	-	ND	ND	ND
Chrysene	ND	ND	-	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	-	ND	ND	ND
Dibenzofuran	ND	ND	-	ND	ND	ND
Diethyl phthalate	ND	ND	-	ND	ND	ND
Dimethyl phthalate	ND	ND	-	ND	ND	ND
Di-n-butylphthalate (DBP)	ND	ND	-	ND	ND	ND
Di-n-octyl phthalate (DnOP)	ND	ND	-	ND	14-22	ND
Fluoranthene	ND	ND	-	ND	ND	ND
Fluorene	ND	ND	-	ND	ND	ND
Hexachlorobenzene	ND	ND	-	ND	ND	ND
Hexachlorobutadiene	ND	ND	-	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	-	ND	ND	ND
Hexachloroethane	ND	ND	-	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	-	ND	ND	ND
Isophorone	ND	ND	-	ND	ND	ND
Naphthalene	ND	ND	-	ND	ND	ND
Nitrobenzene	ND	ND	-	ND	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	-	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	-	ND	ND	ND
Pentachlorophenol	ND	ND	-	ND	ND	ND
Phenanthrene	ND	ND	-	ND	ND	ND
Phenol	ND	ND	-	ND	2.8-28	ND
Pyrene	ND	ND	-	ND	ND	ND
Inorganics (Metals & General Chemistry)						
Metals						
Aluminum	34	9700-56200	-	95	30	470
Antimony	9.2-11	4.3	-	ND	ND	ND
Arsenic	ND	15-81	-	ND	ND	ND
Barium	34-56	66-890	-	49	210	21-65
Beryllium	ND	1.4	-	ND	ND	ND
Cadmium	ND	ND	-	ND	ND	ND
Chromium	ND	14-87	-	ND	ND	ND
Cobalt	ND	22-120	-	ND	ND	2.4
Copper	5.7-22	77-380	-	4.9	ND	8
Iron	120-140	310-306000	-	160	4800-5100	1400
Lead	ND	9.4-67	-	ND	ND	ND
Manganese	5.6-30	530-57400	-	75	200	1200-1400
Mercury	ND	0.58-1	-	ND	0.12-0.17	0.13
Nickel	ND	25-150	-	ND	ND	2.4-3.8
Selenium	ND	ND	-	ND	ND	ND
Silver	ND	3.1-3.1	-	ND	ND	ND
Thallium	ND	71-420	-	ND	6.4	7
Vanadium	ND	7.5-9.8	-	ND	ND	ND
Zinc	14-27	16-96	-	28	ND	ND
Metals, dissolved						
Aluminum (dissolved)	ND	ND	-	ND	-	170
Antimony (dissolved)	9.3-13	ND	-	ND	-	2.7
Arsenic (dissolved)	ND	ND	-	ND	-	ND
Barium (dissolved)	36-61	64-93	-	45	-	22-65
Beryllium (dissolved)	ND	ND	-	ND	-	ND
Cadmium (dissolved)	ND	ND	-	ND	-	ND
Chromium (dissolved)	ND	ND	-	ND	-	ND
Cobalt (dissolved)	ND	ND	-	ND	-	2.3
Copper (dissolved)	5.3-7.6	ND	-	5.1	-	6.7
Iron (dissolved)	ND	ND	-	ND	-	570-1200
Lead (dissolved)	ND	ND	-	ND	-	ND
Manganese (dissolved)	3.4-25	260-710	-	24	-	1200-1500
Mercury (dissolved)	ND	ND	-	ND	-	ND
Nickel (dissolved)	ND	ND	-	ND	-	2.5-3.8
Selenium (dissolved)	ND	ND	-	ND	-	ND
Silver (dissolved)	ND	ND	-	ND	-	ND
Thallium (dissolved)	ND	7.5-9	-	5.5	-	7.5
Vanadium (dissolved)	ND	ND	-	ND	-	ND
Zinc (dissolved)	28	13-13	-	17	-	ND
General Chemistry						
Ammonia	40-70	-	-	-	-	100-100
Cyanide (amenable)	ND	ND	-	ND	ND	ND
Cyanide (total)	ND	ND	-	ND	ND	ND
Total residual chlorine	ND	-	-	-	-	-

Notes:
All concentrations are in units of µg/L
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.3

Matrix Detection Summary – Wipe Sampling
GM GPS Bedford Facility
Bedford, Indiana

Area:	**A003**
PCBs	
Aroclor-1016 (PCB-1016)	ND
Aroclor-1221 (PCB-1221)	ND
Aroclor-1232 (PCB-1232)	ND
Aroclor-1242 (PCB-1242)	ND
Aroclor-1248 (PCB-1248)	ND
Aroclor-1254 (PCB-1254)	ND
Aroclor-1260 (PCB-1260)	ND
Total PCBs	ND

Notes:
All concentrations are in unit of µg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.

Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database. All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A002	A004	A005	A006
PCBs					
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	6900
Aroclor-1221 (PCB-1221)	0.24	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	2300-2300	ND
Aroclor-1242 (PCB-1242)	0.027-0.34	ND	0.024-1100	0.029-8600	0.024-21000
Aroclor-1248 (PCB-1248)	0.0072-0.2	ND	0.0081-250	0.0058-1000	0.0073-1500
Aroclor-1254 (PCB-1254)	ND	2.5	0.13-280	0.5-1.4	ND
Aroclor-1260 (PCB-1260)	0.012-0.089	ND	0.011-18	0.016-73	0.024-260
Total PCBs	0.0072-0.58	2.5	0.0081-1100	0.0058-8600	0.0073-21000
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	ND	0.0077	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	0.013-0.21	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	0.0023-0.035	0.0042-0.3	0.0073-1.7
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	0.00064-0.55	0.00098-1.2	0.00089-3.6
1,2-Dichloroethane	ND	ND	0.016-0.016	0.013-0.013	0.017-0.017
1,2-Dichloropropane	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	0.00067-2.6	0.0071-20	0.00099-32
1,4-Dichlorobenzene	0.0013-0.0013	ND	0.00052-7.1	0.00095-54	0.00044-84
2-Butanone (Methyl ethyl ketone) (MEK)	0.0036-0.011	0.0032-0.027	0.003-0.036	0.0017-0.025	0.0034-0.25
2-Hexanone	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	0.0052-0.0052	ND	ND
Acetone	0.01-0.045	0.055-0.23	0.0081-0.44	0.0047-0.19	0.0068-0.18
Benzene	0.00073-0.0011	ND	0.00046-0.0014	0.0012-0.0013	ND
Bromodichloromethane	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	ND	ND	0.5
Carbon disulfide	0.0013-0.0033	0.0098	0.0013-0.34	0.001-0.0025	ND
Carbon tetrachloride	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	0.00052-3.5	0.0005-2	0.00077-4
Chloroethane	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	0.0023-0.008	ND	ND	ND	ND
Chloromethane (Methyl chloride)	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.001-0.044	ND	0.00075-0.0025	0.0016-0.0016	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
Cyclohexane	ND	ND	0.0019-0.0026	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	ND	0.058-0.058	ND
Ethylbenzene	ND	ND	0.00043-0.0032	0.00064-0.043	0.04-0.062
Isopropyl benzene	0.0014-0.0014	ND	0.00043-0.028	0.0029-0.09	0.0013-0.78
Methyl acetate	0.0019-0.002	0.0013	0.0014-0.074	0.0017-0.2	0.0013-1.1
Methyl cyclohexane	0.0013-0.0048	ND	0.00071-0.028	0.0012-0.029	0.12-0.12
Methyl tert butyl ether (MTBE)	ND	ND	ND	ND	ND
Methylene chloride	0.0015-0.0028	0.0037-0.0065	0.003-0.0086	0.0025-0.023	0.0016-0.014
Styrene	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	0.00055-0.52	0.0058-0.012	ND
Toluene	0.00082-0.0022	0.0022	0.00053-0.014	0.0011-0.14	0.0028-0.73
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND
Trichloroethene	0.0023-0.0047	0.0012	0.00087-0.057	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	ND	ND	ND
Vinyl chloride	0.0031-0.0049	ND	ND	ND	ND
Xylenes (total)	0.0064-0.0064	0.009	0.0031-0.012	0.0021-0.19	0.0027-0.3
Semi-Volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	0.084-6.1	0.73-150	0.1-24
2,4-Dinitrophenol	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND
2-Methylnaphthalene	0.1-0.16	ND	0.037-2.8	0.13-0.64	0.029-1
2-Methylphenol	ND	ND	0.024-0.73	0.061-0.13	ND
2-Nitroaniline	ND	ND	ND	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND
3&4-Methylphenol	-	-	-	-	-
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND
3-Nitroaniline	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND
4-Chloroaniline	ND	ND	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	ND	ND	ND

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A002	A004	A005	A006
4-Methylphenol	ND	ND	0.032-0.27	0.11-0.14	ND
4-Nitroaniline	ND	ND	0.35	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND
Acenaphthene	0.11	ND	0.034-0.6	0.046-0.046	0.02-9.7
Acenaphthylene	ND	ND	ND	ND	0.087-0.087
Acetophenone	ND	ND	0.066-0.066	ND	ND
Anthracene	0.082-0.24	ND	0.057-0.82	0.076-0.076	0.11-0.11
Atrazine	ND	ND	ND	ND	ND
Benzaldehyde	ND	ND	0.02-0.02	0.038-0.27	0.027-0.13
Benzo(a)anthracene	0.053-1.4	ND	0.058-0.49	0.061-0.79	0.039-0.41
Benzo(a)pyrene	0.068-1.5	ND	0.069-0.94	0.071-0.74	0.092-0.64
Benzo(b)fluoranthene	0.049-1.7	ND	0.031-1.4	0.066-0.78	0.15-0.72
Benzo(g,h,i)perylene	0.051-1.1	ND	0.026-0.39	0.078-0.4	0.17-0.72
Benzo(k)fluoranthene	0.058-0.9	ND	0.048-0.48	0.43-0.43	0.36-0.36
Biphenyl (1,1-Biphenyl)	ND	ND	0.02-0.057	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	0.042-10	ND	0.02-18	0.048-9.9	0.021-150
Butyl benzylphthalate (BBP)	0.1	ND	ND	ND	4-4.7
Caprolactam	ND	ND	0.17-0.27	0.022-0.022	0.017-4.3
Carbazole	0.046-0.18	ND	0.11-0.43	0.098-0.098	0.038-0.084
Chrysene	0.042-1.7	ND	0.059-0.56	0.068-1	0.023-0.68
Dibenz(a,h)anthracene	0.042-0.25	ND	0.057-0.069	ND	0.1
Dibenzofuran	ND	ND	0.015-0.38	0.041	0.031
Diethyl phthalate	ND	ND	ND	ND	ND
Dimethyl phthalate	ND	ND	ND	ND	ND
Di-n-butylphthalate (DBP)	ND	ND	0.22-67	ND	0.28-0.35
Di-n-octyl phthalate (DnOP)	ND	ND	0.18-29	0.067-9.5	0.029-170
Fluoranthene	0.038-2.9	ND	0.021-4.4	0.077-1.2	0.046-1.1
Fluorene	ND	ND	0.018-1.8	0.053-0.053	0.027-0.047
Hexachlorobenzene	ND	ND	0.048-0.09	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.049-0.91	ND	0.015-0.35	0.37	0.13-0.51
Isophorone	ND	ND	ND	ND	ND
Naphthalene	0.064	ND	0.027-0.95	0.093-0.76	0.03-2.1
Nitrobenzene	ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Phenanthrene	0.056-1.9	ND	0.058-4.2	0.025-0.73	0.023-0.67
Phenol	ND	0.091	0.14-21	0.076-7.5	1.1-6.6
Pyrene	0.04-4	ND	0.027-1.6	0.061-1.2	0.035-0.91
Petroleum Products					
Total Petroleum Hydrocarbons - Extractable (DRO)	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	-	-	-	-
Inorganics (Metals & General Chemistry)					
Metals					
Aluminum	493-34700	461-83400	1350-85700	1200-18000	2800-23500
Antimony	0.63-8.5	4.5-4.5	0.33-0.84	0.38-5.9	0.33-2.2
Arsenic	0.9-22	0.76-12	0.66-22.8	0.47-12.9	1.2-37
Barium	4.6-279	1.6-69.8	2.4-379	1.1-130	6.2-533
Beryllium	0.3-5.5	0.16-2.3	0.25-1.9	0.18-3.4	0.17-7.8
Cadmium	0.27-5	0.05-2.5	0.035-2.3	0.075-2	0.086-15.4
Chromium	4.6-53.9	4-39.1	9.4-441	3.8-160	5.8-94.3
Cobalt	0.38-31	1.5-19.8	4.3-1500	0.84-37.3	1.9-846
Copper	2-1160	11.9-6360	12.5-3550	4.9-786	6-773
Iron	1680-54100	1880-25800	2000-73700	2520-48600	3270-39800
Lead	1.5-401	5.3-79.4	7.2-2020	4.6-125	4.4-151
Manganese	7.3-1690	9.1-501	23.9-757	27.1-1640	15.9-3390
Mercury	0.019-0.52	0.027-0.3	0.013-134	0.013-0.79	0.015-2.5
Nickel	2.3-111	5.7-91	11.9-984	2.2-360	4.1-187
Selenium	0.52-3.9	0.4-0.68	0.43-1.2	0.45-0.9	0.35-1.6
Silver	0.18-0.6	0.74-0.74	0.18-2.9	0.14-1.8	0.43-0.81
Thallium	0.67-4	0.77-0.77	0.42-5.6	0.57-3.3	0.4-4
Vanadium	2.4-85.2	0.55-30.6	1.2-60.7	2.1-77.5	2.7-68.8
Zinc	9.6-711	6.8-339	15.5-829	8.8-154	11.2-1670
General Chemistry					
Chloride	1.2-4970	-	-	-	-
Cyanide (amenable)	0.22-13.6	ND	0.22-0.33	ND	ND
Cyanide (total)	0.12-33000	ND	0.15-0.33	0.25-0.25	0.24-1.5
Sulfide		-	-	-	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A007	A008	A009	A010	A011
PCBs					
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	38-1800	ND	1.2-380
Aroclor-1232 (PCB-1232)	ND	760-1700	ND	ND	ND
Aroclor-1242 (PCB-1242)	0.012-180	0.037-2.8	0.14-1600	0.17-15000	0.67-290
Aroclor-1248 (PCB-1248)	0.007-840	0.011-2.4	0.0065-97	9.5	0.023-3.8
Aroclor-1254 (PCB-1254)	0.006-0.3	ND	ND	ND	ND
Aroclor-1260 (PCB-1260)	0.013-140	0.35-0.81	0.0085-12	0.41-16	0.18-0.63
Total PCBs	0.006-980	0.011-1700	0.0081-3400	0.17-15000	0.023-670
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	0.79	0.0053-0.008	ND	0.083
1,2-Dichloroethane	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	0.014-6.5	0.014-0.23	ND	0.0025-0.89
1,4-Dichlorobenzene	0.001	0.023-34	0.0023-0.67	0.51	0.0042-1.7
2-Butanone (Methyl ethyl ketone) (MEK)	0.003-0.0058	0.0017-0.0053	0.0035-0.013	ND	0.0016-0.0086
2-Hexanone	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	0.0023-0.0023	ND	ND
Acetone	0.0033-0.026	ND	0.002-0.046	ND	0.014
Benzene	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	ND	ND	ND
Carbon disulfide	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND
Chlorobenzene	ND	0.13-9	0.016-0.033	ND	0.011-2.2
Chloroethane	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.0017	ND	ND	ND	0.0079
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
Cyclohexane	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND
Isopropyl benzene	ND	ND	0.0011-0.012	ND	0.021
Methyl acetate	ND	ND	ND	ND	0.0021
Methyl cyclohexane	ND	ND	ND	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	ND	ND	ND
Methylene chloride	ND	0.0011-0.0029	0.0026-0.0038	ND	0.0011-0.0028
Styrene	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	0.021
Toluene	ND	ND	0.00068	ND	0.00078-0.0016
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	0.0028
Trichlorofluoromethane (CFC-11)	ND	ND	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	0.067	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	0.093	ND	8.3	0.037
2-Methylphenol	ND	ND	ND	ND	ND
2-Nitroaniline	ND	ND	ND	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND
3&4-Methylphenol	-	-	-	ND	-
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND
3-Nitroaniline	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND
4-Chloroaniline	ND	ND	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	ND	ND	ND

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A007	A008	A009	A010	A011
4-Methylphenol	ND	ND	0.24	-	ND
4-Nitroaniline	ND	ND	ND	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	86	0.026
Acenaphthylene	ND	ND	ND	ND	0.023
Acetophenone	ND	ND	ND	ND	ND
Anthracene	ND	0.023-0.058	0.039-0.11	110	0.072
Atrazine	ND	ND	ND	ND	ND
Benzaldehyde	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	0.045-0.055	0.086-0.33	370	0.089-0.58
Benzo(a)pyrene	ND	0.02-0.063	0.088-0.31	340	0.11-0.51
Benzo(b)fluoranthene	ND	0.029-0.085	0.062-0.45	450	0.095-0.81
Benzo(g,h,i)perylene	ND	0.016-0.044	0.064-0.17	230	0.3
Benzo(k)fluoranthene	ND	ND	0.12-0.15	150	0.096-0.27
Biphenyl (1,1-Biphenyl)	ND	0.046	ND	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	0.039-0.2	0.04-4.5	0.27-1.5	ND	0.51-5.1
Butyl benzylphthalate (BBP)	ND	ND	ND	ND	ND
Caprolactam	ND	ND	ND	ND	ND
Carbazole	ND	ND	0.063	100	ND
Chrysene	ND	0.028-0.062	0.054-0.38	480	0.11-0.58
Dibenz(a,h)anthracene	ND	ND	0.04	52	0.092
Dibenzofuran	ND	0.062	0.073	ND	ND
Diethyl phthalate	ND	ND	ND	ND	0.18
Dimethyl phthalate	ND	ND	ND	ND	ND
Di-n-butylphthalate (DBP)	ND	ND	ND	ND	ND
Di-n-octyl phthalate (DnOP)	ND	3.6	0.33-2.3	ND	0.65-6
Fluoranthene	ND	0.033-0.065	0.097-0.76	1100	0.1-0.85
Fluorene	ND	0.043	0.19	52	0.02
Hexachlorobenzene	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	0.13-0.17	190	0.3
Isophorone	ND	ND	ND	ND	ND
Naphthalene	ND	0.024	ND	45	0.023
Nitrobenzene	ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Phenanthrene	ND	0.019-0.13	0.15-0.66	800	0.067-0.32
Phenol	ND	0.47	0.07-3.7	ND	0.23
Pyrene	ND	0.025-0.092	0.054-0.64	860	0.16-0.59
Petroleum Products					
Total Petroleum Hydrocarbons - Extractable (DRO)	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	-	-	-	-
Inorganics (Metals & General Chemistry)					
Metals					
Aluminum	9050-19800	1210-17700	1330-12700	18000	1170-20700
Antimony	0.43-0.51	0.33-1.6	0.42-1.6	1.4	7-11.2
Arsenic	7.5-15.7	0.61-27.3	0.56-18.4	4-4	0.78-44.2
Barium	45.9-87.7	28.6-300	10.9-3110	43	17.1-136
Beryllium	1.1-2.4	0.12-6.7	0.091-7.7	ND	0.16-2.8
Cadmium	ND	0.19-2.2	0.034-6.2	1.3	0.2-0.77
Chromium	9.8-36.2	3.3-39.7	4.3-37.1	42	4.2-1080
Cobalt	5.8-29.8	0.83-85.6	0.6-69.4	14	0.86-56.1
Copper	9.1-24	1.6-44.4	4.1-220	730	2.9-1960
Iron	19200-34400	2460-37900	2180-44100	11000	2890-336000
Lead	14.8-41.2	1.5-50.1	2.5-36.6	68	1.4-191
Manganese	120-425	57.9-2900	28.5-14800	360	37-2810
Mercury	0.064-0.11	0.023-0.13	0.0097-1.1	ND	0.014-5.3
Nickel	12.1-48.1	4.4-128	3.8-120	59	5.2-1830
Selenium	ND	0.58-1.3	0.48-0.88	0.69	0.37-3.7
Silver	ND	ND	ND	ND	ND
Thallium	ND	0.66-3.8	0.58-5.2	ND	0.7-1.4
Vanadium	10.3-49.5	2.5-53.2	2.3-58.1	11	2.6-44.3
Zinc	35.7-62.6	21.9-119	8.1-159	600	27.9-445
General Chemistry					
Chloride	-	4.1-20.2	-	-	-
Cyanide (amenable)	ND	ND	ND	-	ND
Cyanide (total)	ND	0.11-83	0.2	ND	0.25-1.1
Sulfide	-	-	-	77	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A012	A013	A014	A015	A017	A018	A019	A020
PCBs								
Aroclor-1016 (PCB-1016)	ND	-	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	-	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	-	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	ND	-	ND	ND	0.27	0.075-140	ND	ND
Aroclor-1248 (PCB-1248)	ND	-	0.084	0.0071-48	3.1	0.018-17	ND	ND
Aroclor-1254 (PCB-1254)	ND	-	ND	0.062-9.1	ND	ND	ND	ND
Aroclor-1260 (PCB-1260)	ND	-	ND	0.31-4.7	0.029	0.022-1.7	ND	ND
Total PCBs	ND	-	0.084	0.0071-52.7	0.299-3.1	0.018-140	ND	ND
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	ND	ND	-	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	-	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	-	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	-	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	-	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	0.078	-	ND	0.0053	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	-	ND	ND	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	-	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	-	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	0.00099	-	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	-	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	-	ND	0.0024-0.016	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	-	0.023	0.0039-0.027	ND	ND	ND
2-Butanone (Methyl ethyl ketone) (MEK)	ND	0.0021	-	0.003-0.004	ND	ND	0035-0.006	ND
2-Hexanone	ND	ND	-	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	-	ND	ND	ND	ND	ND
Acetone	0.0041	0.014-6.3	-	ND	0.0099	0.011-0.34	0.036-0.038	ND
Benzene	ND	0.11-0.43	-	0.031	ND	0.00054	ND	ND
Bromodichloromethane	ND	ND	-	ND	ND	ND	ND	ND
Bromoform	ND	ND	-	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	-	ND	ND	ND	ND	ND
Carbon disulfide	ND	ND	-	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	-	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	-	ND	ND	ND	ND	ND
Chloroethane	ND	ND	-	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	ND	ND	-	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	ND	ND	-	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.0017	ND	-	0.9	0.0013-0.062	0.015-0.063	ND	ND
cis-1,3-Dichloropropene	ND	ND	-	ND	ND	ND	ND	ND
Cyclohexane	ND	0.092-31	-	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	-	ND	ND	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	-	ND	ND	ND	ND	ND
Ethylbenzene	ND	0.2-5	-	0.001-0.019	ND	ND	ND	ND
Isopropyl benzene	ND	0.22-2.9	-	ND	ND	ND	ND	ND
Methyl acetate	ND	0.1	-	0.0023	ND	0.0026	ND	ND
Methyl cyclohexane	ND	0.05-28	-	ND	ND	0.00072	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	-	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	-	0.0046-0.021	ND	0.004-0.0073	ND	ND
Styrene	ND	ND	-	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	-	0.92	ND	0.00067-1.1	ND	ND
Toluene	ND	0.029-0.38	-	0.22	ND	0.00088-0.026	ND	0.0013
trans-1,2-Dichloroethene	ND	ND	-	0.11	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	-	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	-	0.28	0.00078-0.017	0.21	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	-	ND	ND	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	-	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	-	0.0069-0.32	ND	0.0055	ND	ND
Xylenes (total)	ND	1.9-18	-	0.0033-0.0067	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)								
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	-	ND	ND	ND	-	ND
2,4,5-Trichlorophenol	ND	ND	-	ND	ND	ND	-	ND
2,4,6-Trichlorophenol	ND	ND	-	ND	ND	ND	-	ND
2,4-Dichlorophenol	ND	ND	-	ND	ND	ND	-	ND
2,4-Dimethylphenol	ND	18	-	ND	ND	ND	-	ND
2,4-Dinitrophenol	ND	ND	-	ND	ND	ND	-	ND
2,4-Dinitrotoluene	ND	ND	-	ND	ND	ND	-	ND
2,6-Dinitrotoluene	ND	ND	-	ND	ND	ND	-	ND
2-Chloronaphthalene	ND	ND	-	ND	ND	ND	-	ND
2-Chlorophenol	ND	ND	-	ND	ND	ND	-	ND
2-Methylnaphthalene	ND	0.051-7.3	-	ND	ND	ND	-	ND
2-Methylphenol	ND	ND	-	ND	ND	ND	-	ND
2-Nitroaniline	ND	ND	-	ND	ND	ND	-	ND
2-Nitrophenol	ND	ND	-	ND	ND	ND	-	ND
3&4-Methylphenol	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	ND	ND	-	ND	ND	ND	-	ND
3-Nitroaniline	ND	ND	-	ND	ND	ND	-	ND
4,6-Dinitro-2-methylphenol	ND	ND	-	ND	ND	ND	-	ND
4-Bromophenyl phenyl ether	ND	ND	-	ND	ND	ND	-	ND
4-Chloro-3-methylphenol	ND	ND	-	ND	ND	ND	-	ND
4-Chloroaniline	ND	ND	-	ND	ND	ND	-	ND
4-Chlorophenyl phenyl ether	ND	ND	-	ND	ND	ND	-	ND

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A012	A013	A014	A015	A017	A018	A019	A020
4-Methylphenol	ND	ND	-	ND	ND	ND	-	ND
4-Nitroaniline	ND	ND	-	ND	ND	ND	-	ND
4-Nitrophenol	ND	ND	-	ND	ND	ND	-	ND
Acenaphthene	ND	ND	-	0.073	ND	ND	-	ND
Acenaphthylene	ND	ND	-	ND	ND	0.074	-	ND
Acetophenone	ND	ND	-	ND	ND	ND	-	ND
Anthracene	ND	ND	-	0.083-0.1	ND	0.069-0.13	-	ND
Atrazine	ND	ND	-	ND	ND	ND	-	ND
Benzaldehyde	ND	ND	-	ND	ND	ND	-	ND
Benzo(a)anthracene	ND	ND	-	0.061-0.37	ND	0.021-0.21	-	ND
Benzo(a)pyrene	ND	ND	-	0.074-0.4	ND	0.024-0.2	-	ND
Benzo(b)fluoranthene	ND	ND	-	0.071-0.59	ND	0.031-0.32	-	ND
Benzo(g,h,i)perylene	ND	ND	-	0.22-0.28	ND	0.029-0.13	-	ND
Benzo(k)fluoranthene	ND	ND	-	0.19-0.21	ND	0.03-0.21	-	ND
Biphenyl (1,1-Biphenyl)	ND	ND	-	ND	ND	ND	-	ND
bis(2-Chloroethoxy)methane	ND	ND	-	ND	ND	ND	-	ND
bis(2-Chloroethyl)ether	ND	ND	-	ND	ND	ND	-	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ND	0.043-0.055	-	0.069	ND	0.12	-	ND
Butyl benzylphthalate (BBP)	ND	ND	-	ND	ND	0.12	-	ND
Caprolactam	ND	ND	-	ND	ND	0.12	-	ND
Carbazole	ND	ND	-	0.066-0.072	ND	0.057	-	ND
Chrysene	ND	ND	-	0.052-0.44	ND	0.027-0.2	-	ND
Dibenz(a,h)anthracene	ND	ND	-	0.062-0.071	ND	0.025-0.082	-	ND
Dibenzofuran	ND	ND	-	ND	ND	0.07	-	ND
Diethyl phthalate	ND	ND	-	ND	ND	ND	-	ND
Dimethyl phthalate	ND	ND	-	ND	ND	ND	-	ND
Di-n-butylphthalate (DBP)	ND	ND	-	0.32-0.43	ND	0.065-0.096	-	ND
Di-n-octyl phthalate (DnOP)	ND	ND	-	ND	ND	ND	-	ND
Fluoranthene	ND	0.6	-	0.077-0.96	ND	0.04-0.36	-	ND
Fluorene	ND	ND	-	ND	ND	ND	-	ND
Hexachlorobenzene	ND	ND	-	ND	ND	ND	-	ND
Hexachlorobutadiene	ND	ND	-	ND	ND	ND	-	ND
Hexachlorocyclopentadiene	ND	ND	-	ND	ND	ND	-	ND
Hexachloroethane	ND	ND	-	ND	ND	ND	-	ND
Indeno(1,2,3-cd)pyrene	ND	ND	-	0.21-0.27	ND	0.026-0.13	-	ND
Isophorone	ND	ND	-	ND	ND	ND	-	ND
Naphthalene	ND	0.056-4.5	-	0.057	ND	ND	-	ND
Nitrobenzene	ND	ND	-	ND	ND	ND	-	ND
N-Nitrosodi-n-propylamine	ND	ND	-	ND	ND	ND	-	ND
N-Nitrosodiphenylamine	ND	ND	-	ND	ND	ND	-	ND
Pentachlorophenol	ND	ND	-	ND	ND	ND	-	ND
Phenanthrene	ND	1.5	-	0.063-0.51	ND	0.028-0.17	-	ND
Phenol	ND	ND	-	0.07-0.3	ND	ND	-	ND
Pyrene	ND	ND	-	0.12-0.74	ND	0.034-0.28	-	ND
Petroleum Products								
Total Petroleum Hydrocarbons - Extractable (DRO)	-	0.47-11000	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	0.71-530	-	-	-	-	-	-
Inorganics (Metals & General Chemistry)								
Metals								
Aluminum	6510-8670	-	-	1380-21400	1320-10300	633-16300	-	1550
Antimony	ND	-	-	1.4-1.6	0.59-0.61	0.28-1.6	-	ND
Arsenic	5.5-10.9	-	-	0.36-17.5	1.8-10.4	2.3-11.3	-	2.7
Barium	24.3-48.2	-	-	14.3-871	13.5-90.7	13.5-121	-	206
Beryllium	ND	-	-	0.7-6.7	0.49-2.7	0.097-3.8	-	0.14
Cadmium	ND	-	-	0.29-0.88	0.29-3	0.17-3.3	-	0.3
Chromium	19.3-22.9	-	-	3.1-109	5.6-69.2	5.1-248	-	3.8
Cobalt	1.4-2.5	-	-	5.6-37.2	1.2-14.8	0.8-346	-	1.9
Copper	7.3-20.5	-	-	5.7-541	3.3-41.9	8.6-224	-	6.8
Iron	20700-59600	-	-	1040-36900	1530-29200	3370-53200	-	7800
Lead	11.4-13.6	-	-	9.1-160	4.1-31.2	9.8-213	-	2.7
Manganese	26.4-118	-	-	51.8-1120	10.4-1180	24.1-1170	-	377
Mercury	0.020-0.029	-	-	0.02-5	0.021-0.13	0.027-1.1	-	ND
Nickel	4.0-5.5	-	-	10.5-1130	1.8-41.2	3-312	-	8.8
Selenium	0.89	-	-	1.2-1.2	0.51-1.3	0.61-2.5	-	ND
Silver	ND	-	-	0.23-0.48	ND	0.33-0.33	-	ND
Thallium	ND	-	-	1.2-4.4	0.78-2.3	0.61-2	-	ND
Vanadium	37.2-40.1	-	-	1.8-53.9	4.5-52	3.7-106	-	4.7
Zinc	15.2-19.1	-	-	10.3-160	12.5-97.3	23.2-315	-	34.6
General Chemistry								
Chloride	-	-	-	-	-	-	-	-
Cyanide (amenable)	ND	-	-	ND	ND	ND	-	ND
Cyanide (total)	ND	-	-	ND	ND	ND	-	ND
Sulfide	-	-	-	-	-	-	-	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A021	A021-1	A021-2	A021-3	A021-4
PCBs					
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	ND	0.023	0.015-2400	ND	ND
Aroclor-1248 (PCB-1248)	0.038-58000	0.052-0.95	0.0063-20000	0.073	0.18-51
Aroclor-1254 (PCB-1254)	ND	0.074-67	0.015-270	0.049	0.41-0.41
Aroclor-1260 (PCB-1260)	0.43-5800	0.0094-0.55	0.012-1900	0.13-0.13	0.029-3.1
Total PCBs	0.038-63800	0.0094-67	0.0063-21900	0.049-0.203	0.22-54.1
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	0.0029	ND	ND	ND	ND
2-Butanone (Methyl ethyl ketone) (MEK)	0.0037-0.012	0.0015-0.0043	0.0021-0.0068	0.0019-0.0022	ND
2-Hexanone	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	ND	ND	ND
Acetone	0.049-0.057	0.0066-0.022	0.007-0.024	0.01-0.015	0.0059
Benzene	ND	0.00054	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	ND	ND	ND
Carbon disulfide	0.0016-0.039	0.0016-0.064	0.0011	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	0.0016-0.037	0.0013	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
Cyclohexane	0.0017	0.0011	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	ND	ND	ND
Ethylbenzene	ND	0.00054-0.0012	ND	ND	ND
Isopropyl benzene	ND	0.0011	ND	ND	ND
Methyl acetate	ND	0.0023-0.095	ND	0.0014-0.017	ND
Methyl cyclohexane	0.0021	0.0009-0.0018	ND	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	ND	ND	ND
Methylene chloride	ND	0.0013-0.0022	ND	0.0015-0.002	ND
Styrene	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND
Toluene	0.0013	0.0023	0.00075	ND	0.00056
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND
Trichloroethene	0.0021-0.0052	0.0054-0.022	ND	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.0022	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	1.2	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND
2-Methylnaphthalene	0.11-0.14	0.035-0.56	0.043	ND	ND
2-Methylphenol	ND	1.4-1.4	ND	ND	ND
2-Nitroaniline	ND	ND	ND	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND
3&4-Methylphenol	-	-	-	-	-
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND
3-Nitroaniline	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND
4-Chloroaniline	ND	0.018	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	ND	ND	ND

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A021	A021-1	A021-2	A021-3	A021-4
4-Methylphenol	ND	0.93	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	0.45	ND	0.032
Acenaphthylene	ND	ND	ND	ND	0.029
Acetophenone	ND	0.024-0.38	ND	ND	0.034
Anthracene	ND	ND	0.034-0.58	ND	0.15
Atrazine	ND	ND	ND	ND	ND
Benzaldehyde	ND	0.021-0.093	ND	0.095	ND
Benzo(a)anthracene	0.097	0.022-0.025	0.096-0.7	0.17	0.51
Benzo(a)pyrene	ND	0.023-0.027	0.083-0.78	0.063-0.22	0.67
Benzo(b)fluoranthene	ND	0.019-0.038	0.15-0.83	0.025-0.28	0.86
Benzo(g,h,i)perylene	ND	0.017-0.031	0.097-0.49	0.069-0.12	0.5
Benzo(k)fluoranthene	ND	ND	0.082-0.45	0.09	0.39
Biphenyl (1,1-Biphenyl)	0.21	0.025-0.26	0.04	0.19	ND
bis(2-Chloroethoxy)methane	ND	ND	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	0.083	0.02-0.046	0.075	0.33	0.067-0.072
Butyl benzylphthalate (BBP)	ND	ND	ND	ND	ND
Caprolactam	ND	ND	ND	ND	ND
Carbazole	ND	ND	0.016-0.13	ND	0.024
Chrysene	0.19	0.025-0.031	0.12-0.81	0.018-0.17	0.67
Dibenz(a,h)anthracene	ND	ND	0.027-0.11	ND	0.13
Dibenzofuran	0.09	0.051	0.015-0.22	ND	0.052
Diethyl phthalate	ND	ND	ND	ND	ND
Dimethyl phthalate	ND	ND	ND	ND	ND
Di-n-butylphthalate (DBP)	ND	ND	ND	0.082	ND
Di-n-octyl phthalate (DnOP)	ND	ND	ND	ND	ND
Fluoranthene	0.066-0.083	0.02-0.037	0.025-2.1	0.024-0.33	1.2
Fluorene	0.22	0.05	0.23	ND	0.12
Hexachlorobenzene	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	0.023	0.078-0.43	0.11	0.43
Isophorone	ND	ND	ND	ND	ND
Naphthalene	ND	0.031-0.4	0.036-0.036	ND	ND
Nitrobenzene	ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Phenanthrene	0.062-0.34	0.049-0.13	0.13-1.5	0.068	0.22
Phenol	ND	1.1	ND	ND	0.031-0.44
Pyrene	0.09	0.016-0.034	0.021-1.6	0.02-0.32	1
Petroleum Products					
Total Petroleum Hydrocarbons - Extractable (DRO)	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	-	-	-	-
Inorganics (Metals & General Chemistry)					
Metals					
Aluminum	1270-14700	715-40900	6640-21300	2500-19300	1430-51500
Antimony	0.64-0.76	0.33-1.1	0.28-0.95	0.32-0.53	0.6-0.85
Arsenic	1.2-29	0.55-33.3	3.3-12	0.84-14.4	1.9-9.6
Barium	5.1-95.3	3.2-148	31.9-1070	7.3-1530	12.4-126
Beryllium	0.21-1.3	0.61-2.5	0.2-4	0.05-0.88	0.49-3.6
Cadmium	0.062-2.1	0.031-1.2	0.067-2.8	0.12-1.2	0.13-0.72
Chromium	4.5-24.1	1.9-112	9-64.5	13.5-162	2.7-34.3
Cobalt	1.5-39.2	0.65-29.2	3.2-293	2.6-19	2.1-27.4
Copper	4.4-241	6.6-1360	8.2-317	9.1-455	6.4-1920
Iron	1840-32700	549-42900	9010-37800	2390-41900	3340-28800
Lead	3.2-38.4	5.7-261	11.2-86.6	12.2-1340	5-46.6
Manganese	25.2-837	10.1-768	82.9-5350	28.6-724	94.2-285
Mercury	0.018-0.13	0.019-8.1	0.027-0.63	0.023-104	0.0089-0.26
Nickel	7.6-78.8	1.5-389	7.7-183	7.3-697	7-50.5
Selenium	0.43-1	0.37-0.58	0.3-0.81	0.34-0.96	0.54-0.73
Silver	ND	0.28-0.52	ND	0.21-11.9	0.32-0.32
Thallium	0.61-1.4	0.53-1.5	0.48-1.2	0.52-0.54	ND
Vanadium	3.1-42.2	1.2-54.6	12.8-68	3-54.9	3.9-36.1
Zinc	14.4-183	14.3-204	26.8-197	24-1200	20-159
General Chemistry					
Chloride	-	-	-	-	-
Cyanide (amenable)	ND	0.22	ND	ND	ND
Cyanide (total)	ND	0.22-0.23	ND	ND	ND
Sulfide	-	-	-	-	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A022	A023	A024	A030	Background	Boundary
PCBs						
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	ND	ND	ND	0.052-74	ND	ND
Aroclor-1248 (PCB-1248)	0.0073-0.044	3.3	0.017	0.0088-1200	ND	0.016-14
Aroclor-1254 (PCB-1254)	ND	ND	ND	1.4	ND	ND
Aroclor-1260 (PCB-1260)	0.018-0.022	ND	ND	0.013-47	ND	1.1
Total PCBs	0.0073-0.066	3.3	0.017	0.0088-1247	ND	0.016-15.1
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	ND	ND	ND	-	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	-	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	-	ND	ND
1,1-Dichloroethane	ND	ND	ND	-	ND	ND
1,1-Dichloroethene	ND	ND	ND	-	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	-	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	ND	-	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	ND	-	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	-	ND	ND
1,2-Dichloroethane	ND	ND	ND	-	ND	ND
1,2-Dichloropropane	ND	ND	ND	-	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	-	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	-	ND	ND
2-Butanone (Methyl ethyl ketone) (MEK)	ND	ND	ND	-	ND	ND
2-Hexanone	ND	ND	ND	-	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	ND	ND	-	ND	ND
Acetone	0.0037-0.0084	ND	ND	-	0.004-0.034	ND
Benzene	0.00066-0.00078	ND	ND	-	ND	ND
Bromodichloromethane	ND	ND	ND	-	ND	ND
Bromoform	ND	ND	ND	-	ND	ND
Bromomethane (Methyl bromide)	ND	ND	ND	-	ND	ND
Carbon disulfide	ND	ND	ND	-	ND	ND
Carbon tetrachloride	ND	ND	ND	-	ND	ND
Chlorobenzene	ND	ND	ND	-	ND	ND
Chloroethane	ND	ND	ND	-	ND	ND
Chloroform (Trichloromethane)	ND	ND	0.0068	-	ND	ND
Chloromethane (Methyl chloride)	ND	ND	ND	-	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	-	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	-	ND	ND
Cyclohexane	ND	ND	ND	-	ND	ND
Dibromochloromethane	ND	ND	ND	-	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	ND	-	ND	ND
Ethylbenzene	ND	ND	ND	-	ND	ND
Isopropyl benzene	ND	ND	ND	-	ND	ND
Methyl acetate	ND	ND	ND	-	0.0035	0.0033-0.005
Methyl cyclohexane	ND	ND	ND	-	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	ND	-	ND	ND
Methylene chloride	0.0013-0.0017	ND	ND	-	0.004	ND
Styrene	ND	ND	ND	-	ND	ND
Tetrachloroethene	ND	ND	ND	-	ND	ND
Toluene	0.00073-0.00076	ND	ND	-	0.0028	0.00096
trans-1,2-Dichloroethene	ND	ND	ND	-	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	-	ND	ND
Trichloroethene	ND	ND	ND	-	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	ND	-	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	ND	-	ND	ND
Vinyl chloride	ND	ND	ND	-	ND	ND
Xylenes (total)	ND	ND	ND	-	ND	ND
Semi-Volatile Organic Compounds (SVOCs)						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	ND	-	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	-	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	-	ND	ND
2,4-Dichlorophenol	ND	ND	ND	-	ND	ND
2,4-Dimethylphenol	ND	ND	ND	-	ND	ND
2,4-Dinitrophenol	ND	ND	ND	-	ND	ND
2,4-Dinitrotoluene	ND	ND	ND	-	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	-	ND	ND
2-Chloronaphthalene	ND	ND	ND	-	ND	ND
2-Chlorophenol	ND	ND	ND	-	ND	ND
2-Methylnaphthalene	ND	ND	ND	-	ND	ND
2-Methylphenol	ND	ND	ND	-	ND	ND
2-Nitroaniline	ND	ND	ND	-	ND	ND
2-Nitrophenol	ND	ND	ND	-	ND	ND
3&4-Methylphenol	-	-	-	-	-	-
3,3'-Dichlorobenzidine	ND	ND	ND	-	ND	ND
3-Nitroaniline	ND	ND	ND	-	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	ND	-	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	-	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	-	ND	ND
4-Chloroaniline	ND	ND	ND	-	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	ND	-	ND	ND

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	A022	A023	A024	A030	Background	Boundary
4-Methylphenol	ND	ND	ND	-	ND	ND
4-Nitroaniline	ND	ND	ND	-	ND	ND
4-Nitrophenol	ND	ND	ND	-	ND	ND
Acenaphthene	0.13	ND	ND	-	ND	ND
Acenaphthylene	ND	ND	ND	-	ND	ND
Acetophenone	ND	ND	ND	-	ND	ND
Anthracene	0.022-0.26	ND	ND	-	ND	ND
Atrazine	ND	ND	ND	-	ND	ND
Benzaldehyde	ND	ND	ND	-	ND	ND
Benzo(a)anthracene	0.022-0.38	ND	ND	-	ND	ND
Benzo(a)pyrene	0.023-0.39	ND	ND	-	ND	ND
Benzo(b)fluoranthene	0.029-0.48	ND	ND	-	ND	0.074
Benzo(g,h,i)perylene	0.025-0.19	ND	ND	-	ND	ND
Benzo(k)fluoranthene	0.026-0.31	ND	ND	-	ND	ND
Biphenyl (1,1-Biphenyl)	ND	ND	ND	-	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	ND	-	ND	ND
bis(2-Chloroethyl)ether	ND	ND	ND	-	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	0.084	ND	ND	-	ND	ND
Butyl benzylphthalate (BBP)	ND	ND	ND	-	ND	ND
Caprolactam	ND	ND	ND	-	ND	ND
Carbazole	0.14	ND	ND	-	ND	ND
Chrysene	0.034-0.41	ND	ND	-	ND	0.065
Dibenz(a,h)anthracene	0.087-0.087	ND	ND	-	ND	ND
Dibenzofuran	0.059-0.059	ND	ND	-	ND	ND
Diethyl phthalate	ND	ND	ND	-	ND	ND
Dimethyl phthalate	ND	ND	ND	-	ND	ND
Di-n-butylphthalate (DBP)	ND	ND	ND	-	ND	ND
Di-n-octyl phthalate (DnOP)	ND	ND	ND	-	ND	ND
Fluoranthene	0.028-1.4	ND	ND	-	ND	0.14
Fluorene	0.12	ND	ND	-	ND	ND
Hexachlorobenzene	ND	ND	ND	-	ND	ND
Hexachlorobutadiene	ND	ND	ND	-	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	-	ND	ND
Hexachloroethane	ND	ND	ND	-	ND	ND
Indeno(1,2,3-cd)pyrene	0.025-0.19	ND	ND	-	ND	ND
Isophorone	ND	ND	ND	-	ND	ND
Naphthalene	ND	ND	ND	-	ND	ND
Nitrobenzene	ND	ND	ND	-	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	ND	-	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	-	ND	ND
Pentachlorophenol	ND	ND	ND	-	ND	ND
Phenanthrene	0.031-1.3	ND	ND	-	ND	0.11
Phenol	ND	ND	ND	-	ND	ND
Pyrene	0.029-0.76	ND	ND	-	ND	0.1
Petroleum Products						
Total Petroleum Hydrocarbons - Extractable (DRO)	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	-	-	-	-	-
Inorganics (Metals & General Chemistry)						
Metals						
Aluminum	1290-12500	11000	1300-14600	-	4820-20800	9280-14100
Antimony	0.26-1410	ND	ND	-	ND	ND
Arsenic	0.89-24.6	9.9	1-10.2	-	5.7-18.6	7.3-18
Barium	6.3-85.8	72.2	45-49.2	-	7.7-146	68-137
Beryllium	0.19-1.7	0.74	0.35-0.64	-	0.18-10.5	0.27-1.3
Cadmium	0.049-3.7	0.49	0.32-0.32	-	0.062-0.71	0.084-0.75
Chromium	2.4-30.4	18.4	6.7-51	-	6.8-57.8	17.4-28.3
Cobalt	0.88-17	14.1	0.95-7.7	-	2-12.2	6.9-17.2
Copper	1.8-654	14.5	2.7-12.5	-	9.6-47.5	11.8-42.1
Iron	2830-30400	22800	2900-49400	-	8710-41800	16100-34600
Lead	1.3-10600	21.4	2.2-18	-	7.4-22.5	20.1-37.3
Manganese	34.7-804	492	57.4-451	-	42.4-1200	276-1260
Mercury	0.023-0.17	0.067	0.057-0.057	-	0.033-0.07	0.057-0.25
Nickel	1.9-42.6	22.1	4.8-8.7	-	7.7-151	12.3-65
Selenium	0.35-0.82	ND	0.8-2.4	-	0.39-0.91	0.66-1.3
Silver	2.9-2.9	ND	ND	-	ND	ND
Thallium	0.47-0.92	ND	0.67	-	0.86-1.2	0.77-1.1
Vanadium	3.8-25.9	28.2	3.3-92.6	-	9-81.1	24.9-41
Zinc	16.4-272	53.6	27.3-40.7	-	26-141	45.7-135
General Chemistry						
Chloride	-	-	-	-	-	-
Cyanide (amenable)	0.12-0.22	ND	ND	-	ND	ND
Cyanide (total)	0.12-0.34	ND	ND	-	ND	ND
Sulfide	-	-	-	-	-	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	-	WestPlantOther	EastPlantOther	GMIndus
PCBs				
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	0.0097-340	0.077-0.28	0.04-330	ND
Aroclor-1248 (PCB-1248)	0.007-5600	0.011-16	0.008-110	0.0089 - 0.27
Aroclor-1254 (PCB-1254)	0.0082-110	0.013-0.94	0.014-12	ND
Aroclor-1260 (PCB-1260)	0.0058-270	0.018-1.1	0.013-18	0.036
Total PCBs	0007-5600	0.011-17.1	0.008-330	0.0089 - 0.27
Volatile Organic Compounds (VOCs)				
1,1,1-Trichloroethane	ND	-	-	-
1,1,2,2-Tetrachloroethane	ND	-	-	-
1,1,2-Trichloroethane	ND	-	-	-
1,1-Dichloroethane	ND	-	-	-
1,1-Dichloroethene	ND	-	-	-
1,2,4-Trichlorobenzene	ND	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ND	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	ND	-	-	-
1,2-Dichlorobenzene	ND	-	-	-
1,2-Dichloroethane	ND	-	-	-
1,2-Dichloropropane	ND	-	-	-
1,3-Dichlorobenzene	ND	-	-	-
1,4-Dichlorobenzene	ND	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	ND	-	-	-
2-Hexanone	ND	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	-	-	-
Acetone	0.0065-0.015	-	-	-
Benzene	ND	-	-	-
Bromodichloromethane	ND	-	-	-
Bromoform	ND	-	-	-
Bromomethane (Methyl bromide)	ND	-	-	-
Carbon disulfide	ND	-	-	-
Carbon tetrachloride	ND	-	-	-
Chlorobenzene	0.00039-0.00045	-	-	-
Chloroethane	ND	-	-	-
Chloroform (Trichloromethane)	ND	-	-	-
Chloromethane (Methyl chloride)	ND	-	-	-
cis-1,2-Dichloroethene	ND	-	-	-
cis-1,3-Dichloropropene	ND	-	-	-
Cyclohexane	ND	-	-	-
Dibromochloromethane	ND	-	-	-
Dichlorodifluoromethane (CFC-12)	ND	-	-	-
Ethylbenzene	ND	-	-	-
Isopropyl benzene	ND	-	-	-
Methyl acetate	ND	-	-	-
Methyl cyclohexane	ND	-	-	-
Methyl tert butyl ether (MTBE)	ND	-	-	-
Methylene chloride	ND	-	-	-
Styrene	ND	-	-	-
Tetrachloroethene	ND	-	-	-
Toluene	ND	-	-	-
trans-1,2-Dichloroethene	ND	-	-	-
trans-1,3-Dichloropropene	ND	-	-	-
Trichloroethene	ND	-	-	-
Trichlorofluoromethane (CFC-11)	ND	-	-	-
Trifluorotrichloroethane (Freon 113)	ND	-	-	-
Vinyl chloride	ND	-	-	-
Xylenes (total)	ND	-	-	-
Semi-Volatile Organic Compounds (SVOCs)				
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	-	-	-
2,4,5-Trichlorophenol	ND	-	-	-
2,4,6-Trichlorophenol	ND	-	-	-
2,4-Dichlorophenol	ND	-	-	-
2,4-Dimethylphenol	ND	-	-	-
2,4-Dinitrophenol	ND	-	-	-
2,4-Dinitrotoluene	ND	-	-	-
2,6-Dinitrotoluene	ND	-	-	-
2-Chloronaphthalene	ND	-	-	-
2-Chlorophenol	ND	-	-	-
2-Methylnaphthalene	ND	-	-	-
2-Methylphenol	ND	-	-	-
2-Nitroaniline	ND	-	-	-
2-Nitrophenol	ND	-	-	-
3&4-Methylphenol	-	-	-	-
3,3'-Dichlorobenzidine	ND	-	-	-
3-Nitroaniline	ND	-	-	-
4,6-Dinitro-2-methylphenol	ND	-	-	-
4-Bromophenyl phenyl ether	ND	-	-	-
4-Chloro-3-methylphenol	ND	-	-	-
4-Chloroaniline	ND	-	-	-
4-Chlorophenyl phenyl ether	ND	-	-	-

Table 7.1.4

Matrix Detection Summary – Soil
GM GPS Bedford Facility
Bedford, Indiana

Area:	-	WestPlantOther	EastPlantOther	GMIndus
4-Methylphenol	ND	-	-	-
4-Nitroaniline	ND	-	-	-
4-Nitrophenol	ND	-	-	-
Acenaphthene	ND	-	-	-
Acenaphthylene	ND	-	-	-
Acetophenone	ND	-	-	-
Anthracene	ND	-	-	-
Atrazine	ND	-	-	-
Benzaldehyde	0.08-0.08	-	-	-
Benzo(a)anthracene	ND	-	-	-
Benzo(a)pyrene	0.024-0.024	-	-	-
Benzo(b)fluoranthene	0.038-0.038	-	-	-
Benzo(g,h,i)perylene	ND	-	-	-
Benzo(k)fluoranthene	ND	-	-	-
Biphenyl (1,1-Biphenyl)	ND	-	-	-
bis(2-Chloroethoxy)methane	ND	-	-	-
bis(2-Chloroethyl)ether	ND	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	0.12-0.12	-	-	-
Butyl benzylphthalate (BBP)	ND	-	-	-
Caprolactam	ND	-	-	-
Carbazole	ND	-	-	-
Chrysene	ND	-	-	-
Dibenz(a,h)anthracene	ND	-	-	-
Dibenzofuran	ND	-	-	-
Diethyl phthalate	ND	-	-	-
Dimethyl phthalate	ND	-	-	-
Di-n-butylphthalate (DBP)	ND	-	-	-
Di-n-octyl phthalate (DnOP)	ND	-	-	-
Fluoranthene	0.021-0.033	-	-	-
Fluorene	ND	-	-	-
Hexachlorobenzene	ND	-	-	-
Hexachlorobutadiene	ND	-	-	-
Hexachlorocyclopentadiene	ND	-	-	-
Hexachloroethane	ND	-	-	-
Indeno(1,2,3-cd)pyrene	0.032-0.032	-	-	-
Isophorone	ND	-	-	-
Naphthalene	ND	-	-	-
Nitrobenzene	ND	-	-	-
N-Nitrosodi-n-propylamine	ND	-	-	-
N-Nitrosodiphenylamine	ND	-	-	-
Pentachlorophenol	ND	-	-	-
Phenanthrene	0.018-0.018	-	-	-
Phenol	ND	-	-	-
Pyrene	0.018-0.025	-	-	-
Petroleum Products				
Total Petroleum Hydrocarbons - Extractable (DRO)	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	-	-	-	-
Inorganics (Metals & General Chemistry)				
Metals				
Aluminum	10400-18900	-	-	-
Antimony	0.39	-	-	-
Arsenic	7-10.1	-	-	-
Barium	71.8-85.5	-	-	-
Beryllium	0.21-0.88	-	-	-
Cadmium	0.037-0.13	-	-	-
Chromium	17.4-25.3	-	-	-
Cobalt	11.2-14.6	-	-	-
Copper	11.2-313	-	-	-
Iron	14400-19800	-	-	-
Lead	15-43.9	-	-	-
Manganese	707-1280	-	-	-
Mercury	0.063-0.15	-	-	-
Nickel	13-44.3	-	-	-
Selenium	0.74-0.76	-	-	-
Silver	ND	-	-	-
Thallium	1.3	-	-	-
Vanadium	24.2-34.6	-	-	-
Zinc	41.2-148	-	-	-
General Chemistry				
Chloride	-	-	-	-
Cyanide (amenable)	ND	-	-	-
Cyanide (total)	0.18	-	-	-
Sulfide	-	-	-	-

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.

All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A004	A007	A008	A011	A015	A021
PCBs							
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	0.69	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	11-78	ND	ND	ND
Aroclor-1242 (PCB-1242)	ND	ND	ND	0.085-72	ND	ND	ND
Aroclor-1248 (PCB-1248)	0.18-1.5	2.1-2.3	ND	10-10	ND	ND	ND
Aroclor-1254 (PCB-1254)	0.073-0.073	ND	ND	ND	ND	ND	ND
Aroclor-1260 (PCB-1260)	0.078-0.96	ND	ND	0.077-0.57	ND	0.042	0.052
Total PCBs	0.073-1.5	2.1-2.3	ND	0.077-78	0.69	0.042	0.052
PCBs, dissolved							
Aroclor-1016 (PCB-1016) (dissolved)	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221) (dissolved)	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232) (dissolved)	ND	ND	ND	1.2	ND	ND	ND
Aroclor-1242 (PCB-1242) (dissolved)	ND	ND	ND	0.29-0.82	ND	ND	ND
Aroclor-1248 (PCB-1248) (dissolved)	ND	0.83-1.2	ND	ND	ND	ND	ND
Aroclor-1254 (PCB-1254) (dissolved)	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260 (PCB-1260) (dissolved)	ND	ND	0.062	ND	ND	ND	ND
Total PCBs (dissolved)	ND	0.83-1.2	0.062	0.29-1.2	ND	ND	ND
Volatile Organic Compounds (VOCs)							
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	-	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	ND	-	ND	ND	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	ND	-	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	3.5-3.9	ND	0.18-0.4	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	0.21-2.2	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	0.39-6.2	ND	ND	ND
2-Butanone (Methyl ethyl ketone) (MEK)	0.73-11	ND	-	ND	ND	0.88	ND
2-Chloroethyl vinyl ether	-	-	ND	ND	-	-	-
2-Hexanone	ND	ND	-	ND	ND	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	0.54-0.62	ND	-	ND	ND	ND	ND
Acetone	ND	ND	-	ND	ND	ND	ND
Benzene	ND	1.5-1.6	ND	0.31-0.31	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	0.97	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	0.27	ND	-	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	140-150	ND	0.25-1.7	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	0.35-5.1	ND	ND	0.32-0.32	ND	6	ND
Chloromethane (Methyl chloride)	ND	ND	ND	0.16-0.19	ND	ND	ND
cis-1,2-Dichloroethene	2-2	ND	-	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	ND	ND	-	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND
Isopropyl benzene	ND	ND	-	ND	ND	ND	ND
Methyl acetate	ND	ND	-	ND	ND	ND	ND
Methyl cyclohexane	ND	ND	-	ND	ND	ND	ND
Methyl tert butyl ether (MTBE)	ND	ND	-	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	-	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND
Toluene	0.48-8.4	ND	ND	0.21-0.31	ND	3.9-9.7	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	-	ND	ND	ND	ND
Trichlorofluoromethane (CFC-11)	ND	ND	ND	ND	ND	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	ND	-	ND	ND	ND	ND
Vinyl chloride	0.89-8.6	5.3	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	-	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)							
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	ND	-	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	-	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	-	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	-	ND	ND	ND	ND
2,4-Dimethylphenol	3.4	ND	-	1.1-1.1	ND	ND	ND
2,4-Dinitrophenol	ND	ND	-	ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	-	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	-	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	-	ND	ND	ND	ND
2-Chlorophenol	ND	ND	-	ND	ND	ND	ND

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A004	A007	A008	A011	A015	A021
2-Methylnaphthalene	1.2	ND	-	ND	ND	ND	ND
2-Methylphenol	ND	ND	-	ND	ND	ND	ND
2-Nitroaniline	ND	ND	-	ND	ND	ND	ND
2-Nitrophenol	ND	ND	-	ND	ND	ND	ND
3&4-Methylphenol	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	ND	ND	-	ND	ND	ND	ND
3-Nitroaniline	ND	ND	-	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	-	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	-	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	-	ND	ND	ND	ND
4-Chloroaniline	ND	ND	-	ND	ND	ND	ND
4-Chlorophenyl phenyl ether	ND	ND	-	ND	ND	ND	ND
4-Methylphenol	ND	ND	-	ND	ND	ND	ND
4-Nitroaniline	ND	ND	-	ND	ND	ND	ND
4-Nitrophenol	ND	ND	-	ND	ND	ND	ND
Acenaphthene	ND	ND	-	1.9	ND	ND	ND
Acenaphthylene	ND	ND	-	ND	ND	ND	ND
Acetophenone	ND	ND	-	ND	ND	ND	ND
Anthracene	ND	ND	-	ND	ND	ND	ND
Atrazine	ND	ND	-	ND	ND	ND	ND
Benzaldehyde	ND	ND	-	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	-	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	-	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	-	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	-	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	-	ND	ND	ND	ND
Biphenyl (1,1-Biphenyl)	ND	ND	-	ND	ND	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	-	ND	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	-	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ND	ND	-	0.67-0.8	ND	ND	ND
Butyl benzylphthalate (BBP)	ND	ND	-	0.61-3.4	ND	ND	ND
Caprolactam	ND	ND	-	0.91-620	92	ND	ND
Carbazole	ND	ND	-	ND	ND	ND	ND
Chrysene	ND	ND	-	ND	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	-	ND	ND	ND	ND
Dibenzofuran	ND	ND	-	ND	ND	ND	ND
Diethyl phthalate	0.76-11	ND	-	ND	ND	ND	ND
Dimethyl phthalate	ND	ND	-	ND	ND	ND	ND
Di-n-butylphthalate (DBP)	0.64-3.1	ND	-	0.73-0.73	ND	1.6	ND
Di-n-octyl phthalate (DnOP)	ND	ND	-	ND	ND	ND	ND
Fluoranthene	ND	ND	-	ND	ND	ND	ND
Fluorene	ND	ND	-	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	-	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	-	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	-	ND	ND	ND	ND
Hexachloroethane	ND	ND	-	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	-	ND	ND	ND	ND
Isophorone	ND	ND	-	ND	ND	ND	ND
Naphthalene	ND	ND	-	ND	ND	ND	ND
Nitrobenzene	ND	ND	-	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	ND	ND	-	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	-	ND	ND	ND	ND
Pentachlorophenol	ND	ND	-	ND	ND	ND	ND
Phenanthrene	ND	ND	-	ND	ND	ND	ND
Phenol	ND	ND	-	0.58-120	9	ND	ND
Pyrene	ND	ND	-	ND	ND	ND	ND
Inorganics (Metals & General Chemistry)							
Metals	*12*	*8*	-	*11*	*2*	*8*	*8*
Aluminum	ND	ND	-	33	ND	ND	240
Antimony	ND	ND	-	ND	ND	ND	ND
Arsenic	2.5-4.7	ND	-	ND	ND	3.8	2.9
Barium	32-190	36-37	-	36-220	ND	44-80	29-210
Beryllium	ND	ND	-	ND	ND	ND	ND
Cadmium	0.7-0.7	ND	-	ND	ND	ND	ND
Chromium	2.5-6.9	3.5-3.9	-	3.8-12	ND	ND	ND
Chromium VI (hexavalent)	2.5-6.9	3.5-3.9	-	3.8-12	ND	ND	ND
Cobalt	9.8-180	ND	-	5	ND	0.86-1.7	3.9-17
Copper	35-35	4700	-	2.6-16	ND	ND	ND
Iron	ND	ND	-	64-2600	16300	370-1400	3300
Lead	ND	66-67	-	ND	ND	ND	ND
Manganese	3.2-790	0.091	-	7.1-120	190	14-44	62-2200
Mercury	0.15-0.15	2.9	-	0.05-0.05	ND	ND	ND
Nickel	3-140	ND	-	3.1-11	ND	3.1-11	3.3-130
Selenium	ND	ND	-	ND	ND	ND	ND
Silver	ND	ND	-	ND	ND	ND	ND
Thallium	0.4-2.2	ND	-	ND	ND	ND	ND
Vanadium	ND	ND	-	ND	ND	0.99	ND
Zinc	14-66	ND		15-86	ND	38	52

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A004	A007	A008	A011	A015	A021
Metals - dissolved							
Aluminum (dissolved)	ND	ND	-	40-330	ND	ND	ND
Antimony (dissolved)	ND	ND	-	4.3-4.3	ND	ND	ND
Arsenic (dissolved)	3.3-4.7	36-38	-	ND	ND	7.1	5.2
Barium (dissolved)	31-180	ND	-	35-210	66	50-81	34-210
Beryllium (dissolved)	ND	ND	-	ND	ND	ND	ND
Cadmium (dissolved)	0.67-0.67	ND	-	ND	ND	ND	ND
Chromium (dissolved)	ND	-	-	ND	ND	ND	ND
Chromium VI (hexavalent) (dissolved)	ND	-	-	ND	ND	ND	-
Cobalt (dissolved)	10-110	ND	-	4.9-4.9	ND	1.7-2	4-19
Copper (dissolved)	17	ND	-	2.5-2.7	ND	ND	ND
Iron (dissolved)	88-4100	4600-4700	-	60-2200	16000	1500	3300
Lead (dissolved)	ND	ND	-	ND	ND	ND	ND
Manganese (dissolved)	1.8-510	64-65	-	9.3-120	200	14-50	67-2200
Mercury (dissolved)	0.11-0.13	ND	-	0.04-0.096	ND	ND	ND
Nickel (dissolved)	8-130	ND	-	3.5-9.4	ND	4.2-12	3.2-140
Selenium (dissolved)	ND	ND	-	ND	ND	ND	ND
Silver (dissolved)	ND	ND	-	ND	ND	ND	ND
Thallium (dissolved)	0.41-2	ND	-	ND	ND	ND	ND
Vanadium (dissolved)	ND	ND	-	ND	ND	0.94	ND
Zinc (dissolved)	14-54	ND	-	14-36	ND	34	66
General Chemistry							
Chloride	1100-7630000	-	-	-	-	-	-
Cyanide (amenable)	ND	ND	-	ND	ND	ND	ND
Cyanide (total)	ND	ND	-	ND	ND	ND	ND

Notes:

1 - this area includes groundwater sampling locations in parcels that are not associated with any other areas
All concentrations are in units of µg/L
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.

Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database. All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A021-1	A021-2	A021-4	A030	WestPlantOther	EastPlantOther
PCBs						
Aroclor-1016 (PCB-1016)	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242)	ND	2.9	ND	ND	ND	0.08-510
Aroclor-1248 (PCB-1248)	ND	ND	0.95	ND	ND	0.056-0.45
Aroclor-1254 (PCB-1254)	ND	ND	ND	ND	ND	0.056-0.056
Aroclor-1260 (PCB-1260)	ND	0.078	ND	ND	ND	ND
Total PCBs	ND	2.978	0.95	ND	ND	0.056-510
PCBs, dissolved						
Aroclor-1016 (PCB-1016) (dissolved)	ND	ND	ND	ND	ND	ND
Aroclor-1221 (PCB-1221) (dissolved)	ND	ND	ND	ND	ND	ND
Aroclor-1232 (PCB-1232) (dissolved)	ND	ND	ND	ND	ND	ND
Aroclor-1242 (PCB-1242) (dissolved)	ND	ND	ND	ND	ND	0.064-1.2
Aroclor-1248 (PCB-1248) (dissolved)	ND	1.7	ND	ND	0.46-0.46	0.067-0.15
Aroclor-1254 (PCB-1254) (dissolved)	ND	ND	ND	ND	ND	ND
Aroclor-1260 (PCB-1260) (dissolved)	ND	ND	ND	ND	ND	ND
Total PCBs (dissolved)	ND	1.7	ND	ND	0.46-0.46	0.064-1.2
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	ND	-	ND	-	ND	ND
1,1,2,2-Tetrachloroethane	ND	-	ND	-	ND	ND
1,1,2-Trichloroethane	ND	-	ND	-	ND	ND
1,1-Dichloroethane	ND	-	ND	-	ND	ND
1,1-Dichloroethene	ND	-	ND	-	ND	ND
1,2,4-Trichlorobenzene	ND	-	ND	-	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	-	ND	-	ND	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	-	ND	-	ND	ND
1,2-Dichlorobenzene	ND	-	ND	-	ND	ND
1,2-Dichloroethane	ND	-	ND	-	ND	ND
1,2-Dichloropropane	ND	-	ND	-	ND	ND
1,3-Dichlorobenzene	ND	-	ND	-	ND	0.37
1,4-Dichlorobenzene	ND	-	ND	-	ND	0.43
2-Butanone (Methyl ethyl ketone) (MEK)	ND	-	3.6	-	ND	0.67-1.5
2-Chloroethyl vinyl ether	-	-	-	-		ND
2-Hexanone	ND	-	ND	-	ND	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	-	ND	-	0.88	ND
Acetone	ND	-	ND	-	ND	4.2-16
Benzene	ND	-	ND	-	ND	ND
Bromodichloromethane	ND	-	ND	-	ND	ND
Bromoform	ND	-	ND	-	ND	ND
Bromomethane (Methyl bromide)	ND	-	ND	-	ND	ND
Carbon disulfide	ND	-	ND	-	0.27-0.35	0.43
Carbon tetrachloride	ND	-	ND	-	ND	ND
Chlorobenzene	ND	-	ND	-	ND	ND
Chloroethane	ND	-	ND	-	ND	ND
Chloroform (Trichloromethane)	ND	-	1.1	-	0.56-1.1	0.82
Chloromethane (Methyl chloride)	ND	-	ND	-	ND	ND
cis-1,2-Dichloroethene	ND	-	ND	-	ND	ND
cis-1,3-Dichloropropene	ND	-	ND	-	ND	ND
Cyclohexane	ND	-	ND	-	ND	ND
Dibromochloromethane	ND	-	ND	-	ND	ND
Dichlorodifluoromethane (CFC-12)	ND	-	ND	-	ND	ND
Ethylbenzene	ND	-	ND	-	ND	ND
Isopropyl benzene	ND	-	ND	-	ND	ND
Methyl acetate	ND	-	ND	-	3.3	ND
Methyl cyclohexane	ND	-	ND	-	ND	ND
Methyl tert butyl ether (MTBE)	ND	-	ND	-	ND	ND
Methylene chloride	ND	-	ND	-	ND	0.32
Styrene	ND	-	ND	-	ND	ND
Tetrachloroethene	ND	-	ND	-	ND	ND
Toluene	0.37	-	66	-	1.2-5.2	0.18-6.6
trans-1,2-Dichloroethene	ND	-	ND	-	ND	0.76
trans-1,3-Dichloropropene	ND	-	ND	-	ND	ND
Trichloroethene	ND	-	ND	-	ND	ND
Trichlorofluoromethane (CFC-11)	ND	-	ND	-	ND	ND
Trifluorotrichloroethane (Freon 113)	ND	-	ND	-	ND	ND
Vinyl chloride	ND	-	ND	-	ND	0.31
Xylenes (total)	ND	-	ND	-	ND	ND
Semi-Volatile Organic Compounds (SVOCs)						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	-	ND	-	ND	ND
2,4,5-Trichlorophenol	ND	-	ND	-	ND	ND
2,4,6-Trichlorophenol	ND	-	ND	-	ND	ND
2,4-Dichlorophenol	ND	-	ND	-	ND	ND
2,4-Dimethylphenol	ND	-	ND	-	ND	0.64
2,4-Dinitrophenol	ND	-	ND	-	ND	ND
2,4-Dinitrotoluene	ND	-	ND	-	ND	ND
2,6-Dinitrotoluene	ND	-	ND	-	ND	ND
2-Chloronaphthalene	ND	-	ND	-	ND	ND
2-Chlorophenol	ND	-	ND	-	ND	ND

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A021-1	A021-2	A021-4	A030	WestPlantOther	EastPlantOther
2-Methylnaphthalene	ND	-	ND	-	ND	ND
2-Methylphenol	ND	-	ND	-	ND	ND
2-Nitroaniline	ND	-	ND	-	ND	ND
2-Nitrophenol	ND	-	ND	-	ND	ND
3&4-Methylphenol	-	-	-	-	-	--
3,3'-Dichlorobenzidine	ND	-	ND	-	ND	ND
3-Nitroaniline	ND	-	ND	-	ND	ND
4,6-Dinitro-2-methylphenol	ND	-	ND	-	ND	ND
4-Bromophenyl phenyl ether	ND	-	ND	-	ND	ND
4-Chloro-3-methylphenol	ND	-	ND	-	ND	ND
4-Chloroaniline	ND	-	ND	-	ND	ND
4-Chlorophenyl phenyl ether	ND	-	ND	-	ND	ND
4-Methylphenol	ND	-	ND	-	9.6	ND
4-Nitroaniline	ND	-	ND	-	ND	ND
4-Nitrophenol	ND	-	ND	-	ND	ND
Acenaphthene	ND	-	ND	-	ND	ND
Acenaphthylene	ND	-	ND	-	ND	ND
Acetophenone	ND	-	ND	-	ND	ND
Anthracene	ND	-	ND	-	ND	ND
Atrazine	ND	-	ND	-	ND	ND
Benzaldehyde	ND	-	ND	-	ND	ND
Benzo(a)anthracene	ND	-	ND	-	ND	ND
Benzo(a)pyrene	ND	-	ND	-	ND	ND
Benzo(b)fluoranthene	ND	-	ND	-	ND	ND
Benzo(g,h,i)perylene	ND	-	ND	-	ND	0.28
Benzo(k)fluoranthene	ND	-	ND	-	ND	ND
Biphenyl (1,1-Biphenyl)	ND	-	ND	-	ND	ND
bis(2-Chloroethoxy)methane	ND	-	ND	-	ND	ND
bis(2-Chloroethyl)ether	ND	-	ND	-	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ND	-	3.1	-	ND	4.5-6.9
Butyl benzylphthalate (BBP)	ND	-	ND	-	ND	ND
Caprolactam	ND	-	ND	-	1	ND
Carbazole	ND	-	ND	-	ND	ND
Chrysene	ND	-	ND	-	ND	ND
Dibenz(a,h)anthracene	ND	-	ND	-	ND	0.39
Dibenzofuran	ND	-	ND	-	ND	ND
Diethyl phthalate	ND	-	3.7	-	5.6-59	0.76-1.9
Dimethyl phthalate	ND	-	ND	-	ND	ND
Di-n-butylphthalate (DBP)	ND	-	5.3	-	5-19	0.76-2
Di-n-octyl phthalate (DnOP)	ND	-	ND	-	ND	0.69
Fluoranthene	ND	-	ND	-	ND	ND
Fluorene	ND	-	ND	-	ND	ND
Hexachlorobenzene	ND	-	ND	-	ND	ND
Hexachlorobutadiene	ND	-	ND	-	ND	ND
Hexachlorocyclopentadiene	ND	-	ND	-	ND	ND
Hexachloroethane	ND	-	ND	-	ND	ND
Indeno(1,2,3-cd)pyrene	ND	-	ND	-	ND	ND
Isophorone	ND	-	ND	-	ND	ND
Naphthalene	ND	-	ND	-	ND	ND
Nitrobenzene	ND	-	ND	-	ND	ND
N-Nitrosodi-n-propylamine	ND	-	ND	-	ND	ND
N-Nitrosodiphenylamine	ND	-	ND	-	ND	ND
Pentachlorophenol	ND	-	ND	-	ND	ND
Phenanthrene	ND	-	ND	-	ND	ND
Phenol	ND	-	ND	-	63	ND
Pyrene	ND	-	ND	-	ND	ND
Inorganics (Metals & General Chemistry)						
Metals	*7*	-	*8*	-	*8*	*9*
Aluminum	ND	-	ND	-	ND	750
Antimony	ND	-	ND	-	ND	ND
Arsenic	3.6	-	12	-	3.5	4.3
Barium	ND	-	44	-	85-210	37-87
Beryllium	ND	-	ND	-	0.62	ND
Cadmium	0.4	-	ND	-	ND	ND
Chromium	ND	-	ND	-	5.2-210	6.4
Chromium VI (hexavalent)	ND	-	ND	-	ND	ND
Cobalt	ND	-	4	-	ND	0.87-1.1
Copper	ND	-	ND	-	ND	ND
Iron	13300	-	2200	-	170-1700	75-1400
Lead	ND	-	ND	-	ND	ND
Manganese	230	-	14	-	10-76	4.7-74
Mercury	ND	-	ND	-	0.089	ND
Nickel	5.6	-	11	-	ND	4.1-5.2
Selenium	ND	-	ND	-	ND	ND
Silver	ND	-	ND	-	ND	ND
Thallium	ND	-	ND	-	ND	ND
Vanadium	ND	-	ND	-	ND	ND
Zinc	20	-	38	-	17-280	17-320

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	A021-1	A021-2	A021-4	A030	WestPlantOther	EastPlantOther
Metals - dissolved						
Aluminum (dissolved)	ND	-	ND	-	ND	ND
Antimony (dissolved)	ND	-	ND	-	ND	ND
Arsenic (dissolved)	ND	-	13	-	2.3-3.1	2.7-3.9
Barium (dissolved)	ND	-	41	-	81-150	36-81
Beryllium (dissolved)	ND	-	ND	-	ND	ND
Cadmium (dissolved)	0.57	-	ND	-	ND	0.32-0.32
Chromium (dissolved)	ND	-	ND	-	6.3-430	3.6
Chromium VI (hexavalent) (dissolved)	-	-	-	-	ND	ND
Cobalt (dissolved)	1.6	-	4.4	-	ND	0.87-1.2
Copper (dissolved)	ND	-	ND	-	ND	2.7
Iron (dissolved)	17000	-	1700	-	210-1800	92-1300
Lead (dissolved)	ND	-	ND	-	ND	ND
Manganese (dissolved)	260	-	12	-	10-60	4-70
Mercury (dissolved)	ND	-	ND	-	ND	ND
Nickel (dissolved)	29	-	13	-	ND	3.7-4.5
Selenium (dissolved)	ND	-	ND	-	ND	ND
Silver (dissolved)	ND	-	ND	-	ND	ND
Thallium (dissolved)	ND	-	ND	-	ND	ND
Vanadium (dissolved)	ND	-	ND	-	ND	ND
Zinc (dissolved)	ND	-	ND	-	16-590	14-300
General Chemistry						
Chloride	-	-	-	-	-	-
Cyanide (amenable)	ND	-	ND	-	ND	ND
Cyanide (total)	ND	-	ND	-	ND	ND

Notes:

1 - this area includes groundwater sampling locations in parcels that are not associated with any other areas
All concentrations are in units of µg/L
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.

Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database. All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	Boundary	GMIndus	-[1]
PCBs			
Aroclor-1016 (PCB-1016)	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND
Aroclor-1242 (PCB-1242)	0.095-0.7	ND	0.061-1.3
Aroclor-1248 (PCB-1248)	ND	ND	ND
Aroclor-1254 (PCB-1254)	ND	ND	ND
Aroclor-1260 (PCB-1260)	ND	ND	0.15-0.18
Total PCBs	0.095-0.7	ND	0.061-1.3
PCBs, dissolved			
Aroclor-1016 (PCB-1016) (dissolved)	ND	ND	ND
Aroclor-1221 (PCB-1221) (dissolved)	ND	ND	ND
Aroclor-1232 (PCB-1232) (dissolved)	ND	ND	ND
Aroclor-1242 (PCB-1242) (dissolved)	0.48	0.95-1.1	0.3
Aroclor-1248 (PCB-1248) (dissolved)	ND	ND	0.09-0.15
Aroclor-1254 (PCB-1254) (dissolved)	ND	ND	ND
Aroclor-1260 (PCB-1260) (dissolved)	ND	ND	0.068-0.068
Total PCBs (dissolved)	0.48	0.95-1.1	0.068-0.3
Volatile Organic Compounds (VOCs)			
1,1,1-Trichloroethane	ND	-	ND
1,1,2,2-Tetrachloroethane	ND	-	ND
1,1,2-Trichloroethane	ND	-	ND
1,1-Dichloroethane	ND	-	ND
1,1-Dichloroethene	ND	-	ND
1,2,4-Trichlorobenzene	ND	-	ND
1,2-Dibromo-3-chloropropane (DBCP)	ND	-	ND
1,2-Dibromoethane (Ethylene dibromide)	ND	-	ND
1,2-Dichlorobenzene	ND	-	ND
1,2-Dichloroethane	ND	-	ND
1,2-Dichloropropane	ND	-	ND
1,3-Dichlorobenzene	ND	-	ND
1,4-Dichlorobenzene	ND	-	ND
2-Butanone (Methyl ethyl ketone) (MEK)	ND	-	ND
2-Chloroethyl vinyl ether	-	-	-
2-Hexanone	ND	-	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	-	ND
Acetone	ND	-	0.94-2.5
Benzene	ND	-	ND
Bromodichloromethane	ND	-	ND
Bromoform	ND	-	ND
Bromomethane (Methyl bromide)	ND	-	ND
Carbon disulfide	ND	-	0.22
Carbon tetrachloride	ND	-	ND
Chlorobenzene	ND	-	0.24
Chloroethane	ND	-	ND
Chloroform (Trichloromethane)	ND	-	0.21-1
Chloromethane (Methyl chloride)	ND	-	0.2
cis-1,2-Dichloroethene	ND	-	3.6
cis-1,3-Dichloropropene	ND	-	ND
Cyclohexane	ND	-	ND
Dibromochloromethane	ND	-	ND
Dichlorodifluoromethane (CFC-12)	ND	-	ND
Ethylbenzene	ND	-	ND
Isopropyl benzene	ND	-	ND
Methyl acetate	ND	-	ND
Methyl cyclohexane	ND	-	ND
Methyl tert butyl ether (MTBE)	ND	-	ND
Methylene chloride	ND	-	ND
Styrene	ND	-	ND
Tetrachloroethene	ND	-	ND
Toluene	8.6	-	0.18-2.7
trans-1,2-Dichloroethene	ND	-	0.5
trans-1,3-Dichloropropene	ND	-	ND
Trichloroethene	ND	-	0.37
Trichlorofluoromethane (CFC-11)	ND	-	ND
Trifluorotrichloroethane (Freon 113)	ND	-	ND
Vinyl chloride	ND	-	0.86
Xylenes (total)	ND	-	ND
Semi-Volatile Organic Compounds (SVOCs)			
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	-	ND
2,4,5-Trichlorophenol	ND	-	ND
2,4,6-Trichlorophenol	ND	-	ND
2,4-Dichlorophenol	ND	-	ND
2,4-Dimethylphenol	ND	-	ND
2,4-Dinitrophenol	ND	-	ND
2,4-Dinitrotoluene	ND	-	ND
2,6-Dinitrotoluene	ND	-	ND
2-Chloronaphthalene	ND	-	ND
2-Chlorophenol	ND	-	ND

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	Boundary	GMIndus	-[1]
2-Methylnaphthalene	ND	-	ND
2-Methylphenol	ND	-	ND
2-Nitroaniline	ND	-	ND
2-Nitrophenol	ND	-	ND
3&4-Methylphenol	-	-	ND
3,3'-Dichlorobenzidine	ND	-	ND
3-Nitroaniline	ND	-	ND
4,6-Dinitro-2-methylphenol	ND	-	ND
4-Bromophenyl phenyl ether	ND	-	ND
4-Chloro-3-methylphenol	ND	-	ND
4-Chloroaniline	ND	-	ND
4-Chlorophenyl phenyl ether	ND	-	ND
4-Methylphenol	ND	-	ND
4-Nitroaniline	ND	-	ND
4-Nitrophenol	ND	-	ND
Acenaphthene	ND	-	0.18
Acenaphthylene	ND	-	0.21
Acetophenone	ND	-	ND
Anthracene	ND	-	ND
Atrazine	ND	-	ND
Benzaldehyde	ND	-	ND
Benzo(a)anthracene	ND	-	ND
Benzo(a)pyrene	ND	-	ND
Benzo(b)fluoranthene	ND	-	ND
Benzo(g,h,i)perylene	ND	-	ND
Benzo(k)fluoranthene	ND	-	ND
Biphenyl (1,1-Biphenyl)	ND	-	ND
bis(2-Chloroethoxy)methane	ND	-	ND
bis(2-Chloroethyl)ether	ND	-	18
bis(2-Ethylhexyl)phthalate (DEHP)	ND	-	0.33-1.6
Butyl benzylphthalate (BBP)	ND	-	0.45-1.8
Caprolactam	ND	-	18-2000
Carbazole	ND	-	ND
Chrysene	ND	-	ND
Dibenz(a,h)anthracene	ND	-	ND
Dibenzofuran	ND	-	ND
Diethyl phthalate	0.89	-	2-31
Dimethyl phthalate	ND	-	ND
Di-n-butylphthalate (DBP)	0.76	-	0.34-3.1
Di-n-octyl phthalate (DnOP)	ND	-	1.4-1.5
Fluoranthene	ND	-	ND
Fluorene	ND	-	ND
Hexachlorobenzene	ND	-	ND
Hexachlorobutadiene	ND	-	ND
Hexachlorocyclopentadiene	ND	-	ND
Hexachloroethane	ND	-	ND
Indeno(1,2,3-cd)pyrene	ND	-	ND
Isophorone	ND	-	ND
Naphthalene	ND	-	ND
Nitrobenzene	ND	-	ND
N-Nitrosodi-n-propylamine	ND	-	ND
N-Nitrosodiphenylamine	ND	-	ND
Pentachlorophenol	ND	-	ND
Phenanthrene	ND	-	ND
Phenol	ND	-	4.3
Pyrene	ND	-	ND
Inorganics (Metals & General Chemistry)			
Metals	*3*	-	*11*
Aluminum	ND		50
Antimony	ND	-	4.6
Arsenic	2.3	-	2.6-2.7
Barium	73	-	47-140
Beryllium	ND	-	ND
Cadmium	ND	-	ND
Chromium	ND	-	ND
Chromium VI (hexavalent)	ND	-	ND
Cobalt	ND	-	2
Copper	ND	-	3.6
Iron	87	-	56-1900
Lead	ND	-	2.8
Manganese	ND	-	3.8-68
Mercury	ND	-	ND
Nickel	ND	-	2.8-24
Selenium	ND	-	ND
Silver	ND	-	ND
Thallium	ND	-	ND
Vanadium	ND	-	ND
Zinc	ND	-	25-530

Table 7.1.5

Matrix Detection Summary – Groundwater
GM GPS Bedford Facility
Bedford, Indiana

Area:	Boundary	GMIndus	-[1]
Metals - dissolved			
Aluminum (dissolved)	ND		ND
Antimony (dissolved)	ND	-	11
Arsenic (dissolved)	ND	-	ND
Barium (dissolved)	70	-	48-140
Beryllium (dissolved)	ND	-	ND
Cadmium (dissolved)	ND	-	ND
Chromium (dissolved)	ND	-	7.5
Chromium VI (hexavalent) (dissolved)	ND	-	ND
Cobalt (dissolved)	ND	-	2.2
Copper (dissolved)	ND	-	ND
Iron (dissolved)	89	-	51-1400
Lead (dissolved)	ND	-	ND
Manganese (dissolved)	8.5	-	3.3-59
Mercury (dissolved)	ND	-	ND
Nickel (dissolved)	ND	-	4.8-27
Selenium (dissolved)	ND	-	ND
Silver (dissolved)	ND	-	ND
Thallium (dissolved)	ND	-	ND
Vanadium (dissolved)	ND	-	ND
Zinc (dissolved)	ND	-	16-520
General Chemistry			
Chloride	-	-	-
Cyanide (amenable)	ND	-	31-31
Cyanide (total)	ND	-	44-44

Notes:

1 - this area includes groundwater sampling locations in parcels that are not associated with any other areas
All concentrations are in units of µg/L
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.

Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database. All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.6

Matrix Detection Summary – Bedrock
GM GPS Bedford Facility
Bedford, Indiana

Area:	**A009**
PCBs	
Aroclor-1016 (PCB-1016)	ND
Aroclor-1221 (PCB-1221)	ND
Aroclor-1232 (PCB-1232)	ND
Aroclor-1242 (PCB-1242)	4.3
Aroclor-1248 (PCB-1248)	ND
Aroclor-1254 (PCB-1254)	ND
Aroclor-1260 (PCB-1260)	ND
Total PCBs	4.3
Volatile Organic Compounds (VOCs)	
1,1,1-Trichloroethane	ND
1,1,2,2-Tetrachloroethane	ND
1,1,2-Trichloroethane	ND
1,1-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2,4-Trichlorobenzene	0.0022
1,2-Dibromo-3-chloropropane (DBCP)	ND
1,2-Dibromoethane (Ethylene dibromide)	ND
1,2-Dichlorobenzene	ND
1,2-Dichloroethane	ND
1,2-Dichloropropane	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
2-Butanone (Methyl ethyl ketone) (MEK)	ND
2-Hexanone	ND
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND
Acetone	ND
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane (Methyl bromide)	ND
Carbon disulfide	0.0012
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
Chloroform (Trichloromethane)	0.0016
Chloromethane (Methyl chloride)	ND
cis-1,2-Dichloroethene	ND
cis-1,3-Dichloropropene	ND
Cyclohexane	0.0014
Dibromochloromethane	ND
Dichlorodifluoromethane (CFC-12)	ND
Ethylbenzene	ND
Isopropyl benzene	ND
Methyl acetate	ND
Methyl cyclohexane	ND
Methyl tert butyl ether (MTBE)	ND
Methylene chloride	0.0017
Styrene	ND
Tetrachloroethene	ND
Toluene	0.0014
trans-1,2-Dichloroethene	ND
trans-1,3-Dichloropropene	ND
Trichloroethene	ND
Trichlorofluoromethane (CFC-11)	ND
Trifluorotrichloroethane (Freon 113)	ND
Vinyl chloride	ND
Xylenes (total)	ND
Semi-Volatile Organic Compounds (SVOCs)	
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND
2,4-Dinitrotoluene	ND
2,6-Dinitrotoluene	ND
2-Chloronaphthalene	ND
2-Chlorophenol	ND
2-Methylnaphthalene	0.12-0.26
2-Methylphenol	ND
2-Nitroaniline	ND
2-Nitrophenol	ND
3,3'-Dichlorobenzidine	ND
3-Nitroaniline	ND
4,6-Dinitro-2-methylphenol	ND
4-Bromophenyl phenyl ether	ND
4-Chloro-3-methylphenol	ND
4-Chloroaniline	ND
4-Chlorophenyl phenyl ether	ND
4-Methylphenol	ND
4-Nitroaniline	ND

Table 7.1.6

Matrix Detection Summary – Bedrock
GM GPS Bedford Facility
Bedford, Indiana

Area:	**A009**
4-Nitrophenol	ND
Acenaphthene	ND
Acenaphthylene	ND
Acetophenone	ND
Anthracene	ND
Atrazine	ND
Benzaldehyde	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Biphenyl (1,1-Biphenyl)	ND
bis(2-Chloroethoxy)methane	ND
bis(2-Chloroethyl)ether	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ND
Butyl benzylphthalate (BBP)	ND
Caprolactam	ND
Carbazole	ND
Chrysene	0.075-0.14
Dibenz(a,h)anthracene	ND
Dibenzofuran	0.15-0.17
Diethyl phthalate	ND
Dimethyl phthalate	ND
Di-n-butylphthalate (DBP)	ND
Di-n-octyl phthalate (DnOP)	ND
Fluoranthene	ND
Fluorene	0.086-0.16
Hexachlorobenzene	ND
Hexachlorobutadiene	ND
Hexachlorocyclopentadiene	ND
Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
Naphthalene	ND
Nitrobenzene	ND
N-Nitrosodi-n-propylamine	ND
N-Nitrosodiphenylamine	ND
Pentachlorophenol	ND
Phenanthrene	0.085-0.26
Phenol	ND
Pyrene	0.088-0.094
	ND
Inorganics (Metals & General Chemistry)	
Metals	
Aluminum	716-4960
Antimony	1.2
Arsenic	0.76-29
Barium	5.8-25.7
Beryllium	0.22-0.24
Cadmium	0.062-3.6
Chromium	1.7-6.6
Cobalt	0.47-26.8
Copper	2-182
Iron	2430-29800
Lead	0.53-111
Manganese	71.2-138
Mercury	0.032-0.11
Nickel	1.5-117
Selenium	2.7-39.2
Silver	0.59-5.5
Thallium	0.74-3.4
Vanadium	1.2-10.3
Zinc	11.6-190
General Chemistry	
Cyanide (amenable)	ND
Cyanide (total)	ND

Notes:

All concentrations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.
All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.7

Matrix Detection Summary – NAPL
GM GPS Bedford Facility Bedford, Indiana

Area:	A007	A008	A030
PCBs			
Aroclor-1016 (PCB-1016)	ND	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	ND
Aroclor-1242 (PCB-1242)	81000	130000	400000
Aroclor-1248 (PCB-1248)	ND	ND	ND
Aroclor-1254 (PCB-1254)	8700	ND	ND
Aroclor-1260 (PCB-1260)	ND	ND	ND
Total PCBs	89700	130000	400000
Volatile Organic Compounds (VOCs)			
1,1,1-Trichloroethane	ND	-	ND
1,1,2,2-Tetrachloroethane	ND	-	ND
1,1,2-Trichloroethane	ND	-	ND
1,1-Dichloroethane	ND	-	ND
1,1-Dichloroethene	ND	-	ND
1,2,4-Trichlorobenzene	ND	-	8.9
1,2-Dibromo-3-chloropropane (DBCP)	ND	-	ND
1,2-Dibromoethane (Ethylene Dibromide)	ND	-	ND
1,2-Dichlorobenzene	0.7	-	ND
1,2-Dichloroethane	ND	-	ND
1,2-Dichloropropane	ND	-	ND
1,3-Dichlorobenzene	9.8	-	5.1
1,4-Dichlorobenzene	25	-	6.6
2-Butanone (Methyl Ethyl Ketone)	ND	-	ND
2-Hexanone	ND	-	ND
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ND	-	ND
Acetone	ND	-	ND
Benzene	0.32	-	ND
Bromodichloromethane	ND	-	ND
Bromoform	ND	-	ND
Bromomethane (Methyl Bromide)	ND	-	ND
Carbon disulfide	ND	-	ND
Carbon tetrachloride	ND	-	ND
Chlorobenzene	150	-	ND
Chloroethane	ND	-	ND
Chloroform (Trichloromethane)	ND	-	ND
Chloromethane (Methyl Chloride)	ND	-	ND
cis-1,2-Dichloroethene	ND	-	ND
cis-1,3-Dichloropropene	ND	-	ND
Cyclohexane	ND	-	ND
Dibromochloromethane	ND	-	ND
Dichlorodifluoromethane (CFC-12)	ND	-	ND
Ethylbenzene	ND	-	ND
Isopropylbenzene	4.4	-	ND
Methyl acetate	ND	-	1.7
Methyl cyclohexane	ND	-	ND
Methyl Tert Butyl Ether	ND	-	ND
Methylene chloride	ND	-	ND
Styrene	ND	-	ND
Tetrachloroethene	ND	-	ND
Toluene	ND	-	0.25
trans-1,2-Dichloroethene	ND	-	ND
trans-1,3-Dichloropropene	ND	-	ND
Trichloroethene	0.59	-	ND
Trichlorofluoromethane (CFC-11)	ND	-	ND
Trifluorotrichloroethane (Freon 113)	ND	-	ND
Vinyl chloride	ND	-	ND
Xylene (total)	ND	-	ND
Semi-Volatile Organic Compounds (SVOCs)			
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)	-	-	ND
2,4,5-Trichlorophenol	-	-	ND
2,4,6-Trichlorophenol	-	-	ND
2,4-Dichlorophenol	-	-	ND
2,4-Dimethylphenol	-	-	ND
2,4-Dinitrophenol	-	-	ND
2,4-Dinitrotoluene	-	-	ND
2,6-Dinitrotoluene	-	-	ND
2-Chloronaphthalene	-	-	ND
2-Chlorophenol	-	-	ND
2-Methylnaphthalene	-	-	ND
2-Methylphenol	-	-	ND
2-Nitroaniline	-	-	ND
2-Nitrophenol	-	-	ND
3,3'-Dichlorobenzidine	-	-	ND
3-Nitroaniline	-	-	ND
4,6-Dinitro-2-methylphenol	-	-	ND
4-Bromophenyl phenyl ether	-	-	ND
4-Chloro-3-methylphenol	-	-	ND
4-Chloroaniline	-	-	ND
4-Chlorophenyl phenyl ether	-	-	ND
4-Methylphenol	-	-	ND
4-Nitroaniline	-	-	ND

Table 7.1.7

Matrix Detection Summary – NAPL
GM GPS Bedford Facility Bedford, Indiana

Area:	A007	A008	A030
4-Nitrophenol	-	-	ND
Acenaphthene	-	-	120
Acenaphthylene	-	-	ND
Acetophenone	-	-	ND
Anthracene	-	-	ND
Atrazine	-	-	ND
Benzaldehyde	-	-	ND
Benzo(a)anthracene	-	-	ND
Benzo(a)pyrene	-	-	ND
Benzo(b)fluoranthene	-	-	ND
Benzo(g,h,i)perylene	-	-	ND
Benzo(k)fluoranthene	-	-	ND
Biphenyl (1,1-Biphenyl)	-	-	46
bis(2-Chloroethoxy)methane	-	-	ND
bis(2-Chloroethyl)ether	-	-	ND
bis(2-Ethylhexyl)phthalate	-	-	ND
Butyl benzylphthalate	-	-	ND
Caprolactam	-	-	ND
Carbazole	-	-	ND
Chrysene	-	-	ND
Dibenz(a,h)anthracene	-	-	ND
Dibenzofuran	-	-	ND
Diethyl phthalate	-	-	ND
Dimethyl phthalate	-	-	ND
Di-n-butylphthalate	-	-	ND
Di-n-octyl phthalate	-	-	ND
Fluoranthene	-	-	ND
Fluorene	-	-	ND
Hexachlorobenzene	-	-	ND
Hexachlorobutadiene	-	-	ND
Hexachlorocyclopentadiene	-	-	ND
Hexachloroethane	-	-	ND
Indeno(1,2,3-cd)pyrene	-	-	ND
Isophorone	-	-	ND
Naphthalene	-	-	ND
Nitrobenzene	-	-	ND
N-Nitrosodi-n-propylamine	-	-	ND
N-Nitrosodiphenylamine	-	-	ND
Pentachlorophenol	-	-	ND
Phenanthrene	-	-	ND
Phenol	-	-	ND
Pyrene	-	-	ND
Inorganics (Metals & General Chemistry)			
Metals			
Aluminum	-	-	ND
Antimony	-	-	ND
Arsenic	-	-	ND
Barium	-	-	ND
Beryllium	-	-	ND
Cadmium	-	-	ND
Chromium	-	-	ND
Cobalt	-	-	ND
Copper	-	-	ND
Iron	-	-	ND
Lead	-	-	ND
Manganese	-	-	ND
Mercury	-	-	ND
Nickel	-	-	ND
Selenium	-	-	ND
Silver	-	-	ND
Thallium	-	-	ND
Vanadium	-	-	ND
Zinc	-	-	ND
General Chemistry			
Cyanide (amenable)	-	-	0.0018
Cyanide (total)	-	-	ND
Reactive cyanide	-	ND	-

Notes:

All concentations are in units of mg/kg
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.

Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.
All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.1.8

Matrix Detection Summary – Liquid Emulsion
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A006	A007	A030	EastPlantOther
PCBs (mg/kg)					
Aroclor-1016 (PCB-1016)	-	-	ND	-	-
Aroclor-1221 (PCB-1221)	-	-	ND	-	-
Aroclor-1232 (PCB-1232)	-	-	220000	-	-
Aroclor-1242 (PCB-1242)	-	-	380000	-	-
Aroclor-1248 (PCB-1248)	-	-	ND	-	-
Aroclor-1254 (PCB-1254)	-	-	ND	-	-
Aroclor-1260 (PCB-1260)	-	-	4500	-	-
Total PCBs	-	-	38000-224500	-	-
PCBs (mg/L)					
Aroclor-1016 (PCB-1016)	ND	ND	-	ND	ND
Aroclor-1221 (PCB-1221)	ND	ND	-	ND	ND
Aroclor-1232 (PCB-1232)	ND	ND	-	ND	ND
Aroclor-1242 (PCB-1242)	ND	23	-	55-65	0.024
Aroclor-1248 (PCB-1248)	ND	ND	-	ND	ND
Aroclor-1254 (PCB-1254)	ND	ND	-	ND	ND
Aroclor-1260 (PCB-1260)	ND	ND	-	ND	ND
Total PCBs	ND	23	-	55-65	0.024
PCBs, dissolved (mg/L)					
Aroclor-1016 (PCB-1016) (dissolved)	ND	-	-	ND	-
Aroclor-1221 (PCB-1221) (dissolved)	ND	-	-	ND	-
Aroclor-1232 (PCB-1232) (dissolved)	ND	-	-	ND	-
Aroclor-1242 (PCB-1242) (dissolved)	ND	-	-	ND	-
Aroclor-1248 (PCB-1248) (dissolved)	ND	-	-	0.051	-
Aroclor-1254 (PCB-1254) (dissolved)	ND	-	-	ND	-
Aroclor-1260 (PCB-1260) (dissolved)	ND	-	-	ND	-
Total PCBs (dissolved)	ND	-	-	0.051	-
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	ND	-	-	ND	-
1,1,2,2-Tetrachloroethane	ND	-	-	ND	-
1,1,2-Trichloroethane	ND	-	-	ND	-
1,1-Dichloroethane	ND	-	-	ND	-
1,1-Dichloroethene	ND	-	-	ND	-
1,2,4-Trichlorobenzene	ND	-	-	0.00042	-
1,2-Dibromo-3-chloropropane (DBCP)	ND	-	-	ND	-
1,2-Dibromoethane (Ethylene dibromide)	ND	-	-	ND	-
1,2-Dichlorobenzene	ND	-	-	ND	-
1,2-Dichloroethane	ND	-	-	ND	-
1,2-Dichloropropane	ND	-	-	ND	-
1,3-Dichlorobenzene	ND	-	-	0.00033	-
1,4-Dichlorobenzene	ND	-	-	0.00054	-
2-Butanone (Methyl ethyl ketone) (MEK)	ND	-	-	ND	-
2-Hexanone	ND	-	-	ND	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ND	-	-	ND	-
Acetone	ND	-	-	ND	-
Benzene	ND	-	-	0.00043	-
Bromodichloromethane	ND	-	-	0.00057	-
Bromoform	ND	-	-	ND	-
Bromomethane (Methyl bromide)	ND	-	-	ND	-
Carbon disulfide	ND	-	-	0.00037	-
Carbon tetrachloride	ND	-	-	ND	-
Chlorobenzene	ND	-	-	ND	-
Chloroethane	ND	-	-	ND	-
Chloroform (Trichloromethane)	ND	-	-	0.0067	-
Chloromethane (Methyl chloride)	ND	-	-	ND	-
cis-1,2-Dichloroethene	ND	-	-	ND	-
cis-1,3-Dichloropropene	ND	-	-	ND	-
Cyclohexane	ND	-	-	0.00013	-
Dibromochloromethane	ND	-	-	ND	-
Dichlorodifluoromethane (CFC-12)	ND	-	-	ND	-
Ethylbenzene	ND	-	-	0.00026	-
Isopropyl benzene	ND	-	-	ND	-
Methyl acetate	ND	-	-	ND	-
Methyl cyclohexane	ND	-	-	ND	-
Methyl tert butyl ether (MTBE)	ND	-	-	ND	-
Methylene chloride	ND	-	-	ND	-
Styrene	ND	-	-	ND	-
Tetrachloroethene	ND	-	-	ND	-
Toluene	ND	-	-	0.019	-
trans-1,2-Dichloroethene	ND	-	-	ND	-
trans-1,3-Dichloropropene	ND	-	-	ND	-
Trichloroethene	ND	-	-	ND	-
Trichlorofluoromethane (CFC-11)	ND	-	-	ND	-
Trifluorotrichloroethane (Freon 113)	ND	-	-	ND	-
Vinyl chloride	ND	-	-	ND	-
Xylenes (total)	ND	-	-	0.00092	-

Table 7.1.8

Matrix Detection Summary – Liquid Emulsion
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A006	A007	A030	EastPlantOther
Semi-Volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ND	-	-	ND	-
2,4,5-Trichlorophenol	ND	-	-	ND	-
2,4,6-Trichlorophenol	ND	-	-	ND	-
2,4-Dichlorophenol	ND	-	-	ND	-
2,4-Dimethylphenol	ND	-	-	0.07	-
2,4-Dinitrophenol	-	-	-	ND	-
2,4-Dinitrotoluene	ND	-	-	ND	-
2,6-Dinitrotoluene	ND	-	-	ND	-
2-Chloronaphthalene	ND	-	-	ND	-
2-Chlorophenol	ND	-	-	ND	-
2-Methylnaphthalene	ND	-	-	ND	-
2-Methylphenol	ND	-	-	0.0066	-
2-Nitroaniline	ND	-	-	ND	-
2-Nitrophenol	ND	-	-	ND	-
3,3'-Dichlorobenzidine	ND	-	-	ND	-
3-Nitroaniline	ND	-	-	ND	-
4,6-Dinitro-2-methylphenol	ND	-	-	ND	-
4-Bromophenyl phenyl ether	ND	-	-	ND	-
4-Chloro-3-methylphenol	ND	-	-	ND	-
4-Chloroaniline	ND	-	-	ND	-
4-Chlorophenyl phenyl ether	ND	-	-	ND	-
4-Methylphenol	ND	-	-	0.014	-
4-Nitroaniline	ND	-	-	ND	-
4-Nitrophenol	ND	-	-	ND	-
Acenaphthene	ND	-	-	0.0087	-
Acenaphthylene	ND	-	-	ND	-
Acetophenone	ND	-	-	ND	-
Anthracene	ND	-	-	ND	-
Atrazine	ND	-	-	ND	-
Benzaldehyde	ND	-	-	ND	-
Benzo(a)anthracene	ND	-	-	ND	-
Benzo(a)pyrene	ND	-	-	ND	-
Benzo(b)fluoranthene	ND	-	-	ND	-
Benzo(g,h,i)perylene	ND	-	-	ND	-
Benzo(k)fluoranthene	ND	-	-	ND	-
Biphenyl (1,1-Biphenyl)	ND	-	-	0.0038	-
bis(2-Chloroethoxy)methane	ND	-	-	ND	-
bis(2-Chloroethyl)ether	ND	-	-	ND	-
bis(2-Ethylhexyl)phthalate (DEHP)	ND	-	-	ND	-
Butyl benzylphthalate (BBP)	ND	-	-	ND	-
Caprolactam	ND	-	-	ND	-
Carbazole	ND	-	-	ND	-
Chrysene	ND	-	-	ND	-
Dibenz(a,h)anthracene	ND	-	-	ND	-
Dibenzofuran	ND	-	-	ND	-
Diethyl phthalate	ND	-	-	ND	-
Dimethyl phthalate	ND	-	-	ND	-
Di-n-butylphthalate (DBP)	ND	-	-	ND	-
Di-n-octyl phthalate (DnOP)	ND	-	-	ND	-
Fluoranthene	ND	-	-	ND	-
Fluorene	ND	-	-	ND	-
Hexachlorobenzene	ND	-	-	ND	-
Hexachlorobutadiene	ND	-	-	ND	-
Hexachlorocyclopentadiene	ND	-	-	ND	-
Hexachloroethane	ND	-	-	ND	-
Indeno(1,2,3-cd)pyrene	ND	-	-	ND	-
Isophorone	ND	-	-	ND	-
Naphthalene	ND	-	-	ND	-
Nitrobenzene	ND	-	-	ND	-
N-Nitrosodi-n-propylamine	ND	-	-	ND	-
N-Nitrosodiphenylamine	ND	-	-	ND	-
Pentachlorophenol	ND	-	-	ND	-
Phenanthrene	ND	-	-	ND	-
Phenol	ND	-	-	0.057	-
Pyrene	ND	-	-	ND	-

Table 7.1.8

Matrix Detection Summary – Liquid Emulsion
GM GPS Bedford Facility
Bedford, Indiana

Area:	A001	A006	A007	A030	EastPlantOther
Inorganics (Metals & General Chemistry)					
Metals					
Aluminum	ND	-	-	1.2	-
Antimony	ND	-	-	ND	-
Arsenic	ND	-	-	ND	-
Barium	0.68	-	-	0.092	-
Beryllium	ND	-	-	ND	-
Cadmium	ND	-	-	ND	-
Chromium	0.0028	-	-	0.0052	-
Cobalt	0.0014	-	-	0.0024	-
Copper	ND	-	-	0.090	-
Iron	2.8	-	-	22.9	-
Lead	ND	-	-	ND	-
Manganese	2.8	-	-	0.15	-
Mercury	ND	-	-	ND	-
Nickel	0.0058	-	-	0.020	-
Selenium	ND	-	-	ND	-
Silver	ND	-	-	ND	-
Thallium	ND	-	-	ND	-
Vanadium	ND	-	-	0.0029	-
Zinc	ND	-	-	ND	-
Metals, dissolved					
Aluminum (dissolved)	ND	-	-	0.070	-
Antimony (dissolved)	ND	-	-	ND	-
Arsenic (dissolved)	ND	-	-	ND	-
Barium (dissolved)	0.69	-	-	0.10	-
Beryllium (dissolved)	ND	-	-	ND	-
Cadmium (dissolved)	ND	-	-	ND	-
Chromium (dissolved)	ND	-	-	ND	-
Cobalt (dissolved)	0.0014	-	-	ND	-
Copper (dissolved)	ND	-	-	ND	-
Iron (dissolved)	0.087	-	-	0.079	-
Lead (dissolved)	ND	-	-	ND	-
Manganese (dissolved)	2.9	-		ND	-
Mercury (dissolved)	ND	-	-	ND	-
Nickel (dissolved)	0.0054	-	-	ND	-
Selenium (dissolved)	ND	-	-	ND	-
Silver (dissolved)	ND	-	-	ND	-
Thallium (dissolved)	ND	-	-	ND	-
Vanadium (dissolved)	ND	-	-	ND	-
Zinc (dissolved)	ND	-	-	ND	-
General Chemistry					
Chloride	5180	-	-	-	-
Cyanide (amenable)	ND	-	-	0.0023	-
Cyanide (total)	ND	-	-	ND	-

Notes:

All concentrations except for samples collected from A007 are in units of mg/L; as noted samples from A007 are in units of mg/kg.
ND - Not Detected (ND), None of the samples had a detected concentration of the respective constituent.
"-" - None of the samples analyzed at the respective constituent.
Area is a general grouping of sample locations. The areas are identified by a combination of AOIs, Parcel numbers and other distinguishing identifiers. These area groupings are used to streamline the screening process and are a function of querying data from a relational database.
All sample concentration data was included in this screening table including samples that were addressed through intermediate measures such as engineering controls

Table 7.2

AOI 8 NAPL Accumulation and Recovery
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well Number	Date	Initial NAPL Thickness (ft)	NAPL Recovery (gallons)	Water Recovery (gallons)	Final NAPL Thickness (ft)
MW-X209Y053	03/26/08	NM	0.13	0.63	0.80
	04/08/08	0.76	0.03	0.00	0.77
	04/10/08	NA	NA	NA	NA
	04/16/08	0.98	0.33	0.00	0.51
	04/23/08	0.91	0.33	0.00	0.64
	05/07/08	1.24	0.75	0.00	0.45
	05/21/08	0.53	0.06	0.00	0.43
	06/11/08	0.52	0.00	0.00	NM
	06/17/08	0.65	0.00	0.00	NM
	07/02/08	1.31	0.75	0.00	0.58
	07/07/08	NA	NA	NA	NA
	07/10/08	0.56	0.00	0.00	NM
	07/16/08	1.24	0.00	0.00	NM
	07/25/08	1.66	0.00	0.00	NM
	08/21/08	2.50	1.00	0.00	1.46
	Total		**3.38**	**0.63**	
MW-X227Y049	03/26/08	0.39	0.01	0.38	0.80
	04/08/08	0.62	0.40	0.00	0.80
	04/10/08	NA	NA	NA	NA
	04/16/08	0.56	0.05	0.00	0.65
	04/23/08	0.49	0.13	0.00	0.62
	05/07/08	0.47	0.03	0.00	0.62
	05/21/08	0.47	0.01	0.05	0.47
	06/11/08	0.46	0.00	0.00	NM
	06/17/08	0.47	0.00	0.00	NM
	07/02/08	0.47	0.00	0.00	NM
	07/07/08	NA	NA	NA	NA
	07/10/08	NA	NA	NA	NA
	07/16/08	0.41	0.00	0.00	NM
	07/25/08	0.63	0.00	0.00	NM
	08/21/08	0.25	0.00	0.00	NM
	Total		**0.63**	**0.43**	

Table 7.2

AOI 8 NAPL Accumulation and Recovery
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well Number	Date	Initial NAPL Thickness (ft)	NAPL Recovery (gallons)	Water Recovery (gallons)	Final NAPL Thickness (ft)
CH-1B	03/26/08	NM	0.00	0.01	NM
	04/08/08	0.39	1.50	0.00	0.20
	04/10/08	NA	NA	NA	NA
	04/16/08	0.15	0.01	0.00	0.21
	04/23/08	0.17	0.07	0.00	NM
	05/07/08	NM	0.00	0.00	NM
	05/21/08	NM	0.00	0.01	NM
	06/11/08	NA	NA	NA	NA
	06/17/08	NA	NA	NA	NA
	07/02/08	NA	NA	NA	NA
	07/07/08	NA	NA	NA	NA
	07/10/08	NA	NA	NA	NA
	07/16/08	NA	NA	NA	NA
	07/25/08	NA	NA	NA	NA
	08/21/08	NA	NA	NA	NA
	Total		**1.58**	**0.02**	
CH-5	03/26/08	18.41	2.50	0.00	17.31
	04/08/08	NA	NA	NA	NA
	04/10/08	18.75	9.50	0.00	11.10
	04/16/08	18.37	8.50	0.00	10.45
	04/23/08	18.22	6.50	0.00	11.40
	05/07/08	18.29	17.03	0.00	NM
	05/21/08	18.53	10.32	0.06	10.95
	06/11/08	18.51	6.75	0.00	13.55
	06/17/08	18.31	8.00	0.00	11.92
	07/02/08	18.11	9.75	0.00	10.25
	07/07/08	18.11	10.00	0.00	9.89
	07/10/08	NA	NA	NA	NA
	07/16/08	18.09	6.25	0.00	15.25
	07/25/08	NM	5.25	0.00	NM
	08/21/08	17.50	13.00	0.00	3.95
	Total		**113.35**	**0.06**	

Table 7.2

AOI 8 NAPL Accumulation and Recovery
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well Number	Date	Initial NAPL Thickness (ft)	NAPL Recovery (gallons)	Water Recovery (gallons)	Final NAPL Thickness (ft)
CH-2A	03/26/08	6.65	1.75	0.00	5.05
	04/08/08	6.60	0.00	0.00	NM
	04/10/08	NA	NA	NA	NA
	04/16/08	6.60	2.50	0.00	1.70
	04/23/08	2.09	3.75	0.00	0.13
	05/07/08	0.71	4.25	0.00	0.03
	05/21/08	2.99	3.00	0.00	0.00
	06/11/08	3.80	1.75	0.00	0.30
	06/17/08	1.20	1.50	0.00	NM
	07/02/08	1.96	2.00	0.00	0.05
	07/07/08	0.70	2.25	0.00	0.02
	07/10/08	NA	NA	NA	NA
	07/16/08	1.24	2.25	0.00	NM
	07/25/08	1.16	1.75	0.00	NM
	08/21/08	NA	NA	NA	NA
	Total		**26.75**	**0.00**	
Total			145.69	1.14	

Notes:

ft feet
NM Not Measured
NA Not Applicable (Measurement not taken)

Table 7.3

Packer Test Recovery Results
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well Location	Monitoring Zone (ft/bgs)	Matrix	Volume Removed (Gallons)	Recovery Time (Hours)	Notes
CH-1B	---	---	Prior to Removal	---	Measured 2.9 ft of oil prior to testing
	40.6 - 45.6	oily water	1.5	1.75	Measured 0.10 ft of oil
	36.5 - 41.5	oily water	7.0	1.75	2 ft water return, no oil
	32.5 - 37.5	oily water	5.5	1	No recharge
	28.5 - 33.5	oily water	4.0	17	No oil
	26 - 31	oily water	4.0	1	No oil
CH-2A	---	---	Prior to Removal	---	15.6 ft of oil on tape. Removed 9.5 gallons of oil
	37.9 - 42.9	oily water	2.0 (1.25 oil)	1	No oil
	33.9 - 38.9	oily water	1.0	1	No recovery
	29.9 - 34.9	oily water	---	1.5	No recovery
MW-X209Y053	---	---	Prior to Removal	---	12.2 ft of oil on tape
	---	---	---	---	Removed 9 gallons of which 3-4 gallons were oil
	60.5 - 65.5	oily water	4.5 (1.5 oil)		3.4 ft of oil on tape before removal
				2	0.25 ft of oil on tape with 1.5 ft water
				4	No oil
	56 - 61	oily water	---	2.25	No oil
	52 - 57	oily water	---	17	No oil, nothing above packers

Table 7.3

Packer Test Recovery Results
RFI Final Report
GM GPS Bedford Facility
Bedford, Indiana

Well Location	Monitoring Zone (ft/bgs)	Matrix	Volume Removed (Gallons)	Recovery Time (Hours)	Notes
CH-5	---	---	Prior to Removal	---	Measured 14.5 ft of oil
	---	---	---	---	Removed 7.5 gallons of oil prior to packer placement
	39.1 - 46.1	oily water	1.6	1	Measured 11 ft of oil / oily water Product coming in from above packers
MW-X227Y049	---	---	Prior to Removal	---	Measured 6-inches of oil
	---	---	---	---	Removed 6 gallons prior to packer placement
	36.7 - 41.7	oily water	6.0	1.8	No oil
	32 - 37	oily water	--	1.5	No oil, water above packer
	27 - 32	oily water	3.0	2.5	No oil, no water above packer
	20.5 - 27.0	oily water	---	1	No oil or water
AOI 8 SUMP	---	---	---	---	Measured 5 feet of oil / water mixture No oil layer noted

Notes:

bgs below ground surface
ft feet
- - - Not Applicable

Table 9.1: Conceptual Site Model - Scenarios for Potential Human Exposure
GM GPS Bedford Facility, Bedford, Indiana

Receptor Population	Exposure Medium	Exposure Route	Potential Current Exposure?	Potential Future Exposure?	Type of Analysis	Comments
Facility and Non-Residential GM Owned Parcels[1,2]						
Routine Workers	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Quantitative	Exposure to surface soil through incidental ingestion, dermal contact, and inhalation of vapor and particulates is possible in uncapped areas, areas without ground cover, and in those areas where ground cover may be removed.
		inhalation of soil-derived vapors and airborne particulates (wind erosion) in outdoor air	Yes	Yes		
		inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	Quantitative	
	subsurface soil	inhalation of soil-derived vapors in outdoor air	Yes	Yes	Quantitative	
		inhalation of soil-derived vapors that migrate through building foundations into indoor air	Yes	Yes	Quantitative	
	groundwater	incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	No	Not Applicable	Routine worker activities do not involve contact with groundwater. Currently, there are no active potable or nonpotable water wells at the Facility.
		incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	No		
		inhalation of groundwater-derived vapors in outdoor air	Yes	Yes	Quantitative	
		inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	Yes	Yes	Quantitative	
	NAPL[3]	inhalation of vapors in outdoor air	Yes	Yes	Quantitative	
		inhalation of vapors that migrate through building foundations into indoor air	Yes	Yes	Quantitative	
Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	Quantitative	Exposures to surface and subsurface soil during occasional excavations that are not covered in the site HASP are possible in the future.
	groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	Quantitative	Exposures to groundwater during occasional excavations that are not covered in the site HASP are possible in the future.
	sediment	ingestion and dermal contact	No	Yes	Quantitative	Exposures to sediment on-site while performing occassional maintenance activities that are not covered in the site HASP are possible in the future.
	spring and surface water	ingestion, dermal contact, and inhalation of vapor	No	Yes	Quantitative	Exposures to surface and spring water on-site while performing occassional maintenance activities that are not covered in the site HASP are possible in the future.
	NAPL[3]	dermal contact with exposed NAPL; inhalation of vapors from exposed NAPL in work-space air	No	No	Not Applicable	NAPL collected in the West Plant area is much deeper than the depth to which workers are expected to excavate at and around the Facility (about 10 feet).
Construction Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	No	Yes	Quantitative	Exposures to surface and subsurface soil during larger scale construction activities that are not covered in the site HASP are possible in the future.
	groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	Yes	Quantitative	Exposures to groundwater during larger scale construction activities that are not covered in the site HASP are possible in the future.
	NAPL[3]	dermal contact with exposed NAPL; inhalation of vapors from exposed NAPL in work-space air	No	No	Not Applicable	NAPL collected in the West Plant area is much deeper than the depth to which workers are expected to excavate at and around the Facility (about 10 feet).
Trespassers[4]	surface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Quantitative	Exposure to surface soil is possible in uncapped areas, areas without ground cover, and in those areas where ground cover may be removed.
		inhalation of soil-derived vapors and airborne particulates (wind erosion) in outdoor air	Yes	Yes	Quantitative	
	subsurface soil	inhalation of soil-derived vapors in outdoor air	Yes	Yes	Quantitative	
	groundwater	inhalation of groundwater-derived vapors in outdoor air	Yes	Yes	Quantitative	
	sediment	ingestion and dermal contact	Yes	Yes	Quantitative	
	spring and surface water	ingestion, dermal contact, and inhalation of vapor	Yes	Yes	Quantitative	
	NAPL[3]	inhalation of vapors in outdoor air	Yes	Yes	Quantitative	
Off-Site exposures to on-site media[5]						
Resident/Routine Workers/Maintenance Workers	surface and subsurface soil	inhalation of soil-derived vapors and airborne particulates (wind erosion) in outdoor air	Yes	Yes	Quantitative	Soil contamination does not extend off-site. Off-site exposures to exposed on-site soil are possible through inhalation of airborne vapors and dust.
	groundwater	incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	No	Not Applicable	Groundwater is not used by any household in the well survey area around the Facility.
		incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	No		
		inhalation of groundwater-derived vapors in outdoor air	Yes	Yes	Quantitative	
	NAPL[3]	inhalation of vapors in outdoor air	Yes	Yes	Quantitative	NAPL does not extend off-site.

Table 9.1: Conceptual Site Model - Scenarios for Potential Human Exposure
GM GPS Bedford Facility, Bedford, Indiana

Receptor Population	Exposure Medium	Exposure Route	Potential Current Exposure?	Potential Future Exposure?	Type of Analysis	Comments
Residential GM Owned Parcels[5,6]						
Residents	surface and subsurface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Quantitative	Exposure to post-remediation concentrations of PCBs in soil through incidental ingestion, dermal contact, and inhalation of vapor and particulates is possible.
		inhalation of soil-derived vapors and airborne particulates (wind erosion) in outdoor air	Yes	Yes	Quantitative	
	groundwater	incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	No	Not Applicable	Groundwater is not used by any household in the well survey area around the Facility. Groundwater use at these parcels is prevented through a deed restriction.
		incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	No	Not Applicable	
		inhalation of groundwater-derived vapors in outdoor air	No	No	Not Applicable	
		inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	No	Not Applicable	
	spring and surface water	incidental ingestion, dermal contact, and inhalation of vapor	No	No	Not Applicable	
Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	Yes	Yes	Quantitative	Exposure to post-remediation concentrations of PCBs in soil through incidental ingestion, dermal contact, and inhalation of vapor and particulates is possible.
	groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	No	Not Applicable	
	spring and surface water	incidental ingestion, dermal contact, and inhalation of vapor	No	No	Not Applicable	
Non-GM Owned Parcels[5,7]						
Residents	surface and subsurface soil	incidental ingestion of and dermal contact with surface soil	Yes	Yes	Quantitative	Exposure to post-remediation concentrations of PCBs in soil through incidental ingestion, dermal contact, and inhalation of vapor and particulates is possible.
		inhalation of soil-derived vapors and airborne particulates (wind erosion) in outdoor air	Yes	Yes	Quantitative	
	groundwater	incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for drinking water	No	Yes	Quantitative	Groundwater is not currently used by any household in the well survey area around the Facility. Groundwater could be used in the future at properties without deed restrictions.
		incidental ingestion of and dermal contact with groundwater and inhalation of groundwater-derived vapors during use of groundwater for purposes other than drinking water	No	Yes	Quantitative	
		inhalation of groundwater-derived vapors in outdoor air	No	No	Not Applicable	
		inhalation of groundwater-derived vapors that migrate through building foundations into indoor air	No	No	Not Applicable	
	sediment	incidental ingestion and dermal contact	No	No	Not Applicable	
	spring and surface water	incidental ingestion, dermal contact, and inhalation of vapor	No	No	Not Applicable	
Maintenance Workers	surface and subsurface soil	incidental ingestion of and dermal contact with soil; inhalation of soil-derived vapors and airborne particulates in work-space air	Yes	Yes	Quantitative	Exposure to post-remediation concentrations of PCBs in soil through incidental ingestion, dermal contact, and inhalation of vapor and particulates is possible.
	groundwater	incidental ingestion of and dermal contact with exposed groundwater; inhalation of vapors from exposed groundwater in work-space air	No	No	Not Applicable	
	sediment	incidental ingestion and dermal contact	No	No	Not Applicable	
	spring and surface water	incidental ingestion, dermal contact, and inhalation of vapor	No	No	Not Applicable	

Notes:

1. The Facility (per AOC I.2a) and GM-owned parcels (per AOC I.2b) that have been rezoned as industrial (I-2), including parcels 207, 208, 412, 413, 414 and part of parcels 415 and 416. A deed restriction prohibiting future residential use and any potable or nonpotable groundwater uses will be put in place as part of the Corrective Measures.
2. The cap on the East Plant area prevents direct contact with on-site soil, groundater or NAPL, as well as particulate inhalaltion of on-site soil. All on-site maintenance activities are covered by the site health and safety plan (HASP) which limits the potential for exposure to media beneath the cap, or elsewhere at the Facility, should excavations encounter areas of higher constituent concentrations.
3. Including other environmental media containing NAPL (e.g., liquid emulsion samples).
4. Access to the Facility is limited through fencing around the West Plant and a portion of the East Plant. The Facility is also patrolled by 24-hour security.
5. Removal Action and Site Source Control have addressed contamination and the potential for re-contamination for off-site soil, sediment, and surface/spring water. As demonstrated in the CA750 (GM 2008), off-site groundwater is not contaminated and the Interim Measures (wet wells and barrier wall) prevent future groundwater migration off-site. The risk assessment will confirm that the removal action criteria in soil (i.e., 1.8 mg/kg of PCBs) and sediment (i.e., 1 mg/kg of PCBs) meet the acceptable risk limits and that concentrations in soil and sediment meet the relevant criterion. The risk assessment will also confirm that uncontrolled groundwater and surface/spring water concentrations meet the MCLs.
6. GM-owned parcels (per AOC I.2b) that are zoned residential (R-2), including parcels 3, 203, 204 and part of parcels 415 and 416.
7. Non-GM-owned parcels (per AOC I.2c) assumed to be zoned residential, including parcels 4, 6, 15, 21, 22, 24, 25, 29, 30, 36, 40, 72, 81, 210, 211 and 212.

References:

General Motors Corporation. 2008. Environmental Indicator (EI) RCRIS code (CA750) Migration of Contaminated Groundwater Under Control, GM Powertrain Bedford Facility, 105 GM Drive, Bedford, Indiana, IND 006 036 099. April 29, 2008.

USEPA Region 5. 2014. Administrative Order on Consent. Bedford Castings, Engines Transmissions (CET) Bedford, Indiana 47421. EPA Docket No. RCRA-05-2014-0011. August 14.

Table 9.2: Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to Soil
GM GPS Bedford Facility, Bedford, Indiana

	Routine Worker				Maintenance Worker		Construction Worker		Off-Site Resident		Trespasser	
	Outdoor Activities		Vapor Intrusion		Outdoor Activities		Outdoor Activities		Inhalation		Outdoor Activities	
Area	Risk	HI	Risk	HI	Risk	HI	Risk	HI	Risk	HI	Risk	HI
A001_WestPlantArea	7E-06	1E-01	9E-08	1E-02	7E-07	7E-02	1E-06	6E-01	2E-07	2E-02	3E-07	8E-03
A001MonitoringWell_WestPlantArea	4E-06	7E-02	1E-07	1E-03	3E-07	2E-02	5E-07	1E-01	2E-07	2E-03	1E-07	5E-03
A002_WestPlantArea	3E-06	2E-01	1E-07	7E-03	3E-07	7E-02	4E-07	7E-01	8E-07	1E-02	7E-08	2E-02
A004	4E-08	2E-03	3E-09	NC	3E-09	4E-04	4E-09	2E-03	2E-08	NC	9E-10	1E-04
A004_P215	6E-07	4E-02	4E-08	NC	4E-08	7E-03	7E-08	4E-02	3E-07	NC	1E-08	2E-03
A004_P216West	1E-07	6E-03	7E-09	NC	7E-09	1E-03	1E-08	6E-03	4E-08	NC	2E-09	3E-04
A005	1E-06	5E-02	5E-08	1E-03	9E-08	1E-02	1E-07	6E-02	3E-07	8E-04	3E-08	3E-03
A007_EastPlantArea	1E-07	7E-03	8E-09	NC	8E-09	1E-03	1E-08	7E-03	5E-08	NC	3E-09	4E-04
A008	2E-06	6E-02	8E-08	9E-04	2E-07	1E-02	2E-07	8E-02	4E-07	1E-03	5E-08	4E-03
A008_P200	4E-06	2E-01	1E-07	1E-03	4E-07	5E-02	5E-07	3E-01	9E-07	5E-03	1E-07	1E-02
A009_WestPlantArea	**2E-03**	**2E+02**	4E-06	2E-02	**2E-04**	**3E+01**	**2E-04**	**2E+02**	3E-05	1E-01	5E-05	**9E+00**
A011	2E-06	5E-02	2E-08	9E-02	1E-07	1E-02	2E-07	2E-01	7E-08	1E-01	1E-07	3E-03
A011_P200	1E-04	**9E+00**	4E-06	2E-04	9E-06	1E+00	1E-05	**8E+00**	3E-05	1E-03	3E-06	5E-01
A011_WestPlantArea	4E-06	2E-01	2E-07	5E-03	3E-07	4E-02	4E-07	2E-01	1E-06	3E-04	1E-07	1E-02
A012_WestPlantArea	NC	2E-02	NC	1E-07	NC	5E-03	NC	9E-02	NC	3E-08	NC	2E-03
A013_WestPlantArea	6E-07	3E-02	7E-06	6E-01	5E-08	6E-03	1E-07	1E-01	3E-06	9E-02	2E-08	2E-03
A014_P216West	6E-08	4E-03	4E-09	NC	4E-09	7E-04	7E-09	4E-03	3E-08	NC	1E-09	2E-04
A017_WestPlantArea	5E-06	2E-01	2E-07	2E-02	6E-07	5E-02	8E-07	3E-01	1E-06	6E-03	1E-07	1E-02
A018	5E-07	1E-02	2E-08	2E-04	7E-08	6E-03	1E-07	7E-02	2E-08	6E-04	1E-08	1E-03
A018_WestPlantArea	3E-05	1E+00	2E-06	3E-01	4E-06	4E-01	5E-06	**2E+00**	6E-06	7E-02	8E-07	8E-02
A019_WestPlantArea	NC	1E-07	NC	3E-06	NC	3E-08	NC	7E-07	NC	3E-07	NC	8E-09
A020_ estPlantArea	NC	3E-04	NC	7E-07	NC	6E-05	NC	1E-03	NC	4E-08	NC	2E-05
A021_WestPlantArea	4E-06	2E-01	2E-07	8E-03	3E-07	4E-02	5E-07	2E-01	9E-07	3E-03	1E-07	1E-02
A021-1_A021_WestPlantArea	1E-05	2E-01	4E-07	2E-01	1E-06	6E-02	2E-06	6E-01	6E-07	2E-01	3E-07	1E-02
A021-1_A021_WestPlantArea_MonitoringWell	2E-06	3E-02	NC	1E-03	2E-07	1E-02	3E-07	9E-02	7E-09	2E-03	6E-08	2E-03
A021-1_A021-3_A021_WestPlantArea	2E-06	1E-01	1E-07	6E-06	1E-07	2E-02	2E-07	1E-01	7E-07	9E-05	4E-08	6E-03
A021-2_WestPlantArea	5E-06	3E-01	2E-07	3E-03	7E-07	1E-01	9E-07	4E-01	1E-06	1E-02	1E-07	2E-02
A021-3_WestPlantArea	1E-05	5E-01	1E-08	8E-01	1E-06	1E-01	2E-06	**2E+00**	3E-07	1E+00	4E-07	4E-02
A021-4_WestPlantArea	2E-05	1E+00	1E-06	3E-03	2E-06	3E-01	3E-06	**2E+00**	9E-06	8E-03	6E-07	8E-02
A022_WestPlantArea	5E-06	**2E+00**	8E-09	2E-03	5E-07	4E-01	7E-07	**6E+00**	7E-08	4E-03	2E-07	1E-01
A023_P200	2E-06	2E-01	2E-07	NC	2E-07	3E-02	3E-07	2E-01	1E-06	2E-04	6E-08	9E-03
A024_ WestPlantArea	2E-06	2E-02	1E-07	3E-04	2E-07	7E-03	3E-07	9E-02	4E-08	2E-04	5E-08	2E-03
ANAOI4_GMPTWest	5E-07	5E-02	3E-08	1E-03	5E-08	3E-02	6E-08	2E-01	2E-07	6E-03	2E-08	3E-03
EastPlantArea	4E-08	3E-03	3E-09	NC	3E-09	4E-04	4E-09	2E-03	2E-08	NC	9E-10	1E-04
GMBaseballDiamond_WestPlantArea	1E-06	7E-02	8E-08	NC	8E-08	1E-02	1E-07	7E-02	5E-07	NC	3E-08	4E-03
GMPT_EastPlantArea	6E-09	4E-04	4E-10	NC	4E-10	7E-05	6E-10	4E-04	2E-09	NC	1E-10	2E-05
GMPT_GMPTWest	2E-06	1E-01	1E-07	NC	1E-07	2E-02	2E-07	1E-01	7E-07	NC	4E-08	6E-03
GMPT_GMPTWest_EastPlantArea	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
GMPT_P216West	8E-07	5E-02	6E-08	NC	6E-08	9E-03	9E-08	5E-02	3E-07	NC	2E-08	3E-03
MonitoringWell_PlantProperty_RFIBoundary	4E-10	3E-03	NC	3E-06	3E-09	1E-03	3E-09	2E-03	2E-09	9E-05	7E-12	2E-04
MonitoringWell_RFIBoundary_WestPlantArea	7E-08	1E-02	5E-09	3E-03	6E-09	2E-03	8E-09	3E-02	3E-08	5E-03	2E-09	7E-04
P003	7E-08	5E-03	5E-09	NC	5E-09	8E-04	8E-09	4E-03	3E-08	NC	2E-09	3E-04
P015_P216GM_P216_east	2E-07	1E-02	1E-08	NC	1E-08	2E-03	2E-08	1E-02	7E-08	NC	4E-09	6E-04
P021_P216GM_P216_east	3E-08	2E-03	2E-09	NC	2E-09	4E-04	3E-09	2E-03	1E-08	NC	7E-10	1E-04
P201	3E-06	2E-01	2E-07	NC	2E-07	4E-02	4E-07	2E-01	1E-06	NC	8E-08	1E-02
P205GM	1E-06	8E-02	9E-08	NC	9E-08	1E-02	1E-07	8E-02	5E-07	NC	3E-08	4E-03
P205GM_P003	8E-07	5E-02	6E-08	NC	6E-08	9E-03	9E-08	5E-02	4E-07	NC	2E-08	3E-03
P207	8E-08	5E-03	6E-09	NC	6E-09	9E-04	9E-09	5E-03	4E-08	NC	2E-09	3E-04
P208	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P215GM_P415_P215_area	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 9.2: Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to Soil
GM GPS Bedford Facility, Bedford, Indiana

	Routine Worker				Maintenance Worker		Construction Worker		Off-Site Resident		Trespasser	
	Outdoor Activities		Vapor Intrusion		Outdoor Activities		Outdoor Activities		Inhalation		Outdoor Activities	
Area	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**
P215GM_P416_P215_area	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P216_east	2E-06	1E-01	2E-07	NC	2E-07	3E-02	2E-07	1E-01	1E-06	NC	5E-08	8E-03
P216GM_P015_P216_east	2E-07	1E-02	1E-08	NC	1E-08	2E-03	2E-08	1E-02	8E-08	NC	4E-09	7E-04
P216GM_P216_east	2E-07	1E-02	1E-08	NC	1E-08	2E-03	2E-08	1E-02	9E-08	NC	5E-09	7E-04
P216GM_P216_west	5E-08	3E-03	3E-09	NC	4E-09	6E-04	5E-09	3E-03	2E-08	NC	1E-09	2E-04
P412	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P413	3E-08	2E-03	2E-09	NC	2E-09	3E-04	3E-09	2E-03	1E-08	NC	6E-10	9E-05
P414	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P415	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P416	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
RFI_Boundary	2E-05	3E-01	4E-07	9E-03	2E-06	9E-02	3E-06	4E-01	1E-06	1E-02	6E-07	2E-02
RFIBoundary_P216West	3E-06	5E-02	2E-08	2E-03	3E-07	1E-02	5E-07	1E-01	2E-07	5E-03	8E-08	3E-03
West_Plant	9E-07	6E-02	6E-08	NC	6E-08	1E-02	1E-07	5E-02	4E-07	NC	2E-08	3E-03
WestPlantArea_TreePlantingEvaluation	9E-07	6E-02	6E-08	NC	7E-08	1E-02	1E-07	6E-02	4E-07	NC	2E-08	3E-03

Notes:

1. Cumulative cancer risk and HI estimates in excess of 1E-4 and 1, respectively, are shaded and bold.
2. Cumulative cancer risk and HI estimates are calculated using the maximum detected site-related concentrations from each area from any depth.
3. NC - Risk and HI estimates were not calculated for detected chemicals with inadequate toxicity or physical/chemical parameters or where chemical concentrations were non-detect.
4. For routine worker exposure to soil at A009_WestPlantArea, the maximum detected concentration of PCBs at B-X059Y135B and B-X106Y102B is currently inaccessible. The cancer risk and HI estimates using PCB concentrations that could be accessible and the maximum detected concentrations for the remaining constituents are $5x10^{6}$ and 0.3, respectively, which are below USEPA's and IDEM's risk limits.
5. For maintenance worker exposure to soil at A009_WestPlantArea, the cancer risk and HI estimates using PCB concentrations other than those at B-X059Y135B and B-X106Y102B and the maximum detected concentrations for the remaining constituents are $6x10^{7}$ and 0.5, respectively, which are below USEPA's and IDEM's risk limits.
6. For construction worker exposure to soil at A009_WestPlantArea, the cancer risk and HI estimates using PCB concentrations other than those at B-X059Y135B and B-X106Y102B, manganese concentrations other than those at B-X069Y098B, and the maximum detected concentrations for the remaining constituents are $8x10^{7}$ and 0.4, respectively, which are below USEPA's and IDEM's risk limits.
7. For routine worker exposure to soil at A011_P200, the maximum detected concentration of PCBs at B-X223Y097A is currently inaccessible. The HI estimate using PCB concentrations that are accessible and the maximum detected concentrations for the remaining constituents is 0.2, which is below USEPA's and IDEM's HI limit of 1.
8. For construction worker exposure to soil at A011_P200, the HI estimate using PCB concentrations other than those at B-X223Y097A and the maximum detected concentrations for the remaining constituents is 0.2, which is below USEPA's and IDEM's HI limit of 1.
9. For construction worker exposure to soil at A018_WestPlantArea, the 95% UCL was calculated using the highest PCB concentration from any depth at each boring location within the area. The HI estimate using the UCL for PCBs and the maximum detected concentrations for the remaining constituents is 1, which is equal to USEPA's and IDEM's HI limit of 1.
10. For construction worker exposure to soil at A021-3_WestPlantArea, the outdoor air concentration for mercury was calculated using a 0.016 acre source area. The HI estimate using the refined source area for mercury and the maximum detected concentrations for the remaining constituents is 0.7, which is below USEPA's and IDEM's HI limit of 1.
11. For construction worker exposure to soil at A021-4_WestPlantArea, the 95% UCL was calculated using the highest PCB concentration from any depth at each boring location within the area. The HI estimate using the UCL for PCBs and the maximum detected concentrations for the remaining constituents is 0.8, which is below USEPA's and IDEM's HI limit of 1.
12. For routine worker exposure to soil at A022_WestPlantArea, the 95% UCL was calculated using the highest antimony concentration from any depth at each boring location within the area. The HI estimate using the UCL for antimony and the maximum detected concentrations for the remaining constituents is 0.7, which is below USEPA's and IDEM's HI limit of 1.
13. For construction worker exposure to soil at A022_WestPlantArea, the 95% UCL was calculated using the highest antimony concentration from any depth at each boring location within the area. The HI estimate using the UCL for antimony and the maximum detected concentrations for the remaining constituents is 3, which is higher than USEPA's and IDEM's HI limit of 1. The HI estimate using IDEM's recommended EF of 45 days/year is 0.5, which is below the HI limit of 1.

Table 9.3: Evaluation of Lead in On-Facility Soil GM GPS Bedford Facility, Bedford, Indiana			
Area	**Locations**	**Max Conc** (mg/kg)	**Mean Conc** (mg/kg)
A001_WestPlantArea	34	4.01E+02	NC
A001MonitoringWell_WestPlantArea	4	3.34E+02	NC
A002_WestPlantArea	13	7.94E+01	NC
A005	3	5.65E+01	NC
A008	3	1.51E+01	NC
A008_P200	16	2.78E+01	NC
A009_WestPlantArea	25	3.66E+01	NC
A011	3	1.07E+02	NC
A011_P200	6	5.18E+01	NC
A011_WestPlantArea	2	5.49E+01	NC
A012_WestPlantArea	2	1.36E+01	NC
A017_WestPlantArea	6	3.12E+01	NC
A018	3	2.45E+01	NC
A018_WestPlantArea	12	2.13E+02	NC
A020_ estPlantArea	1	2.70E+00	NC
A021_WestPlantArea	24	3.84E+01	NC
A021-1_A021_WestPlantArea	25	2.61E+02	NC
A021-1_A021_WestPlantArea_MonitoringWell	1	1.99E+01	NC
A021-1_A021-3_A021_WestPlantArea	2	4.27E+01	NC
A021-2_WestPlantArea	7	5.09E+01	NC
A021-3_WestPlantArea	21	1.34E+03	NC
A021-4_WestPlantArea	7	4.66E+01	NC
A022_WestPlantArea	24	**1.06E+04**	4.82E+02
A023_P200	1	2.14E+01	NC
A024_ WestPlantArea	3	1.80E+01	NC
ANAOI4_GMPTWest	3	4.39E+01	NC
MonitoringWell_PlantProperty_RFIBoundary	2	1.68E+01	NC
MonitoringWell_RFIBoundary_WestPlantArea	5	3.49E+01	NC
RFI_Boundary	13	3.54E+02	NC
RFIBoundary_P216West	4	2.42E+01	NC
Notes:			
The mean concentration in soil is calculated using the maximum detected concentration at each location in an area.			
Lead concentrations above the industrial screening level of 2,240 mg/kg are shaded in bold.			
NC: The mean concentration of lead was not calculated for areas where the maximum lead concentration was below the industrial screening level of 2,240 mg/kg.			

Table 9.4: Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to Groundwater in Overburden and Shallow Bedrock
GM GPS Bedford Facility, Bedford, Indiana

Area	Well Zone	Routine Worker				Maintenance Worker		Construction Worker		Off-Site Resident	
		Vapor Intrusion		Outdoor Air Inhalation		Groundwater Contact		Groundwater Contact		Outdoor Air Inhalation	
		Risk	HI	Risk	HI	Risk	HI	Risk	HI	Risk	HI
A001	Shallow_Bedrock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
A001MonitoringWell_WestPlantArea	Overburden	NC	1E-04	NC	2E-06	5E-08	2E-03	5E-09	6E-04	NC	7E-06
A001MonitoringWell_WestPlantArea	Shallow_Bedrock	5E-08	2E-04	9E-10	3E-06	9E-07	2E-01	9E-08	6E-02	6E-09	1E-05
A004	Overburden	5E-08	8E-04	9E-10	1E-05	1E-06	2E-01	1E-07	9E-02	5E-09	6E-05
A007_EastPlantArea	Shallow_Bedrock	1E-09	NC	2E-11	NC	4E-08	6E-03	4E-09	2E-03	1E-10	NC
A008	Shallow_Bedrock	2E-08	6E-06	3E-10	3E-07	5E-07	8E-02	5E-08	3E-02	1E-09	1E-06
A008_P200	Shallow_Bedrock	1E-06	7E-05	3E-08	1E-06	4E-05	**7E+00**	4E-06	**3E+00**	1E-07	5E-06
A011_P200	Shallow_Bedrock	1E-08	1E-07	2E-10	3E-08	4E-07	7E-02	4E-08	3E-02	1E-09	1E-07
A015_MonitoringWell	Shallow_Bedrock	NC	2E-07	NC	4E-09	4E-09	1E-04	4E-10	3E-05	NC	2E-08
A021-1_A021_WestPlantArea	Shallow_Bedrock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
A021-1_A021_WestPlantArea_MonitoringWell	Shallow_Bedrock	NC	2E-08	NC	4E-10	2E-09	2E-04	2E-10	2E-04	NC	2E-09
A021-4_WestPlantArea	Shallow_Bedrock	2E-08	1E-05	4E-10	2E-07	6E-07	1E-01	6E-08	4E-02	2E-09	8E-07
A021MonitoringWell_WestPlantArea	Overburden	9E-10	NC	2E-11	NC	3E-08	5E-03	3E-09	2E-03	7E-11	NC
EastPlantArea	Shallow_Bedrock	2E-07	5E-07	4E-09	9E-09	7E-06	1E+00	7E-07	4E-01	2E-08	4E-08
Monitoring_Well	Shallow_Bedrock	5E-08	2E-07	9E-10	4E-09	2E-06	3E-01	2E-07	1E-01	4E-09	2E-08
MonitoringWell_EastPlantArea	Shallow_Bedrock	9E-09	8E-09	2E-10	3E-10	3E-07	5E-02	3E-08	2E-02	7E-10	1E-09
MonitoringWell_RFIBoundary_WestPlantArea	Shallow_Bedrock	NC	NC	NC	NC	5E-08	8E-04	5E-09	5E-04	NC	NC
MonitoringWell_WestPlantArea	Shallow_Bedrock	1E-08	6E-05	2E-10	1E-06	3E-06	6E-02	3E-07	3E-02	8E-10	5E-06
P201_East Plant	Shallow_Bedrock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P205	Shallow_Bedrock	2E-08	1E-06	6E-10	4E-08	2E-07	3E-02	2E-08	1E-02	3E-09	2E-07
P205MonitoringWell	Shallow_Bedrock	1E-09	1E-06	2E-11	3E-08	2E-06	2E-02	2E-07	8E-03	1E-10	1E-07
P207	Shallow_Bedrock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
P413	Shallow_Bedrock	1E-08	NC	2E-10	NC	3E-07	5E-02	3E-08	2E-02	8E-10	NC
RFIBoundary	Shallow_Bedrock	NC	2E-07	NC	3E-09	NC	7E-06	NC	5E-06	NC	1E-08

Notes:

1. Cumulative cancer risk and HI estimates in excess of 1E-4 and 1, respectively, are shaded and bold.
2. Cumulative cancer risk and HI estimates are calculated using the maximum detected concentrations from each area for overburden and shallow bedrock.
3. NC - Risk and HI estimates were not calculated for detected chemicals with inadequate toxicity or physical/chemical parameters or where chemical concentrations were non-detect.
4. For maintenance worker and construction worker exposure to groundwater at A008_P200, the maximum detected concentration of 0.072 mg/L of unfiltered PCBs was replaced with a more recent concentration that is also more appropriate for evaluating dermal exposures, as discussed in Section 8.5.5.2 and Section 8.5.2.3. The HI estimates excluding the concentration of 0.072 mg/L are 0.0004 and 0.0003, respectively.

Table 9.5: Upper-Bound Estimates of Cumulative Cancer Risks and HIs for Exposure to NAPL and Liquid Emulsion
GM GPS Bedford Facility, Bedford, Indiana

Area	Routine Worker				Off-Site Resident		Trespasser	
	Outdoor Vapor Inhalation		Vapor Intrusion		Outdoor Vapor Inhalation		Outdoor Vapor Inhalation	
	Risk	HI	Risk	HI	Risk	HI	Risk	HI
A001MonitoringWell_WestPlantArea	NC	NC	NC	NC	NC	NC	NC	NC
A007_EastPlantArea	7E-06	NC	3E-07	NC	3E-05	NC	1E-07	NC
P207	1E-09	1E-05	6E-08	6E-04	5E-09	4E-05	2E-11	4E-07
Notes:								
1. Cumulative cancer risk and HI estimates are presented for all on-site areas where potential vapor intrusion is possible (i.e, areas outside of the engineered cap).								
2. No cumulative cancer risk and HI estimates are in excess of 1E-4 and 1, respectively.								
3. Cumulative cancer risk and HI estimates are calculated using the maximum detected concentrations from each area from any depth.								
4. NC - Risk and HI estimates were not calculated for detected chemicals with inadequate toxicity or physical/chemical parameters or where chemical concentrations were non-detect.								

Table 9.6a: Summary of Media-Specific Cumulative Cancer Risk and Hazard Index (HI) Estimates for On-Facility Media
GM GPS Bedford Facility, Bedford, Indiana

Medium	Exposure Scenario	On-Facility Routine Workers				On-Facility Maintenance Workers				On-Facility Construction Workers				On-Facility Trespassers				Off-Facility Residents				Off-Facility Maintenance Workers			
		Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI
On-Facility Soil	Outdoor	Yes	Yes	**<2E-3 (A)**	**≤2E+2 (A,B)**	Yes	Yes	**<2E-4 (A)**	**<3E+1 (A)**	Yes	Yes	**<2E-4 (A)**	**≤2E+2 (B,C)**	Yes	Yes	<5E-5	**<9 (A)**	Yes (inh only)	Yes (inh only)	<3E-5	<1	Yes (inh only)	Yes (inh only)	<<3E-5	<<1
	Vapor Intrusion	Yes	Yes	<7E-6	<8E-1	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-
On-Facility Groundwater	Outdoor	Yes (inh only)	Yes (inh only)	<3E-8	<1E-5	Yes	Yes	<4E-5	≤1	Yes	Yes	<4E-6	≤4E-1	Yes (inh only)	Yes (inh only)	<<3E-8	<<1E-5	Yes (inh only)	Yes (inh only)	<1E-7	<6E-5	Yes (inh only)	Yes (inh only)	<<1E-7	<<6E-5
	Vapor Intrusion	Yes	Yes	<1E-6	<8E-4	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-
On-Facility Surface Water	Outdoor	NA	NA	-	-	Yes	Yes	<MCL	<MCL	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-
On-Facility NAPL	Outdoor	Yes (inh only)	Yes (inh only)	<7E-6	<1E-5	Yes (inh only)	Yes (inh only)	<<7E-6	<<1E-5	Yes (inh only)	Yes (inh only)	<<7E-6	<<1E-5	Yes (inh only)	Yes (inh only)	<1E-7	<4E-7	Yes (inh only)	Yes (inh only)	<3E-5	<4E-5	Yes (inh only)	Yes (inh only)	<<3E-5	<<4E-5
	Vapor Intrusion	Yes	Yes	<3E-7	<6E-4	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-

Notes:

1 For each receptor population the cumulative cancer risk and HI estimates summarized above are documented in Appendix T of the RFI Report.
2 No risk estimates are provided (designated with "-") for exposures that are not reasonably expected under current or future conditions (designated with "No") or for exposures that are not applicable for the indicated receptor/medium exposure combination (designated with an "NA").
3 The significance of these potential exposures is evaluated by comparing these risk estimates to USEPA-established limits (1E-4 and 1, respectively) in order to determine whether they warrant corrective measures under RCRA corrective action.
4 Cancer risk and HI estimates presented as less-than ("<") values indicate estimates that are based on the highest upper-bound estimate for the medium/receptor combination and highly conservative exposure assumptions.
5 Cancer risk and HI estimates presented as less-than or equal to ("≤") values indicate estimates that represent refined upper-bound estimates and are the highest estimates (upper-bound or refined upper-bound, if calculated) for the receptor/medium combination.
6 Cancer risk and HI estimates presented as much less than ("<<") values indicate estimates that are based on inference ("surrogating") from more conservative receptor/medium exposure combinations.
7 The deed restriction that will be put in place as part of the final CMs will prohibit all uses of groundwater on-site.
8 On-Facility sediment and surface water are those from AOI 10, which were not included in remedial activities.

A The cancer risk and/or HI estimate is primarily due to PCB concentrations from locations B-X059Y135B and B-X106Y102B beneath the service tunnels below the main building at the Facility. The cancer risk and HI estimates excluding these locations are no higher than 5E-6 and 0.2, respectively. See Section 8.5.2 of the RFI Report for futher details.
B The HI estimate is primarily due to PCBs concentration from location B-X223Y097A beneath the concrete pavement around the above ground storage tank. The HI estimate excluding these locations is 1. See Section 8.5.2 of the RFI Report for futher details.
C The HI estimate is primarily due to PCB concentrations from locations B-X059Y135B and B-X106Y102B and manganese from location B-X069Y098B beneath the service tunnels below the main building at the Facility. The HI estimate excluding these locations is 0.5. See Section 8.5.2 of the RFI Report for futher details.
DWC Water concentrations compared to drinking water criteria based on the following hierarchy: State MCL, Federal MCL, RSL Tap Water Ingestion value at the lower of the criteria calculated at either the target cancer risk of 1E-5 or target hazard quotient of 1.

Table 9.6b: Summary of Media-Specific Cumulative Cancer Risk and Hazard Index (HI) Estimates for Off-Facility Media
GM GPS Bedford Facility, Bedford, Indiana

Medium	Exposure Scenario	Off-Facility Residents				Off-Facility Maintenance Workers			
		Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI	Exposure Possible Currently?	Exposure Possible in Future?	Cancer Risk	HI
Off-Facility Soil	Outdoor	Yes	Yes	<8E-6	<5E-1	Yes	Yes	<<8E-6	<<5E-1
Off-Facility Sediment	Outdoor	Yes	Yes	<TSCA	<TSCA	Yes	Yes	<TSCA	<TSCA
Off-Facility Groundwater	Potable Use	No	Yes	<DWC	<DWC	No	Yes	<DWC	<DWC
	Nonpotable Use	No	Yes	<DWC	<DWC	No	Yes	<DWC	<DWC
Off-Facility Surface and Spring Water	Outdoor	Yes	Yes	<DWC	<DWC	Yes	Yes	<DWC	<DWC

Notes:

1 For each receptor population the cumulative cancer risk and HI estimates summarized above are documented in Appendix T of the RFI Report.

2 No risk estimates are provided (designated with "-") for exposures that are not reasonably expected under current or future conditions (designated with "No") or for exposures that are not applicable for the indicated receptor/medium exposure combination (designated with an "NA").

3 The significance of these potential exposures is evaluated by comparing these risk estimates to USEPA-established limits (1E-4 and 1, respectively) in order to determine whether they warrant corrective measures under RCRA corrective action.

4 Cancer risk and HI estimates presented as less-than ("<") values indicate estimates that are based on the highest upper-bound estimate for the medium/receptor combination and highly conservative exposure assumptions.

5 Cancer risk and HI estimates presented as less-than or equal to ("≤") values indicate estimates that represent refined upper-bound estimates and are the highest estimates (upper-bound or refined upper-bound, if calculated) for the receptor/medium combination.

6 Cancer risk and HI estimates presented as much less than ("<<") values indicate estimates that are based on inference ("surrogating") from more conservative receptor/medium exposure combinations.

DWC Water concentrations compared to drinking water criteria based on the following hierarchy: State MCL, Federal MCL, RSL Tap Water Ingestion value at the lower of the criteria calculated at either the target cancer risk of 1E-5 or target hazard quotient of 1.

TSCA Sediment concentration compared to the removal action limit of 1 mg/kg of PCBs, which is the high occupancy cleanup criterion under 40 CFR 761.61(a)(4)(i)(A).

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