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Pilot Perimeter Groundwater Trench Collection System Study

Groundwater Trench Collection System Interim Measure East Plant Area - Revision 1

GM CET Bedford Facility
105 GM Drive
Bedford, Indiana

EPA ID# IND006036099
AOC Docket No. RCRA 05-2014-0011

Prepared for: GM LLC

Disclaimer - Please note, Conestoga-Rovers & Associates (CRA) changed its name to GHD Limited on July 1, 2015. This document was originally submitted under the CRA name prior to this date. However, in the interest of continuity, the CRA name will remain on this document after July 1, 2015.

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December 7, 2015 • 013968 • Report No. 365
February 19, 2016 Revision 1

Table of Contents

Page

Section 1.0 Introduction 1

Section 2.0 Site Information 3

2.1 Site Location and Description 3
2.2 Geologic/Hydrogeologic/Hydrologic Conditions 3
2.2.1 Regional Physiography and Topography 3
2.2.2 Regional Land Use 3
2.2.3 Regional Geology 4
2.2.4 Regional Hydrogeology 5
2.2.5 Regional Hydrology 6
2.3 East Plant Area Environmental Setting 6
2.3.1 East Plant Area Geology 7
2.3.2 East Plant Area Hydrology 8

Section 3.0 Design Data Collection Activities 9

3.1 Perimeter Groundwater Trench Collection System Coreholes 9
3.2 Geotechnical Samples 10
3.3 Downhole Geophysical Logging 10
3.4 Packer-Pressure Testing 10
3.5 Environmental Samples 11

Section 4.0 Pilot Trench Design 11

4.1 Basis of Pilot Trench Profile Selection 14
4.2 Pilot Trench Alignment Selection 15
4.2.1 Pilot Trench Bedrock Descriptions 15

Section 5.0 Construction Quality Assurance 23

5.1 Bedrock Quality Verification 24
5.1.1 Electrical Resistivity 24
5.1.2 Ground Penetrating Radar 25

Section 6.0 Pilot Trench Construction 26

6.1 Qualification of Contractor 26
6.2 Materials 27
6.2.1 Cement-Bentonite Grout 27
6.2.2 Physical Barrier 27
6.2.3 Drain Collection Pipe 27
6.2.4 Trench Backfill 27
6.2.8 Geotextile 28

Table of Contents

Page

6.2.9 Drainage Media Sand 28
6.2.10 Backfill 28
6.2.11 East Plant Area Cover System 28
6.2.12 Wet Well....29
6.3 Equipment and Approach 29
6.3.1 Working Platform 29
6.3.2 Trench Excavation 29
6.3.3 Soil Handling and Stockpiling 30
6.3.4 Physical Barrier Placement....31
6.3.5 Grout Placement 31
6.3.6 Drain Pipe Placement 31
6.3.7 Geotextile Placement 32
6.3.8 Backfill Placement 32
6.4 Execution of the Work....32
6.4.1 Site Preparation....32
6.4.2 Excavation 33
6.4.3 Trench Completion....33
6.4.4 Tolerances 34

Section 7.0 Construction Support And Coordination With Other East Plant Area Activities 35

7.1 Supporting Facilities.... 35
7.1.1 Site Security....35
7.1.2 Site Offices....35
7.1.3 Emergency First Aid Facilities....35
7.1.4 Fire Fighting Equipment 35
7.1.5 Decontamination Facilities....35
7.1.6 Portable Sanitary Facilities 36
7.1.7 Utilities 36
7.1.8 Site Communications....36
7.1.9 Access Roads 36
7.1.10 Parking....36
7.3 Fugitive Particulate Control 36
7.4 Sediment and Erosion Control 37
7.5 Institutional Controls 37
7.6 Operation, Maintenance, and Monitoring 37
7.7 Permit Applications and Approvals.... 37

Section 8.0 Community Relations 38

Section 9.0 Schedule 38

Table of Contents

Page

Section 10.0 Cost Estimate 38

Section 11.0 References 39

List of Figures
(Following Text)

Figure 1.1 Facility Location

Figure 1.2 Facility Plan

Figure 2.1 Groundwater Collection System

Figure 2.2 Glacial Features of South-Central Indiana

Figure 2.3 Bedrock Structural Features of Indiana

Figure 2.4 Bedrock Geology of Indiana

Figure 2.5 Generalized Stratigraphic Column for Paleozoic Rocks In Indiana

Figure 2.6 Lower East Fork White River Drainage Basin

Figure 2.7 East Plant Area and AOI Locations

Figure 2.8 Approximate Bedrock Formation Contact Locations

Figure 2.9 Bedrock Topography

Figure 3.1 Perimeter Groundwater Trench Collection System Investigation Coreholes

Figure 3.2 Groundwater Analytical Results

Figure 4.1 Proposed Draft Perimeter Groundwater Trench Collection System Alignment

Figure 4.2 Pilot Trench Study Profile (North Leg)

Figure 4.3 Pilot Trench Study Profile (South Leg)

Figure 9.1 Project Schedule

List of Tables
(Following Text)

Table 3.1 Soil Sample Analytical Results Summary

Table 3.2 Groundwater Sample Analytical Results Summary

List of Appendices

Appendix A Boring Logs

Appendix B Bedrock Geotechnical Sample Results

Appendix C Downhole Geophysical Logging

Appendix D Packer-Pressure Testing

Appendix E Design Drawings

Appendix F Construction Quality Assurance Plan

Appendix G Design Calculations

Appendix H Sampling and Analysis Plan (SAP)

Appendix I Ambient Air Quality Monitoring Program (AAQMP)

AAQMP	-	ambient air quality monitoring program
AMSL	-	above mean sea level
AOC	-	Administrative Order on Consent, effective August 4, 2014
AOIs	-	Areas of Interest
ASTM	-	American Society for Testing and Materials
bgs	-	below ground surface
BIPS	-	borehole image processing system
CA	-	Corrective Action
CET	-	Castings, Engines, and Transmissions
CFR	-	Code of Federal Regulations
cfs	-	cubic feet per second
CLP	-	Community Liaison Panel
cm/s	-	centimeters per second

List of Acronyms

QA	-	Construction Quality Assurance
CRA	-	Conestoga-Rovers & Associates, Inc.
DB-4	-	Detention Basin 4
ERI	-	Electrical Resistivity Imaging Survey
EM	-	electromagnetic
Facility	-	GM CET Bedford Facility
ft	-	feet
GM	-	General Motors LLC
gpm	-	gallons per minute
GPR	-	Ground Penetrating Radar
HASP	-	Consolidated Health and Safety Plan
HDPE	-	High Density Polyethylene
HSA	-	Hollow-Stem Augers
IDNR	-	Indiana Department of Natural Resources
IM	-	Interim Measure
Interim Groundwater Monitoring Plan	-	Pilot Trench Interim Groundwater Monitoring Program and Operation Schedule
MPa	-	Mega Pascal
NAPL	-	Non-Aqueous Phase Liquids
NPDES	-	National Pollutant Discharge Elimination System
OM&M Plan	-	Operation, Maintenance, and Monitoring Plan
PCB	-	Polychlorinated Biphenyl
Pilot Trench	-	Pilot Perimeter Groundwater Trench Collection System
QAPP	-	Quality Assurance Project Plan
RA	-	Removal Action
RCRA	-	Resource Conservation and Recovery Act
Report	-	Pilot Perimeter Groundwater Trench Collection System Study Report
RFI	-	RCRA Facility Investigation
RQD	-	Rock Quality Index
SDR	-	Standard Diameter Ratio

List of Acronyms

SAP	-	Sampling and Analysis Plan
Site	-	GM CET Bedford Facility
spr	-	single-point resistance
sp	-	spontaneous potential
SSC	-	Site Source Control
STA	-	Station Along Trench
TM	-	Technical Memorandum
TSCA	-	Toxic Substances Control Act
TSP	-	total suspended particulates
U.S. EPA	-	United States Environmental Protection Agency
WW	-	Wet Well

Section 1.0 Introduction

This Pilot Perimeter Groundwater Trench Collection System (Pilot Trench) Study (Report) has been prepared by Conestoga-Rovers & Associates, Inc. (CRA) for the General Motors LLC (GM) Castings, Engines, and Transmissions (CET) Bedford Facility (Facility) located in Bedford, Indiana as part of the Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) activities being conducted under the Administrative Order on Consent (AOC) (effective August 4, 2014) between United States Environmental Protection Agency (U.S. EPA) and GM for the Facility (Docket No. RCRA-005-2014-0011), and in accordance with the Toxic Substances Control Act (TSCA).

The Facility location and Facility plan are presented on Figures 1.1 and 1.2, respectively.

One major component of the selected CA activities to be implemented for the Site includes the construction of a Perimeter Groundwater Trench Collection System Interim Measure (IM) as one of the East Plant Area IMs. To help evaluate the effectiveness of this CA activity and help with the design of the collection system as a whole, GM will design, install, and operate a small section of bedrock trench as a Pilot Trench Study prior to undertaking the design and construction of the remainder of the Perimeter Groundwater Trench Collection System. A plan for a Pilot Trench, dated November 25, 2008, was previously submitted to U.S. EPA. This Report presents a revised alignment for the Pilot Trench. The Pilot Trench will be located on the east side of the East Plant Area near Bailey Scales Road and will be approximately 800 feet (ft) long. This Report provides the details associated with the construction of the Pilot Trench spanning the bedrock valley in the northeast corner of the East Plant Area.

Post-closure care and performance monitoring of the Pilot Trench will be included in the Pilot Trench Interim Groundwater Monitoring Program and Operation Schedule (Interim Groundwater Monitoring Plan) which will be submitted within 60 days of completion of the Pilot Trench construction, as required under the AOC.

The approved Quality Assurance Project Plan (QAPP) (CRA, July 18, 2001; as amended in Addendum 2 to the QAPP, dated July 25, 2006) and Consolidated Health and Safety Plan (HASP): Revision 2 (CRA, June 24, 2008), as amended in 2015, will apply to the Pilot Trench Study activities.

This Report is organized as follows:

Section 2.0 – Site Information

This section provides background information related to Site land use, geology, and hydrogeology.

Section 3.0 – Design Data Collection Activities

This section provides RCRA Facility Investigation (RFI) sample results related to the Pilot Trench design.

Section 4.0 – Pilot Trench Design

This section provides specific details related to the Pilot Trench.

Section 5.0 – Construction Quality Assurance

This section presents additional information related to the Pilot Trench construction and construction quality assurance procedures.

Section 6.0 – Pilot Trench Construction

This section presents technical information and requirements for various components of the Pilot Trench.

Section 7.0 – Construction Support Facilities and Coordination with Other East Plant Area Activities

This section presents details of the support facilities required for construction of the Pilot Trench Study.

Section 8.0 - Community Relations

This section presents various means of community participation and awareness.

Section 9.0 - References

This section presents references cited in this Report.

Section 2.0 Site Information

2.1 Site Location and Description

The Facility is located at 105 GM Drive in the City of Bedford, Shawswick Township, Lawrence County, Indiana. The Facility lies on approximately 152.5 acres of land on either side of GM Drive and extends north along Bailey Scales Road. The East Plant Area represents a portion of the Facility and is located to the east of GM Drive and west of Bailey Scales Road (see Figure 1.2).

Currently, the Facility is bordered by residential and undeveloped areas to the north; to the south by the White River Port Authority (former Canadian and Pacific Railway railroad tracks have been removed), Bedford Recycling (formerly IMCO, a Kaiser Aluminum recycling facility) and a residential property; to the east by residential and undeveloped areas; and to the west by the abandoned railway, church, residential properties, commercial properties, and a cemetery.

The Facility is currently zoned and utilized for industrial purposes. The reasonably foreseeable future land use is industrial.

The proposed Pilot Trench will be constructed in the East Plant Area, east of GM Drive, and west of Bailey Scales Road (see Figure 2.1). The existing facilities and topography in the vicinity of the proposed Pilot Trench are also shown on Figure 2.1.

2.2 Geologic/Hydrogeologic/Hydrologic Conditions

2.2.1 Regional Physiography and Topography

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

The approximate 152.5 acres of the Facility ranges from the peak of 755 ft AMSL on the East Plant Area Cover System, to 604 ft AMSL at the northeast drainage to Tributary 3 (648 ft AMSL at Bailey's Branch Creek in the southeast). The Facility works within the West Plant Area are generally located on a topographic high region at approximately 720 ft AMSL.

2.2.2 Regional Land Use

Regional land use in this area is mixed, consisting of industrial, commercial, residential, and agricultural. The primary crops on agricultural property are corn, soybeans, feed grains, and

hay. Raising livestock is common in the area. Industrial and commercial uses are also important, especially near urban areas. Oil and gas (in the east central section) was discovered in 1889, however, this resource was depleted by 1912. There are several oil and natural gas fields located in the southwestern portion of Indiana.

2.2.3 Regional Geology

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

The bedrock within the region is near the eastern margin of a structure known as the Illinois Basin. The bedrock formations in this area generally dip to the west at approximately 20 to 25 ft per mile. The Cincinnati Arch lies to the east of the Illinois Basin and covers much of Indiana (Figure 2.3) (Indiana Geological Survey, 2001).

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

Bedrock within the immediate vicinity of the Bedford Facility (Figure 2.4) consists of the lower beds of the Middle Mississippian St. Louis Limestone (the oldest formation within the Blue River Group) and is only approximately 25 ft thick in the immediate vicinity of the Bedford Facility (Melhorn and Smith, 1959). Immediately underlying the St. Louis Limestone, and outcropping to the east of the Bedford Facility, are the Salem Limestone, the Harrodsburg Limestone, and the Ramp Creek Limestone Formations, respectively. These Mississippian formations comprise the Sanders Group. The Salem Limestone is approximately 70 to 80 ft thick, where fully preserved, the Harrodsburg Limestone is approximately 80 to 90 ft thick in the area, and the

Ramp Creek is approximately 20 ft thick (Melhorn and Smith, 1959). Figure 2.5 presents a generalized stratigraphic column for Paleozoic formations in Indiana.

The uppermost formation of The Borden Group is the Edwardsville Shale Formation. The Borden group consists of approximately 500 to 800 ft of silty, calcareous shale, interbedded with some siltstone, sandstone, and minor limestone.

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

Numerous joints and fractures are present in these formations with master sets trending east-west within the Mississippian limestone, with minor sets 90 degrees to the master sets (Powell, 1976 and 2001). Numerous sinkholes can be observed on the United States Geological Survey (USGS) topographic quadrangles approximately 5 to 10 miles to the west of the Bedford Facility, with much less surface expression through the mid and eastern portions of the country. Several caverns have been mapped in Lawrence County, including one of the largest mapped caverns in the United States, the Blue Springs Cavern, located approximately five miles southwest of the City of Bedford. Other mapped caverns in the area include the Shiloh Cave, the No Sweat Cave, the Dog Hill Cave, the Donnehue Cave, and the Salt Creek Cave. Other unmapped caverns within close proximity to the Bedford Facility include: Mouse Hole Cave, located one mile east-northeast; Eighteenth Street Cave, located one and one-half miles to the south-southeast; and Armstrong Caves I and II, located one and one-half miles to the west-southwest (Etzel, 1982).

The City of Bedford lies within the physiographic province known as the Mitchell Plain, or Plateau (karst plain). The Mitchell Plain extends from near Bloomington south to the Ohio River within the State of Indiana.

2.2.4 Regional Hydrogeology

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

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

Groundwater flow within the confined (carbonate) aquifers takes place along the joints, fractures, and bedding planes that eventually may become enlarged by solution to cave passages or karst features. Recharge to a karst system occurs through surface openings that vary in scale from narrow, solutionally widened joints to large sinkholes. Discharge typically occurs through springs, which are solutionally widened joints or bedding planes, but may be enlarged, to sizable cave openings. Most groundwater within this aquifer system discharges to surficial water bodies, to underground water bodies, and to springs (Etzel, 1982).

2.2.5 Regional Hydrology

Most of the rivers in the East Fork White River Basin drain to the southwest. According to USGS Water Resources Division, the annual average flow recorded in 2006 at the East Fork White River gauging Station, located 7.8 miles southeast of Bedford in Lawrence County, is 4,210 cubic feet per second (cfs).

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

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

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

2.3 East Plant Area Environmental Setting

The East Plant Area is located on the portion of the Facility to the east of GM Drive and west of Bailey Scales Road. It is bordered to the west by GM Drive and the main plant operations, to

the north by residential properties Parcels 401 through 406, to the east by residential properties Parcels 203, 204, 3, 207, 412, 413, 414, 415, 416, 214, and 15, to the northeast by Bailey Scales Road, and to the north by Parcels 217 and 21. Figure 1.2 depicts the residential properties owned by GM.

2.3.1 East Plant Area Geology

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

The overburden materials at the East Plant Area consist mostly of fill materials, including clay, sand and silt. The thickness of the overburden materials varies considerably across the East Plant Area. Overburden in the East Plant Area is generally thickest in Area of Interests (AOIs) 4, 5, 6, and 7, (Figure 2.7) where foundry sand placement and other filling activities are known to have occurred historically.

The St. Louis and Salem Limestone Formations underlie the overburden within the East Plant Area. The St. Louis Limestone Formation has been identified to be highly weathered and fractured near surface. Fracture density appears to decrease with depth. The highly weathered and fractured St. Louis Limestone is underlain by the Salem Limestone (also known as the Indiana, Bedford, or Oolitic Limestone) which is the limestone formation utilized by local quarries for fine building stone. The Salem Limestone is also weathered and fractured at the erosional rock surface but is generally more massive and less weathered and fractured than the St. Louis Limestone. The Salem Limestone becomes more massive with depth. The location of both the St. Louis and Salem Formations through the East Plant Area are presented on Figure 2.8. Available bedrock topographic information is presented on Figure 2.9.

No faults have been identified in, or in the vicinity of, the East Plant Area based on a review of regional information, boring and monitoring well installation data, and the geophysical investigations completed in the East Plant Area.

Additional information on the East Plant Area geology has been previously presented in the Soil Technical Memorandum (TM) (CRA, April 14, 2004), RCRA Facility Investigation (RFI) Work Plan (CRA, October 29, 2001) , the Draft Collection Trench System 95% Design Report (CRA, November 2007), and the RFI Report (GHD, September 30, 2015). Additional geophysical and geotechnical investigations along the alignment of the proposed Groundwater Trench Collection System have been completed as part of the RFI Work Plan. The investigation identified weathered bedrock containing solution enlarged fractures near the surface of the

bedrock with more massive bedrock at depth with fewer and tighter fractures. This information serves as the basis for determining the depth of the Pilot Trench.

2.3.2 East Plant Area Hydrology

The Facility is situated on a topographic ridge, such that the Facility is drained by surface runoff primarily to the east and northeast in small valleys, which are tributaries of Bailey's Branch of Pleasant Run Creek. According to Facility personnel, surface water runoff from the Facility to the west of the Facility is minimal. The ridge top is approximately 150 ft to 185 ft higher than the valley bottom, located approximately one-half mile northeast of the Bedford Facility. Stormwater from the manufacturing portions (e.g., improved surfaces) of the Bedford Facility is currently collected in the Stormwater Lagoon (AOI 10). Water from the Stormwater Lagoon is either recycled back to the Plant for reuse, or treated at an on-Facility treatment system and discharged under a National Pollutant Discharge Elimination System (NPDES) permit. Clean stormwater from non-operational portions of the Facility (i.e., the 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.

As a result of the existing topography and the proximity of Bailey Scales Road, the Pilot Trench will intersect the existing detention basin network, specifically Detention Bain 4 (DB-4). Clean surface water runoff collected upstream of DB-4 (from the East Plant Area Cover System) will bypass the Pilot Trench working platform before being released into Tributary 3 during construction. The two culverts from DB-3 and DB-5 that discharge to DB-4 will be plugged and pumps installed into DB-3 and DB-5 for pumping. The selected contractor will be required to pump the water from a 24-hour 100-year storm event, as described in the East Plant Area Cover System Design (CRA, April 18, 2008) through the by-pass piping (around the construction limits) and into Tributary 3.

The detention basins are essentially dry ponds by design and contain a low flow channel, which allows for connectivity through underground culverts. Prior to construction of the Pilot Trench, the contractor will need to prevent inflow into DB-4 (and thus into the Pilot Trench excavation) during construction. Furthermore, once the surface within DB-4 has been disturbed for construction purposes, storm water within the capture area of DB-4, itself, as well as the area within the construction limits for the Pilot Trench will be contained and treated for potential polychlorinated biphenyl (PCB) impact prior to discharge to Tributary 3.

Section 3.0 Design Data Collection Activities

Multiple sampling events were conducted as part of the RFI Work Plan (CRA, 2001) to support the design of the proposed Perimeter Groundwater Trench Collection System. Sampling was completed in accordance with the Scope of Work and Field Sampling Plan presented in the RFI Work Plan. This section briefly presents the environmental, geotechnical, and geophysical results for the samples collected during the RFI.

3.1 Perimeter Groundwater Trench Collection System Coreholes

Coreholes were installed as part of RFI Addendum No. 9 and No. 12, using hollow-stem auger (HSA) drilling technique, along the alignment of the Perimeter Groundwater Trench Collection System. Additional geotechnical and geophysical data were collected along the proposed future alignment of the Perimeter Groundwater Trench Collection System from coreholes completed in July through September 2012 (see Figure 3.1, CH-45 to CH-58). The corehole drilling program provided information on the depth to bedrock and the depth to competent bedrock needed to support the design of the Perimeter Groundwater Trench Collection System. The new corehole locations installed to support the proposed future Perimeter Groundwater Trench Collection System alignment are presented on Figure 3.1.

The sample location and subsurface conditions at each boring were recorded in the field at the time of collection by the field geologist. Drilling logs (including coring logs) for locations installed along and in close proximity to the Pilot Trench alignment are provided in Appendix A.

To provide an approximate range of hydraulic conductivity, several assumptions were used for the preliminary design of the Perimeter Groundwater Trench Collection System, based on the corehole data collected. Actual conditions may vary once the Pilot Trench and full-length Perimeter Groundwater Trench Collection System are installed. Hydraulic conductivity values above the competent bedrock were conservatively estimated between 6×10^{-4} centimeters per second (cm/s) and 6×10^{-5} cm/s based on testing completed at the Site. The current hydraulic gradient for the shallow groundwater is approximately 0.25 ft/ft and the area of the saturated thickness is conservatively assumed to be averaged approximately 40 ft over the 800 foot length (for the Pilot Trench). This yields flow estimates for the Pilot Trench between approximately 71 gallons per minute (gpm) to 7 gpm (102,000 gallons per day (gpd) to 10,000 gpd). The length of the full proposed Perimeter Groundwater Collection Trench is approximately 3,700 ft, thereby yielding an approximate flow of 330 gpm to a low estimate of 33 gpm, using the same assumptions.

It should be noted, that the existing groundwater collections system (e.g., Site Source Control [SSC] systems and Vault), currently operates at an average flow rate of 25 to 50 gpm (31 gpm in 2014) with maximum estimated flows rates of up to 184 gpm in 2014. If the hydraulic

conductivity for bedrock was 6 x 10^{-3} cm/s in the bedrock the flow rate would be increased to 710 gpm for the Pilot Trench and 3,300 gpm for the whole trench. As a result, CRA estimates that the whole Perimeter Groundwater Trench Collection System would operate between 500 gpm and 1,000 gpm (e.g., Pilot Trench, being 21 percent of the length would produce approximately 100 to 200 gpm).

Implementation of the Pilot Trench will be key to understanding what rate of water the whole trench will produce. Completed calculations for the infiltration rates, conveyances and pumps will be included as an Appendix to the revised Design Report for the Perimeter Groundwater Trench Collection System.

3.2 Geotechnical Samples

At select locations, bedrock samples of competent and weather-fractured bedrock were collected for uniaxial compression testing to provide information on the strength of bedrock. The bedrock compression results varied between 45.3 and 166.5 mega Pascal (MPa). Results for testing along the Pilot Trench Study area are presented in Appendix B.

3.3 Downhole Geophysical Logging

Downhole geophysical logging was conducted at the locations shown on Figure 3.1. Where the bedrock was more competent (usually at depth), logging was conducted on longer sections of the bedrock. A full suite of logs was also run upon completion of the borehole to total depth. COLOG, a Division of Layne-Christensen Company, of Golden, Colorado provided the equipment and engineer/operator for downhole geophysical logging.

The geophysical logging consisted of measurements of the borehole diameter (caliper), the rock's natural radioactivity (natural gamma-ray), the rock's natural resistivity (short and long-normal), single-point resistance (spr), fluid spontaneous (or self) potential (sp), fluid temperature, and specific conductance. Additionally, logging runs also utilized a digital acoustic televiewer (ATV) and final logging runs (i.e., from total depth) also utilized a borehole image processing system (BIPS). Logs from each run were printed in the field (except the BIPS) upon completion and reviewed by the field geologist prior to further advancement of the borehole.

Geophysical logs for locations near the Pilot Trench are presented in Appendix C.

3.4 Packer-Pressure Testing

East Plant Area hydraulic conductivity testing was performed in selected overburden and bedrock monitoring wells using packers to isolate a test interval. Specific intervals were selected on the basis of inspecting both the drilling core logs and the downhole geophysical test

results or adjacent holes. The results of the hydraulic conductivity testing can be found in Appendix D.

3.5 Environmental Samples

Samples for PCB analysis were collected from boreholes at two foot intervals (e.g., 0 to 2 ft below ground surface [bgs], 2-4 ft bgs, 4-6 ft bgs) for overburden from select boring locations. A summary of the soil sample analytical results for locations adjacent to the proposed Pilot Trench is presented in Table 3.1 (note that a number of these locations have been removed or covered during various East Plant Area IMs). Groundwater samples have been collected from select monitoring wells and analyzed for PCBs. Additional groundwater sampling continues under the Environmental Indicator CA750 monitoring. The groundwater sampling locations are presented on Figure 3.2 and results are presented on Table 3.2.

Section 4.0 Pilot Trench Design

The Perimeter Groundwater Trench Collection System is designed to work in conjunction with the East Plant Area IM (source removal and Cover System) 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 Perimeter Trench Collection System. The Cover System construction was completed in 2013. The Pilot Trench Study will consist of installing a short section of the Pilot Trench Collection System in order to evaluate potential future performance of the water collection and treatment system.

The Pilot Trench Study will consist of a continuous gravel-filled trench that will span through DB-4. A 6-inch perforated high density polyethylene (HDPE) pipe will be placed at the bottom of the trench to facilitate groundwater conveyance to the proposed Wet Well (WW). Collection sumps, complete with float-controlled pumping systems, will be placed at the WW to pump the water to an on-Site water treatment facility. Collected non-aqueous phase liquids (NAPL) will be separated from the collected water using an oil/water separator prior to water treatment and transportation off-Site for proper disposal.

The Perimeter Groundwater Trench Collection System location and alignment have been determined based on bedrock topography, the elevation of competent bedrock, and groundwater flow directions. By design, the trench runs through areas such as grikes, open fractures, solution cavities and vugs. The purpose is to collect groundwater potentially conveyed by these features, providing efficient means to drain upgradient water into the trench. The competent rock will be located at the base of the trench. If an “open” feature is

encountered at the base of the trench, it will be sealed prior to placement of the pipe and drainage media. Based on the available inspection data, an onsite geologist will review the existing records (in including new observations made pre- and post-cutting) to make the determination if the trench has been extended too deep, requiring additional grout to bring the base back into the competent bedrock layer, or if the base of the trench has not yet extended into the competent bedrock layer.

The alignment for the Pilot Trench is based on the following considerations:

- The nature and extent of impacted groundwater and preferential flow pathways based upon the RFI and property boundaries
- The location of the perimeter of the East Plant Area Cover System
- 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 Perimeter Groundwater Trench Collection System alignment
- Constraints of the bedrock trench construction methodology and bedrock trenching equipment (e.g., number of bends within the trench alignment, ability of the equipment to make turns)

The plan view of the proposed alignment of the Perimeter Groundwater Trench Collection System, highlighting the Pilot Trench is presented on Figure 3.1. The profile of the Pilot Trench alignment is presented on Figures 4.2 and 4.3. Design Drawings are provided in Appendix E.

The bottom of the Pilot Trench is designed to be terminated within the competent rock. A permeability increase was noted in the packer testing results from CH-21 (2×10^{-5} cm/s) and CH-50 (8×10^{-5} cm/s) below the proposed bottom of the Pilot Trench. Both coreholes were completed in the Harrodsburg Formation, which is below the competent Salem Formation. CH-50 was advanced into competent rock. However, the last core retrieved from CH-50 showed potential permeability (i.e., vertical fracture and vug) at the bottom of the corehole below the competent rock. Based on previous knowledge regarding the formation in the area (e.g., swallets and the Spring 18 Area) further advancement of CH-50 was terminated to prevent potential downward migration of groundwater to the lower formation. During the advancement of CH-21, the field geologist determined the corehole had been advanced into competent rock. It wasn't until the packer-pressure testing when the increased permeability was noted and that the corehole had been actually advanced past the competent rock.

The bottom elevation of the trench is designed to be completed within competent rock in these locations, above the bottom elevation of the exploratory corehole. In addition, to prevent

potential downward migration of groundwater along the length of the Pilot Trench, a physical barrier will be placed along the downgradient side of the trench and a minimum 6-inch thick cement-bentonite grout layer will be installed along the Pilot Trench floor to provide a low-permeability seal and to key in the physical barrier. The minimum 6-inch grout barrier was selected as a thickness that would be measureable from the surface of the construction platform. In addition, this minimum thickness would also decrease the risk of extending the grout layer above the layer of the competent bedrock and blocking open fractures. Consequently, the physical barrier will be utilized to prevent upgradient water traversing across the trench and to prevent collection of downgradient water beyond the trench, as well as impeding the vertical migration of groundwater downward beneath the bottom of the physical barrier across the length of the trench.

After clearing out the cuttings, the the trench bottom/floor will be surveyed prior to placement of the 6-inch grout barrier. A second survey will be completed following placement of the grout to confirm the grout thickness. Additionally, the survey will also provide the slope of the trench bottom and will be used to determine whether additional grout is required to ensure the trench floor is leveled to effectively transport water to the downstream WW.

It is anticipated that the physical barrier placed on the downgradient side of the Pilot Trench would be a plastic material of some sort, however it is expected that installation of a standard HDPE liner, similar to that placed horizontally for landfill cover systems, would be difficult to place in this vertical application. Installation without damage, either during movement of the liner from a horizontal position for seaming to the vertical position or during installation along the potentially jagged vertical face of the bedrock trench, would be likely, rendering the impermeable liner system ineffective. There are also safety considerations for lowering the liner while attempting to steer it down into the trench while completing seams, all while attempting to avoid rips. Therefore, the physical barrier will be specified to be a more rigid plastic material that is intended for vertical applications. This could either be a vertical geomembrane (HDPE) barrier system (e.g., GSE Gundwall or CurtainWall) that is intended for trench applications and includes mechanical interlocks between panels (in lieu of field seaming) or plastic (vinyl or fiber-reinforced polymer - FRP) sheet piling with hydrophilic or viton seals to create an impermeable barrier. It would also be expected that in addition to the grout seal at the base of the Pilot Trench, that a grout material would likely be placed behind the physical (plastic) barrier to fill gaps between the barrier material and the downgradient rock face. Above the bedrock surface, the use of drainage media sand will be implemented to serve as a vertical extension of the bedrock trench, following completion of the bedrock trench itself. The drainage media sand will be placed to the angle of repose and its intent would be to collect the lateral migration of groundwater within the overburden regime. The remainder of the working

platform constructed within the overburden soils will be backfilled with the material removed during initial excavation for the working platform.

Where the trench falls within the limits of the East Plant Cover System, the area will be restored consistent with the Cover System design (previously approved by U.S.EPA) which will include components as follows (bottom to top):

- soil barrier layer – compacted clay (12 inches);
- 60 ml Linear Low Density Polyethylene Liner (LLDPE);
- drainage geocomposite;
- common fill (12 inches); and
- topsoil (6 inches) and vegetative cover.

The East Plant Area Cover System Design Report (April 18, 2008) provides a detailed description of the Cover System design elements. As-built construction details for the East Plant Cover System are provided in the Construction Certification Report East Plant Area Cover System (March 2, 2015), currently under U.S.EPA review.

4.1 Basis of Pilot Trench Profile Selection

In selecting the elevation of the Pilot Trench bottom, available data from coreholes and monitoring wells were utilized to identify the zone in which competent rock was encountered. Competent rock is rock that does not have significant fractures which would facilitate significant water movement through the trench or allow significant downward migration of impacted water. Coreholes in close proximity of the proposed Pilot Trench Study alignment that were evaluated included, from north to south, CH-50, CH-23, CH-21, CH-60, CH-19, and CH-51. Other coreholes in the vicinity of the Pilot Trench included CH-49, CH-22, CH-20, CH-41, CH-15B, and CH-52. Coreholes within the trench footprint, not already abandoned, will be sealed with a cement/bentonite grout to the elevation of the proposed Pilot Trench, prior to trench installation.

The proposed Pilot Trench elevations will allow for gravity drainage from the north and south ends of the trench to the WW within this zone of competent rock. Collected groundwater within the Pilot Trench will then be pumped through a forcemain to the on-Site water treatment system for treatment prior to discharge. The depth and grade of the Pilot Trench in this location was determined to facilitate installation of the Pilot Trench at a depth that most efficiently captures water from the East Plant Cover System area.

4.2 Pilot Trench Alignment Selection

The following sections present a description of each data point used in determining the minimum and maximum elevations for the groundwater collection system in the Pilot Trench, and the criteria used for the basis of selection. The design data collected as described in Section 3.0 includes visual inspection of the retrieved core, groundwater elevation measurements, downhole geophysical logging, packer-pressure testing, and groundwater analytical results.

4.2.1 Pilot Trench Bedrock Descriptions

The alignment of the Pilot Trench will run approximately along 800 ft along station (STA) 0+82 and STA 8+03 (Figure 4.1 and Drawing C-05 [Appendix E]). The information at each corehole location, relevant to the design of the Pilot Trench, is summarized below. Where the corehole was terminated in competent rock, the summary below (from north to south) identifies the bottom elevation of competent rock as the bottom elevation of the corehole, although competent rock may extend below that elevation.

CH-50

- This corehole was installed along the proposed Pilot Trench alignment. The limestone consists of the Salem Formation to a total depth of 34.2 ft. Evaluation of the core and analysis of the geophysical logs showed several horizontal fractures and three vertical fractures near the top of the core. A vertical fracture was also observed near the total depth of the corehole. Geophysical results showed a larger opening at a depth of approximately 10 ft and packer-pressure testing showed a slight intake at the bottom of the corehole, below the proposed bottom elevation of the trench in this area. Analysis revealed that competent rock was obtained prior to total depth and that the bottom of the corehole ended up going beyond the elevation of competent rock into a slightly more permeable formation beneath it. Refer to additional discussion in Section 4.0 regarding low permeability seals to be used in the trench bottom and the downgradient wall.

CH 50 Summary

Location (STA)	00+81.99 ft
Offset from Trench Centerline	11.81 ft West
Total Depth of Hole	34.2 ft
Elevation – top of corehole/MW	634.8 ft AMSL
Elevation – top of bedrock	631.8 ft AMSL
Elevation – top of competent rock	609.8 ft AMSL

Elevation – bottom of competent rock	604.8 ft AMSL
Elevation – bottom of corehole/MW	600.6 ft AMSL
Proposed Trench Elevation	607.5 ft AMSL
Minimum hydraulic conductivity within zone of competent rock	<5.84 x 10^{-6} centimeters per second)(cm/s)

CH-23

This corehole was completed to a depth of 26.9 ft. One horizontal fracture was noted during the core inspection. The limestone cored at this location consists of the lower portion of the Salem Formation and the upper portion of the Harrodsburg Formation. The results of the packer-pressure testing indicated a hydraulic conductivity less than the limits of testing through the entire corehole.

CH 23 Summary

Location (STA)	2+33.46
Offset from Trench Centerline	8.29 ft East
Total Depth of Hole	26.9 ft
Elevation – top of corehole/MW	613.5 ft AMSL
Elevation – top of bedrock	610.0 ft AMSL
Elevation – top of competent rock	610.0 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	586.6 ft AMSL
Proposed Trench Elevation	600.0 ft AMSL
Minimum hydraulic conductivity within zone of competent rock	<3.06 x 10^{-6} cm/s

CH-21

- This corehole was completed to a depth of 45.5 ft. The limestone at this location consists mostly of the Harrodsburg Formation with approximately one foot of Salem at the very top. The results of this boring showed competent bedrock to an approximate depth of 25 ft. A fractured zone was encountered between approximately 25 and 36 ft, below the proposed bottom elevation of the trench in this area. Analysis revealed that competent rock was obtained prior to total depth and that the bottom of the corehole ended up going beyond the elevation of competent rock into a slightly more permeable formation beneath it. Refer

to additional discussion in Section 4.0 regarding low permeability seals to be used in the trench bottom and the downgradient wall.

CH 21 Summary

Location (STA)	3+13.02
Offset from Trench Centerline	0.02 ft East
Total Depth of Hole	45.5 ft
Elevation – top of corehole/MW	612.1 ft AMSL
Elevation – top of bedrock	600.6 ft AMSL
Elevation – top of competent rock	600.6 ft AMSL
Elevation – bottom of competent rock	575.1 ft AMSL
Elevation – bottom of corehole/MW	566.6 ft AMSL
Proposed Trench Elevation	596.49 ft AMSL
Minimum hydraulic conductivity within zone of competent rock	$< 2.05 \times 10^{-6}$ cm/s

CH-60

This corehole was installed along the proposed Pilot Trench alignment. The limestone cored at this location consists of approximately 23 ft of the Salem Formation. Analysis of the core and geophysics completed at this location showed a few small vugs. However, the results of the packer-pressure testing were negative for water intake to the formation throughout the corehole tested.

CH 60 Summary

Location (STA)	4+19.96
Offset from Trench Centerline	6.35 ft East
Total Depth of Hole	30.0 ft
Elevation – top of corehole/MW	620.2 ft AMSL
Elevation – top of bedrock	613.2 ft AMSL
Elevation – top of competent rock	609.7 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	590.2 ft AMSL
Proposed Trench Elevation	595.07 ft AMSL

Minimum hydraulic conductivity within zone of competent rock	<2.20 x 10^{-6} cm/s

CH-19

This corehole was completed to a depth of 31.7 ft. The limestone at this location consists of the lower portion of the Salem Formation and approximately 1.5 ft of the upper Harrodsburg Formation at total depth. Two horizontal fractures were observed near the contact of these two formations. The results of the packer-pressure testing showed hydraulic conductivity values of less that the limits of the testing through this section.

CH 19 Summary

Location (STA)	4+73.18
Offset from Trench Centerline	43.74 ft West
Total Depth of Hole	31.7 ft
Elevation – top of corehole/MW	625.0 ft AMSL
Elevation – top of bedrock	616.5 ft AMSL
Elevation – top of competent rock	616.5 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	593.3 ft AMSL
Proposed Trench Elevation	596.08 ft AMSL
Minimum hydraulic conductivity within zone of competent rock	<1.43 x 10^{-6} cm/s

CH-51

This corehole was installed along the revised Pilot Trench alignment. The limestone cut at this location consists of the Salem Formation to a total depth of 39.9 ft. Several horizontal fractures were observed from the retrieved core. The results of the geophysical testing did not indicate that any of the fractures were open. Packer-pressure testing was completed at the bottom of the corehole and indicated a slight water take to the formation upon low pressure and higher pressure. The middle pressure tested showed no water take to the formation, which indicates an initial take filling the fractures and a slight water take at a higher pressure.

CH 51 Summary

Location (STA)	8+03.70
Offset from Trench Centerline	13.92 Ft
Total Depth of Hole	39.9 ft
Elevation – top of corehole/MW	644.3 ft AMSL
Elevation – top of bedrock	637.3 ft AMSL
Elevation – top of competent rock	637.3 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	604.4 ft AMSL
Proposed Trench Elevation	607.0 ft AMSL
Minimum hydraulic conductivity within zone of competent rock	$<1.51 \times 10^{-6}$ cm/s

The following nearby coreholes were also investigated as part of the evaluation of the proposed trench alignment:

CH-49

This corehole was installed along the revised full trench alignment. The limestone cored as part of this evaluation consists of the Salem Formation to a depth of 34.2 ft below ground elevation (606.9 ft AMSL). There were seven horizontal fractures noted and one vertical. The results of the geophysical acoustic logging showed that the vertical fracture may be partially open at a depth of 19.8 ft. No remaining fractures on the geophysical logs showed any evidence of being open. The results of the packer-pressure testing were negative for permeability at the limits of the testing.

CH 49 Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	34.2 ft
Elevation – top of corehole/MW	641.1 ft AMSL
Elevation – top of bedrock	637.6 ft AMSL
Elevation – top of competent rock	625.1 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	606.9 ft AMSL

Proposed Trench Elevation	N/A
Minimum hydraulic conductivity within zone of competent rock	<1.67 x 10^{-6} cm/s

CH-22

Corehole CH-22 was installed as part of the original trench alignment evaluation. The limestone cored at this location consist of the lower Salem and upper Harrodsburg Formations (transition zone). Several stylolites were observed along the length of the core. A few horizontal fractures, which increase in frequency with depth were observed. One vertical fracture was also detected. None of the structural features encountered indicated evidence of groundwater flow. Both core runs at this location resulted in 100% core recovery and 100% rock quality index (RQD). Both downhole geophysical logging and packer-pressure testing were conducted at this location upon completion of the coring. Analysis of these data suggest that the upper portions of the corehole are competent and do not show evidence of any significant secondary permeability features. The packer-pressure pressure testing of the lower 3 ft (583.8 to 583.8 ft AMSL) of this corehole, however, did show increased permeability (4.4 x 10^{-4} cm/s).
The upper portion of this corehole shows more competent rock in this area between an approximate elevation of 588.0 and 584.0 ft AMSL. The lower limestone units have not been shown to be impacted with PCBs.

CH 22 Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	32.6 ft
Elevation – top of corehole/MW	613.4 ft AMSL
Elevation – top of bedrock	604.2 ft AMSL
Elevation – top of competent rock	588 ft AMSL
Elevation – bottom of competent rock	584 ft AMSL
Elevation – bottom of corehole/MW	580.8 ft AMSL
Proposed Trench Elevation	N/A
Minimum hydraulic conductivity within zone of competent rock	<7.01 x 10^{-6} cm/s

CH-20

Corehole CH-20 was installed as part of the original trench alignment evaluation. The limestone cored at this location consists of the lower portion of the Salem Formation and the upper portion of the Harrodsburg Formation (transition zone). Four horizontal fractures were encountered to the total depth of 38 ft bgs (581.2 ft AMSL). None of these fractures exhibited evidence of groundwater flow. Both core runs resulted in 100% core recovery and 100% RQD. No geophysical logging or packer-pressure testing was completed at this location. Based on the above analysis, competent rock has been identified between 596.2 and 581.2 ft AMSL.

CH-20 Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	38.0 ft
Elevation – top of corehole/MW	619.2 ft AMSL
Elevation – top of bedrock	605.2 ft AMSL
Elevation – top of competent rock	596.2 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	581.2 ft AMSL
Proposed Trench Elevation	N/A
Minimum hydraulic conductivity within zone of competent rock	Not determined within zone of competent rock

CH-41

Corehole CH-41 was installed as part of the original trench alignment evaluation. The geology at this location consisted of the Salem Formation to the total depth of approximately 26.2 ft bgs (604.9 ft AMSL). One fracture was encountered through the approximate 20 ft of core collected, which was an over 1-foot long oxidized vertical fracture that was encountered at a depth of approximately 6 ft bgs (625.1 ft AMSL). The percent recovery and RQD were both 100% for both core runs. No geophysical logging or packer-pressure testing was completed at this location. Based on the above results, competent rock was identified between 620 and 604.9 ft AMSL, below the depth of the vertical fracture.

CH-41 Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	26.2 ft
Elevation – top of corehole/MW	631.1 ft AMSL
Elevation – top of bedrock	628.1 ft AMSL
Elevation – top of competent rock	620.0 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	604.9 ft AMSL
Proposed Trench Elevation	N/A
Minimum hydraulic conductivity within zone of competent rock	Not determined within zone of competent rock

CH-15B

Corehole CH-15B was installed as part of the original trench alignment evaluation. The bedrock at this location consists of the upper portion of the Salem Formation. Two horizontal fractures were encountered; one at approximately 7.5 ft bgs (636.2 ft AMSL) showed evidence of groundwater flow (water entered the corehole); and the other at an approximate depth of 21.7 ft bgs (622 ft AMSL) that did not show any signs of groundwater flow (water did not enter the corehole at this fracture). The percent recovery and RQD for both core runs completed were 100%. No geophysical logging or packer-pressure testing was completed at this location. Based on the above results, competent rock was identified between 633.7 and 617.4 ft. AMSL.

CH-15B Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	26.3 ft
Elevation – top of corehole/MW	643.7 ft AMSL
Elevation – top of bedrock	640.5 ft AMSL
Elevation – top of competent rock	633.7 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	617.4 ft AMSL
Proposed Trench Elevation	N/A

Minimum hydraulic conductivity within zone of competent rock	Not determined within zone of competent rock

CH-52

- This corehole was installed immediately along the revised trench alignment. The limestone cut at this location consists of the Salem Formation to a total depth of 55 ft. Several horizontal fractures were observed from the retrieved core. The results of the geophysical testing did not indicate that any of the fractures were open. Packer-pressure testing was completed at 30 to 35 ft, and 50 to 55 ft bgs, with negative results for permeability at the limits of the testing at both intervals.

CH-52 Summary

Location (STA)	N/A
Offset from Trench Centerline	N/A
Total Depth of Hole	55 ft
Elevation – top of corehole/MW	668.3 ft AMSL
Elevation – top of bedrock	665.3 ft AMSL
Elevation – top of competent rock	644.3 ft AMSL
Elevation – bottom of competent rock	total depth
Elevation – bottom of corehole/MW	613.3 ft AMSL
Proposed Trench Elevation	N/A
Minimum hydraulic conductivity within zone of competent rock	$<1.22 \times 10^{-6}$ cm/s

Section 5.0 Construction Quality Assurance

The Construction Quality Assurance (CQA) Plan for the Pilot Trench is included in Appendix F. The CQA Plan details the inspection and testing needed to verify the material quality and installation of the Perimeter Groundwater Trench Collection System components. The CQA Plan also details the methods that will be employed to verify the Pilot Trench is completed to a sufficient depth to encounter competent bedrock.

5.1 Bedrock Quality Verification

Electrical Resistivity Imaging (ERI) and Ground Penetrating Radar (GPR) surveys will be completed along the proposed Pilot Trench alignment following construction of the working platform (for the trenching machine) but prior to bedrock removal/cutting if it can be done safely (i.e., having personnel in the trench and depending on slope stability and water entering the excavation). The surveys will assist in augmenting the bedrock competency assessment along the length of the Pilot Trench, including the delineation of potential groundwater migration pathways, such as fractures and voids. In areas in which potential groundwater migration pathways are identified which could impact trench design, the trench design will be modified to address these features (e.g. by changing the depth of the trench or other measures).

To the extent practical, a remote video camera will be used to perform a video inspection of the bottom of the trench after completion of cutting segments. Based on research of options for remote inspection of the trench cut, including discussions with the rock trenching contractor, a remote video camera was selected as the best option. If significant fractures are identified, they will be assessed and it will be determined if actions, such as grouting, or increasing the depth of the trench, are required to address the presence of the fracture.

It should be noted that following excavation/trenching, every attempt will be made to survey the bottom of the trench with at least video inspection, and where possible, geophysical surveys. As it is not yet known what conditions will be like in the trench bottom, geophysical studies cannot be guaranteed. For these reasons, GPR and resistivity surveys will be completed along the entire length of the Pilot Trench before excavation/trenching. The GPR and remote camera will be attempted again post-trench cutting, as trench work progresses.

5.1.1 Electrical Resistivity

ERI surveys utilize a number of evenly spaced electrodes, which are configured in a straight line or array. This procedure is conducted by applying a current (I) to two electrodes and measuring the potential difference (V) across a series of remaining electrode pairs. A distribution of the apparent resistivity (ρ) in the subsurface can then be calculated and inversion software can be used to produce a modeled section of apparent resistivity (ρ_α) values.

Bedrock and overburden units tend to fall into known ranges of apparent resistivity values. Clay has a very low resistivity (10 to 50 Ohm-m), while limestone tends to be significantly higher. Weathered and fractured limestone generally has moderate resistivity values (100 to 400 Ohm-m), with values increasing with the competency of the bedrock (to approximately 5000 Ohm-m). Voids, if present, tend to show up as anomalously high resistivity zones, as air is

quite resistive, or low resistivity zones if in-filled with clay. ERI has relatively good resolution, although this is dependent on the spacing of the electrodes and type of array used. The depth of investigation is also dependent on the electrode spacing, with a larger spacing producing a greater depth of penetration (Sharma 1997).

The electrical resistivity (ER) survey will be completed along the proposed Pilot Trench alignment prior to commencement of excavation activities. The survey will be completed using a Syscal R1 Plus receiver and a 72 electrode spread. The Syscal R1 Plus is a multi-electrode resistivity imaging system, with an internal switching board and a 200 Watt power source. The output current is automatically adjusted to optimize the input voltage values and ensure the best measurement quality. This system is designed to automatically survey pre-defined sets of resistivity measurements with roll along capability.

The ER survey parameters will be configured to achieve depths of investigation ranging from 30 to 50 feet bgs, or at least 20 feet below the base of the constructed Pilot Trench. The deeper investigative depths will be employed over zones where the bedrock to be trenched is thicker, and the shallower depths of investigation may be employed where the bedrock is thinner (i.e. near the trough of the trench profile). Electrode spacings ranging from 3 to 5 feet will be utilized to achieve these depths of investigation, and high resolution results will be obtained by using a Wenner-Schlumberger array. The measured apparent resistivity data will be imported into an inversion software program (RES2DINV), and processed to yield a modeled profile section of resistivity along the proposed Pilot Trench alignment.

5.1.2 Ground Penetrating Radar

GPR systems utilize pulsed electromagnetic (EM) waves, which are emitted from a transmitting antenna. They are propagated into the ground and travel at velocities determined by the electrical properties of earth materials. If, as a wave moves downward, it hits a buried object or boundary between materials with different electrical properties, 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. With respect to void detection, a significant void appears as an intensified response or reflector, due to the airwave response created by the void. Fractures appear as traces that are non-parallel to the bedding plane, and heavily weathered zones show a lack of continuity in the bedding planes, and may show some signal attenuation as well.

GPR has a comparatively higher resolution than many other geophysical methods, as features such as individual fractures can be detected and accurately located. The resolution of a GPR

system is dependent on the frequency of the antenna, with lower frequencies providing greater depth of investigation, but reduced resolution. The depth of investigation is also dependent on the nature of the subsurface, with conductive materials (e.g., clay) attenuating the signal and dramatically reducing the depth of investigation (Sharma 1997).

The survey will be undertaken in short sections, and will utilize a Ground Explorer GPR system equipped with an 80 MHz high dynamic range (HDR) shielded antenna and a GX Controller for data acquisition. The width of the 80 MHz HDR antenna is approximately 2.5 feet, which can be accommodated by the proposed width of the Pilot Trench. The 80 MHz HDR antenna has a depth of penetration in bedrock that typically ranges from 50 to 60 feet bgs, which is below the base elevation of the proposed Pilot Trench. Consequently, the initial GPR survey will be completed along the alignment of the proposed Pilot Trench prior to commencement of excavation activities, to assess bedrock quality. Furthermore, once trenching activities have commenced, additional GPR surveying will be completed at the base of the excavation to assess the bedrock quality beneath the Pilot Trench prior to trench completion.

Section 6.0 Pilot Trench Construction

This section outlines general requirements for performing operations required to construct the Pilot Trench, utilizing the bedrock trenching excavation methodology.

6.1 Qualification of Contractor

A general contractor will be selected that has sufficient expertise, competent experienced personnel, and proven methodologies and equipment to manage the overall construction of the project including site preparation, water management, materials procurement and soil handling. A specialized trenching contractor will be retained to provide personnel and equipment to perform the bedrock trenching activities.

CRA will supervise the construction activities, provide engineering consulting (design development, contractor procurement, survey evaluation), and conduct the necessary quality control inspections and testing. As the on-Site representative, CRA is knowledgeable in: (1) construction equipment, (2) excavation and backfill operations, and (3) testing for quality control of groundwater collection trenches constructed using a bedrock trenching excavator. The work will be coordinated with other site activities to benefit from shared resources and support facilities. This is discussed in further detail in Section 7.0.

6.2 Materials

6.2.1 Cement-Bentonite Grout

An approximate 6-inch thick cement-bentonite grout layer will be installed along the length of the Pilot Trench floor to provide a low-permeability seal for bedrock fractures, minimize exfiltration, and maximize groundwater capture collection and conveyance through the forcemain to the WW. Cement-bentonite grout will be made from Portland cement and sodium bentonite powder and mixed using the manufacturer's recommended volume of water to achieve an optimal seal. The slurry will contain at least 20 percent solids by weight and have a density of 3.4 kg/L (9.4 lbs/gallon) or water or greater.

6.2.2 Physical Barrier

A physical barrier will be installed on the downgradient wall of the Pilot Trench to serve as a water resistant membrane to prevent groundwater entering the trench from traversing beyond the outer (downgradient) trench wall (Appendix E, Drawing C-07). A minimum 6-inch grout layer will be placed at the base of the Pilot Trench to prevent water from circumventing the barrier system by going under the installed physical barrier. The physical barrier should also prevent groundwater downgradient of the trench from entering the trench, thus minimizing the quantity of water to be treated.

6.2.3 Drain Collection Pipe

A 6-inch diameter HDPE drain pipe will be installed within the bedrock trench backfill to convey groundwater to the WW. The drain pipe will be solid wall slotted (or perforated) polyethylene pipe. Pipe joints will be butt-fusion welded. The pipe will meet requirements of American Society for Testing and Materials (ASTM) D 3350 for Grade PE3408 pipe with a minimum standard diameter ratio (SDR) of 11 (Appendix E, Drawing C-07). The SDR or pipe thickness will be adequate to withstand the burial depth without excessive deformation. Design calculations for the buried piping are presented in Appendix G.

6.2.4 Trench Backfill

Imported 1/4-inch diameter gravel from an off-Site source will be used to backfill the trench after the drain pipe is placed. Gravel will be placed in the trench from the floor of the trench to approximately the top of the bedrock. The gravel backfill along with the collection pipe will form a preferential pathway to direct groundwater to the WW. The installation of geotextile above the gravel backfill will lead to a reduction in infiltration and groundwater recharge in the trench area and, subsequently, lead to less shallow groundwater collection and more effective stormwater management in the detention basins and WW.

6.2.8 Geotextile

A polypropylene geotextile will be installed for filtration control to separate the bedrock trench granular backfill from the drainage media placed above the bedrock surface (Appendix E, Drawing C-07). Typical bias weave materials such as (Mirafi 700X or 70/20, Filterweave 500, or similar) can be used.

6.2.9 Drainage Media Sand

A sand layer, wrapped in a geotextile ('burrito' style) placed directly over the bedrock trench will be utilized to provide a downward path into the trench for water travelling through the overburden regime, or along the bedrock surface, thus preventing water from traversing the trench. The sand will be piled over the trench and allowed to slope at its natural angle of repose, as compaction of sand is not necessary or possible.

6.2.10 Backfill

A minimum one foot of common fill material will be placed over the geotextile layer-wrapped sand layer. Fill material will consist of either the material removed during initial excavation for the working platform or, if that material is deemed unsuitable, clean fill from an approved off-Site source. Fill material will be placed, compacted, and graded to promote surface water drainage away from the Cover System and trench.

A 6-inch topsoil and vegetative cover layer will be included to prevent wind and water erosion, provide storage for vegetation, maximize evapotranspiration, and reduce the volume of infiltrating stormwater that would migrate to the trench

6.2.11 East Plant Area Cover System

Portions of the trench extend through areas previously capped by the East Plant Area Cover System. In these areas, the trench will be backfilled with the aforementioned granular backfill, overlain with the sand drainage material, and fill. However, the components of the East Plant Area Cover System will subsequently be reinstalled in lieu of the common fill and topsoil components listed above to make up the final approximate 30 inches. Design criteria, including materials, compaction requirements, elevations and grades, liner/geocomposite tie-in, and construction quality assurance testing, presented in the East Plant Area Design Report and finalized in the Construction Certification Report East Plant Area Cover System (CRA, March 2, 2015), will be maintained.

6.2.12 Wet Well

Two dual vertical 2-foot diameter HDPE sumps will be installed to accept a single extraction pump each and permit the free flow of groundwater into the pump well from the 6-inch diameter HDPE drain pipe (Appendix E, Drawings C-08 to C-10). For the Pilot Trench, two of the sumps will be outfitted with EPG Companies, Inc. electric submersible pumps (or equivalent) with individual 3-inch diameter discharges connected to a 6-inch diameter header pipe within the WW structure leading to a HDPE force main. Collected water will be transferred to an on-Site water treatment facility prior to discharge to the creek under a NPDES permit.

For design flexibility, the WW chamber will include 2 additional sumps. One sump will be used for a future pump should additional pumping capacity be required following completion of the full Perimeter Groundwater Trench Collection System. The other sump will be installed to facilitate the use of a diesel pump as a backup in the event of a power outage or to provide supplemental pumping capabilities. Design calculations for the sump pump selection are presented in Appendix G.

6.3 Equipment and Approach

The contractor will locate and mark aboveground and underground utilities prior to commencing field activities. Utilities will be periodically relocated during the course of the construction as needed or required by law.

6.3.1 Working Platform

Overburden will be removed by the general contractor along the Pilot Trench alignment to the bedrock surface to provide a level working platform to accommodate the bedrock trencher, spoils and haul roads. The working platform will be fenced to prevent unauthorized access to the Site.

6.3.2 Trench Excavation

Excavation in the Pilot Trench will be performed using a specially-equipped bedrock trenching machine so the trench can be carried to its final depth continuously along the trench alignment. Special chopping, chiseling or other suitable equipment may be used as necessary to satisfactorily accomplish the required excavation. Consequently, the width of the trenching machine will be equal to or greater than the specified minimum width of the Pilot Trench.

The potential trenching machine must have the capability to cut a trench in the bedrock and achieve the 30-foot depth requirement of the Pilot Trench. An example of a rock trenching machine would be the Tesmec 1660 trencher that can be provided by specialty contractor, Rock

Removal Resources. An alternative cutting machine would be to use a hydraulic head attachment similar to that which is manufactured by Antraquip. This AQ attachment would allow for the penetration of bedrock with a uniaxial compressive strength (UCS) rating up to 25,000 psi. Furthermore, this hydraulic head attachment could potentially be combined with either a standard or a long-stick excavator to reach the deeper depths required for the future collection system.

Following consultation with the selected general contractor, potential rock excavation options, if proposed by the general contractor, will be evaluated to determine whether an acceptable production rate and trench quality is achievable using an alternate trenching method, as compared to the rock trenching machine.

The Pilot Trench will be inspected, to the safest extent possible, prior to installation of the remaining components, which will be installed as outlined below.

6.3.3 Soil Handling and Stockpiling

Soil materials removed during the construction of the working platform outside of the Cover System footprint will be handled under the assumption that the materials do not contain PCBs. Fill soil from under the Cover System foot print will be transported off-Site for disposal as ≥50 mg/kg PCBs waste. Soil outside of the Cover System will transported to an on-Site staging area and sampled in accordance with the Sampling and Analysis Plan (SAP) (Appendix H). The staging area will be constructed with an exterior berm to allow for the collection and treatment of water within the staging area. If soils are securely tarped and runoff cannot come in contact with the soil piles, then the water may be diverted as storm water runoff.

Due to the limited working area, rock cuttings from the trenching activities will be temporarily diverted, and put back into the cut trench. Depending on the consistency and water content, de-watering of the rock cuttings in bags or using another method may be necessary before being placed back into the cut trench, or when removed again.

Stockpiled materials that are less than or equal to 1.8 mg/kg PCBs may be re-used anywhere along the trench alignment where the consistency is deemed suitable (rock cuttings not suitable for reuse and will be hauled off-Site for disposal). Materials with >1.8 mg/kg PCBs and <50 mg/kg PCBs may be placed in the footprint of and subsequently covered by the East Plant Area Cover System that was disturbed to install the Pilot Trench.

6.3.4 Physical Barrier Placement

The trench will be excavated to the line, grade, and width shown on the construction drawings in Appendix E.

The physical barrier will be set to the bottom depth of the excavated bedrock trench. Sections of the physical barrier material will be lowered into the trench following the manufacturer's requirements for overlap and/or sealants. Care will be taken when backfilling the trench to prevent damage to the physical barrier.

The physical barrier will likely be comprised of plastic sheeting, a geotextile liner (LLDPE) or a comparative curtain wall. Individual barrier options will be evaluated and left to the contractor to determine installation suitability. The physical barrier will be installed along the downgradient face of the Pilot Trench and may likely require additional protection requirements to facilitate implementation.

The intention is to select a barrier that is flexible and malleable enough to allow for installation within the trench yet be robust and durable enough to withstand installation along the face of the trench and placement of the granular fill. The rock face will likely contain sharp protrusions of bedrock and therefore the selected barrier must not be susceptible to tearing throughout installation procedures.

Final selection of the specific physical barrier type and associated specifications will be submitted to U.S. EPA for approval prior to installation in the Pilot Trench.

6.3.5 Grout Placement

A cement-bentonite grout slurry will be mixed on Site. The slurry mixture will be tremied to the bottom of the trench to "key" in the plastic physical barrier between the bedrock floor and downgradient wall and the grout slurry mixture.

6.3.6 Drain Pipe Placement

Equipment for handling and placing the drain pipe will operate from the surface of the working platform. The line and grade of the pipe will be controlled and measured using survey, laser equipment and/or telltales. The pipe will be centered between the trench walls. Granular drainage media will be placed as bedding for the pipe, above the pipe and will extend to the top of the bedrock surface.

6.3.7 Geotextile Placement

Geotextile (LLDPE) will be placed to maintain separation between granular backfill and overlying soil backfill (to keep the backfilled common fill soil from infiltrating the sand drainage media), while allowing water to pass through the geotextile to the sand drainage media. Equipment for handling and placing geotextile panels may consist of suitable material handling equipment such as loaders or forklifts that are capable of delivering the geotextile panels to the proper position in the trench without damage. The equipment will place the panels with an overlap. The geotextile will be placed, such that the geotextile panel conforms to the shape of the trench without excessive folds, tears, or unnecessary patching.

6.3.8 Backfill Placement

Standard earth moving equipment (i.e. excavators, dozers, loaders) will be used for backfill activities above the bedrock and drainage media sand. Soil backfill (common fill and topsoil) will be placed above the geotextile layer, outside the extents of the Pilot Trench installed within the East Plant Area Cover System footprint, to meet substantially similar pre-construction elevations. In particular, common fill will be compacted to 6 inches below the existing surface elevation and then covered with 6 inches of topsoil. To the extent possible, soils removed when constructing the working platform will be re-used as common fill.

6.4 Execution of the Work

The groundwater collection system in the Pilot Trench will be constructed to the elevations, lines and grades, and cross sections shown on the plans (Appendix E). The Pilot Trench will have essentially vertical walls, a minimum width of 24 inches, and extend to the design depth.

6.4.1 Site Preparation

Prior to initiating trenching activities, a working platform will be prepared to provide a level working surface for the operation of the trenching equipment, and to provide an area for trench spoils to be discharged and managed. This platform will be prepared by excavating existing overburden soils to the bedrock surface, and adding a gravel working surface, if necessary, to provide a suitable platform. Temporary berms will be constructed to divert clean surface water around the Pilot Trench area. Clean surface water that is diverted around the working surface and has met the requirements for surface water drainage for construction sites, may be discharged to the creek system in accordance with the applicable permits. In some cases, diversion of clean surface water may require piping as the trench will temporarily eliminate a portion of the East Plant Area Cover System detention basin and stormwater discharge system. As-built drawings for the detention basin and stormwater discharge system can be found in the Construction Certification Report East Plant Area Cover System.

Water which collects within the bermed area (including the working platform), will be collected, handled, and treated as impacted water.

A portion of the trench will be constructed through a portion of the East Plant Area Cover System. It is assumed that the underlying soil in this area contains low level PCB impacted soil below the Cover System components. During construction of the working platform, soils from under the cover will be segregated and managed as impacted soils. Soils from the Cover System will be segregated and reused to repair the Cover System after completion of the trench, to the extent possible. Further, the general contractor will take care when approaching the geocomposite and LLDPE layers which are part of the East Plant Area Cover System. The general contractor will be required to cleanly cut through these layers so that that the remaining liner edges can be unearthed following completion of the trench and the Cover System can be re-established as part of the final backfill activities.

6.4.2 Excavation

The Pilot Trench excavation will be maintained in a safe, open condition and be constructed without undue interruption until complete. Open excavations will be safely protected using construction fencing, site security, lighting, warning signs, etc. to prevent unintended access. Excavation will be conducted in a manner that provides for a continuous minimum width trench to the required depth along the centerline of the excavation. The trench may be deepened based on examination of the trench.

6.4.3 Trench Completion

Upon completion of inspections, the plastic physical barrier liner will be placed to the trench bottom and along the trench wall. Grouting will be completed in the bottom of the completed excavation to seal the bottom of the trench and "key" in the plastic physical barrier.

The pipe and media drain will then be placed above the grout after allowing adequate time for the grout to set (1 to 2 days depending on weather conditions). The drainage media will be placed up to the top of bedrock elevation.

Geotextile will be placed to separate drainage media from the backfill soil placed above the top of bedrock. Backfill material within the overburden regime above the bedrock trench drainage media will consist of native backfill material previously removed during construction of the working platform. Where the trench is within the limits of the East Plant Cover System, a sand drainage media will be placed directly above the geotextile, followed by native material. This

area of the Pilot Trench will be restored consistent with the East Plant Area Cover System design.

Groundwater collected during trench construction will be collected, handled, and treated as impacted water.

6.4.4 Tolerances

The following tolerances are typical and generally apply to the Pilot Trench dimensions and construction. The final construction may vary within these tolerances from the designed values.

- The Pilot Trench walls will be essentially vertical. The working platform and/or excavating equipment may be leveled to be plumb within 1 percent of vertical.
- The depth of the Pilot Trench will be measured or surveyed to within 6 inches of the desired elevation. The trencher will operate using a laser level to maintain proper depth and grade control.
- The bedrock trenching excavator will be at least as wide as the design width of the Pilot Trench.
- The Pilot Trench will follow the designed alignment within 2 ft of the designated centerline.
- Overlaps of the geotextile fabric sheets will be at least 4 ft, as measured at the top of the trench.
- The WW will be installed to within 3 ft of the designated location.
- The perforated drain pipe will be installed in accordance with the manufacturer's recommendations. The elevation of the installed drain pipe will be within $\pm$ 6 inches of the plan elevation without kinks or bends and the elevation of the pipe and recorded at 20 ft intervals. The grade of the pipe will be continuously maintained without mounds or sags in the line of the pipe.

Should Site conditions require deviation from these criteria, these deviations will be relayed to U.S. EPA for approval prior to implementation.

Section 7.0 Construction Support And Coordination With Other East Plant Area Activities

7.1 Supporting Facilities

Construction of the Pilot Trench will be coordinated with ongoing activities to minimize impacts to ongoing Site activities. The Pilot Trench construction will utilize the following supporting facilities:

7.1.1 Site Security

A temporary fence will be placed around the active work areas. The contractor will be responsible for maintaining security at all times during the construction period. The contractor will inspect, maintain, and repair the fencing, as necessary, to ensure protection of the public and security of the trenching work area. A cover will be placed over the open areas of bedrock trench when work is not ongoing as an additional precaution.

7.1.2 Site Offices

Existing Site offices will be utilized by the consultant to support the Pilot Trench construction. Additional Site offices may be established for the general contractor and the trenching contractor.

7.1.3 Emergency First Aid Facilities

First aid facilities will be established and maintained the major work area. The first aid supplies will comply with the requirements of 29 CFR 1910.141 and follow the Facility Health and Safety Plan.

7.1.4 Fire Fighting Equipment

The general contractor will provide the necessary fire suppression equipment to ensure the safety of Site personnel and protection of GM's property. Coordination will be established with the Facility, local Fire Department, and emergency responders during trench construction activities.

7.1.5 Decontamination Facilities

Prior to commencing work in an Exclusion Zone at the Site, the contractor will establish a personnel hygiene/decontamination facility. The contractor will also maintain an equipment decontamination pad(s) outside the exclusion zone in the construction area, as required.

Wastewater from the decontamination operations will be pumped to designated storage tanks prior to on-Site treatment, or pumped directly to on-Site treatment.

7.1.6 Portable Sanitary Facilities

Portable toilet facilities will be provided as needed and maintained in an area outside the Exclusion Zone. Sanitary wastes will be removed and disposed of off Site, on a periodic basis.

7.1.7 Utilities

Electrical power, potable water, telephone service, and other utilities, as required, will be established for the construction support facilities.

7.1.8 Site Communications

Two-way radios will be utilized by the contractor and provided to the Engineer. Suitable warning signals such as horns or whistles shall be designated for emergencies and identified in the contractor's HASP.

7.1.9 Access Roads

On-Site access roads will be utilized for Site access. Temporary access roads, where required, will be removed by the Contractor at the completion of the work.

7.1.10 Parking

Sufficient space for parking for Site personnel will be established. In the event an established parking area becomes encumbered by specific Site-related operations, temporary alternate space will be provided.

7.3 Fugitive Particulate Control

During Pilot Trench construction activities, real-time particulate air monitoring will be performed by the contractor(s) for their employees. The contractor will adjust work practices based on the monitoring data. The particulate control measures will be designed to limit the emissions of total suspended particulates (TSPs) that are likely to remain airborne and be carried out of the work area.

During construction of the Pilot Trench, the contractor will be responsible for the control of fugitive particulates generated by the excavation, trenching, transporting and backfilling of the

soil and rock. In the event that dust control is not sufficient, work will be stopped and changes to the operation made prior to resuming work.

Ambient air quality monitoring will be conducted by CRA around the work platform and the staging areas to monitor potential exposure of off-Site receivers in accordance with the Ambient Air Quality Monitoring Program (AAQMP) in Appendix I. Monitoring will initially be completed daily for total suspended particulates (TSPs) and PCBs during the preparation of the work platform and the trenching activities. PCB monitoring will be reduced on the schedule indicated in the AAQMP (Appendix I), pending PCB results consistently less than the action level (1 µg/m^3). U.S. EPA will be notified of any operational problems, or of detected concentrations of airborne contaminants in excess of the ambient air criteria.

7.4 Sediment and Erosion Control

Sediment and erosion controls will be installed and may include swales, berms, plastic sheeting (tarps), straw bales, and silt fences, as necessary. The requirements will be evaluated based on Site conditions and the extent of work being performed.

7.5 Institutional Controls

Following the Pilot Trench construction, the timing for permanent institutional controls and deed restrictions to restrict access, land use, and development will be evaluated as part of the overall East Plant Area remedy.

7.6 Operation, Maintenance, and Monitoring

The Pilot Trench Interim Groundwater Monitoring Program and Operation Schedule will be submitted to U.S.EPA within 60 days of construction completion of the Pilot Trench. The document will outline the operation of the trench, procedures for collection of operational data, and a monitoring schedule for determining effectiveness of the system and its impact to the area groundwater.

7.7 Permit Applications and Approvals

A soil erosion and sediment control permit will be required for the Pilot Trench installation at the East Plant Area.

Section 8.0 Community Relations

Community relations activities and community participation in the review of the East Plant Area collection trench includes:

- Project fact sheets specific to the East Plant Area Work Plan activities, including the Perimeter Groundwater Trench Collection System design and construction
- Project website
- GM-organized community meetings for neighbors and the general public
- Community Liaison Panel (CLP) meetings.

Section 9.0 Schedule

A project schedule is presented on Figure 9.1. The schedule presents project tasks in a sequence that will expeditiously implement the trench activities once U.S.EPA approval of the design has been approved.

Section 10.0 Cost Estimate

The cost estimate for the Pilot Trench installation was provided to U.S.EPA during the AOC negotiations. The cost estimate is broken down as follows:

Task	***Estimated Cost***
Mobilization	$259,000
Site Preparation	$827,000
Rock Trenching	$538,000
Plastic Barrier System	$250,000
Collection System Installation	$482,000
Bedrock Backfilling	$55,000
System Startup	(included)
Restoration	$89,000
Demobilization	(included)
Operation and Monitoring	(not included)
Engineering Oversight (fulltime)	$100,000
Total	**$2,600,000**

Section 11.0 References

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Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*P215EastPlantArea*	*P215EastPlantArea*	*P215EastPlantArea*	*P215EastPlantArea*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_P216West*	*EastPlantArea_P216West*	*EastPlantArea_P216West*
Sample Location:		*215-M1*	*215-M1*	*215-M2*	*215-M2*	*AD-10*	*AD-10*	*AD-11*	*AD-11*	*AD-11*
Sample Identification:		*S-215-062205-DD-885*	*S-215-062205-DD-886*	*S-215-062205-DD-887*	*S-215-062205-DD-888*	*S-060805-JL-1287*	*S-060805-JL-1288*	*S-061405-DD-854*	*S-061405-DD-855*	*S-061405-DD-856*
Sample Date:		*6/22/2005*	*6/22/2005*	*6/22/2005*	*6/22/2005*	*6/8/2005*	*6/8/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*
Sample Depth:		*(0-2) ft*	*(2-4) ft*	*(0-2) ft*	*(2-3.4) ft*	*(0-2) ft*	*(5-7) ft*	*(0-2) ft*	*(0-2) ft*	*(2-4) ft*
Sample Type:									*Duplicate*	
	Units									
PCBs										
Aroclor-1016 (PCB-1016)	mg/kg	0.044 U	18 U	0.044 U	18 U	2.1 U	4.4 U	9.3 U	4.3 U	0.043 U
Aroclor-1221 (PCB-1221)	mg/kg	0.044 U	18 U	0.044 U	18 U	2.1 U	4.4 U	9.3 U	4.3 U	0.043 U
Aroclor-1232 (PCB-1232)	mg/kg	0.044 U	18 U	0.044 U	18 U	2.1 U	4.4 U	9.3 U	4.3 U	0.043 U
Aroclor-1242 (PCB-1242)	mg/kg	0.044 U	280 J	0.044 U	200 J	2.1 U	31	9.3 U	4.3 U	0.25
Aroclor-1248 (PCB-1248)	mg/kg	0.33 J	18 U	0.22 J	18 U	37	4.4 U	110	73	0.043 U
Aroclor-1254 (PCB-1254)	mg/kg	0.044 U	18 U	0.044 U	18 U	2.1 U	4.4 U	9.3 U	4.3 U	0.043 U
Aroclor-1260 (PCB-1260)	mg/kg	0.044 U	4.5 J	0.044 U	18 U	3.8	2.4 J	11	6.8	0.013 J
Total PCBs	mg/kg	0.33 J	284.5 J	0.22 J	200 J	40.8	33.4 J	121	79.8	0.263 J
Metals										
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)										
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***215-M1***	***215-M1***	***215-M2***	***215-M2***	***AD-10***	***AD-10***	***AD-11***	***AD-11***	***AD-11***
Sample Identification:		***S-215-062205-DD-885***	***S-215-062205-DD-886***	***S-215-062205-DD-887***	***S-215-062205-DD-888***	***S-060805-JL-1287***	***S-060805-JL-1288***	***S-061405-DD-854***	***S-061405-DD-855***	***S-061405-DD-856***
Sample Date:		***6/22/2005***	***6/22/2005***	***6/22/2005***	***6/22/2005***	***6/8/2005***	***6/8/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***
Sample Depth:		***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(2-3.4) ft***	***(0-2) ft***	***(5-7) ft***	***(0-2) ft***	***(0-2) ft***	***(2-4) ft***
Sample Type:									***Duplicate***	
	Units									
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)										
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***215-M1***	***215-M1***	***215-M2***	***215-M2***	***AD-10***	***AD-10***	***AD-11***	***AD-11***	***AD-11***
Sample Identification:		***S-215-062205-DD-885***	***S-215-062205-DD-886***	***S-215-062205-DD-887***	***S-215-062205-DD-888***	***S-060805-JL-1287***	***S-060805-JL-1288***	***S-061405-DD-854***	***S-061405-DD-855***	***S-061405-DD-856***
Sample Date:		***6/22/2005***	***6/22/2005***	***6/22/2005***	***6/22/2005***	***6/8/2005***	***6/8/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***
Sample Depth:		***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(2-3.4) ft***	***(0-2) ft***	***(5-7) ft***	***(0-2) ft***	***(0-2) ft***	***(2-4) ft***
Sample Type:									***Duplicate***	
	Units									
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--
General Chemistry										
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--
Total solids	%	74.7	73.7	75.5	75.2	80.5	75.8	71.2	76.2	76.3

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*EastPlantArea_P216West*	*EastPlantArea_P216West*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*
Sample Location:		*AD-12*	*AD-12*	*AD-13*	*AD-13*	*AD-14*	*AD-14*	*AD-14*	*AD-14*	*AD-15*	*AD-15*
Sample Identification:		*S-061405-DD-857*	*S-061405-DD-858*	*S-061405-DD-859*	*S-061405-DD-860*	*S-061405-DD-861*	*S-061405-DD-862*	*S-061405-DD-863*	*S-061405-DD-864*	*S-061405-DD-865*	*S-061405-DD-866*
Sample Date:		*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/14/2005*
Sample Depth:		*(0-2) ft*	*(2-4) ft*	*(0-2) ft*	*(3.5-5.5) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(15-17) ft*	*(0-2) ft*	*(3-5) ft*
Sample Type:											
	Units										
PCBs											
Aroclor-1016 (PCB-1016)	mg/kg	0.42 U	0.041 U	2 U	16 U	0.045 U	20 U	21 U	4.2 U	0.042 U	4.1 U
Aroclor-1221 (PCB-1221)	mg/kg	0.42 U	0.041 U	2 U	16 U	0.045 U	20 U	21 U	4.2 U	0.042 U	4.1 U
Aroclor-1232 (PCB-1232)	mg/kg	0.42 U	0.041 U	2 U	16 U	0.045 U	20 U	21 U	4.2 U	0.042 U	4.1 U
Aroclor-1242 (PCB-1242)	mg/kg	0.42 U	0.04 J	2 U	16 U	0.045 U	190	120	50	0.051	54
Aroclor-1248 (PCB-1248)	mg/kg	3.8	0.041 U	33	250	0.13	20 U	21 U	4.2 U	0.042 U	4.1 U
Aroclor-1254 (PCB-1254)	mg/kg	0.42 U	0.041 U	2 U	16 U	0.045 U	20 U	21 U	4.2 U	0.042 U	4.1 U
Aroclor-1260 (PCB-1260)	mg/kg	0.42 U	0.041 U	3.4	16	0.028 J	4.8 J	21 U	1.3 J	0.042 U	5.5
Total PCBs	mg/kg	3.8	0.04 J	36.4	266	0.158 J	194.8 J	120	51.3 J	0.051	59.5
Metals											
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)											
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***AD-12***	***AD-12***	***AD-13***	***AD-13***	***AD-14***	***AD-14***	***AD-14***	***AD-14***	***AD-15***	***AD-15***
Sample Identification:		***S-061405-DD-857***	***S-061405-DD-858***	***S-061405-DD-859***	***S-061405-DD-860***	***S-061405-DD-861***	***S-061405-DD-862***	***S-061405-DD-863***	***S-061405-DD-864***	***S-061405-DD-865***	***S-061405-DD-866***
Sample Date:		***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***
Sample Depth:		***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(3.5-5.5) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(15-17) ft***	***(0-2) ft***	***(3-5) ft***
Sample Type:											
	Units										
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)											
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***AD-12***	***AD-12***	***AD-13***	***AD-13***	***AD-14***	***AD-14***	***AD-14***	***AD-14***	***AD-15***	***AD-15***
Sample Identification:		***S-061405-DD-857***	***S-061405-DD-858***	***S-061405-DD-859***	***S-061405-DD-860***	***S-061405-DD-861***	***S-061405-DD-862***	***S-061405-DD-863***	***S-061405-DD-864***	***S-061405-DD-865***	***S-061405-DD-866***
Sample Date:		***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/14/2005***
Sample Depth:		***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(3.5-5.5) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(15-17) ft***	***(0-2) ft***	***(3-5) ft***
Sample Type:											
	Units										
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	--
General Chemistry											
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--
Total solids	%	79.2	80.0	82.1	80.6	73.2	83.2	79.0	79.3	79.5	81.2

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_A004*	*EastPlantArea_P216West*	*EastPlantArea_P216West*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*Background_P216West*
Sample Location:		*AD-16*	*AD-16*	*AD-16*	*AD-18*	*AD-18*	*AD-19*	*AD-19*	*AD-20*	*AD-20*	*BK-X281Y296*
Sample Identification:		*S-061405-DD-867*	*S-061405-DD-868*	*S-061405-DD-869*	*S-062105-DD-881*	*S-062105-DD-882*	*S-062105-DD-879*	*S-062105-DD-880*	*S-062105-DD-877*	*S-062105-DD-878*	*S-010223-MO-001*
Sample Date:		*6/14/2005*	*6/14/2005*	*6/14/2005*	*6/21/2005*	*6/21/2005*	*6/21/2005*	*6/21/2005*	*6/21/2005*	*6/21/2005*	*1/23/2002*
Sample Depth:		*(0-2) ft*	*(0-2) ft*	*(3.5-5.5) ft*	*(0-2) ft*	*(4-6) ft*	*(0-2) ft*	*(2-4) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*
Sample Type:			*Duplicate*							*Duplicate*	
	Units										
PCBs											
Aroclor-1016 (PCB-1016)	mg/kg	0.041 U	0.041 U	4 U	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Aroclor-1221 (PCB-1221)	mg/kg	0.041 U	0.041 U	4 U	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Aroclor-1232 (PCB-1232)	mg/kg	0.041 U	0.041 U	4 U	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Aroclor-1242 (PCB-1242)	mg/kg	0.7	0.034 J	4 U	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Aroclor-1248 (PCB-1248)	mg/kg	0.041 U	0.041 U	39	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Aroclor-1254 (PCB-1254)	mg/kg	0.041 U	0.041 U	4 U	0.081 J	0.041 U	0.055 J	0.042 U	12	6.3	0.042 U
Aroclor-1260 (PCB-1260)	mg/kg	0.041 U	0.041 U	3.2 J	0.043 U	0.041 U	0.042 U	0.042 U	2 U	2 U	0.042 U
Total PCBs	mg/kg	0.7	0.034 J	42.2 J	0.081 J	ND	0.055 J	ND	12	6.3	ND
Metals											
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	11400
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	7.7 UJ
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	10.4
Barium	mg/kg	--	--	--	--	--	--	--	--	--	64.0
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	0.33 J
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	0.11 J
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	18.0
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	10.2
Copper	mg/kg	--	--	--	--	--	--	--	--	--	14.0
Iron	mg/kg	--	--	--	--	--	--	--	--	--	20200
Lead	mg/kg	--	--	--	--	--	--	--	--	--	17.6
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	556 J
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	0.13 U
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	11.7
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	0.64 U
Silver	mg/kg	--	--	--	--	--	--	--	--	--	1.3 U
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	1.3 U
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	34.8
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	40.7 J
Semi-Volatile Organic Compounds (SVOCs)											
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***AD-16***	***AD-16***	***AD-16***	***AD-18***	***AD-18***	***AD-19***	***AD-19***	***AD-20***	***AD-20***	***BK-X281Y296***
Sample Identification:		***S-061405-DD-867***	***S-061405-DD-868***	***S-061405-DD-869***	***S-062105-DD-881***	***S-062105-DD-882***	***S-062105-DD-879***	***S-062105-DD-880***	***S-062105-DD-877***	***S-062105-DD-878***	***S-010223-MO-001***
Sample Date:		***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***1/23/2002***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(3.5-5.5) ft***	***(0-2) ft***	***(4-6) ft***	***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:			***Duplicate***							***Duplicate***	
	Units										
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	2.1 U
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	0.42 U
Volatile Organic Compounds (VOCs)											
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***AD-16***	***AD-16***	***AD-16***	***AD-18***	***AD-18***	***AD-19***	***AD-19***	***AD-20***	***AD-20***	***BK-X281Y296***
Sample Identification:		***S-061405-DD-867***	***S-061405-DD-868***	***S-061405-DD-869***	***S-062105-DD-881***	***S-062105-DD-882***	***S-062105-DD-879***	***S-062105-DD-880***	***S-062105-DD-877***	***S-062105-DD-878***	***S-010223-MO-001***
Sample Date:		***6/14/2005***	***6/14/2005***	***6/14/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***6/21/2005***	***1/23/2002***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(3.5-5.5) ft***	***(0-2) ft***	***(4-6) ft***	***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:			***Duplicate***							***Duplicate***	
	Units										
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	0.012 U
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	0.024 U
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	0.024 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	0.024 U
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	0.017 J
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	0.006 UJ
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	0.003 U
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	0.012 U
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	0.012 U
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	0.012 U
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	0.024 U
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	0.003 U
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	0.006 U
General Chemistry											
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	0.64 U
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	0.64 U
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	5400
Total solids	%	80.0	80.6	82.5	76.8	81.2	77.9	78.2	82.8	81.7	77.7

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*Background_P216West*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*
Sample Location:		*BK-X281Y296*	*CH-41 Abandoned*	*CH-41 Abandoned*	*CH-15 Abandoned*	*CH-15 Abandoned*	*CH-15A Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-17 Abandoned*
Sample Identification:		*S-010223-MO-005*	*S-040605-JL-1125*	*S-040605-JL-1126*	*S-040505-DD-789*	*S-040505-DD-790*	*S-061505-DD-871*	*S-040605-KMV-1143*	*S-040605-KMV-1144*	*S-040605-KMV-1145*	*S-040605-KMV-1146*	*S-040705-KMV-1147*
Sample Date:		*1/23/2002*	*4/6/2005*	*4/6/2005*	*4/5/2005*	*4/5/2005*	*6/15/2005*	*4/6/2005*	*4/6/2005*	*4/6/2005*	*4/6/2005*	*4/7/2005*
Sample Depth:		*(0-2) ft*	*(0-2) ft*	*(2-3) ft*	*(0-2) ft*	*(2.5-4.5) ft*	*(0-2) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(13-14) ft*	*(0-2) ft*
Sample Type:		*Duplicate*										
	Units											
PCBs												
Aroclor-1016 (PCB-1016)	mg/kg	0.042 U	0.087 U	0.2 U	0.042 U	0.091 U	0.042 U	0.21 U	0.42 U	0.9 U	4.4 U	0.041 U
Aroclor-1221 (PCB-1221)	mg/kg	0.042 U	0.087 U	0.2 U	0.042 U	0.091 U	0.042 U	0.21 U	0.42 U	0.9 U	4.4 U	0.041 U
Aroclor-1232 (PCB-1232)	mg/kg	0.042 U	0.087 U	0.2 U	0.042 U	0.091 U	0.042 U	0.21 U	0.42 U	0.9 U	4.4 U	0.041 U
Aroclor-1242 (PCB-1242)	mg/kg	0.042 U	0.087 U	0.2 U	0.018 J	0.091 U	0.042 U	1	2.4	6	26	0.041 U
Aroclor-1248 (PCB-1248)	mg/kg	0.042 U	0.27	0.84	0.042 U	0.68	0.027 J	0.21 U	0.42 U	0.9 U	4.4 U	0.039 J
Aroclor-1254 (PCB-1254)	mg/kg	0.042 U	0.087 U	0.2 U	0.042 U	0.091 U	0.042 U	0.21 U	0.42 U	0.9 U	4.4 U	0.041 U
Aroclor-1260 (PCB-1260)	mg/kg	0.042 U	0.087 U	0.2 U	0.042 U	0.091 U	0.042 U	0.21 U	0.42 U	0.9 U	4.4 U	0.041 U
Total PCBs	mg/kg	ND	0.27	0.84	0.018 J	0.68	0.027 J	1	2.4	6	26	0.039 J
Metals												
Aluminum	mg/kg	13900	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	7.7 UJ	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	12.5	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	67.3	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	0.28 J	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	0.64 U	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	22.0	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	10.2	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	12.9	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	25400	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	17.0	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	477 J	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	0.13 U	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	12.8	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	0.91	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	1.3 U	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	1.3 U	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	43.4	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	45.6 J	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)												
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***BK-X281Y296***	***CH-41 Abandoned***	***CH-41 Abandoned***	***CH-15 Abandoned***	***CH-15 Abandoned***	***CH-15A Abandoned***	***CH-16 Abandoned***	***CH-16 Abandoned***	***CH-16 Abandoned***	***CH-16 Abandoned***	***CH-17 Abandoned***
Sample Identification:		***S-010223-MO-005***	***S-040605-JL-1125***	***S-040605-JL-1126***	***S-040505-DD-789***	***S-040505-DD-790***	***S-061505-DD-871***	***S-040605-KMV-1143***	***S-040605-KMV-1144***	***S-040605-KMV-1145***	***S-040605-KMV-1146***	***S-040705-KMV-1147***
Sample Date:		***1/23/2002***	***4/6/2005***	***4/6/2005***	***4/5/2005***	***4/5/2005***	***6/15/2005***	***4/6/2005***	***4/6/2005***	***4/6/2005***	***4/6/2005***	***4/7/2005***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(2-3) ft***	***(0-2) ft***	***(2.5-4.5) ft***	***(0-2) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(13-14) ft***	***(0-2) ft***
Sample Type:		***Duplicate***										
	Units											
4-Bromophenyl phenyl ether	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	2 U	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	0.42 U	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)												
1,1,1-Trichloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*BK-X281Y296*	*CH-41 Abandoned*	*CH-41 Abandoned*	*CH-15 Abandoned*	*CH-15 Abandoned*	*CH-15A Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-16 Abandoned*	*CH-17 Abandoned*
Sample Identification:		*S-010223-MO-005*	*S-040605-JL-1125*	*S-040605-JL-1126*	*S-040505-DD-789*	*S-040505-DD-790*	*S-061505-DD-871*	*S-040605-KMV-1143*	*S-040605-KMV-1144*	*S-040605-KMV-1145*	*S-040605-KMV-1146*	*S-040705-KMV-1147*
Sample Date:		*1/23/2002*	*4/6/2005*	*4/6/2005*	*4/5/2005*	*4/5/2005*	*6/15/2005*	*4/6/2005*	*4/6/2005*	*4/6/2005*	*4/6/2005*	*4/7/2005*
Sample Depth:		*(0-2) ft*	*(0-2) ft*	*(2-3) ft*	*(0-2) ft*	*(2.5-4.5) ft*	*(0-2) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(13-14) ft*	*(0-2) ft*
Sample Type:		*Duplicate*										
	Units											
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	0.011 U	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	0.023 U	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	0.023 U	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	0.023 U	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	0.013 J	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	0.0057 UJ	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	0.0028 U	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	0.011 U	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	0.011 U	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	0.011 U	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	0.023 U	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	0.0028 U	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	0.0057 U	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Cyanide (amenable)	mg/kg	0.64 U	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	0.64 U	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	5800	--	--	--	--	--	--	--	--	--	--
Total solids	%	78.2	76.2	80.8	79.3	72.8	78.5	77.8	78.7	73.7	75.1	80.7

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*A007_EastPlantArea*	*A007_EastPlantArea*	*EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*
Sample Location:		*CH-17 Abandoned*	*CH-17 Abandoned*	*CH-17A Abandoned*	*CH-18 Abandoned*	*CH-18 Abandoned*	*CH-18 Abandoned*	*CH-18 Abandoned*	*CH-19*	*CH-19*	*CH-20*	*CH-20*
Sample Identification:		*S-040705-KMV-1148*	*S-040705-KMV-1149*	*S-061505-DD-870*	*S-041405-KMV-1138*	*S-041405-KMV-1139*	*S-041405-KMV-1140*	*S-041405-KMV-1141*	*S-041805-KMV-1157*	*S-041805-KMV-1158*	*S-041905-KMV-1161*	*S-041905-KMV-1162*
Sample Date:		*4/7/2005*	*4/7/2005*	*6/15/2005*	*4/14/2005*	*4/14/2005*	*4/14/2005*	*4/14/2005*	*4/18/2005*	*4/18/2005*	*4/19/2005*	*4/19/2005*
Sample Depth:		*(0-2) ft*	*(6-8) ft*	*(0-2) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(15-17) ft*	*(0-2) ft*	*(5-7) ft*	*(0-2) ft*	*(5-7) ft*
Sample Type:		*Duplicate*										
	Units											
PCBs												
Aroclor-1016 (PCB-1016)	mg/kg	0.041 U	0.045 U	0.84 U	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Aroclor-1221 (PCB-1221)	mg/kg	0.041 U	0.045 U	0.84 U	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Aroclor-1232 (PCB-1232)	mg/kg	0.041 U	0.045 U	0.84 U	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Aroclor-1242 (PCB-1242)	mg/kg	0.044	0.045 U	0.84 U	0.041 U	0.042 U	0.059	0.27	0.041 U	0.042 U	0.04 U	0.026 J
Aroclor-1248 (PCB-1248)	mg/kg	0.041 U	0.015 J	5.9	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Aroclor-1254 (PCB-1254)	mg/kg	0.041 U	0.045 UJ	0.84 U	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Aroclor-1260 (PCB-1260)	mg/kg	0.041 U	0.045 UJ	0.48 J	0.041 U	0.042 U	0.042 U	0.044 U	0.041 U	0.042 U	0.04 U	0.045 U
Total PCBs	mg/kg	0.044	0.015 J	6.38 J	ND	ND	0.059	0.27	ND	ND	ND	0.026 J
Metals												
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)												
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***CH-17 Abandoned***	***CH-17 Abandoned***	***CH-17A Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-19***	***CH-19***	***CH-20***	***CH-20***
Sample Identification:		***S-040705-KMV-1148***	***S-040705-KMV-1149***	***S-061505-DD-870***	***S-041405-KMV-1138***	***S-041405-KMV-1139***	***S-041405-KMV-1140***	***S-041405-KMV-1141***	***S-041805-KMV-1157***	***S-041805-KMV-1158***	***S-041905-KMV-1161***	***S-041905-KMV-1162***
Sample Date:		***4/7/2005***	***4/7/2005***	***6/15/2005***	***4/14/2005***	***4/14/2005***	***4/14/2005***	***4/14/2005***	***4/18/2005***	***4/18/2005***	***4/19/2005***	***4/19/2005***
Sample Depth:		***(0-2) ft***	***(6-8) ft***	***(0-2) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(15-17) ft***	***(0-2) ft***	***(5-7) ft***	***(0-2) ft***	***(5-7) ft***
Sample Type:		***Duplicate***										
	Units											
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)												
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***CH-17 Abandoned***	***CH-17 Abandoned***	***CH-17A Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-18 Abandoned***	***CH-19***	***CH-19***	***CH-20***	***CH-20***
Sample Identification:		***S-040705-KMV-1148***	***S-040705-KMV-1149***	***S-061505-DD-870***	***S-041405-KMV-1138***	***S-041405-KMV-1139***	***S-041405-KMV-1140***	***S-041405-KMV-1141***	***S-041805-KMV-1157***	***S-041805-KMV-1158***	***S-041905-KMV-1161***	***S-041905-KMV-1162***
Sample Date:		***4/7/2005***	***4/7/2005***	***6/15/2005***	***4/14/2005***	***4/14/2005***	***4/14/2005***	***4/14/2005***	***4/18/2005***	***4/18/2005***	***4/19/2005***	***4/19/2005***
Sample Depth:		***(0-2) ft***	***(6-8) ft***	***(0-2) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(15-17) ft***	***(0-2) ft***	***(5-7) ft***	***(0-2) ft***	***(5-7) ft***
Sample Type:		***Duplicate***										
	Units											
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	80.3	72.8	78.1	79.8	77.9	78.5	74.4	79.7	78.9	83.0	73.1

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*
Sample Location:		*CH-20*	*CH-20*	*CH-20*	*CH-21 Abandoned*	*CH-21 Abandoned*	*CH-21 Abandoned*	*CH-22*	*CH-22*	*CH-22*	*CH-23*	*CH-24 Abandoned*
Sample Identification:		*S-041905-KMV-1163*	*S-041905-KMV-1165*	*S-041905-KMV-1164*	*S-042005-JL-1170*	*S-042005-JL-1171*	*S-042005-JL-1172*	*S-042005-KMV-1181*	*S-042005-KMV-1182*	*S-042005-KMV-1183*	*S-042105-JL-1173*	*S-042105-JL-1174*
Sample Date:		*4/19/2005*	*4/19/2005*	*4/19/2005*	*4/20/2005*	*4/20/2005*	*4/20/2005*	*4/20/2005*	*4/20/2005*	*4/20/2005*	*4/21/2005*	*4/21/2005*
Sample Depth:		*(10-12) ft*	*(10-12) ft*	*(13.5-13.5) ft*	*(0-2) ft*	*(5-7) ft*	*(10-11.5) ft*	*(0-2) ft*	*(5-7) ft*	*(9-9) ft*	*(0-2) ft*	*(0-2) ft*
Sample Type:			*Duplicate*									
	Units											
PCBs												
Aroclor-1016 (PCB-1016)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.041 U
Aroclor-1221 (PCB-1221)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.041 U
Aroclor-1232 (PCB-1232)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.041 U
Aroclor-1242 (PCB-1242)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.041 U
Aroclor-1248 (PCB-1248)	mg/kg	0.046 U	0.045 U	0.045 U	0.34	0.041 U	0.044 U	0.041 U	0.05	0.012 J	0.042 U	0.4
Aroclor-1254 (PCB-1254)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.041 U
Aroclor-1260 (PCB-1260)	mg/kg	0.046 U	0.045 U	0.045 U	0.042 U	0.041 U	0.044 U	0.041 U	0.043 U	0.043 U	0.042 U	0.13
Total PCBs	mg/kg	ND	ND	ND	0.34	ND	ND	ND	0.05	0.012 J	ND	0.53
Metals												
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)												
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***CH-20***	***CH-20***	***CH-20***	***CH-21 Abandoned***	***CH-21 Abandoned***	***CH-21 Abandoned***	***CH-22***	***CH-22***	***CH-22***	***CH-23***	***CH-24 Abandoned***
Sample Identification:		***S-041905-KMV-1163***	***S-041905-KMV-1165***	***S-041905-KMV-1164***	***S-042005-JL-1170***	***S-042005-JL-1171***	***S-042005-JL-1172***	***S-042005-KMV-1181***	***S-042005-KMV-1182***	***S-042005-KMV-1183***	***S-042105-JL-1173***	***S-042105-JL-1174***
Sample Date:		***4/19/2005***	***4/19/2005***	***4/19/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/21/2005***	***4/21/2005***
Sample Depth:		***(10-12) ft***	***(10-12) ft***	***(13.5-13.5) ft***	***(0-2) ft***	***(5-7) ft***	***(10-11.5) ft***	***(0-2) ft***	***(5-7) ft***	***(9-9) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:			***Duplicate***									
	Units											
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)												
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***CH-20***	***CH-20***	***CH-20***	***CH-21 Abandoned***	***CH-21 Abandoned***	***CH-21 Abandoned***	***CH-22***	***CH-22***	***CH-22***	***CH-23***	***CH-24 Abandoned***
Sample Identification:		***S-041905-KMV-1163***	***S-041905-KMV-1165***	***S-041905-KMV-1164***	***S-042005-JL-1170***	***S-042005-JL-1171***	***S-042005-JL-1172***	***S-042005-KMV-1181***	***S-042005-KMV-1182***	***S-042005-KMV-1183***	***S-042105-JL-1173***	***S-042105-JL-1174***
Sample Date:		***4/19/2005***	***4/19/2005***	***4/19/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/20/2005***	***4/21/2005***	***4/21/2005***
Sample Depth:		***(10-12) ft***	***(10-12) ft***	***(13.5-13.5) ft***	***(0-2) ft***	***(5-7) ft***	***(10-11.5) ft***	***(0-2) ft***	***(5-7) ft***	***(9-9) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:			***Duplicate***									
	Units											
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	72.0	72.6	72.9	78.9	80.9	75.2	79.5	76.5	77.3	78.1	80.2

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*P215EastPlantArea*	*P215EastPlantArea*	*P215EastPlantArea*
Sample Location:		*CH-24 Abandoned*	*CH-24 Abandoned*	*CH-24 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*P-1*	*P-1*	*P-2*
Sample Identification:		*S-042105-JL-1175*	*S-042105-JL-1176*	*S-042105-JL-1177*	*S-042105-JL-1178*	*S-042105-JL-1179*	*S-042105-JL-1180*	*S-042105-JL-1181*	*S-215-062205-DD-889*	*S-215-062205-DD-890*	*S-215-062205-DD-891*
Sample Date:		*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*6/22/2005*	*6/22/2005*	*6/22/2005*
Sample Depth:		*(5-7) ft*	*(5-7) ft*	*(9-9.5) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(14-16) ft*	*(0-2) ft*	*(2-4) ft*	*(0-2) ft*
Sample Type:			*Duplicate*								
	Units										
PCBs											
Aroclor-1016 (PCB-1016)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1221 (PCB-1221)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1232 (PCB-1232)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1242 (PCB-1242)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1248 (PCB-1248)	mg/kg	0.041 J	0.044 U	0.007 J	0.013 J	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1254 (PCB-1254)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Aroclor-1260 (PCB-1260)	mg/kg	0.044 U	0.044 U	0.04 U	0.043 UJ	0.042 U	0.04 U	0.043 U	0.043 UJ	0.041 U	0.039 U
Total PCBs	mg/kg	0.041 J	ND	0.007 J	0.013 J	ND	ND	ND	ND	ND	ND
Metals											
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)											
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***CH-24 Abandoned***	***CH-24 Abandoned***	***CH-24 Abandoned***	***CH-25 Abandoned***	***CH-25 Abandoned***	***CH-25 Abandoned***	***CH-25 Abandoned***	***P-1***	***P-1***	***P-2***
Sample Identification:		***S-042105-JL-1175***	***S-042105-JL-1176***	***S-042105-JL-1177***	***S-042105-JL-1178***	***S-042105-JL-1179***	***S-042105-JL-1180***	***S-042105-JL-1181***	***S-215-062205-DD-889***	***S-215-062205-DD-890***	***S-215-062205-DD-891***
Sample Date:		***4/21/2005***	***4/21/2005***	***4/21/2005***	***4/21/2005***	***4/21/2005***	***4/21/2005***	***4/21/2005***	***6/22/2005***	***6/22/2005***	***6/22/2005***
Sample Depth:		***(5-7) ft***	***(5-7) ft***	***(9-9.5) ft***	***(0-2) ft***	***(5-7) ft***	***(10-12) ft***	***(14-16) ft***	***(0-2) ft***	***(2-4) ft***	***(0-2) ft***
Sample Type:			***Duplicate***								
	Units										
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)											
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*CH-24 Abandoned*	*CH-24 Abandoned*	*CH-24 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*P-1*	*P-1*	*P-2*
Sample Identification:		*S-042105-JL-1175*	*S-042105-JL-1176*	*S-042105-JL-1177*	*S-042105-JL-1178*	*S-042105-JL-1179*	*S-042105-JL-1180*	*S-042105-JL-1181*	*S-215-062205-DD-889*	*S-215-062205-DD-890*	*S-215-062205-DD-891*
Sample Date:		*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*4/21/2005*	*6/22/2005*	*6/22/2005*	*6/22/2005*
Sample Depth:		*(5-7) ft*	*(5-7) ft*	*(9-9.5) ft*	*(0-2) ft*	*(5-7) ft*	*(10-12) ft*	*(14-16) ft*	*(0-2) ft*	*(2-4) ft*	*(0-2) ft*
Sample Type:			*Duplicate*								
	Units										
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	--
General Chemistry											
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--
Total solids	%	75.3	75.6	82.9	76.9	78.6	82.3	76.8	76.1	80.4	85.4

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*P215EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*	*EastPlantArea*
Sample Location:		*P-2*	*PS-8A*	*PS-8B*	*PS-8B*	*PS-9A*	*PS-9B*	*PS-9B*	*PS-10A*	*PS-10B*	*PS-11A*	*PS-11B*	*PS-12A*
Sample Identification:		*S-215-062205-DD-892*	*S-031705-JC-970*	*S-031705-JC-972*	*S-031705-JC-973*	*S-031705-JC-975*	*S-032105-JC-1016*	*S-032105-JC-1017*	*S-031705-JC-977*	*S-031805-JC-979*	*S-032105-JC-1014*	*S-032105-JC-1010*	*S-032105-JC-1012*
Sample Date:		*6/22/2005*	*3/17/2005*	*3/17/2005*	*3/17/2005*	*3/17/2005*	*3/21/2005*	*3/21/2005*	*3/17/2005*	*3/18/2005*	*3/21/2005*	*3/21/2005*	*3/21/2005*
Sample Depth:		*(2-4) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*	*(2-4) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*	*(0-2) ft*
Sample Type:					*Duplicate*								
	Units												
PCBs													
Aroclor-1016 (PCB-1016)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.38 U
Aroclor-1221 (PCB-1221)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.38 U
Aroclor-1232 (PCB-1232)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.38 U
Aroclor-1242 (PCB-1242)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.38 U
Aroclor-1248 (PCB-1248)	mg/kg	0.038 U	0.041 U	0.013 J	0.044 U	0.044 U	16	0.91	0.022 J	0.041 U	0.043 U	0.041 U	0.87
Aroclor-1254 (PCB-1254)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.38 U
Aroclor-1260 (PCB-1260)	mg/kg	0.038 U	0.041 U	0.042 U	0.044 U	0.044 U	2.1 U	0.21 U	0.042 U	0.041 U	0.043 U	0.041 U	0.18 J
Total PCBs	mg/kg	ND	ND	0.013 J	ND	ND	16	0.91	0.022 J	ND	ND	ND	1.05 J
Metals													
Aluminum	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)													
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***P-2***	***PS-8A***	***PS-8B***	***PS-8B***	***PS-9A***	***PS-9B***	***PS-9B***	***PS-10A***	***PS-10B***	***PS-11A***	***PS-11B***	***PS-12A***
Sample Identification:		***S-215-062205-DD-892***	***S-031705-JC-970***	***S-031705-JC-972***	***S-031705-JC-973***	***S-031705-JC-975***	***S-032105-JC-1016***	***S-032105-JC-1017***	***S-031705-JC-977***	***S-031805-JC-979***	***S-032105-JC-1014***	***S-032105-JC-1010***	***S-032105-JC-1012***
Sample Date:		***6/22/2005***	***3/17/2005***	***3/17/2005***	***3/17/2005***	***3/17/2005***	***3/21/2005***	***3/21/2005***	***3/17/2005***	***3/18/2005***	***3/21/2005***	***3/21/2005***	***3/21/2005***
Sample Depth:		***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:					***Duplicate***								
	Units												
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)													
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***P-2***	***PS-8A***	***PS-8B***	***PS-8B***	***PS-9A***	***PS-9B***	***PS-9B***	***PS-10A***	***PS-10B***	***PS-11A***	***PS-11B***	***PS-12A***
Sample Identification:		***S-215-062205-DD-892***	***S-031705-JC-970***	***S-031705-JC-972***	***S-031705-JC-973***	***S-031705-JC-975***	***S-032105-JC-1016***	***S-032105-JC-1017***	***S-031705-JC-977***	***S-031805-JC-979***	***S-032105-JC-1014***	***S-032105-JC-1010***	***S-032105-JC-1012***
Sample Date:		***6/22/2005***	***3/17/2005***	***3/17/2005***	***3/17/2005***	***3/17/2005***	***3/21/2005***	***3/21/2005***	***3/17/2005***	***3/18/2005***	***3/21/2005***	***3/21/2005***	***3/21/2005***
Sample Depth:		***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(2-4) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***	***(0-2) ft***
Sample Type:					***Duplicate***								
	Units												
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry													
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	87.8	80.5	78.7	74.6	75.0	78.6	79.5	78.7	80.1	76.9	80.1	87.0

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		***GMPT_EastPlantArea***	***A004***	***A004***	***A004***	***A004***	***A004***	***A004***
Sample Location:		***PS-12B***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***
Sample Identification:		***S-032105-JC-1008***	***S-021005-JC-936***	***S-021005-JC-937***	***S-021005-JC-938***	***S-021005-JC-939***	***S-021005-JC-940***	***S-021005-JC-941***
Sample Date:		***3/21/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(4-6) ft***	***(9-11) ft***	***(14-16) ft***	***(19-21) ft***	***(24-26) ft***
Sample Type:								
	Units							
PCBs								
Aroclor-1016 (PCB-1016)	mg/kg	0.041 U	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Aroclor-1221 (PCB-1221)	mg/kg	0.041 U	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Aroclor-1232 (PCB-1232)	mg/kg	0.041 U	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Aroclor-1242 (PCB-1242)	mg/kg	0.041 U	0.057	100	94	120	0.092	0.043 U
Aroclor-1248 (PCB-1248)	mg/kg	0.008 J	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Aroclor-1254 (PCB-1254)	mg/kg	0.041 U	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Aroclor-1260 (PCB-1260)	mg/kg	0.041 U	0.04 U	21 U	21 U	20 U	0.04 U	0.043 U
Total PCBs	mg/kg	0.008 J	0.057	100	94	120	0.092	ND
Metals								
Aluminum	mg/kg	--	--	--	--	--	--	--
Antimony	mg/kg	--	--	--	--	--	--	--
Arsenic	mg/kg	--	--	--	--	--	--	--
Barium	mg/kg	--	--	--	--	--	--	--
Beryllium	mg/kg	--	--	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--	--	--
Chromium	mg/kg	--	--	--	--	--	--	--
Cobalt	mg/kg	--	--	--	--	--	--	--
Copper	mg/kg	--	--	--	--	--	--	--
Iron	mg/kg	--	--	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--	--	--
Manganese	mg/kg	--	--	--	--	--	--	--
Mercury	mg/kg	--	--	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--	--	--
Selenium	mg/kg	--	--	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--	--	--
Thallium	mg/kg	--	--	--	--	--	--	--
Vanadium	mg/kg	--	--	--	--	--	--	--
Zinc	mg/kg	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)								
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	mg/kg	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	mg/kg	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	--	--	--	--	--	--	--
2-Methylphenol	mg/kg	--	--	--	--	--	--	--
2-Nitroaniline	mg/kg	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg	--	--	--	--	--	--	--
3-Nitroaniline	mg/kg	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	mg/kg	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***PS-12B***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***
Sample Identification:		***S-032105-JC-1008***	***S-021005-JC-936***	***S-021005-JC-937***	***S-021005-JC-938***	***S-021005-JC-939***	***S-021005-JC-940***	***S-021005-JC-941***
Sample Date:		***3/21/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(4-6) ft***	***(9-11) ft***	***(14-16) ft***	***(19-21) ft***	***(24-26) ft***
Sample Type:								
	Units							
4-Bromophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	--
4-Chloroaniline	mg/kg	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg	--	--	--	--	--	--	--
4-Methylphenol	mg/kg	--	--	--	--	--	--	--
4-Nitroaniline	mg/kg	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg	--	--	--	--	--	--	--
Acenaphthene	mg/kg	--	--	--	--	--	--	--
Acenaphthylene	mg/kg	--	--	--	--	--	--	--
Acetophenone	mg/kg	--	--	--	--	--	--	--
Anthracene	mg/kg	--	--	--	--	--	--	--
Atrazine	mg/kg	--	--	--	--	--	--	--
Benzaldehyde	mg/kg	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	--	--	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	mg/kg	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/kg	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/kg	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP)	mg/kg	--	--	--	--	--	--	--
Caprolactam	mg/kg	--	--	--	--	--	--	--
Carbazole	mg/kg	--	--	--	--	--	--	--
Chrysene	mg/kg	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	--	--	--	--	--	--	--
Dibenzofuran	mg/kg	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	mg/kg	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP)	mg/kg	--	--	--	--	--	--	--
Fluoranthene	mg/kg	--	--	--	--	--	--	--
Fluorene	mg/kg	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg	--	--	--	--	--	--	--
Hexachloroethane	mg/kg	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	--	--	--	--	--
Isophorone	mg/kg	--	--	--	--	--	--	--
Naphthalene	mg/kg	--	--	--	--	--	--	--
Nitrobenzene	mg/kg	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/kg	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg	--	--	--	--	--	--	--
Phenanthrene	mg/kg	--	--	--	--	--	--	--
Phenol	mg/kg	--	--	--	--	--	--	--
Pyrene	mg/kg	--	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	mg/kg	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	--	--	--	--	--	--	--

Table 3.1

Soil Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		***PS-12B***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***	***TMW-X247Y261 Abandoned***
Sample Identification:		***S-032105-JC-1008***	***S-021005-JC-936***	***S-021005-JC-937***	***S-021005-JC-938***	***S-021005-JC-939***	***S-021005-JC-940***	***S-021005-JC-941***
Sample Date:		***3/21/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***	***2/10/2005***
Sample Depth:		***(0-2) ft***	***(0-2) ft***	***(4-6) ft***	***(9-11) ft***	***(14-16) ft***	***(19-21) ft***	***(24-26) ft***
Sample Type:								
	Units							
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	--	--	--	--	--	--	--
2-Hexanone	mg/kg	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/kg	--	--	--	--	--	--	--
Acetone	mg/kg	--	--	--	--	--	--	--
Benzene	mg/kg	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	--	--	--	--	--	--	--
Bromoform	mg/kg	--	--	--	--	--	--	--
Bromomethane (Methyl bromide)	mg/kg	--	--	--	--	--	--	--
Carbon disulfide	mg/kg	--	--	--	--	--	--	--
Carbon tetrachloride	mg/kg	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	--	--	--	--	--	--	--
Chloroethane	mg/kg	--	--	--	--	--	--	--
Chloroform (Trichloromethane)	mg/kg	--	--	--	--	--	--	--
Chloromethane (Methyl chloride)	mg/kg	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--
Cyclohexane	mg/kg	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	--	--	--	--	--	--	--
Dichlorodifluoromethane (CFC-12)	mg/kg	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	--	--	--	--	--	--	--
Isopropyl benzene	mg/kg	--	--	--	--	--	--	--
Methyl acetate	mg/kg	--	--	--	--	--	--	--
Methyl cyclohexane	mg/kg	--	--	--	--	--	--	--
Methyl tert butyl ether (MTBE)	mg/kg	--	--	--	--	--	--	--
Methylene chloride	mg/kg	--	--	--	--	--	--	--
Styrene	mg/kg	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	--	--	--	--	--	--	--
Toluene	mg/kg	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	--	--	--	--	--	--	--
Trichloroethene	mg/kg	--	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	mg/kg	--	--	--	--	--	--	--
Trifluorotrichloroethane (Freon 113)	mg/kg	--	--	--	--	--	--	--
Vinyl chloride	mg/kg	--	--	--	--	--	--	--
Xylenes (total)	mg/kg	--	--	--	--	--	--	--
General Chemistry								
Cyanide (amenable)	mg/kg	--	--	--	--	--	--	--
Cyanide (total)	mg/kg	--	--	--	--	--	--	--
Total organic carbon (TOC)	mg/kg	--	--	--	--	--	--	--
Total solids	%	79.8	82.9	80.3	78.8	82.2	82.8	77.0

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*A007_EastPlantArea*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*
Sample Location:		*CH-22*	*CH-22*	*CH-22*	*CH-22*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*MW-X297Y305D-1*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*
Sample Identification:		*EB-040507-CL-001*	*EB-052207-CL-004*	*GW-052207-CL-079*	*TB-052207-CL-001*	*EB-031207-PG-001*	*GW-031207-PG-049*	*TB-031207-PG-001*	*GW-102403-ME-049*	*GW-102303-ME-045*	*GW-050806-JD-005*	*GW-033007-CL-065*	*GW-101608-ET-095*	*GW-052709-MXB-136*	*GW-052709-MXB-137*	*GW-080510-CL-157*
Sample Date:		*4/5/2007*	*5/22/2007*	*5/22/2007*	*5/22/2007*	*3/12/2007*	*3/12/2007*	*3/12/2007*	*10/24/2003*	*10/23/2003*	*5/8/2006*	*3/30/2007*	*10/16/2008*	*5/27/2009*	*5/27/2009*	*8/5/2010*
Sample Type:															*Duplicate*	
	Units															
PCBs																
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.40 U	0.40 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.20 U	0.20 U	--	0.20 U	0.20 U	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs	ug/L	--	--	ND	--	--	ND	--	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1016 (PCB-1016) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1221 (PCB-1221) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1232 (PCB-1232) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.40 UJ	0.40 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1242 (PCB-1242) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1248 (PCB-1248) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1254 (PCB-1254) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Aroclor-1260 (PCB-1260) (d	ug/L	--	--	0.20 U	--	--	0.20 U	--	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total PCBs (dissolved)	ug/L	--	--	ND	--	--	ND	--	ND	ND	ND	ND	ND	ND	ND	ND
Metals																
Aluminum	ug/L	--	--	--	--	--	--	--	200 U	200 U	--	--	--	--	--	--
Aluminum (dissolved)	ug/L	--	--	--	--	--	--	--	200 U	200 U	--	--	--	--	--	--
Antimony	ug/L	--	--	--	--	--	--	--	60 U	60 U	--	--	--	--	--	--
Antimony (dissolved)	ug/L	--	--	--	--	--	--	--	60 U	4 J	--	--	--	--	--	--
Arsenic	ug/L	--	--	--	--	--	--	--	7.2 J	10 U	--	--	--	--	--	--
Arsenic (dissolved)	ug/L	--	--	--	--	--	--	--	6 J	10 U	--	--	--	--	--	--
Barium	ug/L	--	--	--	--	--	--	--	98 J	90 J	--	--	--	--	--	--
Barium (dissolved)	ug/L	--	--	--	--	--	--	--	89 J	89 J	--	--	--	--	--	--
Beryllium	ug/L	--	--	--	--	--	--	--	5 U	5 U	--	--	--	--	--	--
Beryllium (dissolved)	ug/L	--	--	--	--	--	--	--	5 U	5 U	--	--	--	--	--	--
Cadmium	ug/L	--	--	--	--	--	--	--	5 U	5 U	--	--	--	--	--	--
Cadmium (dissolved)	ug/L	--	--	--	--	--	--	--	5 U	5 U	--	--	--	--	--	--
Chromium	ug/L	--	--	--	--	--	--	--	1300	10 U	--	--	--	--	--	--
Chromium (dissolved)	ug/L	--	--	--	--	--	--	--	1100	10 U	--	--	--	--	--	--
Cobalt	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
Cobalt (dissolved)	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
Copper	ug/L	--	--	--	--	--	--	--	37	25 U	--	--	--	--	--	--
Copper (dissolved)	ug/L	--	--	--	--	--	--	--	15 J	25 U	--	--	--	--	--	--
Iron	ug/L	--	--	--	--	--	--	--	940	100 U	--	--	--	--	--	--
Iron (dissolved)	ug/L	--	--	--	--	--	--	--	770	100 U	--	--	--	--	--	--
Lead	ug/L	--	--	--	--	--	--	--	3 U	3 U	--	--	--	--	--	--
Lead (dissolved)	ug/L	--	--	--	--	--	--	--	3 U	3 U	--	--	--	--	--	--
Manganese	ug/L	--	--	--	--	--	--	--	38	17	--	--	--	--	--	--
Manganese (dissolved)	ug/L	--	--	--	--	--	--	--	31	18	--	--	--	--	--	--
Mercury	ug/L	--	--	--	--	--	--	--	0.2 U	0.2 U	--	--	--	--	--	--
Mercury (dissolved)	ug/L	--	--	--	--	--	--	--	0.2 U	0.2 U	--	--	--	--	--	--
Nickel	ug/L	--	--	--	--	--	--	--	22 J	2.5 J	--	--	--	--	--	--
Nickel (dissolved)	ug/L	--	--	--	--	--	--	--	18 J	3 J	--	--	--	--	--	--
Selenium	ug/L	--	--	--	--	--	--	--	13	5 U	--	--	--	--	--	--
Selenium (dissolved)	ug/L	--	--	--	--	--	--	--	9.8	5 U	--	--	--	--	--	--
Silver	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Silver (dissolved)	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Thallium	ug/L	--	--	--	--	--	--	--	1 U	1 U	--	--	--	--	--	--
Thallium (dissolved)	ug/L	--	--	--	--	--	--	--	1 U	1 U	--	--	--	--	--	--
Vanadium	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
Vanadium (dissolved)	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
Zinc	ug/L	--	--	--	--	--	--	--	400	20 U	--	--	--	--	--	--
Zinc (dissolved)	ug/L	--	--	--	--	--	--	--	290	20 U	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*CH-22*	*CH-22*	*CH-22*	*CH-22*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*MW-X297Y305D-1*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*
Sample Identification:		*EB-040507-CL-001*	*EB-052207-CL-004*	*GW-052207-CL-079*	*TB-052207-CL-001*	*EB-031207-PG-001*	*GW-031207-PG-049*	*TB-031207-PG-001*	*GW-102403-ME-049*	*GW-102303-ME-045*	*GW-050806-JD-005*	*GW-033007-CL-065*	*GW-101608-ET-095*	*GW-052709-MXB-136*	*GW-052709-MXB-137*	*GW-080510-CL-157*
Sample Date:		*4/5/2007*	*5/22/2007*	*5/22/2007*	*5/22/2007*	*3/12/2007*	*3/12/2007*	*3/12/2007*	*10/24/2003*	*10/23/2003*	*5/8/2006*	*3/30/2007*	*10/16/2008*	*5/27/2009*	*5/27/2009*	*8/5/2010*
Sample Type:															*Duplicate*	
	Units															
Semi-Volatile Organic Compounds (SVOCs)																
2,2'-Oxybis(1-chloropropan	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,4,5-Trichlorophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,4,6-Trichlorophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,4-Dichlorophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,4-Dimethylphenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,4-Dinitrophenol	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
2,4-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2,6-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2-Chloronaphthalene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2-Chlorophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2-Methylnaphthalene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2-Methylphenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
2-Nitroaniline	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
2-Nitrophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
3,3'-Dichlorobenzidine	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
3-Nitroaniline	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
4-Bromophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
4-Chloro-3-methylphenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
4-Chloroaniline	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
4-Chlorophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
4-Methylphenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
4-Nitroaniline	ug/L	--	--	--	--	--	--	--	50 UJ	50 U	--	--	--	--	--	--
4-Nitrophenol	ug/L	--	--	--	--	--	--	--	50 UJ	50 UJ	--	--	--	--	--	--
Acenaphthene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Acenaphthylene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Acetophenone	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Anthracene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Atrazine	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzaldehyde	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzo(a)anthracene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzo(a)pyrene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzo(b)fluoranthene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzo(g,h,i)perylene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Benzo(k)fluoranthene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
bis(2-Chloroethoxy)methan	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
bis(2-Chloroethyl)ether	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Butyl benzylphthalate (BBP	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Caprolactam	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Carbazole	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Chrysene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Dibenz(a,h)anthracene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Dibenzofuran	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Diethyl phthalate	ug/L	--	--	--	--	--	--	--	16	10 U	--	--	--	--	--	--
Dimethyl phthalate	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	ug/L	--	--	--	--	--	--	--	0.49 J	10 U	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Fluoranthene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Fluorene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Hexachlorobenzene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Hexachlorobutadiene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Hexachlorocyclopentadiene	ug/L	--	--	--	--	--	--	--	50 U	50 U	--	--	--	--	--	--
Hexachloroethane	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Isophorone	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Naphthalene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Nitrobenzene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
N-Nitrosodiphenylamine	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Pentachlorophenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Phenanthrene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Phenol	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Pyrene	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*CH-22*	*CH-22*	*CH-22*	*CH-22*	*CH-25 Abandoned*	*CH-25 Abandoned*	*CH-25 Abandoned*	*MW-X297Y305D-1*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*
Sample Identification:		*EB-040507-CL-001*	*EB-052207-CL-004*	*GW-052207-CL-079*	*TB-052207-CL-001*	*EB-031207-PG-001*	*GW-031207-PG-049*	*TB-031207-PG-001*	*GW-102403-ME-049*	*GW-102303-ME-045*	*GW-050806-JD-005*	*GW-033007-CL-065*	*GW-101608-ET-095*	*GW-052709-MXB-136*	*GW-052709-MXB-137*	*GW-080510-CL-157*
Sample Date:		*4/5/2007*	*5/22/2007*	*5/22/2007*	*5/22/2007*	*3/12/2007*	*3/12/2007*	*3/12/2007*	*10/24/2003*	*10/23/2003*	*5/8/2006*	*3/30/2007*	*10/16/2008*	*5/27/2009*	*5/27/2009*	*8/5/2010*
Sample Type:															*Duplicate*	
	Units															
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,1,2-Trichloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,1-Dichloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,1-Dichloroethene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 UJ	--	--	--	--	--	--
1,2-Dibromo-3-chloropropa	ug/L	--	--	--	--	--	--	--	2.0 U	2.0 U	--	--	--	--	--	--
1,2-Dibromoethane (Ethyle	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,2-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,2-Dichloropropane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
2-Butanone (Methyl ethyl k	ug/L	--	--	--	--	--	--	--	10 U	10 UJ	--	--	--	--	--	--
2-Hexanone	ug/L	--	--	--	--	--	--	--	0.67 J	10 U	--	--	--	--	--	--
4-Methyl-2-pentanone (Me	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Acetone	ug/L	--	--	--	--	--	--	--	22	10 UJ	--	--	--	--	--	--
Benzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Bromodichloromethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Bromoform	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Bromomethane (Methyl br	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Carbon disulfide	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Carbon tetrachloride	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Chlorobenzene	ug/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--
Chloroethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Chloroform (Trichlorometh	ug/L	--	--	--	--	--	--	--	1.5	1.0 U	--	--	--	--	--	--
Chloromethane (Methyl ch	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	0.50 U	0.50 U	--	--	--	--	--	--
cis-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Cyclohexane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Dibromochloromethane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Dichlorodifluoromethane (C	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Ethylbenzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Isopropyl benzene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Methyl acetate	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Methyl cyclohexane	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Methyl tert butyl ether (MT	ug/L	--	--	--	--	--	--	--	5.0 U	5.0 U	--	--	--	--	--	--
Methylene chloride	ug/L	--	--	--	--	--	--	--	0.41 J	1.0 U	--	--	--	--	--	--
Styrene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Tetrachloroethene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Toluene	ug/L	--	--	--	--	--	--	--	0.78 J	1.0 U	--	--	--	--	--	--
trans-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	0.50 U	0.50 U	--	--	--	--	--	--
trans-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Trichlorofluoromethane (Cl	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Trifluorotrichloroethane (F	ug/L	--	--	--	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--
Vinyl chloride	ug/L	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--
Xylenes (total)	ug/L	--	--	--	--	--	--	--	1.4	1.0 U	--	--	--	--	--	--
General Chemistry																
Cyanide (amenable)	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Cyanide (total)	ug/L	--	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Field parameters																
Conductivity, field	mS/cm	--	--	0.691	--	--	0.998	--	1.396	0.882	0.624	0.73	0.666	0.657	0.657	0.727
Dissolved oxygen (DO), fiel	ug/L	--	--	300	--	--	360	--	1050	1440	620	890	2210	290	290	6600
Flow rate	gpm/ft	--	--	0.01	--	--	0.02	--	--	--	0.01	0.02	0.03	0.02	0.02	0.01
Oxidation reduction potent	millivolts	--	--	-126.3	--	--	-84.1	--	-10.1	260	68.2	166.6	-24.5	-99.8	-99.8	35.5
pH, field	s.u.	--	--	8.7	--	--	11.61	--	6.92	6.84	7.02	6.88	6.73	6.94	6.94	6.59
Temperature, field	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature, sample	Deg C	--	--	27.03	--	--	12.36	--	14.10	13.88	14.1	14.52	15.22	14.21	14.21	18
Turbidity, field	NTU	--	--	4.16	--	--	4.23	--	0.31	0	0	0	1.01	0.82	0.82	0.71

Notes
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P216GM_P216_east*	*P015*	*P015*	*P015*	*P015*	*P015*	*P015*
Sample Location:		*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*
Sample Identification:		*GW-032211-CL-183*	*GW-120711-MB-211*	*GW-080312-SA-023*	*GW-121812-SA-011*	*GW-062713-SA-013*	*GW-062713-SA-015*	*GW-103013-JL-010*	*GW-103013-JL-012*	*GW-051614-SA-022*	*SW-052209-SM-132*	*SW-081110-ET-168*	*SW-081110-ET-169*	*SW-031511-ET-169*	*SW-120911-CL-217*	*SW-080212-JL-024*
Sample Date:		*3/22/2011*	*12/7/2011*	*8/3/2012*	*12/18/2012*	*6/27/2013*	*6/27/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/22/2009*	*8/11/2010*	*8/11/2010*	*3/15/2011*	*12/9/2011*	*8/2/2012*
Sample Type:							*Duplicate*		*Duplicate*				*Duplicate*			
	Units															
PCBs																
Aroclor-1016 (PCB-1016)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1221 (PCB-1221)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1232 (PCB-1232)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1242 (PCB-1242)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.11 J	0.13 J
Aroclor-1248 (PCB-1248)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1254 (PCB-1254)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1260 (PCB-1260)	ug/L	0.20 U	0.19 U	0.20 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Total PCBs	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.11 J	0.13 J
Aroclor-1016 (PCB-1016) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1221 (PCB-1221) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1232 (PCB-1232) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1242 (PCB-1242) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1248 (PCB-1248) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 U	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1254 (PCB-1254) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Aroclor-1260 (PCB-1260) (d	ug/L	0.20 U	0.20 U	0.21 U	0.19 U	0.19 U	0.20 U	0.20 U	0.20 U	0.19 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.19 U	0.21 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals																
Aluminum	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aluminum (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*
Sample Identification:		*GW-032211-CL-183*	*GW-120711-MB-211*	*GW-080312-SA-023*	*GW-121812-SA-011*	*GW-062713-SA-013*	*GW-062713-SA-015*	*GW-103013-JL-010*	*GW-103013-JL-012*	*GW-051614-SA-022*	*SW-052209-SM-132*	*SW-081110-ET-168*	*SW-081110-ET-169*	*SW-031511-ET-169*	*SW-120911-CL-217*	*SW-080212-JL-024*
Sample Date:		*3/22/2011*	*12/7/2011*	*8/3/2012*	*12/18/2012*	*6/27/2013*	*6/27/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/22/2009*	*8/11/2010*	*8/11/2010*	*3/15/2011*	*12/9/2011*	*8/2/2012*
Sample Type:							*Duplicate*		*Duplicate*				*Duplicate*			
	Units															
Semi-Volatile Organic Compounds (SV																
2,2'-Oxybis(1-chloropropan	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Atrazine	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzaldehyde	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methan	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Caprolactam	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbazole	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyrene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*MW-X297Y305D-2*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*
Sample Identification:		*GW-032211-CL-183*	*GW-120711-MB-211*	*GW-080312-SA-023*	*GW-121812-SA-011*	*GW-062713-SA-013*	*GW-062713-SA-015*	*GW-103013-JL-010*	*GW-103013-JL-012*	*GW-051614-SA-022*	*SW-052209-SM-132*	*SW-081110-ET-168*	*SW-081110-ET-169*	*SW-031511-ET-169*	*SW-120911-CL-217*	*SW-080212-JL-024*
Sample Date:		*3/22/2011*	*12/7/2011*	*8/3/2012*	*12/18/2012*	*6/27/2013*	*6/27/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/22/2009*	*8/11/2010*	*8/11/2010*	*3/15/2011*	*12/9/2011*	*8/2/2012*
Sample Type:							*Duplicate*		*Duplicate*				*Duplicate*			
	Units															
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropa	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethyle	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl k	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Me	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromoform	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl br	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform (Trichlorometh	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl ch	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyclohexane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane ((	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropyl benzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl acetate	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MT	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (Cl	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Fı	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes (total)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																
Cyanide (amenable)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyanide (total)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field parameters																
Conductivity, field	mS/cm	0.572	--	0.654	0.636	0.794	0.794	0.612	0.613	0.65	0.541	1.092	1.092	--	--	1.003
Dissolved oxygen (DO), fiel	ug/L	44400	--	1090	2080	4350	4350	730	640	700	12200	58100	58100	--	--	5540
Flow rate	gpm/ft	0.02	--	--	--	--	--	--	--	--	0 NM	--	--	--	--	--
Oxidation reduction potent	millivolts	-24.3	--	-101.1	125.8	-135.9	-135.9	-105.1	-99.3	-123.4	307.4	95.1	95.1	--	--	16
pH, field	s.u.	6.75	--	6.36	6.94	7.15	7.15	6.98	6.96	6.14	7.74	7.35	7.35	--	--	7.79
Temperature, field	Deg C	13.38	--	15.37	13.4	15.62	15.62	15.14	15.04	12.91	--	--	--	--	--	27.36
Temperature, sample	Deg C	--	--	--	--	--	--	--	--	--	22.55	24.49	24.49	--	--	--
Turbidity, field	NTU	0.82	--	1.77	1.71	2.17	2.17	3.26	1.24	2.7	12.8	31.6	31.6	80.8	--	77.6

Notes
U - Not detected at the associated repo
J - Estimated concentration.
UJ - Not detected; associated reporting

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Area		*P015*	*P015*	*P015*	*P015*	*P015*	*P015*	*P416*	*P416*	*P416*
Sample Location:		*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*PARCEL 416 WELL*	*PARCEL 416 WELL*	*PARCEL 416 WELL*
Sample Identification:		*SW-121912-SA-021*	*SW-062813-SA-023*	*SW-103013-KC-021*	*SW-103013-KC-023*	*GW-051614-SA-023*	*GW-051614-SA-024*	*GW-053102-327012-JW-001*	*GW-053102-327012-JW-002*	*GW-053102-327012-JW-003*
Sample Date:		*12/19/2012*	*6/28/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/16/2014*	*5/31/2002*	*5/31/2002*	*5/31/2002*
Sample Type:							*Duplicate*		*Duplicate*	*Replicate*
	Units									
PCBs										
Aroclor-1016 (PCB-1016)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U	0.08 UJ	0.08 UJ	0.20 UJ
Aroclor-1221 (PCB-1221)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 UJ
Aroclor-1232 (PCB-1232)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.40 UJ
Aroclor-1242 (PCB-1242)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.067 J	0.10 UJ	0.10 UJ	0.20 UJ
Aroclor-1248 (PCB-1248)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 UJ
Aroclor-1254 (PCB-1254)	ug/L	0.19 U	0.19 U	0.19 UJ	0.084 J	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 UJ
Aroclor-1260 (PCB-1260)	ug/L	0.19 U	0.19 U	0.19 UJ	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 UJ
Total PCBs	ug/L	ND	ND	ND	0.084 J	ND	0.067 J	ND	ND	ND
Aroclor-1016 (PCB-1016) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.08 UJ	0.08 UJ	0.20 U
Aroclor-1221 (PCB-1221) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 U
Aroclor-1232 (PCB-1232) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.40 U
Aroclor-1242 (PCB-1242) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 U
Aroclor-1248 (PCB-1248) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.10 UJ	0.10 UJ	0.20 U
Aroclor-1254 (PCB-1254) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 UJ	0.19 UJ	0.10 UJ	0.10 UJ	0.20 U
Aroclor-1260 (PCB-1260) (d	ug/L	0.19 U	0.19 U	0.19 U	0.19 U	0.19 UJ	0.19 UJ	0.10 UJ	0.10 UJ	0.20 U
Total PCBs (dissolved)	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals										
Aluminum	ug/L	--	--	--	--	--	--	--	--	--
Aluminum (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Antimony	ug/L	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Barium	ug/L	--	--	--	--	--	--	--	--	--
Barium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	--	--	--	--	--	--	--	--	--
Cadmium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Chromium	ug/L	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	--	--	--	--	--	--	--	--	--
Cobalt (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Copper	ug/L	--	--	--	--	--	--	--	--	--
Copper (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Iron	ug/L	--	--	--	--	--	--	--	--	--
Iron (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Lead	ug/L	--	--	--	--	--	--	--	--	--
Lead (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Manganese	ug/L	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Mercury	ug/L	--	--	--	--	--	--	--	--	--
Mercury (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Nickel	ug/L	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Selenium	ug/L	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Silver	ug/L	--	--	--	--	--	--	--	--	--
Silver (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Thallium	ug/L	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	ug/L	--	--	--	--	--	--	--	--	--
Zinc	ug/L	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	ug/L	--	--	--	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

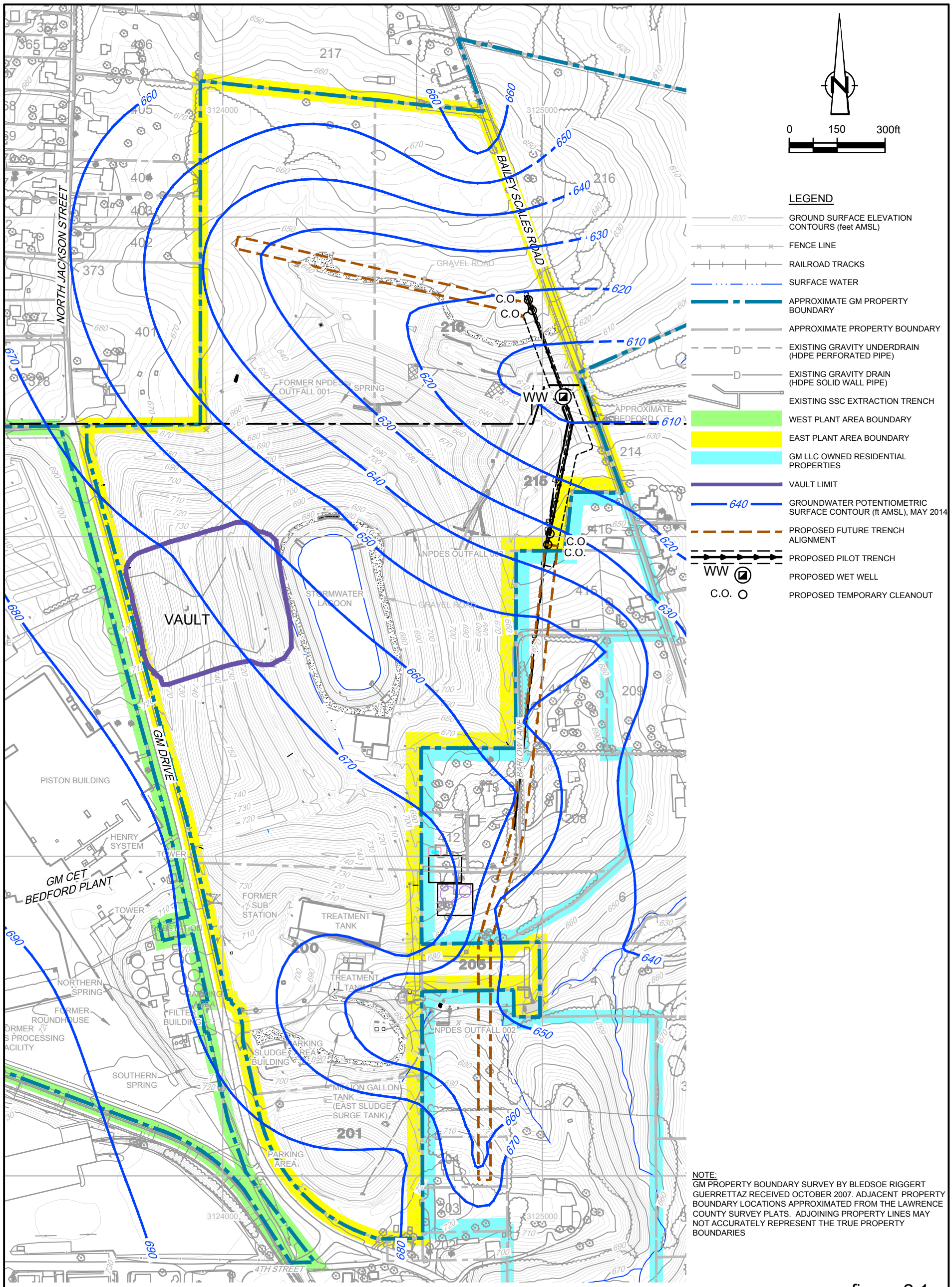
Sample Location:		*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*PARCEL 416 WELL*	*PARCEL 416 WELL*	*PARCEL 416 WELL*
Sample Identification:		*SW-121912-SA-021*	*SW-062813-SA-023*	*SW-103013-KC-021*	*SW-103013-KC-023*	*GW-051614-SA-023*	*GW-051614-SA-024*	*GW-053102-327012-JW-001*	*GW-053102-327012-JW-002*	*GW-053102-327012-JW-003*
Sample Date:		*12/19/2012*	*6/28/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/16/2014*	*5/31/2002*	*5/31/2002*	*5/31/2002*
Sample Type:							*Duplicate*		*Duplicate*	*Replicate*
	Units									
Semi-Volatile Organic Compounds (SV										
2,2'-Oxybis(1-chloropropan	ug/L	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	ug/L	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	ug/L	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	ug/L	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	ug/L	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	ug/L	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	ug/L	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	ug/L	--	--	--	--	--	--	--	--	--
2-Chlorophenol	ug/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/L	--	--	--	--	--	--	--	--	--
2-Methylphenol	ug/L	--	--	--	--	--	--	--	--	--
2-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--
2-Nitrophenol	ug/L	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	ug/L	--	--	--	--	--	--	--	--	--
3-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	ug/L	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	ug/L	--	--	--	--	--	--	--	--	--
4-Chloroaniline	ug/L	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ethe	ug/L	--	--	--	--	--	--	--	--	--
4-Methylphenol	ug/L	--	--	--	--	--	--	--	--	--
4-Nitroaniline	ug/L	--	--	--	--	--	--	--	--	--
4-Nitrophenol	ug/L	--	--	--	--	--	--	--	--	--
Acenaphthene	ug/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	ug/L	--	--	--	--	--	--	--	--	--
Acetophenone	ug/L	--	--	--	--	--	--	--	--	--
Anthracene	ug/L	--	--	--	--	--	--	--	--	--
Atrazine	ug/L	--	--	--	--	--	--	--	--	--
Benzaldehyde	ug/L	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	ug/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	ug/L	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	ug/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	ug/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	ug/L	--	--	--	--	--	--	--	--	--
Biphenyl (1,1-Biphenyl)	ug/L	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy)methan	ug/L	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl)ether	ug/L	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate (	ug/L	--	--	--	--	--	--	--	--	--
Butyl benzylphthalate (BBP	ug/L	--	--	--	--	--	--	--	--	--
Caprolactam	ug/L	--	--	--	--	--	--	--	--	--
Carbazole	ug/L	--	--	--	--	--	--	--	--	--
Chrysene	ug/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	ug/L	--	--	--	--	--	--	--	--	--
Dibenzofuran	ug/L	--	--	--	--	--	--	--	--	--
Diethyl phthalate	ug/L	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	ug/L	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate (DBP)	ug/L	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate (DnOP	ug/L	--	--	--	--	--	--	--	--	--
Fluoranthene	ug/L	--	--	--	--	--	--	--	--	--
Fluorene	ug/L	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	ug/L	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	ug/L	--	--	--	--	--	--	--	--	--
Hexachloroethane	ug/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L	--	--	--	--	--	--	--	--	--
Isophorone	ug/L	--	--	--	--	--	--	--	--	--
Naphthalene	ug/L	--	--	--	--	--	--	--	--	--
Nitrobenzene	ug/L	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	ug/L	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	ug/L	--	--	--	--	--	--	--	--	--
Pentachlorophenol	ug/L	--	--	--	--	--	--	--	--	--
Phenanthrene	ug/L	--	--	--	--	--	--	--	--	--
Phenol	ug/L	--	--	--	--	--	--	--	--	--
Pyrene	ug/L	--	--	--	--	--	--	--	--	--

Table 3.2

Groundwater Sample Analytical Results Summary
Pilot Perimeter Groundwater Trench Collection System Study
GM CET Bedford Facility
Bedford, Indiana

Sample Location:		*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*Tributary 3-3*	*PARCEL 416 WELL*	*PARCEL 416 WELL*	*PARCEL 416 WELL*
Sample Identification:		*SW-121912-SA-021*	*SW-062813-SA-023*	*SW-103013-KC-021*	*SW-103013-KC-023*	*GW-051614-SA-023*	*GW-051614-SA-024*	*GW-053102-327012-JW-001*	*GW-053102-327012-JW-002*	*GW-053102-327012-JW-003*
Sample Date:		*12/19/2012*	*6/28/2013*	*10/30/2013*	*10/30/2013*	*5/16/2014*	*5/16/2014*	*5/31/2002*	*5/31/2002*	*5/31/2002*
Sample Type:							*Duplicate*		*Duplicate*	*Replicate*
	Units									
Volatile Organic Compounds (VOCs)										
1,1,1-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	ug/L	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	ug/L	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropa	ug/L	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (Ethyle	ug/L	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	ug/L	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
2-Butanone (Methyl ethyl k	ug/L	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (Me	ug/L	--	--	--	--	--	--	--	--	--
Acetone	ug/L	--	--	--	--	--	--	--	--	--
Benzene	ug/L	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L	--	--	--	--	--	--	--	--	--
Bromoform	ug/L	--	--	--	--	--	--	--	--	--
Bromomethane (Methyl br	ug/L	--	--	--	--	--	--	--	--	--
Carbon disulfide	ug/L	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	ug/L	--	--	--	--	--	--	--	--	--
Chlorobenzene	ug/L	--	--	--	--	--	--	--	--	--
Chloroethane	ug/L	--	--	--	--	--	--	--	--	--
Chloroform (Trichlorometh	ug/L	--	--	--	--	--	--	--	--	--
Chloromethane (Methyl ch	ug/L	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	--	--
Cyclohexane	ug/L	--	--	--	--	--	--	--	--	--
Dibromochloromethane	ug/L	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane ((	ug/L	--	--	--	--	--	--	--	--	--
Ethylbenzene	ug/L	--	--	--	--	--	--	--	--	--
Isopropyl benzene	ug/L	--	--	--	--	--	--	--	--	--
Methyl acetate	ug/L	--	--	--	--	--	--	--	--	--
Methyl cyclohexane	ug/L	--	--	--	--	--	--	--	--	--
Methyl tert butyl ether (MT	ug/L	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	--	--	--	--	--	--	--	--	--
Styrene	ug/L	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	--	--	--	--	--	--	--	--	--
Toluene	ug/L	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	ug/L	--	--	--	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane (Cl	ug/L	--	--	--	--	--	--	--	--	--
Trifluorotrichloroethane (Fı	ug/L	--	--	--	--	--	--	--	--	--
Vinyl chloride	ug/L	--	--	--	--	--	--	--	--	--
Xylenes (total)	ug/L	--	--	--	--	--	--	--	--	--
General Chemistry										
Cyanide (amenable)	ug/L	--	--	--	--	--	--	--	--	--
Cyanide (total)	ug/L	--	--	--	--	--	--	--	--	--
Field parameters										
Conductivity, field	mS/cm	0.339	0.655	0.629	0.627	0.004	0.004	0.441	--	--
Dissolved oxygen (DO), fiel	ug/L	10920	15330	11720	10680	7040	7040	7650	--	--
Flow rate	gpm/ft	--	--	--	--	--	--	--	--	--
Oxidation reduction potent	millivolts	263.1	51.9	58.4	57.9	-58.2	-58.2	--	--	--
pH, field	s.u.	6.85	7.53	7.9	7.91	7.37	7.37	7.25	--	--
Temperature, field	Deg C	7.22	21.69	12.66	12.54	17.53	17.53	--	--	--
Temperature, sample	Deg C	--	--	--	--	--	--	15.16	--	--
Turbidity, field	NTU	6.71	21.5	26.1	16.2	4.39	4.39	155.00	--	--

Notes
U - Not detected at the associated repo
J - Estimated concentration.
UJ - Not detected; associated reporting



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 2.1

GROUNDWATER COLLECTION SYSTEM PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY GM CET BEDFORD FACILITY

Bedford, Indiana

CRA

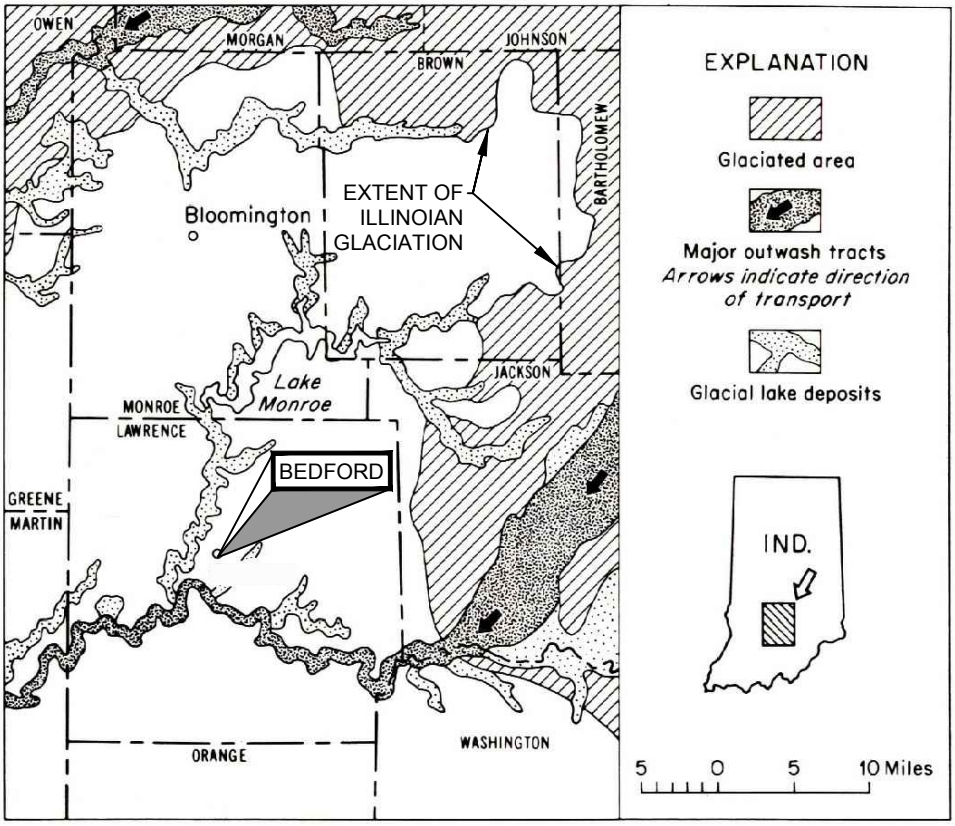


figure 2.2

GLACIAL FEATURES OF SOUTH-CENTRAL INDIANA
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

SOURCE: GRAY, 1974

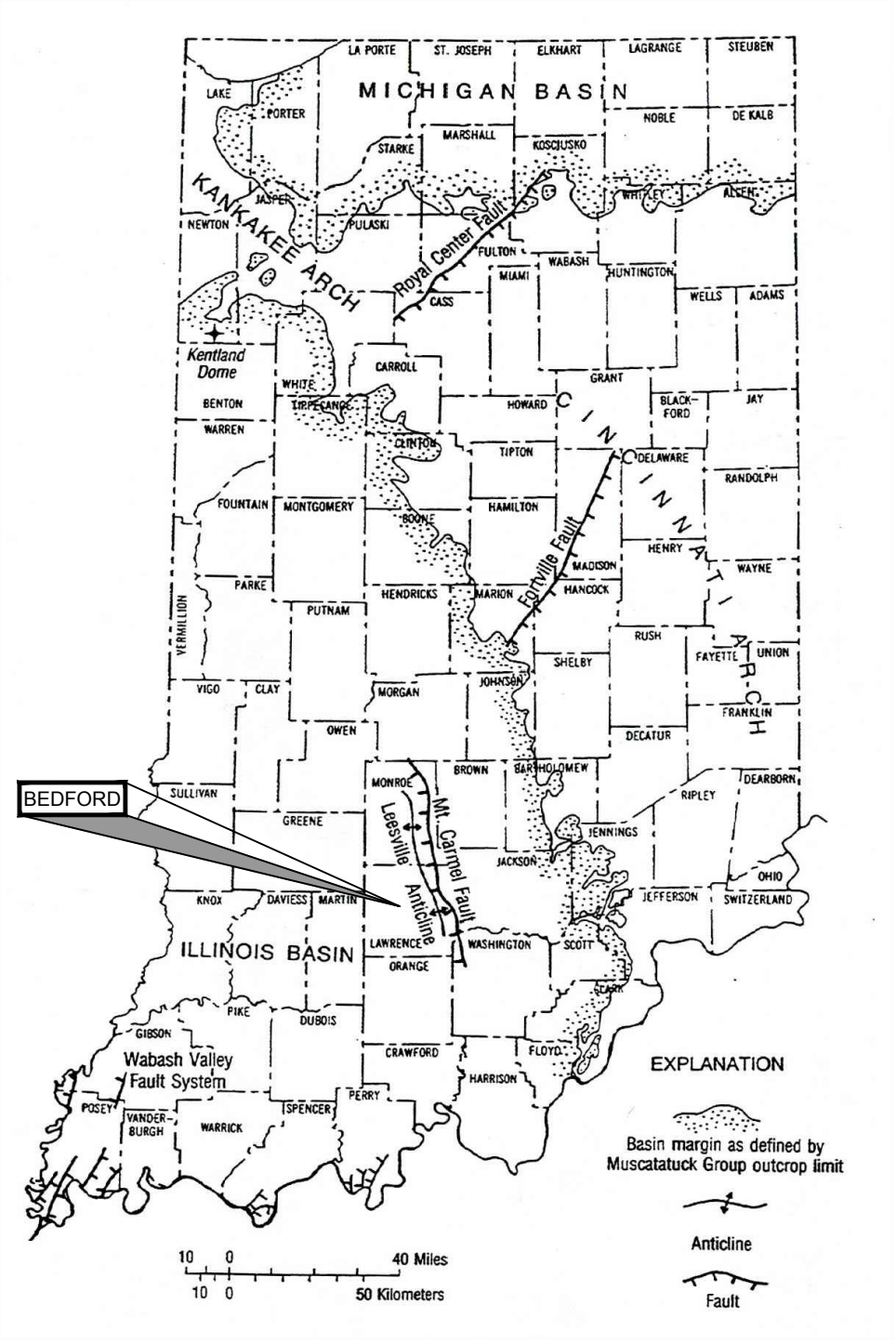


figure 2.3

BEDROCK STRUCTURAL FEATURES OF INDIANA
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

SOURCE: RUPP, 1991

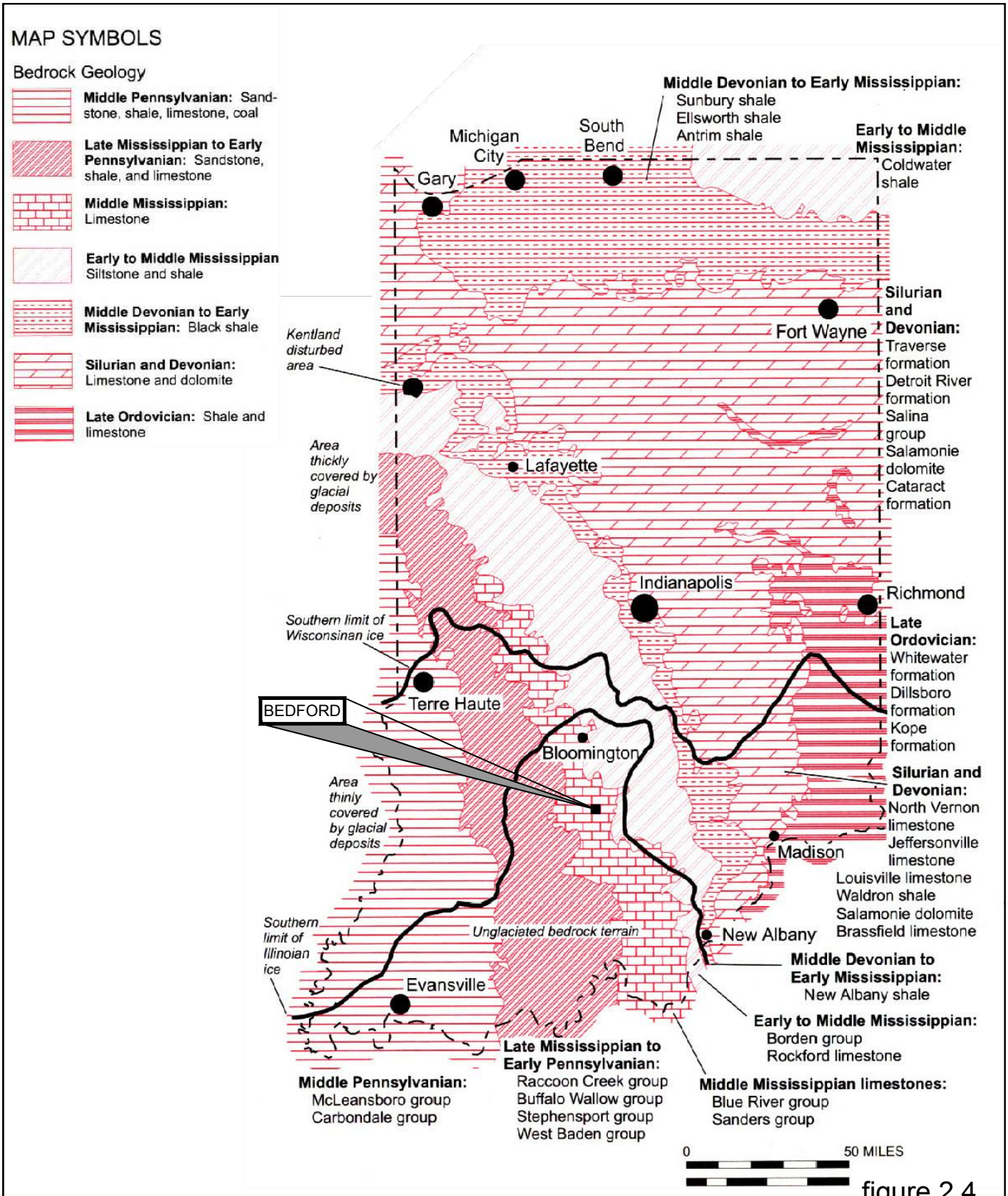
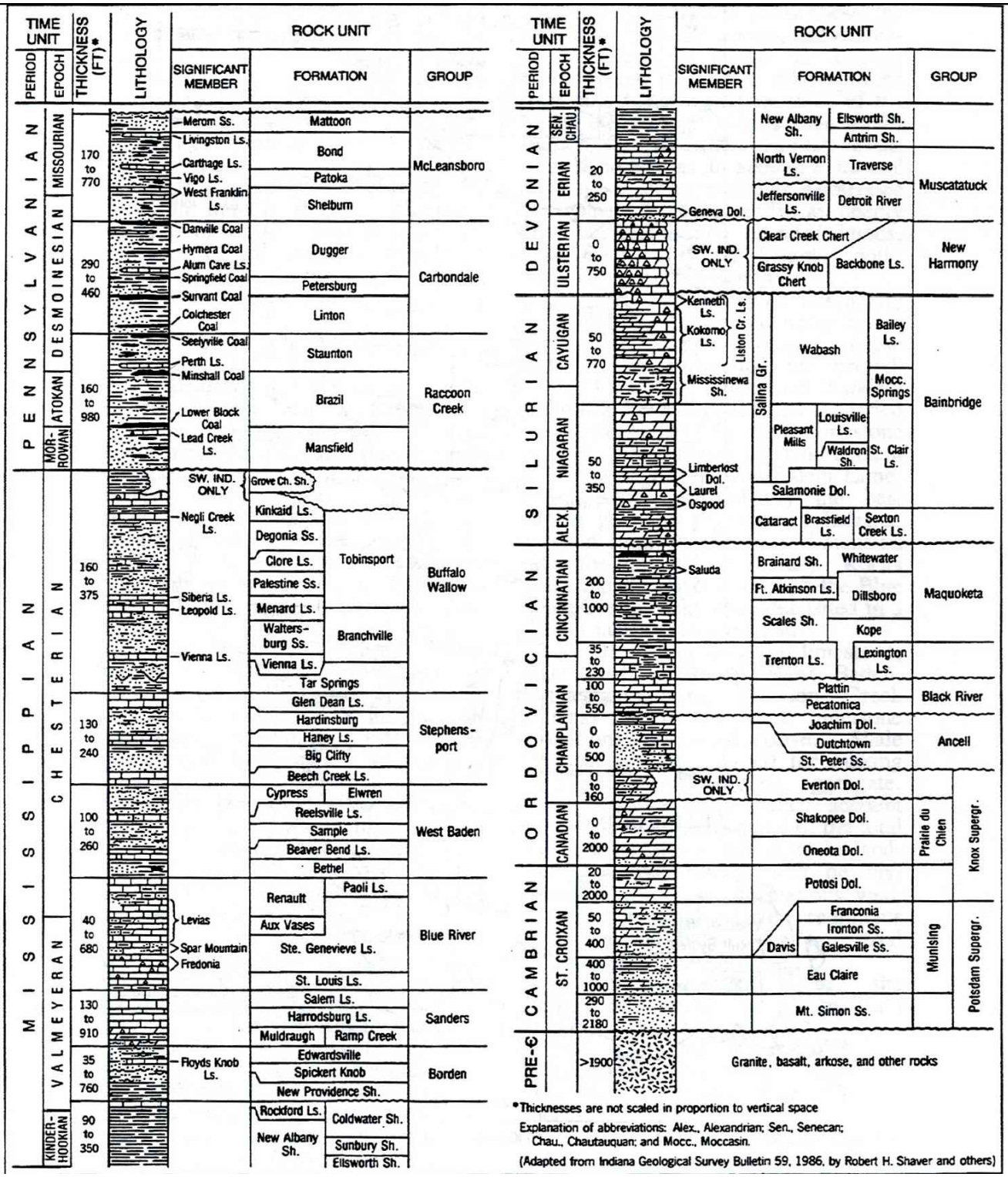


figure 2.4

BEDROCK GEOLOGY OF INDIANA
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

SOURCE: CAMP AND RICHARDSON, 1999



*Thicknesses are not scaled in proportion to vertical space

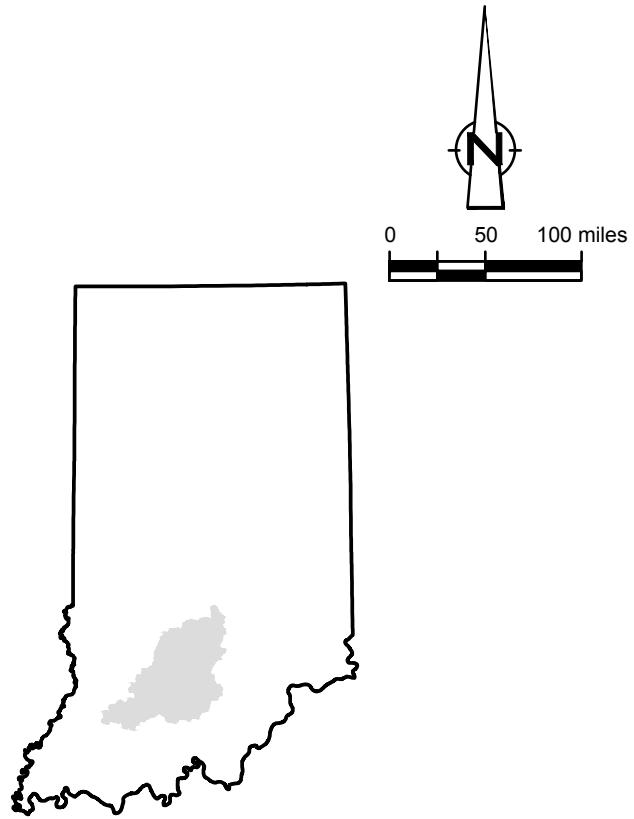
Explanation of abbreviations: Alex., Alexandrian; Sen., Senecan; Chau., Chautauquan; and Mocc., Moccasin.

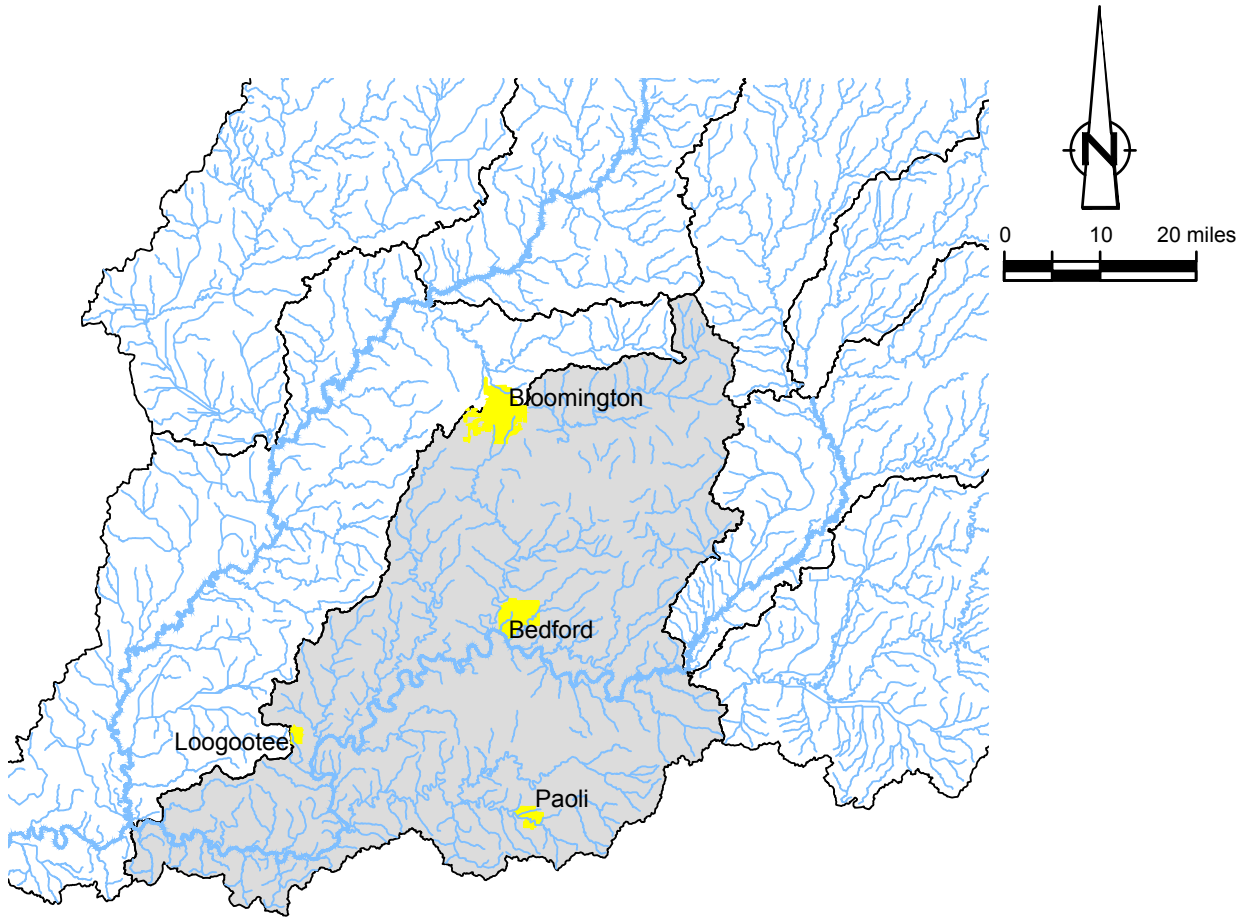
(Adapted from Indiana Geological Survey Bulletin 59, 1986, by Robert H. Shaver and others)

figure 2.5

GENERALIZED STRATIGRAPHIC COLUMN
FOR PALEOZOIC ROCKS IN INDIANA
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

SOURCE: HILL, UNDATED



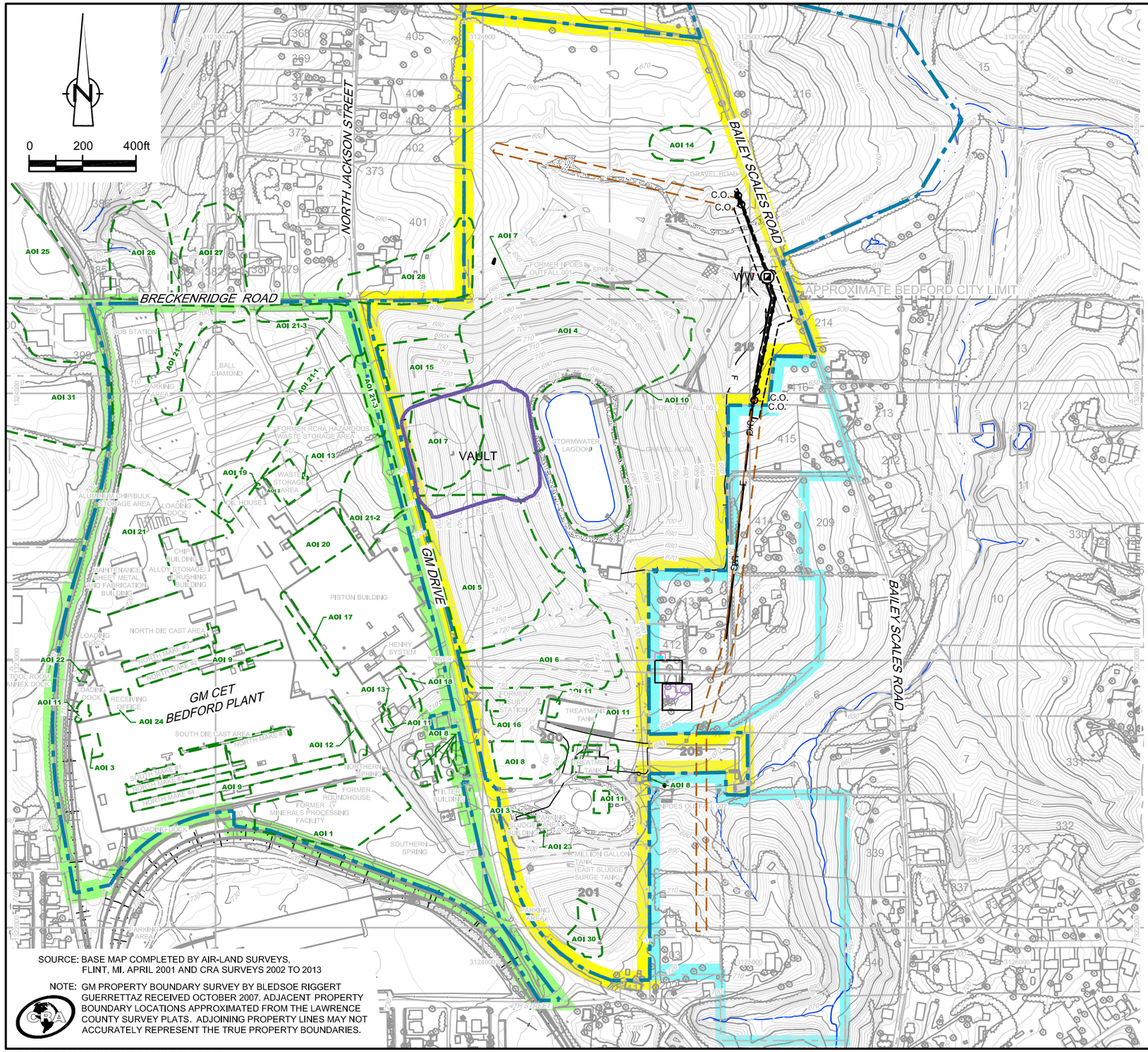


SOURCE: SOURCE: INDIANA GEOLOGICAL SURVEY, INDIANA DEPARTMENT OF TRANSPORTATION

figure 2.6

LOWER EAST FORK WHITE RIVER DRAINAGE BASIN
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

13968-00(365)GN-WA009 NOV 20/2014



LEGEND

- GROUND SURFACE ELEVATION CONTOURS (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
- PROPOSED WET WELL
- PROPOSED TEMPORARY CLEANOUT

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 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

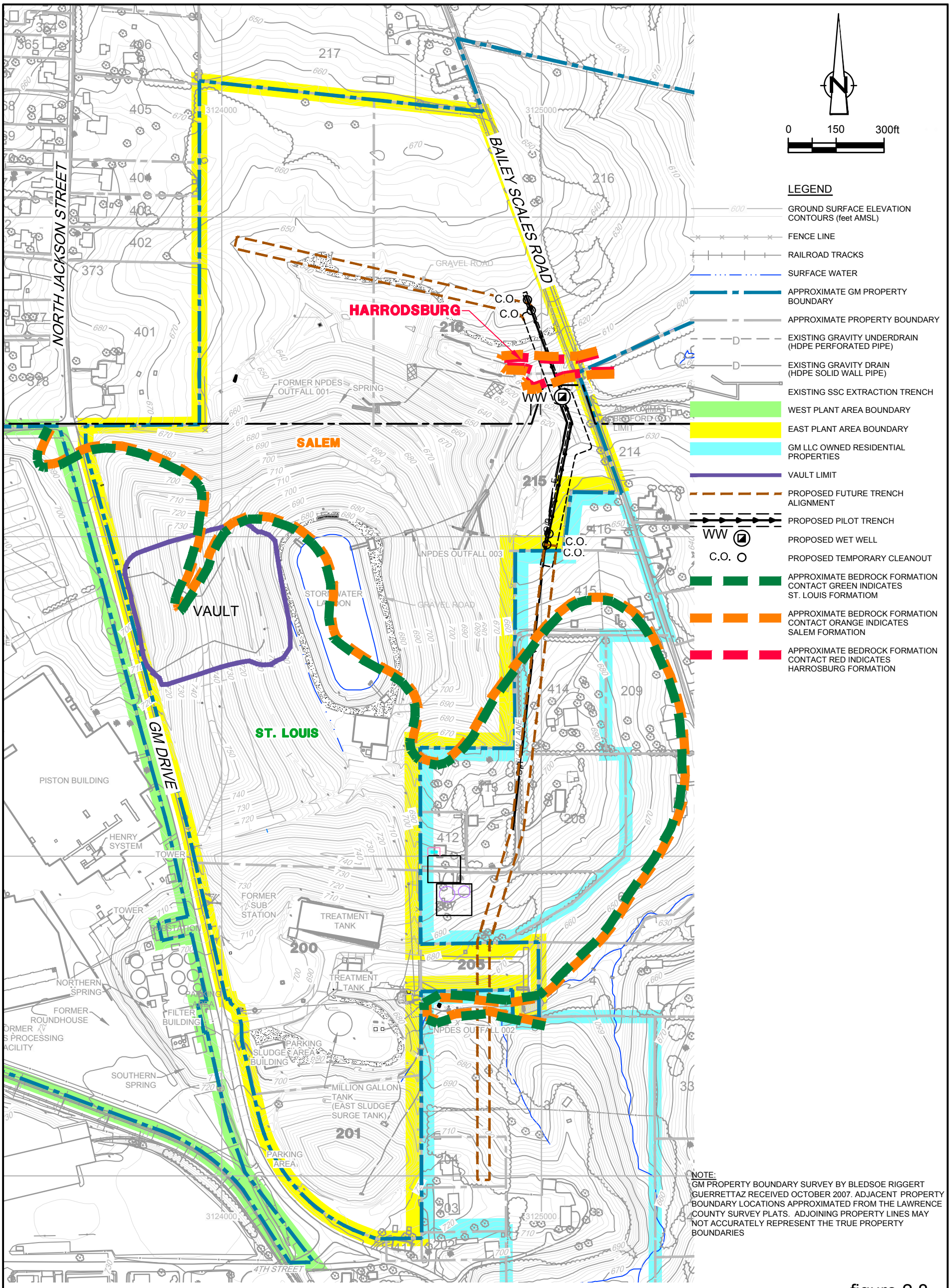
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001 AND CRA SURVEYS 2002 TO 2013

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 2.7

EAST PLANT AREA AND AOI LOCATIONS PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY GM CET BEDFORD FACILITY

Bedford, Indiana



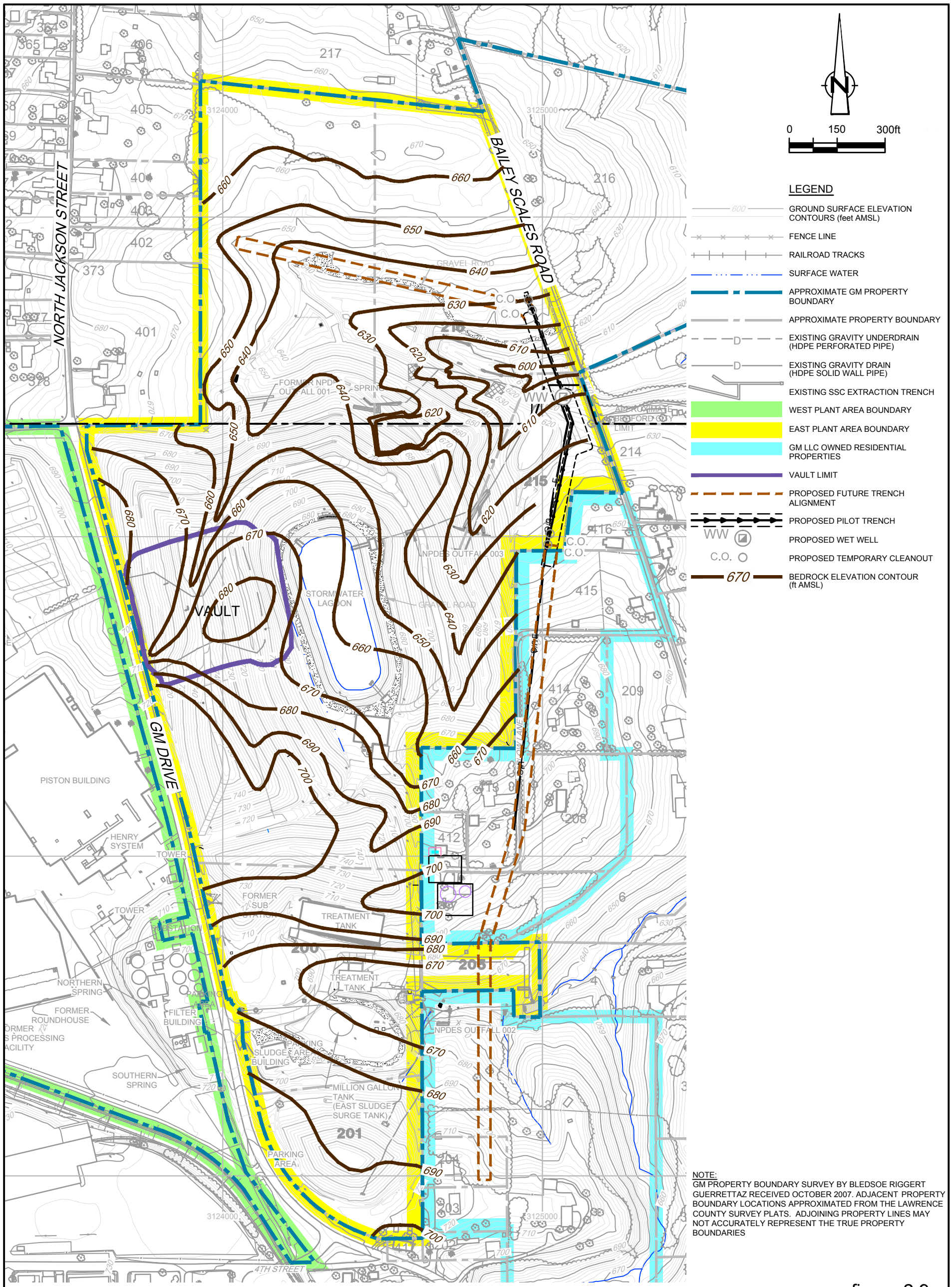
NOTE:
GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

figure 2.8

APPROXIMATE BEDROCK FORMATION CONTACT LOCATIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

13968-00(365)GN-WA011 OCT 6/2015



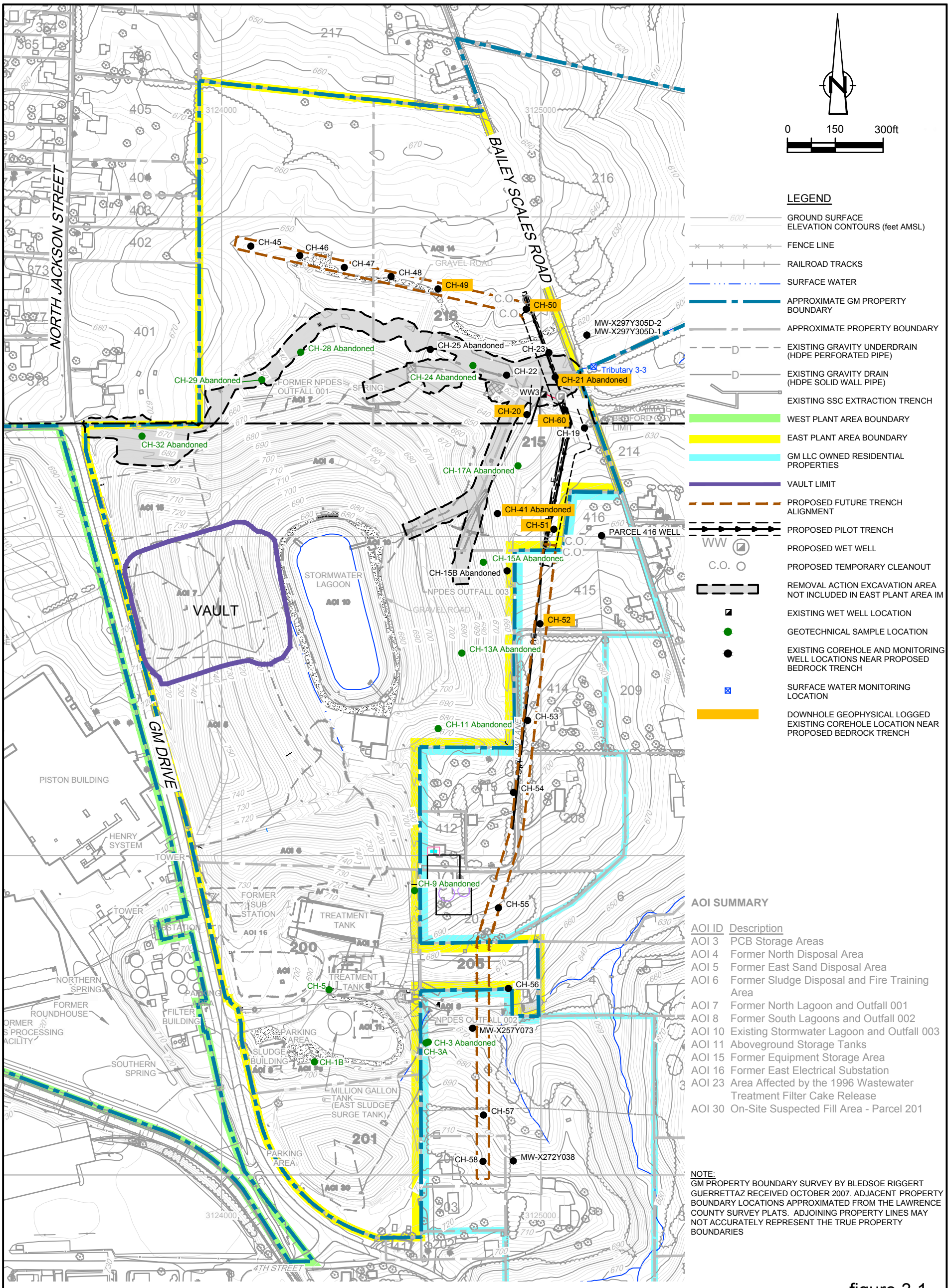
NOTE:
GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

figure 2.9

BEDROCK TOPOGRAPHY
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

13968-00(365)GN-WA012 OCT 6/2015



AOI SUMMARY

AOI ID	Description
AOI 3	PCB Storage Areas
AOI 4	Former North Disposal Area
AOI 5	Former East Sand Disposal Area
AOI 6	Former Sludge Disposal and Fire Training Area
AOI 7	Former North Lagoon and Outfall 001
AOI 8	Former South Lagoons and Outfall 002
AOI 10	Existing Stormwater Lagoon and Outfall 003
AOI 11	Aboveground Storage Tanks
AOI 15	Former Equipment Storage Area
AOI 16	Former East Electrical Substation
AOI 23	Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 30	On-Site Suspected Fill Area - Parcel 201

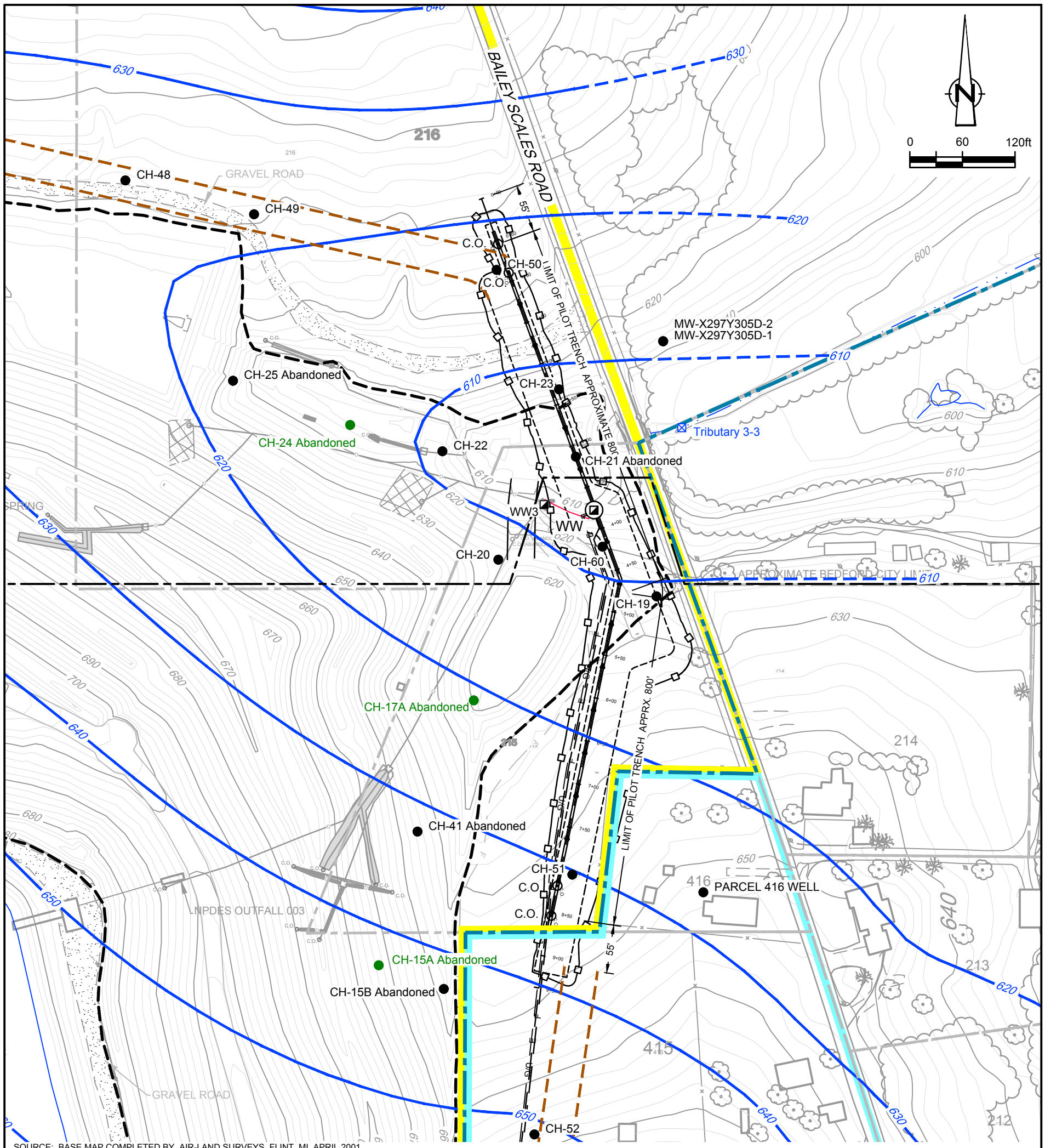
NOTE:
GM PROPERTY BOUNDARY SURVEY BY BLEDSOE RIGGERT GUERRETTAZ RECEIVED OCTOBER 2007. ADJACENT PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. ADJOINING PROPERTY LINES MAY NOT ACCURATELY REPRESENT THE TRUE PROPERTY BOUNDARIES

SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

figure 3.1

PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM INVESTIGATION COREHOLES
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

13968-00(365)GN-WA022 OCT 8/2015



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001 AND CRA SURVEYS 2002 TO 2013.

LEGEND

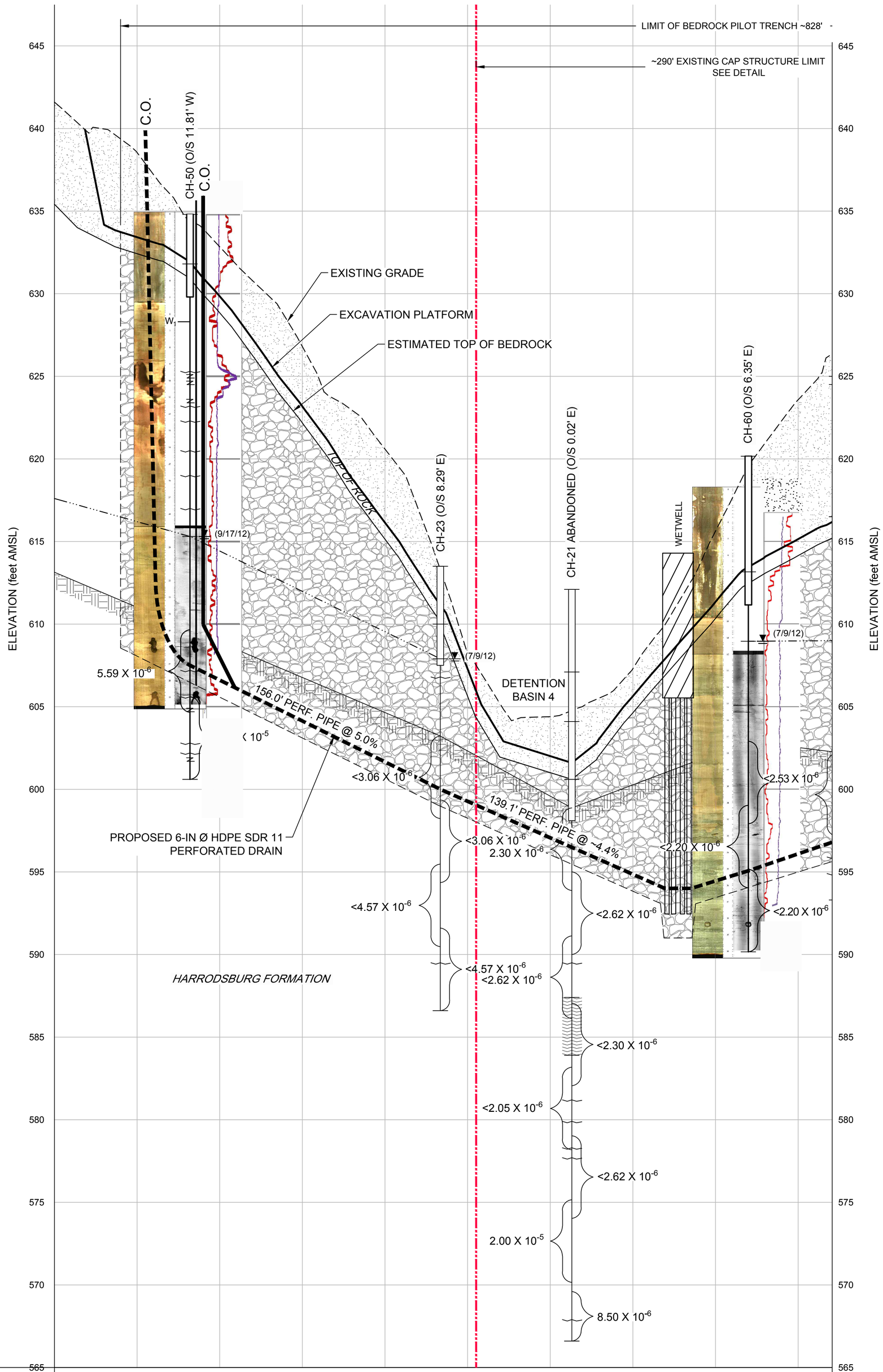
- GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- FENCE LINE
- SURFACE WATER
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING GRAVITY UNDERDRAIN (HDPE PERFORATED PIPE)
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING SSC EXTRACTION TRENCH
- EXISTING WET WELL LOCATION
- GEOTECHNICAL SAMPLE LOCATION
- EAST PLANT COVER SYSTEM LIMIT
- EAST PLANT AREA BOUNDARY
- GM LLC OWNED RESIDENTIAL PROPERTIES
- PROPOSED FUTURE TRENCH ALIGNMENT
- GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (ft AMSL), MAY 2014
- PROPOSED PILOT TRENCH
- PROPOSED SILT FENCE
- PROPOSED WET WELL
- PROPOSED TEMPORARY CLEANOUT
- EXISTING COREHOLE AND MONITORING WELL LOCATIONS NEAR PROPOSED BEDROCK TRENCH
- SURFACE WATER MONITORING 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 4.1

PROPOSED DRAFT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM ALIGNMENT
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

13968-00(365)GN-WA023 OCT 6/2015



COREHOLE LEGEND

CH-50 (O/S 12.58' S)

WELL IDENTIFICATION (OFF-SET DISTANCE & DIRECTION)

W_1

GROUND SURFACE

COREHOLE CASING

WATER LOSS

OPEN HORIZONTAL FRACTURE

OPEN VERTICAL FRACTURE

(9/17/12) GROUND WATER LEVEL (DATE TAKEN)

<2.62 X 10^{-6}

<2.30 X 10^{-6} HYDRAULIC CONDUCTIVITY TEST ZONE (cm/sec)

ZONE OF HIGHLY FRACTURED ROCK

C.O. TEMPORARY CLEANOUT

OVERBURDEN MATERIAL. TOTAL OVERBURDEN EXCAVATION VOLUME ~11,510 yd³

1/4-IN Ø GRAVEL BACKFILL

ESTIMATED LEVEL OF COMPETENT ROCK

CALIPER (IN)

NATURAL GAMMA (CPS)

ACOUSTIC AMPLITUDE

OPTICAL IMAGE

4ft
2
0

0 20 40ft

SCALES: VERTICAL AND HORIZONTAL

NOTES:

1. DEPICTION OF FRACTURES WITHIN THE BEDROCK ARE APPROXIMATE AND ARE PROVIDED FOR GRAPHICAL REPRESENTATION ONLY. REFER TO THE BORING LOGS FOR ADDITIONAL DETAIL.
2. PIPE LENGTHS SHOWN ARE INSTALLED LENGTHS.

SCALE VERIFICATION

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

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY

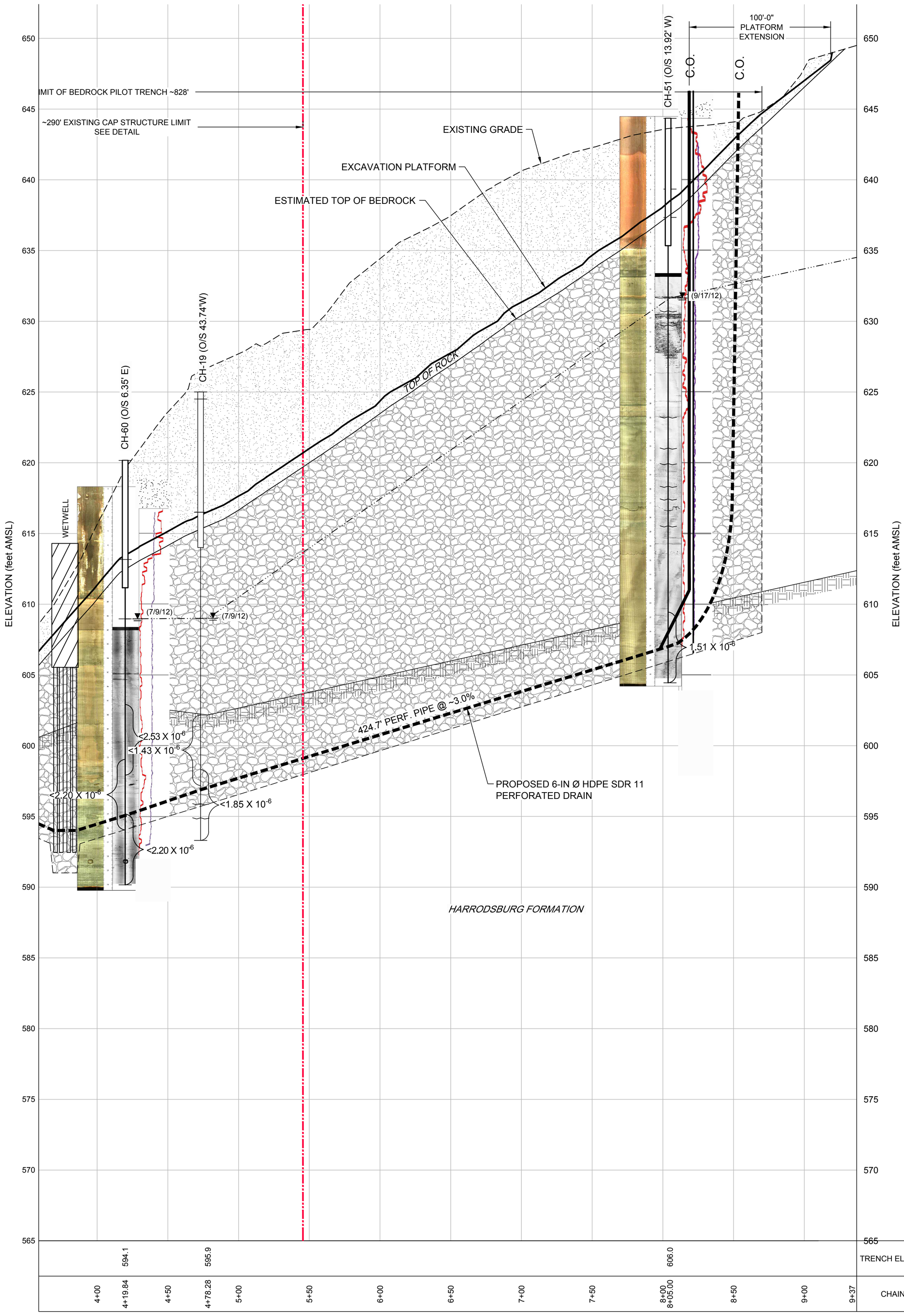
PILOT TRENCH STUDY PROFILE (NORTH LEG)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	OCTOBER 2014	
Scale: HORIZONTAL - 1:40 VERTICAL - 1:4	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: 4.2

13968-00(365)GN-WA016 OCT 9/2015



COREHOLE LEGEND

- WELL IDENTIFICATION (OFF-SET DISTANCE & DIRECTION)
- GROUND SURFACE
- COREHOLE CASING
- WATER LOSS
- OPEN HORIZONTAL FRACTURE
- OPEN VERTICAL FRACTURE
- GROUND WATER LEVEL (DATE TAKEN)

- HYDRAULIC CONDUCTIVITY TEST ZONE (cm/sec)
- ZONE OF HIGHLY FRACTURED ROCK
- TEMPORARY CLEANOUT

- OVERBURDEN MATERIAL. TOTAL OVERBURDEN EXCAVATION VOLUME ~11,510 yd³
- 1/4-IN Ø GRAVEL BACKFILL
- ESTIMATED LEVEL OF COMPETENT ROCK
- CALIPER (IN)
- NATURAL GAMMA (CPS)
- ACOUSTIC AMPLITUDE
- OPTICAL IMAGE

SCALES: VERTICAL AND HORIZONTAL

NOTES:

1. DEPICTION OF FRACTURES WITHIN THE BEDROCK ARE APPROXIMATE AND ARE PROVIDED FOR GRAPHICAL REPRESENTATION ONLY. REFER TO THE BORING LOGS FOR ADDITIONAL DETAIL.
2. PIPE LENGTHS SHOWN ARE INSTALLED LENGTHS.

SCALE VERIFICATION

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

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY

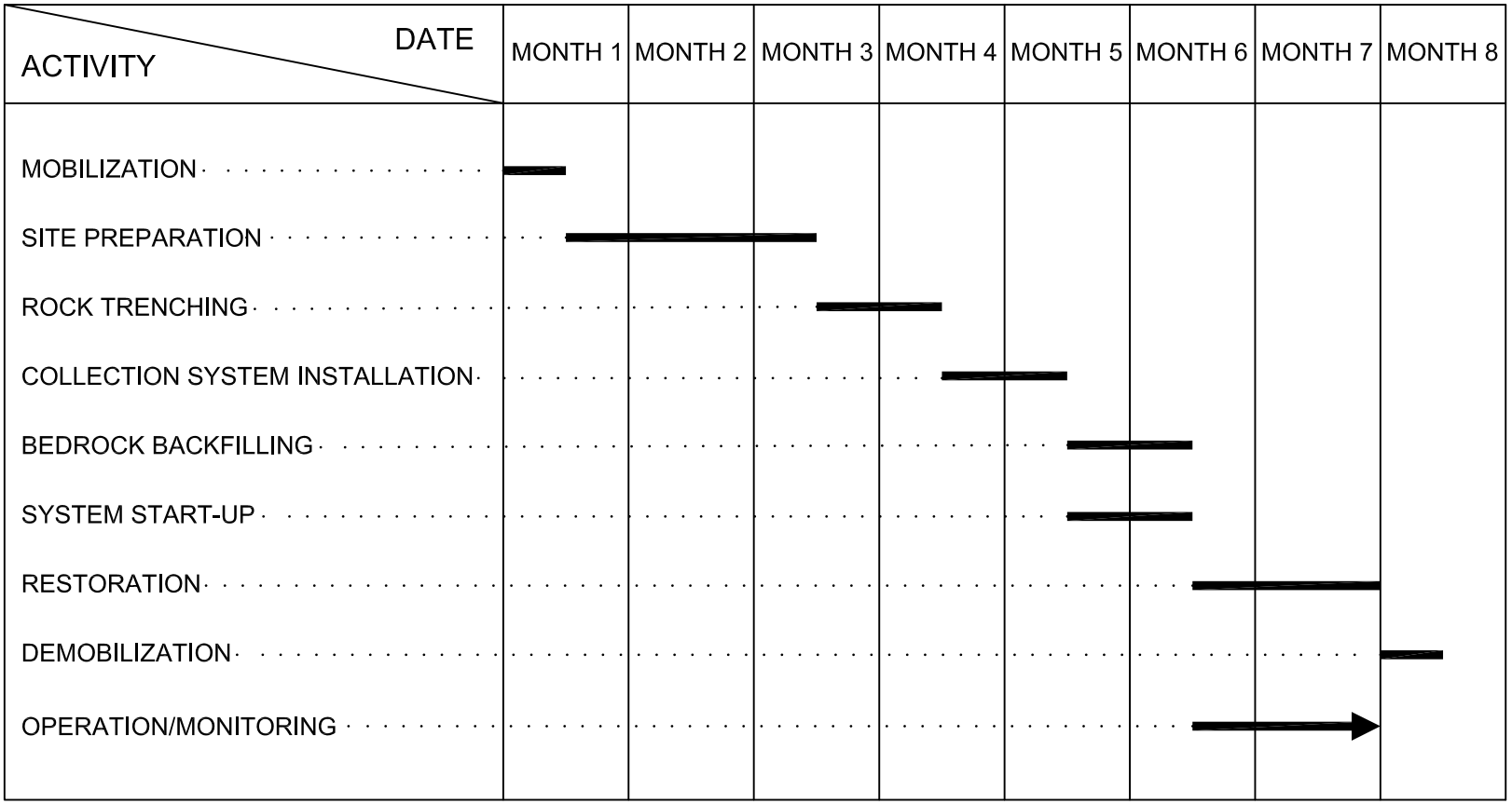
PILOT TRENCH STUDY PROFILE (SOUTH LEG)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	P.G.	OCTOBER 2014	
Scale: HORIZONTAL - 1:40 VERTICAL - 1:4	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: 4.3

13968-00(365)GN-WA016 OCT 9/2015



NOTE

SCHEDULE IS DEPENDENT ON SUITABLE WEATHER CONDITIONS.

LEGEND

CONTINUOUS ACTIVITY

figure 9.1

PROJECT SCHEDULE
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

Appendix A

Boring Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-15B
DATE COMPLETED: January 17, 2006
DRILLING METHOD: 4 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	GROUND SURFACE	643.7					
0	CL-CLAY, with silt, soft-firm, tan-brown, moist		4-INCH DIA. STEEL CASING				
3.2	END OF OVERBURDEN HOLE @ 3.2ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-15B
DATE COMPLETED: January 17, 2006
DRILLING METHOD: 4 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
4	LIMESTONE (SALEM FORMATION), thin bedded, fine grained, light gray	640.5	CEMENT / BENTONITE SEAL			
6						
8	- horizontal fracture, oxidized at 7.5ft BGS - calcite content, medium to coarse grained, gray at 8.4ft BGS					
10	- stylolite at 9.6ft BGS - stylolite at 10.4ft BGS			1	100	100
12	- stylolite at 11.8ft BGS - stylolite at 12.3ft BGS					
14			4-INCH DIA. COREHOLE			
16	- stylolite at 15.3ft BGS - stylolite at 15.4ft BGS - medium to fine grained at 16.0ft BGS					
18	- open stylolite at 17.6ft BGS					
20	- stylolite at 19.1ft BGS			2	100	100
22	- horizontal fracture at a thin shale lens at 21.7ft BGS - open stylolite at 22.0ft BGS					
24						
26	- open stylolite at 25.0ft BGS					
	END OF BOREHOLE @ 26.3ft BGS	617.4				
28						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-19
DATE COMPLETED: June 15, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	627.8 625.0					
0	TOPSOIL	624.4					
	CL-CLAY, little silt, stiff, low to medium plasticity, strong brown, moist			1	P/S	3.0	
2			4" DIA. STEEL CASING				
4							
6				2	P/S	3.0	
8			CEMENT / BENTONITE SEAL				
	END OF OVERBURDEN HOLE @ 8.5ft BGS						
10							
12							
14							
16							
18							
20							
22							
24							
26							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-19
DATE COMPLETED: June 15, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
8			CEMENT / BENTONITE SEAL			
	LIMESTONE (SALEM FORMATION), medium grained, light brown	616.5				
10	- set 4-inch steel casing at 11.0ft BGS					
12	- stylolite at 12.6ft BGS - stylolite at 13.1ft BGS - gray in color at 13.4ft BGS			1	100	100
14	- stylolite at 15.2ft BGS					
16						
18	- stylolite at 18.3ft BGS					
20	- stylolite at 20.3ft BGS					
22						
24						
26				2	100	100
28	- open stylolite at 28.6ft BGS - stylolite at 28.7ft BGS - horizontal fracture at 29.1ft BGS		4" DIA. COREHOLE			
30	- horizontal fracture with silt infilling at 30.1ft BGS	594.8				
	LIMESTONE (UPPER HARRODSBURG FORMATION), dark gray, fossilized	593.3				
32	- stylolite at 31.3ft BGS - stylolite at 31.6ft BGS					
	END OF BOREHOLE @ 31.7ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-19
DATE COMPLETED: June 15, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %	
36	Limestone formation contacts may represent gradational changes and as shown on this log are approximations of the actual formation contact.						
38							
40							
42							
44							
46							
48							
50							
52							
54							
56							
58							
60							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-20
DATE COMPLETED: June 7, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING	621.8						
	GROUND SURFACE	619.2						
0	CL-CLAY (FILL), with silt, gravel, firm, low plasticity, brown, moist							
2	ML-SILT (FILL), little clay, compact, beige, wet, dilatant	617.2	4" DIA. STEEL CASING	1	P/S	3.0		0.0
4								
6	CL-CLAY (FILL), little silt, soft, medium plasticity, dark gray, very moist to wet	613.2		2	P/S	4.0		0.0
8								
10			CEMENT / BENTONITE SEAL	3	P/S	3.0		0.0
12								
14	Rock fragments END OF OVERBURDEN HOLE @ 14.0ft BGS	605.7		4	P/S	2.0		0.0
16								
18								
20								
22								
24								
26								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-20
DATE COMPLETED: June 7, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
		605.7				
	Rock fragments	605.2				
14	LIMESTONE (SALEM FORMATION), medium grained, gray with brown in color		CEMENT / BENTONITE SEAL			
16	- set 4-inch steel casing at 17.0ft BGS					
	- stylolite at 17.6ft BGS					
18	LIMESTONE (UPPER HARRODSBURG FORMATION), medium to coarse grained, gray/tan	601.2				
20	- horizontal fracture at 20.8ft BGS					
22	- horizontal fracture at 22.7ft BGS			1	100	100
	- shale parting at 23.4ft BGS					
24	- shale parting at 23.8ft BGS					
	- shale parting at 24.4ft BGS					
	- 1/2-inch vug at 25.4ft BGS					
26	- open stylolite at 26.0ft BGS		4" DIA. COREHOLE			
	- stylolite at 27.5ft BGS					
28	- fossils present at 27.9ft BGS					
	- 8-inch slightly porous section at 28.6ft BGS					
30	- stylolite at 30.4ft BGS					
	- stylolite at 30.9ft BGS					
	- stylolite at 31.5ft BGS					
32	- open stylolite at 32.1ft BGS					
	- 10-inch slightly porous section at 33.3ft BGS			2	100	100
34	- horizontal fracture at 33.7ft BGS					
	- stylolite at 35.1ft BGS					
36	- horizontal fracture at 37.1ft BGS					
38	END OF BOREHOLE @ 38.0ft BGS	581.2				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-21
DATE COMPLETED: June 6, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	612.1						
0	CL-CLAY (FILL), trace gravel, low plasticity, strong brown, moist							
2				1	P/S	1.8		0.0
4			4" DIA. STEEL CASING					
6	SP-SAND (FILL), fine grained, poorly graded, brown, moist	607.1		2	P/S	3.0		0.2
	- Wet at 7.0ft BGS							
8	CL-CLAY (FILL), soft, medium plasticity, gray, moist	604.1	CEMENT / BENTONITE SEAL					
10				3	P/S	3.5		0.0
12	END OF OVERBURDEN HOLE @ 11.5ft BGS							
14								
16								
18								
20								
22								
24								
26								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-21
DATE COMPLETED: June 6, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
12	LIMESTONE (SALEM FORMATION), medium grained, gray	600.6	CEMENT / BENTONITE SEAL			
	LIMESTONE (UPPER HARRODSBURG FORMATION), medium grained, gray	599.6				
14	- set 4-inch steel casing at 14.0ft BGS - 7-inch slightly porous section at 14.5ft BGS					
16	- stylolite at 15.3ft BGS - stylolite at 15.6ft BGS - vug at 16.1ft BGS - open stylolite at 17.0ft BGS					
18	- 7-inch slightly porous section at 18.0ft BGS - stylolite at 18.8ft BGS					
20	- 1 feet of slightly porous section at 19.7ft BGS			1	100	99
22	- open stylolite at 21.4ft BGS - stylolite at 22.5ft BGS - horizontal fracture at 22.6ft BGS - stylolite at 23.0ft BGS					
24	- stylolite at 23.1ft BGS - stylolite at 23.4ft BGS - 1/4-inch vug at 24.1ft BGS - stylolite at 24.6ft BGS					
26	- 3.5-feet of highly vertical and horizontal fractures with partial silt infilling at 24.7ft BGS					
28	- stylolite at 28.6ft BGS					
30	- stylolite at 30.0ft BGS - stylolite at 30.4ft BGS - stylolite at 30.6ft BGS		4" DIA. COREHOLE	2	100	65
32	- 9-inch fracture section with silt infilling at 30.9ft BGS - horizontal fracture at 32.2ft BGS					
34	- horizontal fracture at 33.8ft BGS - horizontal fracture at 34.4ft BGS					
36	- open stylolite at 37.3ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-21
DATE COMPLETED: June 6, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
40	- stylolite at 38.1ft BGS - shale parting at 39.3ft BGS - stylolite at 40.0ft BGS - stylolite at 41.0ft BGS - stylolite at 41.2ft BGS			3	100	100
42	- 1/2-inch shale parting at 41.5ft BGS - stylolite at 42.9ft BGS - stylolite at 43.1ft BGS		4" DIA. COREHOLE			
44	- horizontal fracture at 44.2ft BGS - stylolite at 44.6ft BGS - open stylolite at 44.7ft BGS	566.6				
46	- open stylolite at 45.0ft BGS - stylolite at 45.4ft BGS END OF BOREHOLE @ 45.5ft BGS					
48	Limestone formation contacts may represent gradational changes and as shown on this log are approximations of the actual formation contact.					
50						
52						
54						
56						
58						
60						
62						
64						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-22
DATE COMPLETED: June 1, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	615.9 613.4						
0	CL-CLAY (FILL), some silt, trace gravel, firm, low to medium plasticity, strong brown, moist		4" DIA. STEEL CASING	1	P/S	3.0		0.0
2								
4			CEMENT / BENTONITE SEAL	2	P/S	3.0		0.0
6								
8				3	P/S	1.0		0.0
10	END OF OVERBURDEN HOLE @ 9.2ft BGS							
12								
14								
16								
18								
20								
22								
24								
26								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-22
DATE COMPLETED: June 1, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
		604.2				
10	LIMESTONE (SALEM FORMATION), fine to medium grained, occasional calcite content, thin bedded, gray					
12	- set 4-inch steel casing at 12.0ft BGS		CEMENT / BENTONITE SEAL			
		599.9				
14	LIMESTONE (UPPER HARRODSBURG FORMATION), fine to medium grained, occasional calcite content, thin bedded, gray - stylolite at 13.9ft BGS - stylolite at 14.1ft BGS					
16	- open stylolite at 14.5ft BGS - stylolite at 15.0ft BGS					
	- vertical fracture at 15.5ft BGS - open stylolite at 16.3ft BGS			1	100	100
18	- 1.4 feet of porous section at 17.5ft BGS - stylolite at 18.8ft BGS					
20	- stylolite at 19.7ft BGS - stylolite at 19.8ft BGS - open stylolite at 20.7ft BGS		4" DIA. HQ COREHOLE			
22						
24	- open stylolite at 23.4ft BGS - stylolite at 24.0ft BGS - 3 feet of porous section at 24.9ft BGS					
26						
28	- stylolite at 27.1ft BGS - stylolite at 27.5ft BGS - open stylolite at 28.2ft BGS - 4 feet porous section at 28.8ft BGS			2	100	100
30	- horizontal fracture at 30.5ft BGS					
32	- horizontal fracture at 31.6ft BGS - horizontal fracture at 31.8ft BGS - horizontal fracture at 32.1ft BGS	580.8				
	END OF BOREHOLE @ 32.6ft BGS					
34						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-23
DATE COMPLETED: June 1, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: J. LUZWICK / K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	616.3 613.5						
0	CL-CLAY (FILL), trace gravel, soft, medium plasticity, strong brown, moist		4" DIA. STEEL CASING CEMENT / BENTONITE GROUT	1	P/S	3.5		1.0
4	END OF OVERBURDEN HOLE @ 3.5ft BGS							
2, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 13968-EAST PLANT AREA INVESTIGATION (ADD.#9).GPJ CRA_CORP.GDT 8/21/06

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-23
DATE COMPLETED: June 1, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: J. LUZWICK / K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
4	LIMESTONE (SALEM FORMATION), fine to medium grained, gray, thin bedded	610.0	CEMENT / BENTONITE GROUT; 4" DIA. STEEL CASING			
6	- set 4-inch steel casing at 6.0ft BGS - horizontal fracture at 6.7ft BGS					
8						
10						
12				1	100	100
14	LIMESTONE (UPPER HARRODSBURG FORMATION), medium to coarse grained, gray, 1.5 feet of porous section - stylolite at 13.5ft BGS - stylolite at 13.6ft BGS - stylolite at 14.7ft BGS	600.5				
16	- open stylolite at 14.8ft BGS - stylolite at 14.9ft BGS					
18	- open stylolite at 15.9ft BGS - stylolite at 17.2ft BGS - stylolite at 17.6ft BGS - stylolite at 18.5ft BGS - stylolite at 19.0ft BGS					
20	- stylolite at 19.2ft BGS - stylolite at 20.4ft BGS		4" DIA. HQ COREHOLE			
22	- stylolite at 22.7ft BGS - open stylolite at 22.9ft BGS - stylolite at 23.1ft BGS			2	100	100
24	- horizontal fracture at 24.0ft BGS - open stylolite at 24.1ft BGS - open stylolite at 24.8ft BGS					
26	END OF BOREHOLE @ 26.9ft BGS	586.6				
28						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968-EAST PLANT AREA INVESTIGATION (ADD.#9).GPJ CRA_CORP.GDT 8/21/06

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-41
DATE COMPLETED: June 14, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	631.1						
0	GRAVEL (FILL)	630.5	4" DIA. STEEL CASING	1	P/S	3.0		0.0
2	CL-CLAY (FILL), soft, medium plasticity, strong brown, moist - trace gravel at 2.0ft BGS		CEMENT / BENTONITE SEAL					
	END OF OVERBURDEN HOLE @ 3.0ft BGS							
4								
6								
8								
10								
12								
14								
16								
18								
20								
22								
24								
26								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: GM BEDFORD RFI
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-41
DATE COMPLETED: June 14, 2005
DRILLING METHOD: 6 1/4" HSA & HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
0		628.1	CEMENT / BENTONITE SEAL			
4	LIMESTONE (SALEM FORMATION), brown, medium grained, fossils					
6	- set 4" steel casing at 5.5ft BGS - 1.3-feet open vertical fracture with oxidization at 6.0ft BGS		CEMENT / BENTONITE SEAL			
8	- stylolite at 7.4ft BGS - gray in color at 8.0ft BGS - stylolite at 8.4ft BGS - stylolite at 8.8ft BGS			1	100	100
10	- stylolite at 10.4ft BGS					
12	- stylolite at 12.8ft BGS					
14	- stylolite at 13.6ft BGS - stylolite at 14.9ft BGS					
16	- open stylolite at 16.0ft BGS					
18						
20			4" DIA. COREHOLE	2	100	100
22	- stylolite at 21.8ft BGS					
24						
26	END OF BOREHOLE @ 26.2ft BGS	604.9				
28						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 13968-EAST PLANT AREA INVESTIGATION (ADD.#9).GPJ CRA_CORP.GDT 3/31/08

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-49
DATE COMPLETED: August 23, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	643.8 641.1					
0	CL-SILTY CLAY, little silt, firm, medium plasticity, strong brown, moist		CEMENT / BENTONITE GROUT				
4	END OF OVERBURDEN HOLE @ 3.5ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-49
DATE COMPLETED: August 23, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
4	LIMESTONE (SALEM FORMATION), fine grained, thin bedded, calcite content, light grey	637.6	4" DIA. STEEL CASING			
6	- set 4-inch steel casing at 6.5ft BGS					
	- stylolite at 7.3ft BGS					
8	- horizontal fracture at 8.1ft BGS					
	- stylolite at 9.8ft BGS					
10	- horizontal fracture at 10.2ft BGS			1	98	98
12	- open stylolite at 12.3ft BGS					
	- horizontal fracture at 13.1ft BGS					
14	- horizontal fracture at 14.3ft BGS					
	- stylolite at 15.9ft BGS					
16	- horizontal fracture at 16.3ft BGS					
18			4" DIA. HQ COREHOLE			
	- 7-inch vertical fracture at 19.8ft BGS			2	100	100
20	- horizontal fracture at 20.9ft BGS					
22						
	- horizontal fracture at 23.2ft BGS					
24	- stylolite at 24.7ft BGS					
26						
	- open stylolite at 27.1ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-49
DATE COMPLETED: August 23, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
30	- stylolite at 28.6ft BGS - 6-inch medium grained section at 29.6ft BGS - fine grained at 30.0ft BGS - open stylolite at 30.9ft BGS - trace small fosil content at 31.0ft BGS		4" DIA. HQ COREHOLE	3	100	100
32						
34	END OF BOREHOLE @ 34.2ft BGS	606.9				
36						
38						
40						
42						
44						
46						
48						
50						
52						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-50
DATE COMPLETED: July 13, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	637.6 634.8					
0	CL-SILTY CLAY, with silt, firm, low plasticity, strong brown, moist		CEMENT / BENTONITE GROUT				
3.0	END OF OVERBURDEN HOLE @ 3.0ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-50
DATE COMPLETED: July 13, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
		631.8				
4	LIMESTONE (SALEM FORMATION), fine grained, thin bedded, calcite content, light brown/light grey		4" DIA. STEEL CASING			
	- set 4-inch steel casing at 5.0ft BGS					
6	- no water return at 6.5ft BGS					
8						
10	- horizontal fracture with clay infill at 9.5ft BGS - 4-inch vertical fracture with clay infill at 9.8ft BGS - 9-inch vertical fracture with clay infill at 10.2ft BGS			1	100	100
12	- near vertical fracture at 11.3ft BGS - horizontal fracture at 11.6ft BGS - light grey in color at 11.7ft BGS - horizontal fracture at 12.5ft BGS					
14	- horizontal fracture at 14.3ft BGS					
16	- horizontal fracture at 15.8ft BGS					
18	- horizontal fracture at 17.8ft BGS			2	100	100
20			4" DIA. HQ COREHOLE			
22						
24						
26	- horizontal fracture at 27.6ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-50
DATE COMPLETED: July 13, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
30	- horizontal fracture at 29.2ft BGS - 9-inch vertical fracture with iron staining at 30.0ft BGS			3	100	100
32	- horizontal fracture at 32.0ft BGS - horizontal fracture with iron staining at 32.6ft BGS					
34	- 5-inch vertical fracture with iron staining at 33.0ft BGS	600.6				
	END OF BOREHOLE @ 34.2ft BGS					
36						
38						
40						
42						
44						
46						
48						
50						
52						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-51
DATE COMPLETED: July 16, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	646.7 644.3					
0	WOOD CHIPS						
	CL-CLAY (FILL)	643.3	CEMENT / BENTONITE GROUT				
6	CL-SILTY CLAY, little silt, firm, medium plasticity, strong brown, moist	639.3					
7	END OF OVERBURDEN HOLE @ 7.0ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-51
DATE COMPLETED: July 16, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
		637.3	4" DIA. STEEL CASING			
8	LIMESTONE (SALEM FORMATION), fine grained, thin bedded, light grey, calcite content					
	- set 4-inch steel casing at 9.0ft BGS					
10	- open stylolite at 10.8ft BGS					
	- open stylolite at 11.6ft BGS					
12	- open stylolite with iron staining at 12.7ft BGS					
	- horizontal fracture at 13.6ft BGS					
14	- open stylolite at 13.9ft BGS - stylolite at 14.1ft BGS - horizontal fracture at 14.6ft BGS			1	100	100
16						
18	- open stylolite at 18.1ft BGS					
20			4" DIA. HQ COREHOLE			
	- horizontal fracture at 21.1ft BGS					
22						
	- horizontal fracture at 23.3ft BGS					
24	- horizontal fracture at 24.4ft BGS - stylolite at 24.8ft BGS - stylolite at 25.3ft BGS			2	100	100
26	- horizontal fracture at 26.0ft BGS					
	- horizontal fracture at 26.9ft BGS					
28	- open stylolite at 27.7ft BGS					
	- horizontal fracture at 28.8ft BGS					
30						
	- open stylolite at 30.8ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-51
DATE COMPLETED: July 16, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
34						
36						
38						
40	END OF BOREHOLE @ 39.9ft BGS	604.4		3	100	100
42						
44						
46						
48						
50						
52						
54						
56						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-52
DATE COMPLETED: August 28, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	671.0 668.3					
0	CL-SILTY CLAY, little silt, firm, low plasticity, strong brown, moist		CEMENT / BENTONITE GROUT				
2	END OF OVERBURDEN HOLE @ 3.0ft BGS						
4							
6							
8							
10							
12							
14							
16							
18							
20							
22							
24							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-52
DATE COMPLETED: August 28, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
0		665.3				
4	LIMESTONE (SALEM FORMATION), fine grained, thin bedded, light grey, trace calcite - set 4-inch steel casing at 5.0ft BGS - 1-feet broken rock at 5.5ft BGS		4" DIA. STEEL CASING			
6						
8	- horizontal fracture with clay infill at 8.5ft BGS					
10	- horizontal fracture at 10.4ft BGS			1	89	89
12	- open stylolite at 11.9ft BGS					
14	- open stylolite at 13.8ft BGS					
16	- oxidized horizontal fracture at 16.0ft BGS					
18	- horizontal fracture at 17.8ft BGS					
20	- horizontal fracture with half-inch clay fill at 20.3ft BGS		4" DIA. HQ COREHOLE	2	100	100
22	- horizontal fracture at 23.0ft BGS					
24						
26	- horizontal fracture at 27.8ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-52
DATE COMPLETED: August 28, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
30	- horizontal fracture at 28.4ft BGS - open stylolite at 28.9ft BGS - medium grained at 29.4ft BGS			3	100	100
32	- stylolite at 32.1ft BGS - open stylolite at 33.0ft BGS					
34	- stylolite at 34.0ft BGS - medium grained, high calcite content, gray at 35.0ft BGS					
36	- stylolite at 35.6ft BGS - horizontal fracture at 36.5ft BGS					
38	- stylolite at 38.4ft BGS - horizontal fracture at 39.2ft BGS					
40	- horizontal fracture at 40.4ft BGS - half-inch open stylolite at 40.9ft BGS - fine grained at 41.0ft BGS		← 4" DIA. HQ COREHOLE	4	100	99
42	- stylolite at 43.3ft BGS					
44	- horizontal fracture at 44.0ft BGS - stylolite at 45.0ft BGS					
46						
48	- horizontal fracture at 47.9ft BGS - stylolite at 48.0ft BGS - horizontal fracture at 48.8ft BGS					
50	- stylolite at 50.3ft BGS			5	100	100
52	- horizontal fracture at 51.3ft BGS - horizontal fracture at 51.8ft BGS					
	- horizontal fracture at 52.9ft BGS - brown in color at 53.0ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-52
DATE COMPLETED: August 28, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
	- stylolite at 54.0ft BGS - horizontal fracture at 54.7ft BGS	613.3				
	END OF BOREHOLE @ 55.0ft BGS					
56						
58						
60						
62						
64						
66						
68						
70						
72						
74						
76						
78						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-60
DATE COMPLETED: September 10, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	622.1 620.2					
0	CL-SILTY CLAY, with silt, firm, low plasticity, strong brown, moist		CEMENT / BENTONITE GROUT				
7.0	END OF OVERBURDEN HOLE @ 7.0ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: INVESTIGATORY BEDROCK COREHOLES
PROJECT NUMBER: 013968
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: BEDFORD, INDIANA

HOLE DESIGNATION: CH-60
DATE COMPLETED: September 10, 2012
DRILLING METHOD: HSA / HQ CORE
FIELD PERSONNEL: K. VANDER MEULEN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	COREHOLE	RUN NUMBER	CORE RECOVERY %	RQD %
		613.2	4" DIA. STEEL CASING			
8	LIMESTONE (SALEM FORMATION), fine grained, thin bedded, brown, high calcite content					
	- set 4-inch steel casing at 9.0ft BGS					
10						
	- stylolite at 11.1ft BGS					
12						
	- stylolite at 12.5ft BGS - light grey in color at 12.7ft BGS					
14	- stylolite at 13.9ft BGS - brown in color at 14.1ft BGS			1	100	100
16	- light grey in color at 16.2ft BGS					
18	- stylolite at 18.3ft BGS					
20	- 1 feet brown in color then back to grey at 20.0ft BGS					
22	- stylolite at 22.1ft BGS - half-inch open vug at 22.6ft BGS - open stylolite at 22.8ft BGS - open stylolite at 23.2ft BGS		4" DIA. HQ COREHOLE			
24	- open stylolite at 24.2ft BGS - 2-inch vuggy section at 24.6ft BGS - stylolite at 25.0ft BGS			2	100	100
26	- 1-inch vuggy section at 25.8ft BGS - stylolite at 26.0ft BGS					
28	- open stylolite at 28.6ft BGS					
30	- stylolite at 29.8ft BGS	590.2				
	END OF BOREHOLE @ 30.0ft BGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG ADDITIONAL INVESTIGATORY BEDROCK COREHOLES.GPJ CRA_CORP.GDT 8/5/15

Appendix B

Bedrock Geotechnical Sample Results

TABLE B.1

SUMMARY OF UNIAXIAL COMPRESSION TESTING
GM CET BEDFORD FACILITY
BEDFORD, INDIANA

Sample Area:		*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*
Sample Location:		*CH- 29*	*CH- 24*	*CH- 11*	*CH- 28*	*CH- 13A*	*CH- 9*	*CH- 15A*
Sample ID:		*RO-092205-KMV-1194*	*RO-092205-KMV-1195*	*RO-092205-KMV-1197*	*RO-092205-KMV-1200*	*RO-092205-KMV-1201*	*RO-092205-KMV-1205*	*RO-092205-KMV-1198*
Sample Date:		*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*
Sample Depth:		*32.0-32.8*	*12.5-13.3*	*9.3-10.3*	*23.0-23.8*	*15.7-16.5*	*15.5-16.3*	*23.1-23.9*
Parameters	***Units***							
Compressive Strength	MPa	48.8	90.1	108.0	71.9	98.0	45.8	67.8

TABLE B.1

SUMMARY OF UNIAXIAL COMPRESSION TESTING
GM CET BEDFORD FACILITY
BEDFORD, INDIANA

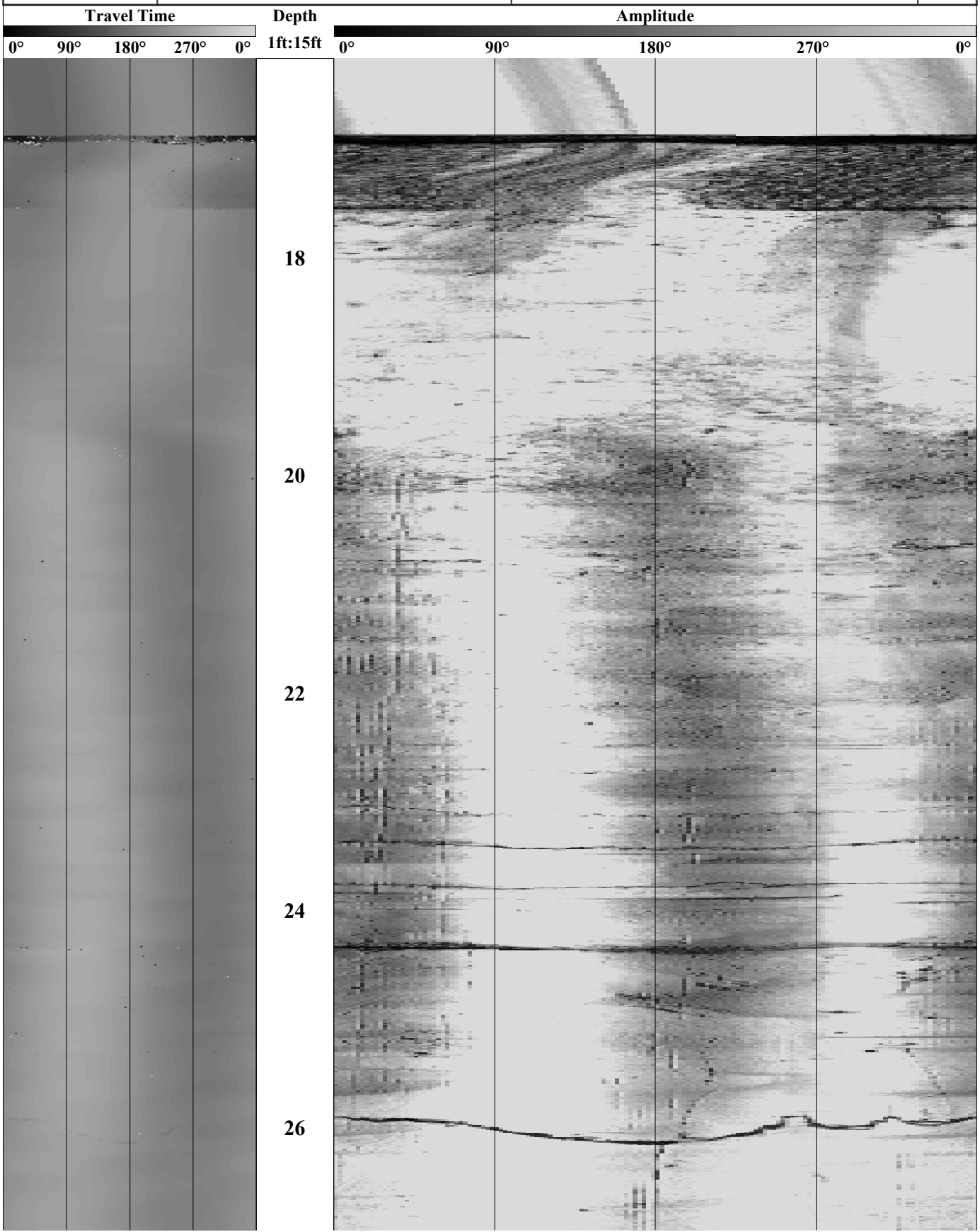
Sample Area:		*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*	*East Plant Area*
Sample Location:		*CH- 32*	*CH- 28*	*CH- 5*	*CH- 17A*	*CH- 3*	*CH- 1B*	*CH- 3A*
Sample ID:		*RO-092205-KMV-1199*	*RO-092205-KMV-1200*	*RO-092205-KMV-1203*	*RO-092205-KMV-1204*	*RO-092205-KMV-1206*	*RO-092205-KMV-1207*	*RO-092205-KMV-1208*
Sample Date:		*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*	*9/22/05*
Sample Depth:		*11.4-12.2*	*23.0-23.8*	*29.4-30.2*	*27.6-28.4*	*9.5-10.3*	*33.0-33.7*	*38.7-39.5*
Parameters	***Units***							
Compressive Strength	MPa	110.2	71.9	147.0	63.1	45.3	166.5	68.4

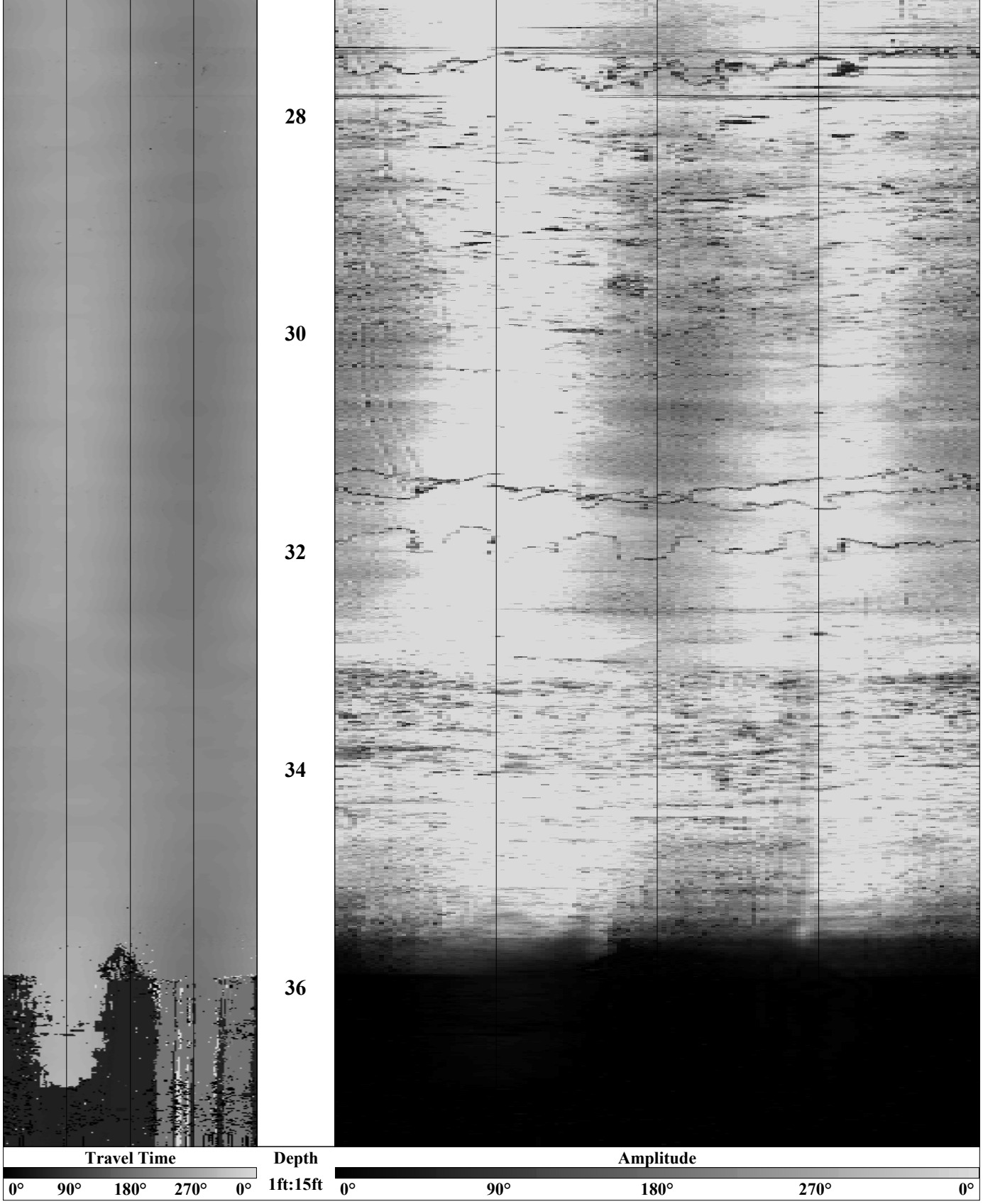
Appendix C

Downhole Geophysical Logging

	COMPANY: CRA	Casing
	Location: GM Powertrain	

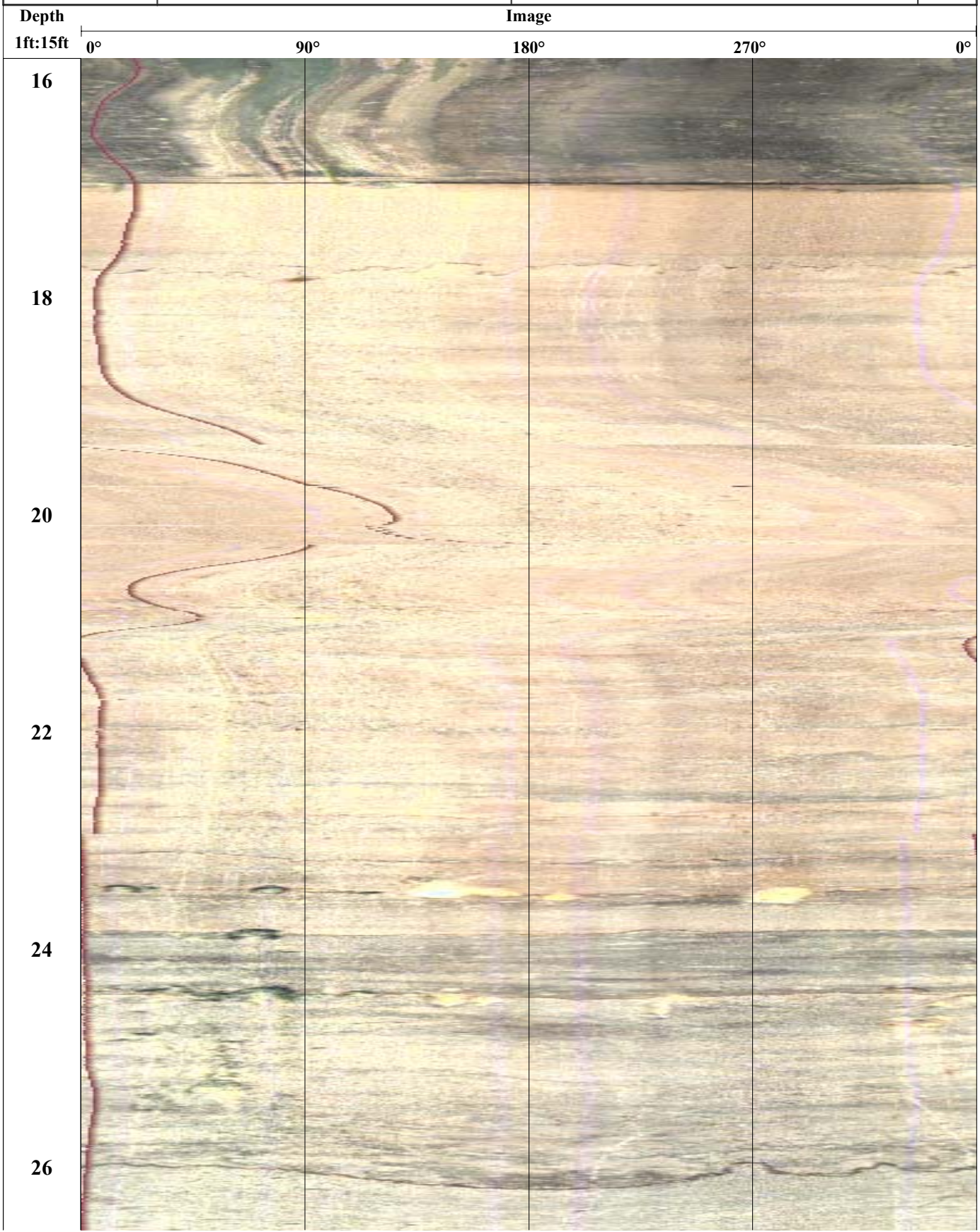
Well	CH-20			Depth Driller Depth Logger	
Date	Aug 5, 05	BH Fluid		Logged by:	
File Name				Witness:	

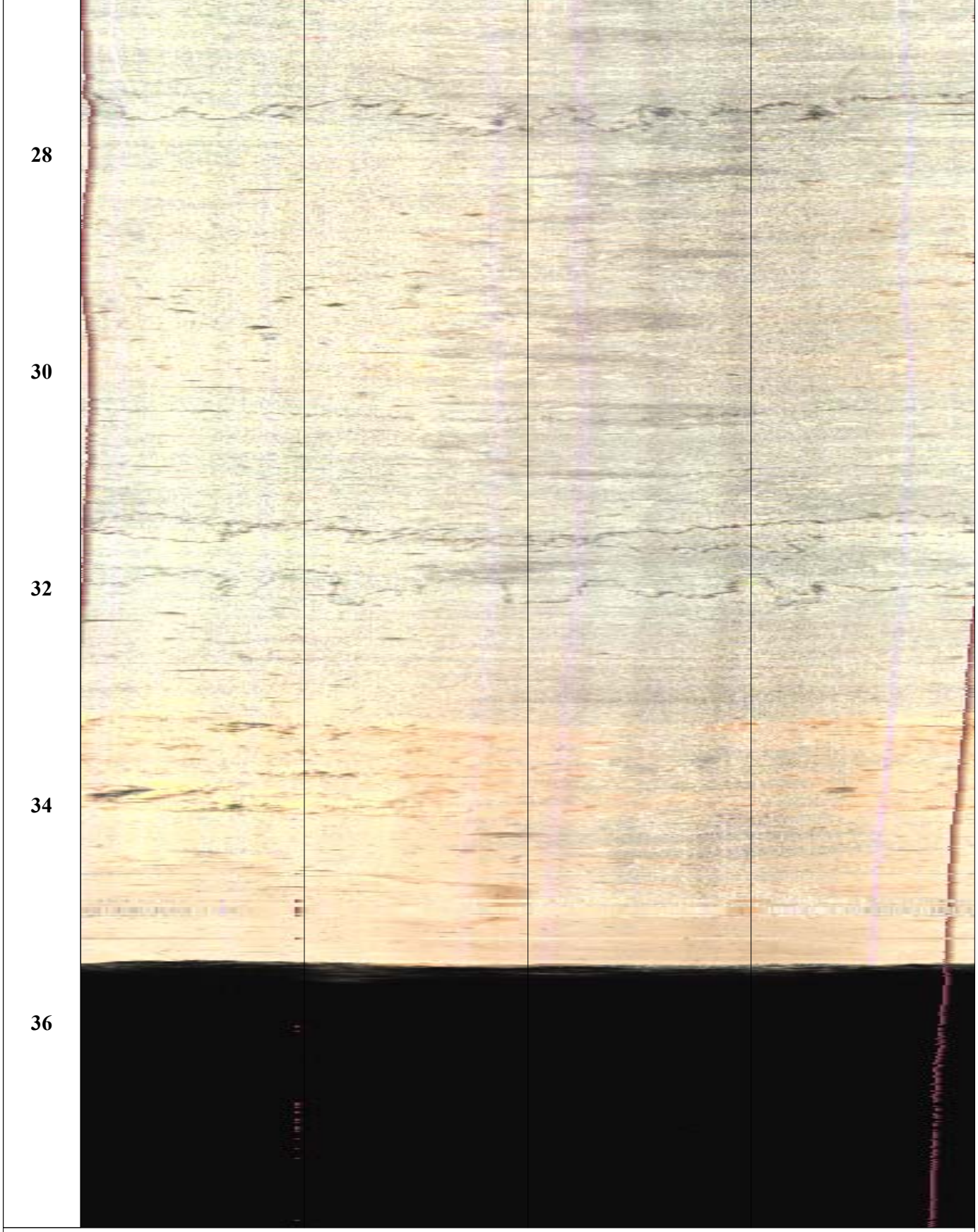



28
30
32
34
36
Travel Time
0° 90° 180° 270° 0°
Depth
1ft:15ft
Amplitude
0° 90° 180° 270° 0°

	COMPANY: CRA	Casing
	Location: GM Powertrain	

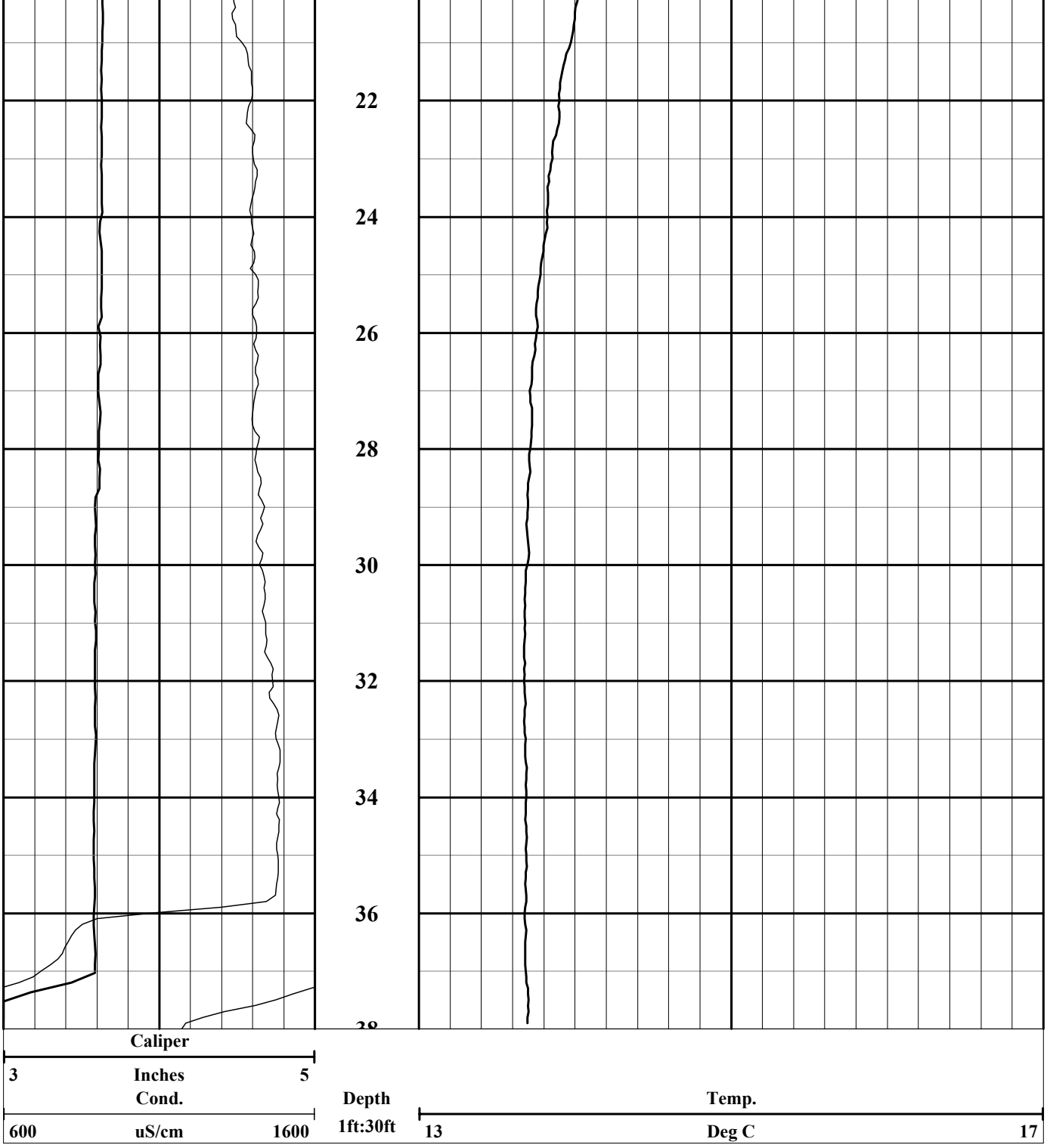
Well	CH-20			Depth Driller Depth Logger	
Date	Aug 5, 05	BH Fluid		Logged by:	
File Name				Witness:	



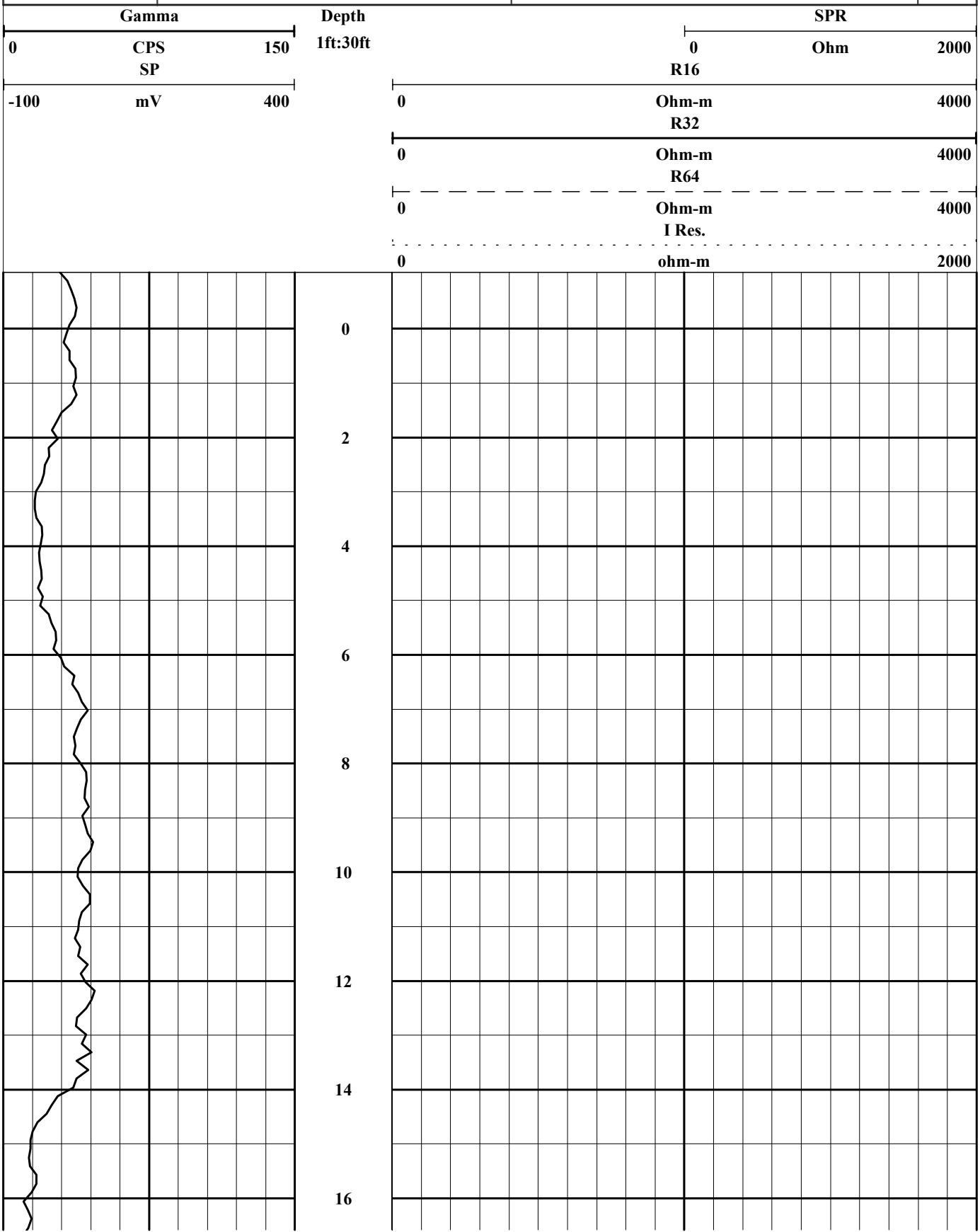


Depth	Image				
1ft:15ft	0°	90°	180°	270°	0°

	COMPANY: CRA	Casing
	Location: GM Powertrain	
Well: CH-20	Depth Driller / Depth Logger	
Date: Aug 5, 05 / BH Fluid	Logged by:	
File Name	Witness:	


22
24
26
28
30
32
34
36
Caliper
3
Inches
5
Cond.
600
uS/cm
1600
Depth
1ft:30ft
Temp.
13
Deg C
17

	COMPANY: CRA	Casing
	Location: GM Powertrain	
Well: CH-20	Depth Driller / Depth Logger	
Date: Aug 5, 05 / BH Fluid	Logged by:	
File Name	Witness:	



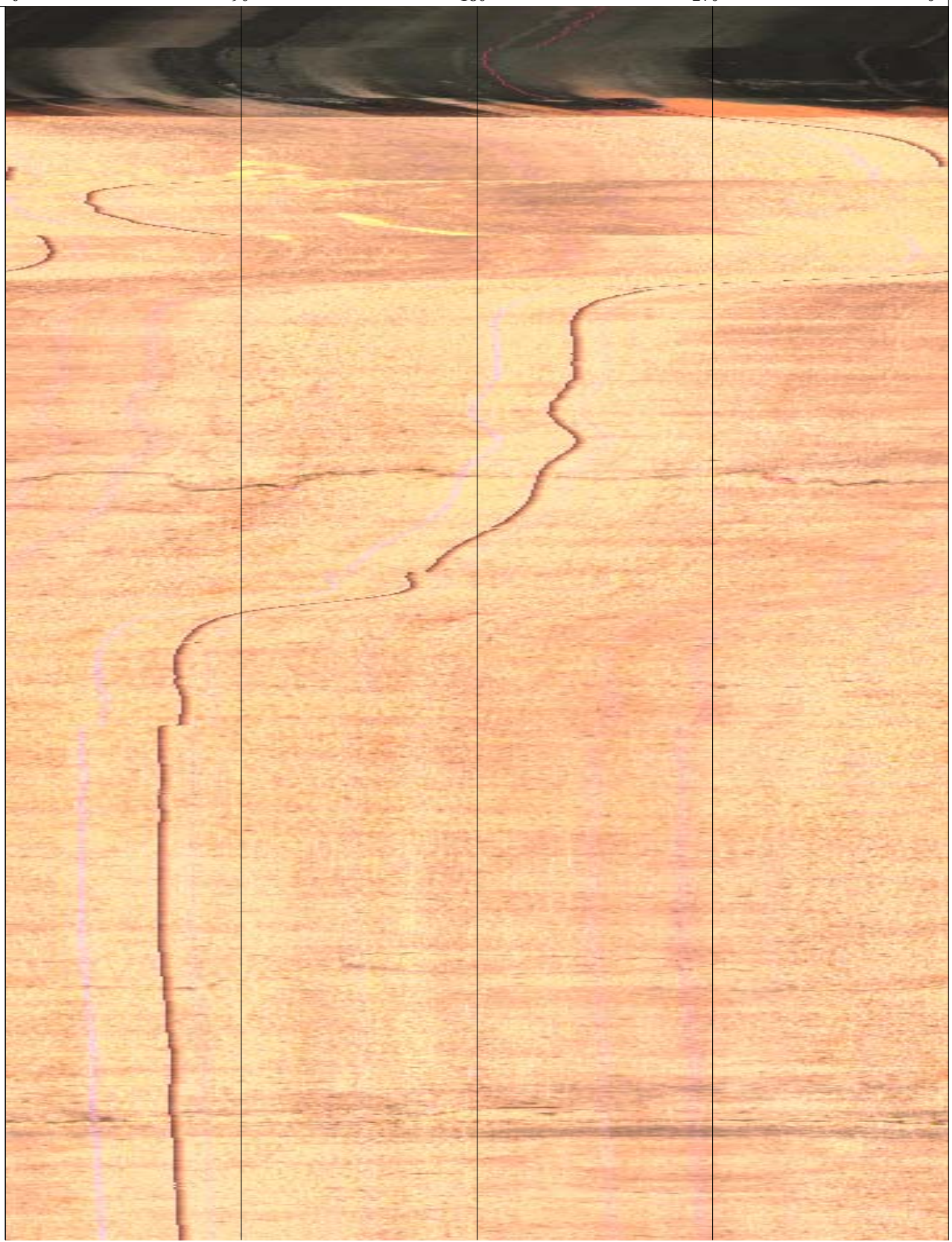

18
20
22
24
26
28
30
32
34
36
I Res.
0
ohm-m
2000
R64
0
Ohm-m
4000
R32
0
Ohm-m
4000
R16
0
Ohm-m
4000
SP
-100
mV
400
Gamma
0
CPS
150
Depth
1ft:30ft
SPR
0
Ohm
2000

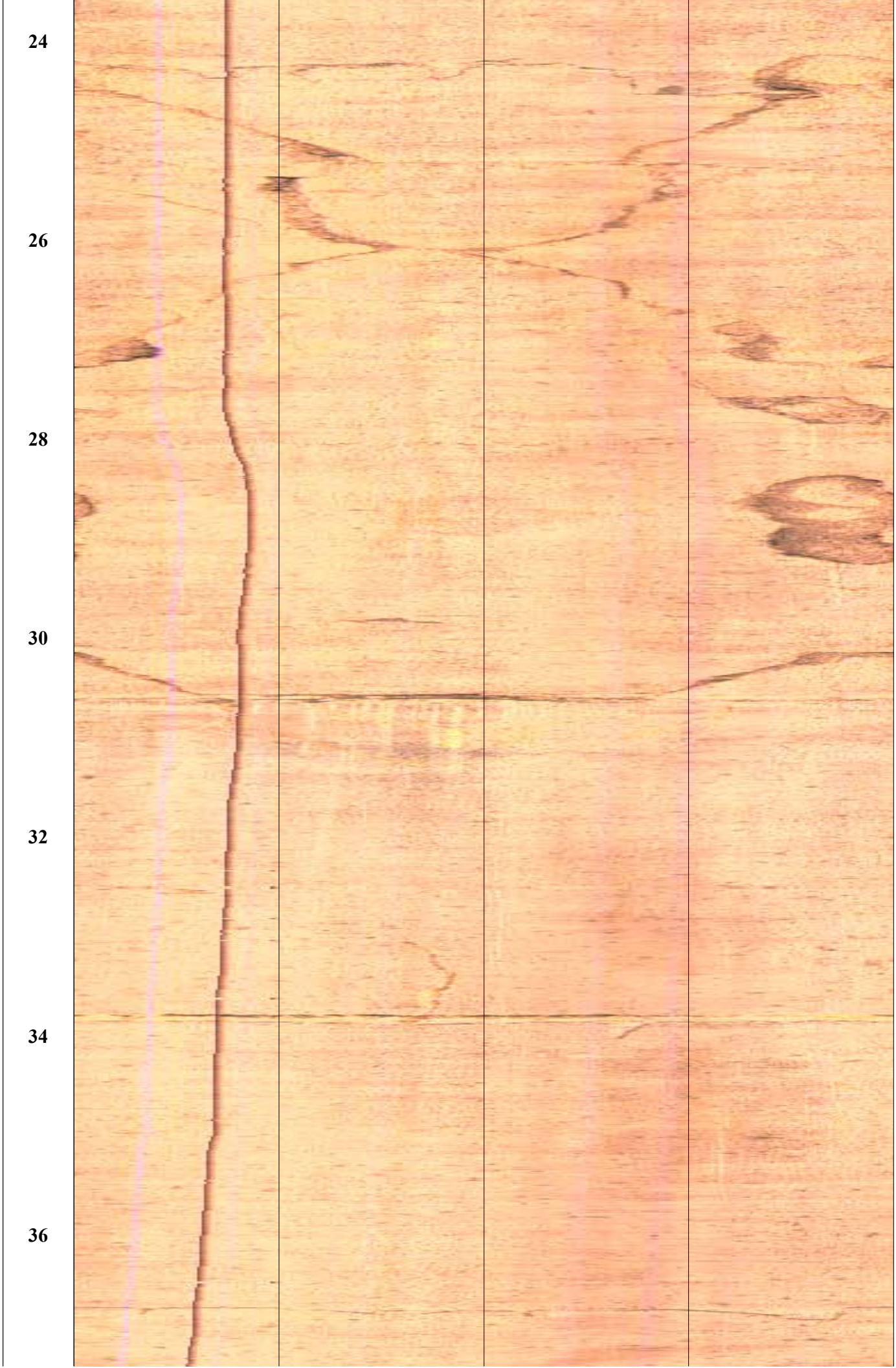
	COMPANY: CRA	Casing
	Location: GM Powertrain	

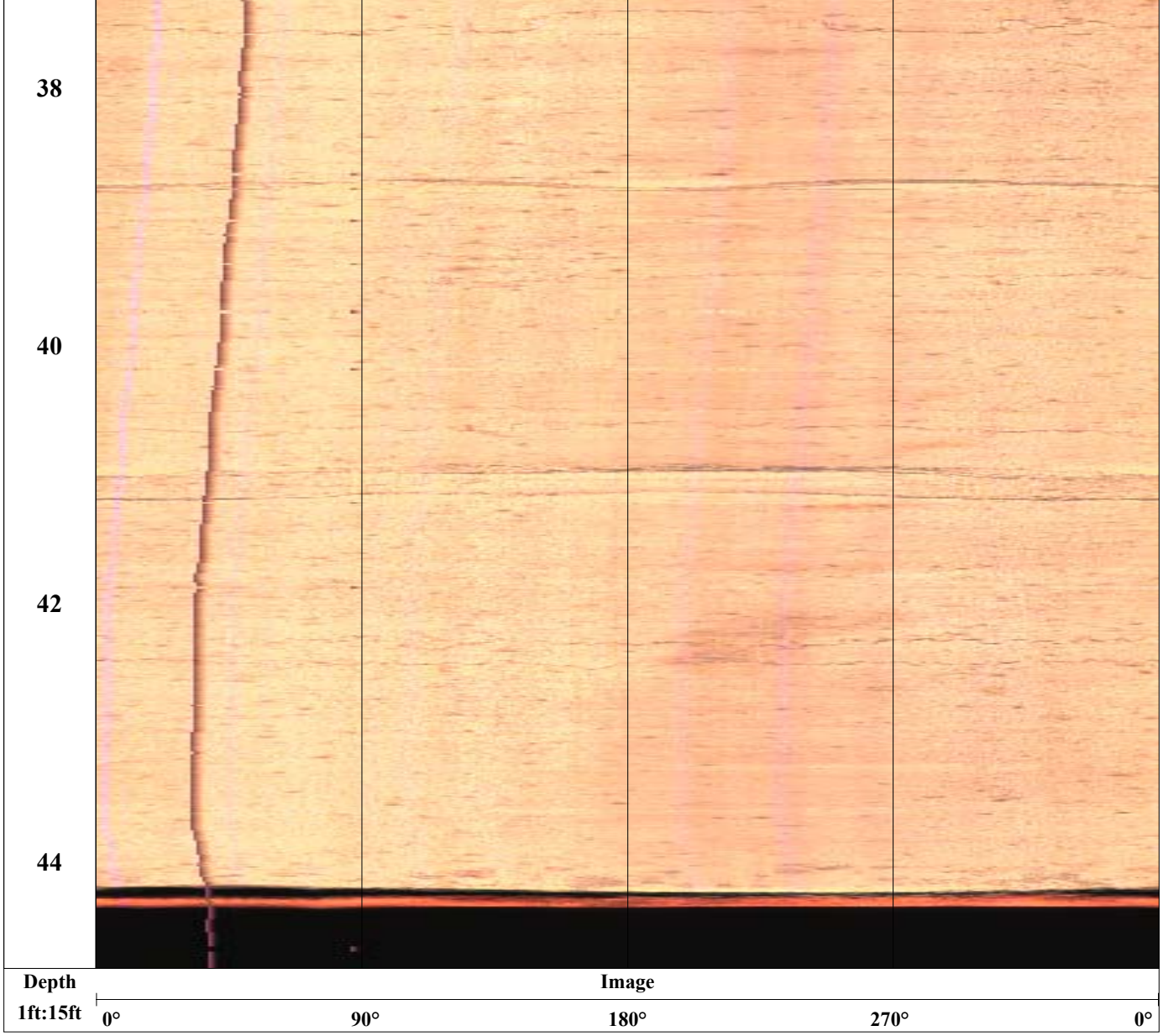
Well	CH-21			Depth Driller Depth Logger	
Date	Aug 8, 05	BH Fluid		Logged by:	
File Name				Witness:	

Depth
1ft:15ft

Image
0° 90° 180° 270° 0°

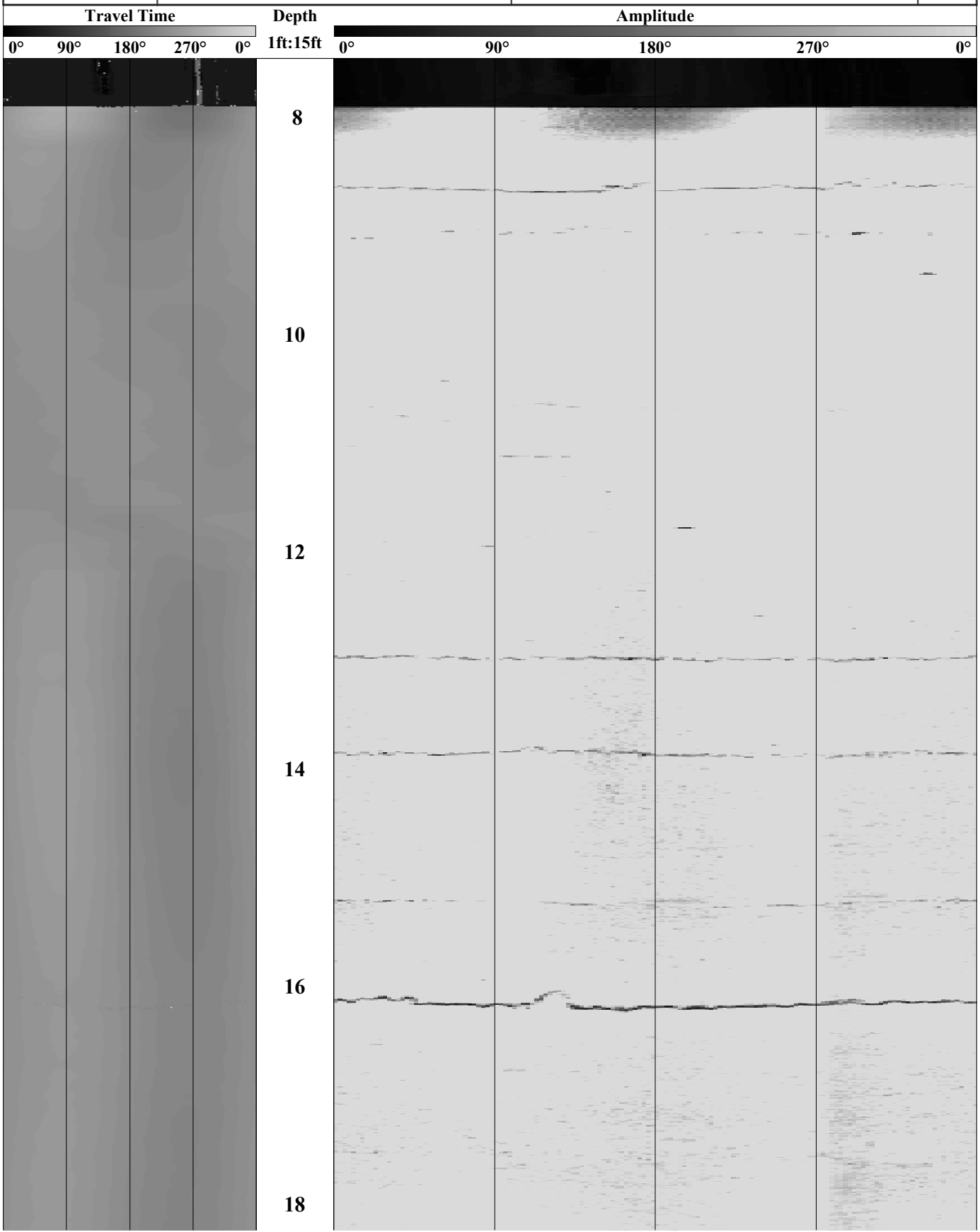


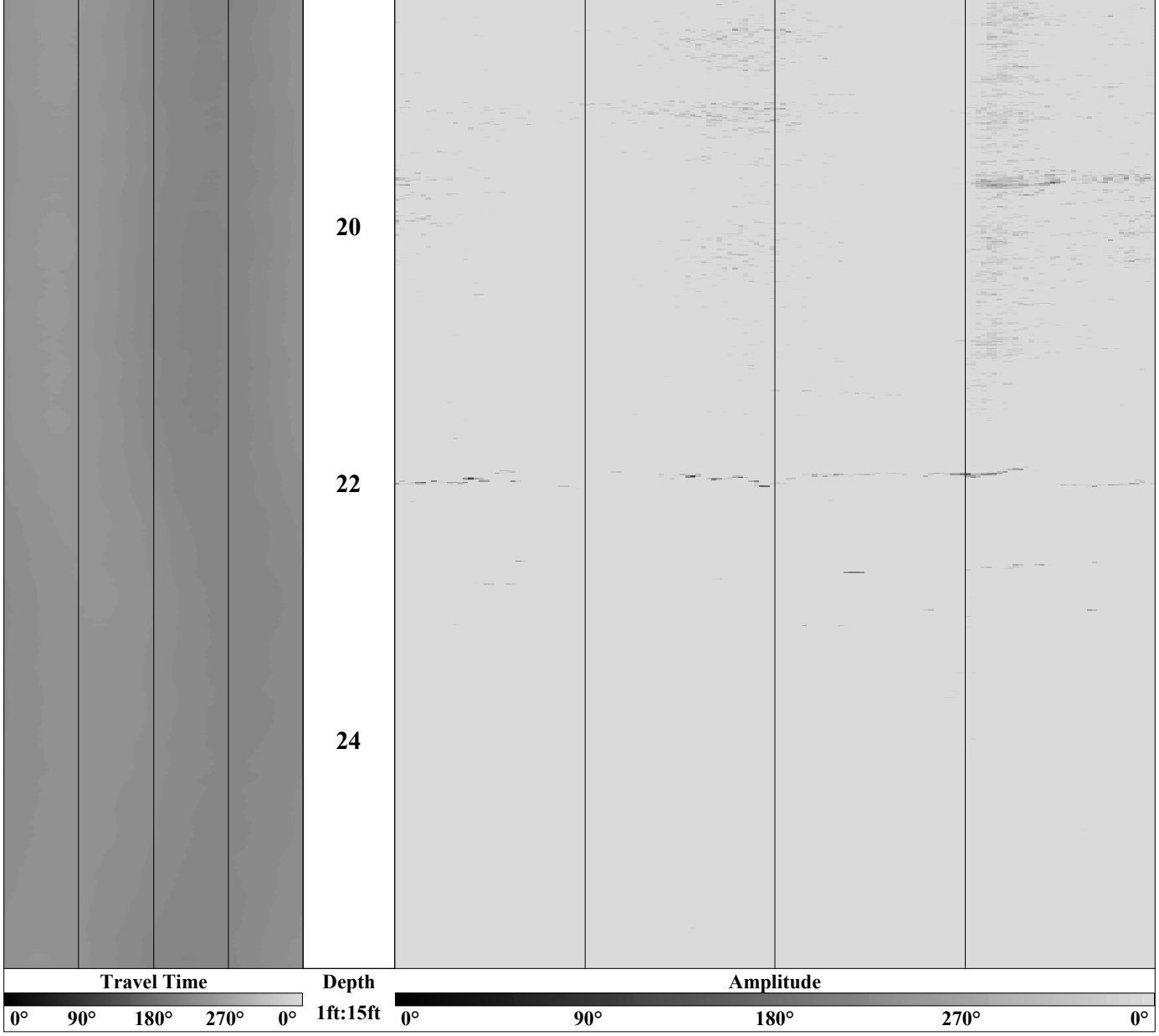

24
26
28
30
32
34
36


38
40
42
44
Depth
1ft:15ft
Image
0°
90°
180°
270°
0°

	COMPANY: CRA	Casing
	Location: GM Powertrain	

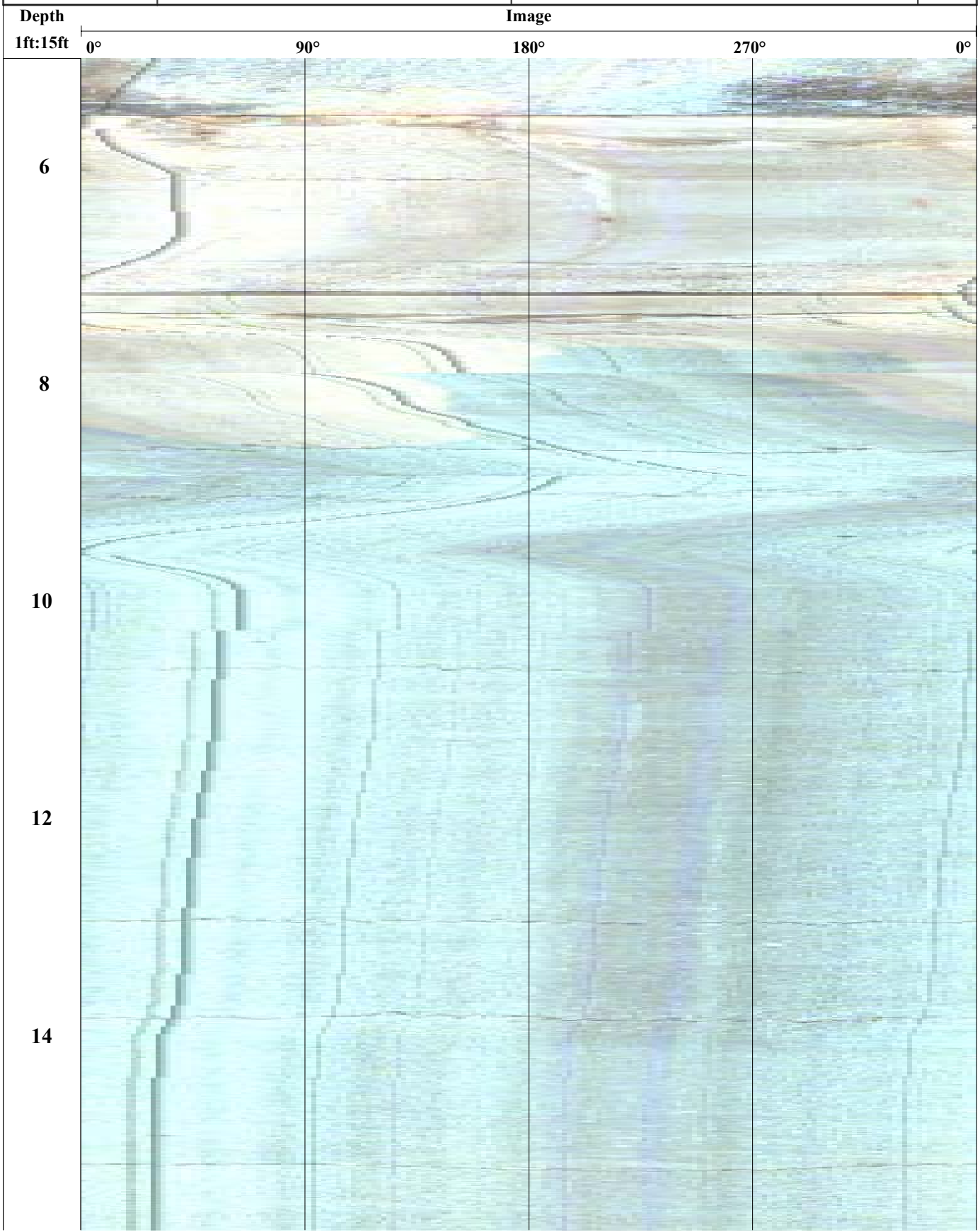
Well	CH-41			Depth Driller Depth Logger	
Date	Aug 4, 05	BH Fluid		Logged by:	
File Name				Witness:	

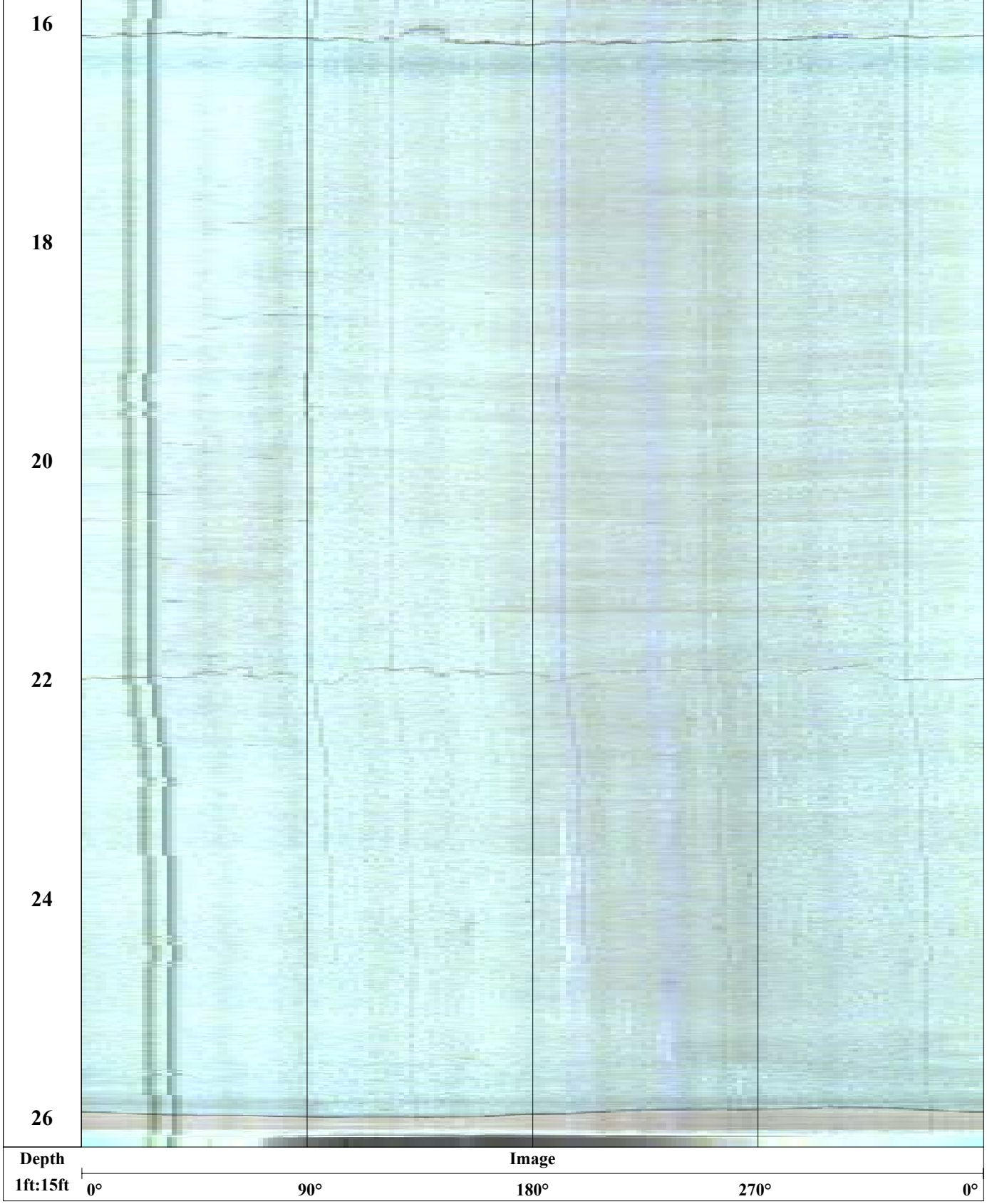



20
22
24
Travel Time
0° 90° 180° 270° 0°
Depth
1ft:15ft
Amplitude
0° 90° 180° 270° 0°

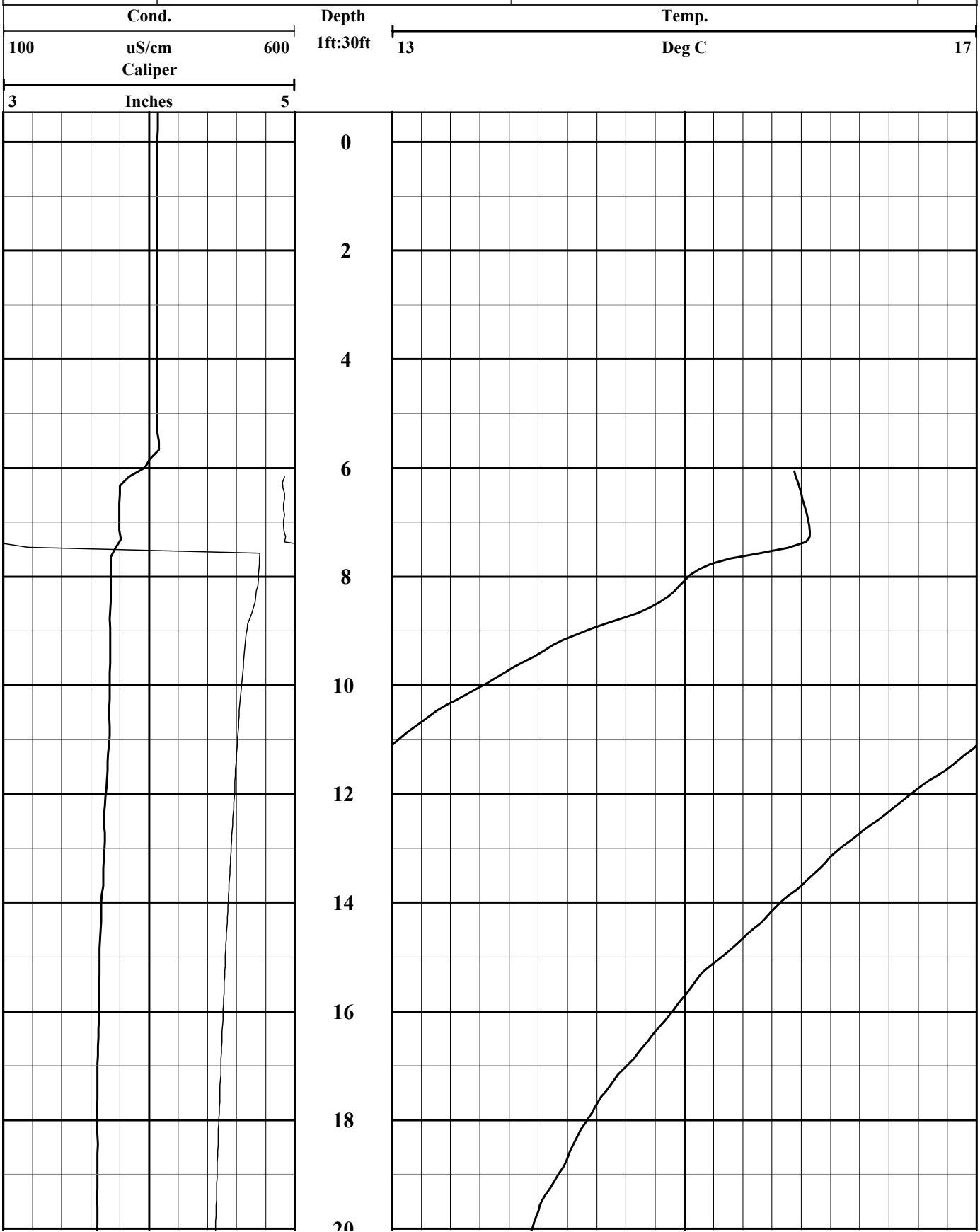
	COMPANY: CRA	Casing
	Location: GM Powertrain	

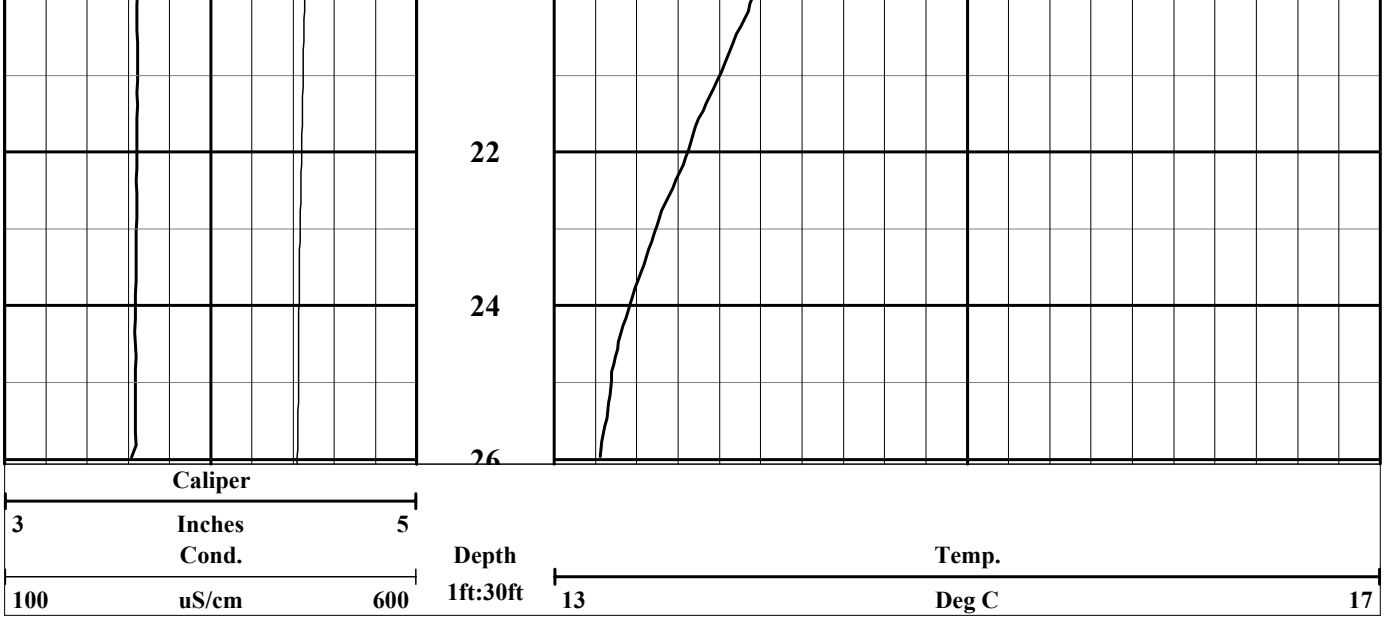
Well	C H-41			Depth Driller Depth Logger	
Date	Aug 4, 05	BH Fluid		Logged by:	
File Name				Witness:	




16
18
20
22
24
26
Depth
1ft:15ft
Image
0°
90°
180°
270°
0°

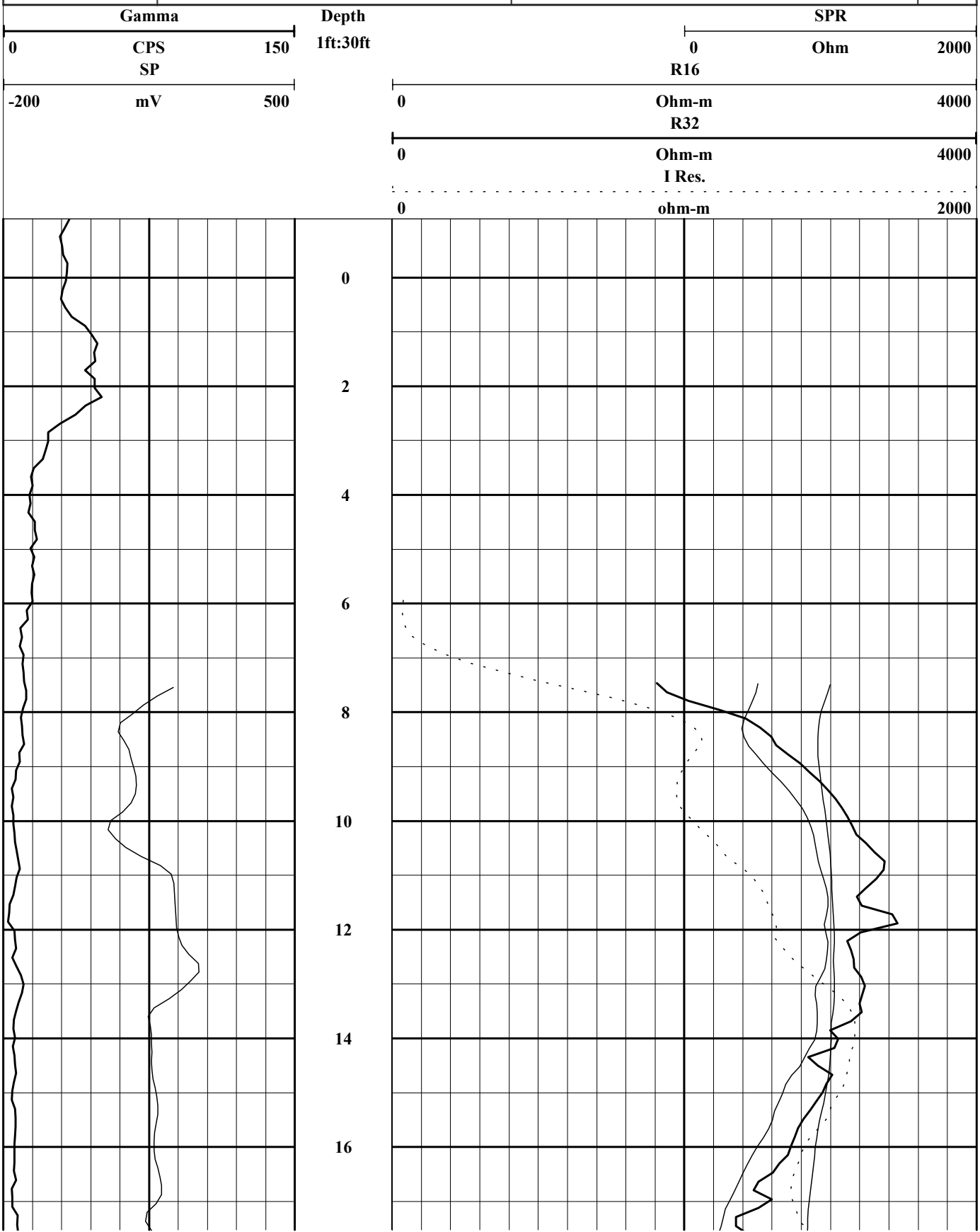
	COMPANY: CRA	Casing
	Location: GM Powertrain	
Well: CH-41	Depth Driller / Depth Logger	
Date: Aug 4, 05 / BH Fluid	Logged by:	
File Name	Witness:	

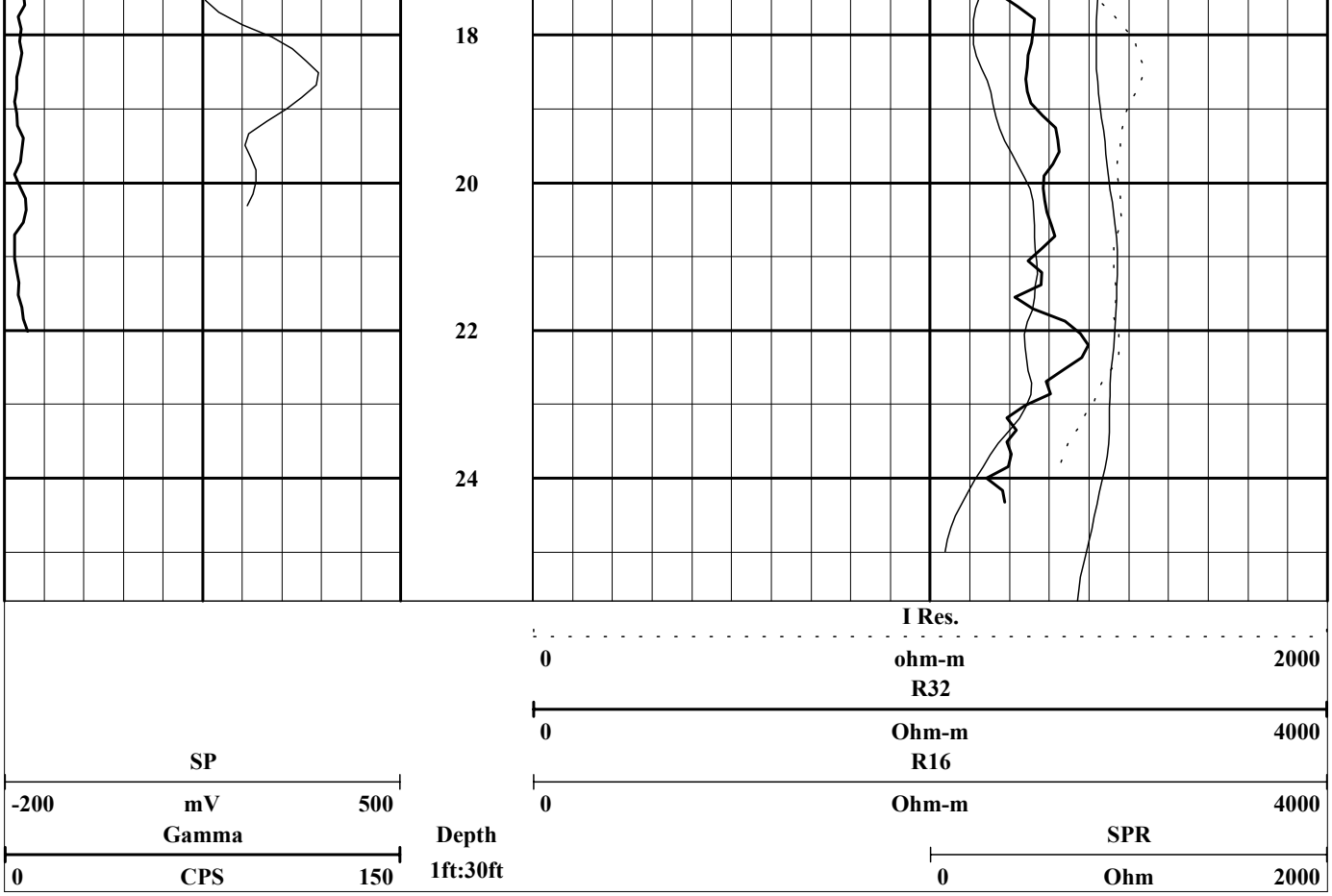




Caliper				
3	Inches	5		
Cond.			Depth	Temp.
100	uS/cm	600	1ft:30ft	13 Deg C 17

	COMPANY: CRA	Casing
	Location: GM Powertrain	
Well: CH-41	Depth Driller / Depth Logger	
Date: Aug 4, 05 — BH Fluid	Logged by:	
File Name	Witness:	




18
20
22
24
I Res.
0
ohm-m
2000
R32
0
Ohm-m
4000
SP
R16
-200
mV
500
0
Ohm-m
4000
Gamma
Depth
SPR
0
CPS
150
1ft:30ft
0
Ohm
2000

Geophysical Summary Plot

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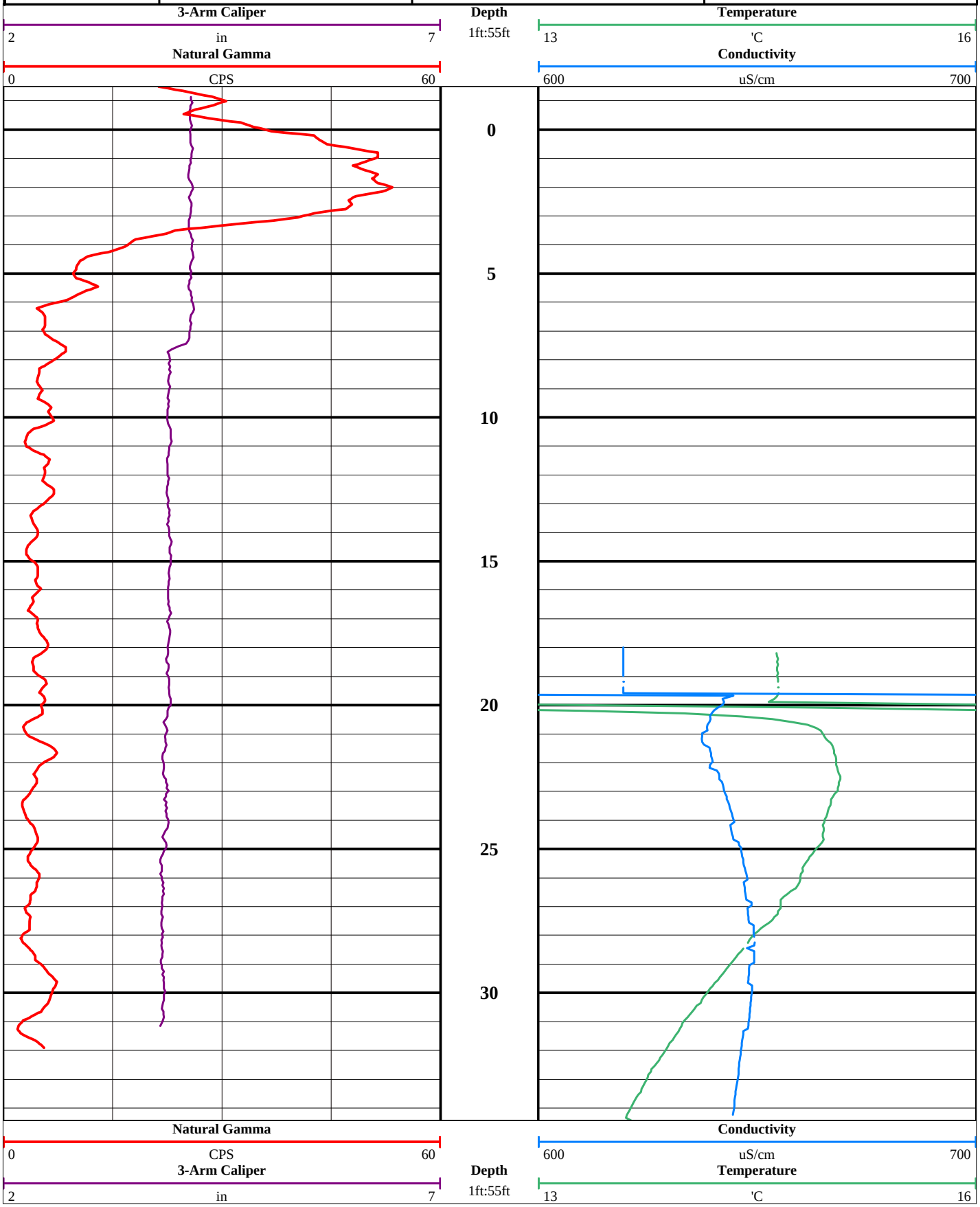
COMPANY: CRA | PROJECT: GM Powertrain

DATE LOGGED: 19 December 2012 | WELL: CH49



Geophysical Televiewer Plot

COMPANY: CRA	PROJECT: GM Powertrain
DATE LOGGED: 19 December 2012	WELL: CH49

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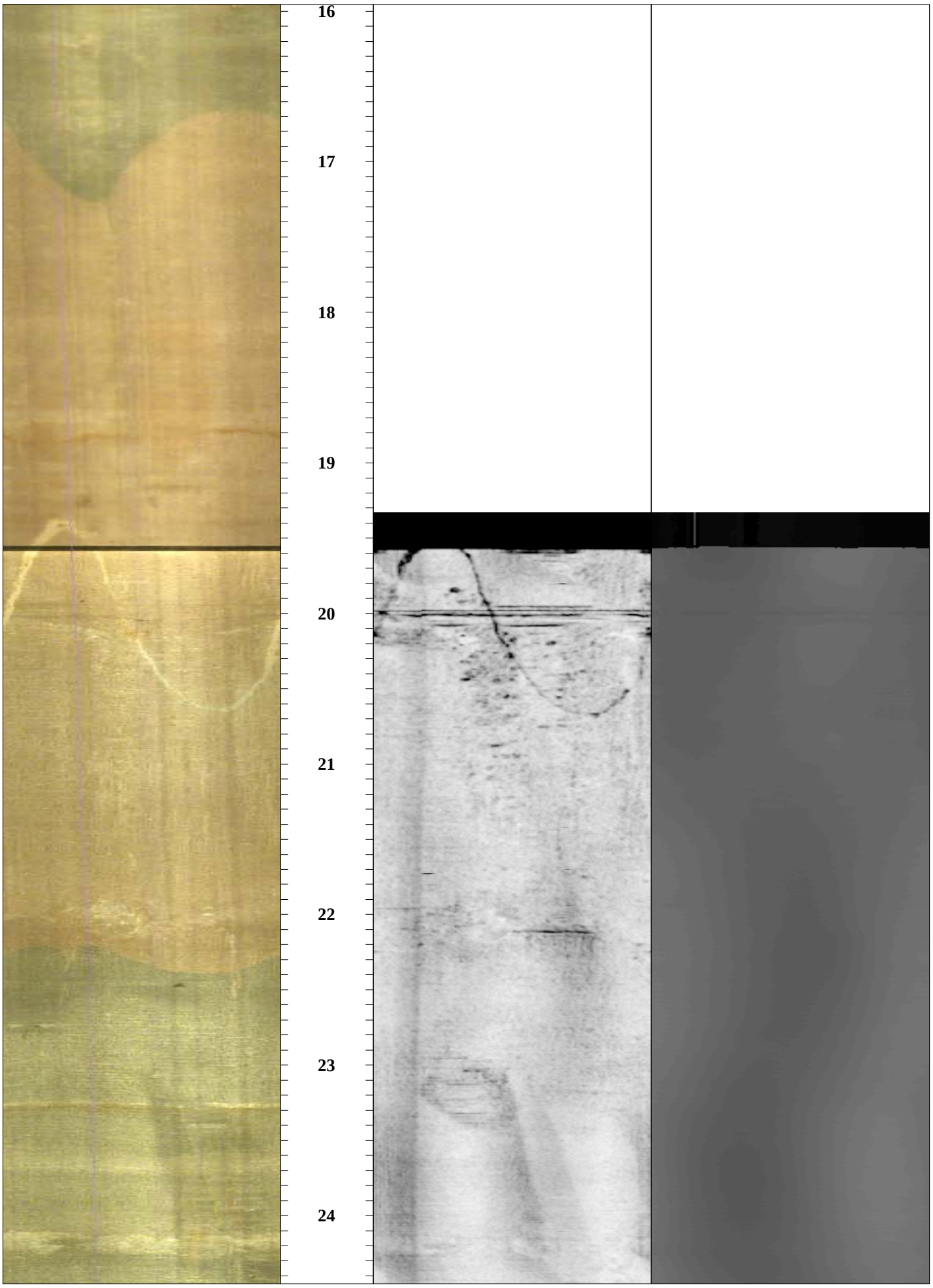
Optical Image - MN: 0° 90° 180° 270° 0°

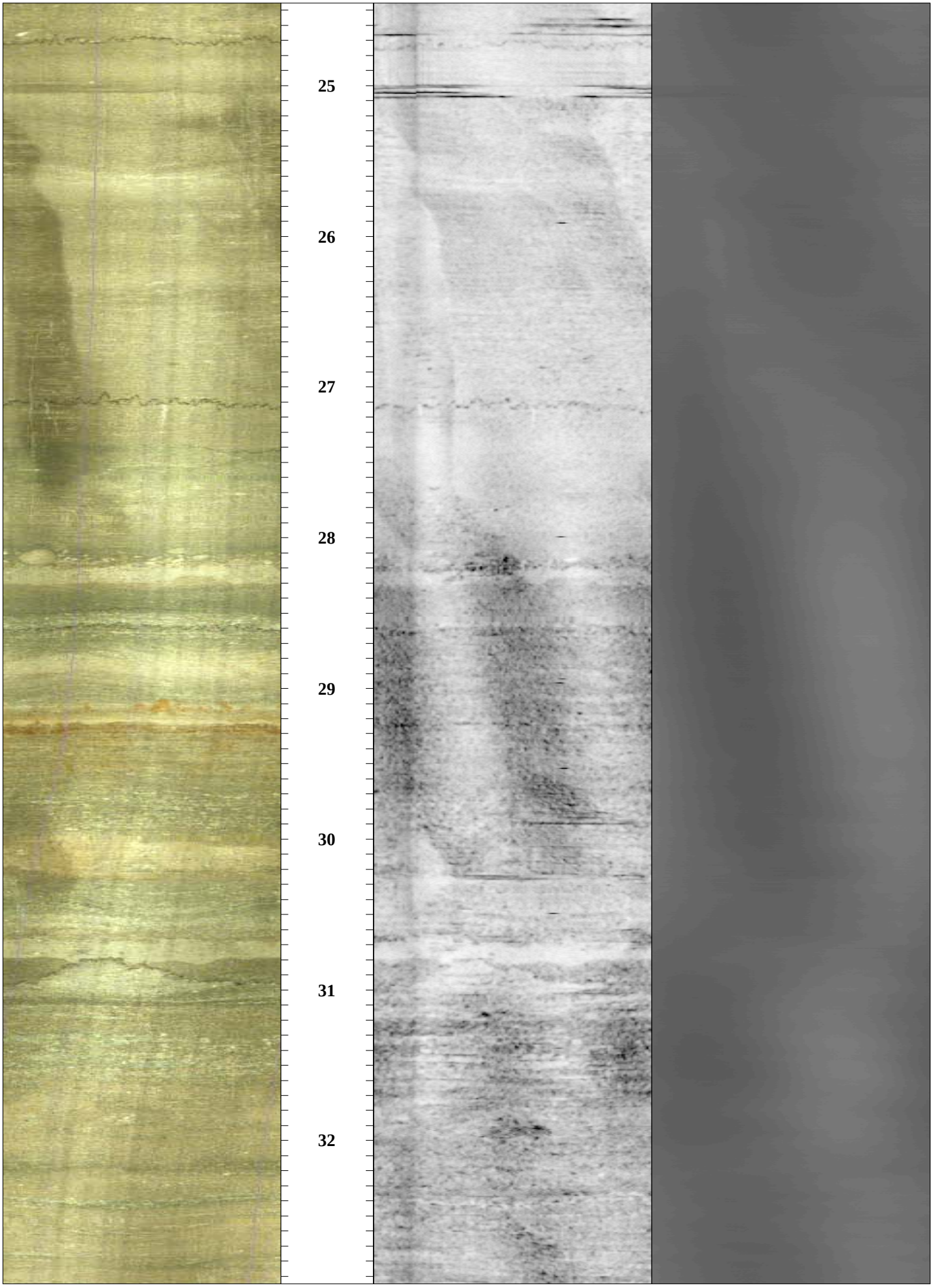
Depth: 1ft:10ft

Acoustic Amplitude - MN: 0° 90° 180° 270° 0°

Acoustic Travel Time - MN: 0° 90° 180° 270° 0°

0
1
2
3
4
5
6
7


16
17
18
19
20
21
22
23
24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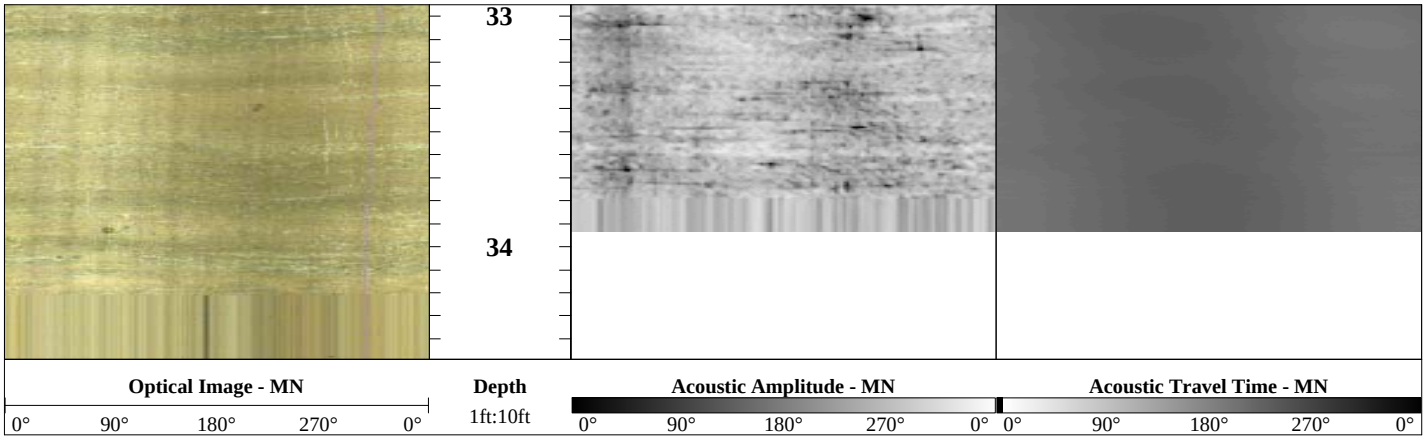
26
27
28
29
30
31
32


33
34
Optical Image - MN
0°
90°
180°
270°
0°
Depth
1ft:10ft
Acoustic Amplitude - MN
0°
90°
180°
270°
0°
Acoustic Travel Time - MN
0°
90°
180°
270°
0°

Geophysical Summary Plot

COMPANY: CRA	PROJECT: GM Powertrain
DATE LOGGED: 7 January 2013	WELL: CH50

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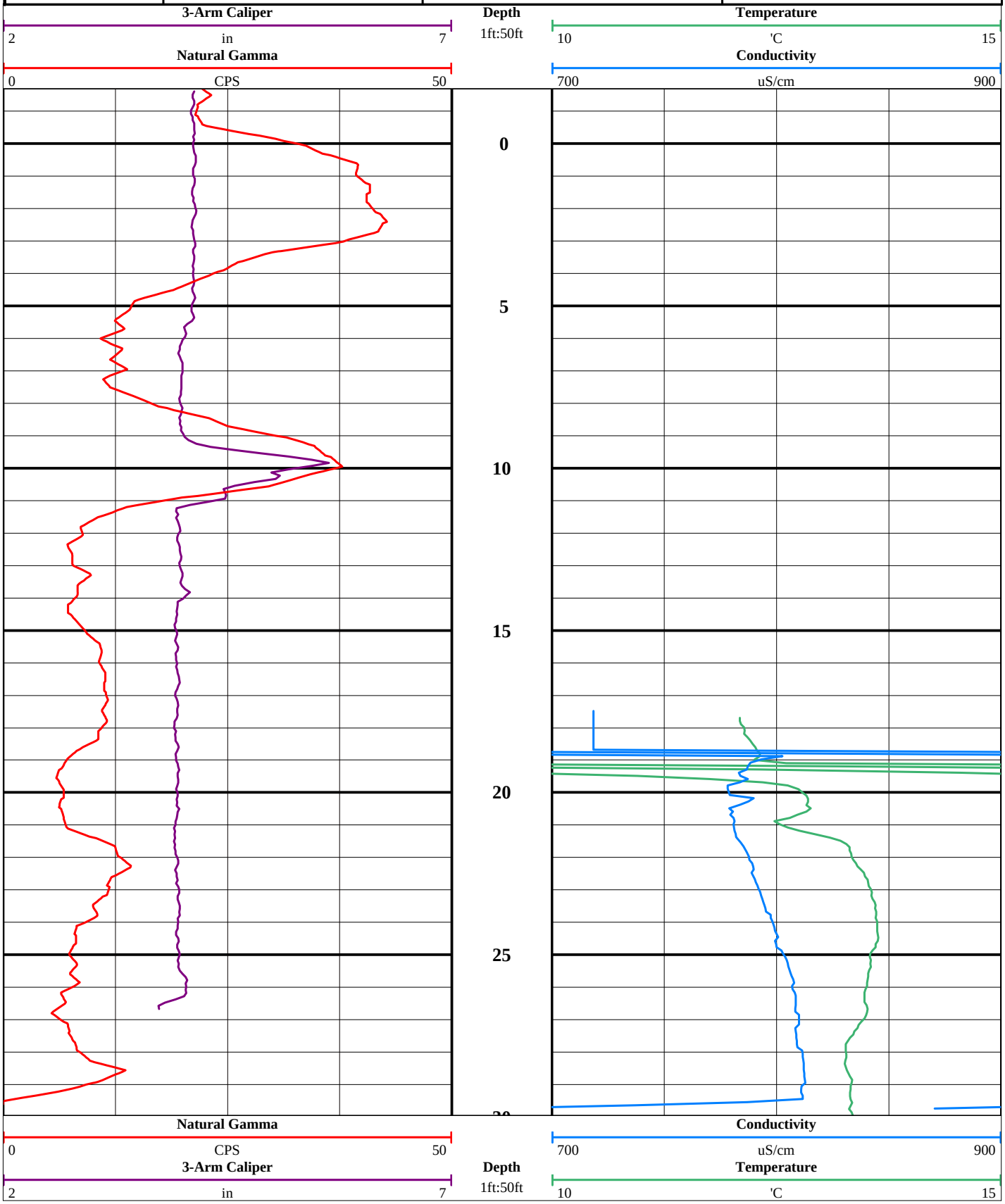

Geophysical Televiewer Plot

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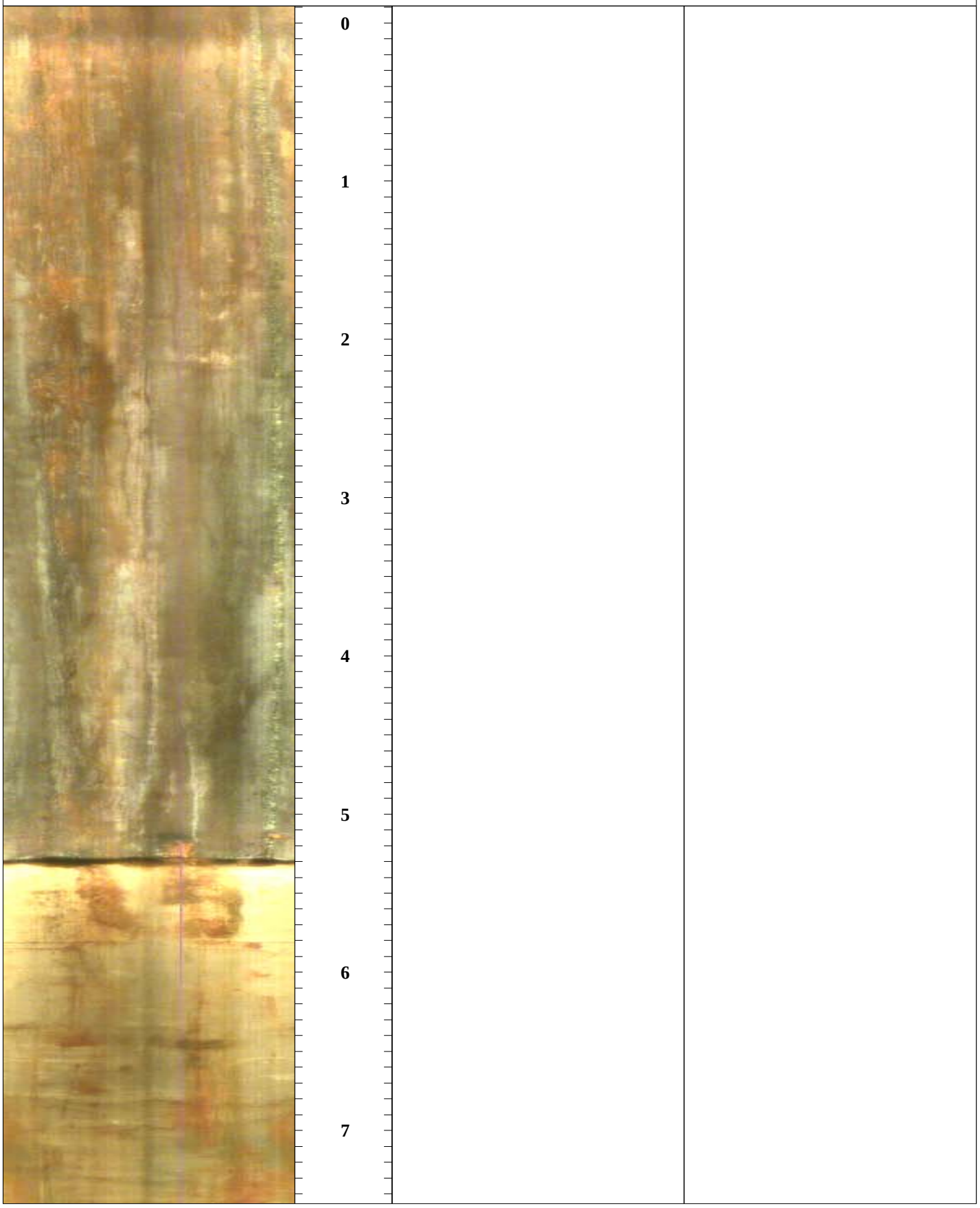
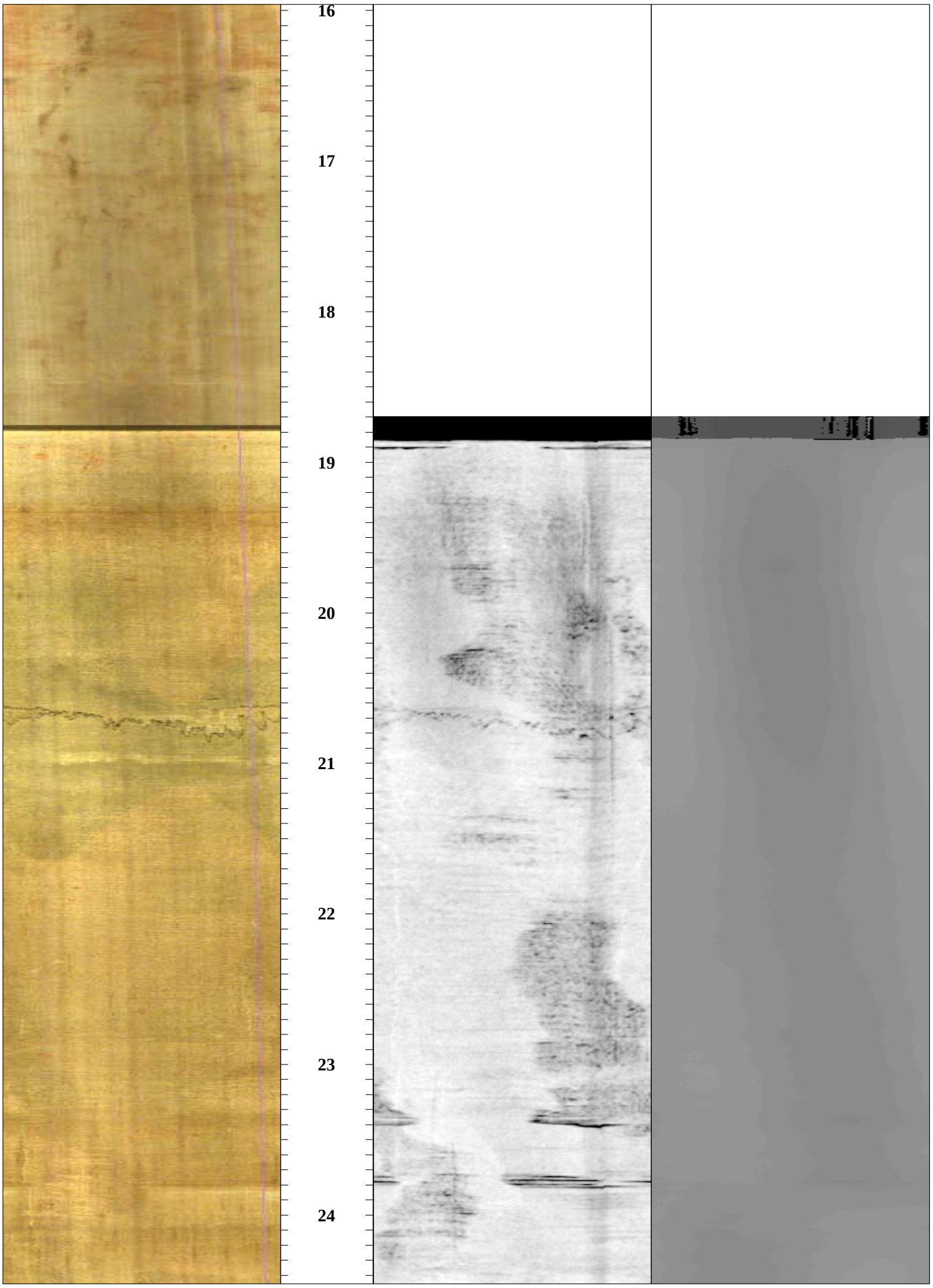
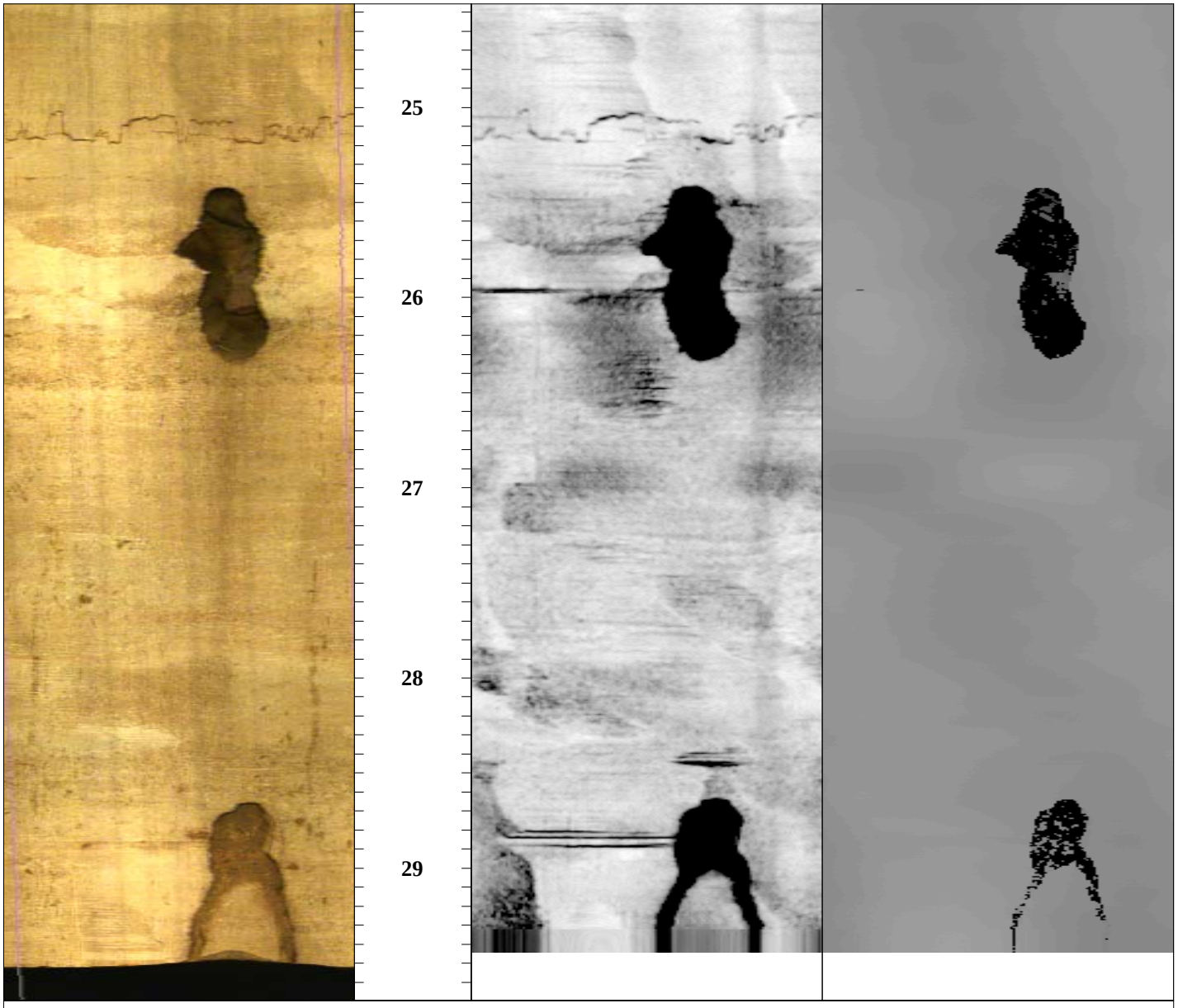
COMPANY: CRA | PROJECT: GM Powertrain

DATE LOGGED: 7 January 2013 | WELL: CH50




8
9
10
11
12
13
14
15


16
17
18
19
20
21
22
23
24



Optical Image - MN

0° 90° 180° 270° 0°

Depth

1ft:10ft

Acoustic Amplitude - MN

0° 90° 180° 270° 0°

Acoustic Travel Time - MN

0° 90° 180° 270° 0°

Geophysical Summary Plot

COMPANY: CRA	PROJECT: GM Powertrain
DATE LOGGED: 19 December 2012	WELL: CH51

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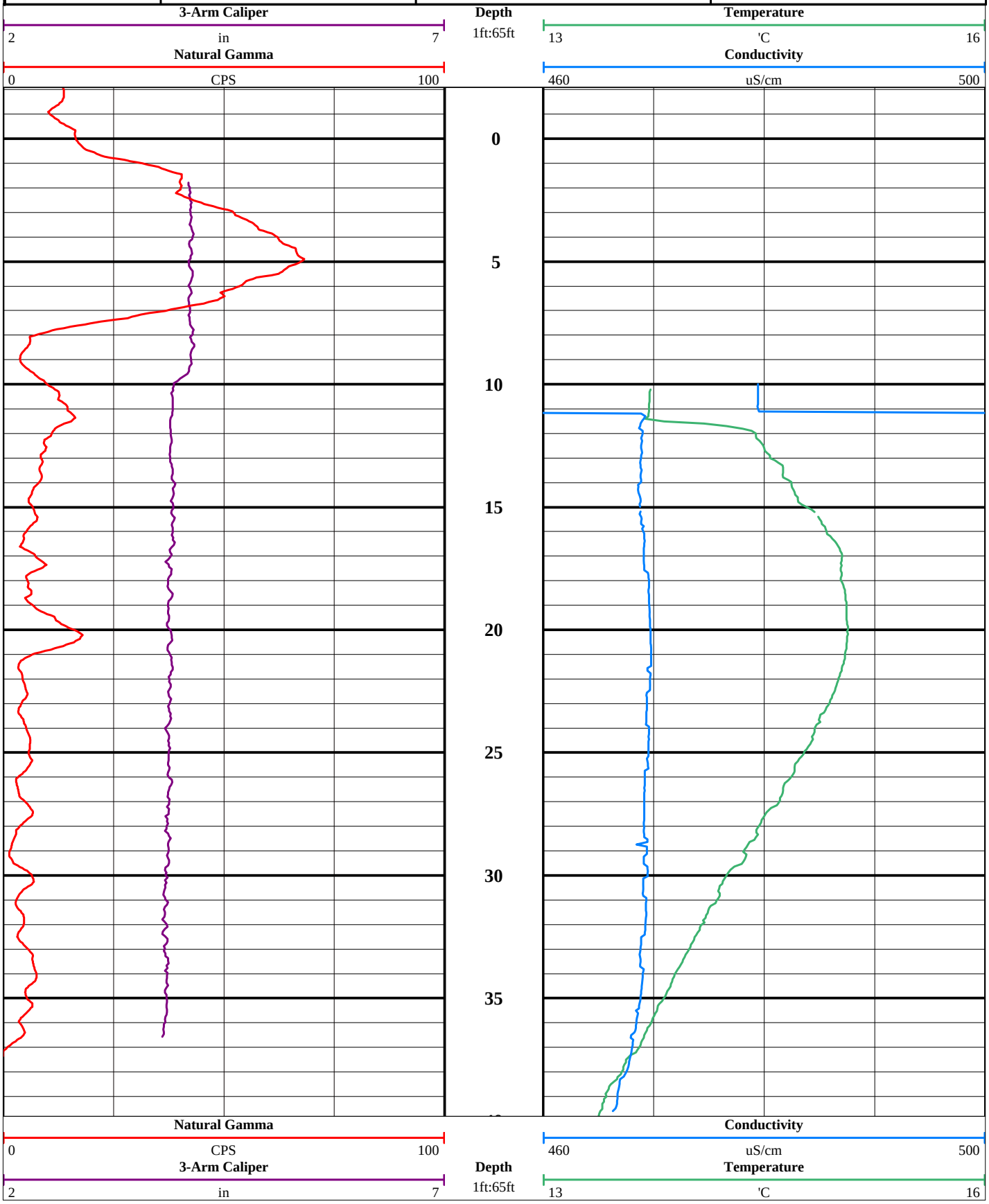
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



Geophysical Televiewer Plot

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Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

COMPANY: CRA | PROJECT: GM Powertrain

DATE LOGGED: 19 December 2012 | WELL: CH51

Optical Image - MN	Depth	Acoustic Amplitude - MN	Acoustic Travel Time - MN
0° 90° 180° 270° 0°	1ft:10ft	0° 90° 180° 270° 0°	0° 90° 180° 270° 0°

0

1

2

3

4

5

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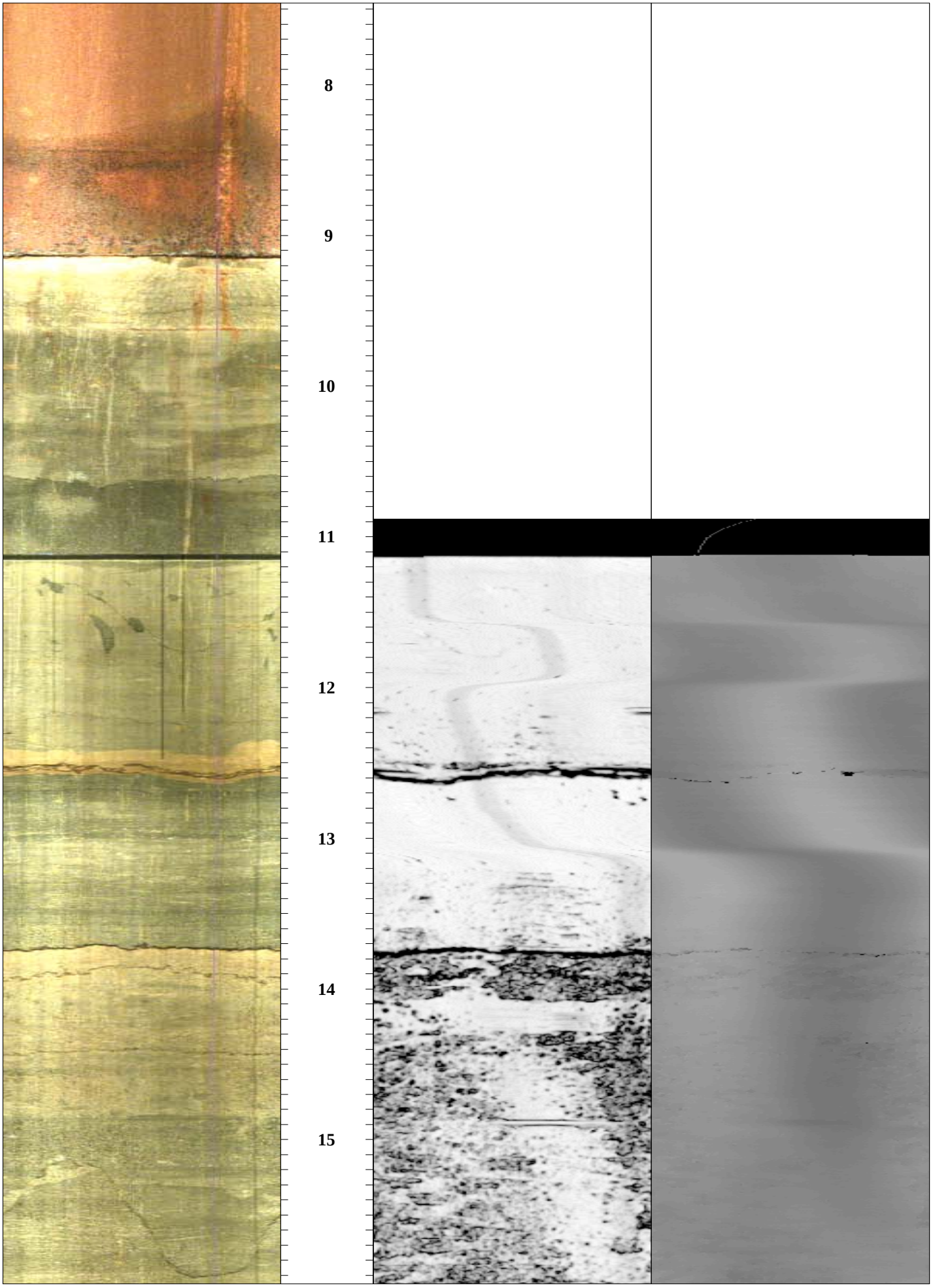
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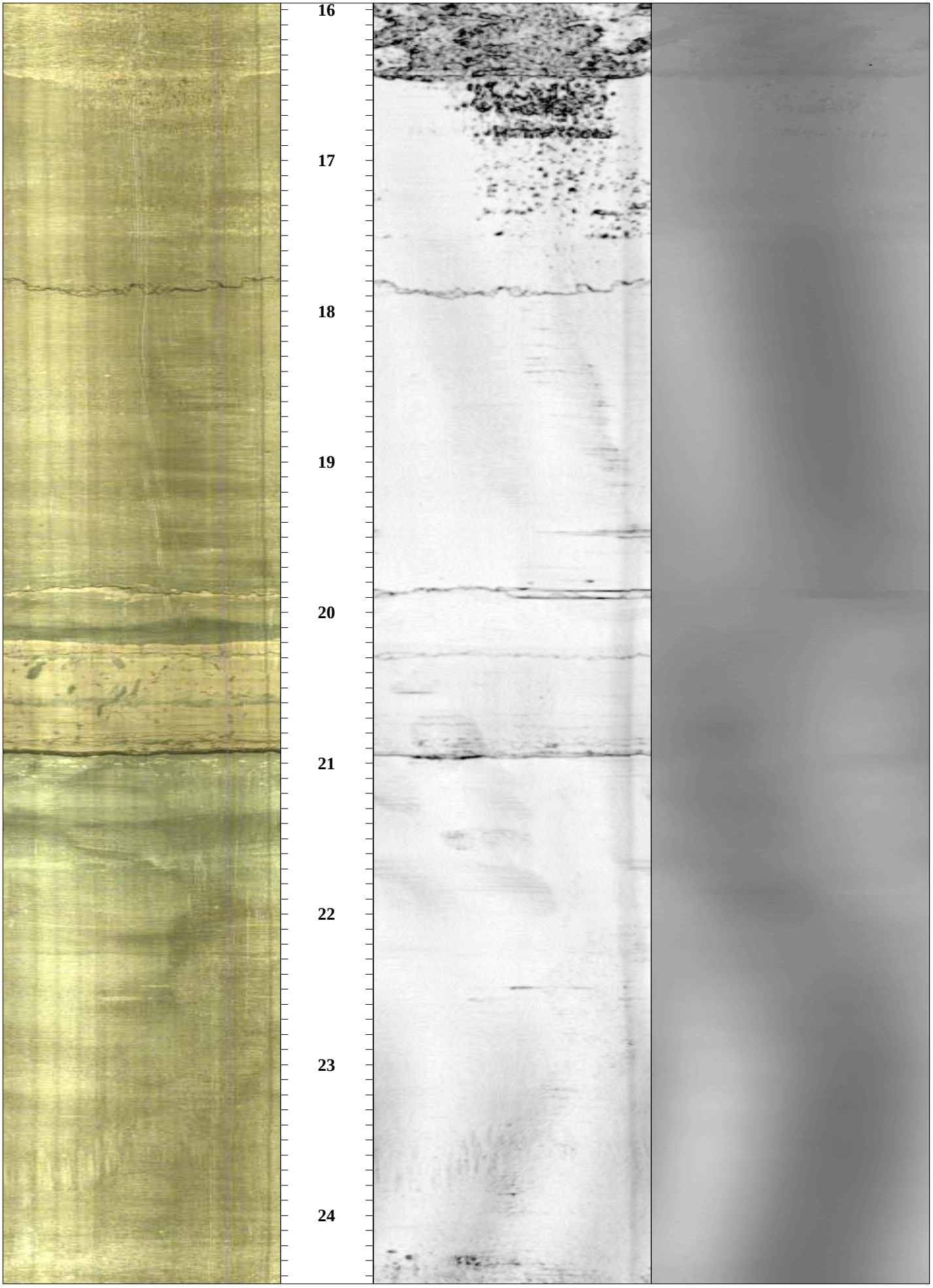
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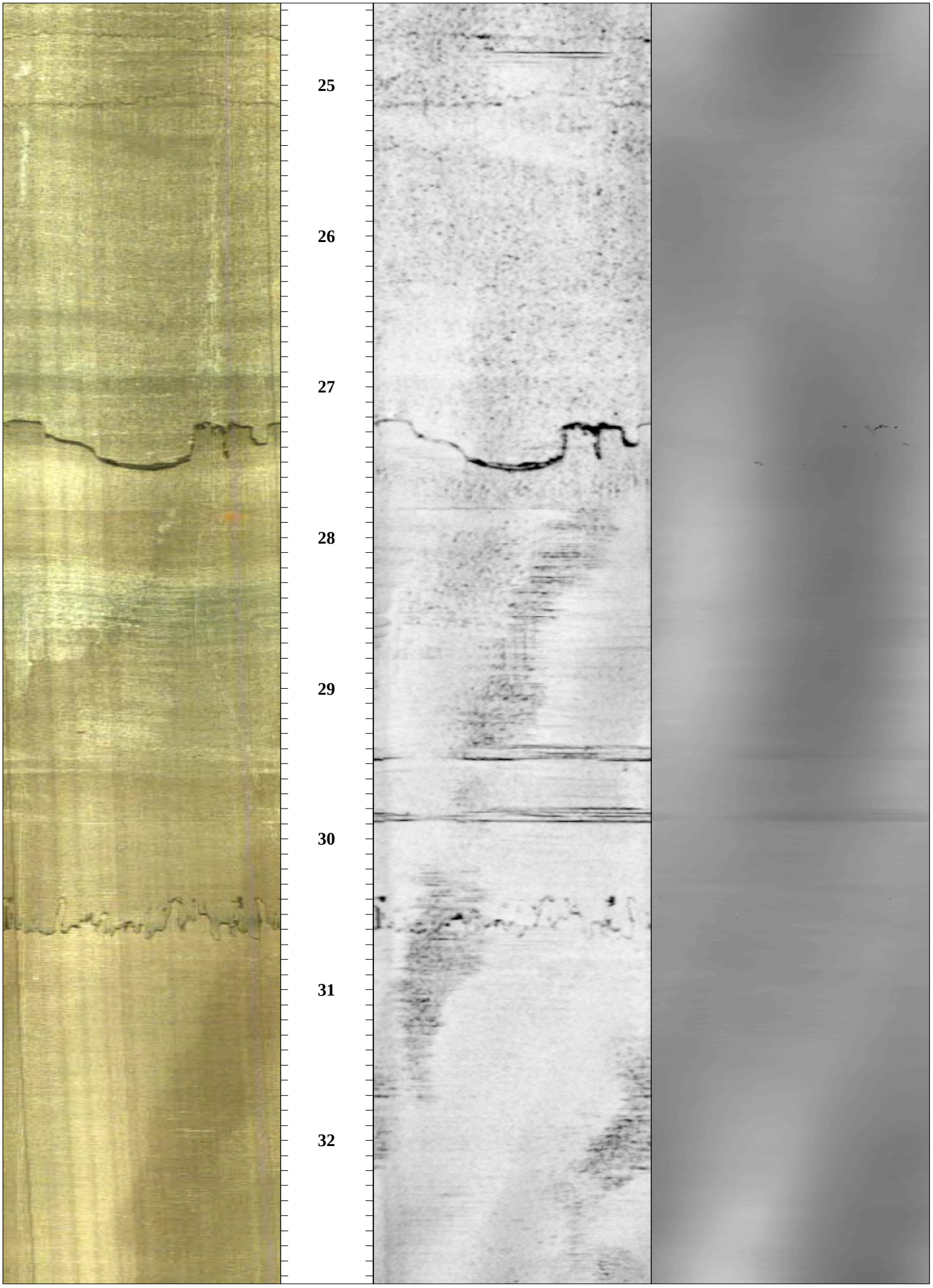
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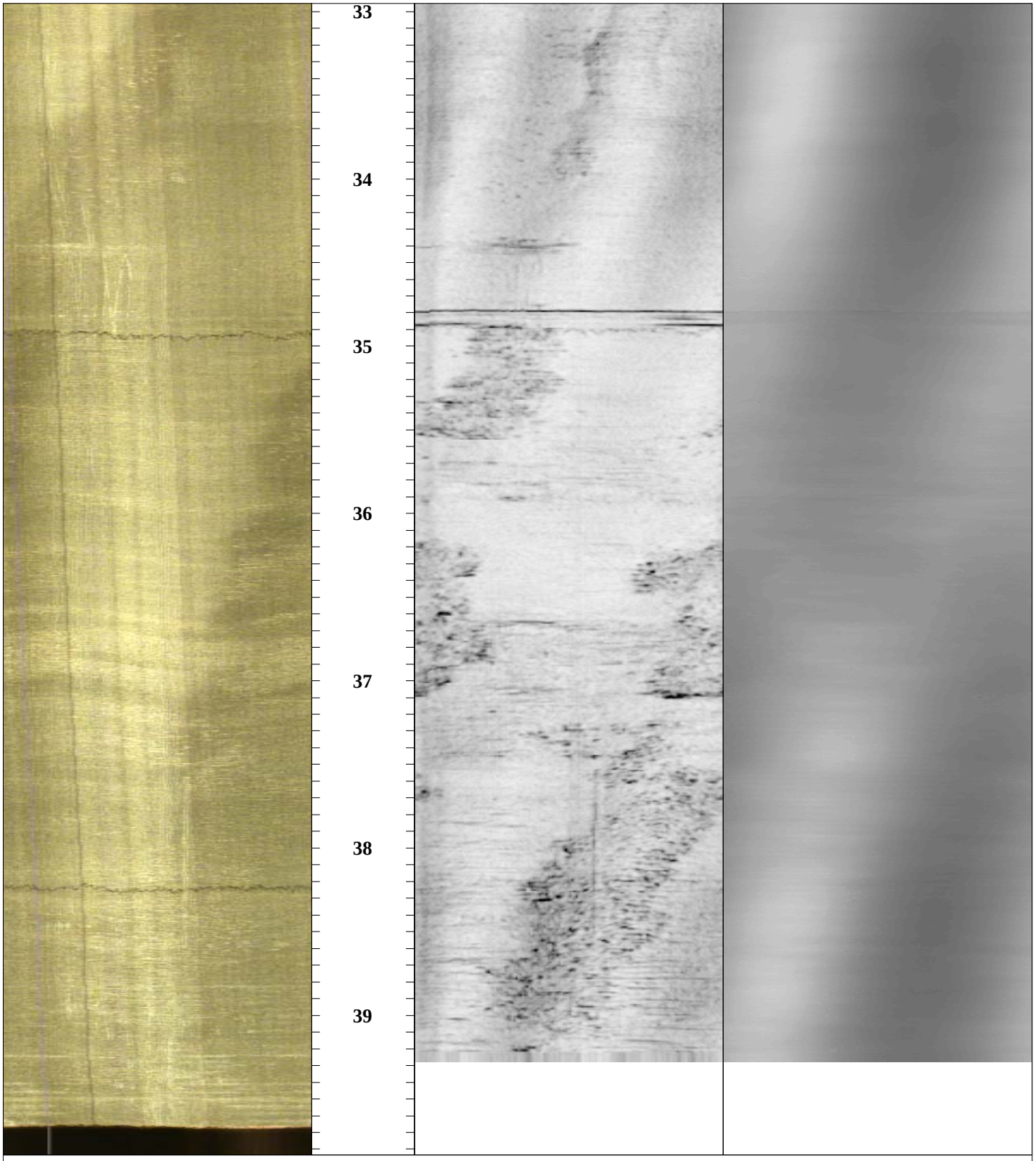

Optical Image - MN

0° 90° 180° 270° 0°

Depth

1ft:10ft

Acoustic Amplitude - MN

0° 90° 180° 270° 0°

Acoustic Travel Time - MN

0° 90° 180° 270° 0°

Geophysical Summary Plot

COMPANY: CRA | PROJECT: GM Powertrain

DATE LOGGED: 20 December 2012 | WELL: CH52

COLOG Main Office
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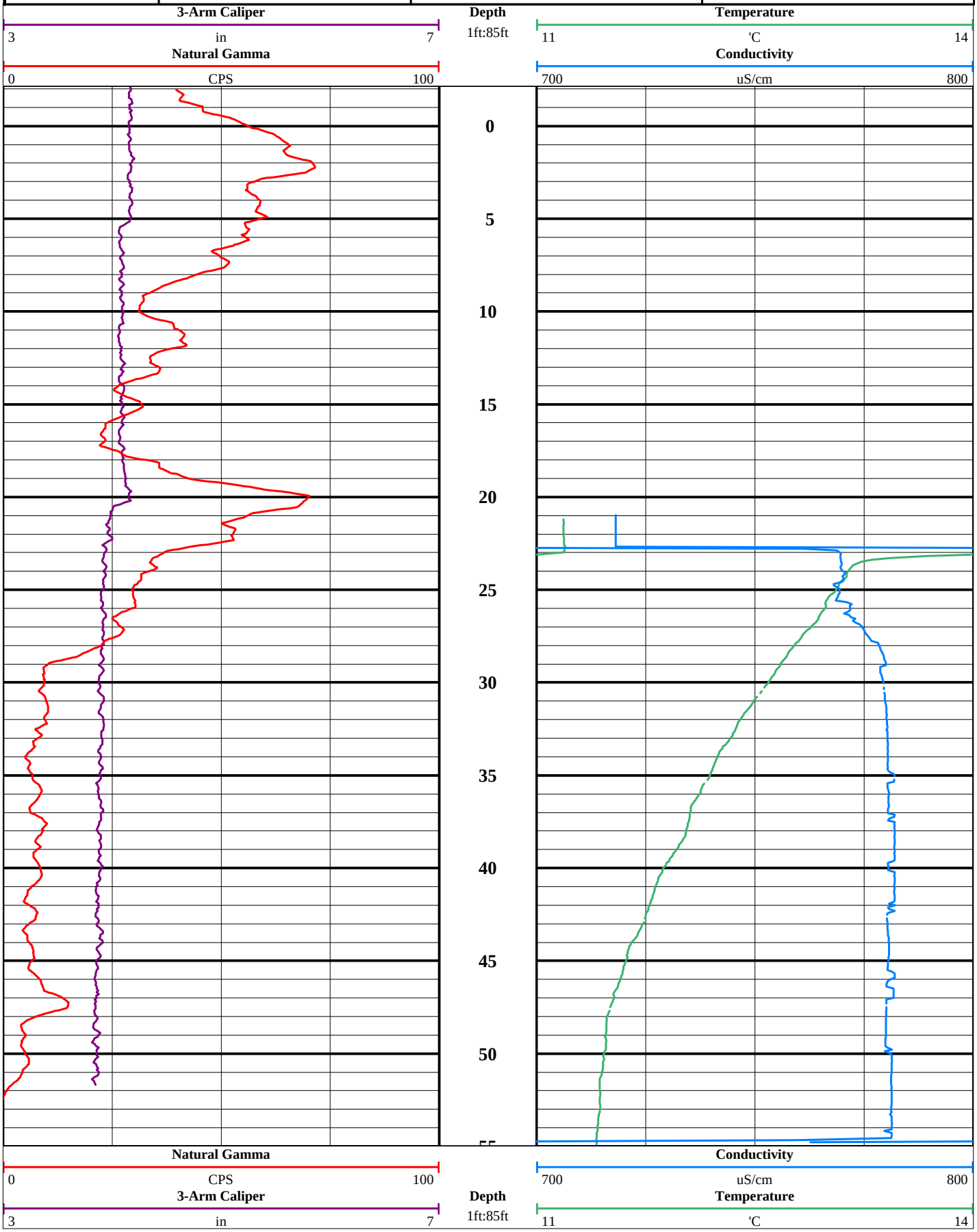

Geophysical Televiewer Plot

COMPANY: CRA	PROJECT: GM Powertrain
DATE LOGGED: 20 December 2012	WELL: CH52

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Phone: (303) 279-0171, Fax: (303) 278-0135
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Optical Image - MN	Depth	Acoustic Amplitude - MN	Acoustic Travel Time - MN
0° 90° 180° 270° 0°	1ft:10ft	0° 90° 180° 270° 0°	0° 90° 180° 270° 0°

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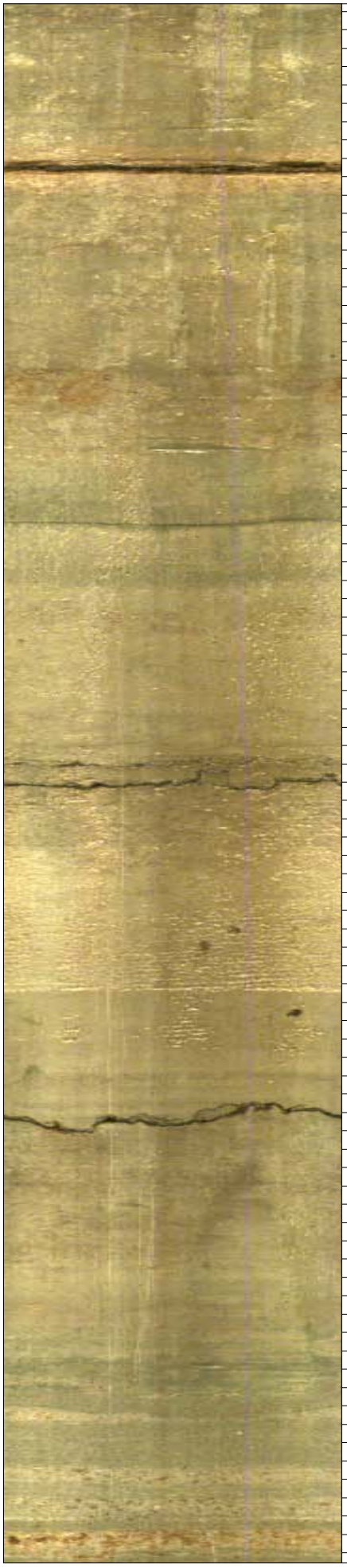
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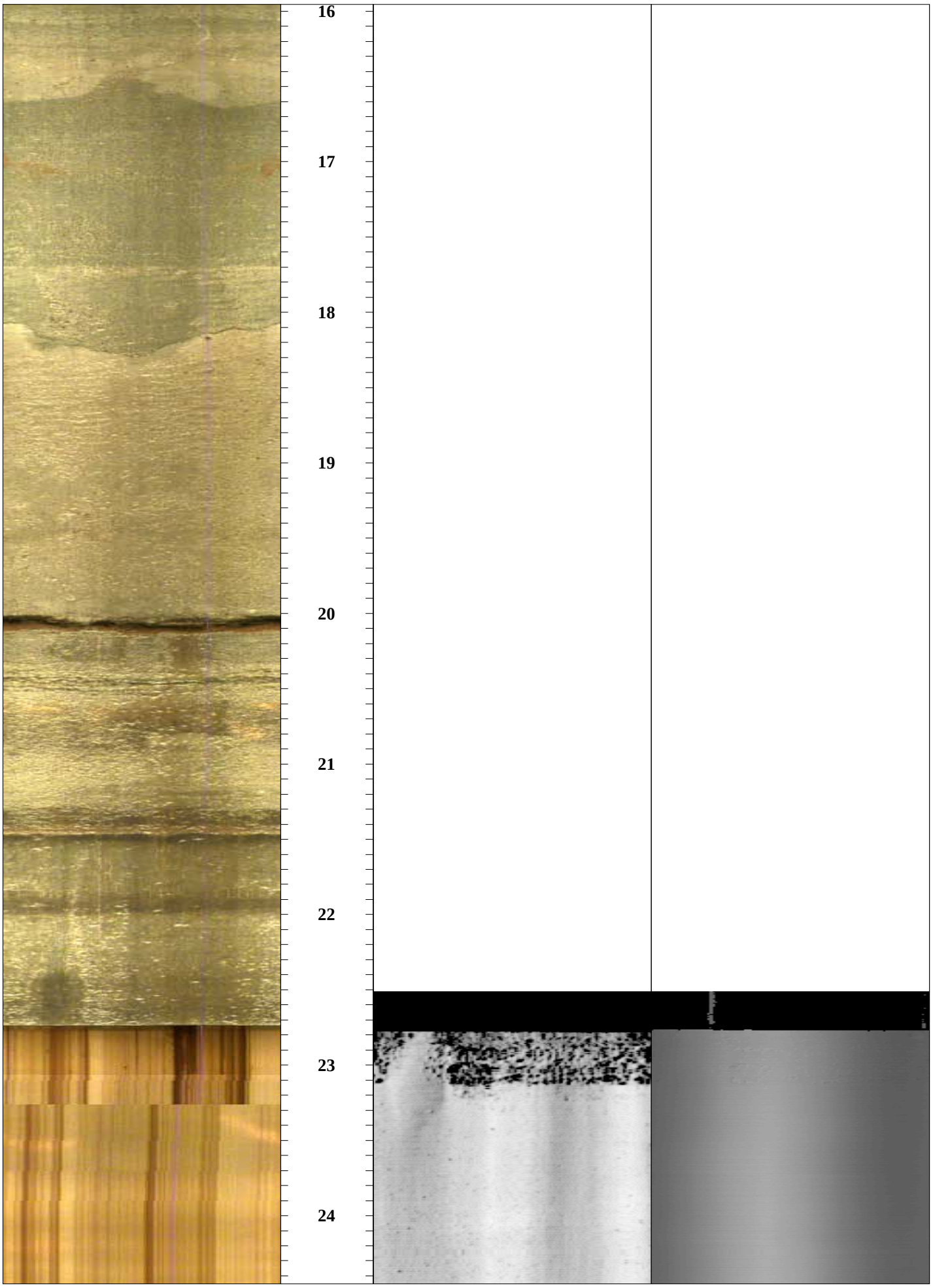
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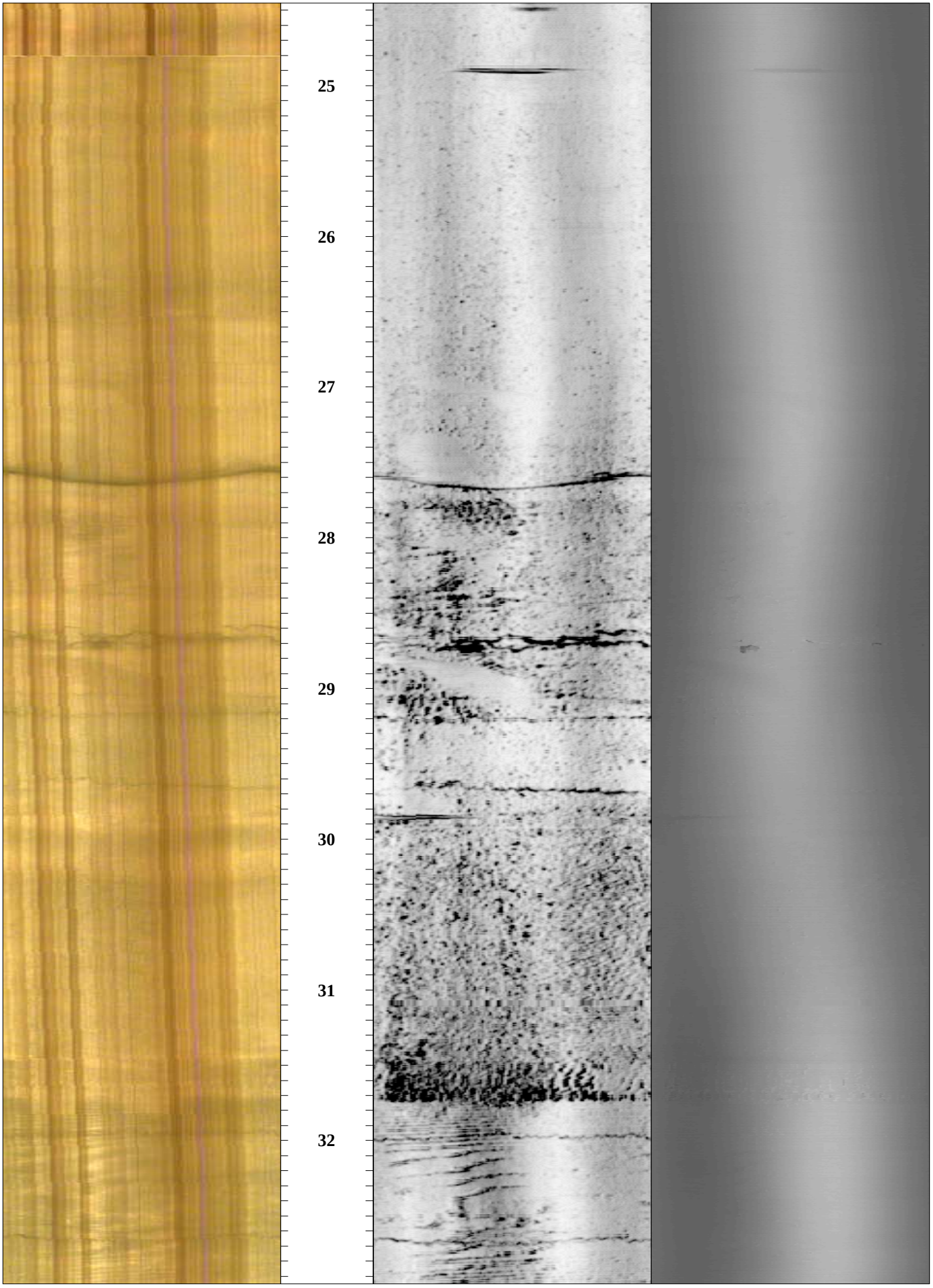
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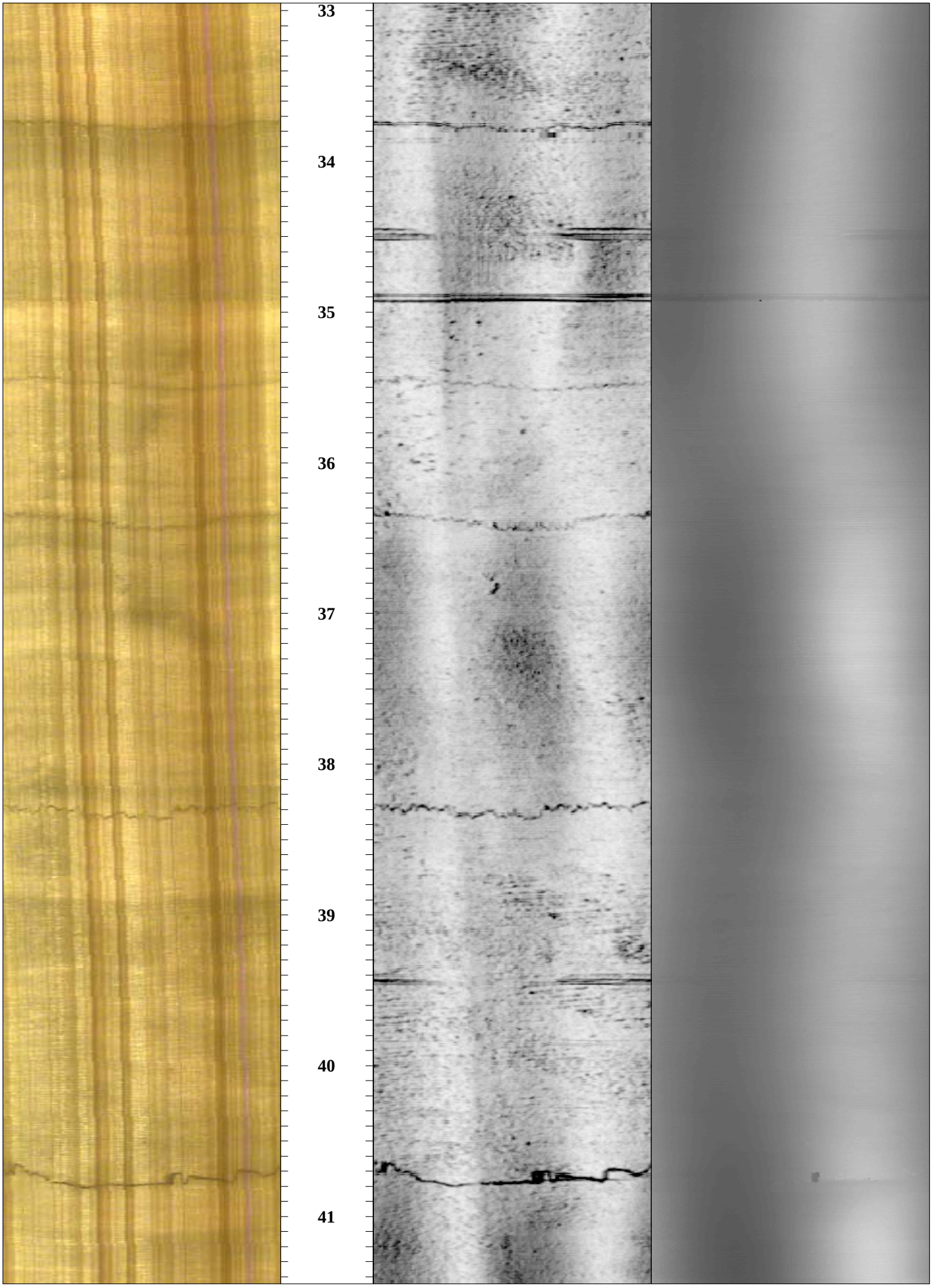
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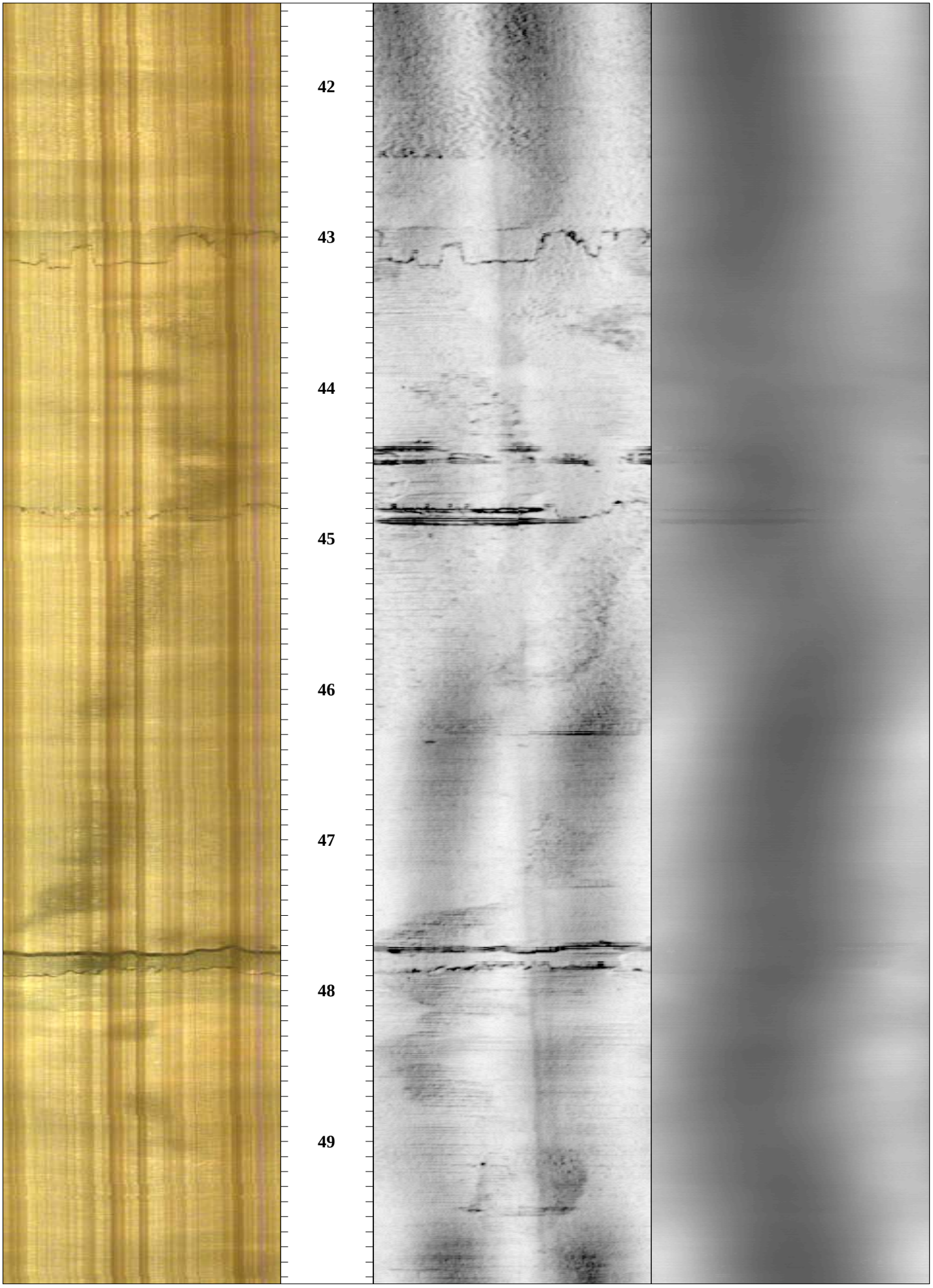
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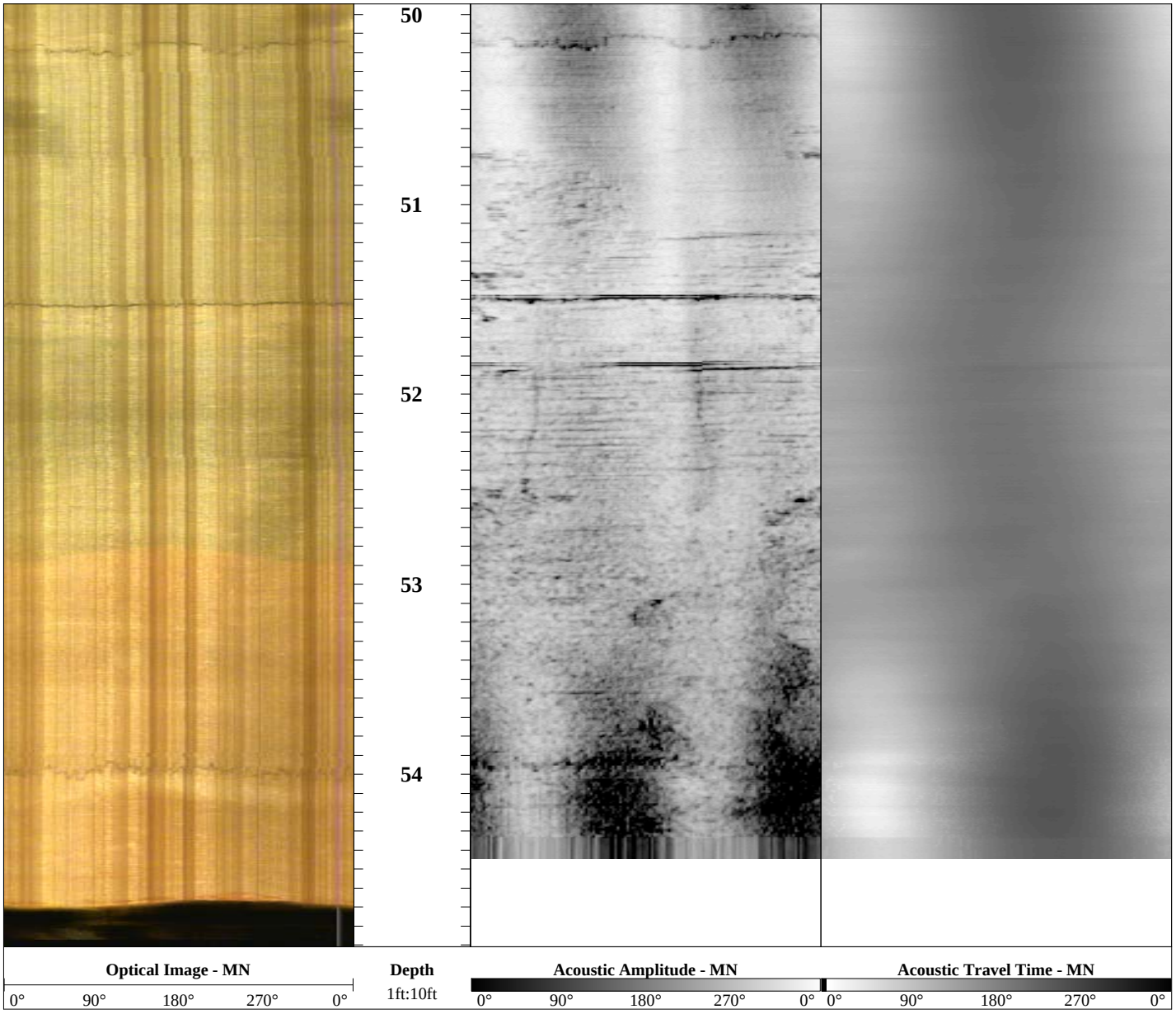
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Optical Image - MN
0°
90°
180°
270°
0°
Depth
1ft:10ft
Acoustic Amplitude - MN
0°
90°
180°
270°
0°
Acoustic Travel Time - MN
0°
90°
180°
270°
0°

Geophysical Summary Plot

COMPANY: CRA	PROJECT: GM Powertrain
DATE LOGGED: 2-3 January 2013	WELL: CH60

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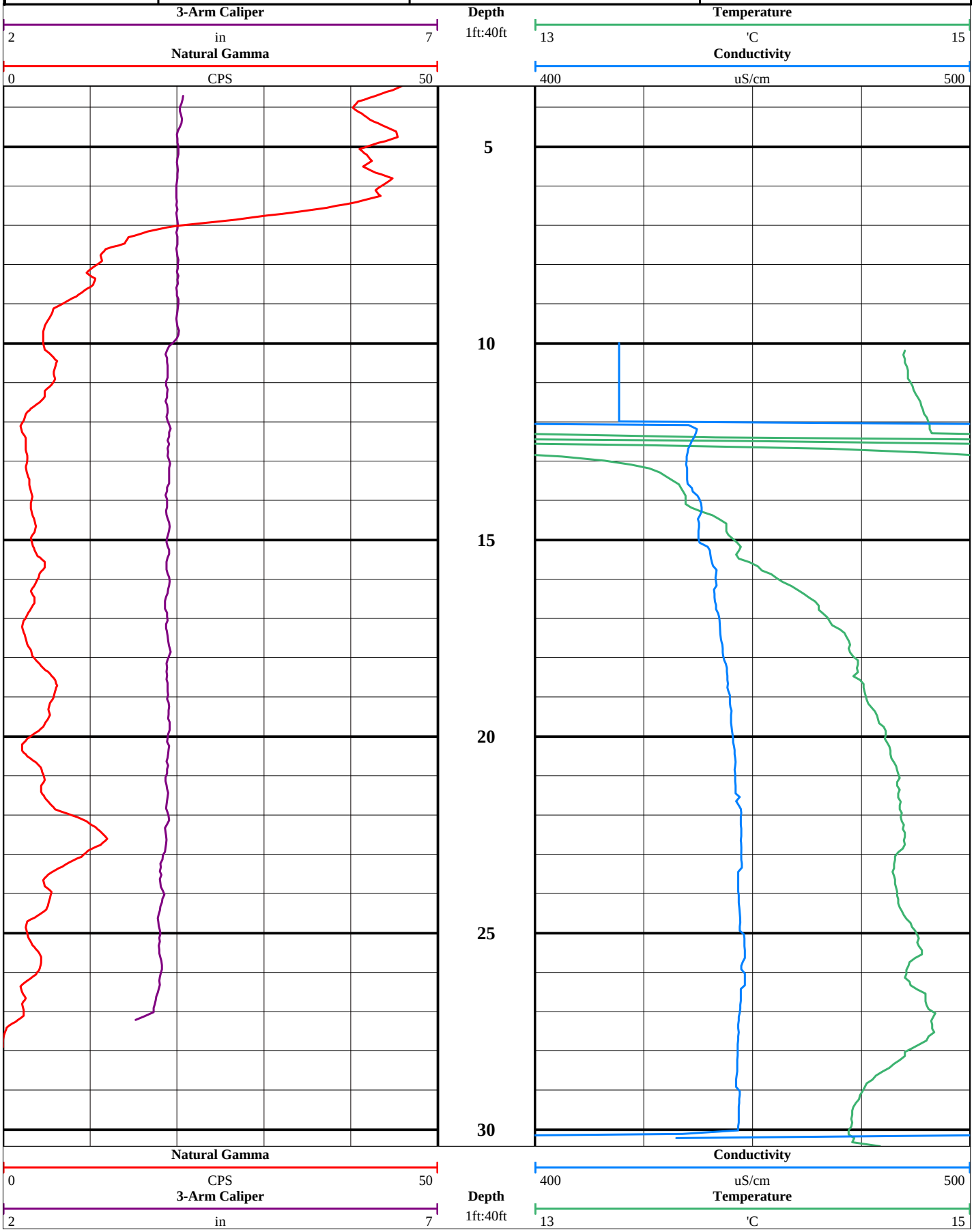

Geophysical Televiewer Plot

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COMPANY: CRA | PROJECT: GM Powertrain

DATE LOGGED: 2-3 January 2013 | WELL: CH60

Optical Image - MN	Depth	Acoustic Amplitude - MN	Acoustic Travel Time - MN
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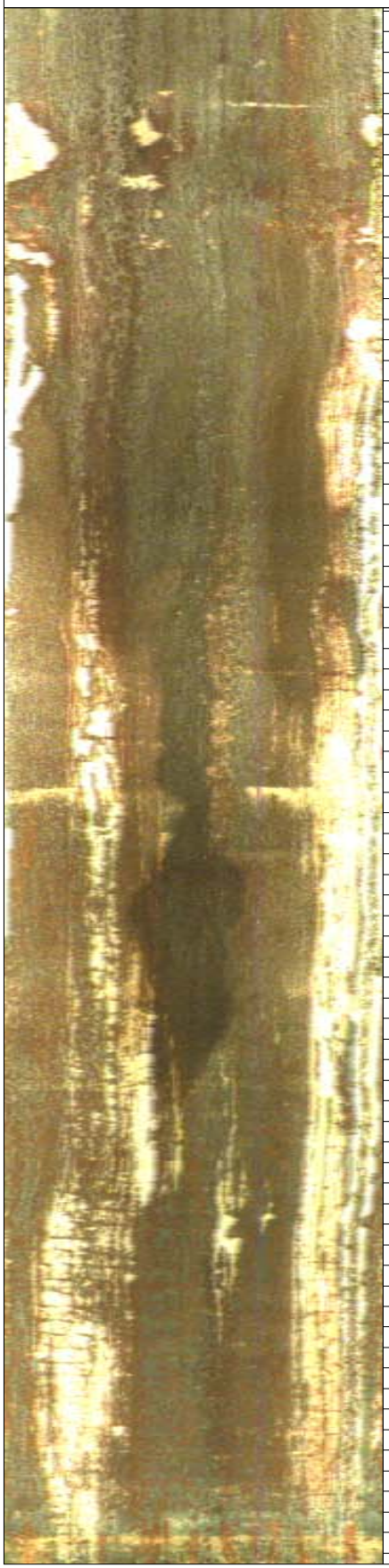

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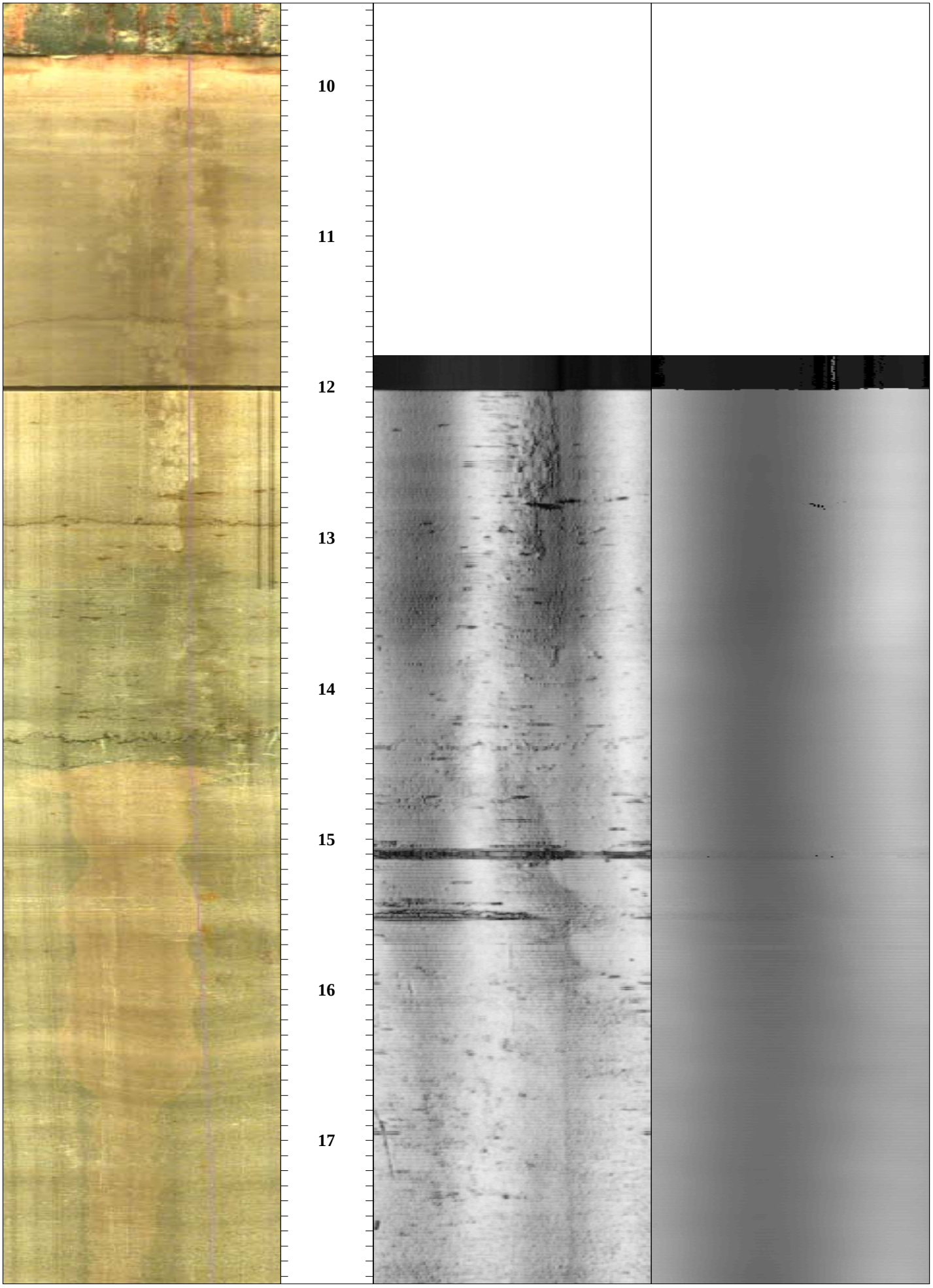
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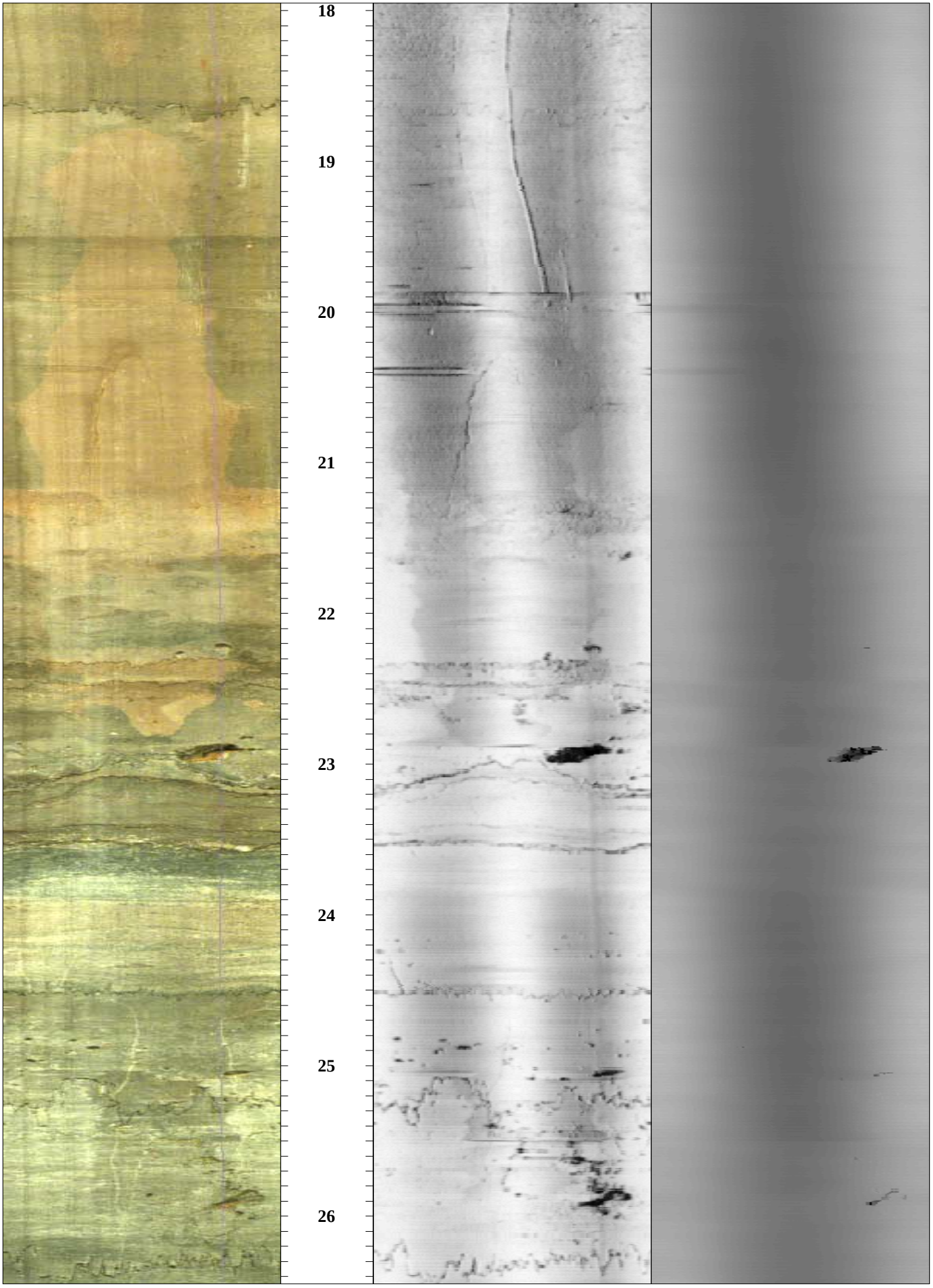
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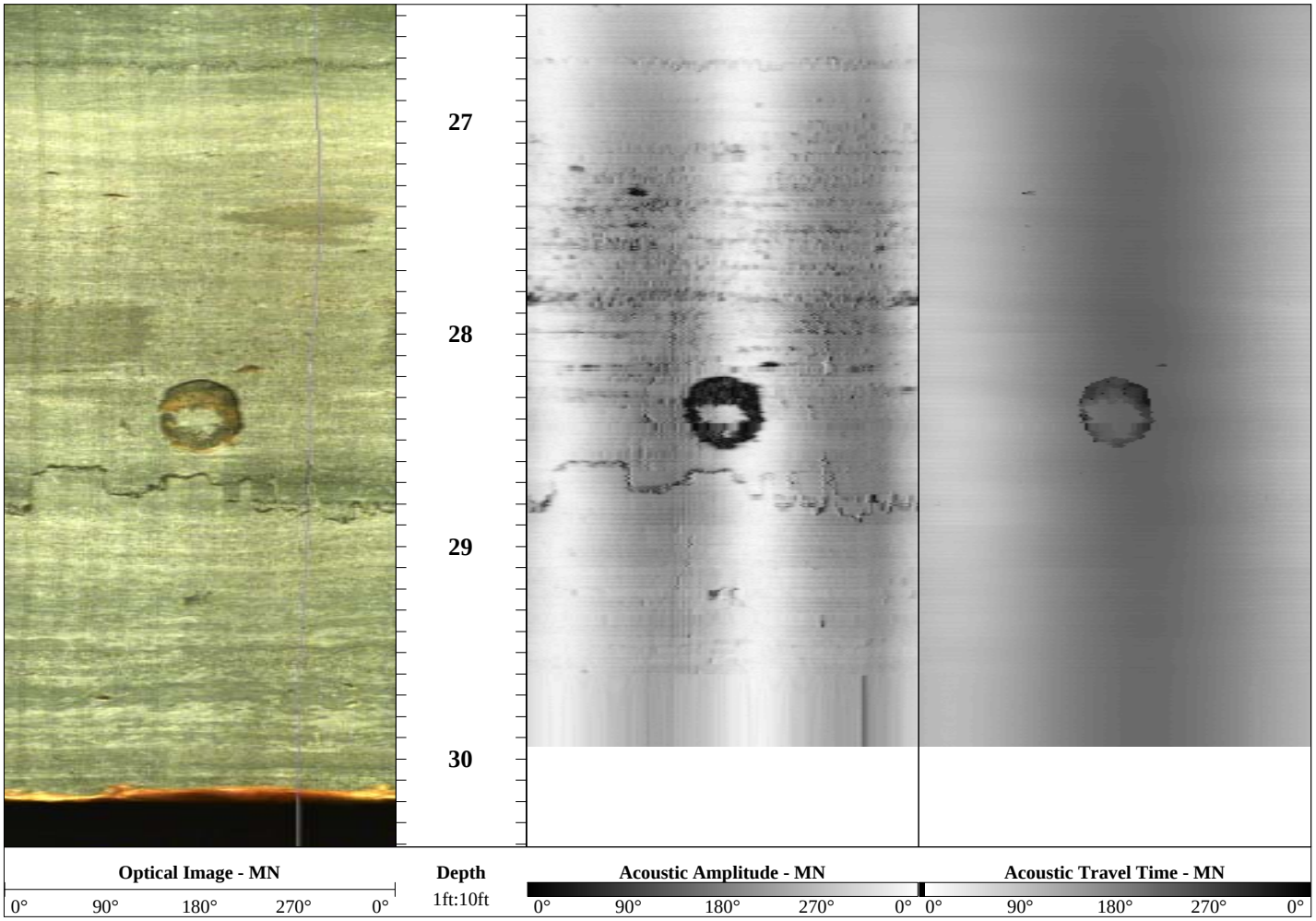
27
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Optical Image - MN
0° 90° 180° 270° 0°
Depth
1ft:10ft
Acoustic Amplitude - MN
0° 90° 180° 270° 0°
Acoustic Travel Time - MN
0° 90° 180° 270° 0°

Appendix D

Packer - Pressure Testing

SUMMARY OF PACKER TESTING DATA - CH-19
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval (ft BGS)		Average Hydraulic Conductivity (cm/sec)				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
23	28	<2.42E-06	<1.76E-06	<1.38E-06	<1.85E-06	
27	32	<1.76E-06	<1.38E-06	<1.14E-06	<1.43E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING
GENERAL MOTORS CET
BEDFORD FACILITY

Project No.: 013968	**Hole No.:** CH-19	**Location:** GM Bedford		**Sheet No.** 1 **of** 2
Date Started: August 27, 2012	**Date Completed:** August 28, 2012	**Surface Elevation:** 625.0 assumed	**Depth to Rock:** 8.5 feet BGS	**Depth to Groundwater:** 19.45 feet TOC
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 627.79 **Stickup (ft):** 2.8

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	110	27.0	32.0	5	17357.80	17357.80	0.00	5	0.00			10		<1.76E-06
2	110	27.0	32.0	5	17358.90	17358.90	0.00	5	0.00			10		<1.76E-06
3	110	27.0	32.0	5	17359.85	17359.85	0.00	5	0.00			10		<1.76E-06
4	110	27.0	32.0	5	17361.15	17361.15	0.00	5	0.00			15		<1.38E-06
5	110	27.0	32.0	5	17362.40	17362.40	0.00	5	0.00			15		<1.38E-06
6	110	27.0	32.0	5	17363.60	17363.60	0.00	5	0.00			15		<1.38E-06
7	110	27.0	32.0	5	17364.90	17364.90	0.00	5	0.00			20		<1.14E-06
8	110	27.0	32.0	5	17366.15	17366.15	0.00	5	0.00			20		<1.14E-06
9	110	27.0	32.0	5	17367.35	17367.35	0.00	5	0.00			20		<1.14E-06
1	110	23.0	28.0	5	17368.70	17368.70	0.00	5	0.00			5		<2.42E-06
2	110	23.0	28.0	5	17369.00	17369.00	0.00	5	0.00			5		<2.42E-06
3	110	23.0	28.0	5	17369.35	17369.35	0.00	5	0.00			5		<2.42E-06
4	110	23.0	28.0	5	17369.90	17369.90	0.00	5	0.00			10		<1.76E-06
5	110	23.0	28.0	5	17370.35	17370.35	0.00	5	0.00			10		<1.76E-06
6	110	23.0	28.0	5	17371.90	17371.90	0.00	5	0.00			10		<1.76E-06
7	110	23.0	28.0	5	17371.60	17371.60	0.00	5	0.00			15		<1.38E-06
8	110	23.0	28.0	5	17372.30	17372.30	0.00	5	0.00			15		<1.38E-06
9	110	23.0	28.0	5	17373.00	17373.00	0.00	5	0.00			15		<1.38E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-21
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval (ft BGS)		Average Hydraulic Conductivity (cm/sec)				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
13	18	<3.52E-06	2.45E-06	<1.88E-06	2.62E-06	
17	22	<3.52E-06	<2.45E-06	<1.88E-06	<2.62E-06	
21	26	<3.17E-06	<2.13E-06	<1.60E-06	<2.30E-06	
25	30	<3.17E-06	<2.13E-06	<1.60E-06	<2.30E-06	
29	34	<2.89E-06	<1.88E-06	<1.39E-06	<2.05E-06	
33	38	<3.52E-06	<2.45E-06	<1.88E-06	<2.62E-06	
37	42	6.39E-06	2.12E-05	3.18E-05	2.0E-05	
42.5	45.5	5.26E-06	1.81E-05	2.27E-06	8.5E-06	
13	45.5	<5.82E-07	NT	NT	<5.82E-07	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-21	**Location:** GM Bedford		**Sheet No.** 1 **of** 5
Date Started: August 15, 2006	**Date Completed:** August 17, 2006	**Surface Elevation:** 612.1	**Depth to Rock:** 11.5 feet BGS	**Depth to Groundwater:** 11.1 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.3 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 614.47 **Stickup (ft):** 2.4

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	150	13	18	5	1981.75	1981.75	0.00	5	0.0			4		<3.52E-06
2	150	13	18	5	1982.00	1982.00	0.00	5	0.0			4		<3.52E-06
3	150	13	18	5	1982.00	1982.00	0.00	5	0.0			4		<3.52E-06
4	150	13	18	5	1983.10	1983.15	0.05	5	14.4			8		2.45E-06
5	150	13	18	5	1983.55	1983.60	0.05	5	14.4			8		2.45E-06
6	150	13	18	5	1984.05	1984.10	0.05	5	14.4			8		2.45E-06
7	150	13	18	5	1984.70	1984.70	0.00	5	0.0			12		<1.88E-06
8	150	13	18	5	1985.35	1985.35	0.00	5	0.0			12		<1.88E-06
9	150	13	18	5	1986.05	1986.05	0.00	5	0.0			12		<1.88E-06
1	160	17	22	5	1978.85	1978.85	0.00	5	0.0			4		<3.52E-06
2	160	17	22	5	1978.95	1978.95	0.00	5	0.0			4		<3.52E-06
3	160	17	22	5	1979.15	1979.15	0.00	5	0.0			4		<3.52E-06
4	160	17	22	5	1979.40	1979.40	0.00	5	0.0			8		<2.45E-06
5	160	17	22	5	1979.70	1979.70	0.00	5	0.0			8		<2.45E-06
6	160	17	22	5	1979.95	1979.95	0.00	5	0.0			8		<2.45E-06
7	160	17	22	5	1980.35	1980.35	0.00	5	0.0			12		<1.88E-06
8	160	17	22	5	1980.75	1980.75	0.00	5	0.0			12		<1.88E-06
9	160	17	22	5	1981.20	1981.20	0.00	5	0.0			12		<1.88E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-21	**Location:** GM Bedford		**Sheet No.** 2 **of** 5
Date Started: August 15, 2006	**Date Completed:** August 17, 2006	**Surface Elevation:** 612.1	**Depth to Rock:** 11.5 feet BGS	**Depth to Groundwater:** 11.1 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.3 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 614.47 **Stickup (ft):** 2.4

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	160	21	26	5	1975.80	1975.80	0.00	5	0.0			5		<3.17E-06
2	160	21	26	5	1975.90	1975.90	0.00	5	0.0			5		<3.17E-06
3	160	21	26	5	1976.00	1976.00	0.00	5	0.0			5		<3.17E-06
4	160	21	26	5	1976.35	1976.35	0.00	5	0.0			10		<2.13E-06
5	160	21	26	5	1976.60	1976.60	0.00	5	0.0			10		<2.13E-06
6	160	21	26	5	1976.90	1976.90	0.00	5	0.0			10		<2.13E-06
7	160	21	26	5	1977.45	1977.45	0.00	5	0.0			15		<1.60E-06
8	160	21	26	5	1977.80	1977.80	0.00	5	0.0			15		<1.60E-06
9	160	21	26	5	1978.25	1978.25	0.00	5	0.0			15		<1.60E-06
1	160	25	30	5	1973.45	1973.45	0.00	5	0.0			5		<3.17E-06
2	160	25	30	5	1973.55	1973.55	0.00	5	0.0			5		<3.17E-06
3	160	25	30	5	1973.65	1973.65	0.00	5	0.0			5		<3.17E-06
4	160	25	30	5	1973.95	1973.95	0.00	5	0.0			10		<2.13E-06
5	160	25	30	5	1974.20	1974.20	0.00	5	0.0			10		<2.13E-06
6	160	25	30	5	1974.45	1974.45	0.00	5	0.0			10		<2.13E-06
7	160	25	30	5	1974.90	1974.90	0.00	5	0.0			15		<1.60E-06
8	160	25	30	5	1975.30	1975.30	0.00	5	0.0			15		<1.60E-06
9	160	25	30	5	1975.70	1975.70	0.00	5	0.0			15		<1.60E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-21	**Location:** GM Bedford		**Sheet No.** 3 **of** 5
Date Started: August 15, 2006	**Date Completed:** August 17, 2006	**Surface Elevation:** 612.1	**Depth to Rock:** 11.5 feet BGS	**Depth to Groundwater:** 11.1 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.3 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 614.47 **Stickup (ft):** 2.4

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	160	29	34	5	1970.35	1970.35	0.00	5	0.0			6		<2.89E-06
2	160	29	34	5	1970.50	1970.50	0.00	5	0.0			6		<2.89E-06
3	160	29	34	5	1970.60	1970.60	0.00	5	0.0			6		<2.89E-06
4	160	29	34	5	1970.95	1970.95	0.00	5	0.0			12		<1.88E-06
5	160	29	34	5	1971.20	1971.20	0.00	5	0.0			12		<1.88E-06
6	160	29	34	5	1971.70	1971.70	0.00	5	0.0			12		<1.88E-06
7	160	29	34	5	1972.15	1972.15	0.00	5	0.0			18		<1.39E-06
8	160	29	34	5	1972.60	1972.60	0.00	5	0.0			18		<1.39E-06
9	160	29	34	5	1973.15	1973.15	0.00	5	0.0			18		<1.39E-06
1	160	33	38	5	1968.80	1968.80	0.00	5	0.0			4		<3.52E-06
2	160	33	38	5	1968.85	1968.85	0.00	5	0.0			4		<3.52E-06
3	160	33	38	5	1968.95	1968.95	0.00	5	0.0			4		<3.52E-06
4	160	33	38	5	1969.20	1969.20	0.00	5	0.0			8		<2.45E-06
5	160	33	38	5	1969.35	1969.35	0.00	5	0.0			8		<2.45E-06
6	160	33	38	5	1969.50	1969.50	0.00	5	0.0			8		<2.45E-06
7	160	33	38	5	1969.75	1969.75	0.00	5	0.0			12		<1.88E-06
8	160	33	38	5	1969.95	1969.95	0.00	5	0.0			12		<1.88E-06
9	160	33	38	5	1970.20	1970.20	0.00	5	0.0			12		<1.88E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-21	**Location:** GM Bedford		**Sheet No.** 4 **of** 5
Date Started: August 15, 2006	**Date Completed:** August 17, 2006	**Surface Elevation:** 612.1	**Depth to Rock:** 11.5 feet BGS	**Depth to Groundwater:** 11.1 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.3 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 614.47 **Stickup (ft):** 2.4

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	150	37	42	5	1948.05	1948.05	0.00	5	0.0			10		<2.13E-06
2	150	37	42	5	1948.75	1949.10	0.35	5	100.8			10		1.49E-05
3	150	37	42	5	1949.50	1949.50	0.00	5	0.0			10		<2.13E-06
4	150	37	42	5	1950.15	1950.15	0.00	5	0.0			18		<1.39E-06
5	150	37	42	5	1951.25	1951.70	0.45	5	129.6			18		1.26E-05
6	150	37	42	5	1952.70	1952.90	0.20	5	57.6			18		5.58E-06
7	150	37	42	5	1954.45	1955.85	1.40	5	403.2			24		3.10E-05
8	150	37	42	5	1957.90	1958.80	0.90	5	259.2			24		1.99E-05
9	150	37	42	5	1959.90	1961.90	2.00	5	576.0			24		4.43E-05
10	150	37	42	5	1962.75	1963.65	0.90	5	259.2			18		2.51E-05
11	150	37	42	5	1964.40	1966.10	1.70	5	489.6			18		4.74E-05
12	150	37	42	5	1966.90	1968.15	1.25	5	360.0			18		3.49E-05
1	150	42.5	45.5	3	1939.15	1939.15	0.00	5	0.0			5		<4.51E-06
2	150	42.5	45.5	3	1939.60	1939.70	0.10	5	28.8			5		9.01E-06
3	150	42.5	45.5	3	1940.15	1940.15	0.00	5	0.0			5		<4.51E-06
4	150	42.5	45.5	3	1941.05	1941.05	0.00	5	0.0			10		<3.02E-06
5	150	42.5	45.5	3	1941.65	1942.30	0.65	5	187.2			10		3.93E-05
6	150	42.5	45.5	3	1942.90	1943.10	0.20	5	57.6			10		1.21E-05
7	150	42.5	45.5	3	1943.95	1944.00	0.05	5	14.4			15		2.27E-06
8	150	42.5	45.5	3	1945.05	1945.05	0.00	5	0.0			15		<2.27E-06
9	150	42.5	45.5	3	1945.85	1945.85	0.00	5	0.0			15		<2.27E-06
10	150	42.5	45.5	3	1946.60	1946.60	0.00	5	0.0			5		<4.51E-06
11	150	42.5	45.5	3	1947.05	1947.05	0.00	5	0.0			5		<4.51E-06
12	150	42.5	45.5	3	1947.55	1947.55	0.00	5	0.0			5		<4.51E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-21	**Location:** GM Bedford		**Sheet No.** 5 **of** 5
Date Started: August 15, 2006	**Date Completed:** August 17, 2006	**Surface Elevation:** 612.1	**Depth to Rock:** 11.5 feet BGS	**Depth to Groundwater:** 11.1 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.3 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 614.47 **Stickup (ft):** 2.4

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	**(Q)** *Rate (gpd)*	*Pressure Static Borehole (psi)*	*Pressure Line Gauge (psi)*	*Pressure Test Borehole (psi)*	*Pressure Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	150	13	45.5	32.5	1986.75	1986.75	0.00	5	0.0			8		<5.82E-07
2	150	13	45.5	32.5	1987.05	1987.05	0.00	5	0.0			8		<5.82E-07
3	150	13	45.5	32.5	1987.35	1987.35	0.00	5	0.0			8		<5.82E-07

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-23
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval (ft BGS)		Average Hydraulic Conductivity (cm/sec)				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
6	11	<3.74E-06	NT	NT	<3.74E-06	
10	15	<3.75E-06	<2.37E-06	NT	<3.06E-06	
14	19	<3.75E-06	<2.37E-06	NT	<3.06E-06	
18	23	<3.66E-06	<2.34E-06	<7.72E-06	<4.57E-06	
22	27	<3.66E-06	<2.34E-06	<7.72E-06	<4.57E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-23	**Location:** GM Bedford			**Sheet No.** 1 **of** 3
Date Started: August 24, 2012	**Date Completed:** August 24, 2012	**Surface Elevation:** 613.5	**Depth to Rock:** 3.5 feet BGS	**Depth to Groundwater:** 8.58 feet TOC	
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 3.08 feet AGS	**Boring Radius (ft) =** r_w 0.16	**TOC Elevation:** 616.33	**Stickup (ft):** 2.8

Test No.	*Packer Inflation Pressure (psi)*	*Depth*		*Length of Interval Tested (feet)*	*Water Meter* (gal)		*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure*				*Hydraulic Conductivity (cm/s)*
		From	*To*		*Start*	*End*				*Static Borehole (psi)*	*Line Gauge (psi)*	*Test Borehole (psi)*	*Recorder Sensitivity (%)*	
1	110	22	27	5	17315.70	17315.70	0.00	5	0.0			5		<3.66E-06
2	110	22	27	5	17316.00	17316.00	0.00	5	0.0			5		<3.66E-06
3	110	22	27	5	17316.30	17316.30	0.00	5	0.0			5		<3.66E-06
4	110	22	27	5	17316.85	17316.85	0.00	5	0.0			10		<2.34E-06
5	110	22	27	5	17317.40	17317.40	0.00	5	0.0			10		<2.34E-06
6	110	22	27	5	17317.90	17317.90	0.00	5	0.0			10		<2.34E-06
7	110	22	27	5	17318.70	17318.70	0.00	5	0.0			15		<7.72E-06
8	110	22	27	5	17319.50	17319.50	0.00	5	0.0			15		<7.72E-06
9	110	22	27	5	17320.40	17320.40	0.00	5	0.0			15		<7.72E-06
1	110	18	23	5	17321.55	17321.55	0.00	5	0.0			5		<3.66E-06
2	110	18	23	5	17321.60	17321.60	0.00	5	0.0			5		<3.66E-06
3	110	18	23	5	17321.80	17321.80	0.00	5	0.0			5		<3.66E-06
4	110	18	23	5	17321.90	17321.90	0.00	5	0.0			10		<2.34E-06
5	110	18	23	5	17322.15	17322.15	0.00	5	0.0			10		<2.34E-06
6	110	18	23	5	17322.30	17322.30	0.00	5	0.0			10		<2.34E-06
7	110	18	23	5	17322.75	17322.75	0.00	5	0.0			15		<7.72E-06
8	110	18	23	5	17323.05	17323.05	0.00	5	0.0			15		<7.72E-06
9	110	18	23	5	17323.55	17323.55	0.00	5	0.0			15		<7.72E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-23	**Location:** GM Bedford		**Sheet No.** 2 **of** 3
Date Started: August 27, 2012	**Date Completed:** August 27, 2012	**Surface Elevation:** 613.5	**Depth to Rock:** 3.5 feet BGS	**Depth to Groundwater:** 8.58 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 616.33 **Stickup (ft):** 2.8

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	110	14	19	5	17323.85	17323.85	0.00	5	0.0			5		<3.75E-06
2	110	14	19	5	17324.10	17324.10	0.00	5	0.0			5		<3.75E-06
3	110	14	19	5	17324.35	17324.35	0.00	5	0.0			5		<3.75E-06
4	110	14	19	5	17324.90	17324.90	0.00	5	0.0			10		<2.37E-06
5	110	14	19	5	17325.30	17325.30	0.00	5	0.0			10		<2.37E-06
6	110	14	19	5	17325.65	17325.65	0.00	5	0.0			10		<2.37E-06
7				0			0.00	5	0.0					#NUM!
8				0			0.00	5	0.0					#NUM!
9				0			0.00	5	0.0					#NUM!
1	110	10	15	5	17326.40	17326.40	0.00	5	0.0			5		<3.75E-06
2	110	10	15	5	17326.55	17326.55	0.00	5	0.0			5		<3.75E-06
3	110	10	15	5	17326.65	17326.65	0.00	5	0.0			5		<3.75E-06
4	110	10	15	5	17327.10	17327.10	0.00	5	0.0			10		<2.37E-06
5	110	10	15	5	17327.40	17327.40	0.00	5	0.0			10		<2.37E-06
6	110	10	15	5	17327.70	17327.70	0.00	5	0.0			10		<2.37E-06
7				0			0.00	5	0.0					#NUM!
8				0			0.00	5	0.0					#NUM!
9				0			0.00	5	0.0					#NUM!

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-23	**Location:** GM Bedford		**Sheet No.** 3 **of** 3
Date Started: August 27, 2012	**Date Completed:** August 27, 2012	**Surface Elevation:** 613.5	**Depth to Rock:** 3.5 feet BGS	**Depth to Groundwater:** 8.58 feet TOC
Logged By: KMV	**Client:** General Motors Corp.	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 616.33 **Stickup (ft):** 2.8

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	110	6	11	5	17328.30	17328.30	0.00	5	0.0			5		<3.74E-06
2	110	6	11	5	17328.65	17328.65	0.00	5	0.0			5		<3.74E-06
3	110	6	11	5	17329.05	17329.05	0.00	5	0.0			5		<3.74E-06
4				0			0.00	5	0.0					#NUM!
5				0			0.00	5	0.0					#NUM!
6				0			0.00	5	0.0					#NUM!
7				0			0.00	5	0.0					#NUM!
8				0			0.00	5	0.0					#NUM!
9				0			0.00	5	0.0					#NUM!
1				0			0.00	5	0.0					#NUM!
2				0			0.00	5	0.0					#NUM!
3				0			0.00	5	0.0					#NUM!
4				0			0.00	5	0.0					#NUM!
5				0			0.00	5	0.0					#NUM!
6				0			0.00	5	0.0					#NUM!
7				0			0.00	5	0.0					#NUM!
8				0			0.00	5	0.0					#NUM!
9				0			0.00	5	0.0					#NUM!

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH49
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval (ft BGS)		Average Hydraulic Conductivity (cm/sec)				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
19	24	<2.13E-06	<1.60E-06	<1.28E-06	<1.67E-06	
25	30	<2.13E-06	<1.60E-06	<1.28E-06	<1.67E-06	
29	34	<2.13E-06	<1.60E-06	<1.28E-06	<1.67E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.: CH-49**	**Location: GM Bedford**			**Sheet No. 1 of 2**
Date Started: August 9, 2012	**Date Completed: August 23, 2012**	**Surface Elevation: 641.1**	**Depth to Rock: 3.5 feet BGS**	**Depth to Groundwater: 23.1 feet TOC**	
Logged By: KMV	**Client: GM LLC**	**Gage Height: 3.17 feet AGS**	**Boring Radius (ft) = r_w 0.16**	**TOC Elevation: 643.84**	**Stickup (ft): 2.8**

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	19.0	24.0	5	16932.25	16932.25	0.00	5	0.00			5		<2.13E-06
2	110	19.0	24.0	5	16932.55	16932.55	0.00	5	0.00			5		<2.13E-06
3	110	19.0	24.0	5	16933.00	16933.00	0.00	5	0.00			5		<2.31E-06
4	110	19.0	24.0	5	16933.65	16933.65	0.00	5	0.00			10		<1.60E-06
5	110	19.0	24.0	5	16934.25	16934.25	0.00	5	0.00			10		<1.60E-06
6	110	19.0	24.0	5	16934.85	16934.85	0.00	5	0.00			10		<1.60E-06
7	110	19.0	24.0	5	16935.90	16935.90	0.00	5	0.00			15		<1.28E-06
8	110	19.0	24.0	5	16937.00	16937.00	0.00	5	0.00			15		<1.28E-06
9	110	19.0	24.0	5	16937.90	16937.90	0.00	5	0.00			15		<1.28E-06
1				0			0.00	5	0.00					#NUM!
2				0			0.00	5	0.00					#NUM!
3				0			0.00	5	0.00					#NUM!
4				0			0.00	5	0.00					#NUM!
5				0			0.00	5	0.00					#NUM!
6				0			0.00	5	0.00					#NUM!
7				0			0.00	5	0.00					#NUM!
8				0			0.00	5	0.00					#NUM!
9				0			0.00	5	0.00					#NUM!

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-49	**Location:** GM Bedford			**Sheet No.** 2 **of** 2
Date Started: August 9, 2012	**Date Completed:** August 23, 2012	**Surface Elevation:** 641.1	**Depth to Rock:** 3.5 feet BGS	**Depth to Groundwater:** 23.1 feet TOC	
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 3.17 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 643.84	**Stickup (ft):** 2.8

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	25.0	30.0	5	17309.05	17309.05	0.00	5	0.00			5		<2.13E-06
2	110	25.0	30.0	5	17309.30	17309.30	0.00	5	0.00			5		<2.13E-06
3	110	25.0	30.0	5	17309.50	17309.50	0.00	5	0.00			5		<2.31E-06
4	110	25.0	30.0	5	17309.90	17309.90	0.00	5	0.00			10		<1.60E-06
5	110	25.0	30.0	5	17310.35	17310.35	0.00	5	0.00			10		<1.60E-06
6	110	25.0	30.0	5	17310.80	17310.80	0.00	5	0.00			10		<1.60E-06
7	110	25.0	30.0	5	17311.35	17311.35	0.00	5	0.00			15		<1.28E-06
8	110	25.0	30.0	5	17311.95	17311.95	0.00	5	0.00			15		<1.28E-06
9	110	25.0	30.0	5	17312.50	17312.50	0.00	5	0.00			15		<1.28E-06
1	110	29.0	34.0	5	17301.90	17301.90	0.00	5	0.00			5		<2.13E-06
2	110	29.0	34.0	5	17302.25	17302.25	0.00	5	0.00			5		<2.13E-06
3	110	29.0	34.0	5	17302.65	17302.65	0.00	5	0.00			5		<2.31E-06
4	110	29.0	34.0	5	17303.50	17303.50	0.00	5	0.00			10		<1.60E-06
5	110	29.0	34.0	5	17304.00	17304.00	0.00	5	0.00			10		<1.60E-06
6	110	29.0	34.0	5	17304.55	17304.55	0.00	5	0.00			10		<1.60E-06
7	110	29.0	34.0	5	17305.25	17305.25	0.00	5	0.00			15		<1.28E-06
8	110	29.0	34.0	5	17306.00	17306.00	0.00	5	0.00			15		<1.28E-06
9	110	29.0	34.0	5	17307.90	17307.90	0.00	5	0.00			15		<1.28E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).

- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.

(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-50
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval *(ft BGS)*		Average Hydraulic Conductivity *(cm/sec)*				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
25	30	1.45E-05	<1.65E-06	<1.32E-06	5.84E-06	
29	34	7.99E-05	NT	NT	7.99E-05	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING
GENERAL MOTORS CET

Project No.: 013968	**Hole No.:** CH-50	**Location:** GM Bedford			**Sheet No.** 1 **of**
Date Started: August 10, 2012	**Date Completed:** August 13, 2012	**Surface Elevation:** 634.8	**Depth to Rock:** 3.0 feet BGS	**Depth to Groundwater:** 22.25 feet TOC	
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) =** r_w 0.16	**TOC Elevation:**	**Stickup (ft):** 2.8

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	25.0	30.0	5	17098.60	17099.45	0.85	5	244.80			5		3.77E-05
2	110	25.0	30.0	5	17099.50	17099.50	0.00	5	0.00			5		<2.22E-06
3	110	25.0	30.0	5	17099.65	17099.65	0.00	5	0.00			5		<2.22E-06
4	110	25.0	30.0	5	17000.15	17000.15	0.00	5	0.00			10		<1.65E-06
5	110	25.0	30.0	5	17000.60	17000.60	0.00	5	0.00			10		<1.65E-06
6	110	25.0	30.0	5	17001.15	17001.15	0.00	5	0.00			10		<1.65E-06
7	110	25.0	30.0	5	17101.75	17101.75	0.00	5	0.00			15		<1.32E-06
8	110	25.0	30.0	5	17102.35	17102.35	0.00	5	0.00			15		<1.32E-06
9	110	25.0	30.0	5	17102.95	17102.95	0.00	5	0.00			15		<1.32E-06
1	110	29.0	34.0	5	16946.35	16948.50	2.15	5	619.20			10		7.11E-05
2	110	29.0	34.0	5	16948.45	16952.00	3.55	5	1022.40			10		1.17E-04
3	110	29.0	34.0	5	16953.15	16954.70	1.55	5	446.40			10		5.12E-05
4				0			0.00	5	0.00					#NUM!
5				0			0.00	5	0.00					#NUM!
6				0			0.00	5	0.00					#NUM!
7				0			0.00	5	0.00					#NUM!
8				0			0.00	5	0.00					#NUM!
9				0			0.00	5	0.00					#NUM!

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-51
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval *(ft BGS)*		Average Hydraulic Conductivity *(cm/sec)*				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
35	40	1.89E-06	1.46E-06	1.19E-06	1.51E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING

GENERAL MOTORS CET

Project No.: 013968	**Hole No.:** CH-51	**Location:** GM Bedford			**Sheet No.** 1 **of** 1
Date Started: August 15, 2012	**Date Completed:** August 15, 2012	**Surface Elevation:** 644.3 assumed	**Depth to Rock:** 7.05 feet BGS	**Depth to Groundwater:** 15.80 feet TOC	
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 3.08 feet AGS	**Boring Radius (ft) =** r_w 0.16	**TOC Elevation:** 646.68	**Stickup (ft):** 2.4

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	35.0	40.0	5	17141.60	17141.65	0.05	5	14.40			10		1.89E-06
2	110	35.0	40.0	5	17142.30	17142.30	0.00	5	0.00			10		<1.89E-06
3	110	35.0	40.0	5	17142.85	17142.90	0.05	5	14.40			10		1.89E-06
4	110	35.0	40.0	5	17143.25	17143.30	0.05	5	14.40			15		1.46E-06
5	110	35.0	40.0	5	17144.20	17144.20	0.00	5	0.00			15		<1.46R-06
6	110	35.0	40.0	5	17145.05	17145.05	0.00	5	0.00			15		<1.46R-06
7	110	35.0	40.0	5	17145.95	17145.95	0.00	5	0.00			20		<1.19E-06
8	110	35.0	40.0	5	17146.85	17146.90	0.05	5	14.40			20		1.19E-06
9	110	35.0	40.0	5	17146.90	17146.95	0.05	5	14.40			20		1.19E-06
1				0			0.00	5	0.00					#NUM!
2				0			0.00	5	0.00					#NUM!
3				0			0.00	5	0.00					#NUM!
4				0			0.00	5	0.00					#NUM!
5				0			0.00	5	0.00					#NUM!
6				0			0.00	5	0.00					#NUM!
7				0			0.00	5	0.00					#NUM!
8				0			0.00	5	0.00					#NUM!
9				0			0.00	5	0.00					#NUM!

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).

- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.

(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-52
GENERAL MOTORS CET
BEDFORD FACILTIY

Test Interval *(ft BGS)*		Average Hydraulic Conductivity *(cm/sec)*				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
30	35	<1.71E-06	<1.35E-06	<1.12E-06	<1.39E-06	
50	55	<1.71E-06	<1.12E-06	<8.31E-07	<1.22E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING
GENERAL MOTORS CET

Project No.: 013968	**Hole No.:** CH-52	**Location:** GM Bedford		**Sheet No.** 1 **of** 1
Date Started: August 15, 2012	**Date Completed:** August 28, 2012	**Surface Elevation:** 668.3	**Depth to Rock:** 3.0 feet BGS	**Depth to Groundwater:** 20.92 feet TOC
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) =** r_w 0.16	**TOC Elevation:** 671.03 **Stickup (ft):** 2.92

Test No.	Packer Inflation Pressure (psi)	Depth From	Depth To	Length of Interval Tested (feet)	Water Meter (gal) Start	Water Meter (gal) End	Water Pumped/Injected (cu. ft) (gal)(1)	Elapsed Time (min.)	(Q) Rate (gpd)	Pressure: Static Borehole (psi)	Pressure: Line Gauge (psi)	Pressure: Test Borehole (psi)	Pressure: Recorder Sensitivity (%)	Hydraulic Conductivity (cm/s)
1	110	30.0	35.0	5	17151.00	17151.00	0.00	5	0.00			10		<1.71E-06
2	110	30.0	35.0	5	17152.05	17152.05	0.00	5	0.00			10		<1.71E-06
3	110	30.0	35.0	5	17152.90	17152.90	0.00	5	0.00			10		<1.71E-06
4	110	30.0	35.0	5	17153.70	17153.70	0.00	5	0.00			15		<1.35E-06
5	110	30.0	35.0	5	17154.50	17154.50	0.00	5	0.00			15		<1.35E-06
6	110	30.0	35.0	5	17155.40	17155.40	0.00	5	0.00			15		<1.35E-06
7	110	30.0	35.0	5	17156.55	17156.55	0.00	5	0.00			20		<1.12E-06
8	110	30.0	35.0	5	17157.45	17157.45	0.00	5	0.00			20		<1.12E-06
9	110	30.0	35.0	5	17158.30	17158.30	0.00	5	0.00			20		<1.12E-06
1	115	50.0	55.0	5	17374.70	17374.70	0.00	5	0.00			10		<1.71E-06
2	115	50.0	55.0	5	17375.15	17375.15	0.00	5	0.00			10		<1.71E-06
3	115	50.0	55.0	5	17375.50	17375.50	0.00	5	0.00			10		<1.71E-06
4	115	50.0	55.0	5	17376.30	17376.30	0.00	5	0.00			20		<1.12E-06
5	115	50.0	55.0	5	17377.15	17377.15	0.00	5	0.00			20		<1.12E-06
6	115	50.0	55.0	5	17377.95	17377.95	0.00	5	0.00			20		<1.12E-06
7	115	50.0	55.0	5	17379.95	17379.95	0.00	5	0.00			30		<8.31E-07
8	115	50.0	55.0	5	17379.90	17379.90	0.00	5	0.00			30		<8.31E-07
9	115	50.0	55.0	5	17380.15	17380.15	0.00	5	0.00			30		<8.31E-07

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

SUMMARY OF PACKER TESTING DATA - CH-60
GENERAL MOTORS CET
BEDFORD FACILITY

Test Interval (ft BGS)		Average Hydraulic Conductivity (cm/sec)				
Top	Bottom	Pressure 1	Pressure 2	Pressure 3	AVG.	Comment
17	22	<3.00E-06	<2.05E-06	NT	<2.53E-06	
21	26	<3.00E-06	<2.05E-06	<1.56E-06	<2.20E-06	
25	30	<3.00E-06	<2.05E-06	<1.56E-06	<2.20E-06	

Notes:

1. NT = Not tested
2. Highest possible K used in average calculation with no water take

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-60	**Location:** GM Bedford			**Sheet No.** 1 **of** 2
Date Started: September 11, 2012	**Date Completed:** September 11, 2012	**Surface Elevation:** 620.2	**Depth to Rock:** 7.0 feet BGS	**Depth to Groundwater:** 13.11 feet TOC	
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 622.07	**Stickup (ft):** 2.4

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	17.0	22.0	5	17409.05	17409.05	0.00	5	0.00			5		<3.00E-06
2	110	17.0	22.0	5	17409.40	17409.40	0.00	5	0.00			5		<3.00E-06
3	110	17.0	22.0	5	17409.80	17409.80	0.00	5	0.00			5		<3.00E-06
4	110	17.0	22.0	5	17410.45	17410.45	0.00	5	0.00			10		<2.05E-06
5	110	17.0	22.0	5	17411.10	17411.10	0.00	5	0.00			10		<2.05E-06
6	110	17.0	22.0	5	17411.75	17411.75	0.00	5	0.00			10		<2.05E-06
7				0			0.00	5	0.00					#NUM!
8				0			0.00	5	0.00					#NUM!
9				0			0.00	5	0.00					#NUM!
1	110	21.0	26.0	5	17403.35	17403.35	0.00	5	0.00			5		<3.00E-06
2	110	21.0	26.0	5	17403.80	17403.80	0.00	5	0.00			5		<3.00E-06
3	110	21.0	26.0	5	17404.25	17404.25	0.00	5	0.00			5		<3.00E-06
4	110	21.0	26.0	5	17405.95	17405.95	0.00	5	0.00			10		<2.05E-06
5	110	21.0	26.0	5	17405.50	17405.50	0.00	5	0.00			10		<2.05E-06
6	110	21.0	26.0	5	17406.10	17406.10	0.00	5	0.00			10		<2.05E-06
7	110	21.0	26.0	5	17406.80	17406.80	0.00	5	0.00			15		<1.56E-06
8	110	21.0	26.0	5	17407.65	17407.65	0.00	5	0.00			15		<1.56E-06
9	110	21.0	26.0	5	17408.40	17408.40	0.00	5	0.00			15		<1.56E-06

CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).
- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.
(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

REPORT OF WATER PRESSURE TESTING

Project No.: 013968	**Hole No.:** CH-60	**Location:** GM Bedford			**Sheet No.** 2 **of** 2
Date Started: September 11, 2012	**Date Completed:** September 11, 2012	**Surface Elevation:** 620.2	**Depth to Rock:** 7.0 feet BGS	**Depth to Groundwater:** 13.11 feet TOC	
Logged By: KMV	**Client:** GM LLC	**Gage Height:** 2.67 feet AGS	**Boring Radius (ft) = r_w** 0.16	**TOC Elevation:** 622.07	**Stickup (ft):** 2.4

Test No.	*Packer Inflation Pressure (psi)*	*Depth From*	*Depth To*	*Length of Interval Tested (feet)*	*Water Meter* (gal) *Start*	*Water Meter* (gal) *End*	*Water Pumped/Injected (cu. ft) (gal)(1)*	*Elapsed Time (min.)*	*(Q) Rate (gpd)*	*Pressure: Static Borehole (psi)*	*Pressure: Line Gauge (psi)*	*Pressure: Test Borehole (psi)*	*Pressure: Recorder Sensitivity (%)*	*Hydraulic Conductivity (cm/s)*
1	110	25.0	30.0	5	17296.75	17296.75	0.00	5	0.00			5		<3.00E-06
2	110	25.0	30.0	5	17297.15	17297.15	0.00	5	0.00			5		<3.00E-06
3	110	25.0	30.0	5	17297.70	17297.70	0.00	5	0.00			5		<3.00E-06
4	110	25.0	30.0	5	17298.35	17298.35	0.00	5	0.00			10		<2.05E-06
5	110	25.0	30.0	5	17299.10	17299.10	0.00	5	0.00			10		<2.05E-06
6	110	25.0	30.0	5	17299.80	17299.80	0.00	5	0.00			10		<2.05E-06
7	110	25.0	30.0	5	17300.70	17300.70	0.00	5	0.00			15		<1.56E-06
8	110	25.0	30.0	5	17301.60	17301.60	0.00	5	0.00			15		<1.56E-06
9	110	25.0	30.0	5	17302.40	17302.40	0.00	5	0.00			15		<1.56E-06
1				0			0.00	5	0.00					#NUM!
2				0			0.00	5	0.00					#NUM!
3				0			0.00	5	0.00					#NUM!
4				0			0.00	5	0.00					#NUM!
5				0			0.00	5	0.00					#NUM!
6				0			0.00	5	0.00					#NUM!
7				0			0.00	5	0.00					#NUM!
8				0			0.00	5	0.00					#NUM!
9				0			0.00	5	0.00					#NUM!

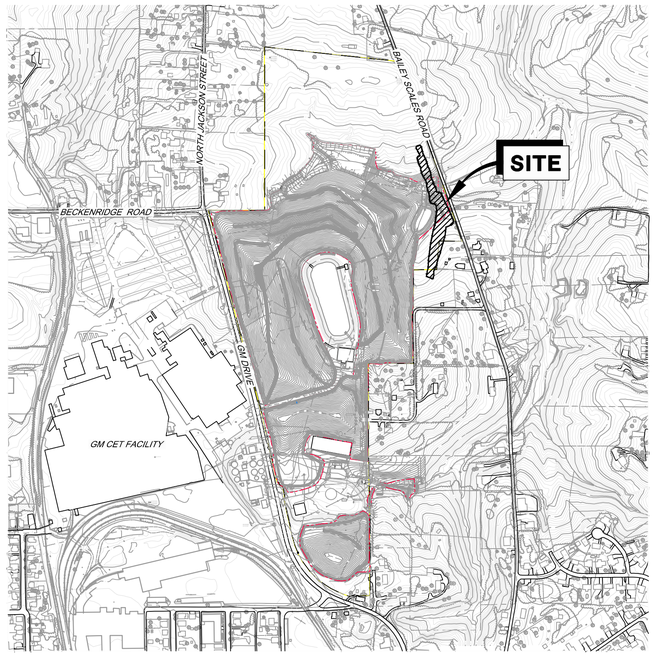
CRA Note: - Gauge Pressure (in psi = 0.433 x ft water).

- Column Pressure = Depth to upper packer to depth to groundwater, whichever is smaller.

(1) Conversion Factor: 7.48 U.S. Gallons = 1 cu. ft.

Appendix E

Design Drawings



KEY MAP

DRAWING INDEX

DWG. No.	TITLE
C-01	EXISTING SITE CONDITIONS
C-02	SITE WORKS - OVERALL AREA
C-02A	SITE WORKS - NORTH AREA
C-02B	SITE WORKS - SOUTH AREA
C-03	FORCEMAIN/ELECTRICAL CONDUIT LAYOUT
C-04	OVERBURDEN EXCAVATION PLAN AND SECTIONS
C-05	GROUNDWATER COLLECTION SYSTEM PLAN AND PROFILE
C-06	GROUNDWATER COLLECTION SYSTEM DETAILS (1 OF 2)
C-07	GROUNDWATER COLLECTION SYSTEM DETAILS (2 OF 2)
C-08	SOILS EROSION AND SEDIMENT CONTROL PLAN
C-09	SOILS EROSION AND SEDIMENT CONTROL DETAILS
C-10	WET WELL DETAILS (1 OF 3)
C-11	WET WELL DETAILS (2 OF 3)
C-12	WET WELL DETAILS (3 OF 3)
C-13	OVERALL PLAN - CONSTRUCTION ACCESS ROADS
C-14	GWTP CONSTRUCTION ACCESS ROAD (OBSOLETE)
C-15	PILOT TRENCH CONSTRUCTION ACCESS ROAD
C-16	CONSTRUCTION ACCESS ROAD DETAILS
E-01	ELECTRICAL SITE PLAN
E-02	ELECTRICAL DISTRIBUTION AND CONTROL SCHEMATIC
E-03	GROUNDING PLAN SECTIONS AND DETAILS
CS1-001	OVERALL EXISTING CONDITIONS SITE PLAN
CS1-002	OVERALL PROPOSED CONDITIONS SITE PLAN
CS1-003	PROPOSED CONDITIONS SITE PLAN
CS1-005	CIVIL SITE PLAN (1 OF 2)
CS3-001	ROAD CROSS SECTIONS
CS5-001	CIVIL DETAILS
CU3-001	PIPELINE PROFILES (1 OF 3)
CU3-002	PIPELINE PROFILES (2 OF 3)
CU3-003	PIPELINE PROFILES (3 OF 3)
CU3-004	CULVERT PROFILE

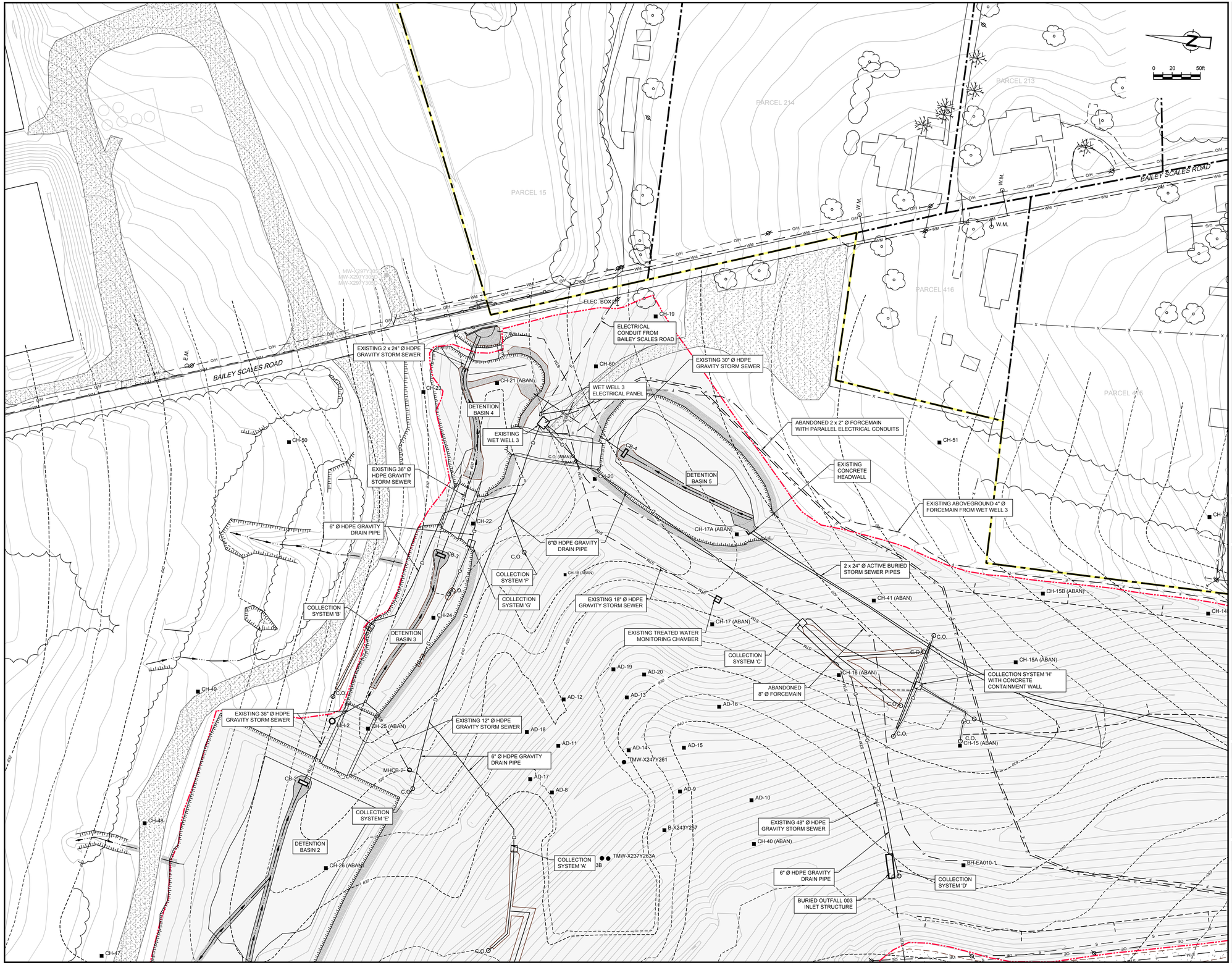
EAST PLANT AREA
GROUNDWATER COLLECTION SYSTEM
BEDROCK PILOT TRENCH DESIGN

ISSUED FOR CONSTRUCTION
REVISION 1 : SEPT. 3, 2015

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

CONESTOGA-ROVERS & ASSOCIATES

13968-00(365)GN-WA001 SEP 3/2015



NO.	Revision	Date	Initial

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- CH-20 EXISTING BOREHOLE
- C.O. EXISTING CLEANOUT
- MH-2 EXISTING MANHOLE
- CB-3 EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

EXISTING SITE CONDITIONS

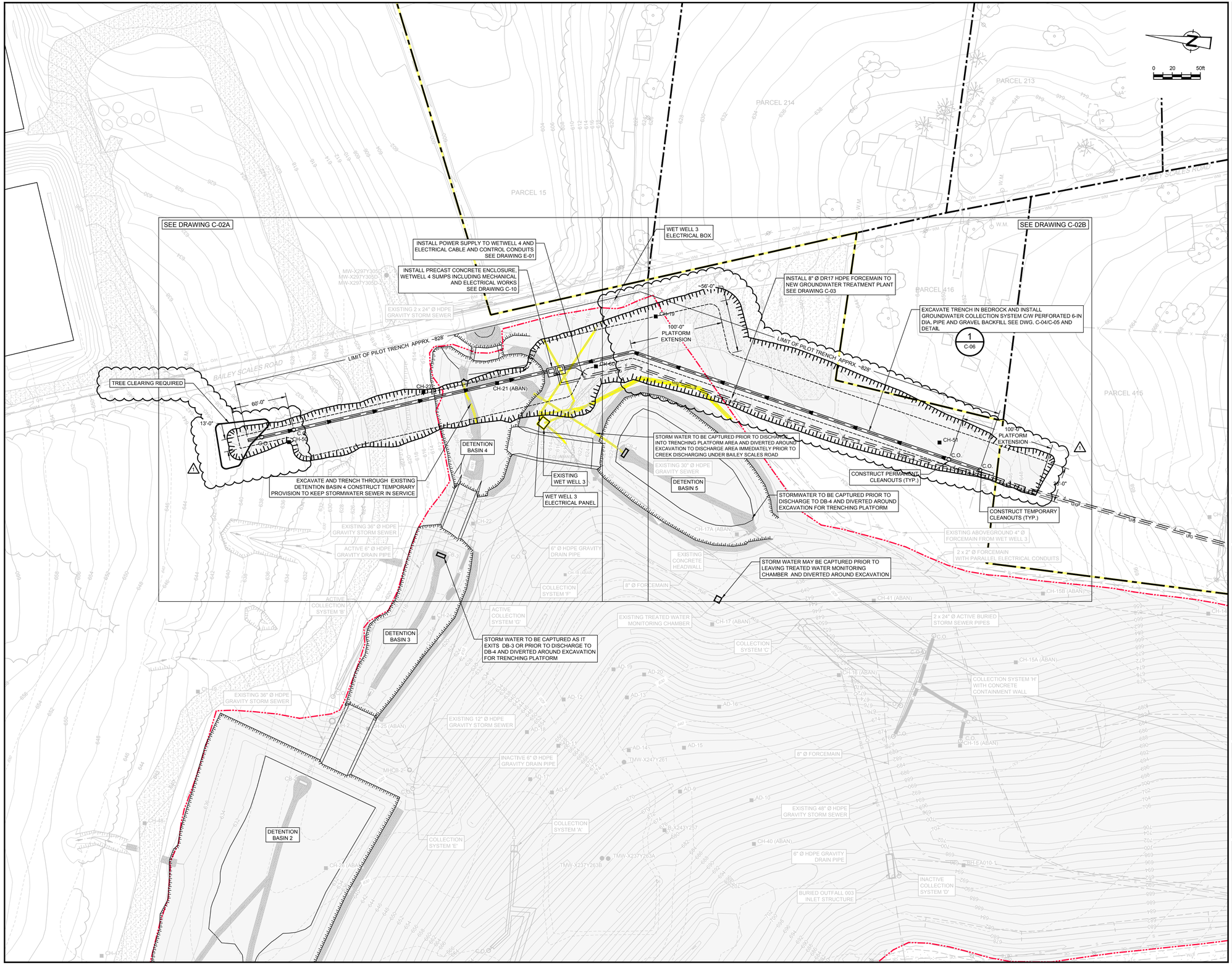
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

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

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=50'	Project No: 13968-00	Report No: 365	Drawing No: C-01

13968-00(365)CI-WA001 AUG 31/2015



NO	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GUARD RAIL
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED HDPE FORCEMAIN
- PROPOSED PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

SITE WORKS
OVERALL AREA

CONESTOGA-ROVERS & ASSOCIATES

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

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=50'	Project NO: 13968-00	Report NO: 365	Drawing NO: C-02

13968-00(365)CI-WA002 SEP 3/2015

Nº	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

0 10 20ft

PHONE/CABLE TV
HEIGHT AT SOUTHERN POLE: 20.7'
HEIGHT AT NORTHERN POLE: 24.5'

MW-X297Y305D
MW-X297Y305D-1
MW-X297Y305D-2

WET WELL 3
ELECTRICAL BOX

ELECTRICAL CONDUIT FROM
BAILEY SCALES ROAD

INSTALL POWER SUPPLY TO WETWELL AND
ELECTRICAL CABLE AND CONTROL CONDUITS
SEE DRAWING E-01

INSTALL PRECAST CONCRETE ENCLOSURE
WETWELL SUMPS INCLUDING MECHANICAL
AND ELECTRICAL WORKS
SEE DRAWING C-10

ELEC. BOX

EXISTING 2 x 24" Ø HDPE
GRAVITY STORM SEWER

LIMIT OF PILOT TRENCH APPRX. ~828'

N: 1324429.06
E: 3125069.92

N: 1324358.62
E: 3125095.68

N: 1324446.59
E: 3125063.50

EXCAVATE TRENCH IN BEDROCK AND INSTALL GROUNDWATER
COLLECTION SYSTEM C/W PERFORATED 6-IN DIA. PIPE AND
GRAVEL BACKFILL SEE DWG. C-04/C-05 AND DETAIL
1 / C-06

E.M.

BAILEY SCALES ROAD

EXCAVATE AND TRENCH THROUGH EXISTING
DETENTION BASIN 4 CONSTRUCT TEMPORARY
PROVISION TO KEEP STORMWATER SEWER IN SERVICE

CH-21 (ABAN)

CH-60

60'-0"

TREE CLEARING REQUIRED

1

13'

38'-0"

SLOPE 14.0%

CH-50

N: 1324707.63
E: 3124968.03

CONSTRUCT TEMPORARY
CLEANOUTS (TYP.)

CONSTRUCT PERMANENT
CLEANOUTS (TYP.)

N: 1324754.59
E: 3124950.85

CLEAR EXISTING VEGETATION WITHIN
THE EXCAVATION WORK LIMIT

WET WELL 3
ELECTRICAL PANEL

DETENTION
BASIN 4

EXISTING
WET WELL 3

EXISTING 30" Ø HDPE
GRAVITY SEWER

EXISTING 36" Ø HDPE
GRAVITY STORM SEWER

6" Ø HDPE GRAVITY
DRAIN PIPE

ACTIVE 6" Ø HDPE
GRAVITY DRAIN PIPE

ACTIVE
COLLECTION
SYSTEM 'G'

COLLECTION
SYSTEM 'F'

DETENTION
BASIN 3

STORM WATER TO BE CAPTURED AS IT
EXITS DB-3 OR PRIOR TO DISCHARGE TO
DB-4 AND DIVERTED AROUND EXCAVATION
FOR TRENCHING PLATFORM

CH-18 (ABAN)

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING RAILROAD TRACKS
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GUARD RAIL
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- MW-X233Y120A — EXISTING MONITORING WELL TO/IN ROCK
- CH-20 — EXISTING BOREHOLE
- C.O. — EXISTING CLEANOUT
- MH-2 — EXISTING MANHOLE
- CB-3 — EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED BEDROCK PILOT TRENCH
- C.O. — PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - PILOT TRENCH

SITE WORKS
NORTH AREA

CONESTOGA-ROVERS & ASSOCIATES

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

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=20'	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-02A

PHONE/CABLE TV
HEIGHT AT SOUTHERN POLE: 18.5'
HEIGHT AT NORTHERN POLE: 20.7'

GUY CABLE
HEIGHT AT EASTERN POLE: 28.1'
HEIGHT AT WESTERN POLE: 23.3'

PHONE/CABLE TV
HEIGHT AT SOUTHERN POLE: 18.2'
HEIGHT AT NORTHERN POLE: 18.5'

W.M.

N: 1324278.23
E: 3125156.25

INSTALL 8" Ø DR17 HDPE FORCEMAIN TO NEW GROUNDWATER TREATMENT PLANT SEE DRAWING C-03

EXCAVATE TRENCH IN BEDROCK AND INSTALL GROUNDWATER COLLECTION SYSTEM C/W PERFORATED 6-IN DIA. PIPE AND GRAVEL BACKFILL SEE DWG. C-04/C-05 AND DETAIL 1/C-06

CLEAR ANY ADDITIONAL EXISTING VEGETATION WITHIN THE EXCAVATION WORK LIMIT

N: 1324358.62
E: 3125095.68

100'-0" PLATFORM EXTENSION

~56'-0"

LIMIT OF PILOT TRENCH, APPRX. 928'

N: 1324254.35
E: 3125107.19

SLOPE 7.0%

100'-0" PLATFORM EXTENSION

CH-51

N: 1324008.93
E: 3125023.65

CONSTRUCT PERMANENT CLEANOUTS (TYP.)

CONSTRUCT TEMPORARY CLEANOUTS (TYP.)

N: 1323974.70
E: 3125016.59

N: 1323912.35
E: 3124997.11

STORM WATER TO BE CAPTURED PRIOR TO DISCHARGE INTO TRENCHING PLATFORM AREA AND DIVERTED AROUND EXCAVATION TO DISCHARGE AREA IMMEDIATELY PRIOR TO CREEK DISCHARGING UNDER BAILEY SCALES ROAD

DETENTION BASIN 5

STORMWATER TO BE CAPTURED PRIOR TO DISCHARGE TO DB-4 AND DIVERTED AROUND EXCAVATION FOR TRENCHING PLATFORM

EXISTING CONCRETE HEADWALL

EXISTING ABOVEGROUND 4" Ø FORCEMAIN FROM WET WELL 3

2 x 2" Ø FORCEMAIN WITH PARALLEL ELECTRICAL CONDUITS

8" Ø FORCEMAIN

PARCEL 416

CH-17A (ABAN)

CH-41 (ABAN)

CH-15B (ABAN)

0 10 20ft

NO	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED BEDROCK PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - PILOT TRENCH

SITE WORKS
SOUTH AREA

CONESTOGA-ROVERS & ASSOCIATES

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

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=20'	Project No: 13968-00	Report No: 365	Drawing No: C-02B

13968-00(365)CI-WA012 SEP 3/2015

N

0 20 50ft

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

WET WELL 4
INSTALL PRECAST 6' x 8' CONCRETE ENCLOSURE WETWELL SUMPS INCLUDING MECHANICAL AND ELECTRICAL WORKS
SEE DWG. C-10

INSTALL FORCEMAIN TO NEW GROUNDWATER TREATMENT PLANT

INSTALL POWER SUPPLY AND ELECTRICAL CONTROL CONDUITS TO WET WELL 4

PILOT TRENCH GROUNDWATER COLLECTION SYSTEM
SEE DWG C-02

INSTALL 8" Ø DR17 HDPE FROM WET WELL 4 TO EQ TANK AT NEW GROUNDWATER TREATMENT PLANT (SEE DWG. CS1-003)

INSTALL AND CONNECT ELECTRICAL POWER AND CONTROL CABLES TO ELECTRICAL ROOM IN NEW GROUNDWATER TREATMENT PLANT (SEE DWG. E-01)

SURFACE WATER/ GROUNDWATER WTP BUILDING

BARLOW LANE

Nº	Revision	Date	Initial
1	ADJUSTED TRENCH AND FORCEMAIN ALIGNMENT	SEPT 3, 2015	C.R.H.

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
ISSUED FOR CLIENT REVIEW	APRIL 30, 2013	C.R.H.
Status	Date	Initial

SCALE VERIFICATION

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

Approved

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

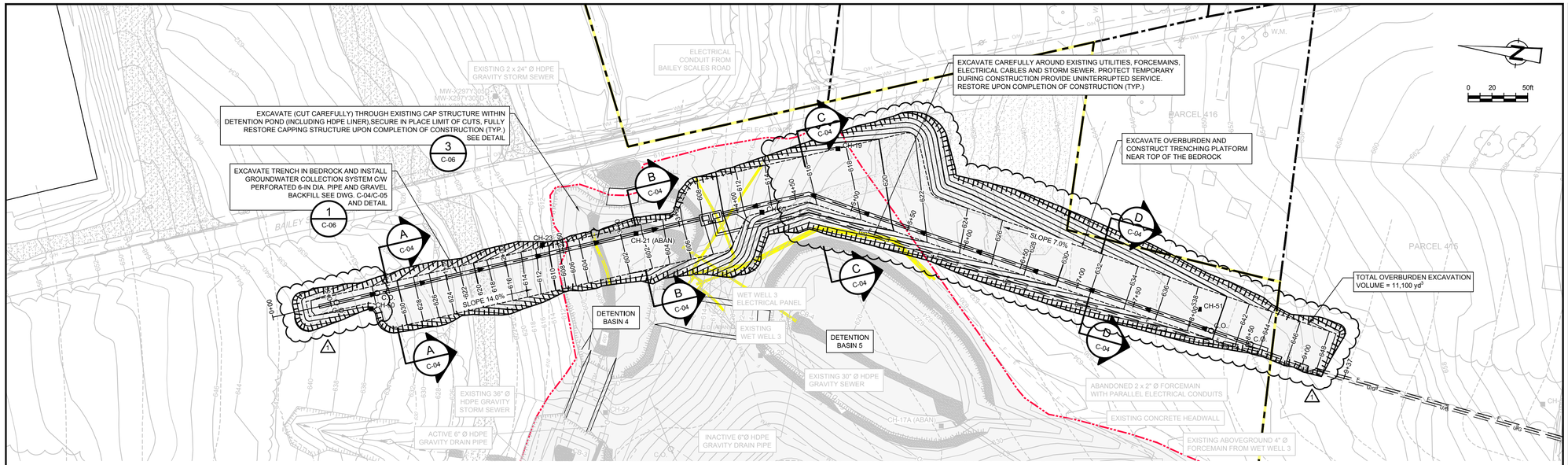
FORCEMAIN/ELECTRICAL CONDUIT LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

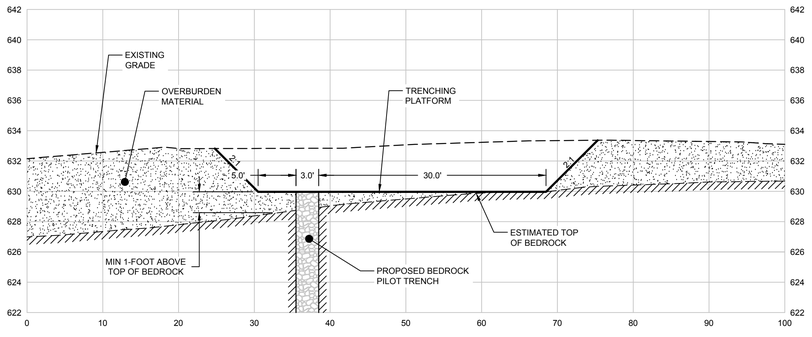
Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=50'	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-03

13968-00(365)CI-WA011 SEP 3/2015



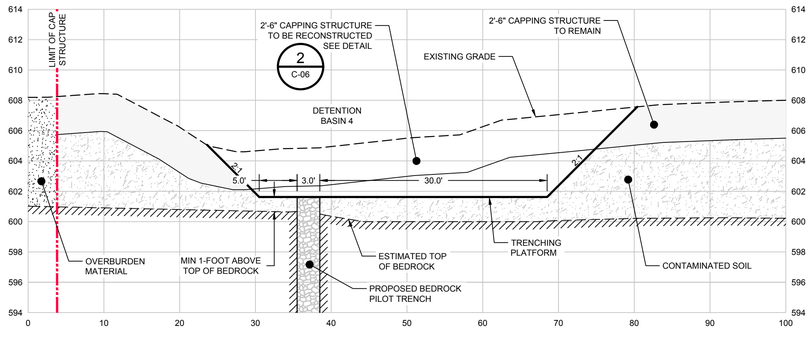
PLAN

SCALE: 1"=50'



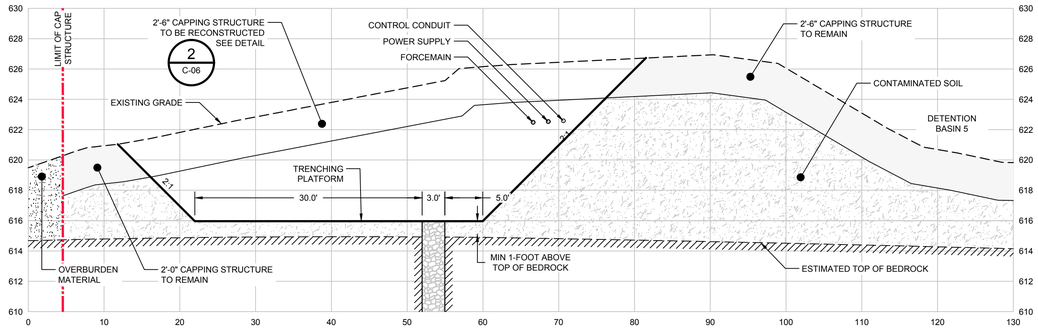
SECTION A @ STA. 1+00

HORZ: 1"=10'
VERT: 1"=5'



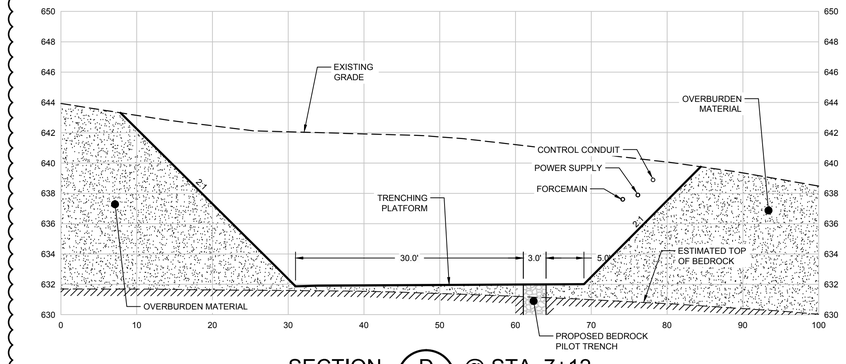
SECTION B @ STA. 3+14

HORZ: 1"=10'
VERT: 1"=5'



SECTION C @ STA. 4+64

HORZ: 1"=10'
VERT: 1"=5'



SECTION D @ STA. 7+12

HORZ: 1"=10'
VERT: 1"=5'

NO	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GUARD RAIL
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED BEDROCK PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
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RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

OVERBURDEN EXCAVATION PLAN AND SECTIONS

CONESTOGA-ROVERS & ASSOCIATES

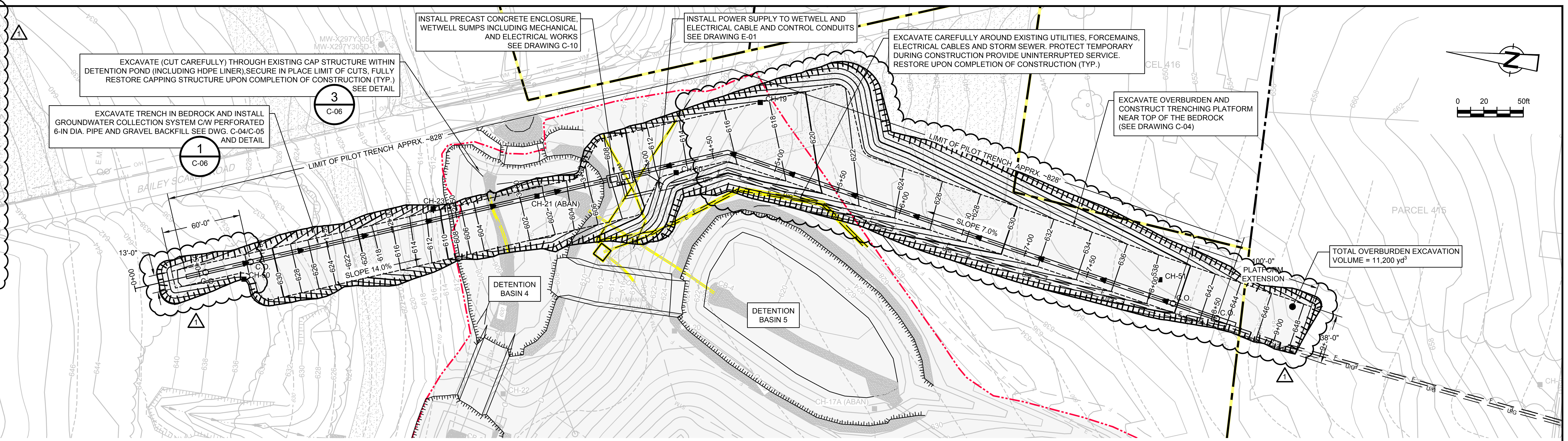
Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project NO: 13968-00	Report NO: 365	Drawing NO: C-04

13968-00(365)CI-WA005 SEP 3/2015

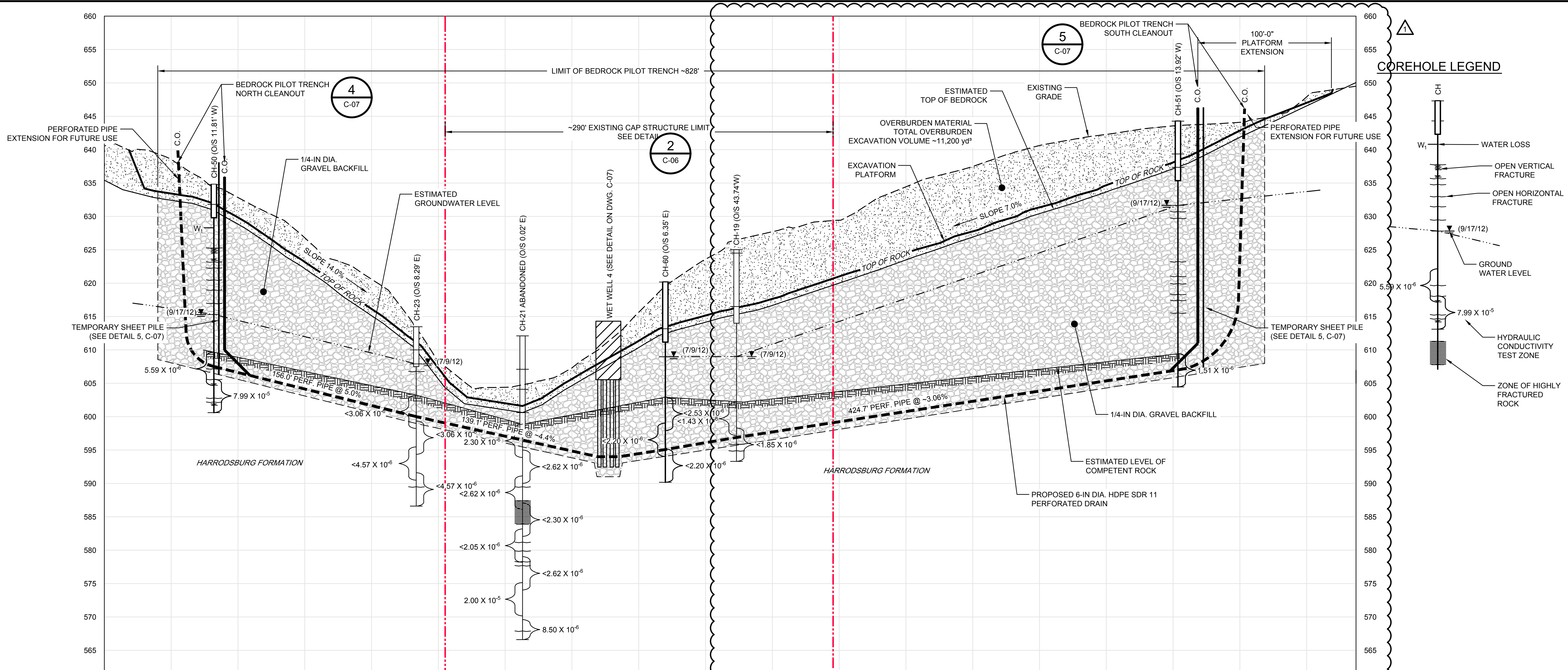
PROPOSED BEDROCK PILOT TRENCH ALIGNMENT LAYOUT

STATION	NORTHING	EASTING
0+00	1324792.15	3124937.10
0+50	1324745.19	3124954.27
1+00	1324698.23	3124971.45
1+50	1324651.28	3124988.63
2+00	1324604.32	3125005.80
2+50	1324557.37	3125022.98
3+00	1324510.41	3125040.16
3+50	1324463.45	3125057.34
4+00	1324416.49	3125074.51
4+50	1324369.53	3125091.67
5+00	1324321.03	3125087.91
5+50	1324272.05	3125077.83
6+00	1324223.08	3125067.74
6+50	1324174.11	3125057.65
7+00	1324125.14	3125047.57
7+50	1324076.17	3125037.48
8+00	1324027.19	3125027.39
8+50	1323978.22	3125017.30
9+00	1323929.25	3125007.21
9+37	1323893.01	3124999.74



PLAN

SCALE: 1"=50'



CHAINAGE	EXISTING GRADE ELEVATION	TOP OF GRADING PLATFORM ELEVATION	COLLECTION PIPE INVERT ELEVATION
0+00		636.41	
0+50		633.44	
0+81.99	634.77		607.5
1+00		629.96	
1+50		623.41	
2+00		616.39	
2+33.46	613.46		600.00
2+50		607.27	
3+00		602.04	
3+13.02	604.83		596.49
3+50		605.81	
3+77.29	611.27		594.00
4+00		611.53	
4+19.96	620.16		595.07
4+50		615.17	
4+73.18	625.01		596.88
5+00		618.10	
5+50		621.39	
6+00		624.89	
6+50		628.31	
7+00		631.66	
7+50		634.89	
8+00 8+03.70	644.26	638.24	607.00
8+50		642.55	
9+00 9+10		647.33 648.30	

PROFILE

HORZ: 1"=50'

VERT: 1"=10'

Nº	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GUARD RAIL
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED PLATFORM CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED LIMIT OF EARTHWORK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED BEDROCK PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.

GM CET BEDFORD FACILITY BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

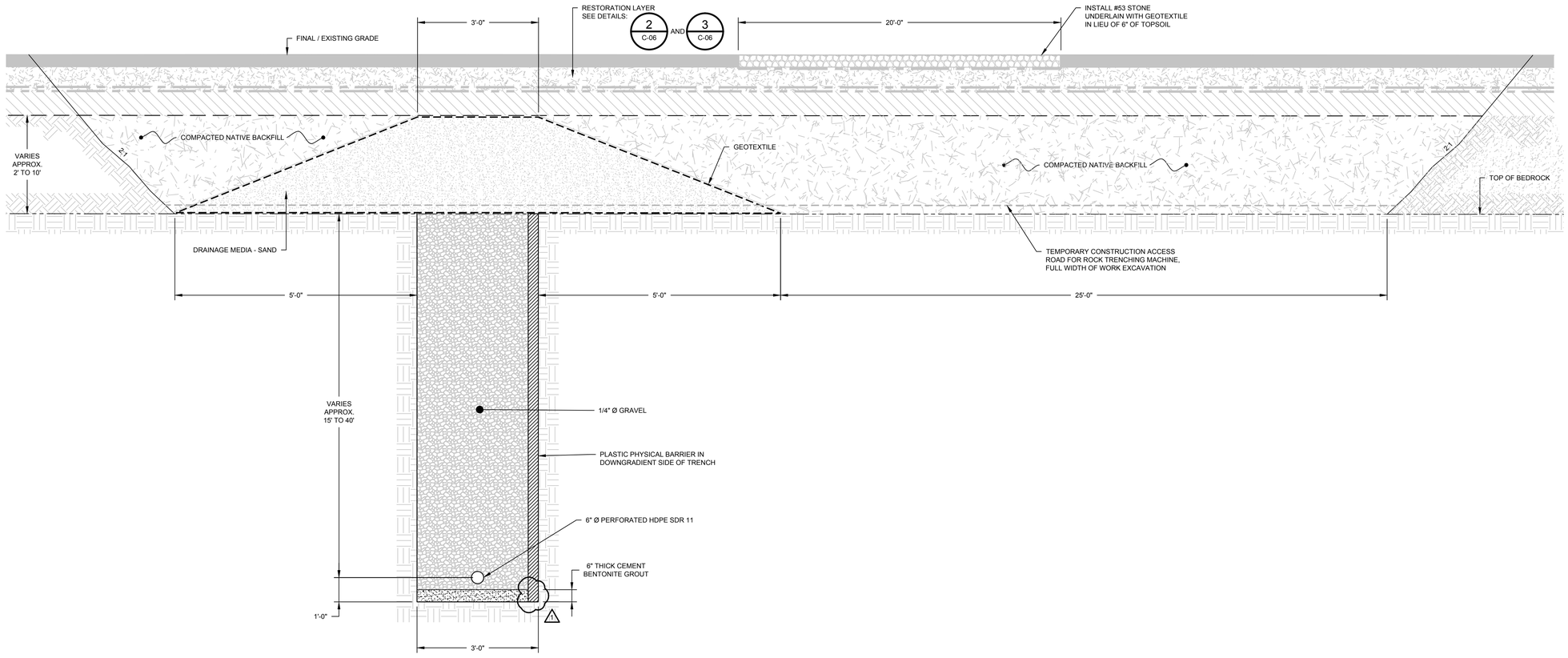
GROUNDWATER COLLECTION SYSTEM PLAN AND PROFILE

CONESTOGA-ROVERS & ASSOCIATES

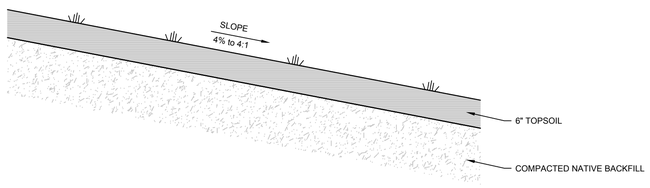
Source Reference: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001

Project Manager: J.M.	Reviewed By: C.R.H.	Date: JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-05

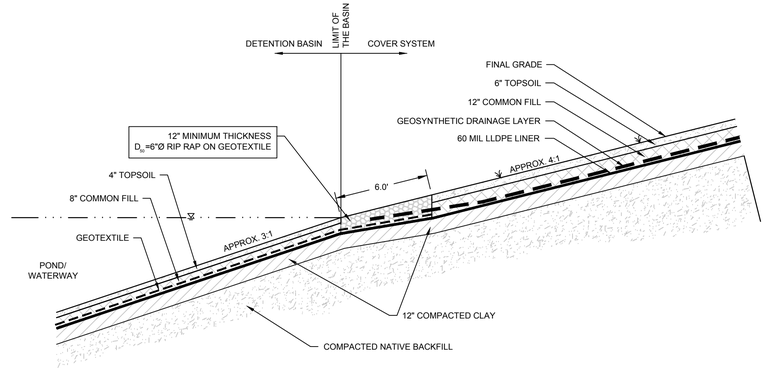
13968-00(365)CI-WA006 SEP 3/2015



DETAIL 1 BEDROCK PILOT TRENCH DETAIL
N.T.S. C-02, C-2A, C-2B, C-04 AND C-05



DETAIL 2 RESTORATION OUTSIDE EXISTING COVER SYSTEM
N.T.S. C-04 AND C-05



DETAIL 3 RESTORATION WITHIN EXISTING COVER SYSTEM
N.T.S. C-04 AND C-05

Nº	Revision	Date	Initial
1	CORRECTED SHEET PILING DETAIL	AUG 24, 2015	C.R.H.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ADDENDUM #1	MAY 26, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

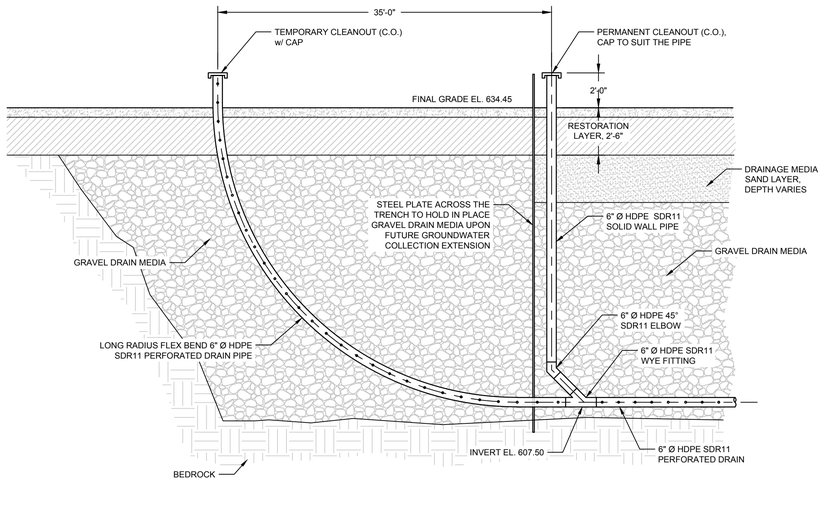
GROUNDWATER COLLECTION SYSTEM DETAILS (1 OF 2)

CONESTOGA-ROVERS & ASSOCIATES

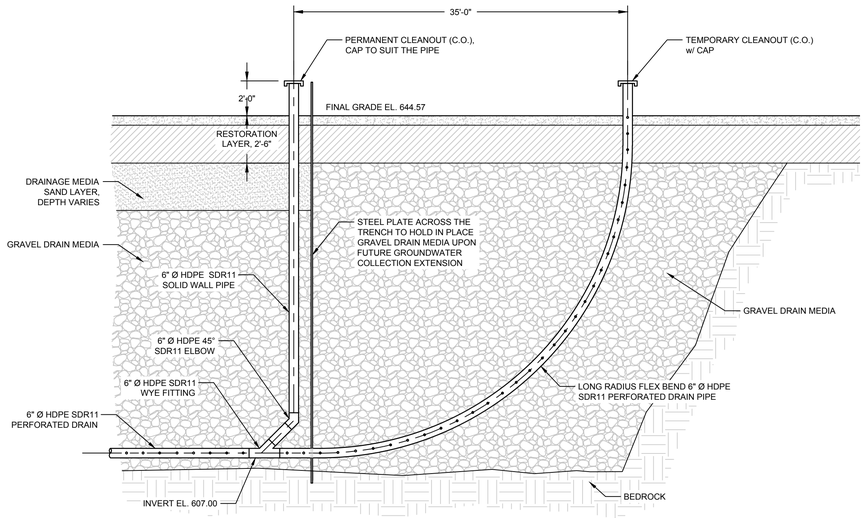
Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-06

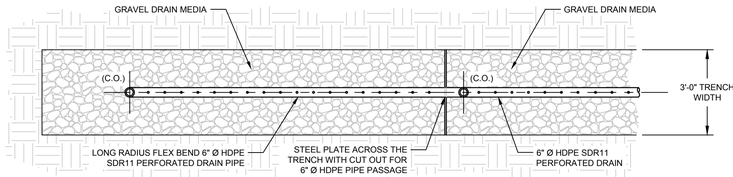
13968-00(365)CI-WA008 SEP 3/2015



ELEVATION VIEW

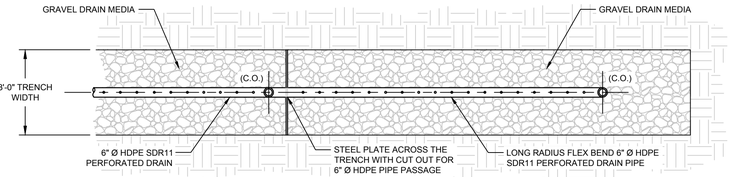


ELEVATION VIEW



PLAN

DETAIL 4 NORTH CLEANOUT
N.T.S. C-05



PLAN

DETAIL 5 SOUTH CLEANOUT
N.T.S. C-05

Nº	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

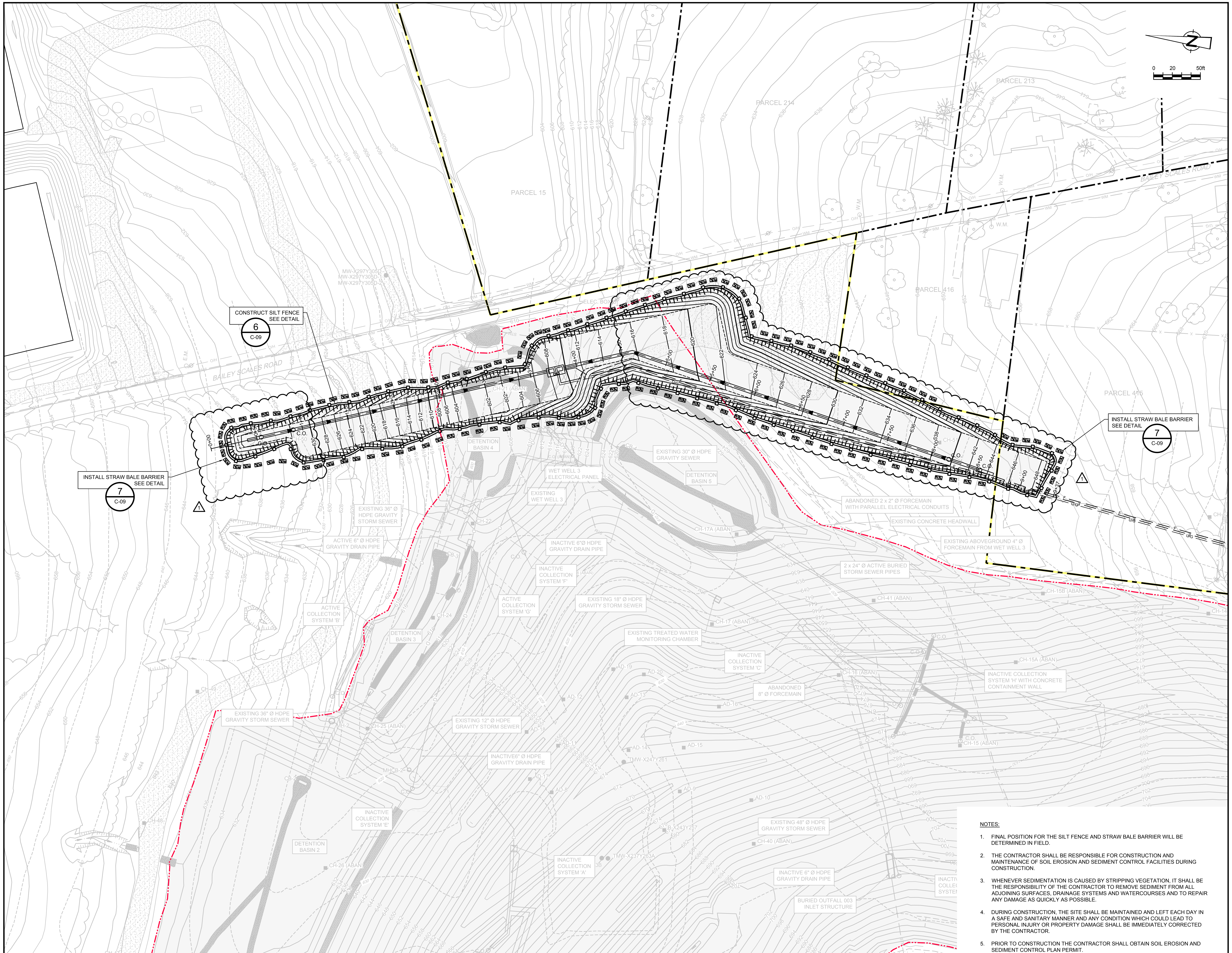
GROUNDWATER COLLECTION SYSTEM DETAILS (2 OF 2)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-07

13968-00(365)CI-WA015 AUG 31/2015



NOTES:

1. FINAL POSITION FOR THE SILT FENCE AND STRAW BALE BARRIER WILL BE DETERMINED IN FIELD.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION AND MAINTENANCE OF SOIL EROSION AND SEDIMENT CONTROL FACILITIES DURING CONSTRUCTION.
3. WHENEVER SEDIMENTATION IS CAUSED BY STRIPPING VEGETATION, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE SEDIMENT FROM ALL ADJOINING SURFACES, DRAINAGE SYSTEMS AND WATERCOURSES AND TO REPAIR ANY DAMAGE AS QUICKLY AS POSSIBLE.
4. DURING CONSTRUCTION, THE SITE SHALL BE MAINTAINED AND LEFT EACH DAY IN A SAFE AND SANITARY MANNER AND ANY CONDITION WHICH COULD LEAD TO PERSONAL INJURY OR PROPERTY DAMAGE SHALL BE IMMEDIATELY CORRECTED BY THE CONTRACTOR.
5. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL OBTAIN SOIL EROSION AND SEDIMENT CONTROL PLAN PERMIT.

№	Revision	Date	Initial
1	ADJUSTED TRENCH ALIGNMENT	SEPT 3, 2015	C.R.H.

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GUARD RAIL
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- EXISTING GRAVEL ROAD AREA
- PROPOSED SILT FENCE
- PROPOSED STRAW BALE BARRIER
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED BEDROCK PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
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RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT 26, 2014	C.R.H.

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

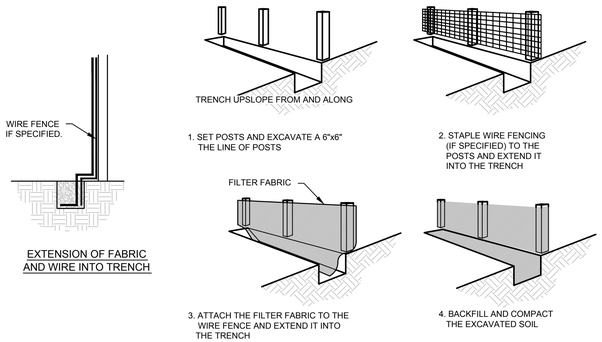
SOIL EROSION AND SEDIMENT CONTROL PLAN

CONESTOGA-ROVERS & ASSOCIATES

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

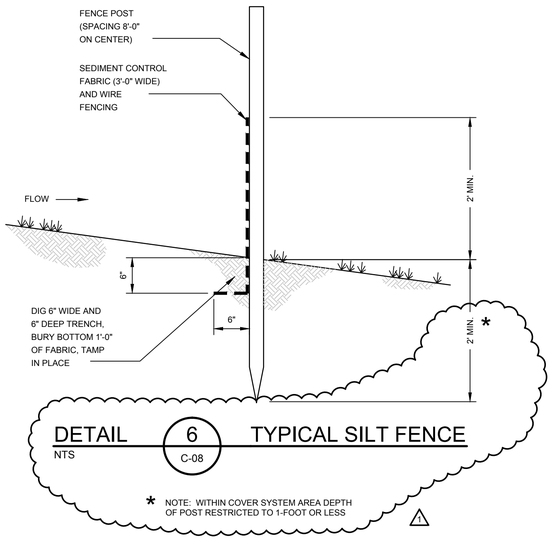
Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1"=50'	Project №: 13968-00	Report №: 365	Drawing №: C-08

13968-00(365)CI-WA003 SEP 3/2015



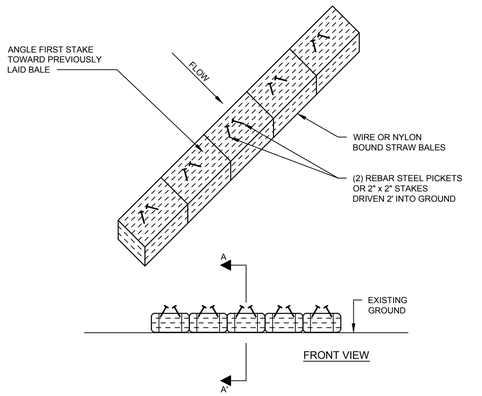
EXTENSION OF FABRIC AND WIRE INTO TRENCH

SILT FENCE INSTALLATION SEQUENCE



DETAIL 6 TYPICAL SILT FENCE
NTS C-08

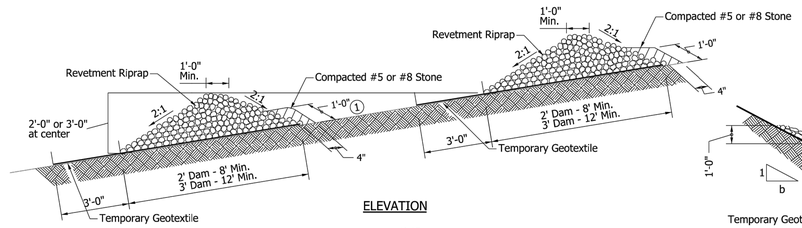
* NOTE: WITHIN COVER SYSTEM AREA DEPTH OF POST RESTRICTED TO 1-FOOT OR LESS



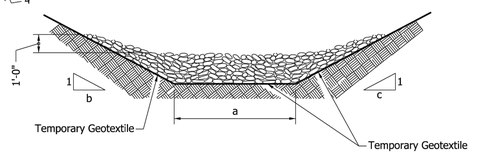
SECTION A - A'

NOTES:
1. INSTALL SECOND ROW OF STRAW BALES IN BOTTOM OF SWALE ONLY.

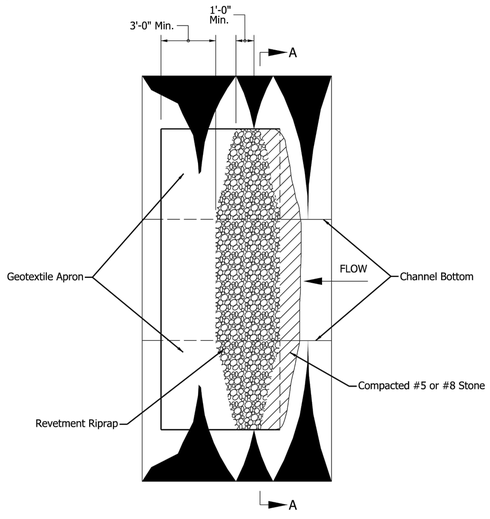
DETAIL 7 STRAW BALE
NTS C-08



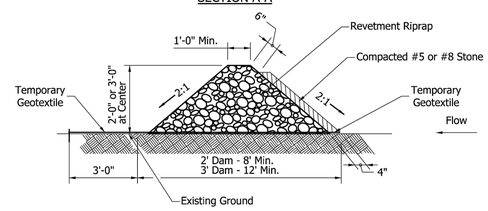
ELEVATION



SECTION A-A



PLAN



CHECK DAM MODIFIED

DETAIL 7b INDOT ROCK CHECK DAM
NTS --

NOTES:

① Riprap ditch check dams shall be spaced such that the top of the downstream check dam is at the same elevation as the toe of the adjacent upstream check dam.

INDIANA DEPARTMENT OF TRANSPORTATION	
TEMPORARY CHECK DAM REVETMENT RIPRAP SEPTEMBER 2012	
STANDARD DRAWING NO. E 205-TECD-01	
RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER	/s/ Richard L. VanCleave 09/04/12 SUPERVISOR, ROADWAY STANDARDS DATE /s/ Mark A. Miller 09/04/12 CHIEF ENGINEER DATE

Nº	Revision	Date	Initial
1	REVISED DETAIL 6 - SILT FENCE POST MIN. DEPTH	SEPT 3, 2015	C.R.H.

NOTES:

1. FINAL POSITION FOR THE SILT FENCE AND STRAW BALE BARRIER WILL BE DETERMINED IN FIELD.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION AND MAINTENANCE OF SOIL EROSION AND SEDIMENT CONTROL FACILITIES DURING CONSTRUCTION.
3. WHENEVER SEDIMENTATION IS CAUSED BY STRIPPING VEGETATION, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE IT FROM ALL ADJOINING SURFACES, DRAINAGE SYSTEMS AND WATERCOURSES AND TO REPAIR ANY DAMAGE AS QUICKLY AS POSSIBLE.
4. DURING CONSTRUCTION, THE SITE SHALL BE MAINTAINED AND LEFT EACH DAY IN A SAFE AND SANITARY MANNER AND ANY CONDITION WHICH COULD LEAD TO PERSONAL INJURY OR PROPERTY DAMAGE SHALL BE IMMEDIATELY CORRECTED BY THE CONTRACTOR.
5. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL OBTAIN SOIL EROSION AND SEDIMENT CONTROL PLAN PERMIT.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

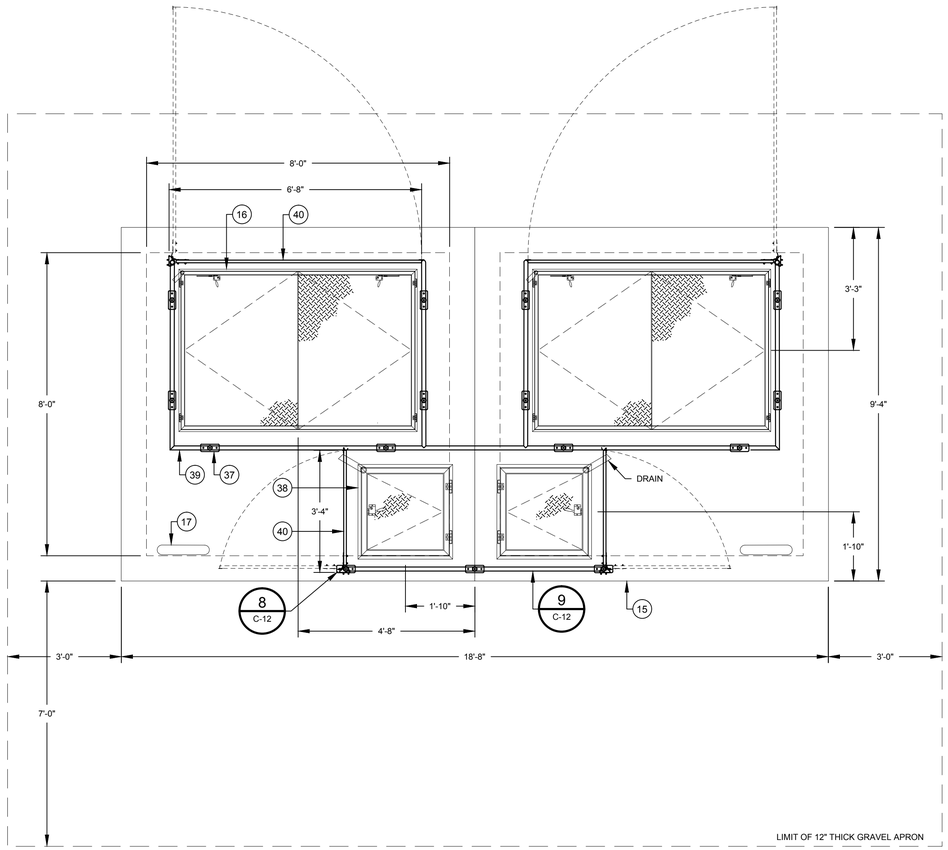
GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

SOILS EROSION AND SEDIMENT CONTROL DETAILS

CONESTOGA-ROVERS & ASSOCIATES

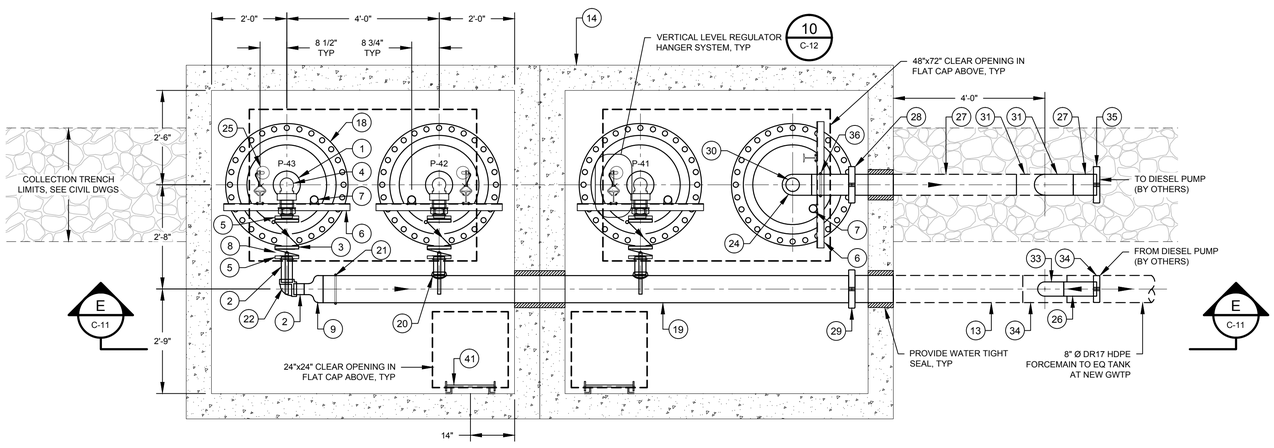
Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-09



PLAN @ COVER

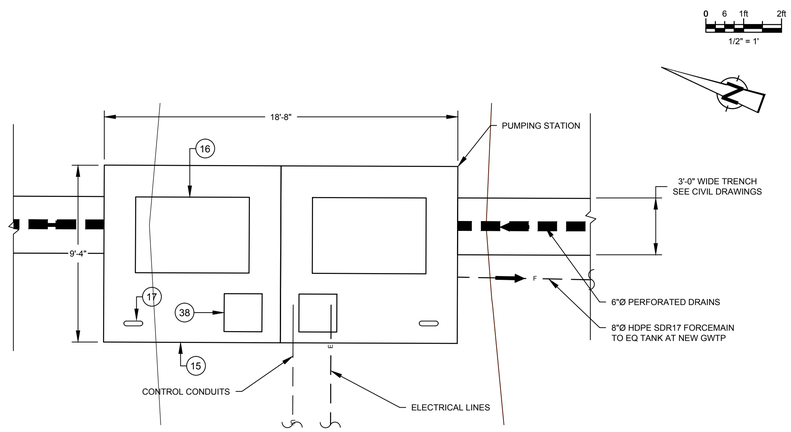
SCALE: 1/2"=1'-0"



NOTE:
SEE DRAWINGS C-02 AND C-03 FOR WET WELL LOCATION AND ORIENTATION

PLAN ABOVE EL 612.00

SCALE: 1/2"=1'-0"



SEE DWG'S E-02/E-03

BILL OF MATERIALS

MARK	DESCRIPTION
1	EPG-ELECTRICAL SUBMERSIBLE PUMP SERIES S60, MODEL 60-6, 25 HP, 3 PHASE, 460 VOLTS, 3 INCH DISCHARGE, VERTICAL SUMP DRAINER, Q= 340 USGPM AT TDH=166FT. C/W STARTER CONTROL PANEL
2	3"Ø CS GALVANIZED PIPE
3	EPG 3"Ø CHECK VALVE, TYPE CVSE300
4	EPG 3"Ø PITLESS ADAPTOR NW SERIES MTD ON CHANNEL AT MID POINT
5	3"Ø NPT FLANGE ADAPTOR
6	C8X11.5 STEEL CHANNEL WELD OR BOLT TO 24" STEEL PIPE
7	EPG 2"Ø PERFORATED PVC STILLING WELL MOUNTED TO C-CHANNEL WITH 2 U-BOLT CLAMPS
8	3"Ø WAFER STYLE BUTTERFLY VALVE C/W HANDLE AND 10 POSITION NOTCH PLATE
9	3"Ø x 8"Ø CS GALVANIZED CONCENTRIC INCREASER
10	30"Ø X 18" LONG CS GALVANIZED PIPE C/W FLANGE
11	30"Ø HDPE ADAPTOR RING AND STEEL BACKING FLANGE
12	STILLING WELL LATERAL SUPPORT MOUNTED TO 30"Ø HDPE SDR9 PIPE SUMP AT 12" ABOVE WELL PIPE PERFORATIONS AND BOTTOM OF WELL PIPE AND AT MID POINT, TYP
13	8"Ø DR17 HDPE FORCEMAIN
14	8'-0"x8'-0"x8'-0" HIGH PRECAST CONCRETE VAULT SECTION
15	8'-0"x8'-0" PRECAST CONCRETE FLAT CAP C/W CAST-IN-PLACE BILCO HATCH, VERIFY SIZE WITH HATCH SUPPLIER
16	4'-0"x6'-0" CLEAR OPENING, ACCESS DOOR TYPE JD, BILCO OR EQUAL C/W LOCK, HANDLE, CAST INTO CAP, VERIFY WITH HATCH SUPPLIER
17	3"Ø GALVANIZED VENT PIPE C/W GOOSE NECK AND INSECT SCREEN
18	30"Ø HDPE SDR9 PIPE SUMP, WITH PERFORATED BOTTOM.
19	8"Ø CS GALVANIZED PIPE
20	3"Ø WELDOLET
21	6"Ø U-BOLT CLAMP AND FLOOR STANCHION
22	3"Ø x 90° THREADED CS GALVANIZED THREADED ELBOW
23	1 1/4"Ø BOLTS, NUTS AND WASHERS TO SUIT
24	6"Ø CS GALVANIZED ELBOW
25	VERTICAL LEVEL REGULATOR HANGER ASSEMBLY WITH FIBERGLASS FRP GUIDE RAIL I-BEAM MOUNTED AT BOTTOM TO WELL PIPE BASE, TO CHANNEL AT TOP OF WELL PIPE AND AT ITEM 15 UP TO U/S OF ITEM 16 WITH CHAIN HOOK
26	4"Ø DR17 HDPE PIPE
27	6"Ø CS GALVANIZED PIPE
28	6"Ø VICTAULIC SNAP-JOINT (STYLE 78) WITH GASKET SEALS
29	8"Ø VICTAULIC SNAP-JOINT (STYLE 78) WITH GASKET SEALS
30	3"Ø THREADED REMOVAL LEG WELDED TO HEEL OF 6"Ø ELBOW UP TO U/S OF ITEM 16
31	6"Ø x 90° DR17 HDPE LR ELBOW
32	4"Ø x 90° DR17 HDPE ELBOW
33	8"x4" HDPE REDUCER TEE
34	4"Ø VICTAULIC RIGID COUPLING (STYLE HP-70) WITH CAP END
35	6"Ø VICTAULIC RIGID COUPLING (STYLE HP-70) WITH CAP END
36	6"Ø U-BOLT CLAMP
37	GUARDRAIL POST ANCHORAGE
38	2'-0"x2'-0" CLEAR OPENING, ACCESS DOOR TYPE J, BILCO OR EQUAL C/W LOCK, HANDLE, CAST INTO CAP, VERIFY WITH HATCH SUPPLIER
39	42" STD OSHA RAILING SYSTEM WITH MID-RAIL, 1½"Ø GALVANIZED PIPE C/W CLAMP COMPONENTS
40	SELF CLOSING GALVANIZED LADDER SAFETY GATE
41	ALUMINUM ACCESS LADDER
42	30"Ø x 12" LONG CS GALVANIZED PIPE C/W FLANGE
43	6"Ø DR17 HDPE PIPE

ALL EXPOSED PIPING FROM PITLESS ADAPTOR TO BE PROTECTED WITH 2" INSULATION TO EXIT FROM CHAMBER

ALL PIPING, VALVES, FITTINGS AND PIPE SUPPORTS, ACCESSORIES, EQUIPMENT AND SAFETY DEVICES WITHIN CHAMBER TO BE CS GALVANIZED UNLESS NOTED OTHERWISE

NO	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
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RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT 26 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

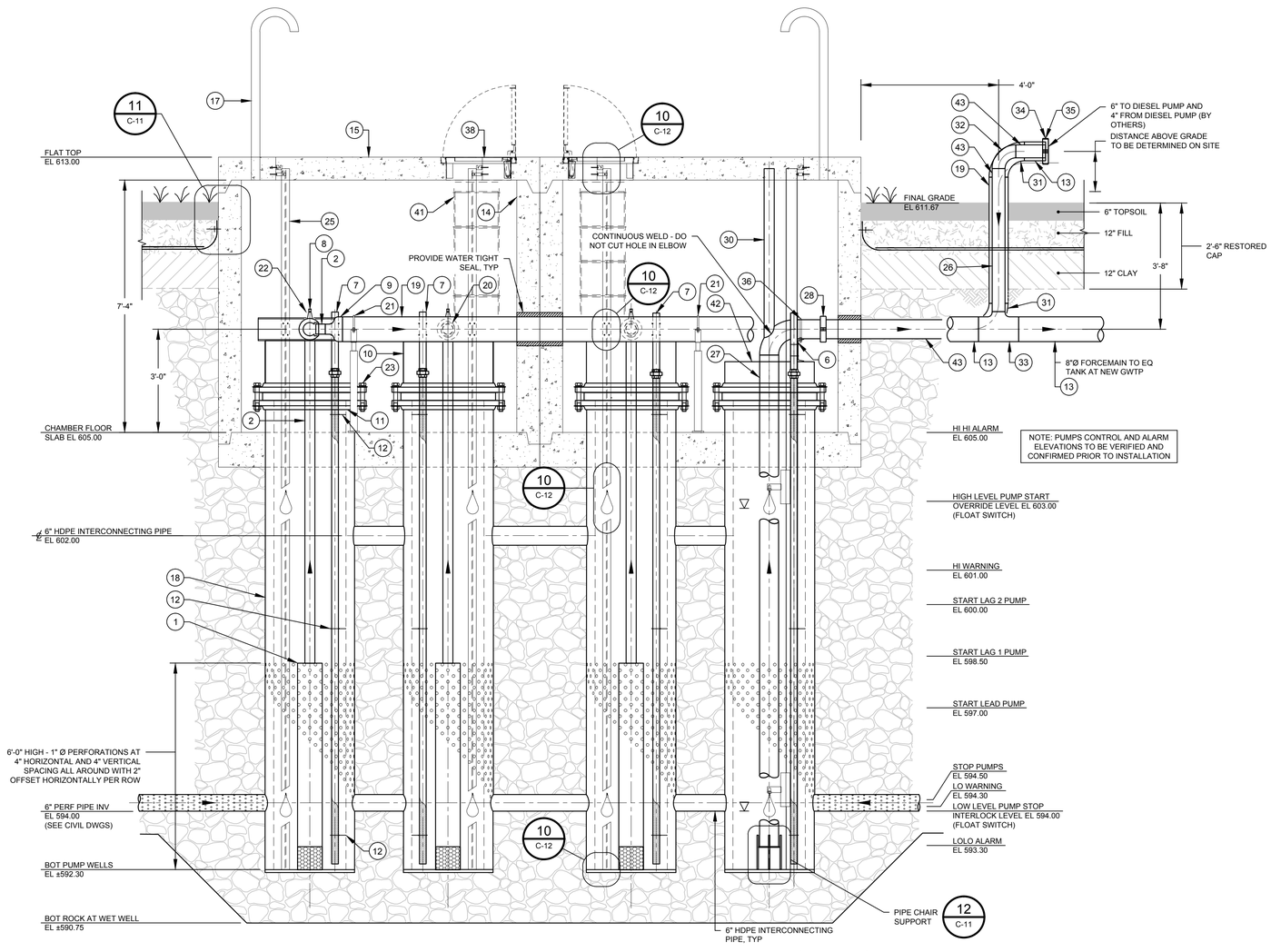
GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

WET WELL 4
DETAILS (1 OF 3)

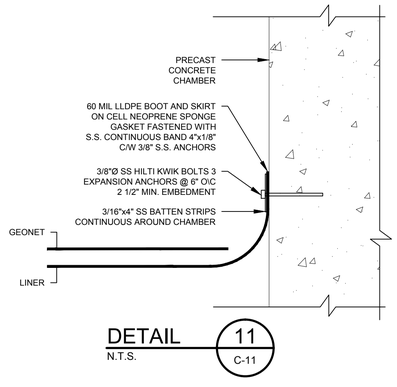
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

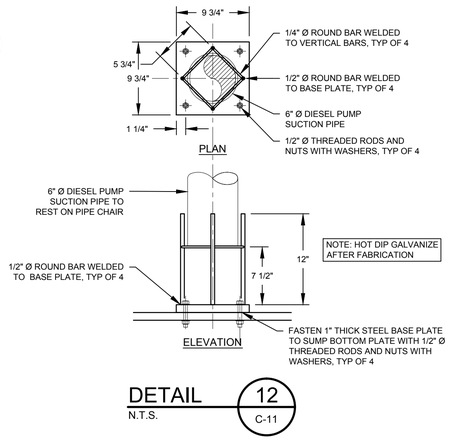
Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project No: 13968-00	Report No: 365	Drawing No: C-10



SECTION E
1/2"=1'-0"
C-10



DETAIL 11
N.T.S.
C-11



DETAIL 12
N.T.S.
C-11

BILL OF MATERIALS

MARK	DESCRIPTION
1	EPG-ELECTRICAL SUBMERSIBLE PUMP SERIES S60, MODEL 60-6, 25 HP, 3 PHASE, 460 VOLTS, 3 INCH DISCHARGE, VERTICAL SUMP DRAINER, Q= 340 USGPM AT TDH=166FT. C/W STARTER CONTROL PANEL
2	3"Ø CS GALVANIZED PIPE
3	EPG 3"Ø CHECK VALVE, TYPE CVSE300
4	EPG 3"Ø PITLESS ADAPTOR NW SERIES MTD ON CHANNEL AT MID POINT
5	3"Ø NPT FLANGE ADAPTOR
6	C8X11.5 STEEL CHANNEL WELD OR BOLT TO 24" STEEL PIPE
7	EPG 2"Ø PERFORATED PVC STILLING WELL MOUNTED TO C-CHANNEL WITH 2 U-BOLT CLAMPS
8	3"Ø WAFER STYLE BUTTERFLY VALVE C/W HANDLE AND 10 POSITION NOTCH PLATE
9	3"Ø x 8"Ø CS GALVANIZED CONCENTRIC INCREASER
10	30"Ø X 18" LONG CS GALVANIZED PIPE C/W FLANGE
11	30"Ø HDPE ADAPTOR RING AND STEEL BACKING FLANGE
12	STILLING WELL LATERAL SUPPORT MOUNTED TO 30"Ø HDPE SDR9 PIPE SUMP AT 12" ABOVE WELL PIPE PERFORATIONS AND BOTTOM OF WELL PIPE AND AT MID POINT, TYP
13	8"Ø DR17 HDPE FORCEMAIN
14	8'-0"x8'-0"x8'-0" HIGH PRECAST CONCRETE VAULT SECTION
15	8'-0"x8'-0" PRECAST CONCRETE FLAT CAP C/W CAST-IN-PLACE BILCO HATCH, VERIFY SIZE WITH HATCH SUPPLIER
16	4'-0"x6'-0" CLEAR OPENING, ACCESS DOOR TYPE JD, BILCO OR EQUAL C/W LOCK, HANDLE, CAST INTO CAP, VERIFY WITH HATCH SUPPLIER
17	3"Ø GALVANIZED VENT PIPE C/W GOOSE NECK AND INSECT SCREEN
18	30"Ø HDPE SDR9 PIPE SUMP, WITH PERFORATED BOTTOM.
19	8"Ø CS GALVANIZED PIPE
20	3"Ø WELDOLET
21	6"Ø U-BOLT CLAMP AND FLOOR STANCHION
22	3"Ø x 90° THREADED CS GALVANIZED THREADED ELBOW
23	1 1/4"Ø BOLTS, NUTS AND WASHERS TO SUIT
24	6"Ø CS GALVANIZED ELBOW
25	VERTICAL LEVEL REGULATOR HANGER ASSEMBLY WITH FIBERGLASS FRP GUIDE RAIL I-BEAM MOUNTED AT BOTTOM TO WELL PIPE BASE, TO CHANNEL AT TOP OF WELL PIPE AND AT ITEM 15 UP TO U/S OF ITEM 16 WITH CHAIN HOOK
26	4"Ø DR17 HDPE PIPE
27	6"Ø CS GALVANIZED PIPE
28	6"Ø VICTAULIC SNAP-JOINT (STYLE 78) WITH GASKET SEALS
29	8"Ø VICTAULIC SNAP-JOINT (STYLE 78) WITH GASKET SEALS
30	3"Ø THREADED REMOVAL LEG WELDED TO HEEL OF 6"Ø ELBOW UP TO U/S OF ITEM 16
31	6"Ø x 90° DR17 HDPE LR ELBOW
32	4"Ø x 90° DR17 HDPE ELBOW
33	8"x4" HDPE REDUCER TEE
34	4"Ø VICTAULIC RIGID COUPLING (STYLE HP-70) WITH CAP END
35	6"Ø VICTAULIC RIGID COUPLING (STYLE HP-70) WITH CAP END
36	6"Ø U-BOLT CLAMP
37	GUARDRAIL POST ANCHORAGE
38	2'-0"x2'-0" CLEAR OPENING, ACCESS DOOR TYPE J, BILCO OR EQUAL C/W LOCK, HANDLE, CAST INTO CAP, VERIFY WITH HATCH SUPPLIER
39	42" STD OSHA RAILING SYSTEM WITH MID-RAIL, 1½"Ø GALVANIZED PIPE C/W CLAMP COMPONENTS
40	SELF CLOSING GALVANIZED LADDER SAFETY GATE
41	ALUMINUM ACCESS LADDER
42	30"Ø x 12" LONG CS GALVANIZED PIPE C/W FLANGE
43	6"Ø DR17 HDPE PIPE

ALL EXPOSED PIPING FROM PITLESS ADAPTOR TO BE PROTECTED WITH 2" INSULATION TO EXIT FROM CHAMBER

ALL PIPING, VALVES, FITTINGS AND PIPE SUPPORTS, ACCESSORIES, EQUIPMENT AND SAFETY DEVICES WITHIN CHAMBER TO BE CS GALVANIZED UNLESS NOTED OTHERWISE

Nº	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT. 26, 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

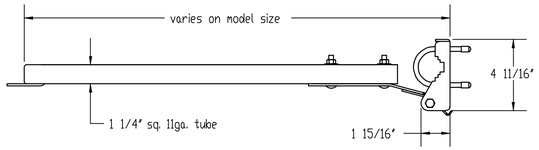
WET WELL 4
DETAILS (2 OF 3)

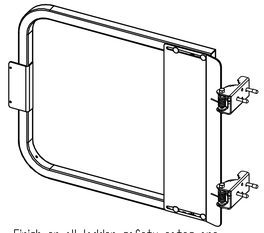
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-11

13968-00(365)CI-WA009 AUG 31/2015

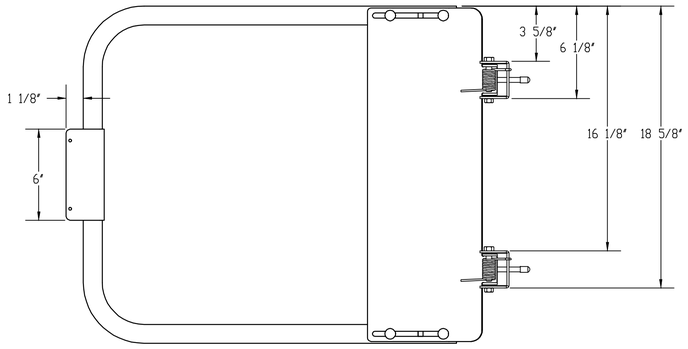


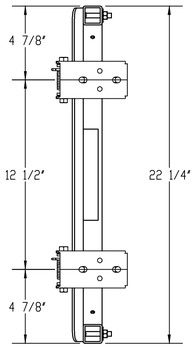


NOTE:

1. STANDARD RAILING SYSTEM COMPLY WITH OSHA 28 CFR OSHS 1910.23
2. ALL GATES AND RAILING COMPONENTS AS MANUFACTURED BY KEE SAFETY INC. BUFFALO, NY OR EQUAL.

Finish on all ladder safety gates are to be one of the follwing:
- Powder coat safety yellow
- Hot dipped galvanized
- Stainless steel

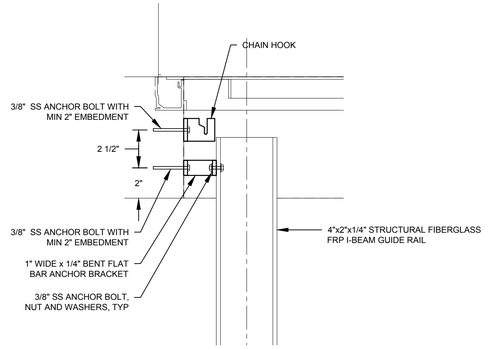




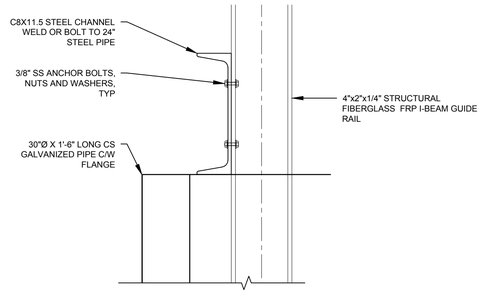
SEE NOTE 2

DETAIL 8 — SELF CLOSING STEEL GALVANIZED LADDER SAFETY GATE

N.T.S. C-10

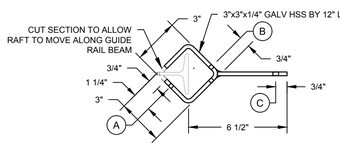


GUIDERAIL TOP SUPPORT

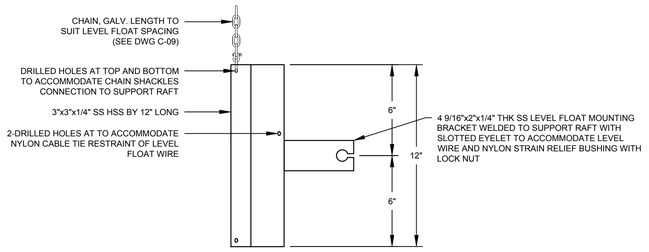


GUIDERAIL UPPER SUPPORT

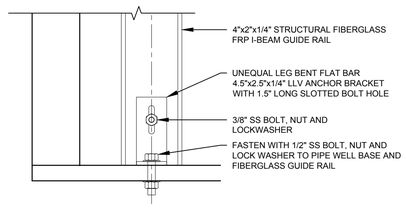
MARK	DESCRIPTION
A	DRILLED HOLES TO ACCOMMODATE CHAIN SHACKLES CONNECTION TO SUPPORT RAFT
B	DRILLED HOLES TO ACCOMMODATE NYLON CABLE TIE RESTRAINT OF LEVEL FLOAT WIRE
C	SLOTTED EYELET TO ACCOMMODATE LEVEL WIRE AND NYLON STRAIN RELIEF BUSHING WITH LOCK NUT



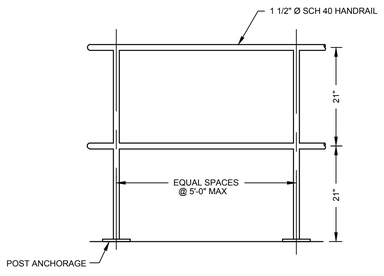
LEVEL SUPPORT RAFT - PLAN



LEVEL SUPPORT RAFT - ELEVATION



GUIDERAIL BASE ANCHOR



ELEVATION - TWO RAIL SYSTEM

DETAIL 9 — TWO RAIL GUARDRAIL

N.T.S. C-10

DETAIL 10 — VERTICAL LEVEL REGULATOR HANGER SYSTEM

N.T.S. C-10,C-11

Nº	Revision	Date	Initial

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID	MAY 11, 2015	C.R.H.
ISSUED FOR DRAFT BID DOCUMENT REVIEW	APR. 24, 2015	C.R.H.
ISSUED FOR EPA REVIEW	DEC. 01, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 25, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	NOV. 12, 2014	C.R.H.
RE-ISSUED FOR CLIENT REVIEW	SEPT 26 2014	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

WET WELL 4
DETAILS (3 OF 3)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-12

13968-00(365)CI-WA009 AUG 31/2015

N

0 20 60ft

LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING FENCE LINE
- EXISTING DIRT ROADS
- EXISTING ROADS / PAVED AREAS
- EXISTING ELECTRICAL POWER LINE
- EXISTING FORCEMAIN TO TREATMENT FACILITY
- EXISTING OVERHEAD ELECTRICAL POWER LINE
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING UNDERGROUND TELEPHONE LINE
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE GM PROPERTY BOUNDARY
- EXISTING STORM SEWER
- EXISTING GRAVITY DRAIN (HDPE SOLID WALL PIPE)
- EXISTING TOP OF BEDROCK CONTOUR
- LOW FLOW CHANNEL
- EXISTING SSC EXTRACTION TRENCH
- EXISTING MONITORING WELL TO/IN ROCK
- EXISTING BOREHOLE
- EXISTING CLEANOUT
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING POWER POLE
- EXISTING LIMIT OF CAPPING
- EXISTING RIPRAP EROSION PROTECTION
- UTILITIES TO BE TEMPORARILY RELOCATED
- PROPOSED CONTOUR
- PROPOSED EXCAVATION TRENCH PLATFORM TOP OF BANK
- PROPOSED EXCAVATION TRENCH PLATFORM BOTTOM OF BANK
- PROPOSED POWER SUPPLY
- PROPOSED CONTROL CONDUIT
- PROPOSED 6" Ø HDPE FORCEMAIN
- PROPOSED PILOT TRENCH
- PROPOSED TEMPORARY CLEANOUT

BEDROCK PILOT TRENCH

WET WELL 4

PROPOSED PILOT TRENCH CONSTRUCTION ACCESS ROAD, TO BE REPLACED WITH PERMANENT ACCESS ROAD SEE SHEET C-06

PROPOSED PILOT TRENCH CONSTRUCTION ACCESS ROAD SEE SHEET C-14

PROPOSED PILOT TRENCH STAGING AREA SEE SHEET C-15

TEMPORARY GWTP ACCESS ROAD TO BE RELOCATED

EXISTING SWM POND

EXISTING WTP BUILDING

BAILEY SCALES ROAD

BARLOW LANE

Nº	Revision	Date	Initial
1	ADJUSTED TRENCH AND ACCESS ROAD ALIGNMENT,		
	REMOVED GWTP TEMPORARY ACCESS ROAD	SEPT 3, 2015	C.R.H.

DRAWING STATUS		
ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID (ADDENDUM #1)	MAY 26, 2015	C.R.H.
Status	Date	Initial

SCALE VERIFICATION

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

Approved

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

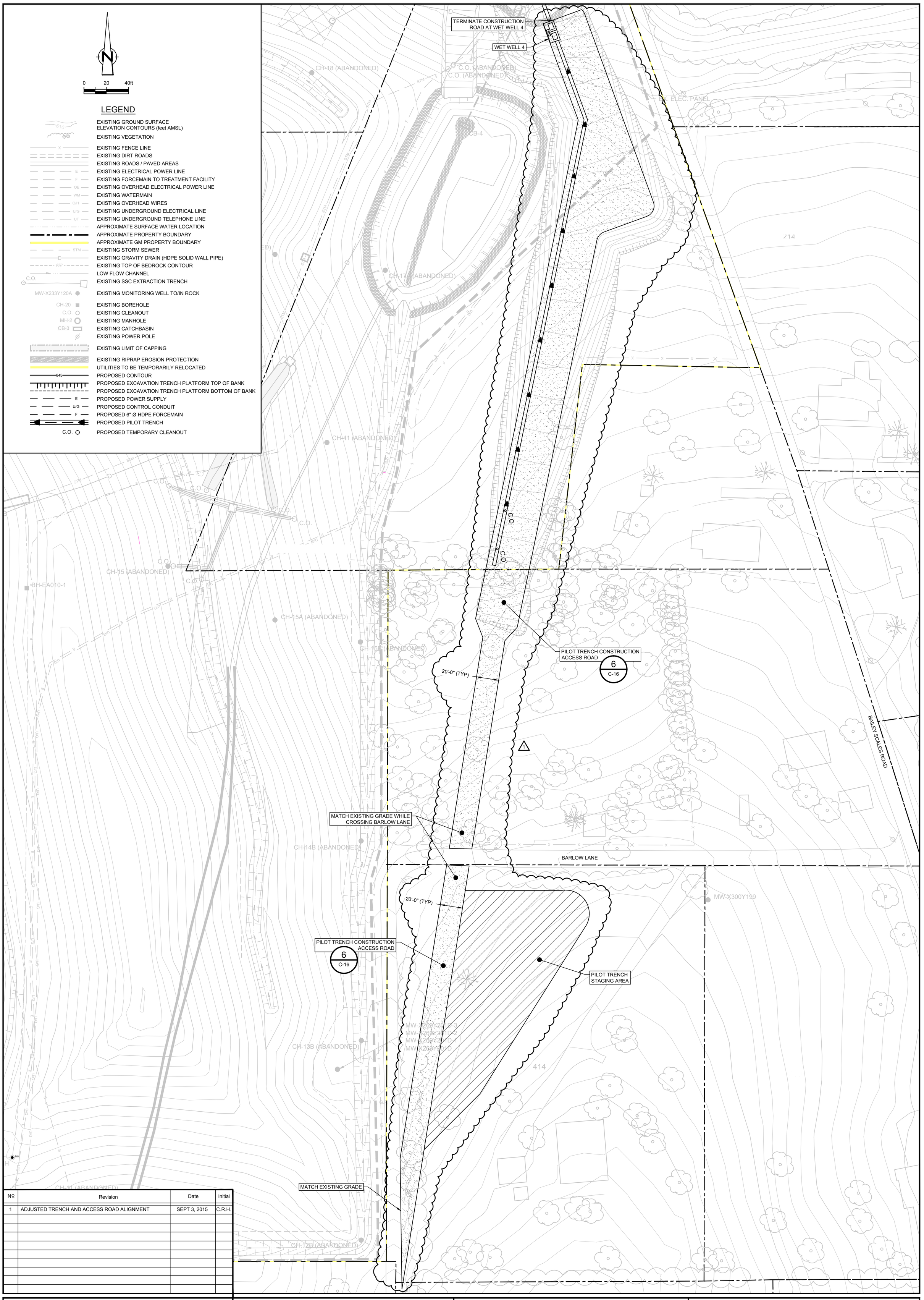
CONSTRUCTION ACCESS ROADS OVERALL SITE PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1" = 60'	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-13

13968-00(365)CI-WA016 SEP 3/2015



Nº	Revision	Date	Initial
1	ADJUSTED TRENCH AND ACCESS ROAD ALIGNMENT	SEPT 3, 2015	C.R.H.

DRAWING STATUS		
ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID (ADDENDUM #1)	MAY 26, 2015	C.R.H.
Status	Date	Initial

SCALE VERIFICATION

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

Approved

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

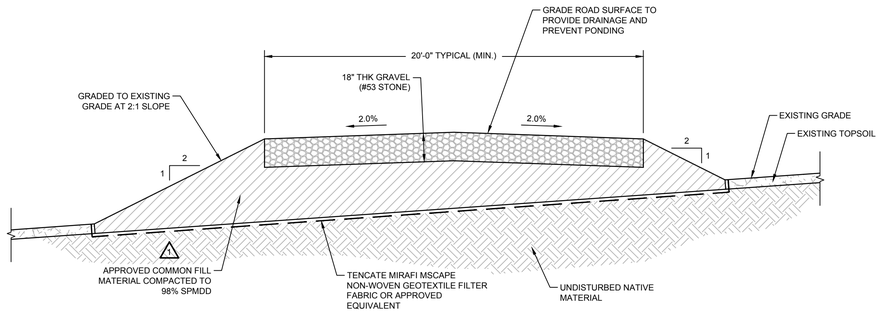
PILOT TRENCH CONSTRUCTION ACCESS ROAD

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: 1" = 40'	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-15

13968-00(365)CI-WA016 SEP 3/2015



DETAIL 6 TYPICAL CONSTRUCTION ACCESS ROAD
N.T.S. C-14,C-15

Nº	Revision	Date	Initial
1	FILL CLARIFICATION	JUN 10, 2015	C.R.H.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	JUL 20, 2015	C.R.H.
ISSUED FOR BID (ADDENDUM #2)	JUN 10, 2015	C.R.H.
ISSUED FOR BID (ADDENDUM #1)	MAY 26, 2015	C.R.H.

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

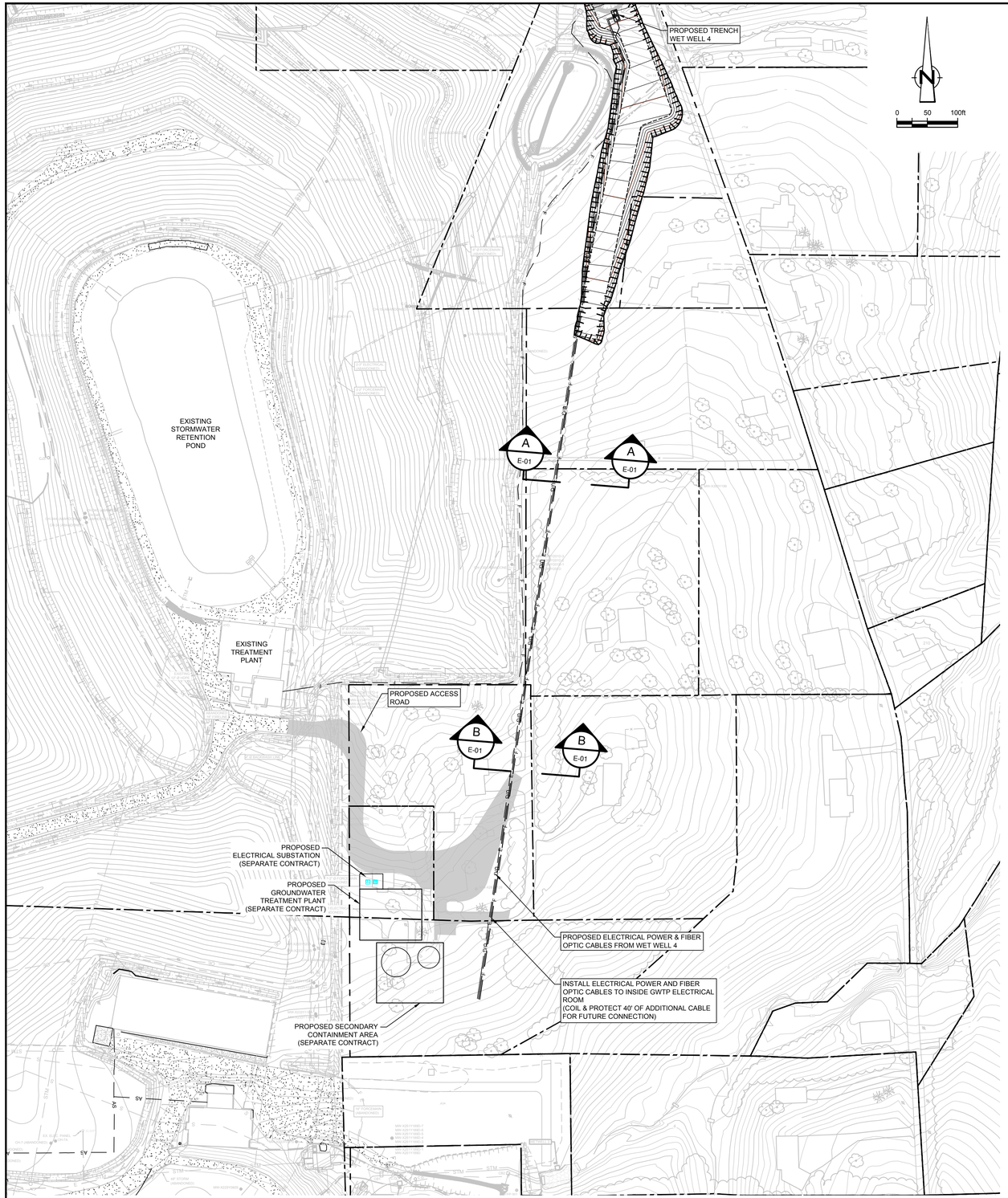
CONSTRUCTION ACCESS ROAD DETAILS

CONESTOGA-ROVERS & ASSOCIATES

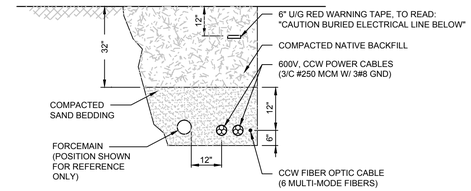
Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	C.R.H.	JULY 2015	
Scale: N.T.S.	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: C-16

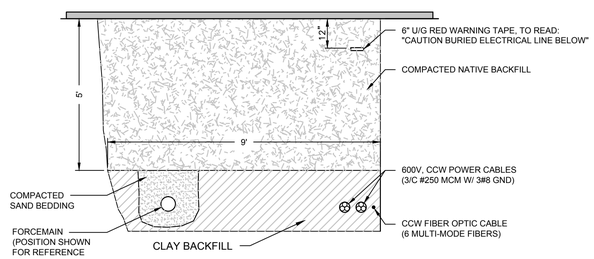
13968-00(365)CI-WA016 AUG 31/2015



ELECTRICAL SITE PLAN
1" = 100'



SECTION A E-01
NTS
TYPICAL
CABLE TRENCH



SECTION B E-01
NTS
TYPICAL ROAD
CROSS CABLE TRENCH

No	Revision	Date	Initial
1	ADJUSTED TRENCH, POWER AND FIBRE OPTIC CABLE	SEPT 3, 2015	C.R.H.
	ALIGNMENT		

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JULY 20, 2015	C.R.H.
ISSUED FOR BID	MAY 5, 2015	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

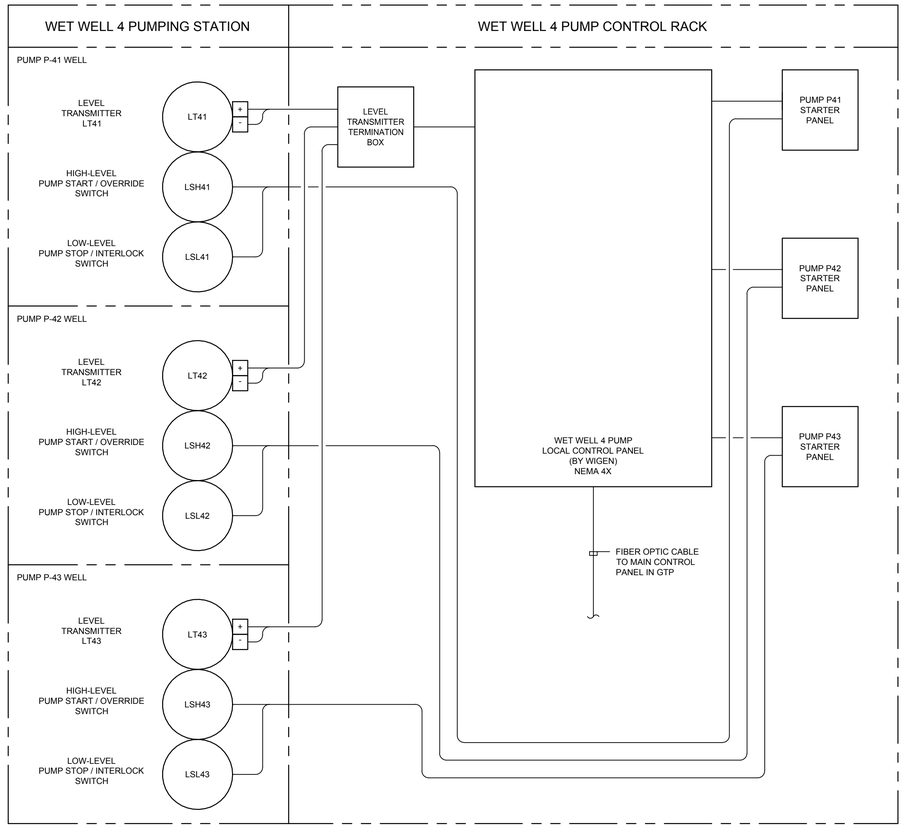
ELECTRICAL SITE PLAN

CONESTOGA-ROVERS & ASSOCIATES

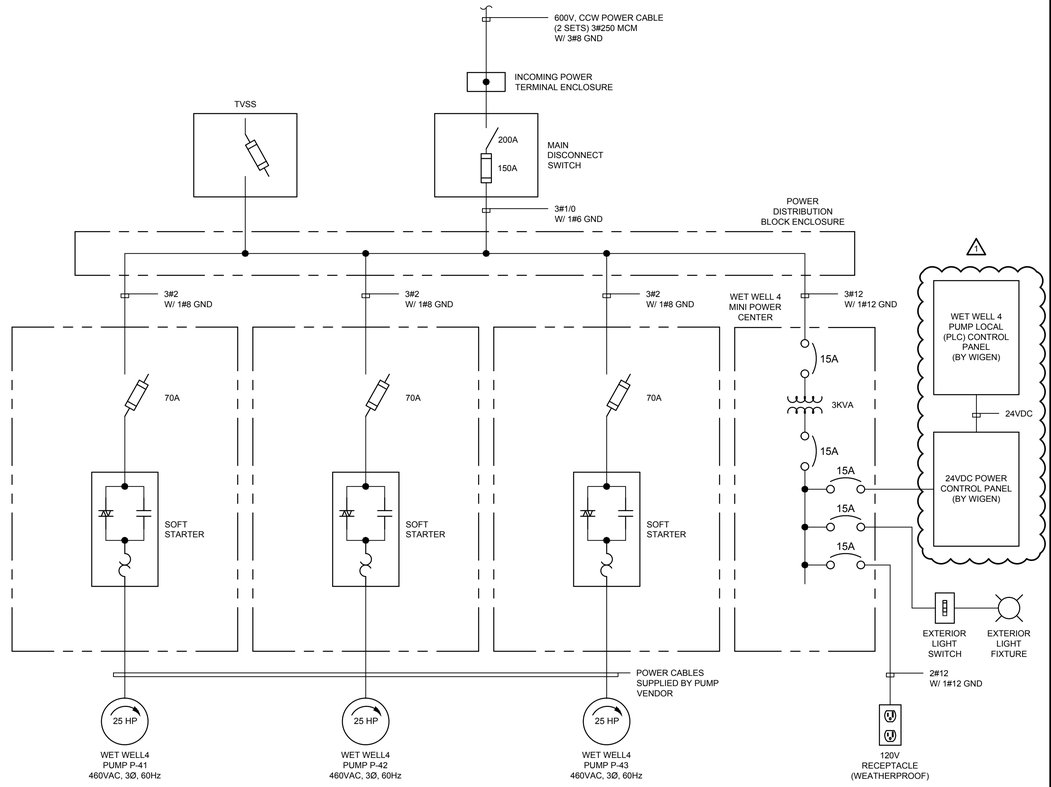
Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001

Project Manager:	Reviewed By:	Date:	
J.M.	D.L.S.	APRIL 2015	
Scale: 1" = 100'	Project No: 13968-00	Report No: 365	Drawing No: E-01

13968-00(365)EL-BU001 SEP 03/2015



WET WELL 4 PUMP CONTROL SCHEMATIC DIAGRAM



WET WELL 4 ELECTRICAL DISTRIBUTION

Nº	Revision	Date	Initial
1	ADDED 24VDC POWER CONTROL PANEL	SEPT 3, 2015	C.R.H.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JULY 20, 2015	C.R.H.
ISSUED FOR BID	MAY 5, 2015	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

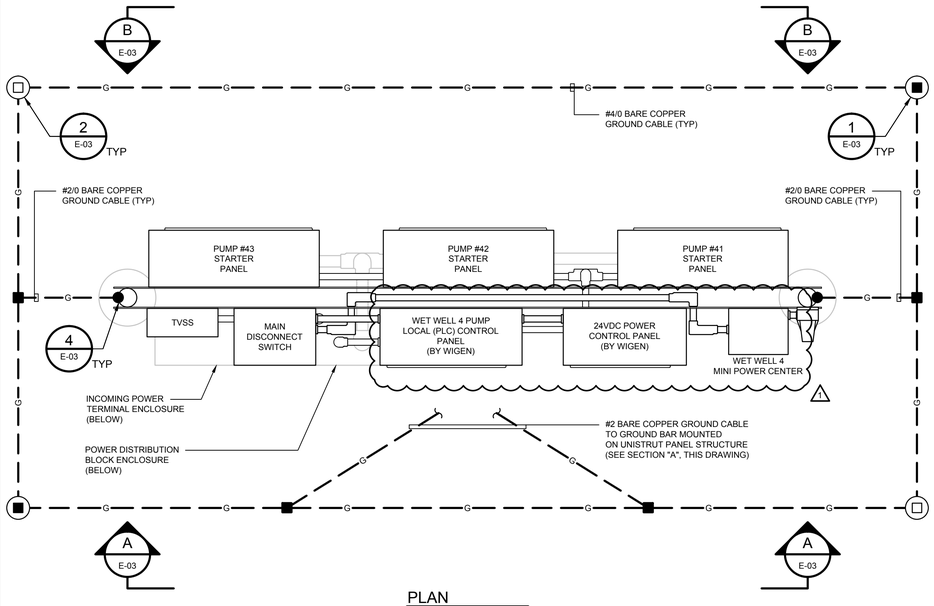
GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

ELECTRICAL DISTRIBUTION & CONTROL SCHEMATIC

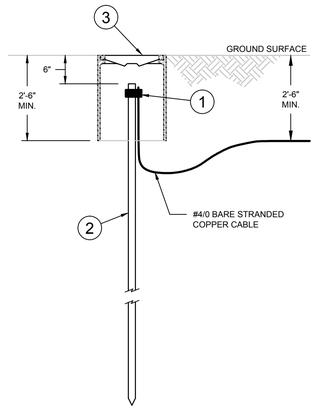
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	D.L.S.	APRIL 2015	
Scale: NTS	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: E-02

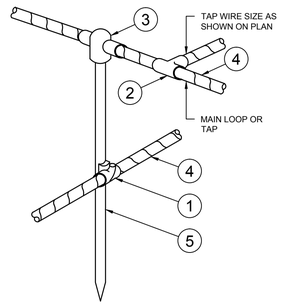


PLAN
3/4" = 1'-0"
GROUNDING
PLAN



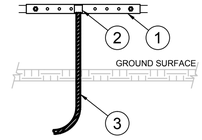
1	CONNECTOR:	CADWELD CAT. No. GR (1 CABLE) OR GT (2 CABLES)
2	GROUND ROD:	COPPERWELD, 3/4" DIA. x 15' LG.
3	INSPECTION WELL:	KISTNER PULL-BOX W/CAST IRON FRAME. & COVER 15" DIA. x 20" LG., PART No. PB-15S

DETAIL 1
NTS
GROUNDING ROD
INSTALLATION
INSPECTION TYPE



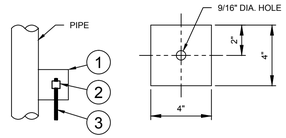
1	CONNECTOR:	CADWELD TYPE 'GY' CONN. (USED FOR 2 HORIZONTAL CABLE TAPS OR THROUGH CABLE OR END OF RUN)
2	CONNECTOR:	GROUNDING TAP "T" OR "X"
3	CONNECTOR:	CADWELD TYPE "GT" CONN.
4	#4/0 BARE COPPER GROUNDING CONDUCTOR MAIN LOOP	
5	GROUND ROD:	COPPER-WELD STEEL, 3/4" x 15' LONG

DETAIL 2
NTS
GROUNDING ROD
CONDUCTOR CONNECTION
DETAIL



1	STEEL BUS BAR, 2 x 3/8" LENGTH TO SUIT, WITH 9/16" DIA. HOLES PRE-DRILLED OR PUNCHED 1/2" ON CENTER TO ACCOMMODATE CONNECTORS. MOUNT TO CROSS BRACE USING STAND-OFFS.
2	GROUNDING CONNECTOR, CONDUCTOR TO FLAT BAR, CADWELD "VB"
3	GROUNDING CONDUCTOR (SIZE PER PLAN)

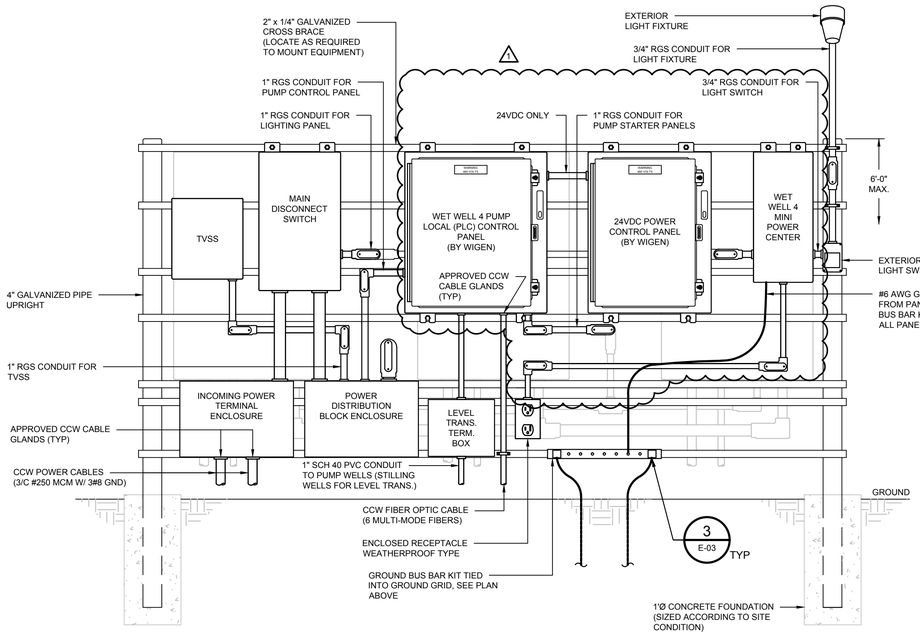
DETAIL 3
NTS
GROUNDING
TYPICAL CONNECTIONS
TO STRUCTURAL STEEL



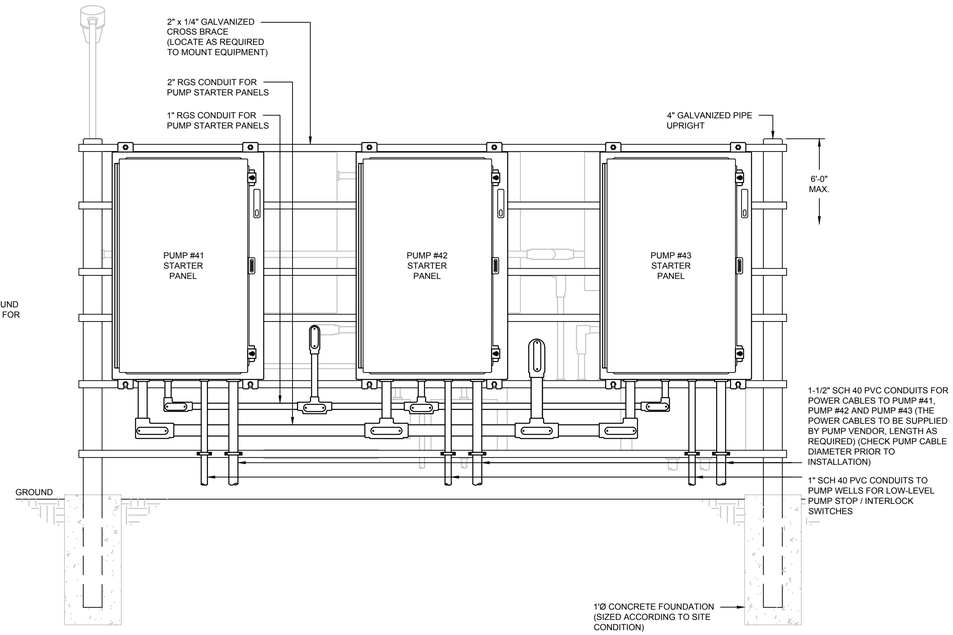
NOTE: TAB MAY BE SUBSTITUTED BY HOLE IN EQUIPMENT OR EQUIPMENT SUPPORT

1	WELDED TAB, 1/4" x 4" STEEL
2	GROUNDING CONNECTOR, CONDUCTOR TO FLAT BAR, CADWELD "VB"
3	GROUNDING CONDUCTOR (SIZE PER PLAN)

DETAIL 4
NTS
GROUNDING
TYPICAL CONNECTIONS
TO WELDED TAB



SECTION A
3/4" = 1'-0"
PUMP CONTROL PANEL
RACK INSTALLATION
FOR WET WELL 4



SECTION B
3/4" = 1'-0"
PUMP CONTROL PANEL
RACK INSTALLATION
FOR WET WELL 4

Nº	Revision	Date	Initial
1	ADDED 24VDC POWER CONTROL PANEL	SEPT 3, 2015	C.R.H.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	JULY 20, 2015	C.R.H.
ISSUED FOR BID	MAY 5, 2015	C.R.H.
Status	Date	Initial

GM CET BEDFORD FACILITY
BEDFORD, INDIANA

GROUNDWATER COLLECTION SYSTEM - BEDROCK PILOT TRENCH

GROUNDING PLAN
SECTIONS AND DETAILS

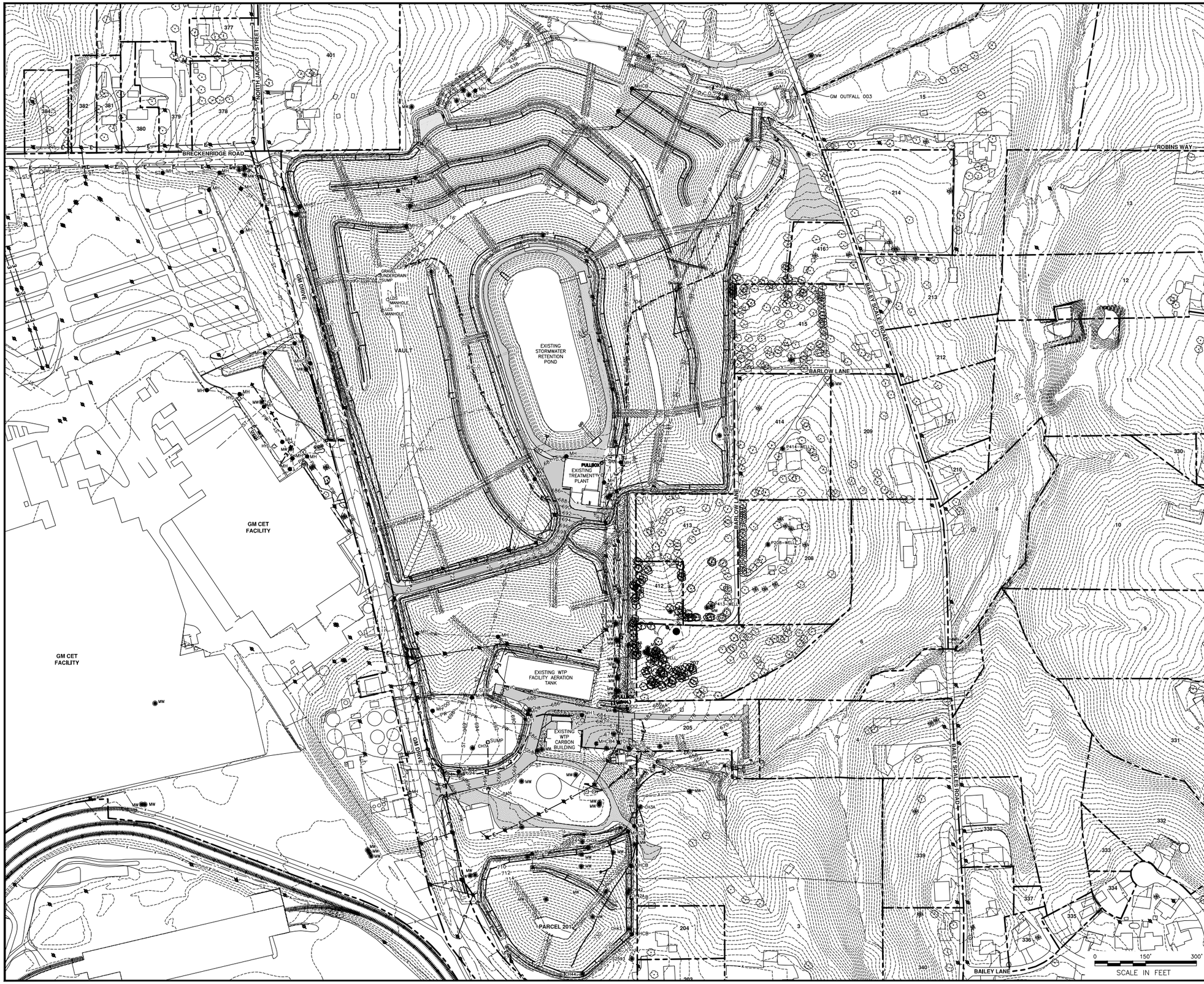
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
J.M.	D.L.S.	APRIL 2015	
Scale: AS NOTED	Project Nº: 13968-00	Report Nº: 365	Drawing Nº: E-03

13968-00(365)EL-BU003 SEP 03/2015

WFG JOB NO. 1500595 SHEET NO. CS1-001



DATE	ISSUED FOR	PROJECT ARCH./ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
04/20/15	30% REVIEW	–	–
07/08/15	PERMIT	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH./ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY B. SUSERSKI	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

CONSULTANT A/E FIRM INFO & LOGO

CRA Engineering, Inc.
14496 Sheldon Road
Plymouth, MI 48170
Phone: (734) 453-5123

Worldwide Facilities Group

General Motors LLC

BEDFORD PT
Site ID: 1611
GROUNDWATER TREATMENT PLANT
Structure ID: 20004
Level: 01

GM CET BEFORD FACILITY
GROUNDWATER TREATMENT PLANT

OVERALL EXISTING CONDITIONS SITE PLAN
Plans
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY B. SUSERSKI	SHEET NUMBER CS1-001
SCALE 1" = 100'	
DATE 7/20/2015	

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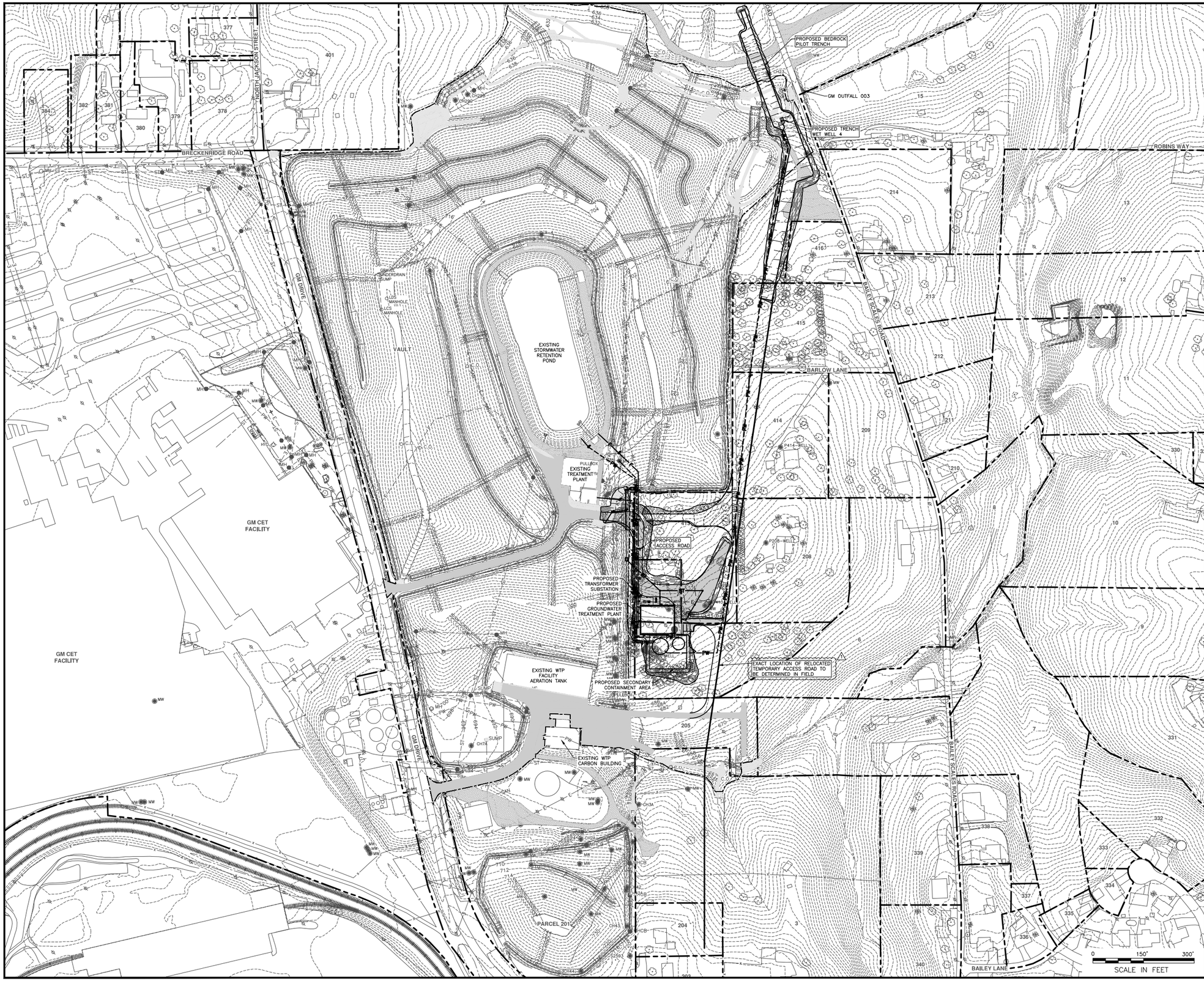
FILE PLOT DATE STAMP Sep 03, 2015 – 4:50pm

WFG JOB NO. **1500595** SHEET NO. **CS1-002**



DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
04/20/15	30% REVIEW	–	–
07/08/15	PERMIT	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

ITEMS INCLUDED IN PILOT TRENCH CONSTRUCTION CONTRACT

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
1	09/03/15	–	–

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY B. SUSERSKI	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

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Worldwide Facilities Group

General Motors LLC

BEDFORD PT
Site ID: 1611
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Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY GROUNDWATER TREATMENT PLANT

OVERALL PROPOSED CONDITIONS SITE PLAN
Plans
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY B. SUSERSKI	SHEET NUMBER
SCALE 1" = 100'	**CS1-002**
DATE 7/20/2015	

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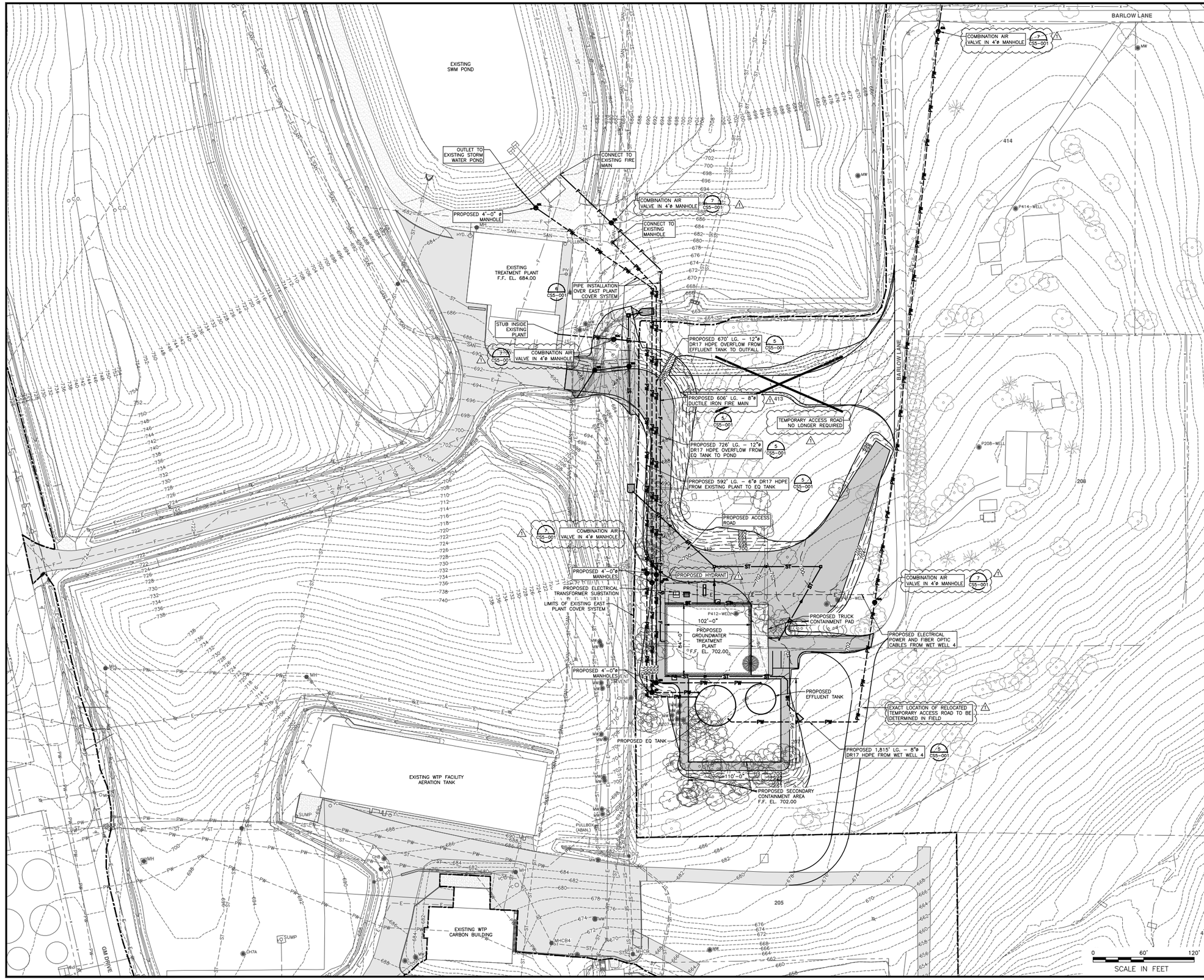

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
04/20/15	30% REVIEW	–	–
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

ITEMS INCLUDED IN PILOT TRENCH CONSTRUCTION CONTRACT

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
1	09/03/15	–	–

REVISIONS

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SUPPLIER DRAWN BY B. SUSERSKI	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

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General Motors LLC

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Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

PROPOSED CONDITIONS SITE PLAN
Plans
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY B. SUSERSKI	SHEET NUMBER
SCALE 1" = 40'	**CS1-003**
DATE 7/20/2015	

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FILE PLOT DATE STAMP Sep 03, 2015 – 4:50pm

WFG JOB NO. **1500595** SHEET NO. **CS1-005**

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

ITEMS INCLUDED IN PILOT TRENCH CONSTRUCTION CONTRACT

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
1	09/03/15	–	–

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY J. SPENLER	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

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Plymouth, MI 48170
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Worldwide Facilities Group

General Motors LLC

BEDFORD PT
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Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY GROUNDWATER TREATMENT PLANT

CIVIL SITE PLAN (1 OF 2)
Plans
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER **CS1-005**
SCALE 1" = 20'	
DATE 7/20/2015	

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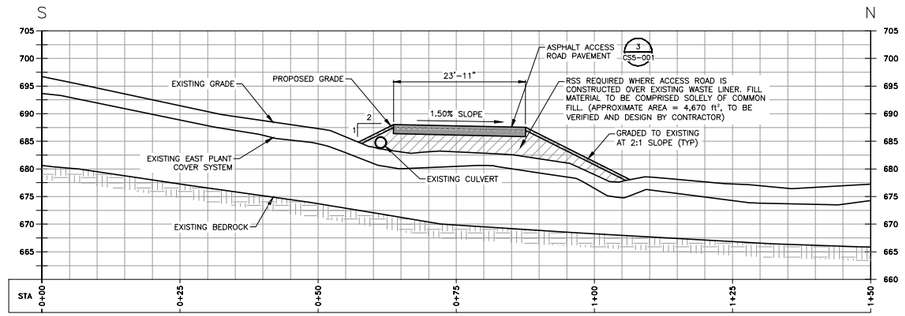
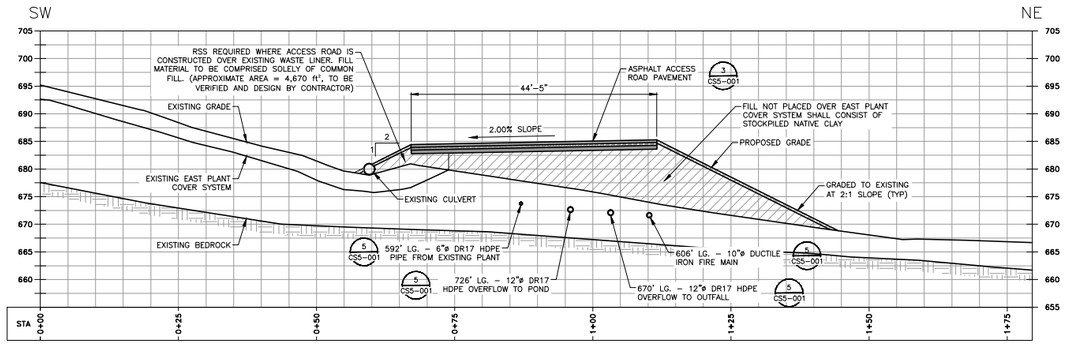
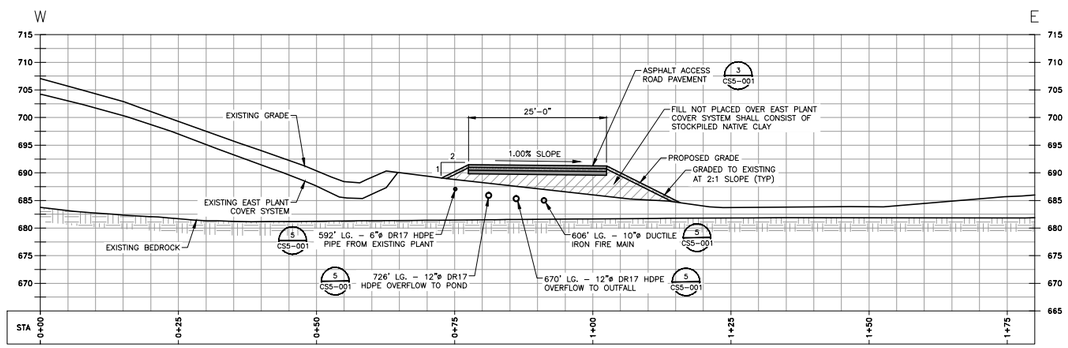


A CS1-005 ASPHALT ACCESS ROAD



B CS1-005 ASPHALT ACCESS ROAD



C CS1-005 ASPHALT ACCESS ROAD

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL

REVISIONS

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SUPPLIER DRAWN BY J. SPENLER	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

CONSULTANT A/E FIRM INFO & LOGO

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Plymouth, MI 48170
Phone: (734) 453-5123

Worldwide Facilities Group

General Motors LLC

BEDFORD PT
Site ID: 1611
GROUNDWATER TREATMENT PLANT
Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

ROAD CROSS SECTIONS
Sections
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER
SCALE 1" = 10'	
DATE 7/20/2015	**CS3-001**

FILE PLOT DATE STAMP Sep 03, 2015 – 4:51pm

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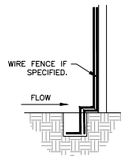
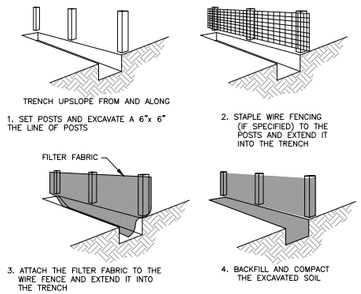
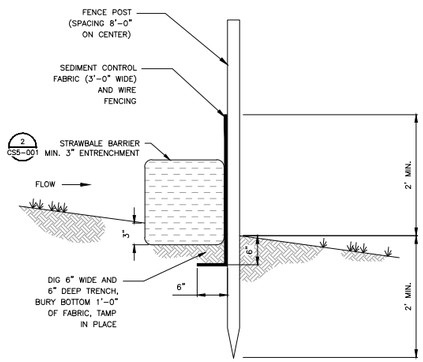


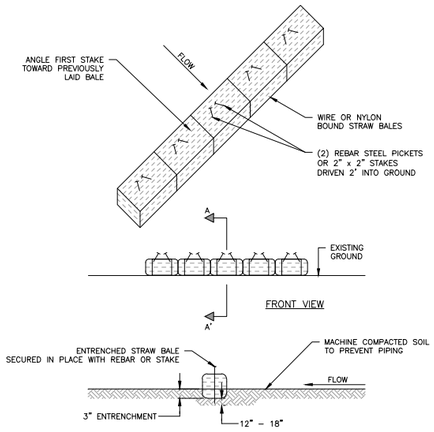
EXTENSION OF FABRIC AND WIRE INTO TRENCH



SILT FENCE INSTALLATION SEQUENCE

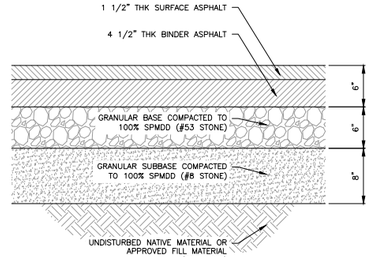


1 CS1-005 TYPICAL SILT FENCE



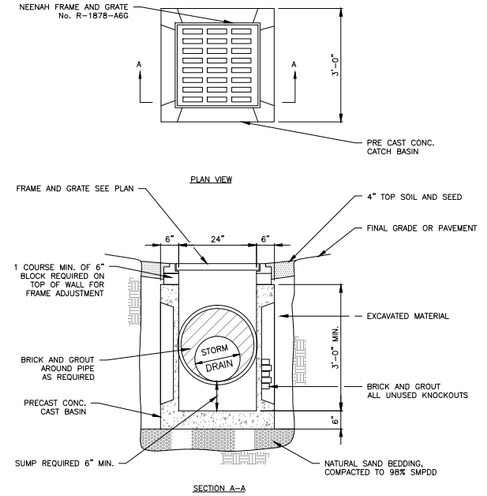
NOTE:
1. INSTALL SECOND ROW OF STRAW BALES IN BOTTOM OF SWALE ONLY.

2 CS5-001 STRAWBALE

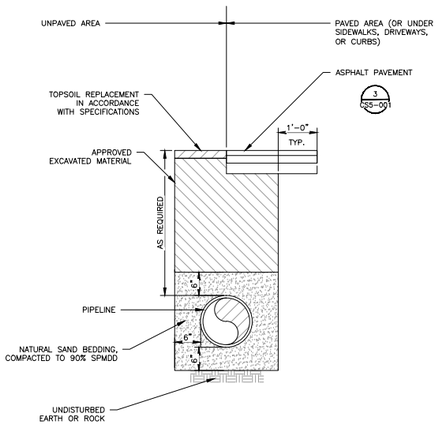


NOTE:
1. AREA OVER LINER TO BE CONSTRUCTED USING COMMON FILL. REMAINDER OF ACCESS ROAD FILL TO BE COMPRISED OF NATIVE CLAY MATERIAL FROM ON-SITE BORROW SOURCE.

3 CS1-005,CS3-001,CS5-001 ASPHALT PAVEMENT

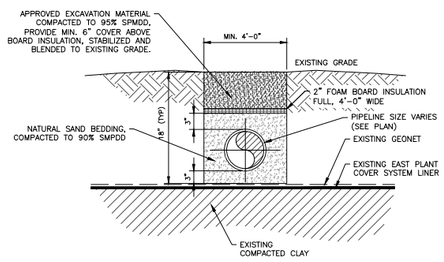


4 CS1-005,CS1-006,CU3-004 TYPICAL CATCH BASIN



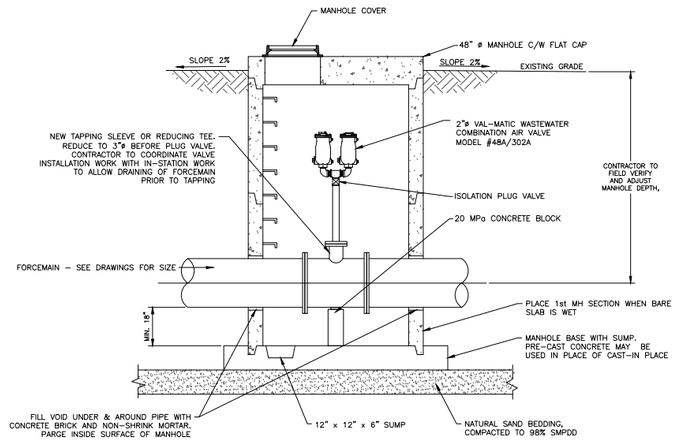
NOTES:
1. DIMENSIONS SHOWN ARE PAYMENT LIMITS WHERE APPROPRIATE.
2. TYPICAL TRENCH DETAIL APPLIES FOR ALL BURIED PIPING INCLUDING FORCEMAINS AND STORM DRAINS.
3. BEDDING MATERIAL SHALL BE WELL GRADED NATURAL SAND FROM COARSE TO FINE GRAINED WITH 100% PASSING No. 4 SIEVE AND NOT MORE THAN 7% PASSING No. 200 SIEVE.

5 CS1-003,CS1-005,CS1-006,CS3-001,CU3-001,CU3-002,CU3-003,CU3-004 TYPICAL PIPE TRENCH



NOTES:
1. BEDDING MATERIAL SHALL BE WELL GRADED NATURAL SAND FROM COARSE TO FINE GRAINED WITH 100% PASSING No. 4 SIEVE AND NOT MORE THAN 7% PASSING No. 200 SIEVE.

6 CS1-003,CS1-005,CU3-001,CU3-002,CU3-003 PIPE TRENCH ABOVE EXISTING EAST PLANT COVER SYSTEM



7 CS1-003,CU3-001,CU3-003 AIR RELIEF CHAMBER FOR FORCEMAINS

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY J. SPENLER	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

CONSULTANT A/E FIRM INFO & LOGO

CRA Engineering, Inc.
14496 Sheldon Road
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Worldwide Facilities Group

General Motors LLC

BEDFORD PT
Site ID: 1611
GROUNDWATER TREATMENT PLANT
Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

CIVIL DETAILS
Details
Civil - Site

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER **CS5-001**
SCALE N.T.S.	
DATE 7/20/2015	

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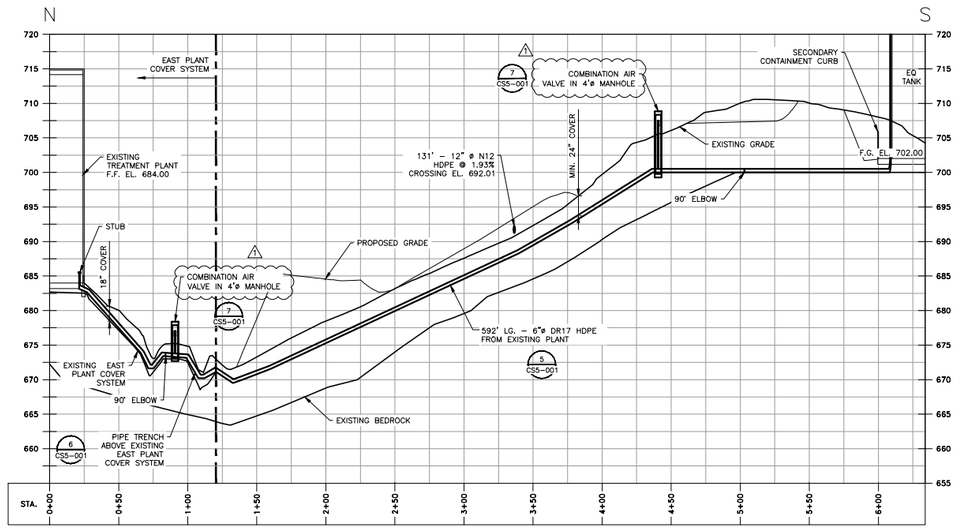
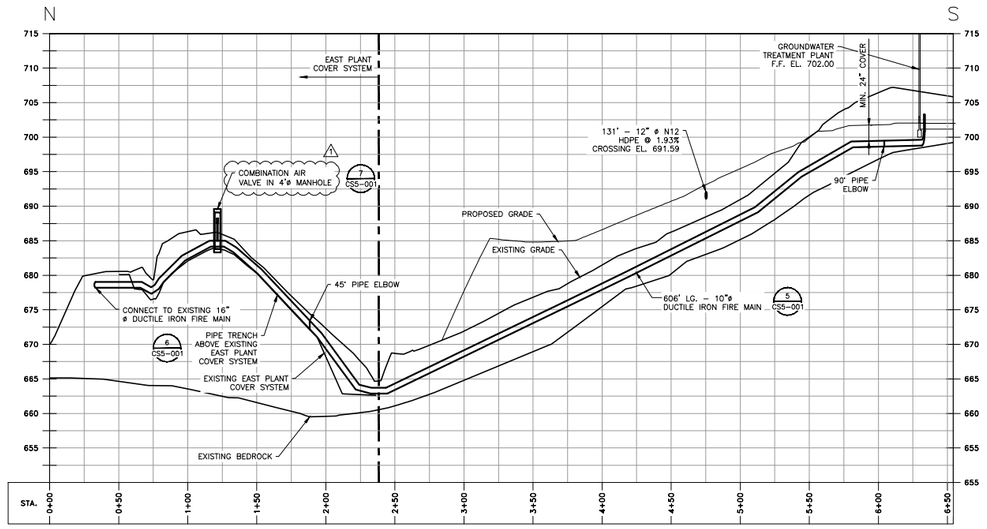
FILE PLOT DATE STAMP Sep 03, 2015 - 4:51pm



PROFILE – INFLUENT PIPE FROM EXISTING PLANT

HOR. 1" = 40'
VERT. 1" = 8'



PROFILE – FIRE MAIN FROM EXISTING FIRE MAIN

HOR. 1" = 40'
VERT. 1" = 8'

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

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1	09/03/15	–	–

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GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

PIPELINE PROFILES (1 OF 3)
Sections
Civil - Site Utilities

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER CU3-001
SCALE AS SHOWN	
DATE 7/20/2015	

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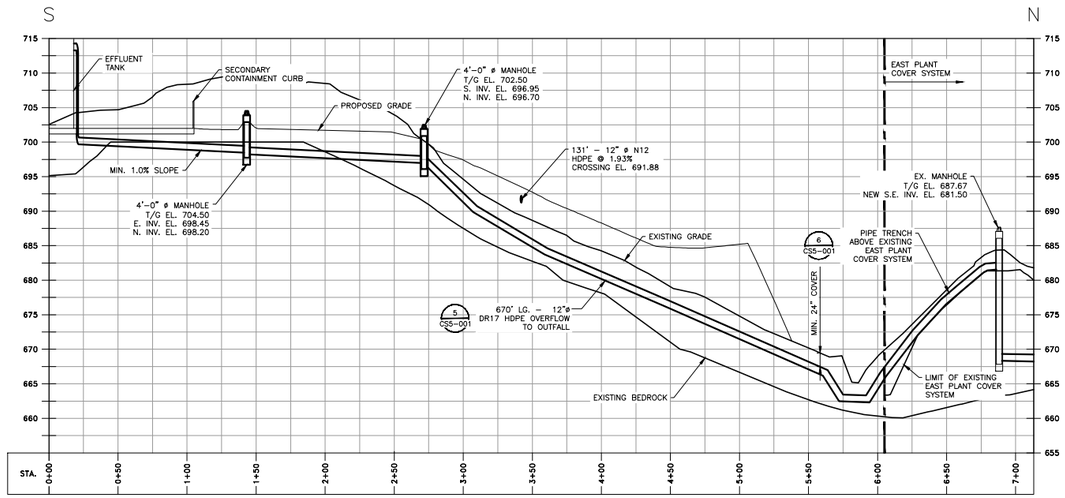
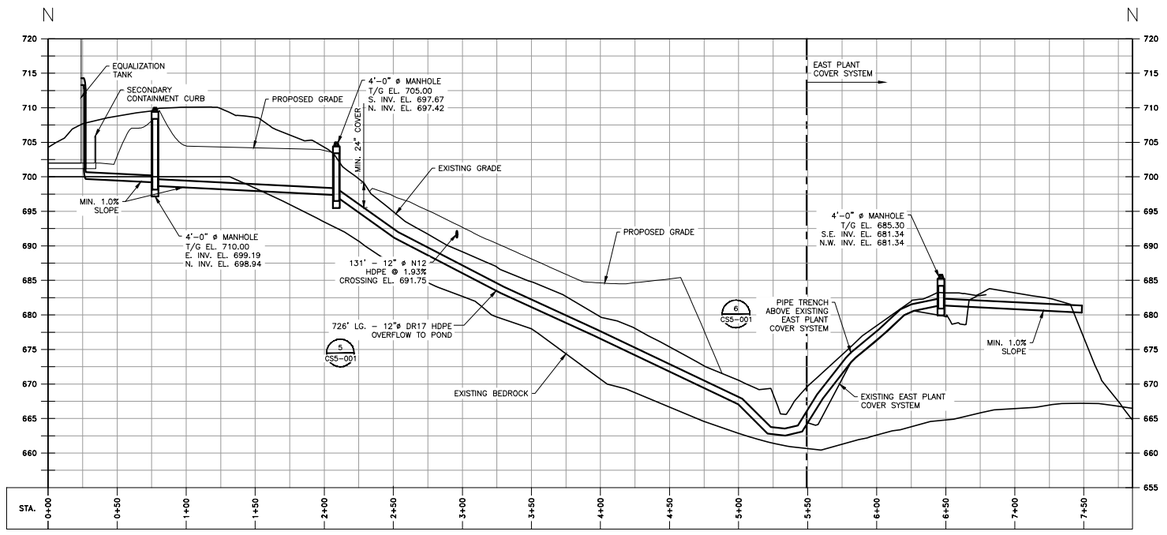
FILE PLOT DATE STAMP Sep 03, 2015 – 4:51pm



PROFILE – OVERFLOW PIPE TO EXISTING OUTFALL

HOR. 1" = 40'
VERT. 1" = 8'



PROFILE – OVERFLOW TO EXISTING SWM POND

HOR. 1" = 40'
VERT. 1" = 8'

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

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SUPPLIER PE/PM G. TURCHAN	

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Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY GROUNDWATER TREATMENT PLANT

PIPELINE PROFILES (2 OF 3)
Sections
Civil - Site Utilities

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER CU3-002
SCALE AS SHOWN	
DATE 7/20/2015	

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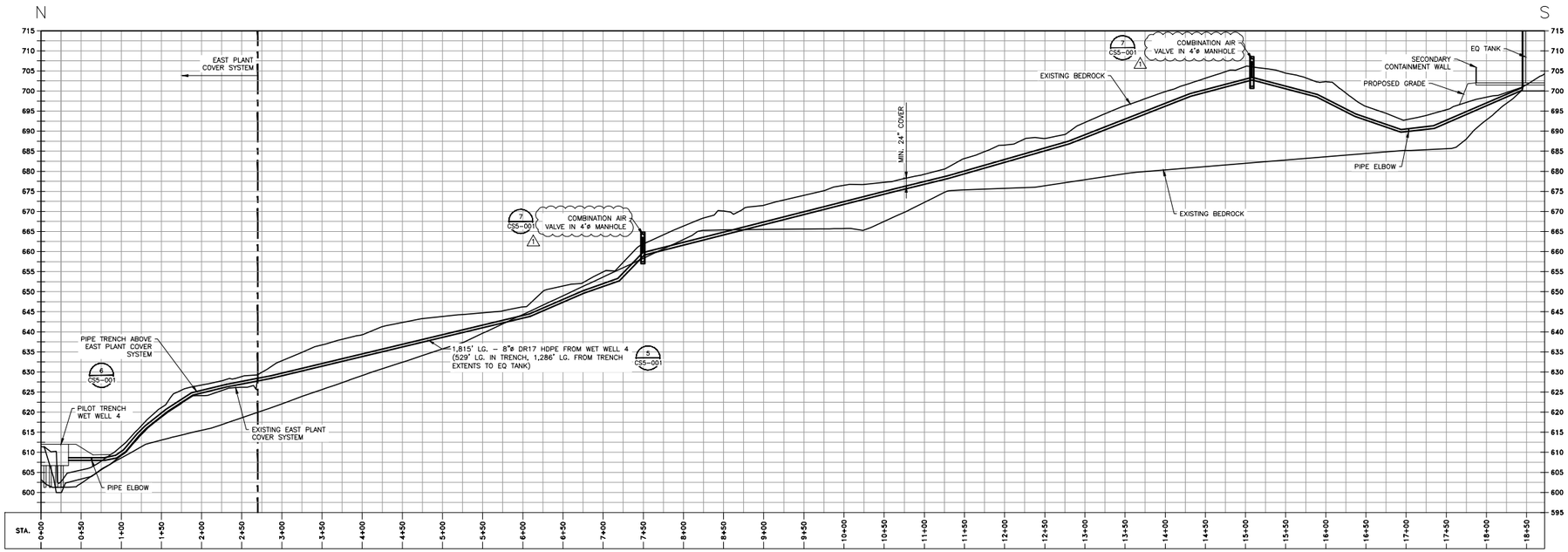
FILE PLOT DATE STAMP Sep 03, 2015 – 4:51pm



PROFILE - INFLUENT FROM PILOT TRENCH WET WELL

HOR. 1" = 60'
VERT. 1" = 12'

DATE	ISSUED FOR	PROJECT ARCH./ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	--	--
05/26/15	ADDENDUM #1	--	--
06/10/15	ADDENDUM #2	--	--
07/20/15	CONSTRUCTION	--	--

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH./ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
1	09/03/15	--	--

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY J. SPENLER	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

CONSULTANT A/E FIRM INFO & LOGO

CRA Engineering, Inc.
14496 Sheldon Road
Plymouth, MI 48170
Phone: (734) 453-5123

Worldwide Facilities Group

General Motors LLC

BEDFORD PT
Site ID: 1611
GROUNDWATER TREATMENT PLANT
Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

PIPELINE PROFILES (3 OF 3)
Sections
Civil - Site Utilities

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER CU3-003
SCALE AS SHOWN	
DATE 7/20/2015	

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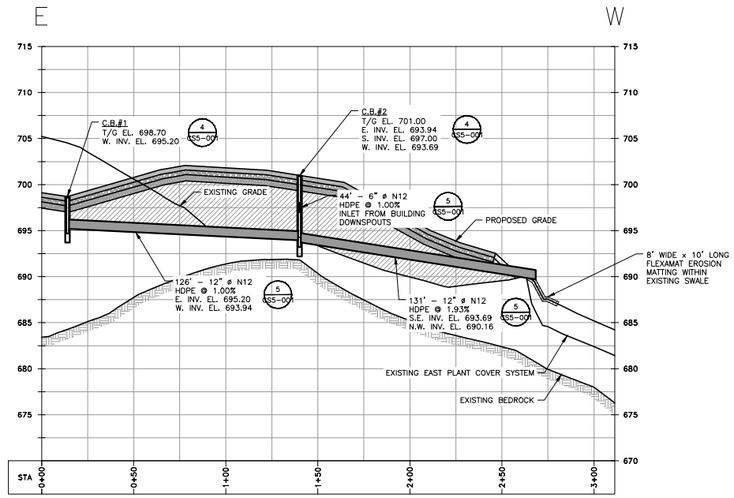
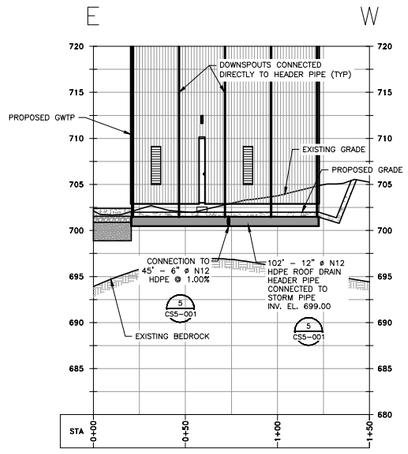
FILE PLOT DATE STAMP Sep 03, 2015 - 4:51pm



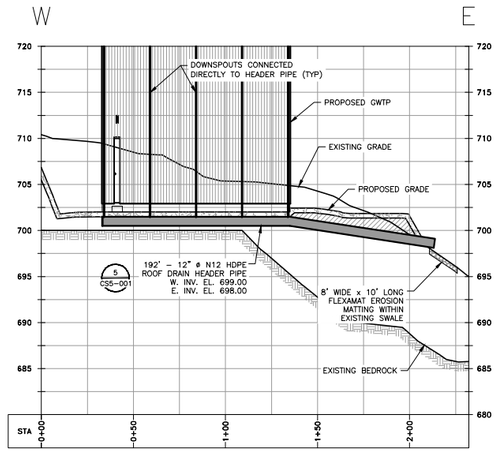
PROFILE – NEW GWTP CATCH BASINS

HOR. 1" = 30'
VERT. 1" = 6'



PROFILE – NORTH DOWNSPOUT HEADER PIPE

HOR. 1" = 30'
VERT. 1" = 6'



PROFILE – SOUTH DOWNSPOUT HEADER PIPE

HOR. 1" = 30'
VERT. 1" = 6'

DATE	ISSUED FOR	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL
05/11/15	BID	–	–
05/26/15	ADDENDUM #1	–	–
06/10/15	ADDENDUM #2	–	–
07/20/15	CONSTRUCTION	–	–

SITE/BUILDING PLAN & NORTH ARROW

GM DISCLAIMER & TYPICAL NOTES

NO.	DATE	PROJECT ARCH/ ENGR APPROVAL	DEPT. MGR/SUPR APPROVAL

REVISIONS

SUPPLIER PROJECT NO. 89428	CERTIFIED BY S. ADAMOWSKI
SUPPLIER DRAWN BY J. SPENLER	
SUPPLIER CHECKED BY D. CHARTERS	
SUPPLIER PE/PM G. TURCHAN	

CONSULTANT A/E FIRM INFO & LOGO

CRA Engineering, Inc.
14496 Sheldon Road
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BEDFORD PT
Site ID: 1611
GROUNDWATER TREATMENT PLANT
Structure ID: 20004
Level: 01

GM CET BEDFORD FACILITY
GROUNDWATER TREATMENT PLANT

CULVERT PROFILE
Sections
Civil - Site Utilities

WFG PE/PM L. WAMBACH	WFG JOB NO 1500595
DRAWN BY J. SPENLER	SHEET NUMBER CU3-004
SCALE AS SHOWN	
DATE 7/20/2015	

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FILE PLOT DATE STAMP Sep 03, 2015 – 4:51pm

Appendix F

Construction Quality Assurance Plan

TABLE F.6.1

SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
A. Construction Facilities and Temporary Controls					
• Temporary controls	• Are barriers in place to prevent unauthorized Site entry and to protect adjacent properties and facilities	• visual	• daily as required	• none	• barriers not correctly installed/located
	• Is fencing in place to delineate work areas and do workers observe and respect limits marked with fencing	• visual	• daily as required	• none	• fencing not correctly installed/located
	• Are appropriate dust control measures being followed to prevent dust release from the Site exceeding specified levels	• visual	• daily as required	• none	• dust control measures not implemented
	• Are appropriate Site access roads and parking areas being maintained	• visual	• daily as required	• none	• roads, parking areas not maintained
	• Are appropriate equipment decontamination procedures being followed	• visual	• daily as required	• none	• decontamination procedures not followed
• Soil erosion and sediment control	• As per Drawings and permits	• visual	• daily as required	• none	• sediment and erosion controls inadequate
	• Are the silt fences and straw bale structures effective in sediment control	• visual	• daily as required	• none	• visual irregularities evident, sediment escape evident
	• Are the silt fences and straw bale structures being maintained during construction activities	• visual	• daily as required	• none	• evident excessive sediment material build-up
	• Is surface water runoff prevented from leaving work areas	• visual	• daily as required	• none	• surface water controls not implemented
	• Is surface water runoff from non-contaminated areas prevented from contacting potentially contaminated areas	• visual	• daily as required	• none	• surface water controls not implemented
	• Are appropriate erosion control measures in place around cuts, fills, stockpiles, staging areas, and other work areas	• visual	• daily as required	• none	• erosion control measures not implemented

TABLE F.6.1

**SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY**

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
B. Earthworks Activities					
• Clearing and Grubbing	• are all above ground portions of trees, shrubs and other cleared vegetation handled separately from below ground portions	• visual	• daily as required	• none	• N/A
	• Have all above ground portions of trees, shrubs and other cleared vegetation been chipped and stockpiled on Site	• visual	• daily as required	• none	• N/A
	• Have all below ground portions of trees, shrubs and other cleared vegetation been chipped and stockpiled separately from above ground portions	• visual	• daily as required	• none	• N/A
• Excavation	• Horizontal and vertical control	• survey	• prior to, during and after excavation	• survey information	• defined extent of soil not reached
• Stockpile Areas	• Have soil stockpile areas been properly prepared	• visual	• prior to excavation	• none	• stockpile areas do not meet specifications
• Backfilling	• Is backfill material approved for backfill application	• visual • analytical for imported soils • geotechnical	• prior to backfilling • for each source of backfill material • for imported materials, prior to delivery to Site	• analytical results • gradation curves	• material is contaminated or otherwise unsuitable
	• Does backfill material contain unsuitable material	• visual • check against Specifications	• each source of backfill material	• none	• unsuitable material present
	• Has backfilled material been compacted to specification	• visual • in situ density	• see Table C.6.2 • in accordance with Specifications	• density results	• 95% Standard Proctor Density
	• Horizontal and vertical control	• survey	• during and on completion of backfilling	• survey information	• N/A

TABLE F.6.1

**SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY**

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
C. Collection Trench System Construction					
• Trench Seal	• Do grout materials meet Specifications	• check suppliers specification	• upon delivery to Site	• certification	• mix design out of specification
• Sheet Pile	• Do pile sections conform to Specifications	• visual	• upon delivery	• manufacturer certificates	
	• Grade inspection	• visual on levels	• prior to start	• none	
	• Damage to sheet piles during installation	• visual	• during installation	• installation records	• ruptures in the sheet pile material or separation of sheet piles at interlocks
	• Quality and integrity of any sealant placed in the interlock	• visual	• each	• installation records	• separation of sheet piles at interlocks
• Groundwater Collection Piping	• Does pipe meet specifications	• check supplier's specifications	• prior to delivery to Site	• supplier and manufacturer's certification	• material does not meet specification
	• Does installation follow proper alignment	• visual	• continuous	• none	• alignment not in accordance with design
	• Has pipe been laid to design depth	• survey	• continuous	• none	• forcemain installed to incorrect depth
	• Has pipe been damaged during installation	• visual	• continuous	• none	• damaged pipe
	• Has trench been properly backfilled	• visual	• continuous	• none	• trench not properly backfilled
• Groundwater Collection Sumps	• Does excavation meet Specifications	• measure layout and depth	• upon completion	• elevations	• proper grade not maintained
	• Do appurtenances meet Specifications	• check supplier's specifications	• prior to delivery to Site	• manufacturer's certification	• material does not meet specifications
	• Does frame leak	• visual leakage test	• upon installation	• none	• leakage observed
	• Are sumps installed to grade and plumb	• survey	• upon installation	• final elevations	• final grade not achieved
	• Do mechanical components meet Specifications	• check supplier's specifications	• upon delivery to Site	• manufacturer's operating and maintenance literature	• N/A

TABLE F.6.1

**SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY**

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
	• Are mechanical components being assembled according to Specifications	• visual	• continuously during assembly	• shop drawings • confirmation in writing that equipment was satisfactorily tested	• incorrect assembly
	• Do electrical components meet Specifications	• check supplier's specifications	• upon delivery to Site	• certification	• N/A
	• Are electrical components being assembled according to Specifications	• visual	• continuously during assembly	• test results upon successful completion of installation	• components not assembled to Specifications
	• Do conduits meet Specifications	• check supplier's specifications	• upon delivery to Site	• manufacturer's certification	• N/A
• Geotextile Installation	• Do geotextile fabric comply with Specifications	• check manufacturer and supplier cerifications	• refer to Specifications	• suppliers and manufacturer's cerification • delivery tickets	material does not meet Specifications
	• Has material arrived at Site undamaged	• visual	• upon delivery to Site	• none	• damaged materials
	• Is material propertly stored to prevent accidental damage and UV exposure	• visual	• upon delivery to Site	• none	• improperly stored materials
	• Has Contractor submitted required submittals	• check against Specifications	• prior to placement	• Contractor's submittals	• required submittals not submitted or deficient
	Is base preparation free of ruts or harmful objects	visual	prior to placement	• none	• presence of ruts or sharp objects
	Is ambient temperature suitable for seaming	thermometer	• continuous	• none	• below 32 F or above 104 F
	Have materials been installed as specified	• visual	• continuous	supplier-installer approval letter	• material not installed as specified
	Are there any visible defects, holes, blisters, undispersed raw materials or any sign of contamination by foreign matter	• visual	• after installation is completed and prior to placement of overlying materials	• none	• visual defects
	Is installation free of wrinkles	• visual	• prior to placement of overlying material	• none	• visual irregularities
	Is cover soil place in direction of overlap	• visual	• continuous	• none	• failure to perform as stated

TABLE F.6.1

**SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY**

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
• Common fill	• is imported material approved for application	• visual • geotechnical • chemical analysis	• prior to delivery to Site	• chemical results • geotechnical data	• does not meet Specifications
	• does imported material contain unsuitable material	• visual • check against specification	• each source of material	• none	• unsuitable material observed
	• hydraulic conductivity	• geotechnical testing	• each source of material (seeTable C.6.2)	• geotechnical results	• hydraulic conductivity > 1 x10-5 cm/s
	• has material been compacted to specification	• visual • check test results against specification	• see Table C.6.2	• geotechnical data	• does not meet Specifications
	• horizontal and vertical control	• survey	• during and upon material placement	• survey information	• 1-inch tolerance to design grades
• Topsoiling and Seeding	• is imported material approved for application	• visual • analytical • geotechnical	• prior to placement • for each source of topsoil and seeding material • for imported materials, prior to delivery to Site	• analytical results • gradation curves	• material out of Specifications
	• does material contain unsuitable material	• visual • check against Specifications	• each source of topsoil and seeding material	• none	• unsuitable material observed
	• horizontal and vertical control	• survey	• during and on completion of topsoil placement	• survey information	• grading does not meet Specifications
D. Landfill Cover Restoration					
Final Cover Construction	• Has landfill reached pregrade elevation	• visual • survey	• on completion of backfilling	• none	
	• See inspection requirements for soil layers and geosynthetics installation				
Geosynthetics Installation	• Do geosynthetic materials comply with Specifications	• check manufacturer and supplier • cerifications check against Specifications	• refer to Specifications	• suppliers and manufacturer's cerification • delivery tickets	• materials do not meet Specifications
	Have materials arrived at Site	• visual	• upon delivery to Site	• none	• damaged materials

TABLE F.6.1

**SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY**

Work Task Component to be Inspected	*Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals to Resident Engineer*	*Rejection Criteria*
	undamaged				
	Is material propertly stored to prevent accidental damage and UV exposure	• visual	• upon delivery to Site	• none	• improperly stored materials
	Has Contractor submitted required submittals	• check against Specifications	• prior to placement	• Contractor's submittals	• required submittals not submitted or deficient
	Is base preparation free of ruts or harmful objects	• visual	• prior to placement	• none	• presence of ruts or sharp objects
	Is ambient temperature suitable for seaming	• thermometer	• continuous	• none	• below 32 F or above 104 F
	Have seams been tested	• seam testing	• refer to Specifications	• results of seam testing	• seams do not meet criteria in Specs
	Have materials been installed as specified	• visual	• continuous	• supplier-installer approval letter	• material not installed as specified
	Are there any visible defects, holes, blisters, undispersed raw materials or any sign of contamination by foreign matter	• visual	• after installation is completed and prior to placement of overlying materials	• none	• visual defects
	Is installation free of wrinkles	• visual	• prior to placement of overlying material	• none	• visual irregularities
	Is cover soil place in direction of overlap	• visual	• continuous	• none	• failure to perform as stated

TABLE F.6.2

SUMMARY OF QUALITY ASSURANCE TESTING PROCEDURES
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY

Work Task to be Inspected	*Type of Testing*	*Method of Testing*	*Frequency*	*Acceptance/Rejection Criteria*
A. Trench Construction				
• Competency of Bedrock	• Bedrock competence • Location/extent of groundwater migration pathways	• GPR Survey • Electrical Resistivity Imaging	• Prior to excavation of trench, along the extent of the proposed perimeter trench	• N/A
• Cement-Bentonite Grout				
a) Material	• Grout mixture	• ASTM C109	• 1 per batch	• 100 psi minimum Unconfined Compressive Strength (UCS)
b) Placement	• In-place grout	• ASTM D5084	• 1 per 100 LF of trench	• 1 x 10^{-6} cm/s or less permeability
• Gravel Bedding and Cover				
a) Material	• Grain Size • Chemical Characterization	• ASTM D422 USEPA SW-846	• 1 per 1000 CY • 1 per source	• per Specification • per Specification
b) Placement	• Grain Size • Compaction/density	• ASTM D422 • ASTM D4253 • ASTM D4254	• 1 per 1000 CY • 1 per lift	• per Specification • 70% relative density
• Vinyl Sheet Piling				
a) Material	• Tensile strength at break • Elongation at break • Tensile yield strength • Compressive strength • Flexural strength • Tensile modulus • Flexural modulus • Izod impact • Hardness • Coefficient of themal expansion • Heat deflection temperature • Thermal conductivity • Density • Water absorption • Creep testing	• ASTM D638 • ASTM D638 • ASTM D638 • ASTM D695 • ASTM D790 • ASTM D638 • ASTM D790 • ASTM D256A • ASTM D2240 (shore) • ASTM D696 • ASTM D648 • ASTM C177 • ASTM D792 • ASTM D570 • ASTM D5262	• Per manufacturer's QC testing frequency • As above • As above • As above • As above • As above • As above • As above • As above • As above • As above • As above • As above • As above • As above	• 5,900-7,500 psi • 40-80% • 5,900-6,500 psi • 8,000-13,000 psi • 10,000-13,000 psi • 350-600 × 103 psi • 300-300 × 103 psi • 0.4-2.2 ft-lb/in. of notch • 65-85 • 50-100 × 10-6 in./in. ºC • 140-170 ºF • 3.5-5.0 cal cm/s cm2 ºC • 0.046-0.056 lb/in3 • 0.04-0.40% (24 hr) • 4.000 psi total strain of less than 3 %
• Drainage Media (Sand)				
a) Material	• Grain Size • Chemical Characterization	• ASTM D422 USEPA SW-846	• 1 per 1000 CY • 1 per source	• per Specification • per Specification
b) Placement	• Grain Size • Compaction/density	• ASTM D422 • ASTM D4253	• 1 per 1000 CY • 1 per lift	• per Specification • 70% relative density

TABLE F.6.2

SUMMARY OF QUALITY ASSURANCE TESTING PROCEDURES
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY

Work Task to be Inspected	*Type of Testing*	*Method of Testing*	*Frequency*	*Acceptance/Rejection Criteria*
• Geotextile				
a) Material	• Unit Weight	• ASTM D5261	• For manufacturer's testing frequency	• 8.8 oz/sq yd
	• Thickness	• ASTM D5199	• As above	• 31 mils
	• Wide Width Tensile Strength	• ASTM D4595	• As above	• 200 lbs/in MD and 275 lbs/in CD
	• Grab Tensile Strength	• ASTM D4632	• As above	• 375 lbs/in MD and 375 lbs/in CD
	• Grab Tensile Elongation	• ASTM D4632	• As above	• 15% in MD and 8% in CD
	• Trapezoid Tear Strength	• ASTM D4533	• As above	• 120 lbs in MD and 120 lbs in CD
	• CBR Puncture Strength	• ASTM D6241	• As above	• 1200 lbs
	• Apparent Opening Size (AOS)	• ASTM D4751	• As above	• 50 U.S. Sieve (maximum)
	• Permittivity	• ASTM D4491	• As above 2	• 0.20 sec-1
	• Permeability	• ASTM D4491	• As above	• 0.015 cm/sec
	• Flow Rate	• ASTM D4491	• As above 2	• 15 gal/min/ft2 -7
	• UV Resistance (at 500 hours)	• ASTM D4355	• As above	• 70% (minimum)
B. Cover System Restoration				
• Grading Layer				
a) Material	• Particle Size Distribution	• ASTM D422	• in accordance with specifications	• 1 per 10,000 CY
	• Maximum Dry Density	• ASTM D698	• lab test to establish criteria	• 1 per 10,000 CY
	• Optimum Moisture Content	• ASTM D698	• lab test to establish criteria	• 1 per 10,000 CY
b) Compaction	• Moisture Content in Laboratory	• ASTM D2216	• ±2% of moisture content in place	• 1 per 5 acre/lift
	• Density in Place	• ASTM D6938	• 90% of maximum dry density	• 2 per acre/lift
	• Moisture Content in Place	• ASTM D3017	• compactible to specified density	• 2 per acre/lift
	• Placement Tolerance	• survey/measurement	• ±0.1 foot from design	• before and after placement
• Compacted Clay Layer				
a) Materials received or at borrow pit (imported)	• Moisture Content	• ASTM D2216	• 1 per 1,500 CY	• lab test to establish criteria
	• Atterburg Limits	• ASTM D4318	• 1 per 1,500 CY	• ML or CL per ASTM D-2487
	• Particle-size distribution	• ASTM D422	• 1 per 1,500 CY	• minimum 25% <2 microns, min. 50% passing No. 200 Sieve of which min. is 15% clay
	• Maximum Dry Density	• ASTM D698	• 1 per 1,500 CY	• lab test to establish criteria
	• Hydraulic Conductivity	• ASTM D5084	• 1 per 10,000 CY	• 1 x 10-7 cm/s at accepted compaction zone
	• Soil Classification	• ASTM D2487	• 1 per 1,500 CY	• CL or ML classification
	• Chemical Characterization	USEPA SW-846	• each source area, as required	• per Specification
b) Compaction	• Density in Place	• ASTM D6938	• 5 /acre/lift	• 95% of Maximum Dry Density
	• Moisture Content in Place	• ASTM D6938	• 5 /acre/lift	• 0 - 5% above optimum
	• Number of Passes	• Observation	• continuous	• determined by compactor and desired %coverage
	• Plasticity Index	• ASTM D4318		• 10% to 30%
	• Bulk Wet Density in Place	• ASTM D6938		• per Specification
	• Depth of Layers	• Observation	• continuous	• equal continuous layers not exceeding 8 inches loose lift
	• Final Elevation	• Survey	• after placement	• tolerance of plus or minus 0.1 foot

TABLE F.6.2

SUMMARY OF QUALITY ASSURANCE TESTING PROCEDURES
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY

Work Task to be Inspected	*Type of Testing*	*Method of Testing*	*Frequency*	*Acceptance/Rejection Criteria*
				from design elevation
• LLDPE Liner				
a) Material	• Carbon Black Content	• ASTM D1603	• As per GRI Standard GM 17 (1/45,000 lbs)	• 2 to 3%
	• Thickness	• ASTM D5994	• As above (GM17- 1/roll)	• 60 mils minimum average roll value (MARV)
	• Density	• ASTM D1505/D792	• As above (GM17 - 1/200,000 lbs)	• 0.939 g/cu cm MARV
	• Tensile strength at break	• ASTM D6693 Type IV Dumbbell, 2ipm	• As above (GM17 - 1/20,000 lbs)	• 90 lbs/inch width MARV
	• Elongation at break	• ASTM D6693 Type IV Dumbbell, 2ipm	• As above (GM17 - 1/20,000 lbs)	• 100% MARV
	• Puncturing resistance	• ASTM D4833	• As above (GM17 - 1/45,000 lbs)	• 66 lbs MARV
	• Tear resistance	• ASTM D1004	• As above (GM17 - 1/45,000 lbs)	• 33 lbs MARV
	• Asperity height	• GM12	• As above (GM17 - every second roll)	• 10 mils MARV
	• Carbon Black Dispersion	• ASTM D5596	• As above (GM17 - 1/45,000 lbs)	
	Cat 1 or 2			• 9
	Cat 3			• 1
	• Oxiation Induction Time (OIT)		• As above (GM17 - 1/200,000 lbs)	
	Standard	• ASTM D3895		• 100 minutes
	High pressure	• ASTM D5885		• 400 minutes
	• Oven Aging @ 85 degrees Celsius	• ASTM D5721	• As above (GM17 - 1 per formulation)	• N/A
	Standard OIT retained after 90 days	• ASTM D3895		• 35%
	High Press. OIT retained after 90 days	ASTM D5885		• 60%
	• UV resistance		• As above (GM17 - 1 per formulation)	
	High Press. OIT retained after 160 days	• ASTM D5885		• 35%
		•		
b) Test Seams	• Seam shear test on test seam	• Field tensiometer (ASTM D4437)	• Minimum 2 times per day for each seaming equipment	• 2,000 & 1,500 psi minimum strength, and seam must not delaminate. Four of 5 replicate samples must pass.
	• seam peel test on test seam	• Field tensiometer (ASTM D4437)	• Minimum 2 times per day for each seaming equipment	• 1500 & 1,250 psi minimum strength, and seam must not delaminate. Four of 5 replicate samples must pass.
	• Non-destructive test	• GRI GM6 and ASTM D4437	• 100% of production seams	• Test results shall meet or exceed the requirements of GM6
	• Destructive seam shear test	• Field tensiometer (GRI GM19 and ASTM D6392)	• Minimum 1 test per approx. 500 linear feet of continuous seam or 300 linear feet of combined seams	• 2,000 & 1,500 psi minimum strength, and seam must not delaminate. Four of 5 replicate samples must pass.
	• Destructive seam peel test	• Field tensiometer (GRI GM19 and ASTM D6392)	• Minimum 1 test per approx. 500 linear feet of continuous seam or 300 linear feet of combined seams	• 1500 & 1,250 psi minimum strength, and seam must not delaminate. Four of 5 replicate samples must pass.
• Drainage Geocomposite	• Ply Adhesion	• ASTM F904 Modified	• Per manufacturer's standard QC testing frequency	• 0.5 lbs/inch
	• Transmissivity	• ASTM D4716	• 1 test	• 5.0 x 10-4 m/s at 1,000 lbs and gradient of 0.2
				• 5.0 x 10-4 m/s at 1,000 lbs and gradient of 0.25
				• 5.0 x 10-4 m/s at 1,000 lbs and gradient of 0.33
a) Geotextile Fastened to the Top and Bottom of Geonet	• Fabric Weight	• ASTM D5261	• Per manufacturer's standard QC testing frequency	• minimum of 5.6 oz/sq yd
	• Grab Strength (MD/CD)	• ASTM D4632	• As above	• minimum of 140 lbs
	• Grab Elongation (MD/CD)	• ASTM D4632	• As above	• 50-140%
	• Permittivity	• ASTM D4491	• As above	• minimum 0.5 (sec-1)
	• Apparent Opening Size (AOS)	• ASTM D4751	• As above	• maximum of 70 sieve size; minimum of 0.210 mm
b) Geocomposite	• Density	• ASTM D1505	• Per manufacturer's standard QC testing frequency	• 0.94 g/cc

TABLE F.6.2

SUMMARY OF QUALITY ASSURANCE TESTING PROCEDURES
PILOT PERIMETER GROUNDWATER TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY

Work Task to be Inspected	*Type of Testing*	*Method of Testing*	*Frequency*	*Acceptance/Rejection Criteria*
	• Carbon Black Content	• ASTM D1603	• As above	• 2.0 percent
	• Tensile Strength (MD)	• ASTM D4595	• As above	• 450 lbs/ft
• Common Fill				
a) Material	• Permeability	• ASTM D5084	• 1 per 1,000 CY	• 1 x 10^{-5} cm/s
	• Maximum Dry Density	• ASTM D698	• 1 per 1,000 CY	• lab test to establish criteria
	• Moisture Content	• ASTM D2216	• 1 per 500CY	• lab test to establish criteria
	• Particle-size distribution	• ASTM D422 or D1140	• 1 per 4,500 CY	
	• Grain Size	• ASTM D422	• 1 per 500CY	• lab test to establish criteria
	• Chemical Characterization	USEPA SW-846	• 1 per source	• per Specification
b) Placement	• Moisture Content in Place	• ASTM D6938	• 1 per 4,800 SY	• +/- 2% of optimum
	• Compaction Density in Place	• ASTM D6938	• 1 per 280 SY	• 95% of maximum dry density
	• Elevation	• Survey	• before and after placement	• tolerance of plus or minus 1 inch from design
	• Recompacted permeability	• ASTM D5084	• 1 per 10,000 CY	• 1 x 10-5 cm/s
	Elevation	Survey	before and after placement	tolerance of plus 1 inch from design
• Topsoil				
a) Material	• Acidity Range (pH)	• ASTM D4972	• 1 per 1,000 CY	• 5.5 to 7.5
	• Organic Matter	• ASTM D2974	• 1 per 1,000 CY	• 2% to 10%
	• Soil Classification	• ASTM D2487	• 1 per 1,000 CY	• SP, SM, ML or OL
	• Chemical Characterization	USEPA SW-846	• 1 per source	• per Specification
	Elevation	Survey	before and after placement	tolerance of plus 1 inch from design

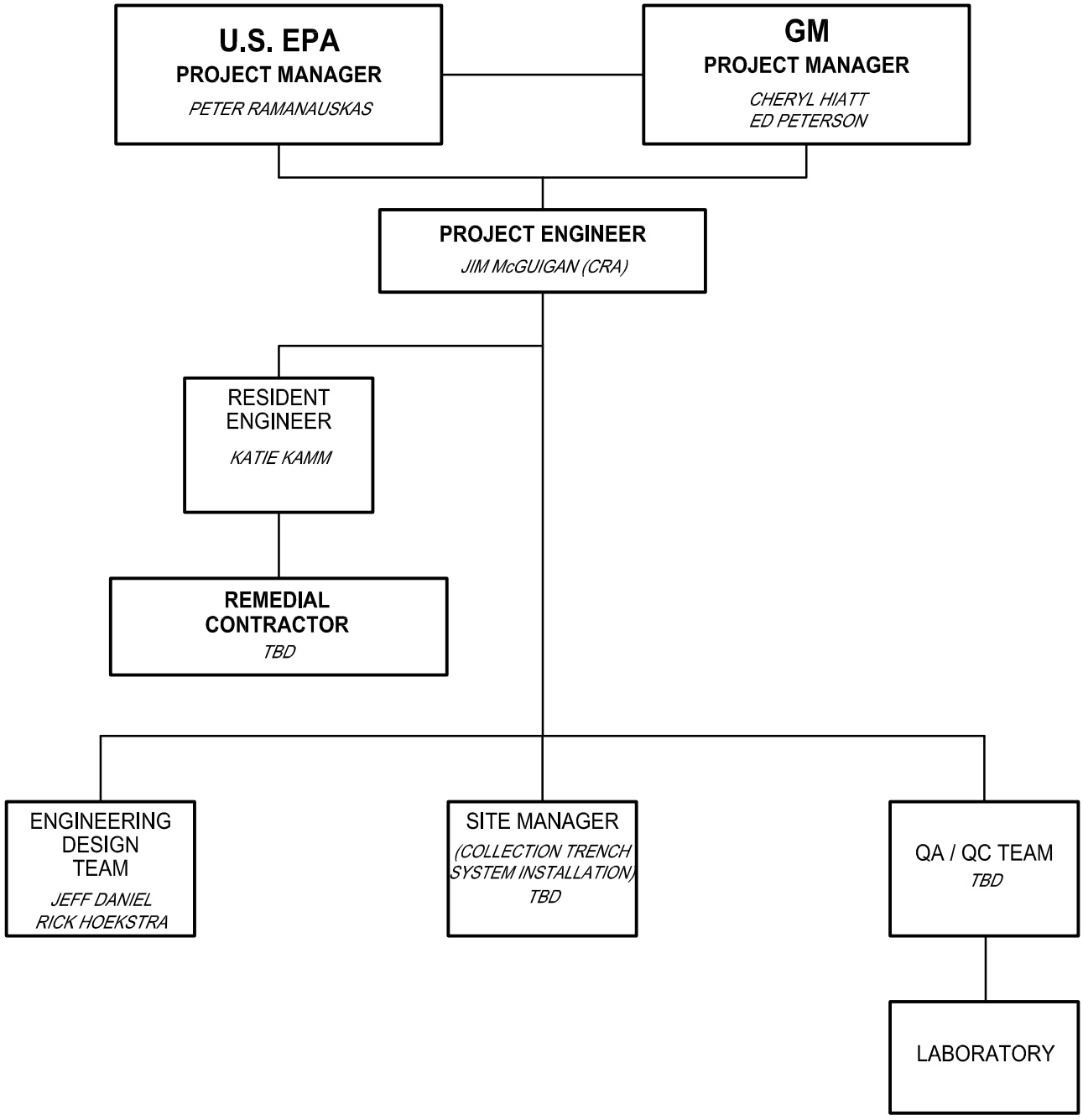


figure F.3.1

PROJECT ORGANIZATION CHART
PILOT PERIMETER GROUNDWATER
TRENCH COLLECTION SYSTEM STUDY
GM CET BEDFORD FACILITY
Bedford, Indiana

Appendix G

Design Calculations

ENGINEERING DESIGN CALCULATION

PROJECT IDENTIFICATION

Client: GM Powertrain 13968

Project: Pilot Trench Sump System Location: Bedford,Indiana

CALCULATION IDENTIFICATION

Calculation Ref. No.: _____ No. Pages: 3
(Including calculation cover sheet)

Calculation Description:

SUMP PUMP SELECTION

Design: A.Wesolowski Date: Sept 26/14

Checked: R.Hoekstra Date: Sept 26/14

RECORD OF REVISION

Revision No.	Revision Date	Design	Checked	Supervised	Project Control	Detail of Revision
0	--	--	--	--	--	Original (per above)

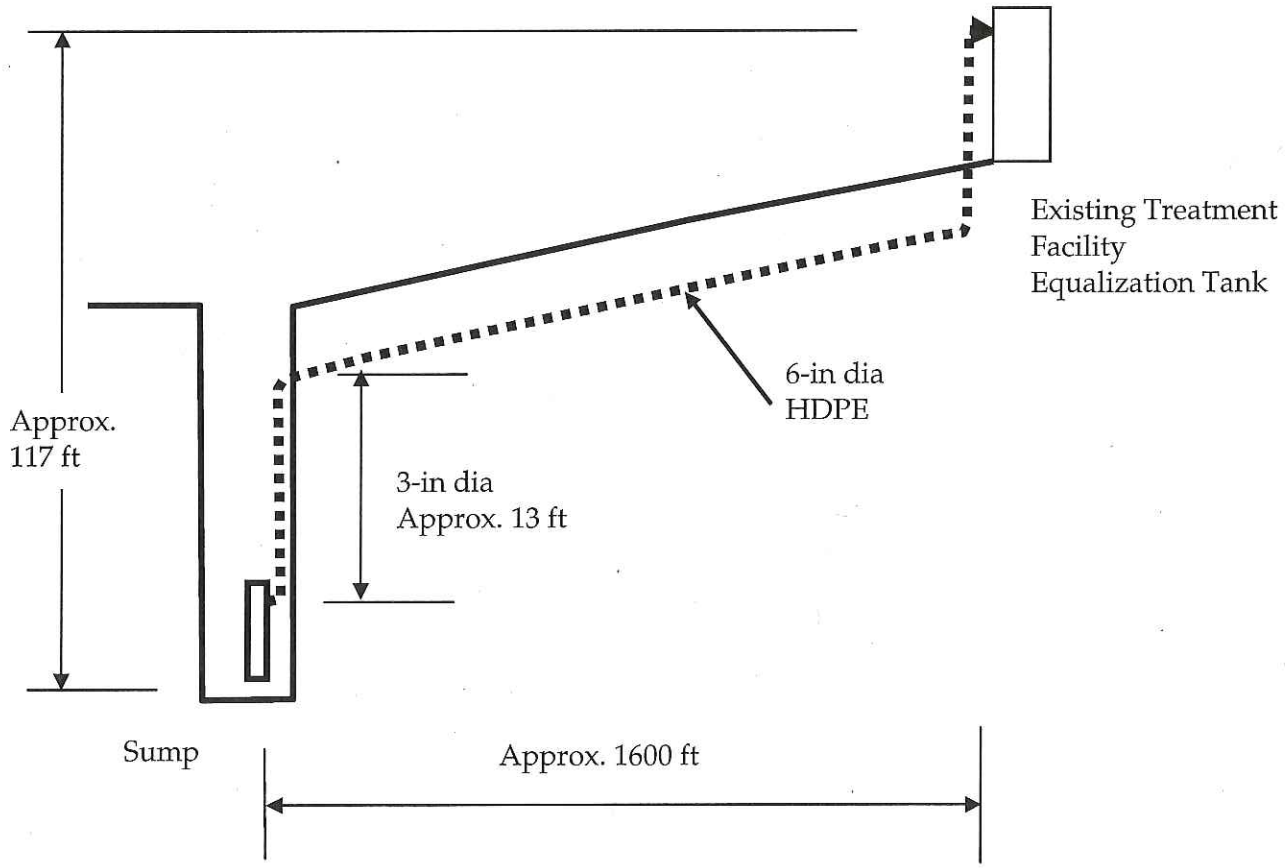
CRA	PROJECT NO: 13968	DESIGNED BY: A.W.
	PROJECT NAME: Pilot Trench Sump System	CHECKED BY: R.H
	DATE : Sept 26/14	PAGE 2 OF 3

1. SUMP PUMP SELECTION

1.1 Data Input

- water flow, Q= 2 x 340 US GPM = 680 US GPM x 0.85 flow reduction factor = 578 US GPM , **use 600 US GPM**
- forcemain size HDPE DR 17 (100 psi), **6-in dia. and 3-in dia.**
- difference in elevation **h_1 = 710 ft top of tank – 593 ft bottom of the sump = 117 ft**

Pump head system



1.2 Friction Losses

Total static head :

h_1 = **117ft**

Total estimated equivalent 3-in pipe length:

L = 13 ft + 10% (fittings) = 14.3ft

Friction losses:

h_2 = **1.26 psi = 2.9 ft**

Total estimated equivalent 6-in pipe length:

L = 1600 ft + 10% (fittings) = 1760 ft

Friction losses:

h_3 = **19.96 psi = 46.1 ft**

Based on Hazen Williams – Head Loss Calculator (see attached) for 6-in diameter forcemain at 600 GPM flow.

Total required dynamic head:

TDH = $h_1 + h_2 + h_3$ = 117ft + 2.9 + 46.1= **166.0 ft**

2. PUMP SELECTION

Electrical Submersible EPG Pump Model 60-6, 460 volts, three phase, 25 HP.
According to attached curve, single pump will be able to deliver approx. **345 GPM** at the total head of **166 ft** .

Design and Engineering Calculator for Polyethylene Piping

Print Result

- Getting Started
- Pipe Data
- Water Flow
- Gas Flow
- Underground
- Above-Ground
- Marine Applications

go back

conversion table

Pressure Water Flow

ref. Ch.6, eqn. 2-12, pp. 175-177

$$P_f = \frac{0.0009015L}{D_I^{4.8655}}\left(\frac{100Q}{C}\right)^{1.85}$$

Hazen-Williams Equation

Calculate for: ◉ P_f ○ L ○ Q ○ D_I ○ C

D_o	3.500	▾	Pipe Outside Diameter, in
DR	17.0	▾	Dimension Ratio
L	14.3		Length Of Line, ft
D_I	3.064		Pipe Inside Diameter, in
Q	340		Flow Rate, gpm
C	150	▾	Hazen-Williams Friction Factor
P_f	1.26		Pressure Loss, psi
V	14.8		Fluid Velocity, fps

Calculate

Design and Engineering Calculator for Polyethylene Piping

Print Result

- Getting Started
- Pipe Data
- Water Flow
- Gas Flow
- Underground
- Above-Ground
- Marine Applications

go back

conversion table

Pressure Water Flow

ref. Ch.6, eqn. 2-12, pp. 175-177

$$P_f = \frac{0.0009015L}{D_I^{4.8655}}\left(\frac{100Q}{C}\right)^{1.85}$$

Hazen-Williams Equation

Calculate for: ◉ P_f ○ L ○ Q ○ D_I ○ C

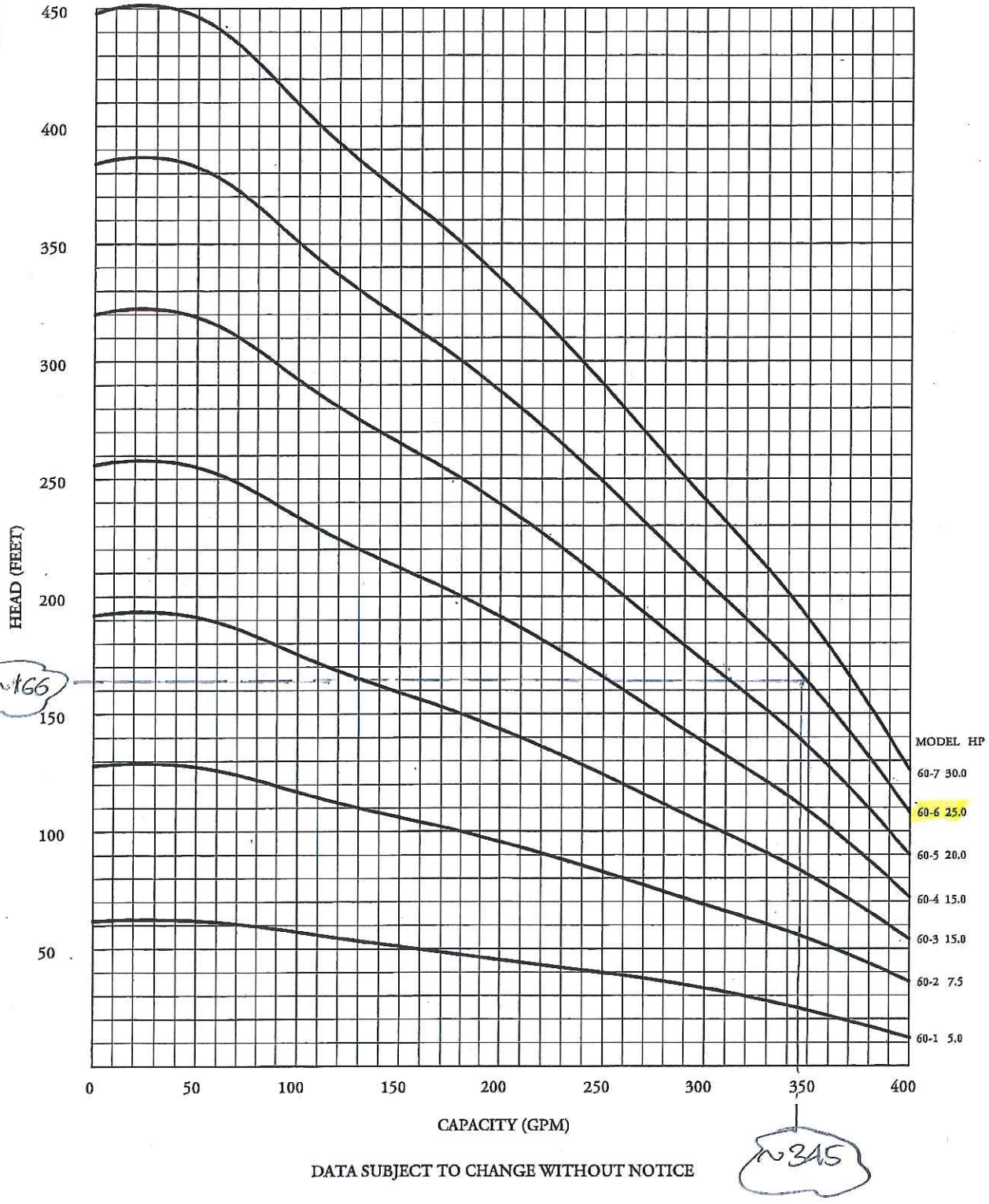
D_o	6.625	▾	Pipe Outside Diameter, in
DR	17.0	▾	Dimension Ratio
L	1760		Length Of Line, ft
D_I	5.799		Pipe Inside Diameter, in
Q	600		Flow Rate, gpm
C	150	▾	Hazen-Williams Friction Factor
P_f	19.96		Pressure Loss, psi
V	7.3		Fluid Velocity, fps

Calculate

SERIES 60 SurePump™

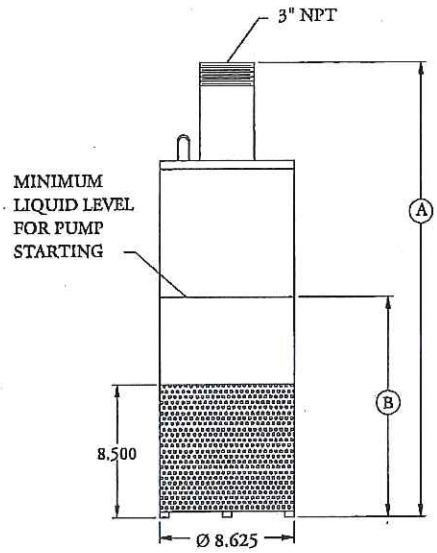
Flow Range 50-400 GPM

60 Hz

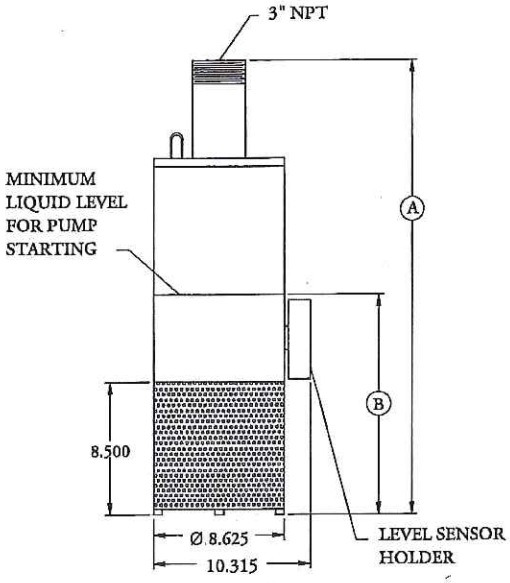


DATA SUBJECT TO CHANGE WITHOUT NOTICE

SERIES 60 SIZE 8 VERTICAL SUMP DRAINER



VSD



VSDPT

MODEL	HP	PHASE	A	B	*APPROX. SHIPPING WEIGHT	
					VSD	VSDPT
60-1	5.00	1	62.26	50	221.31	226.31
60-1	5.00	3	56.26	44	198.66	203.66
60-2	7.50	1	64.80	48	282.06	287.06
60-2	7.50	3	61.00	44	259.21	264.21
60-3	15.00	3	69.34	48	295.35	300.35
60-4	15.00	3	73.88	48	304.64	309.64
60-5	20.00	3	78.42	50	317.25	322.25
60-6	25.00	3	88.06	53	355.74	360.74
60-7	30.00	3	95.20	55	382.35	387.35

NOTE: ALL DIMENSIONS ARE IN INCHES.

*SHIPPING WEIGHT INCLUDES
VSD: CRATE, 50' OF 12-4 MOTOR LEAD, 50' OF 3/16" SS CABLE.
VSDPT: CRATE, 50' OF 12-4 MOTOR LEAD, 50' OF 3/16" SS CABLE,
LEVEL SENSOR AND CABLE.

ENGINEERING DESIGN CALCULATION

PROJECT IDENTIFICATION

Client: GM Powertrain 13968

Project: Pilot Trench Sump System Location: Bedford, Indiana

CALCULATION IDENTIFICATION

Calculation Ref. No.: _____ No. Pages: 2
(Including calculation cover sheet)

Calculation Description:

WET WELL 4 - BURIED PIPING STRUCTURAL

(for sump pipe 30–in dia. HDPE SDR 11)

Design: A.Wesolowski Date: June 29/15

Checked: R.Hoekstra Date: June 29/15

RECORD OF REVISION

Revision No.	Revision Date	Design	Checked	Supervised	Project Control	Detail of Revision
0	--	--	--	--	--	Original (per above)

BURIED PIPING STRUCTURAL

1. HDPE SDR 11 Sump Piping

Data Given

- depth of the sump 20 ft below grade
- soil density 120 lbs/cf
- water table above pipe 8 ft
- live load H-20
- soil modulus 2000 psi (conservative)
- pipe material 30-in dia., HDPE SDR 11 vertical sump

Ring Deflection

Based on Polyethylene Pipe Earthloading software, calculated ring deflection = 1.18 %, for 30-in dia. HDPE SDR 11 pipe, which is acceptable, (see attached results).

Design and Engineering Calculator for Polyethylene Piping

Print Result

- Getting Started
- Pipe Data
- Water Flow
- Gas Flow
- Underground
- Above-Ground
- Marine Applications

go back

conversion table

Earthloading

Spangler's Modified IOWA Formula for Ring Deflection.
ref. Ch.6, p. 211, eqn. 3-10

$$\frac{\Delta X}{D_M} = \frac{1}{144}\left[\frac{K_{BED}\ L_{DL}\ P_E + K_{BED}\ P_L}{\frac{2E}{3}\left(\frac{1}{DR-1}\right)^3 + 0.061 F_s E'}\right]$$

E'	2000	▼	Modulus of Soil Reaction, psi
D_o	30.000	▼	Pipe Outside Diameter, in
DR	11.0	▼	Dimension Ratio
D_M	27.109		Mean Pipe Diameter, in
E	29000	▼	Apparent Modulus of Elasticity, psi
w	120	▼	Soil Density, lb/ft³
K_{BED}	0.1		Bedding Factor, typically 0.1
L_{DL}	1.0		Deflection Lag Factor
F_S	1.0		Soil Support Factor (refer to Chapter 6, Tables 3-9 & 3-10 for additional factors)
H	20		Height of Soil Cover above pipe, ft
H_W	8		Height of water table above pipe, ft
P_S	0		Static Surcharge Load

Note: These calculations are limited to the design of PE pipes buried in trenches or embankments. The load and pipe reaction calculations presented may not apply to pipes installed using trenchless technologies. Reference Chapter 12 of the PPI Design Handbook for additional piping design information.

Total Live Load, psi

(•) No Live Load ( ) AASHTO H20 Live Load ( ) Live Load Without Pavement

P_L	0	▼	Total Live Load, psf

P_E	2400	Earth and Surcharge Load on Pipe, psf
P_T	2400	Total Prism Load, psf
ΔX	0.32	Vertical Deflection, in
ΔX/Dm*100	1.18	Percent Vertical Deflection, %
P_{WC}	36451	Critical Constrained Buckling
	If $P_T > P_{WC}$, critical buckling may occur.	
SF	15.19	Safety Factor against Constrained Buckling

Calculate

* To calculate Critical Buckling Pressure, refer to eqns. 3-15, 3-17 & 3-18. Set Safety Factor, N, in 3-15 equal to 1.

accounts for backfill settlement. This makes even more sense when the Soil Support Factor is included in the calculation.

Vertical Deflection Example

Estimate the vertical deflection of a 24" diameter DR 26 pipe produced from a PE4710 material that is installed under 18 feet of cover. The embedment material is a well-graded sandy gravel, compacted to a minimum 90 percent of Standard Proctor density, and the native ground is a saturated, soft clayey soil. The anticipated trench width is 42".

SOLUTION: Use the prism load, Equation 3-1, Tables 3-7, 3-9, and 3-10, and Equation 3-10. Table 3-7 gives an E′ for a compacted sandy gravel or GW-SW soil as 2000 lb/in^2. The Short-Term Apparent Modulus of Elasticity for PE 4710 material obtained from Table B.2.1 equals 130,000 psi. To estimate maximum deflection due to variability, this value will be reduced by 25%, or to 1500 lb/in^2. Table 3-9 gives an E'_N of 700 psi for soft clay. Since B_d/D equals 1.75 and E'_N/E' equals 0.47, F_S is obtained by interpolation and equal 0.60.

The prism load on the pipe is equal to:

$$P_E = (120)(18) = 2160 lb / ft^2$$

Substituting these values into Equation 3-10 gives:

$$\frac{\Delta X}{D_M} = \frac{2160}{144}\left(\frac{(0.1)(1.0)}{\frac{2(130{,}000)}{3}\left(\frac{1}{26-1}\right)^3 + (0.061)(0.60)(1500)}\right)$$

$$\frac{\Delta X}{D_M} = 0.025 = 2.5\,\%$$

Deflection Limits

The designer limits ring deflection in order to control geometric stability of the pipe, wall bending strain, pipeline hydraulic capacity and compatibility with cleaning equipment, and, for bell-and-spigot jointed pipe, its sealing capability. Only the limits for geometric stability and bending strain will be discussed here. Hydraulic capacity is not impaired at deflections less than 7.5%.

Geometric stability is lost when the pipe crown flattens and loses its ability to support earth load. Crown flattening occurs with excessive deflection as the increase in horizontal diameter reduces crown curvature. At 25% to 30% deflection, the

crown may completely reverse its curvature inward and collapse. See Figure 3-1A. A deflection limit of 7.5% provides at least a 3 to 1 safety factor against reverse curvature.

Bending strain occurs in the pipe wall as a result of ring deflection—outer-fiber tensile strain at the pipe springline and outer-fiber compressive strain at the crown and invert. While strain limits of 5% have been proposed, Jansen [12] reported that, on tests of PE pipe manufactured from pressure-rated resins and subjected to soil pressure only, "no upper limit from a practical design point of view seems to exist for the bending strain." In other words, as deflection increases, the pipe's performance limit will not be overstraining but reverse curvature collapse.

Thus, for non-pressure applications, a 7.5 percent deflection limit provides a large safety factor against instability and strain and is considered a safe design deflection. Some engineers will design profile wall pipe and other non-pressure pipe applications to a 5% deflection limit, but allow spot deflections up to 7.5% during field inspection.

The deflection limits for pressurized pipe are generally lower than for non-pressurized pipe. This is primarily due to strain considerations. Hoop strain from pressurization adds to the outer-fiber tensile strain. But the internal pressure acts to reround the pipe and, therefore, Eq. 3-10 overpredicts the actual long-term deflection for pressurized pipe. Safe allowable deflections for pressurized pipe are given in Table 3-11. Spangler and Handy [13] give equations for correcting deflection to account for rerounding.

TABLE 3-11
Safe Deflection Limits for Pressurized Pipe

DR or SDR	Safe Deflection as % of Diameter
32.5	7.5
26	7.5
21	7.5
17	6.0
13.5	6.0
11	5.0
9	4.0
7.3	3.0

*Based on Long-Term Design Deflection of Buried Pressurized Pipe given in ASTM F1962.

Appendix H

Sampling and Analysis Plan (SAP)

Sampling and Analysis Plan (SAP)

Pilot Perimeter Groundwater Trench Collection System Study

Bedford, Indiana

651 Colby Drive Waterloo Ontario N2V 1C2 Canada

013968 | Report No 393 | February 19, 2016

Table of Contents

1. Introduction 1
2. General Sampling Protocols 1
   - 2.1 Sampling 1
   - 2.2 Equipment Cleaning 2
   - 2.3 Waste Handling 2
3. Stockpile Soil Sampling 2
4. Field Log 3
5. Sample Shipment and Containers 3
   - 5.1 Chain-of-Custody Forms 3
   - 5.2 Sample Containers and Handling 4

Table Index

Table C2.1 Summary of Sampling and Analysis Program

List of Acronyms

Bedford Facility	General Motors Corporation Powertrain Bedford Facility
GHD	GHD Limited
Creek Areas	designated creek and adjacent floodplain areas of Pleasant Run and its tributaries
DOT	Department of Transportation
GM	General Motors Corporation
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
U.S.EPA	United States Environmental Protection Agency
Work Plan	Interim Measures Work Plan

1. Introduction

This Sampling and Analysis Plan (SAP) is submitted as an appendix to and forms part of the Pilot Perimeter Groundwater Collection System Study (Pilot Trench) submitted by General Motors LLC (GM) to the United States Environmental Protection Agency (U.S. EPA) for the completion of the East Plant Area Perimeter Groundwater Trench Collection System Interim Measure. This SAP covers construction activities to be conducted at the Pilot Trench where polychlorinated biphenyls (PCBs) may be present in the soils and rock.

The SAP describes procedures for the collection of stockpile samples that will be collected during the implementation of the Pilot Trench. The purpose of this sampling will be to classify materials (i.e. soil, rock waste) for disposal or re-use purposes. A detailed scope of work for the activities associated with this SAP can be found in Section 3.0 of the Pilot Trench Study Report.

2. General Sampling Protocols

2.1 Sampling

The following protocols will be employed during sampling conducted during implementation of the Work Plan:

1. Sampling instruments and equipment will be cleaned in accordance with the protocols presented herein prior to collecting samples for chemical analyses at each location.
2. A new pair of disposable latex gloves will be used at each location to be sampled for chemical analyses. Additional glove changes will be made for conditions such as: if the gloves are observed to be torn, or the gloves are suspected of being soiled from a source other than the sample media itself.
3. Quality assurance/quality control samples will be collected as outlined in the approved project Quality Assurance Project Plan (QAPP) for the Site, and summarized in Table C.2.1.
4. Sampling generated wastes such as gloves, tyveks, etc. will be collected and containerized for proper disposal.
5. Samples will be identified using labels and a tag affixed to the neck of the container. Samples will also be labeled and tags noting the site, sample location, sample interval (if appropriate), analysis required, preservative added, date, time and sampler's initials. Sample preservation protocols will be followed in adherence with the QAPP. A hard cover bound field book will be maintained to record all samples and sampling events.
6. Containers for sample collection and preservation requirements will be determined as required by the analytical parameters. Sample bottles will be provided by the laboratory and will be prepared using a standard laboratory validated washing procedure. The sample bottles will be delivered to the site in sealed containers.
7. Collected sample shipments for chemical analysis will be immediately iced in laboratory supplied coolers after collection and labeling. Any remaining space will be filled with packing to cushion the containers within the shipment coolers. Each cooler will be sealed with a

transportation custody seal containing the sampler's initials. The cooler will then be sealed with packing tape.

8. Samples will be delivered to the laboratory by commercial courier or GHD Limited (GHD) personnel, the day following sample collection.

9. Samples will be shipped under chain-of-custody procedures as outlined in the QAPP.

2.2 Equipment Cleaning

Prior to the collection of any samples designated for chemical analyses, sampling equipment and tools, except for dedicated equipment and pre-cleaned disposable tools, will be cleaned using the following cleaning protocols as follows:

i. Wash with low phosphate detergent using a brush to remove particulate matter or surface film, if any

ii. Potable water rinse

iii. Rinse with pesticide-grade isopropanol

iv. Rinse with deionized water

v. Air dry

vi. Wrap in aluminum foil or polyethylene until required and during transport to the sampling site.

Fluids used for cleaning will not be recycled. Wash water and rinse water will be transferred to drums and/or a wastewater tank on Site pending final disposal. Isopropanol rinsings will be kept separate from wash/rinse waters and will be transferred to drums pending final disposal.

Following final rinse, sampling equipment will be visually inspected to verify that they are free of soil particulates and other solid material which may contribute to possible sample cross-contamination. Dedicated equipment which is used only once will not be subject to the above decontamination procedures.

2.3 Waste Handling

Wash and rinse waters generated during excavation activities will be containerized in storage tanks or Department of Transportation (DOT) approved 55-gallon drums or equivalent, labeled, and sealed prior to characterization for disposal consistent with the Waste Management Plan.

3. Stockpile Soil Sampling

Sampling of stockpiled soils designated for disposal at commercial facilities, will be performed at the frequency specified by the disposal facility to characterize the soil for disposal purposes. The soil will have been already disturbed during excavation and mixed to a degree, therefore, the procedures used to obtain representative samples from in situ soils are not applicable in this situation. A sufficient number of representative samples will be collected for disposal purposes, based on the quantity required by the disposal facility:

1. Prior to use at each stockpile to be sampled, the sampling equipment will be cleaned according to the protocol presented in Section 2.2;

2. A new pair of disposable gloves will be used at each sample location;
3. Stockpiled soil samples will be collected using a stainless steel trowel or other appropriate tool. Samples will be collected from approximately 1 foot below the surface of the stockpiled soil;
4. The collected soil will be placed directly in a clean, pre-labeled sample jar and sealed with a teflon-lined cap.;
5. A sufficient number of samples will be collected to satisfy disposal facility requirements.
6. Samples will be labeled noting the location, data, time, and sampler's initials. Sample details will be recorded in the hard-cover bound field book; and
7. Samples will be placed in ice or cooler packs in laboratory supplied coolers after collection.

Characterization samples will be analyzed for PCBs and other parameters necessary for waste acceptance at the selected disposal facility(ies).

4. Field Log

The field log book will be a bound document with consecutively numbered pages. The entries for each day will commence on a new page which will be dated. Entries will be made only in indelible ink. Corrections will be made by marking through the error with a single line, so as to remain legible, and initialing this action followed by writing the correction. The field log books generated will be numbered consecutively and maintained by GHD.

The following information will be recorded in the field log book for each sample collected:

i) Site location identification
ii) Unique sample identification number
iii) Date and time (in 2400 hour time format) of sample collection
iv) Weather conditions
v) Designation as to the type of sample (sediment, soil, or water)
vi) Designation as to the means of collection
vii) Name of sampler
viii) Analyses to be performed on sample
ix) Any other relevant comments such as odor, staining, texture, filtering, preservation, etc.

5. Sample Shipment and Containers

5.1 Chain-of-Custody Forms

Chain-of-custody records will be used to track samples from time of sampling to the arrival of samples at the laboratory.

Each shipping container being sent to the laboratory will contain a chain-of-custody form. The chain-of-custody form consists of four copies which are distributed to the sampler, to the shipper, to the contract laboratory and to the office file of GHD. The sampler and shipper will maintain their copies while the other two copies are enclosed in a water proof enclosure within the sample container. The laboratory, upon receiving the samples, will complete the remaining copies. The laboratory will maintain one copy for its records. The executed original will be returned to GHD with the data deliverables package.

5.2 Sample Containers and Handling

Required sample containers, sample preservation methods, maximum holding times and filing instructions are provided in the QAPP.

Samples will be placed in appropriate sample containers, labeled, and properly sealed. In addition, sample labels will include sample number, place of collection, date and time of collection, and analyses to be performed. Samples will be cushioned within the shipping coolers by the use of vermiculite and/or bubble pack. Samples will be kept cool by the use of plastic bags of ice or cooler packs, as required and each sample will have an individual sample tag.

Samples will be shipped by commercial courier on a daily basis to the project laboratory.

Two seals comprised of GHD's chain-of-custody tape will be placed around each shipping cooler prior to shipment to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Clear tape will be placed over the seals to ensure that they are not accidentally broken during shipment.

Upon receipt of the cooler at the laboratory, the cooler will be inspected by the designated sample custodian. The condition of the cooler and seal will be noted on the chain-of-custody form by the sample custodian. The sample custodian will document the date and time of receipt of the cooler and sign the chain-of-custody forms.

The sample custodian then will check the contents of the cooler with those samples listed on the chain-of-custody form. If damage or discrepancies are noticed, they will be recorded in the remarks column of the chain-of-custody form, dated and signed. They will be reported to the laboratory supervisor who will inform the laboratory manager and QA officer.

Sample disposal will be the responsibility of the laboratory. Upon disposal, the laboratory shall sign the next open "Relinquished by" box, and the word "Disposed" will be written in the "Received by" box.

Appendix I

Ambient Air Quality Monitoring Program (AAQMP)

Ambient Air Quality Monitoring Plan (AAQMP)

Pilot Perimeter Groundwater Trench Collection System

General Motors, LLC

Bedford, Indiana

013968 | Report No 388 | February 19, 2016

Table of Contents

1. Introduction 1
2. Exposure Standards and Guidelines 2
3. Dust Action Level Derivation from PCB Data 3
4. Real-Time Monitoring 5
5. Work Zone Monitoring 5
6. Field Documentation 6
7. Quality Assurance / Quality Control (QA/QC) and Reporting 6

Table Index

Table 2.1 Occupational Exposure Limits and Guidelines 2
Table 2.2 Community Exposure Guidelines (Inhalation) 3
Table 3.1 Real Time Air Monitoring Site Action Levels 4

List of Acronyms

AAQMP	Ambient Air Quality Monitoring Plan
ACGIH	American Conference of Governmental Industrial Hygienists
Facility	General Motors LLC Bedford Casings, Engines and Transmissions Facility
GHD	GHD Services, Inc.
GM	General Motors, LLC
IDEM	Indiana Department of Environmental Management
IDLH	Immediately Dangerous to Life and Health
IM	Interim Measures
mg/m^3	mg per cubic meter of air
NAAQS	National Ambient Air Quality Standards
NE	Not Established
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
Pilot Trench	Pilot Perimeter Groundwater Trench Collection System
PEL	Permissible exposure limit
PPE	Personal Protection Equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Removal Action
SES	Sevenson Environmental Services
TLV	Threshold Limit Value
TWA	time weighted average
U.S. EPA	United States Environmental Protection Agency

1. Introduction

This Ambient Air Quality Monitoring Plan (AAQMP) was prepared by GHD, Services, Inc. (GHD) for Interim Measure (IM) activities to be completed for the construction the Pilot Perimeter Groundwater Trench Collection System (Pilot Trench), at the General Motors LLC (GM) Bedford Casings, Engines and Transmissions (CET) Facility (Facility), located in Lawrence County, Indiana. The Pilot Trench will be constructed at the northeast corner of the Facility property west of Bailey Scales Road, with supporting temporary construction facilities (temporary access roads, staging areas) located to the north, west and south of the Pilot Trench with the combined Pilot Trench and support areas hereto referred to as the Site. The purpose of the AAQMP is to present the scope of work for ambient air monitoring activities which will be conducted during construction of the Pilot Trench. The Pilot Trench construction activities will require the excavation of soils and bedrock potentially impacted with polychlorinated biphenyls (PCBs) at low levels (<50 ppm). The objective of this air monitoring program is to quantify the airborne concentrations of contaminants, if any, at the locations of the nearest potential receptors. PCB concentrations in soils (within the excavation area) were detected at levels ranging from non-detect to a maximum concentration of 42.2 mg/kg. The purpose of this work plan is to address air monitoring during the PCB-impacted soil excavation and subsequent loading for offsite transport and disposal. The specific objectives include the following:

- Perform real-time air monitoring for total dust in and around the work area to characterize potential exposures to workers in the exclusion zone and those in the area around the exclusion zone.
- Perform real-time air monitoring for total dust levels to evaluate potential fugitive dust emissions containing PCBs at the property boundaries of the Site.
- Establish and implement procedures to ensure appropriate responses to elevated levels of particulate matter. This may include slowing or stopping work activities, identifying areas requiring respiratory protection, application of dust suppressants or arranging for a timely evacuation of the work site in the event that hazardous concentrations of airborne emissions are detected.
- Perform background perimeter air monitoring to establish baseline real-time dust concentrations.
- Communicate the hazards associated with exposures to dust and PCB-impacted dust to the affected workers and other potential receptors.
- Provide recommendations for controlling site exposures, respiratory protection and other personal protective equipment (PPE) to site management.

GHD will conduct Site perimeter air monitoring during work activities in which PCB-impacted soils are encountered and have the potential for creating airborne dust. This perimeter monitoring will continue until potential worker/community exposures to PCBs and dust are mitigated. The air monitoring data will be collected and compiled in accordance with established guidelines. In addition, the results will be communicated to GM, site workers, and others as required and/or as necessary to ensure the safety and health of potentially affected individuals.

2. Exposure Standards and Guidelines

The U.S. Occupational Safety and Health Administration (OSHA) promulgate workplace standards to protect the safety and health of workers. The administration of these standards has been delegated to the Indiana Occupational Safety and Health Administration (IOSHA), which is part of the Indiana Department of Labor. The IOSHA standards are identical to the OSHA standards an apply to all places of employment in the state, with the exception of federal government employees, the U.S. Postal Service, private sector maritime activities, and certain agricultural operations. The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) have established guidelines to protect workers from chemical hazards on the job. Table 2.1 summarizes the OSHA permissible exposure limits (PEL), NIOSH Immediately Dangerous to Life and Health (IDLH) guidelines, and ACGIH threshold limit values (TLV) for PCBs and total dust.

Table 2.1 Occupational Exposure Limits and Guidelines

Analyte	IOSHA PEL	ACGIH-TLV	NIOSH - IDLH[3]	Units
	TWA[1]	TWA[2]		
PCBs (chlorodiphenyl 54%)	0.5	0.5	5	mg/m^3
Total Dust[4]	15	10	NE	mg/m^3

Notes:

1. Permissible Exposure Limit - Time Weighted Average (PEL-TWA) = An 8-hour time weighted average. An exposure to any material listed in 29 CFR 1910.1000, Tables Z1 and Z2, in any 8-hour work shift of a 40-hour workweek shall not exceed the 8-hour time weighted average limit given for that material in the table.
2. Threshold Limit Value - Time Weighted Average (TLV-TWA) = The TWA concentration for a conventional 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect (ACGIH, 2015).
3. Immediately Dangerous to Life and Health (IDLH) = Indicates an exposure to airborne contaminants that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.
4. A TLV for Particles Not Otherwise Specified (PNOS) has not been established. ACGIH recommends that airborne concentration for these compounds be kept below 10 mg/m^3.

The U.S. Environmental Protection Agency (U.S.EPA) has established National Ambient Air Quality Standards (NAAQS) for five primary pollutants, including particulate matter (dust). The NAAQS for particulate matter are based on a 24-hour average. The NAAQS are derived at levels designed to protect public health, and are based on the known effects of each substance on human health, vegetation and other components of the environment such as soil, water, materials (e.g., metalwork and masonry), visibility and personal comfort and well-being.

There currently is no NAAQS for PCBs. However, U.S.EPA has established generic community exposure limits in the risk-based screening table (target cancer risk of 1E-6). The selected criterion for the residential risk based screening level (low risk) is 0.000281 mg/m^3.

The community exposure guideline values for the identified COI are summarized in Table 2.2:

Table 2.2 Community Exposure Guidelines (Inhalation)

Compound of Interest (COI)	Averaging Period	Exposure Standard/Guideline	Units
Particulate Matter (PM-10)[1]	24-hour	0.15	mg/m^3
PCBs	24-hour	0.000281	mg/m^3
Notes: 1. PM10 is particulate matter 10 micrometers or less in diameter			

3. Dust Action Level Derivation from PCB Data

Work area and community action levels have been established to facilitate a timely and appropriate response to the detection of airborne hazards associated with airborne dust. Action levels have been set at levels lower than the established exposure limits and guidelines. The purpose is to ensure that if these levels are detected, they are effectively communicated to affected workers and Site management so that appropriate actions can be taken to reduce airborne concentrations to acceptable levels. The site-specific action levels for the project are listed in Table 3.1. The real-time dust monitoring data will be compared to the PELs for dust of 15 mg/m^3. The concentration of PCB in soil (based on previous soil investigations) will be used to establish the PCB action level by estimating the concentration of airborne PCB-containing dust as outlined below.

No real-time methods exist for detection of airborne PCBs. Measuring the total dust concentration provides the quickest means of screening potential exposure to workers and the community. The total dust concentration necessary to reach the work area action level of 0.5 mg/m^3 (OSHA PEL) can be estimated from the soil sampling data. This estimate is based on calculating the Equivalent Airborne Dust Concentration based on the applicable exposure limit ($EADC_{EL}$). The $EADC_{EL}$ calculation determines what dust level would equal the exposure limit for a specific soil contaminant, in this instance, PCBs. The following equation shows this relationship.

$$EADC_{EL} = EL \times Conc^{-1}_{Contaminated\ soil} \times 10^6$$

Where: EL = Exposure Limit, mg/m^3

$Conc^{-1}_{Contaminated\ soil}$ = Inverse of the soil PCB concentration, kg/mg

The maximum soil concentration of PCBs is reported to be 42.2 mg of mg/kg of PCBs. Using the equation above, the $EADC_{EL}$ is calculated as shown below:

$$\text{Total dust} = \text{EADC}_{EL} = \frac{mg_{soil}}{m^3_{air}} = \left(\frac{0.5\ mg_{PCBs}}{m^3_{air}}\right)\left(\frac{kg_{soil}}{42.2\ mg_{\ PCBs}}\right)\left(\frac{10^6 mg_{soil}}{kg_{soil}}\right) = 11{,}848\ mg/m^3$$

Where: EL = The OSHA PEL of 0.5 mg/m^3

$Conc^{-1}_{Contaminated\ soil}$ = One kg of soil contains 42.2 mg of PCBs

10^6 = The number of mg of soil in a kg of soil

This calculated total dust concentration (11,848 mg/m^3) is unlikely and PCB-specific personal (worker) exposure sampling is not required during remediation activities of the Site. As such, real time air monitoring for worker exposure will be based on dust readings as summarized in Table 3.1.

Table 3.1 Real Time Air Monitoring Site Action Levels

Analyte	Action Level	Description of Action
Total Dust Readings (Work Zone Action Levels)[1]	< 5.0 mg/m^3	No action required
	≥ 5.0 - < 15 mg/m^3	Apply water or dust suppressant soils generating the dust.
	≥ 15 mg/m^3	Initiate Stop Work Authority (SWA). Notify onsite Safety & Health Officer (SES HSO) and construction superintendent. Institute engineering controls to reduce dust levels.
Total Dust Readings[2] (Perimeter Action Levels)[3]	< 0.15 mg/m^3	No action required. Continue monitoring at upwind perimeter (background) and at up to three perimeter downwind locations. [3]
	≥ 0.15 mg/m^3	1. Initiate SWA, immediately measure the upwind background level using the same monitor. 2. Determine primary source of dust and then apply water or dust suppressant to dusting surfaces. Continue dust monitoring activities with increased focus on downwind dust levels until readings are consistently below 2.5 mg/m^3. 3. If dust suppression efforts do not reduce perimeter dust concentrations below 2.5 mg/m^3 within 15 minutes after initiate SWA and consult with the PM, Project CIH, and others as appropriate to determine an appropriate course of action to reduce dust levels to acceptable levels.

Notes:

1. Work area action Levels are based on sustained (>1 min) airborne concentrations within the worker's breathing zone. Spurious or non-sustained peak readings or surface, contact readings while cause for concern may not indicate the need for additional action requiring PPE upgrade.
2. Perimeter dust readings will be taken upwind (background) prior to initiating work.
3. Dust readings will be taken over an integrated (average) sampling period not to exceed 15 minutes.

The maximum PCB concentration in the soil samples collected was also used to determine the $EADC_{EL}$ for community exposures. The community exposure limit for PCBs is 0.000281 mg/m^3 (based on a 24-hour average). This value is a risk based limit derived using the low risk U.S. EPA Regional Screening Levels for PCBs (based on a cancer risk level of 1E-06) and the anticipated 1 - 2 month exposure duration. Using the same maximum soil concentration reported for PCBs, the community $EADC_{EL}$ is calculated as follows:

$$\text{Total dust} = \text{EADC}_{EL} = \frac{mg_{soil}}{m^3_{air}} = \left(\frac{0.000281\ mg_{PCBs}}{m^3_{air}}\right)\left(\frac{kg_{soil}}{42.2\ mg_{\ PCBs}}\right)\left(\frac{10^6 mg_{soil}}{kg_{soil}}\right) = .7\ \text{mg/m}^3$$

Where: EL = The risk based community exposure limit of 0. 0.000281 mg/m^3

$Conc^{-1}_{Contaminated\ soil}$ = One kg of soil contains 42.2 mg of PCBs

10^6 = The number of mg of soil in a kg of soil

The average dust concentration measured during the work day (10 hours) can be used to estimate a 24-hour average dust concentration by incorporating a dust level value of 0.000 mg/m^3 for non-working hours. The averaged data will be compared to the NAAQS for dust and the $EADC_{EL}$ for PCBs.

4. Real-Time Perimeter Dust Monitoring

Real-time air monitoring for dust will be performed during work operations involving the disturbance/handling of impacted material (remedial activities) using TSI Dustrak aerosol monitors or equivalent. The instruments will be calibrated and operated in accordance with the manufacturer's specifications or applicable test/method specifications. Real-time air monitoring will be performed at the Site perimeter - one upwind (background) and up to three downwind locations. Perimeter Dust Monitoring.

DustTraks will be placed prior to the beginning of each work day and programmed to continuously monitor dust concentrations taking 15-minute time weighted average (TWA) readings. The DustTraks will be housed in rugged environmental enclosures. Each enclosure will be attached to a surveying tripod and powered by a deep cycle marine battery (or similar). Each DustTrak will be connected to a Netronix modem that will stream the data (in real time) to a secure website called Environet. Access to the website will be limited to the individuals designated by the Project Manager. The Environet website allows authorized users to set custom alert levels that will send an email if an alarm or some other threshold is triggered at the site.

1. Particulate dust levels will be monitored at up to four locations which include one upwind location to monitor dust background concentrations and up to three downwind locations to monitor dust levels leaving the site.
2. Dust levels will be integrated over a period not to exceed 15 minutes therefore the dust monitors will be set to record the 15-minute time-weighted average over this period. The action level will be set at 0.15 mg/m^3 over the 15 minute TWA.
3. If particulate levels are detected in excess of 0.15 $mg/m^3$for two consecutive 15 minute intervals, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measure is greater than 0.10 mg/m^3 above the background level, additional dust suppression techniques must be employed to reduce the generation of fugitive dust.

5. Work Zone Monitoring

The general contractor, Sevenson Environmental Services (SES), will use dust monitors in the immediate work area (worker's breathing zones) and at designated off-site locations (if necessary) to monitor airborne dust concentrations. At the conclusion of each work shift, the recorded data from these instruments will be filed, downloaded, and stored by SES.

If airborne concentrations of dust or VOCs are detected above the action levels established for the site, designated site safety personnel, site superintendents, affected workers, and/or GHD representatives will be notified and appropriate actions will be taken to ensure the health and safety of the site workers.

A portable meteorological station will be set up and maintained onsite to provide wind speed, wind direction, and other meteorological measurements. This information will be used to determine potential down-wind receptors in the event of detections from any real-time instruments. The meteorological information will also be archived and available during the reporting process to assist in analysis of perimeter monitoring data.

6. Field Documentation

Appropriate field documentation will be collected including a daily activity log, calibration logs, air monitoring field forms, site observations, and other pertinent monitoring documentation. Real-time air monitoring data and supporting documentation collected during this project will be stored in a secure electronic database that only necessary and authorized GHD personnel can access. GHD will utilize a custom database application that will upload data directly to a secure GHD server, which will be backed up daily.

The daily activity logs will consist of observations and field notes taken throughout the work shift. The daily log will be recorded either in bound log books or on pre-printed daily log forms. To the extent possible, GHD will document work activities observed throughout each day to better correlate these activities with elevated air contaminant concentrations.

7. Quality Assurance / Quality Control (QA/QC) and Reporting

DustTrak data will be downloaded from Environet and stored on-a secure GHD server. Manually-collected and automatically recorded real-time data will be reviewed to ensure accuracy and completeness. Data entry forms and field notes will be kept on-site and retained for reference upon completion of the project. Errors identified during the QA/QC process in field notes or data will be noted appropriately, while retaining original information to ensure a proper historical record.

During the project, interim reporting of results may be required. This may include data summaries, maps, or other presentations of preliminary monitoring results. Such reporting will be considered preliminary.