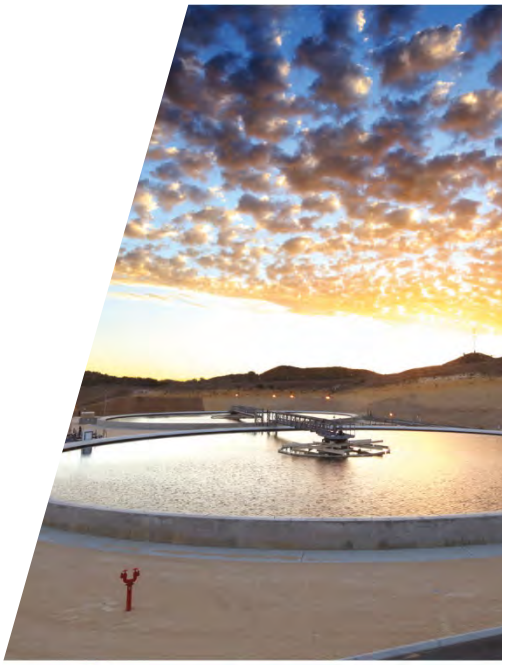

Investigation Results Report
Phase I

Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Glenn Springs Holdings, Inc.
CITGO Petroleum Corporation

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1. Introduction

GHD has prepared this Investigation Results Report – Phase I (Report) to summarize the results of the Laser Induced Fluorescence (LIF) and Membrane interface probe (MIP) qualitative investigation activities at the Former Cities Refinery and CITGO Terminal in East Chicago, Indiana. The Former Cities Refinery is approximately 93.2 acres and the CITGO Terminal is approximately 228.5 acres. Figure 1 presents the locations of the Former Cities Refinery and CITGO Terminal.

OXY USA, Inc. (OXY)/Glenn Springs Holdings, Inc. (GSH) and CITGO Petroleum Corporation (CITGO) are performing Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFIs) at the Former Cities Service Oil Company Refinery (Former Cities Refinery) and the CITGO Terminal (CITGO Terminal) (CITGO Terminal and Former Cities Refinery together are referred to as the Facility). There are two separate draft Administrative Orders on Consent (AOCs) currently in negotiation with the United States Environmental Protection Agency - Region 5 (U.S. EPA), one for the Former Cities Refinery (OXY), and one for the CITGO Terminal (CITGO). Each AOC requires the RFI work be completed under a Corrective Action Framework (CAF), both of which are also currently being negotiated. The work presented herein has been completed in accordance with the intent of the AOCs and CAFs. CITGO and OXY have jointly coordinated efforts related to the performance of the first phase of investigation for their respective portions of the contiguous property.

The Phase I Investigation, covering both the Former Cities Refinery and the CITGO Terminal, was completed in accordance with the “Site Perimeter Investigation Work Plan – Phase I” (Work Plan) submitted to the U.S. EPA on March 13, 2019. The U.S. EPA commented on the submission and responses were provided to the U.S. EPA on April 14, 2019. The U.S. EPA approved the Work Plan, as modified by the responses, on April 19, 2019. As stated in the Work Plan, the primary goal of the Phase I Investigation was to investigate the Facility perimeter to identify potential off-Facility impacts. The investigation was intended to be iterative and adaptive based on conditions encountered in the field and based on real-time results.

Field work associated with the U.S. EPA-approved Work Plan was completed in two mobilizations between May 13 and August 12, 2019.

The Work Plan focused investigation activities around the perimeter of the Former Cities Refinery and CITGO Terminal. The second mobilization included additional perimeter locations, but also included internal investigation locations which were not included in the Work Plan. The purpose of the internal investigation was to utilize available field time to further advance the Conceptual Site Model (CSM). The additional data will be used to inform future investigations, as further described in Section 3.1.

The remainder of this Report provides details of the field investigation activities, the investigation results, as well as a Baseline CSM for the Facility.

2. Investigation Methodology

In accordance with the U.S. EPA-approved Work Plan, the LIF investigation was completed using an Ultra Violet Optical Screening Tool (UVOST) system (Benchtop emulations were performed on LNAPL samples collected from three manholes (internal to the Former Cities Refinery portion of the Facility) prior to the work, and confirmed that the UVOST system would provide appropriate responses). The LIF probe is equipped with a sapphire window through which a laser is directed. As the probe advances, the laser is adsorbed by polycyclic aromatic hydrocarbon (PAH) molecules (e.g., anthracene, pyrene, benzo(a)pyrene, etc.) in contact with the window. The addition of energy (photons) from the laser to the PAHs causes them to release excess energy as light (fluoresce) as they return to ground state after excitation. A portion of the fluorescence emitted from any encountered PAHs is returned through the sapphire window and conveyed by fiber optic cable to a detection system at the surface. The emission data is averaged in one reading per second intervals and is recorded continuously. The emission data is reported as a percentage of the fluorescence intensity of a "reference emitter" (%RE). The Reference Emitter is a standard proprietary hydrocarbon mixture used to calibrate the equipment, and all LIF readings are a quantification of intensity relative to the fluorescence produced by it. For example, a LIF location producing a reading of 100%RE is fluorescing at exactly the same intensity as the standard hydrocarbon mixture. LIF response is proportional to the amount of aromatic hydrocarbon present (i.e., LIF response is proportional to light non-aqueous phase liquid (LNAPL) saturation). In addition, the LIF instrumentation measures the intensities of four different wavelengths produced from a given LNAPL. The proportions of each wavelength that comprise the overall fluorescence response are unique to a given petroleum type and are referred to as the spectral fingerprint.

MIP technology was also used, which involves the use of a heated probe to volatilize liquids, extract the vapor into a sample line and inject into a field gas chromatograph (GC) equipped with photoionization and flame ionization detectors (PID and FID, respectively). It is noted that MIP does not differentiate between dissolved hydrocarbons and LNAPL, is not able to indicate LNAPL type, and cannot reliably indicate relative saturation levels. The use of a MIP is more applicable for delineating and characterizing dissolved phase hydrocarbons where LNAPL is not present. For these reasons, MIP was not used at locations with LIF responses above background.

Hydraulic profiles were obtained at applicable LIF and MIP locations with a Hydraulic Profiling Tool (HPT). The HPT tool employs the injection of a constant flowrate of water into the formation while monitoring the back pressure applied by the formation. The relationship between the injected water flowrate and pressure forms the basis of estimations of hydraulic conductivity continuously as the probe is advanced. Therefore, a continuous profile of the hydraulic conductivity of the formation can be developed at each location. The HPT tool is also used without the water injection in order to conduct hydrostatic dissipation testing to estimate the elevation of the water table.

For more background information on the LIF, MIP, and HPT technologies, refer to Appendix A.

3. Phase I Investigation Activities

3.1 Scope

The proposed Phase I scope included the following:

Screening for the presence/absence of LNAPL and dissolved groundwater impacts using real-time field screening technologies around the perimeter of both the Former Cities Refinery and CITGO Terminal to a typical depth of 15 feet (ft) below ground surface (bgs).

The initial phase of investigation was completed between May 13 and May 24, 2019 (12 field days).

The following field activities were completed:

- A Site reconnaissance event to physically mark proposed boring locations, taking into account known utility corridors, pipelines, historical site activities, access, and observed hazards
- Mobilization of field crew, contractors, and equipment
- Utility clearance at proposed investigation locations (public and private)
- Hydro-excavation of the top 4-6 ft bgs of soil adjacent to each location to verify there were no shallow unmarked obstructions or hazards
- Completed 46 LIF borings to a depth of approximately 15 ft bgs
- Completed 12 MIP borings to a depth of approximately 15 ft bgs
- Completed HPT profiles at applicable LIF and MIP borings
- Survey of completed locations for vertical and horizontal control
- Demobilization

Due to persistent precipitation prior to and during the field work, some initially proposed locations could not be completed during this mobilization. Timing, access, and equipment limitations also necessitated the elimination of some boring locations. Lastly, some locations could not be completed due to safety concerns in congested areas of existing underground utilities.

As stated in Section 1.0, the Phase I Investigation initially focused on the perimeter of the Former Cities Refinery and CITGO Terminal, and was intended to be iterative and adaptive based on conditions encountered in the field and based on real-time results. As such, the quantity and placement of Phase I investigation locations were modified from what was proposed in the approved Work Plan with the intent of focusing the investigation on areas which would provide the most useful data.

An additional phase was completed between August 5 and August 12, 2019 (8 field days) to complete the proposed Phase I scope. The additional phase included investigation locations around the perimeter of the Facility, and investigation locations internal to the Former Cities Refinery and CITGO Terminal properties, which were completed beyond the scope of the Work Plan. The interior locations focused on former operational areas, areas of concern, and solid waste management units (SWMUs), as previously identified in the 1991 Preliminary Assessment/Visual Site Inspection (PA/VSI) (see Appendix B).

The following additional field activities were completed:

- Completed additional 33 LIF borings to a depth of approximately 15 ft bgs
- Completed additional 28 MIP borings to a depth of approximately 15 ft bgs
- Completed HPT profiles at applicable LIF and MIP borings

Two investigation locations were proposed in congested underground utility corridors, but were not completed due to safety concerns. MIP was not completed at any location with LIF response above background, as discussed in Section 2.

In total, between the two field mobilizations, 79 LIF borings and 40 MIP borings were completed.

Figure 2 presents the Phase I investigation locations.

3.2 LIF/MIP Results

For LIF and MIP, the %RE, PID, and FID signals are subject to varying levels of background response or 'noise'. Background response can fluctuate from location to location based on natural site and location-specific variability in the chemical and physical characteristics of the subsurface.

For locations with minimal or only background LIF response (i.e., no LNAPL identified), MIP was advanced adjacent to the LIF boring to screen for dissolved constituents in the saturated zone. As previously discussed, the MIP technology is typically not used at locations with LIF response above background, as the bulk contamination levels are high enough to overwhelm the GC detectors, leading to lengthy downtime between points and less useful output data and 'over-range' results.

LIF responses were reported above background at 33 of the 79 locations (LIF09-19, LIF11-19, LIF11A-19, LIF11B-19, LIF15-19, LIF17-19, LIF17A-19, LIF20-19, LIF20B-19, LIF22-19, LIF22A-19, LIF22B-19, LIF26-19, LIF26A-19, LIF29-19, LIF29A-19, LIF31-19, LIF31A-19, LIF32-19, LIF32A-19, LIF33-19, LIF33A-19, LIF34-19, LIF47-19, LIF48-19, LIF53-19, LIF54-19, LIF55-19, LIF57-19, LIF58-19, LIF63-19, LIF64-19, and LIF65-19).

A number of LIF logs show apparent responses above background levels immediately at ground surface (approx. 0-6 inches bgs) when drilled in areas with gravel roadways. An emulation was run in the field which confirmed that the limestone gravel itself fluoresces at response levels up to 6 %RE. For this reason, near surface LIF responses at locations with limestone gravel were not considered above background. The limestone emulation log is available in Appendix C.

MIP responses were reported above background at 10 of the 40 locations (MIP09-19, MIP14-19, MIP21-19, MIP24-19, MIP25-19, MIP38-19, MIP42-19, MIP49-19, MIP52-19, and MIP62-19).

Figure 3 presents the cross-section locations around the perimeter of the Facility, and Figures 4 to 6 present modelled cross-sections of LIF and MIP results. Please note that there is no cross-section across the northern perimeter since the LIF and MIP returned no responses above background.

Appendix C presents the LIF and MIP logs.

4. Baseline Conceptual Site Model (CSM)

Phase I investigation results and historical investigation information has been used to develop the baseline CSM. The information is discussed in the sections below and attached to this Report, as follows:

Appendix C	Phase I LIF and MIP Logs
Appendix D	Historical Stratigraphic Logs
Appendix E	Historical Soil Particle Size Analysis
Appendix F	Historical Aquifer Testing, Gauging Data, and Contours
Appendix G	Historical Forensic Sampling
Appendix H	Historical Soil and Groundwater Analytical Data
Appendix I	Historical Electromagnetic Survey

Figure 7 presents the locations of the Phase I investigation locations and all historical soil and groundwater investigation locations. Figure 8 presents all historical investigation locations with groundwater analysis. Figure 9 presents all historical investigation locations with soil analysis.

4.1 Current and Future Site Land Use

Current Land Use:

- Former Cities Refinery - None
- CITGO Terminal - Industrial

Expected Future Land Use:

- Former Cities Refinery – Industrial or Commercial
- CITGO Terminal - Industrial

Current and Future Surrounding Property Land Use:

- Mixed residential, commercial, industrial and limited recreational

4.2 Sources and Extent of Known Impacts

Sources of impacts could include former petroleum refinery related operations and petroleum terminal related operations. Previous investigations have identified the presence of select volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals.

Sufficient data is not currently available to conclusively determine the extent of impacts.

Extent of impacts of VOCs, SVOCs, 1,4-dioxane and metals will be confirmed in subsequent phases of the RFI.

4.3 Contamination Transport/Migration Pathways

Contaminant transport and migration pathways include the following:

- Hydrocarbon migration through the subsurface to groundwater
- Groundwater to surface water (Grand Calumet River)
- Hydrocarbon vapor intrusion potential

4.4 Geology

Phase I investigation results (Appendix C), historical stratigraphic logs (Appendix D), and soil particle size analysis (Appendix E), represent multiple sources of information which consistently identify values characteristic of silty sand across the Facility. Baseline stratigraphy for the Facility is as follows:

- Shallow fill – 0-2 ft bgs
- Silty sand (SP-SM) – 0-35 ft bgs
- Clay confining layer at 35 ft bgs

Additional geologic information will be obtained through subsequent phases of the RFI.

4.5 Hydrogeology

Phase I investigation results (Appendix C) and historical investigations on both the Former Cities Refinery and CITGO Terminal properties (available in Appendices D, E, F, G), support the following:

- Unconfined water table is generally present from approximately 1.5 to 5.5 ft bgs
- Subsurface utilities are present at the Facility. Figure 10 presents the approximate locations of known major subsurface utilities
- Groundwater flow (based on historical monitoring wells and the Phase I investigation) is generally to the south (See Appendix F), however, the shallow water levels measured from the historical wells were generally limited to select areas of the Facility. Shallow water levels were obtained from the HPT data collected during the Phase I investigation. Figure 11 presents the estimated piezometric surface which was developed based on HPT data from the Phase I investigation
- Groundwater flow velocity has been calculated at the Facility ranging from 0.01 to 0.055 ft/day; based on hydraulic conductivity (K) values ranging from 0.947 to 2.49 ft/day (from slug tests in Appendix F), hydraulic gradient (i) with average values ranging from 0.0028 to 0.0044 ft/ft (based on historical gauging data), and porosity values ranging from 20% to 25% (based on assumed typical average porosities of the unconfined sand aquifer)
- LNAPL has been reported sporadically at the Former Cities Refinery. In June 2007, LNAPL was detected in MW-17 with an observed thickness of 0.63 feet. No LNAPL of measurable thickness has been recorded in MW-17, nor any of the other monitoring wells since. A sample of the LNAPL found in MW-17 was collected and submitted to an environmental forensics laboratory

(see Appendix G). In August 2018, GHD located and gauged existing monitoring wells and piezometers. LNAPL was identified in piezometers PZ-L-6A and at PZ-L-6C.

Groundwater flow direction is to be confirmed in subsequent phases of the RFI.

4.6 Previous Investigations

Several previous investigations have been completed. The following presents a summary of the investigations completed:

- Forensic LNAPL Sample: from one location on the Former Cities Refinery. Primarily highly degraded distillate with some gasoline range hydrocarbons (laboratory report is presented in Appendix G)
- Soil Samples: 101 samples (Former Cities Refinery) and 5 samples (CITGO Terminal) (a summary of the analytical results are presented in Appendix H)
- Groundwater Samples: 315 samples (Former Cities Refinery) and 18 samples (CITGO Terminal) (a summary of the analytical results are presented in Appendix H)
- Electromagnetic (EM) Survey conducted in two small areas of the Former Cities Refinery – Magnetic anomalies were detected which were indicative of buried pipes that are consistent with historical drawings. See Appendix I for EM results and relevant historical drawings
- Sewer Inspections – In 2008, GHD (formerly Conestoga Rovers and Associates) oversaw the removal of 112,031 gallons of oil/water, jetting of select sewer lines (1,500 feet), and subsequent video inspection of the historical industrial sewer system (ISS) located on the Former Cities Refinery. The ISS was generally in good condition. The ISS was originally constructed as part of the Cities Service Oil Company refinery and was left in place after the refinery was decommissioned. According to historical plans of the former refinery, the ISS piping drains southeast to an oil-water separator, which CITGO now operates

4.7 Exposure Receptors

Potential on-Site exposure receptors include:

- Routine workers
- Maintenance or construction workers
- Trespassers

Potential off-Site exposure receptors include:

- Routine workers
- Maintenance or construction workers
- Residential receptors

Potential off-Site ecological receptors include:

- The natural area to the south
- The Grand Calumet River

Exposure Point and Exposure Mediums include:

- Surface soil
- Subsurface soil
- Groundwater
- Indoor air for regularly occupied buildings (only one regularly occupied building on CITGO Terminal property).

Table 1 presents a summary of Preliminary Scenarios for Potential Human Exposure.

4.8 Exposure Routes

Potential exposure routes include:

- Soil dermal direct contact
- Soil or groundwater ingestion
- Soil vapor inhalation from contaminated soil or groundwater
- Inhalation of fugitive dust

It is noted that institutional or engineering controls will be employed to prevent exposure by any of these potential exposure routes, and that none of these pathways have been confirmed to exist as of the date of this report, but will continue to be investigated as part of the RFI.

4.9 Discussion of Unknowns and Uncertainty

The delineation of Constituents of Potential Concern (COPCs) is currently unknown and ongoing. Historical data and knowledge are being used to design a biased sampling plan for the Former Cities Refinery and CITGO Terminal.

The COPCs, as supported by historical investigations, for soil and groundwater are as follows:

Target compound list (TCL) volatile organic compounds (VOCs) (Method 8260), TCL semi-volatile organic compounds (SVOCs) (Method 8270), target analyte list (TAL) metals (Method 6010/7470) and 1,4-dioxane.

5. Summary

The Phase I investigation was completed in accordance with the U.S. EPA-approved Work Plan.

The Phase I investigation results allow for the completion of the Baseline CSM and will be utilized to identify additional investigation activities (Phase II) as part of a separate submission.

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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www.ghd.com

Source: NAIP 2016.

0 300 600ft

Coordinate System:
IN83-WF

LEGEND

CITGO TERMINAL (228.5 ACRES)
FORMER CITIES REFINERY (93.2 ACRES)

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478-00
May 29, 2019

FACILITY LOCATIONS

FIGURE 1

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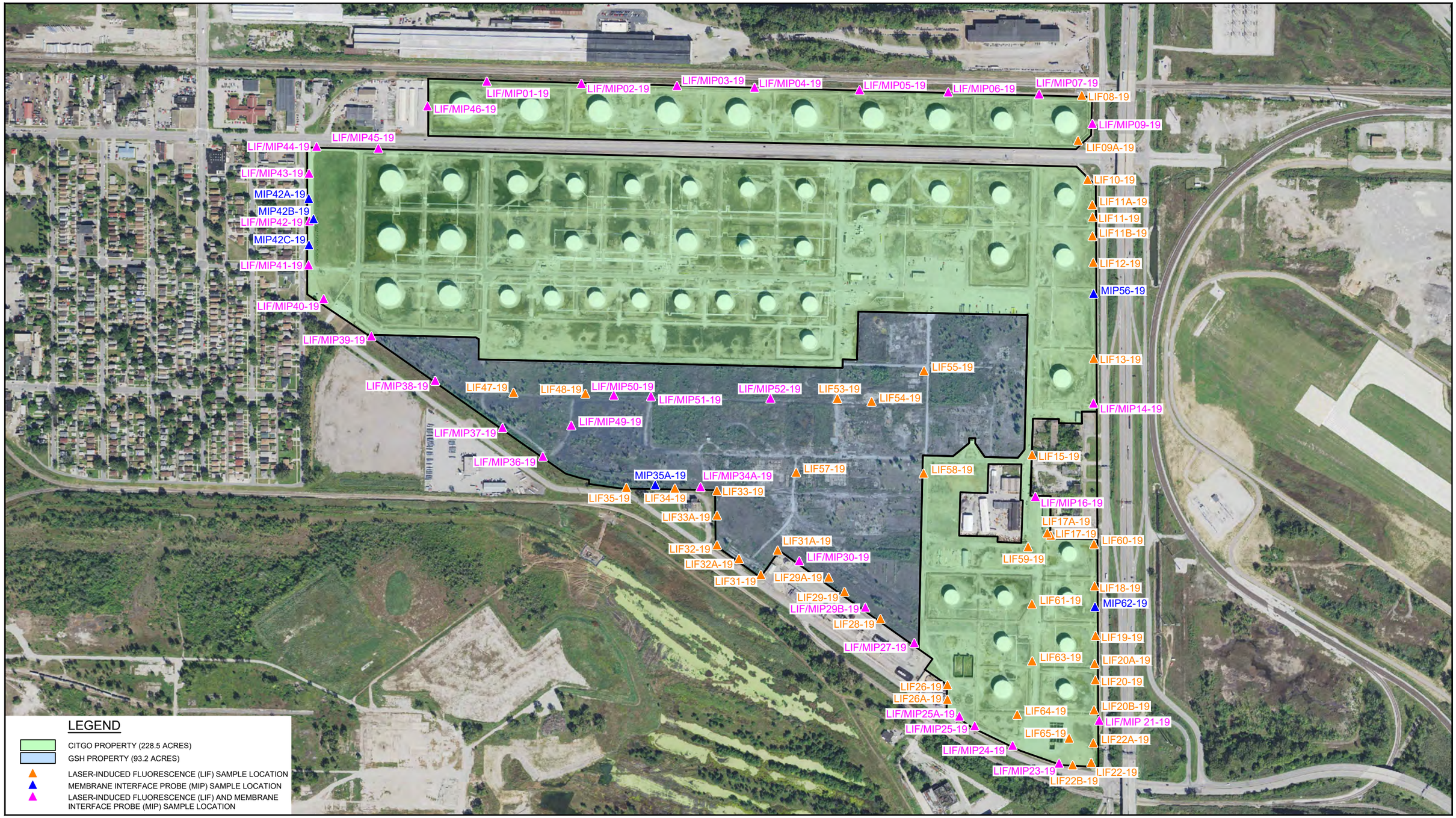

Source: 2016 AERIAL IMAGE FOR LAKE COUNTY, INDIANA IMAGE PROVIDED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) AS PART OF THE NORTH AMERICAN IMAGE PROGRAM (NAIP).

0 300 600ft

Coordinate System: IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478-00

Aug 22, 2019

PHASE 1 INVESTIGATION LOCATIONS

FIGURE 2

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LEGEND

- CITGO PROPERTY (228.5 ACRES)
- GSH PROPERTY (93.2 ACRES)
- LASER-INDUCED FLUORESCENCE (LIF) SAMPLE LOCATION
- MEMBRANE INTERFACE PROBE (MIP) SAMPLE LOCATION
- LASER-INDUCED FLUORESCENCE (LIF) AND MEMBRANE INTERFACE PROBE (MIP) SAMPLE LOCATION
- A — CROSS-SECTION LOCATION

NOTE:
MODEL RESULTS SHOWN ON DESIGNATED CROSS SECTION.
OFF-SET LOCATION RESULTS PRESENTED BUT NOT MODEL REPRESENTATION.

Source: UAV, MAY 14, 2019.

0 300 600ft

Coordinate System:
IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478-D21102
Oct 4, 2019

CROSS-SECTION LOCATIONS

FIGURE 3

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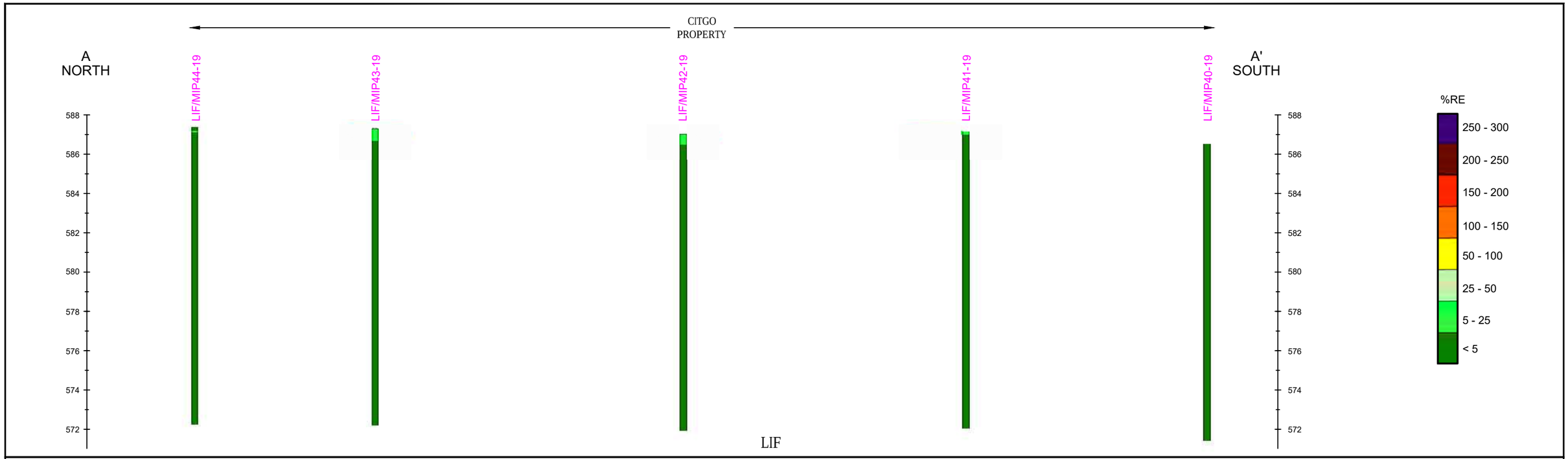

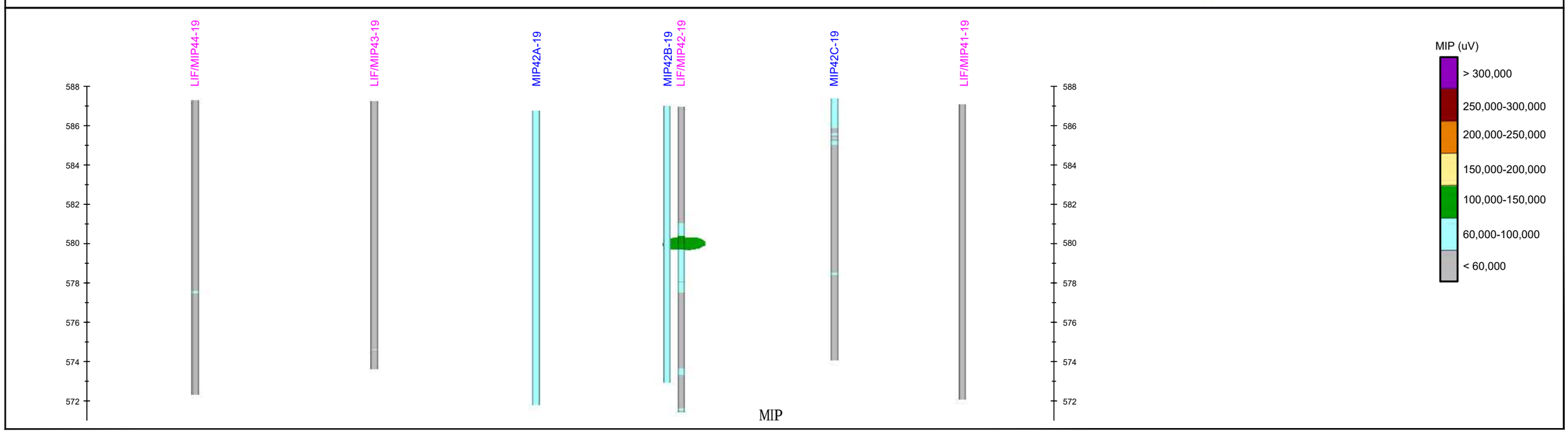

SCALES:
1"=100' HORIZONTAL
1"=5' VERTICAL
20X VERTICAL EXAGGERATION

NOTE:
MODEL RESULTS SHOWN ON DESIGNATED CROSS SECTION.
OFF-SET LOCATION RESULTS PRESENTED BUT NOT MODEL REPRESENTATION.

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

WEST PROPERTY BOUNDARY
CROSS-SECTION A-A'

11194478-D21102
Oct 4, 2019

FIGURE 4

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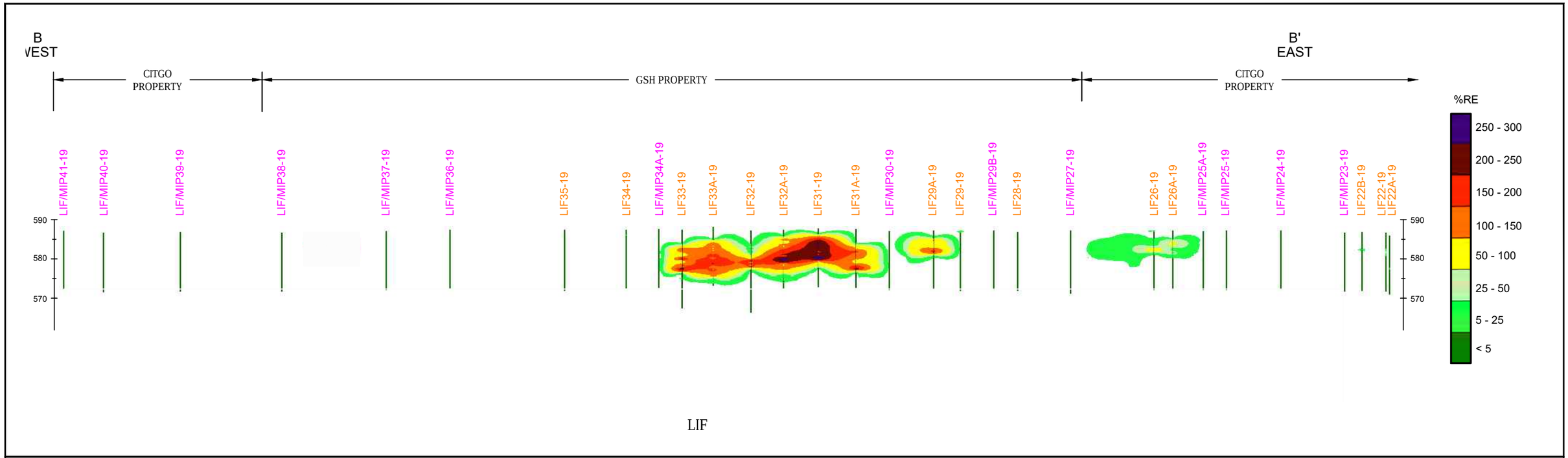

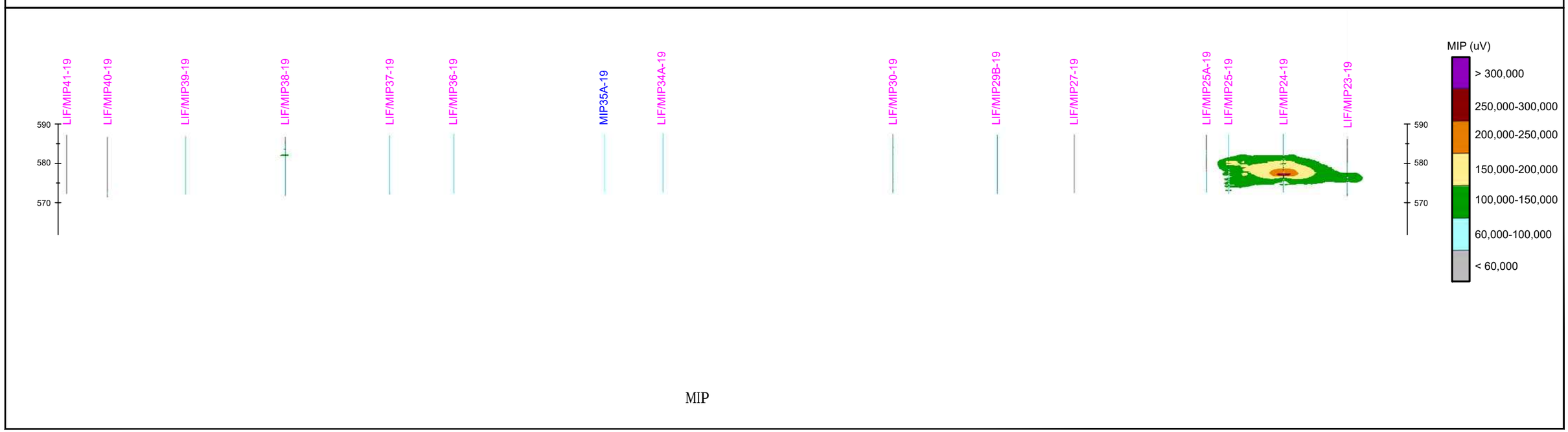

SCALES:
1"=500' HORIZONTAL
1"=25' VERTICAL
20X VERTICAL EXAGGERATION

NOTE:
MODEL RESULTS SHOWN ON DESIGNATED CROSS SECTION.
OFF-SET LOCATION RESULTS PRESENTED BUT NOT MODEL REPRESENTATION.

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

SOUTH PROPERTY BOUNDARY
CROSS-SECTION B-B'

11194478-D21102
Oct 4, 2019

FIGURE 5

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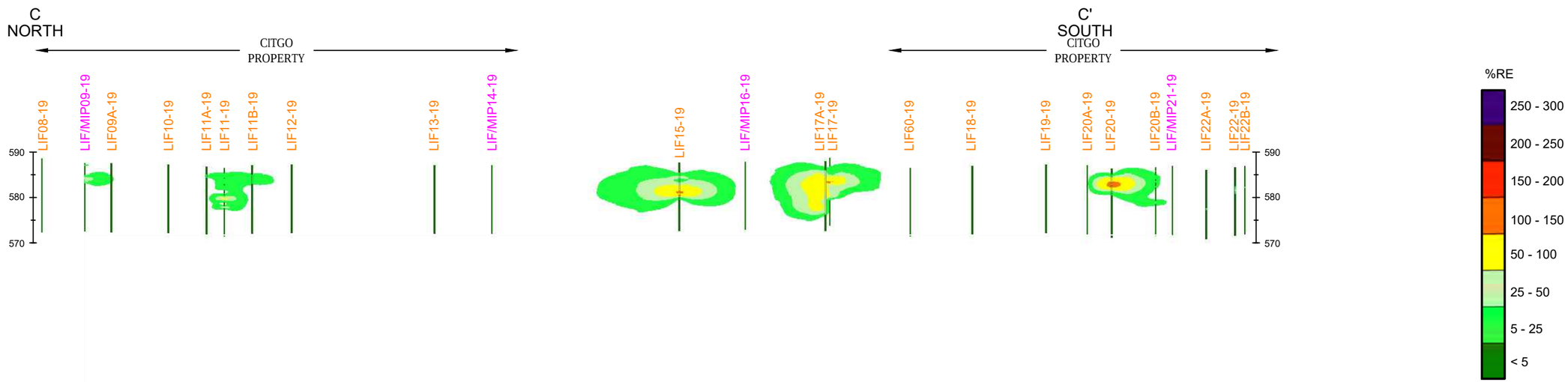
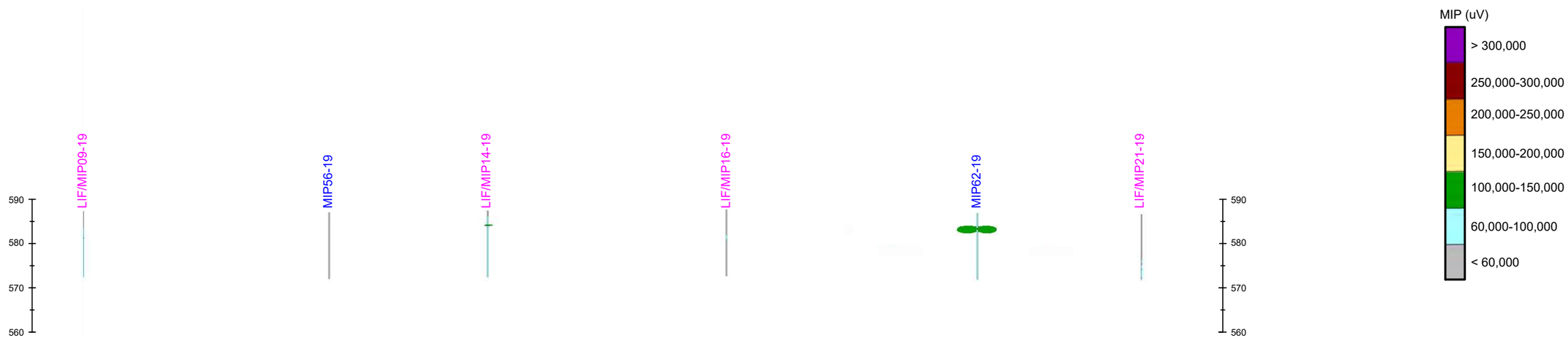


LIF



MIP

SCALES:
1"=500' HORIZONTAL
1"=25' VERTICAL
20X VERTICAL EXAGGERATION

NOTE:
MODEL RESULTS SHOWN ON DESIGNATED CROSS SECTION.
OFF-SET LOCATION RESULTS PRESENTED BUT NOT MODEL REPRESENTATION.

GHD

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

EAST PROPERTY BOUNDARY
CROSS-SECTION C-C'

11194478-D21102
Oct 4, 2019

FIGURE 6

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INSET

SCALE: 1" = 100ft.

LEGEND

EXISTING PROPERTY BOUNDARY

HISTORICAL INVESTIGATION LOCATIONS

- GSH MONITORING WELL LOCATION
- GSH PIEZOMETER LOCATION
- GSH SOIL BORING LOCATION
- CITGO MONITORING WELL LOCATION
- CITGO SOIL BORING LOCATION
- CITGO SOIL BORING WITH GROUNDWATER SCREENING SAMPLE
- LASER-INDUCED FLUORESCENCE (LIF) AND/OR MEMBRANE INTERFACE PROBE (MIP) SAMPLE LOCATION (AUGUST 2019)

Source: NAIP 2016.

0 300 600ft

Coordinate System: IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478

Oct 24, 2019

HISTORICAL INVESTIGATION LOCATIONS

FIGURE 7

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INSET

SCALE: 1" = 100ft.

LEGEND

EXISTING PROPERTY BOUNDARY

HISTORICAL INVESTIGATION LOCATIONS

- GSH MONITORING WELL LOCATION
- GSH SOIL BORING LOCATION
- GSH PIEZOMETER LOCATION
- CITGO MONITORING WELL LOCATION
- CITGO SOIL BORING WITH GROUNDWATER SCREENING SAMPLE

Source: NAIP 2016.

0 300 600ft

Coordinate System: IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478
Oct 24, 2019

HISTORICAL GROUNDWATER INVESTIGATION LOCATIONS

FIGURE 8

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\11194000s\11194478\11194478-REPORTS\11194478-D21102(002)\11194478-D21102(002)GN\11194478-D21102(002)GN-WA008.DWG

INSET
SCALE: 1" = 100ft.

LEGEND

EXISTING PROPERTY BOUNDARY

HISTORICAL INVESTIGATION LOCATIONS

- GSH PIEZOMETER LOCATION
- GSH SOIL SAMPLE LOCATION
- CITGO SOIL BORING LOCATION
- CITGO SOIL BORING WITH GROUNDWATER SCREENING SAMPLE

Source: NAIP 2016.

0 300 600ft

Coordinate System: IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478
Oct 24, 2019

HISTORICAL SOIL INVESTIGATION LOCATIONS

FIGURE 9

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Source: NAIP 2016.

0 300 600ft

Coordinate System:
IN83-WF

LEGEND

EXISTING PROPERTY BOUNDARY

S APPROXIMATE SEWER LINE LOCATIONS

P APPROXIMATE PIPELINE LOCATIONS

GHD

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

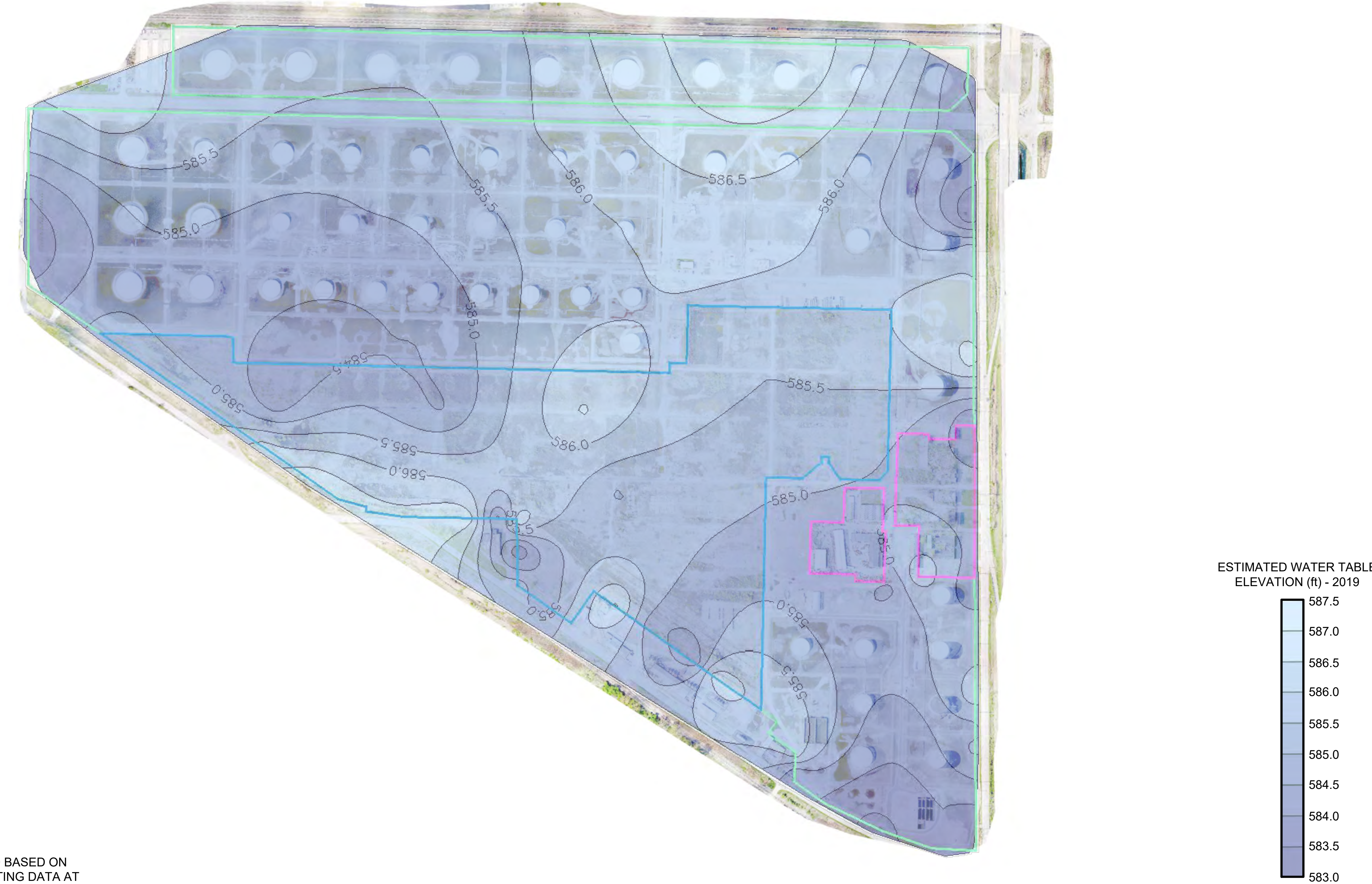
11194478-D21102

Oct 23, 2019

SUBSURFACE UTILITIES

FIGURE 10

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\11194000s\11194478\11194478-REPORTS\11194478-D21102(002)\11194478-D21102(002)GN\11194478-D21102(002)GN-WA007.DWG



THE ESTIMATED PIEZOMETRIC SURFACE IS MODELED BASED ON HYDRAULIC PROFILING TOOL (HTP) DISSIPATION TESTING DATA AT 62 DISCRETE LOCATIONS ACROSS THE FACILITY.

0 300 600ft

Coordinate System: IN83-WF

FORMER CITIES REFINERY AND CITGO TERMINAL
EAST CHICAGO, INDIANA

ESTIMATED PIEZOMETRIC SURFACE - 2019

11194478-D21102

Oct 23, 2019

FIGURE 11

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\11194000s\11194478\11194478-REPORTS\11194478-D21102(002)\11194478-D21102(002)GN\11194478-D21102(002)GN-WA006.DWG

Table 1

Baseline Conceptual Site Model - Preliminary Scenarios for Potential Human Exposure
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

		Routine Workers	Maintenance Workers	Construction Workers	Trespassers	Off-Site Residents
Soil	Incidental Ingestion	●	●	●	●	○
	Dermal Contact	●	●	●	●	○
	Inhalation of Vapor	●	●	●	●	●
	Inhalation of Particulates	●	●	●	●	●
	Vapor Intrusion	■	○	○	○	○
Groundwater	Incidental Ingestion	○	●	●	○	○
	Dermal Contact	○	●	●	○	○
	Inhalation of Vapor	●	●	●	●	●
	Vapor Intrusion	■	○	○	○	○
	Potable and Nonpotable Water Use	◊	○	○	○	unknown
Sediment	Incidental Ingestion	○	○	○	○	○
	Dermal Contact	○	○	○	○	○
Surface Water	Incidental Ingestion	○	○	○	○	○
	Dermal Contact	○	○	○	○	○
	Inhalation of Vapor	○	○	○	○	○

◊ = Institutional controls will be established as part of corrective measures to prevent such exposure
○ = Pathway is not complete
● = Potentially complete pathway, to be confirmed in subsequent phases of the RFI
■ = Potentially complete pathway to be assessed in areas of existing regularly occupied buildings. Only one regularly occupied building is present on the CITGO Terminal portion of the Facility.

Notes:

- The current health & safety procedures ensure that maintenance worker and construction worker exposures are not significant.

Appendices

Appendix A
Technology Information: LIF, MIP, and HPT

UVOST®

Ultra-Violet Optical Screening Tool

At Dakota Technologies, we understand the challenges involved in combining high tech with demanding field conditions.

Our Ultra-Violet Optical Screening Tool (UVOST®) is the culmination of nearly two decades of field experience as LIF service providers. Its highly sophisticated yet rugged design allows the UVOST to reliably delineate nearly any petroleum NAPL including gasoline, diesel, crude oil, kerosene, and many others. It can be deployed by any type of direct push platform. UVOST is simply the world's finest laser-induced fluorescence (LIF) system and it was built to do one thing – find petroleum NAPL.

UVOST benefits include:

- **Real-time data**— allows for "on-the-fly" guidance of the next bore-hole location, leading to better bounding of source term
- **No IDW**— true in-situ information without investigation derived waste, carryover, or handling and storage of samples
- **Fast**— production rates of 300 to 500 feet per day (typical direct push conditions)
- **Flexible**— percussion (i.e. Geoprobe®) or cone penetration test (CPT)
- **Color-coded logs**— the ultimate in qualitative and semi-quantitative information at-a-glance
- **High data density**— one inch/data point
- **Sensitive**— low detection limits and baselines that only laser-based systems provide
- **Selective**— fluorescence time-domain waveforms offer positive identification and interference rejection
- **Proven**— technology with nearly 20 years experience built in
- **Quality**— LIF service by the scientists who pioneered commercial LIF
- **UVOST-HP**— UVOST is now available with built-in hydraulic profiling capability for comprehensive subsurface characterization using a single tool

Our innovative UVOST mates with direct-push platforms such as Geoprobe and CPT. UVOST is percussion-drivable… a Dakota Technologies exclusive!

The UVOST system uses a sapphire window in the side of the direct push probe to measure front-face fluorescence of the petroleum NAPL as the probe is advanced into the soil with nearly any DPT platform.

PAH fluorescence of fuels/oils is directed back to the surface where it is analyzed. Responses are indicated in real-time on a graph of UVOST signal vs. depth.

Petroleum hydrocarbons contain significant amounts of naturally fluorescent PAHs. Laser-induced fluorescence systems consistently detect them. The UVOST system was specifically designed to respond to these challenging NAPLs and precisely log their presence versus depth.

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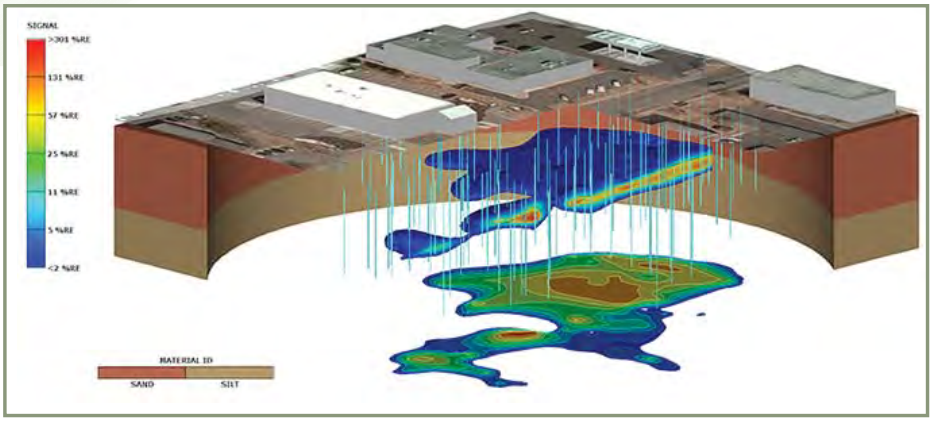
UVOST®

Ultra-Violet Optical Screening Tool

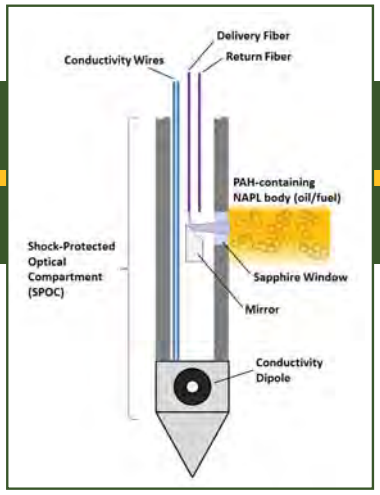
Successful remediation and treatment systems require detailed knowledge of NAPL location and distribution. UVOST provides the site characterization professional with a conceptual site model at unprecedented speed, detail, and efficiency. Traditional soil and ground water sampling techniques simply cannot compete with UVOST's production rates.

Since the first full-scale site characterization project with UVOST LIF technology in 1997, the UVOST system has been successfully applied and validated across a wide range of site conditions and deployment platforms, including Geoprobe and CPT. Nearly every major consulting firm in the U.S. has used UVOST to generate CSMs of petroleum NAPL.



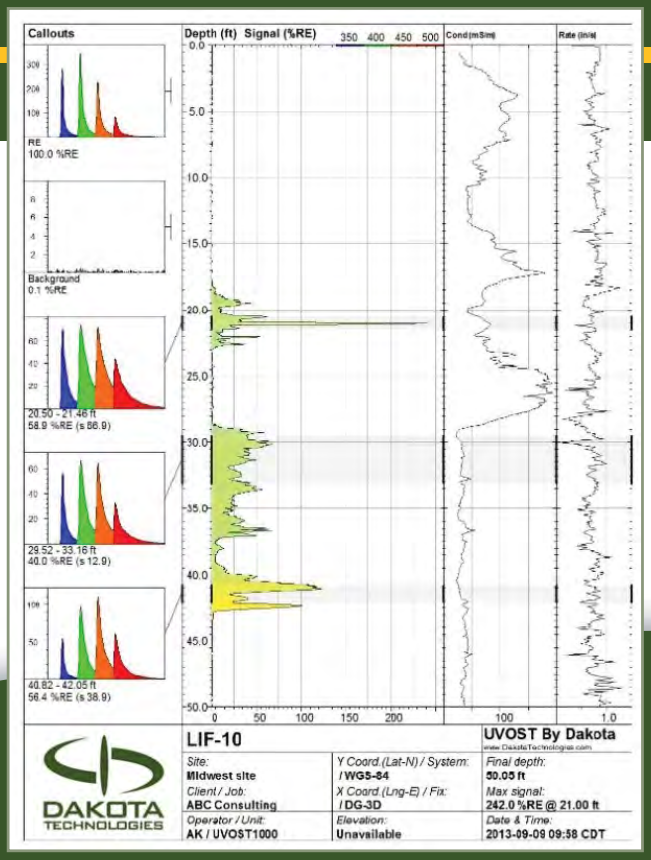
UVOST Data—Conceptual Site Model (CSM)

The end result of a UVOST boring is a high-density, non-subjective electronic data log (bottom left) readily incorporated into accurate conceptual site models. Accurate source term models lead to knowledgeable decisions, accurate treatment and removal designs, and realistic cost estimates—saving time and money.



UVOST Technology Overview

PAHs fluoresce and emit longer wavelength light. This light is captured by the return fiber and sent to the surface for processing with Dakota's proprietary Optical Screening Tool (OST) software.



Example Field UVOST Log

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HPT

Hydraulic Profiling Tool

The **Hydraulic Profiling Tool (HPT)** is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface.

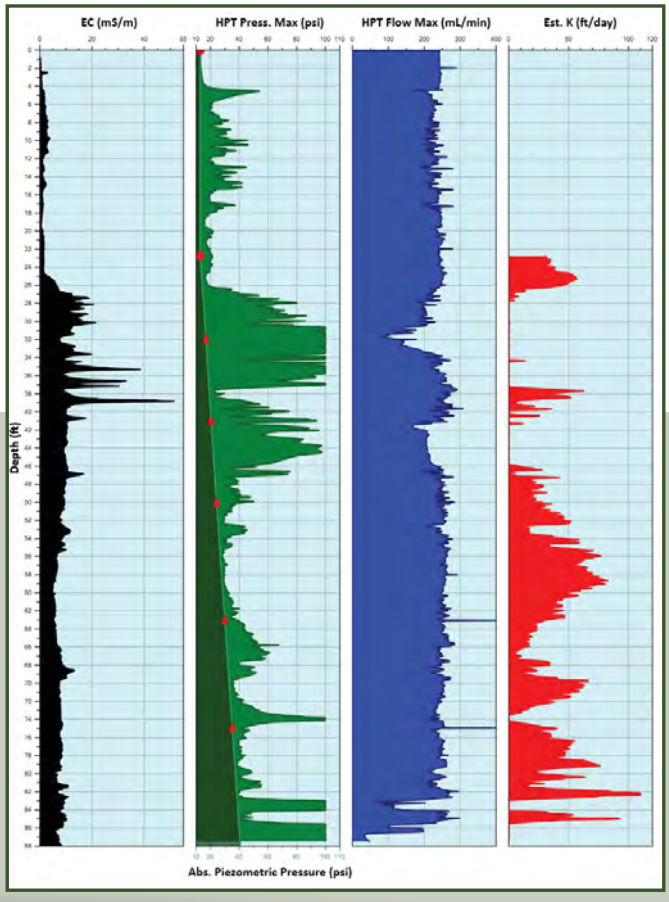
This injection pressure log is an excellent indicator of formation permeability. In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero flow condition. This allows the development of a hydrostatic pressure graph for the log and prediction of the position of the water table.

HPT Injection Pressure Logs

The primary log from the HPT system is the log of HPT injection pressure with depth. Injection pressure correlates well with formation permeability and contributes to the chief use of the HPT: it gives the HPT user a view of permeability with depth. With this log, an experienced practitioner can determine permeable zones, potential contaminant storage or transport zones, zones that will yield groundwater to in-situ samplers, and zones to set monitoring or production wells.

Features of the HPT:

- Produces a detailed hydrostratigraphic log
- Can be used to estimate hydraulic conductivity in the saturated zone
- Logs HPT injection pressure and electrical conductivity (EC)
- Measures hydrostatic pressure and depth to water table
- Identification of contaminant storage and transport zones
- Available with MIP (**MiHpt**) and laser-induced fluorescence (**UVOST-HP** and **TarGOST-HP**) for comprehensive subsurface characterization using a single tool



Measurement of the injection pressure in the HPT system is made using a downhole pressure transducer. Use of a transducer in the downhole position allows measurement of the injection pressure at the HPT screen only and excludes frictional losses through the flow tube of the HPT trunkline. The downhole transducer position is also necessary for making hydrostatic pressure measurements at the probe.

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MIP

Membrane Interface Probe

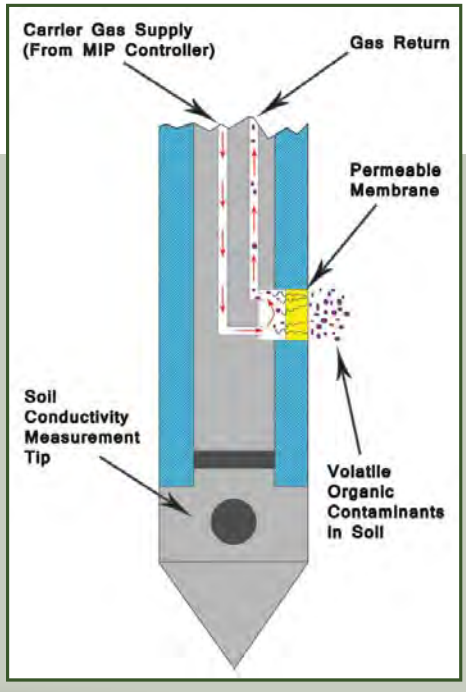
The **Membrane Interface Probe (MIP)** is a screening tool used to log the relative concentration of volatile organic compounds (VOCs) with depth in soil. The probe is robust and percussion driveable (hammerable) with direct push machines.

The MIP membrane is comprised of a semi-permeable, thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block that is advanced into the soil. Dakota uses a photoionization detector (PID), a flame ionization detector (FID), and a halogen specific detector (XSD).

Features of the MIP include:

- Detects and logs chlorinated and non-chlorinated VOC contaminants
- Detects contaminants in coarse and fine grained soils, and in saturated and unsaturated soils
- LL MIP able to detect certain contaminants at or below the 100 ppb level
- Standard tool configurations combine the MIP with HPT **(MiHpt)** for lithology and permeability logging
- Shows distribution and relative magnitude of VOC contaminants
- Real-time mapping of dissolved petroleum and chlorinated VOC plumes allows an adaptive approach to site investigation

The downhole permeable membrane serves as an interface to the detectors at the surface. With heat, volatiles diffuse across the membrane and partition into a stream of carrier gas where they are swept to the detectors. The MIP acquisition software logs detector signal with depth.



Targeted Contaminants

The XSD is highly specific to halogenated compounds and is used for logging chlorinated solvent plumes or source areas (TCE, PCE, Carbon Tet, etc.).

The PID provides sensitivity to aromatic compounds (BTEX) as well as confirmation of chlorinated ethylene compounds detected by the XSD.

The FID is a general detector useful for hydrocarbon detection as well as confirmation of high concentration of all compounds seen on the other two detectors.

Low Level MIP

Low Level MIP greatly increases the sensitivity (and therefore utility) of the MIP. The technology results in an increase in the concentration of VOC contaminant delivered to the MIP detectors and is most useful when low contaminant concentrations are present.

Electrical Conductivity

Electrical Conductivity (EC) is a built in component of the MIP system. EC logs are collected in real-time and are displayed next to detector (signal) logs. The EC logs are useful in determining site lithology in unconsolidated formations.

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Appendix B
1991 Preliminary Assessment/Visual Site Inspection (PA/VSI)

031532

165e
Lake Co.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

JUL 1 9 50 AM '91

To: Phil Harvey
Chicago

June 25, 1991

REPLY TO ATTENTION OF:
5HR-12

Mr. Ken Robb
Terminal Manager
CITGO Petroleum Corporation
2500 East Chicago Avenue
East Chicago, IN 46312

Re: Visual Site Inspection
CITGO Petroleum Corp.
IND 095 267 381

Dear Mr. Robb:

The United States Environmental Protection Agency (U.S. EPA) Region 5 will conduct a Preliminary Assessment and Visual Site Inspection (PA/VSI) at the referenced facility. This inspection is conducted pursuant to the Resource Conservation and Recovery Act, as amended (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA). The PA/VSI requires identification and systematic review of all solid waste streams at the facility. The objective of the PA/VSI is to determine whether or not releases of hazardous wastes or hazardous constituents have occurred or are occurring at the facility which may require further investigation. This analysis will also provide information to establish priorities for addressing any confirmed releases.

The VSI of your facility is to verify the location of all solid waste management units (SWMU) and areas of concern to make a cursory determination of their condition by visual observation. The VSI supplements and updates data gathered during a preliminary file review. During this site inspection, no samples will be taken. A sampling visit to ascertain if releases of hazardous waste or constituents have occurred may be required at a later date.

Assistance of some of your personnel may be required in reviewing solid waste flow(s) or previous disposal practices. The site inspection is to provide a technical understanding of the present and past waste flows and handling, treatment, storage, and disposal practices. Photographs of the facility are necessary to document the condition of units at the facility and the waste management practices used.

The VSI has been scheduled for July 10, 1991 at 8:30 A.M. The inspection team will consist of Mary Wojciechowski and Laurel Berman of PRC Environmental Management, Inc., contractors for the U.S. EPA. A third PRC inspector may accompany them. Representatives of the Indiana Department of Environmental Management may also be present. Your cooperation in admitting and assisting them while on site is appreciated.

The U.S. EPA recommends that personnel who are familiar with present and past manufacturing and waste management activities be available during the VSI. Access to any relevant maps, diagrams, hydrogeologic reports, environmental assessment reports, sampling data sheets, environmental permits (air, NPDES), manifests and/or correspondence is also necessary, as such information is needed to complete the PA/VSI.

Printed on Recycled Paper

If you have any questions, please contact me at (312) 886-4448 or Sheri Bianchin at (312) 886-4446. A copy of the Preliminary Assessment/Visual Site Inspection Report, excluding the conclusions portion may be made available upon request.

Sincerely yours,

Sheri L. Bianchin

for Kevin M. Pierard, Chief
OH/MN Technical Enforcement Section

cc: Tom Linson, IDEM - Indianapolis
Al Gallegos, CITGO - Tulsa

PRC Environmental Management, Inc.
233 North Michigan Avenue
Suite 1621
Chicago, IL 60601
312-856-8700
Fax 312-938-0118

DEC 13 9 02 AM '91

PRC

PRELIMINARY ASSESSMENT/ VISUAL SITE INSPECTION

CITGO PETROLEUM CORPORATION
EAST CHICAGO, INDIANA
IND 095 267 381

FINAL REPORT

IB3E Lake Co.

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, DC 20460

Work Assignment No.	:	C05087
EPA Region	:	5
Site No.	:	IND 095 267 381
Date Prepared	:	December 2, 1991
Contract No.	:	68-W9-0006
PRC No.	:	009-C05087IN05
Prepared by	:	PRC Environmental Management, Inc. (Laurel Berman)
Contractor Project Manager	:	Shin Ahn
Telephone No.	:	(312) 856-8700
EPA Work Assignment Manager	:	Kevin Pierard
Telephone No.	:	(312) 886-4448

CONTAINS RECYCLED FIBERS AND IS RECYCLABLE

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A EPA PRELIMINARY ASSESSMENT FORM 2070-12

B VISUAL SITE INSPECTION SUMMARY AND PHOTOGRAPHS

C VISUAL SITE INSPECTION FIELD NOTES

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EXECUTIVE SUMMARY

PRC Environmental Management, Inc. (PRC), performed a preliminary assessment and visual site inspection (PA/VSI) to identify and assess the existence and likelihood of releases from solid waste management units (SWMU) and other areas of concern (AOC) at the CITGO Petroleum Corporation (CITGO) facility in East Chicago, Indiana. This report summarizes the results of the PA/VSI and evaluates the potential for releases of hazardous wastes or hazardous constituents from SWMUs and AOCs identified. In addition, a completed U.S. Environmental Protection Agency (EPA) Preliminary Assessment Form (EPA Form 2070-12) is included in Attachment A to assist in prioritization of RCRA facilities for corrective action.

CITGO serves as a terminal for oil and fuel products used in various industries. Oil and fuel products are piped into 58 storage tanks from seven pipelines that originate on the Gulf Coast. CITGO has operated at its current location since its creation in 1983. The site has been used as a terminal and refinery since 1929, under the name Cities Service Company. CITGO occupies 300 acres and currently employs 11 people. The facility operates as a large-quantity generator and storer of hazardous waste when the tanks containing oil and fuel products and the skimming tank in the oil-water separator are cleaned. Cleaning occurs infrequently (greater than 90 days). Closure activities were conducted on the former tank 195 but the PA/VSI revealed no evidence of EPA or Indiana Department of Environmental Management (IDEM) approval.

The PA/VSI identified the following 3 SWMUs, and 2 AOCs at the facility:

Solid Waste Management Units

1. Oil-Water Separator
2. Former Tank No. 195
3. Tank No. 88

Areas of Concern

1. Former oil-saturated soil area
2. Former asbestos-contaminated soil area

There is a high potential for the release of hazardous constituents to ground water from surface soils contaminated with oil and asbestos. In the early 1980s, CITGO removed approximately 1,700 cubic yards of oil-saturated soil and 75 cubic yards of asbestos-contaminated soil from the facility grounds. From 1974 to 1976, the oil-saturated soil and asbestos-contaminated soil were generated from dismantling a former operational refinery. CITGO removed the oil-saturated soil until the surrounding soil was visibly clean. The asbestos-

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contaminated soil was sampled after its removal, but CITGO's records do not indicate whether or not further action was required or if the site was considered effectively clean. In addition, it is possible that oily waste stored in former tank No. 195 may have affected surrounding surface soils during the dismantling of this tank. Also, oil-water separator waste could leak into surrounding surface soils when CITGO employees transfer this waste into tank No. 88.

Ground water is not used as drinking water in the East Chicago, Indiana, area. However, ground water flows to area surface waters, including the Grand Calumet River and Lake Michigan.

The potential for release of hazardous constituents to surface water is low. Water in the facility's oil-water separator originates from storm water runoff. The separator consists of a series of separate chambers used to separate oily residue from runoff, leaving "clean" water. The clean water is discharged to the Grand Calumet River, approximately 1,200 feet from the facility. The discharge pipe from the facility is so close to the river that river water enters the discharge pipe and mixes with clean water in the discharge bay of the separator. The oil-water separator operates under a National Pollution Discharge Elimination System (NPDES) permit. Under permit requirements, CITGO routinely monitors final effluent for pollutants at the point of discharge.

The potential for a release of hazardous constituents to the air is low at the facility. Tanks containing oil and fuel products are closed and sealed with primary or secondary vapor seals to prevent air emissions.

Receptors at the facility include CITGO employees and nearby residents of East Chicago. A fence surrounding the facility limits access by potential receptors.

The areas where asbestos-contaminated soil and oil-saturated soil were removed should be sampled to make sure that no pollutants remain in the soil. Soil around Tank No. 88 should also be sampled to make sure there are no pollutants in the soil. Ground water in these areas may need to be monitored if contamination is discovered, as the depth to it is only 3 to 6 feet.

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC), received Work Assignment No. C05087 from the U.S. Environmental Protection Agency (EPA) under Contract No. 68-W9-0006 (TES 9) to conduct preliminary assessments (PA) and visual site inspections (VSI) of hazardous waste treatment and storage facilities in Region 5.

As part of the EPA Region 5 Environmental Priorities Initiative, the RCRA and CERCLA programs are working together to identify and address RCRA facilities that have a high priority for corrective action using applicable RCRA and CERCLA authorities. The PA/VSI is the first step in the process of prioritizing facilities for corrective action. Through the PA/VSI process, enough information is obtained to characterize a facility's actual or potential releases to the environment from solid waste management units (SWMU) and areas of concern (AOC).

A SWMU is defined as any discernible unit at a RCRA facility in which solid wastes have been placed and from which hazardous constituents might migrate, regardless of whether the unit was intended to manage solid or hazardous waste.

The SWMU definition includes the following:

- RCRA-regulated units, such as container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, and underground injection wells
- Closed and abandoned units
- Recycling units, wastewater treatment units, and other units that EPA has generally exempted from standards applicable to hazardous waste management units
- Areas contaminated by routine and systematic releases of wastes or hazardous constituents. Such areas might include a wood preservative drippage area, a loading-unloading area, or an area where solvent used to wash large parts has continually dripped onto soils.

An AOC is defined as any area where a release to the environment of hazardous waste or constituents has occurred or is suspected to have occurred on a nonroutine and nonsystematic basis. This includes any area where such a release in the future is judged to be a strong possibility.

The purpose of the PA is as follows:

- Identify SWMUs and AOCs at the facility.
- Obtain information on the operational history of the facility.
- Obtain information on releases from any units at the facility.
- Identify data gaps and other informational needs to be filled during the VSI.

The PA generally includes review of all relevant documents and files located at state offices and at the EPA Region 5 office in Chicago.

The purpose of the VSI is as follows:

- Identify SWMUs and AOCs not discovered during the PA.
- Identify releases not discovered during the PA.
- Provide a specific description of the environmental setting.
- Provide information on release pathways and the potential for releases to each medium.
- Confirm operational, SWMU, AOC, and release information obtained during the PA.

The VSI includes interviewing appropriate facility staff, inspecting the entire facility to identify all SWMUs and AOCs, photographing all SWMUs, identifying evidence of releases, initially identifying potential sampling locations, and obtaining all information necessary to complete the PA/VSI report.

This report documents the results of a PA/VSI of the CITGO facility in East Chicago, Indiana (IND 095 267 381). The PA was completed on July 8, 1991. PRC gathered and reviewed information from the Indiana Department of Environmental Management (IDEM) in Indianapolis, Indiana, and from EPA Region 5 RCRA files. The VSI was conducted on July 10, 1991. It included interviews with CITGO facility representatives and a walk-through inspection of the facility. PRC identified 3 SWMUs, and 2 AOCs at the facility.

PRC completed EPA Form 2070-12 using information gathered during the PA/VSI. This form is included in Attachment A. The VSI is summarized and 19 inspection photographs are included in Attachment B. Field notes from the VSI are included in Attachment C.

2.0 FACILITY DESCRIPTION

This section describes the facility's location, past and present operations (including waste management practices), waste generating processes, release history, regulatory history, environmental setting, and receptors.

2.1 FACILITY LOCATION

The CITGO facility is located at 2500 East Chicago Avenue in the city of East Chicago, Lake County, Indiana (41° 38' 33" latitude north; 87° 28' 19" longitude west). Surrounding cities include Whiting, Indiana, to the northwest, Hammond, Indiana, to the west, Highland, Indiana to the south, and Gary, Indiana to the east. Lake Michigan is about 1-1/2 miles north of CITGO.

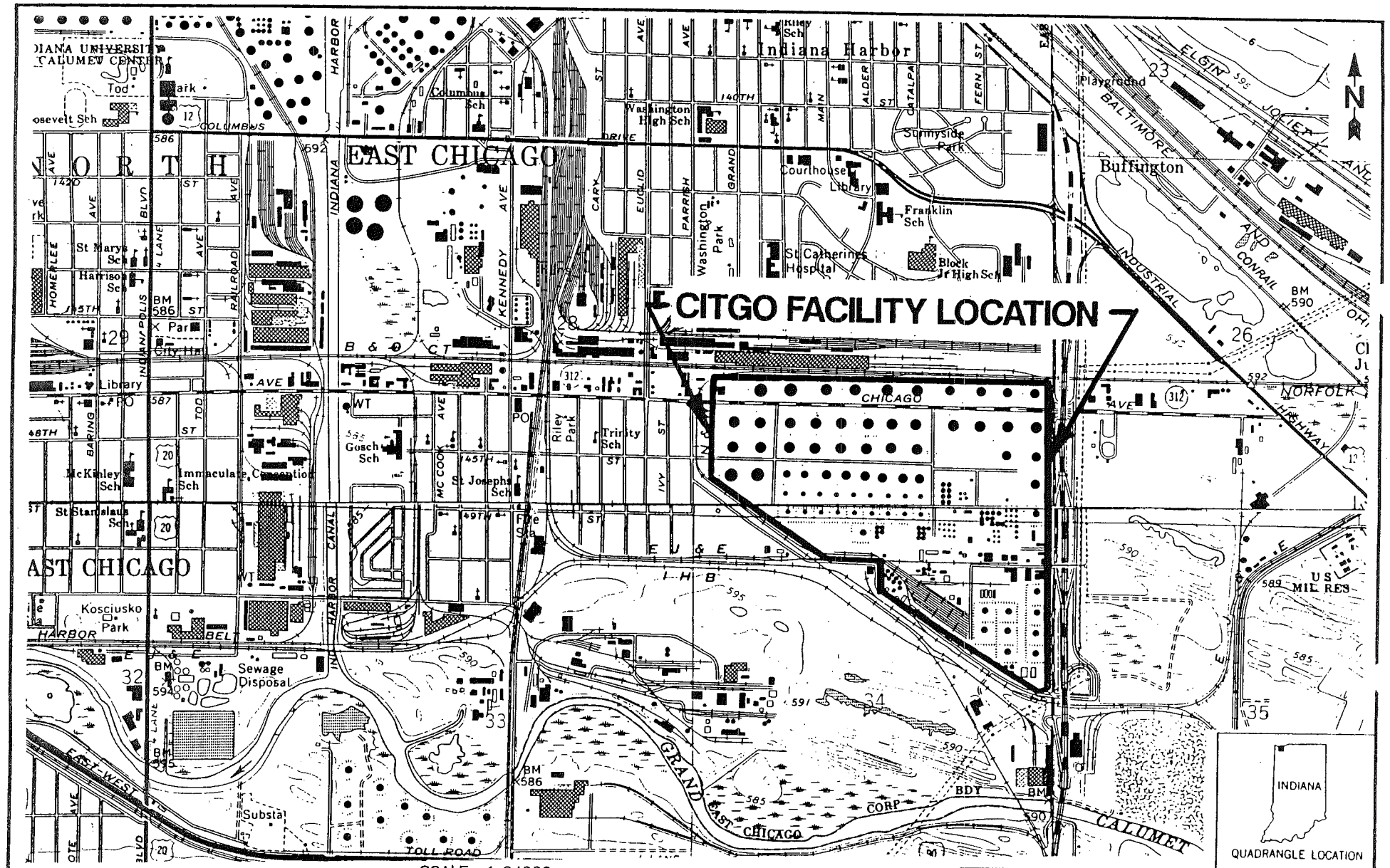
CITGO occupies 300 acres. The facility is surrounded by a security fence. On its east side, it is bounded by Cline Avenue, the boundary between Gary and East Chicago. Gary Avenue and the Elgin Joliet and Eastern Railway border the facility to the south. Parish Avenue borders the facility to the west. Chicago Avenue provides access and bisects the northern portion of the facility, with facility storage tanks on either side of the road. A small access road near the oil-water separator is blocked by a locked gate. The access road leads to a frontage road that runs along Cline Avenue and provides access to the nearby Indiana Toll Road. Figure 1 shows the facility location.

The land surrounding the facility is mainly industrial. The nearest residential areas are about 1-1/2 miles north of the facility, with a population of approximately 3,000, and 1-1/2 miles to the east, with a population of approximately 1,500. The Gary Municipal Airport is about 1 mile east of the facility.

2.2 FACILITY OPERATIONS

Figure 2 shows the facility layout, including tanks, SWMU and AOC locations, and areas where a total of 1700 cubic yards of oil-saturated soil was removed. CITGO has operated at its current location since 1983, and employs 11 people. CITGO operates three shifts per day, 7 days a week. The facility consists of 58 tanks, an office, a truck rack, and an oil-water separator. The SWMUs at CITGO are listed in Table 1. Tank capacities were provided by CITGO and are detailed in Table 2.

CITGO serves as a terminal for oil and fuel products used in various industries. Oil and fuel products are piped into 58 storage tanks from seven pipelines that originate on the Gulf Coast. The storage tanks are steel, with fiberglass bottoms; oil products are distributed to industries in Indiana, Michigan, Illinois, and Wisconsin.



SCALE 1:24000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

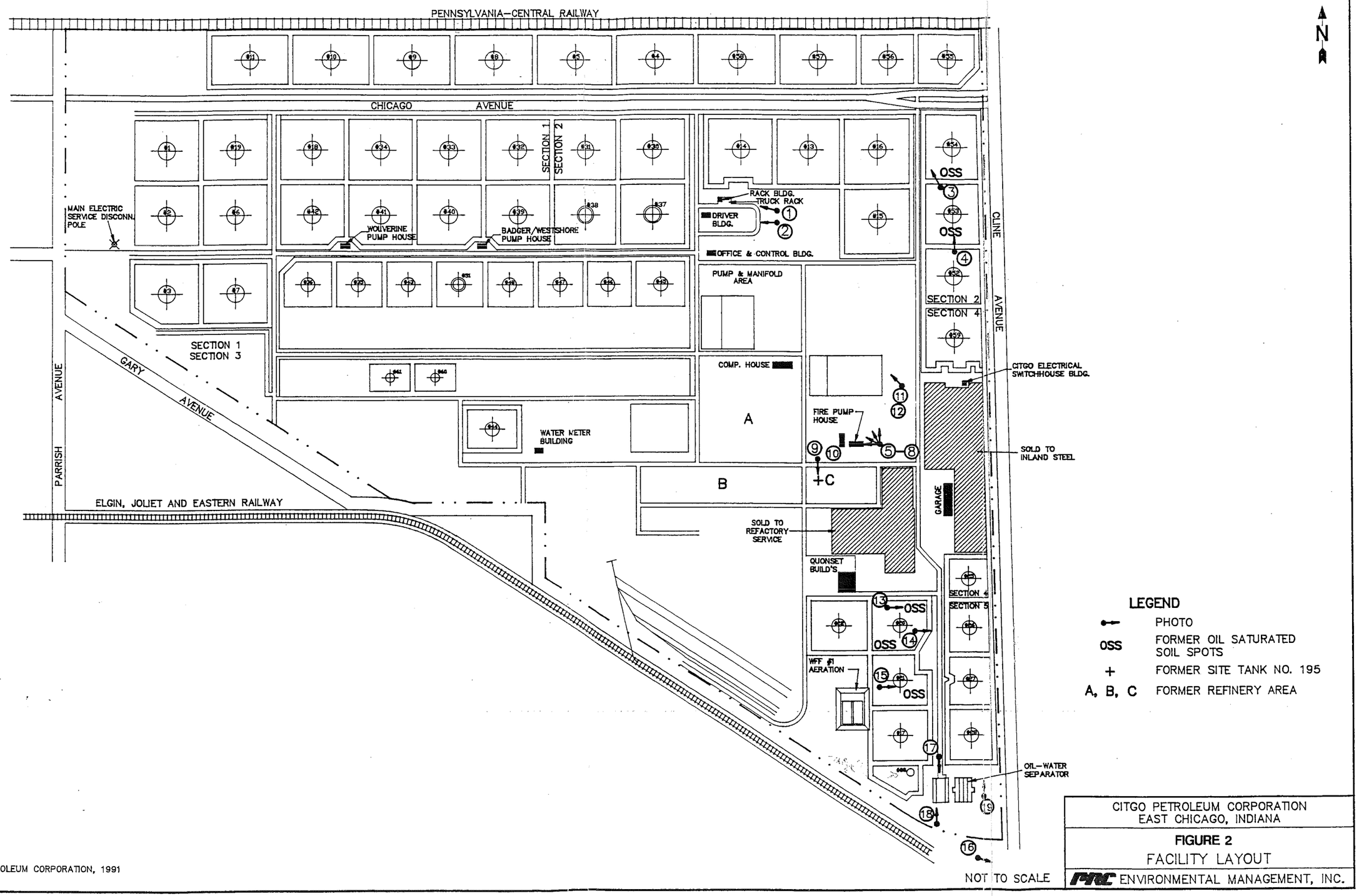
SOURCE: U.S.G.S., Photorevised, 1986.

CITGO PETROLEUM CORPORATION
EAST CHICAGO, INDIANA

FIGURE 1

FACILITY LOCATION

PRC ENVIRONMENTAL MANAGEMENT, INC.



SOURCE: CITGO PETROLEUM CORPORATION, 1991
DRAWN: 2/19/90

CITGO PETROLEUM CORPORATION
EAST CHICAGO, INDIANA

FIGURE 2

FACILITY LAYOUT

PRC ENVIRONMENTAL MANAGEMENT, INC.

TABLE 1

SOLID WASTE MANAGEMENT UNITS (SWMU)

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit*	Status
1	Oil-Water Separator	No[1]	Active
2	Former Tank No. 195	Yes	Closed, tank removed from the facility. Closure not approved by EPA or IDEM
3	Tank No. 88	Yes	Active

Notes:

* A RCRA hazardous waste management unit is one that currently requires or formerly required a RCRA Part A or Part B permit.

1 The oil-water separator is regulated under the National Pollution Discharge Elimination System (NPDES). Waste is manifested under RCRA only when the unit is cleaned.

TABLE 2

TANK CAPACITIES
(1000 gallons)

Tank No.	Volume	Tank No.	Volume
1	140	40	55
2	140	41	55
3	140	42	55
4	140	43	55
5	140	44	55
6	120	45	55
7	120	46	55
8	140	47	55
9	140	48	55
		49	55
10	140		
11	140	50	37.5
13	80	51	55
14	80	52	80
15	80	53	80
16	80	54	80
17	80	55	135
18	80	56	80
19	80	57	120
		58	127.5
20	55	59	80
21	55		
22	55	60	15
25	55	61	15
26	55	88	10
27	55		
28	55		
30	55		
31	55		
32	55		
33	55		
34	55		
35	55		
36	55		
37	55		
38	55		
39	55		

The tanks are bordered by soil berms, which serve as secondary containment. None of the tanks are open at the top. The tanks were built from 1929 to 1954.

The truck rack was built by CITGO in 1985. It is used to load jet fuel for the airline industry. The truck rack is permitted by the City of East Chicago for loading of low-grade fuel distillates under permit No. 616. The truck loading rack is also permitted by the State of Indiana under the general permit for the facility, No. 45-11-93-0592 (CITGO, 1991c). Stormwater runoff from the truck rack is routed by an underground pipe to the oil-water separator.

The oil-water separator is used to treat stormwater runoff. All stormwater is routed into the "dirty" side of the unit. Oily residue is separated from the runoff through a series of tanks or bays. When the "dirty" side of the unit is full, CITGO employees pump the water over a weir to the "clean side." Clean water flows by gravity to the outlet bay of the separator, for eventual discharge to the Grand Calumet River. The oil-water separator is regulated under a NPDES permit.

The CITGO site was used as a petroleum refinery from 1929 through 1972. The Texas-Empire Pipe Line Company, which subsequently became Cities Service Company (Cities), began operations at the site in 1929 (City of East Chicago, 1929). On December 31, 1972, Cities closed the refinery operations. From 1974 through 1976, Cities dismantled the refinery; the site has since operated only as a petroleum products terminal facility. The area of the former refinery operations is shown in Figure 2.

In March 1983, Cities created CITGO the refining, marketing, and transportation operations. In September 1983, Cities sold CITGO to The Southland Corporation, which in turn sold half of CITGO operations to Petroleos de Venezuela, South America (PDVSA). In 1990, the other half of CITGO was sold to PDVSA. CITGO operates as an independent business entity of PDVSA.

2.3 WASTE GENERATING PROCESSES

The are five waste streams that have been generated at this facility. Four waste streams are currently generated and one waste stream was formerly generated. Wastes currently generated consist of 1) low-grade fuel distillate tank bottoms, 2) gasoline tank bottoms, 3) oil and waste water, and 4) oily residue. Oil-water emulsion waste from tank bottoms was generated until about late 1980 and was stored in tank 195 (SWMU 2).

TABLE 3
SOLID WASTES

Waste/EPA Waste Code	Source	Primary Management Unit*
Low-Grade Fuel Distillates Tank Bottoms/D001	Tank Bottoms	Removed Directly[1]
Gasoline Tank Bottoms/D001	Tank Bottoms	Removed Directly
Oil and Wastewater/D001	Tank Bottoms	Removed Directly
Oily Residue/D001	Oil-Water Separator	SWMU 1, 3
Oil-water Emulsion Waste/ D001, D008	Tank Bottoms	Formerly SWMU 2 (Waste no longer generated)

Notes:

* Primary management unit refers to a SWMU that currently manages the waste.

1 Wastes that are removed directly are not managed on site.

The first waste stream consists of low-grade fuel distillates (D001) from distillate tanks. CITGO currently employs Pollution Control Industries of America (PCIA) of East Chicago, Indiana, to clean distillate tanks. These tanks are cleaned at least once every one to five years. CITGO first drains the product out of the tank and stores it in an unused tank, then a PCIA crew scrubs and vacuums out the inside of the tank. Waste low-grade fuel distillate (D001) is vacuum-pumped directly into a hauler truck. PCIA takes the distillate waste to a cement kiln, where it is burned as fuel.

The second waste stream consists of gasoline tank bottoms. If tank bottoms contain gasoline waste (D001), a PCIA crew vacuums out the tank bottoms and drums the waste. These tanks are cleaned about once every one to five years. PCIA transports this waste to various facilities in other states, where it is either landfilled or used as fuel.

The third waste stream consists of wastewater and oil that accumulates in tank bottoms. This waste is classified as an ignitable waste (D001) because of its low flash point (< 140°F). CITGO employees drain the wastewater from the tanks and dispose of it directly into hauler trucks from Clean Harbors in Chicago, Illinois. Clean Harbors analyzes samples of the wastewater before accepting it for disposal to ensure that the Water Reclamation District of Greater Chicago (WRDGC) standards for wastewater quality are met. Clean Harbors then discharges the water to the WRDGC sanitary sewer system. Clean Harbors forwards wastewater analysis results to CITGO.

All of the above activity takes place in one day. Thus none of these wastes are accumulated on site.

The fourth waste stream consists of oily residue (D001) from the oil-water separator. Stormwater from CITGO property is routed through the oil-water separator (SWMU 1). Any oily residues that collect in the separator are skimmed from the surface by CITGO personnel, who pump the residue into tank No. 88 (SWMU 3), which serves as a holding tank. This tank is cleaned when it is full enough to transfer the waste to drums (about once every five years). CITGO contracts PCIA to drain the tank and drum and then immediately transport the ignitable contents. PCIA transports this waste to various facilities in other states, where it is either landfilled or used as fuel.

The fifth waste stream which is no longer generated was an oil-water emulsion waste (D001, D008) from tank bottoms. This material was stored in tank 195 (SWMU 2) prior to off-site disposal. Generation of this waste ceased in the later part of 1980.

2.4 RELEASE HISTORY

This section contains a discussion of the history of releases to surface water, sediment, soil, ground water, and air at the CITGO facility.

In 1980, EPA investigated the site where asbestos insulation had been piled during the dismantling of the refinery. The EPA contracted Clayton Environmental Consultants to sample and analyze soil from these areas. The analysis found asbestos contamination (CITGO, 1991c). In July 1983, CITGO contracted National Wrecking Company (National Wrecking) of Chicago, Illinois to remove asbestos waste from the idle refinery site under an Indiana Environmental Management Board (IEMB) permit. The permit specified disposal procedures (IEMB, 1983).

In January 1984, CITGO applied for an extension of the IEMB permit to allow removal of 75 cubic yards of asbestos-contaminated soil (CITGO, 1984a). According to the Ken Robb, CITGO's terminal manager, National Wrecking conducted the removal and transport of the asbestos-contaminated soil. The soil was disposed of in the Indiana Waste Systems, Inc., landfill in Wheeler, Indiana (CITGO, 1991c).

In September 1981, Cities applied for a permit from the Indiana State Board of Health (ISBH) to dispose of 1700 cubic yards of oil-saturated soil. The wastes ranged in composition from 9 to 24% water and from 76 to 91% oil and water sludge. Prior to this time, the material was sampled, and no hazardous materials were present. The material yielded flash point values of 210°F, 435°F, and (no flash point). Cities requested a permit to dispose of the waste in the Indiana Waste Systems, Inc., landfill, located in Wheeler, Indiana (Cities, 1981a).

According to CITGO personnel, ISBH denied the permit request. Subsequently, a permit dated April 19, 1985, was issued by IDEM. The permit number was No. 850335, and it expired April 17, 1990. The permit authorized Chemical Waste Management, Inc. (CWM) to remove the oil-saturated soil, manifest it, and transport it as asphalt-saturated soil, a nonhazardous waste. The oil-saturated soil was dug up and disposed of in the CID landfill operated by Waste Management, Inc., in Calumet City, Illinois (CITGO, 1991c).

2.5 REGULATORY HISTORY

CITGO operates as a large-quantity generator and storer of hazardous waste when the tanks containing oil and fuel products and the skimming tank in the oil-water separator are cleaned. Cleaning occurs infrequently (greater than 90 days). Although the unit identified on the facility's part A (SWMU 2) was closed, hazardous waste is currently stored longer than 90 days in tank 88 (SWMU 3).

RCRA

Cities submitted a Notification of Hazardous Waste Activity Form as a generator of hazardous waste on August 18, 1980 (Cities, 1980a). This notification listed Cities' waste as ignitable and toxic. Subsequent manifests coded the waste as D001 and D008 (lead).

On November 19, 1980, Cities submitted another Notification of Hazardous Waste Activity Form, amending its original notification to indicate that the facility was storing waste for greater than 90 days. When the original notification was submitted, Cities planned to have already closed tank No. 195, which contained 149,000 gallons of oil and water emulsion waste (D001, D008). By November 19, 1980, the tank had not been closed, and Cities applied for interim status as a storage facility by submitting a Part A Permit Application for the storage of waste contained in this tank (Cities, 1980b).

In March 1981, EPA inspectors conducted a RCRA compliance inspection of Cities as a generator of hazardous waste. No major violations were discovered in the inspection. In May 1981, after reviewing the inspection report, EPA determined that Cities would no longer operate as a TSD facility (EPA, 1981b). On March 18, 1983, CITGO took over operations of the facility. CITGO submitted a Notification of Hazardous Waste Activity Form on November 28, 1983, as a generator of hazardous waste (CITGO, 1983).

In November 1981, Cities initiated closure of tank No. 195. In June 1982, Cities sent a detailed history of tank No. 195 and its removal to EPA Region 5, stating that tank No. 195 was no longer needed to store hazardous waste (Cities, 1982). Subsequently, CITGO submitted a letter to EPA Region 5 requesting closure of the tank and indicated that the facility would remain a generator of hazardous waste (CITGO, 1985).

In April 1985, ISBH performed a closure inspection of the area where tank No. 195 had been placed. The ISBH inspector found no remaining signs of the tank, as well as no signs of soil

stains (ISBH, 1985). The ISBH inspector requested that CITGO submit a new closure plan to ISBH.

In June 1985, ISBH issued a Notice of Violation to Cities citing the alleged closure of tank No. 195 and disposal of waste from the tank. Although the facility was CITGO at the time, Cities was still in existence as a company and responded by letter to ISBH detailing how the tank closure was performed. The closure steps included disposal of the waste material from tank No. 195. Cities contracted CWM of Alsip, Illinois, to remove the waste, drum it, and dispose of it. CWM completed this work in January 1982. Cities retained Haas and Associates of Michigan City, Indiana, to inspect the empty tank. In the summer of 1983, Cities hired National Wrecking to dismantle and remove the tank and its appurtenances as scrap metal. National Wrecking sold the scrap metal to Scrap Corporation of America in Chicago, Illinois. Cities included manifests and contracts detailing the tank closure. Cities also included the closure plan, with applicable references to federal regulations for closure (Cities, 1985). The PA/VSI revealed no evidence that EPA or ISBH approved the closure activities for tank No. 195.

CERCLA

At present, no CERCLA operations are identified under CITGO's identification number. Prior to 1980, Cities used a surface impoundment, located across Cline Avenue in Gary, Indiana, for sludge disposal from its oil-water separator. Cities submitted a CERCLA notification for this site in June 1981 (Cities, 1981b). The impoundment has not been used by CITGO since the mid-1970s. The site (IND 980 607 469) is no longer owned by CITGO (EPA, 1981a). The surface impoundment is not addressed in this report since it was located at a different facility and is not in the scope of this PA/VSI.

Air Permits

Both the City of East Chicago and the State of Indiana require permits for CITGO's air emissions from the storage tanks. All the tanks containing gasoline have internal floating roofs with a primary seal; some have a secondary seal as well. Distillate tanks have conical roofs to help control air emissions. East Chicago issued a permit for each of the 58 tanks; IDEM issued one permit for all of the tanks. The truck loading rack is also permitted by East Chicago for possible air emissions. Each year, CITGO calculates its emissions to air as part of the East Chicago permit requirements.

NPDES Permit

A NPDES permit (No. IN 0000 159) allows CITGO to discharge water from the oil-water separator into the Grand Calumet River at the approximate rate of 1,000 gallons per day. Under the NPDES permit requirements, CITGO samples the effluent on a monthly basis and reports the results in discharge monitoring reports to the Indiana Department of Environmental Management (IDEM, 1989).

Legal Actions

In November 1983, EPA initiated a Consent Decree, filed January 30, 1984, ordering Lloyd J. Hodges Company and Cities to clean up the asbestos-contaminated soil (U.S. District Court, 1984). In January 1984, before the decree was filed, CITGO had already applied for an extension of the permit to allow removal of 75 cubic yards of asbestos-contaminated soil (CITGO, 1984a). According to Ken Robb, CITGO's terminal manager, National Wrecking conducted the removal and transported the asbestos-contaminated soil. The soil was disposed of in the Indiana Waste Systems, Inc., landfill in Wheeler, Indiana (CITGO, 1991c). On April 4, 1984, the U.S. District Court, Northern District of Indiana, terminated the Consent Decree and dismissed the case (U.S. District Court, 1984).

2.6 ENVIRONMENTAL SETTING

This section describes the climate, flood plain and surface water, geology and soils, and ground water in the vicinity of the CITGO facility.

2.6.1 Climate

The climate in Lake County is temperate. The average daily temperature is 48.3°F. The average daily temperature in January is 32.4°F. The average daily temperature in July is 73.6°F (City of East Chicago, 1991b).

The prevailing wind is from the north, off of Lake Michigan (U.S. Department of Agriculture, 1972). Average wind speed is highest in January at 12.4 miles per hour and lowest in June at 9.3 miles per hour (City of East Chicago, 1991b).

Annual net precipitation for the county is 33.86 inches (City of East Chicago, 1991b). The maximum 1-year, 24-hour rainfall was 5.64 inches (U.S. Department of Agriculture, 1972). Snowfall ranged from 3.0 to 27.6 inches per year during the period from 1934 to 1963. The

maximum 24-hour snowfalls were 12 inches in 1939 and 11 inches in 1956 (U.S. Department of Agriculture, 1972).

2.6.2 Flood Plain and Surface Water

The CITGO facility is not located in a flood-prone area. It occupies a zone that has minimal, if any, flooding (City of East Chicago, 1991a).

The chief water bodies in Lake County are the Grand Calumet River, Lake Michigan, and Wolf Lake, a large recreational lake. Surface water in the area is used for recreational purposes. The County obtains its drinking water from Lake Michigan.

The pathway from the facility to surface water originates with the Grand Calumet River, which drains into the Indiana Harbor Shipping Canal, which in turn drains into Lake Michigan (City of East Chicago, 1991b).

All surface runoff on the CITGO facility is routed to the oil-water separator. After oily residues are skimmed, "clean" water is pumped to the "clean side" of the oil-water separator, where it then flows by gravity through discharge pipes into the Grand Calumet River.

2.6.3 Geology and Soils

Approximately 4,500 feet of consolidated bedrock, consisting of sandstones, carbonates, and shale, overlie Precambrian basement rock in northwest Indiana (Burns and McDonnell, 1991). The most recent stage of glaciation, the Wisconsonan, deposited a clay till on the surface of the bedrock. As Lake Michigan levels fluctuated over time, a series of beaches and dunes were formed, which accounts for the deposition of thick sand deposits in the area (Burns and McDonnell, 1991).

2.6.4 Ground Water

East Chicago's ground-water monitoring program includes 11 monitoring wells that are typically 6 feet deep. The wells are constructed of 3-foot-diameter concrete pipe. The primary contaminants of concern reflect the dominant refinery, terminal, and steel mill operations throughout Lake County and include polychlorinated biphenyls, sulfur, iron, and heavy metals.

East Chicago has monitoring wells in several locations. A map of these wells shows that the depth to the ground-water table varies from 3 to 6 feet (City of East Chicago, 1991b). East

Chicago does not have on record any information about hydraulic conductivities or the ground-water flow rate. The ground water flows either into Lake Michigan or the Grand Calumet River. City of East Chicago personnel have been unable to pinpoint exact flow patterns of ground water in Lake County (City of East Chicago, 1991b).

City of East Chicago personnel claimed that the ground water in the area near the CITGO facility is too contaminated with oil and fuel products and pollutants from area steel mills to be usable for drinking water purposes (City of East Chicago, 1991b).

2.7 RECEPTORS

The CITGO facility occupies 300 acres in the City of East Chicago, Indiana. East Chicago is 11.2 square miles in area, with a population of 33,892. There are 11 public schools and four private schools in the city (City of East Chicago, 1991c). Receptors near the CITGO facility include the Gary Municipal Airport and two residential areas, all within 1-1/2 miles of the facility. One residential area is east of the facility and has a population of 1,500; the other residential area, north of the facility, houses 3,000 people.

CITGO is surrounded by a security fence. The main access road is Chicago Avenue. A small access road is located near the oil-water separator and leads onto the access road adjacent to Cline Avenue. This road is blocked by a locked gate. The facility operates 7 days a week, three shifts per day with 11 employees total.

Surface water from Lake Michigan, located about 1/2 mile from CITGO, supplies East Chicago with its municipal drinking water. The intake from the East Chicago Filtration Plant extends 1-1/2 miles north into Lake Michigan. The Filtration Plant is about 1-1/2 miles from CITGO (City of East Chicago, 1991c). Lake Michigan is also used for recreational activities such as boating and fishing. Residents of East Chicago do not use private wells for drinking water because of a history of ground-water contamination from local refineries and area steel mills (City of East Chicago, 1991b).

A release from the CITGO facility could pose potential harm to nearby residents. All surface and ground water ultimately flows into Lake Michigan. A release could affect water life as well as surrounding vegetation. The ground water is already heavily saturated with contaminants resulting from years of oil and fuel waste disposal and spills, along with pollutants from area steel mills (City of East Chicago, 1991b).

3.0 SOLID WASTE MANAGEMENT UNITS

This section describes the 3 SWMUs identified during the PA/VSI. The following information is presented for the SWMU: description of the unit, dates of operation, wastes managed, release controls, history of release, and PRC observations.

SWMU 1	**Oil-Water Separator**
Unit Description:	The oil-water separator is used for separating oil and fuel residues from stormwater runoff. The unit consists of one tank with a "clean" side consisting of three bays and a "dirty side" with two bays. Oil is skimmed from the dirty side by CITGO employees and placed in a tank where it is held for permanent removal. Water flows over a weir from the dirty side to the clean side. Water is discharged by gravity from the clean side to the Grand Calumet River (see photographs Nos. 17, 18, and 19).
Date of Startup:	This unit has been in operation since 1929. In 1976, after the refinery was dismantled, the oil-water separator was used only for treating stormwater. In 1982, Cities added a leachate collection system to one chamber of the oil-water separator.
Date of Closure:	The unit is currently active.
Wastes Managed:	This unit manages an ignitable waste (D001) from the collection of oily residue.
Release Controls:	No release controls are built into the oil-water separator; however, the bays are concrete and only in the case of a flood should any releases or spill-overs occur.
History of Release:	No releases from this unit have been documented.
Observations:	The unit appears to be in sound condition. PRC observed no evidence of leaks or cracks surrounding the unit.

SWMU 2	**Former Tank No. 195**
Unit Description:	The former tank No. 195 is the unit that was identified on the Part A Permit Application submitted by Cities in 1980. The tank was used to store oil-water emulsion waste from tank bottoms (D001, D008). The tank had stored a maximum of 149,000 gallons and was made of steel. It was located in the southeast portion of the facility (see photographs Nos. 9 and 10).
Date of Startup:	The startup date for this unit is unknown.
Date of Closure:	This unit is inactive. CITGO did not provide an official closure date, although cleaning, and inspection procedures were completed January 12, 1982. The PA/VSI revealed no evidence that EPA or IDEM approved the closure.
Wastes Managed:	This unit managed an ignitable waste, toxic waste (D001, D008) from the collection of oily residue.
Release Controls:	The former tank No. 195 had no known release controls.
History of Release:	No releases from this unit have been documented.
Observations:	This tank no longer exists.

SWMU 3	**Tank No. 88**
Unit Description:	This 10,000 gallon concrete and steel tank is used for greater than 90-day storage of oily residue (D001) from the oil-water separator. The tank is located in the southeast corner of the facility (tank No. 88 is visible in the left-hand portion of photograph No. 17). When tank No. 88 becomes full enough to warrant removal of the oily residue, CITGO operates as a generator of hazardous waste. CITGO contracts with a removal company, currently PCIA, to vacuum out the contents of the holding tank. PCIA removes, drums, manifests, and disposes of the oily, ignitable waste (D001). PCIA typically sells the waste to other facilities for use as a low-

	grade fuel or disposes of the waste in an appropriate landfill (CITGO, 1991b).
Date of Startup:	The startup date for this unit is unknown.
Date of Closure:	This unit is active.
Wastes Managed:	This unit manages an ignitable waste (D001) from the collection of oily residue.
Release Controls:	This unit has an earthen base and is bordered by a soil berm.
History of Release:	No releases from this unit have been documented, and none were noted during the VSI.
Observations:	No cracks or leaks in or from this tank were visible at the time of the inspection.

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TABLE 4
SWMU AND AOC SUMMARY

	SWMU	Operational Dates	Evidence of Release	Suggested Further Action
1.	Oil-Water Separator	1929 to present	None	No further action is suggested.
2.	Former Tank No. 195	Unknown	None	No further action is suggested
3.	Tank No. 88	Unknown	None	No further action is suggested

	AOC	Operational Dates	Evidence of Release	Suggested Further Action
1.	Areas of origin for oil-saturated soil	N/A	Former release, possibly still contaminating area	Sample the area surrounding former saturated soil spots
2.	Areas of origin for asbestos-contaminated soil	N/A	Former release, possibly still contaminating area	Sample the area surrounding former saturated soil spots

4.0 AREAS OF CONCERN

PRC identified 2 AOCs during the PA/VSI. These AOCs are discussed below.

AOC 1 Former Oil-Saturated Soil Area

In May 1984, CITGO requested a permit from IEMB to dispose of 1700 cubic yards of oil-saturated soil. CITGO reported that it had analyzed the waste in accordance with EPA Extraction Procedure (EP) toxicity testing and found it to be nontoxic (CITGO, 1984b). In August 1983, CITGO analyzed samples of the oil-saturated soil in the company's in-house laboratory. The analysis showed the following results in parts per million (CITGO, 1984c):

Parameter	Concentration
Lead	1.70
Arsenic	0.02
Barium	2.65
Cadmium	< 0.01
Chromium	0.90
Silver	< 0.01
Selenium	< 0.01
Mercury	0.02

The oil-saturated soil was removed by CWM in 1985. The waste was manifested and shipped by CWM as a nonhazardous, asphalt-saturated soil. The waste was transported by South Chicago Disposal and disposed of in the CID landfill in Calumet City, Illinois. According to CITGO employees, the soil was removed until the areas were visibly clean. PRC inspectors noted that vegetation in the area appeared to be brown, or dead. In addition, most of the soil throughout the facility was "spongy" and often appeared black, as if it contained oily residue (see photographs Nos. 3, 4, 13, 14, and 15). CITGO does not have records indicating whether or not additional soil testing was conducted after the removal. Because test results for the remaining soil are not available, the areas where oil-saturated soil was removed should be tested to assume that the soil is free of any remaining contamination.

AOC 2 **Former Asbestos-Contaminated Soil Area**

In July 1983, CITGO contracted the removal of 75 cubic yards of asbestos-contaminated soil from the idle refinery site. An IEMB permit for the removal specified disposal procedures (IEMB, 1983). CITGO contracted with the Lloyd L. Hodges Company to conduct the removal. PRC inspectors did not notice unusual disturbances throughout the former refinery area. PRC photographed an overview of the former refinery area (see photographs Nos. 5, 6, 7, 8, 11, and 12).

On November 8, 1983, a Consent Decree initiated by EPA ordered Cities to clean up asbestos-contaminated soil. The Consent Decree was filed January 30, 1984. In January 1984, CITGO applied for an extension of the ISBH permit to allow removal of 75 cubic yards of asbestos-contaminated soil (CITGO, 1984a). According to the Ken Robb, the CITGO terminal manager, National Wrecking of Chicago, Illinois, conducted the removal and transport of the asbestos-contaminated soil. The soil was disposed of in the Wheeler landfill in Wheeler, Indiana (CITGO, 1991c). The Consent Decree was subsequently dismissed by the U.S. District Court on April 4, 1984.

Although the Consent Decree was dismissed, CITGO was unable to supply documents to PRC indicating that the asbestos-contaminated soil was completely removed and that detailed sampling was conducted. Because no follow-up sampling results are available, the areas where the asbestos-contaminated soil was removed should be tested to assure the soil is free of any remaining contamination.

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5.0 CONCLUSIONS AND RECOMMENDATIONS

The PA/VSI identified 3 SWMUs and 2 AOCs at the CITGO facility. Background information on the facility's location, operations, waste generating processes, release history, regulatory history, environmental setting, and receptors is presented in Section 2.0. SWMU-specific information, such as the unit's description, dates of operation, wastes managed, release controls, release history, and observed condition, is discussed in Section 3.0. AOCs are discussed in Section 4.0. Following are PRC's conclusions and recommendations for each SWMU and AOC. Table 4 identifies the SWMUs and AOCs at the CITGO facility and suggested further actions.

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SWMU 1 **Oil-Water Separator**

Conclusions: The oil-water separator is an enclosed, concrete and steel structure constructed below ground level. PRC observed no evidence of cracks or leaks from this unit. The probability of a release to environmental media is low. The potential for release via environmental media is summarized below.

Ground Water: Low. The oil-water separator is constructed of concrete bays or tanks enclosed by earth. The depth of each bay is about 6 feet. Although the distance to the water table is only 3 to 6 feet in this area, oily residues are not likely to leak into the ground water. Unless the foundation of one of the bays on the "dirty" side of the separator becomes severely cracked, the likelihood of a release is minimal.

Surface Water: Low. The oil-water separator discharges clean water by gravity flow to the Grand Calumet River under an NPDES permit. The river is located about 1,200 feet from the point of discharge. The discharge pipe is so close to the river that river water travels up the discharge pipe and mixes with water in the discharge bay of the separator. Because the unit is constructed so that the "dirty" and "clean" sides are separated by concrete and steel, the chance of a release to surface water is minimal.

Air: Low. The oily residue that collects in the oil-water separator originates from stormwater runoff. The waste is ignitable, but was not very aromatic at the time of inspection.

On-Site Soils: Low. The oil-water separator is an independent unit. Soils are separated from the unit by its concrete and steel structure. Releases could possibly occur if oily residues spilled during removal from the skimming tank.

Recommendations: No further action is suggested at this time.

ENFORCEMENT CONFIDENTIAL

SWMU 2 **Former Tank No. 195**

Conclusions: This former tank was a steel structure. This tank no longer exists. The probability of a current release to environmental media is non-existent as the tank had been closed and then inspected by a professional engineer. There is a low probability that a past release could have affected ground water and surface soils. However, ground water in the area is not used for human consumption. There is no documented history of release.

Recommendations: No further action is recommended at this time.

SWMU 3 **Tank No. 88**

Conclusions: This tank is a concrete and steel structure and appeared to be in good condition at the time of the VSI. There is no history of release from the tank. It rests on an earthen base and is surrounded by a soil berm. The distance to the water table is only 3 to 6 feet in this area. If a spill were to occur there is a high probability for on site soil and ground water to be affected. However, the tank's structural integrity minimizes the potential for a release to occur. thus the overall release potential to all environmental media (ground water, surface water, air and on-site soils is low.

Recommendations: No further action is recommended at this time.

AOC 1 **Former Oil-Saturated Soil Area**

Conclusions: Oil-saturated soil was removed from areas surrounding existing fuel and oil product storage tanks (see Figure 2). If all of the oil-saturated soil was removed, no potential for release would exist, but because the oil-saturated soil was removed only until visibly clean, the potential for a release to the remaining soil exists. The potential for release to environmental media if oil-saturated soil remains is summarized below.

ENFORCEMENT CONFIDENTIAL

Ground Water: High. If soil contaminated with oil residue remains in the former oil-saturated soil spots, ground water could be affected, because the depth to the water table is only 3 to 6 feet in this area.

Surface Water: Low. Oily residues remaining in the soil should tend to adhere to soil particles, prohibiting a large release to groundwater flowing to surface water. Rainfall runoff is routed to the oil-water separator, preventing a chance for oil-saturated runoff to enter surface water prior to separation.

Air: Low. Oil-saturated soil spots were cleaned up several years ago. If any residue remains in the surrounding soil, it is probably a very minimal amount. This should not cause a large release to the air.

On-Site Soils: High. The oil-saturated soil was removed only until the areas were visibly clean. If any oily residue remains in the surrounding soil areas, it would constitute a direct release to on-site soils. CITGO was unable to provide records of soil sampling to verify adequate clean up in this area.

Recommendations: The facility should sample the soil areas formerly contaminated by oil products to ensure that these areas are no longer contaminated.

AOC 2 **Former Asbestos-Contaminated Soil Area**

Conclusions: Asbestos-contaminated soil areas resulted from dismantling the refinery (see Figure 2). CITGO was unable to provide documents that detailed further action, such as results of follow-up sampling performed after the asbestos-contaminated soil was removed. Without sampling results indicating a thorough cleanup, the possibility of a release to the remaining soil is fairly high. The potential for release to environmental media is summarized below.

Ground Water: Moderate. If soil contaminated with asbestos remains, ground water could be affected, because the depth to the water table is only 3 to 6 feet in this area.

ENFORCEMENT CONFIDENTIAL

Surface Water: Low. Any asbestos fibers remaining in the soil could wash off the soil during storms. However, rainfall runoff is routed to the oil-water separator, and asbestos fibers should be collected in the oil that is separated.

Air: Low. The asbestos-contaminated soil was removed several years ago using ISBH approved methods. If any residue remains in the surrounding soil, it is probably a very minimal amount and should not cause a large release to the air.

On-Site Soils: High. The asbestos-contaminated soil was removed, but no follow-up sampling results were available to show that removal was complete. If any asbestos remains in the surrounding soil areas, it would constitute a direct release to on-site soils.

Recommendations: The facility should sample the soil areas formerly contaminated by asbestos to ensure that these areas are no longer contaminated.

REFERENCES

Burns and McDonnell, Engineers, Architects, Consultants, 1991. Refinery Area Ground-Water Investigation Report, Prepared for Amoco Oil Company Refinery, Whiting, Indiana, Project 5W-2781, Kansas City, Missouri, June 1991.

CITGO Petroleum Corporation (CITGO), 1983. Notification of Hazardous Waste Activity Form, November 28.

CITGO, 1984a. Letter from CITGO to Indiana Environmental Management Board (IEMB), Regarding Extension of Permit for Asbestos Disposal, January 17.

CITGO, 1984b. Letter from CITGO to IEMB, Requesting Waste Disposal Permit for Oil-Saturated Soil, May 11.

CITGO, 1984c. Letter from CITGO to Indiana State Board of Health (ISBH), Regarding Analytical Results of Oil-Saturated Soil Analysis, November 16.

CITGO, 1985. Letter from CITGO to U.S. Environmental Protection Agency (EPA), Regarding Closure of Tank No. 195, September 24.

CITGO, 1991c. Telephone Conversation Between Laurel Berman, PRC Environmental Management, Inc. (PRC), and Ken Robb, Terminal Manager, CITGO, August 19.

Cities Service Company (Cities), 1980a. Notification of Hazardous Waste Activity Form, August 18.

Cities, 1980b. Letter from Cities to EPA Regarding Amended Hazardous Waste Activity Form, November 19.

Cities, 1981a. Letter from Cites to ISBH Requesting Permit to Dispose of Oil-Saturated Soil, September 8.

Cities, 1981b. Notification of Hazardous Waste Site, June 12.

Cities, 1982. Letter from Cities to EPA, Regarding Dismantling and Inspection of Storage Tank No. 195, June 24.

Cities, 1985. Letter from Cities to ISBH, Regarding Notice of Violation for Tank No. 195 and Disposal of Waste from the Tank, July 17.

City of East Chicago, 1929. Purchase Agreement Between City of East Chicago and Texas Empire Pipeline Company, September 24.

City of East Chicago, 1991a. Flood Insurance Map. Provided by Rich Sobilo, Assistant City Engineer, City of East Chicago, July 10.

City of East Chicago, 1991b. Interview with Rich Sobilo, Assistant City Engineer, City of East Chicago, July 10.

City of East Chicago, 1991c. Telephone Conversation Between Laurel Berman, PRC, and Rich Sobilo, Assistant City Engineer, City of East Chicago, August 22.

U.S. Environmental Protection Agency (EPA), 1981a. Notification of Hazardous Waste Site, Regarding a Closed Surface Impoundment Site Formerly Owned by Cities and Sold in 1975, June 9.

EPA, 1981b. Internal memo to Indiana Waste Management Branch, Clarifying that Cities was no longer a Treatment, Storage, or Disposal Facility, May 19.

Indiana Environmental Management Board, 1983. Permit Issued to Indiana Waste Systems, Inc., Regarding Disposal of Asbestos Waste in their Landfill in Wheeler, Indiana, July 6.

Indiana Department of Environmental Management, 1989. NPDES Permit, April 25, 1989.

Indiana State Board of Health, 1985. Office Memorandum, Regarding Closure Inspection of Tank No. 195, May 22.

U.S. Department of Agriculture, 1972. Soil Survey of Lake County Indiana, July.

U.S. Department of Housing and Urban Development, 1980. Flood Insurance Rate Map, City of East Chicago, Indiana.

U.S. District Court, 1984. Termination of Consent Decree, April 4.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IN	IND 095267381

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
CITGO Petroleum Corporation	2500 East Chicago Avenue

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
East Chicago	IN	46312	Lake		

09 COORDINATES: LATITUDE	LONGITUDE
4° 38′ 33"	87° 28′ 19"

10 DIRECTIONS TO SITE *(Starting from nearest public road)*

Indiana Tool Road (I-90), exit Cline Avenue South, east on Chicago Avenue

III. RESPONSIBLE PARTIES

01 OWNER *(if known)*	02 STREET *(Business, mailing residential)*
Petroleos de Venezuela, S.A. (PDVSA)	c/o CITGO Petroleum Corporation, Box 3758

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Tulsa	OK	74102	(918) 499-5111

07 OPERATOR *(If known and different from owner)*	08 STREET *(Business, mailing, residential)*
Same	

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP *(Check one)*

☒ A. PRIVATE ☐ B. FEDERAL: _____ *(Agency name)* ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER _____ *(Specify)* ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE *(Check all that apply)*

☒ A. RCRA 3010 DATE RECEIVED: 11 / 18 / 1980 (MONTH DAY YEAR) ☒ B. UNCONTROLLED WASTE SITE *(CERCLA 103 c)* DATE RECEIVED: 6 / 9 / 81* (MONTH DAY YEAR) ☐ C. NONE

*Submitted by Cities (CITGO), but sold prior to 1980 (1975). Site has a different I.D. No. than CITGO

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

☒ YES DATE 7 /10 /91
☐ NO

BY *(Check all that apply)*
☐ A. EPA ☒ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ *(Specify)*

CONTRACTOR NAME(S): PRC Environmental Management, Inc.

02 SITE STATUS *(Check one)*

☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION

1929 | Present (BEGINNING YEAR ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The substances present include oil and fuel products.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

The facility has a history of asbestos-contamination of 75 cubic yards of soil and oil-saturation of 1,700 cubic yards of soil, both originating from dismantling the former refinery several years ago.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION *(Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents.)*

☐ A. HIGH *(Inspection required promptly)* ☒ B. MEDIUM *(Inspection required)* ☐ C. LOW *(Inspect on time-available basis)* ☐ D. NONE *(No further action needed; complete current disposition form)*

VI. INFORMATION AVAILABLE FROM

U.S. Environmental Protection Agency, Indiana Department of Environmental Management, and CITGO Petroleum Corporation.

01 CONTACT	02 OF *(Agency/Organization)*			03 TELEPHONE NUMBER
Kevin Pierard	U.S. EPA, Region 5			(312) 886-4448
04 PERSON RESPONSIBLE FOR ASSESSMENT	**05 AGENCY**	**06 ORGANIZATION**	**07 TELEPHONE NUMBER**	**08 DATE**
Laurel Berman		PRC EMI	(312) 856-8700	8 / 23 /91 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IN	IND 095267381

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES *(Check all that apply)*

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ■ C. SLUDGE
- ☐ D. OTHER _____ *(Specify)*
- ☐ E. SLURRY
- ■ F. LIQUID
- ■ G. GAS

02 WASTE QUANTITY AT SITE *(Measures of waste quantities must be independent)*

TON NA*

CUBIC YARDS NA

NO. OF DRUMS NA

* Not measurable at time of inspection

03 WASTE CHARACTERISTICS *(Check all that apply)*

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ■ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE	NA*	Gallons	Skimmed from oil-water separator and held in tank
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES *(See Appendix for most frequently cited CAS Numbers)*

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OLW	Oily residue (D001)				

V. FEEDSTOCKS *(See Appendix for CAS Numbers)*

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION *(Cite specific references; e.g., state files, sample analysis, reports)*

Note: Oil and fuel residues, and wastewater are cleaned from tank bottoms on an as-needed basis.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
IN	IND 095267381

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ■ A. GROUNDWATER CONTAMINATION — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

A history of ground-water contamination dating back to the 1920s exists from refineries and steel mills in the area.

01 ■ B. SURFACE WATER CONTAMINATION — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 34,000 — 04 NARRATIVE DESCRIPTION

Population of East Chicago and CITGO employees could be affected by a spill. Lake Michigan is within 1 mile of the facility. No surface water contamination has been documented.

01 ■ C. CONTAMINATION OF AIR — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: ~4,500 — 04 NARRATIVE DESCRIPTION

No air contamination documented.

01 ■ D. FIRE/EXPLOSIVE CONDITIONS — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 11 — 04 NARRATIVE DESCRIPTION

CITGO employees. Note: PRC inspectors observed a crew welding a tank seam with an open torch.

01 ■ E. DIRECT CONTACT — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 11 — 04 NARRATIVE DESCRIPTION

CITGO employees.

01 ■ F. CONTAMINATION OF SOIL — 02 ■ OBSERVED (DATE: after 1976) — □ POTENTIAL — □ ALLEGED

03 AREA POTENTIALLY AFFECTED: 300 (Acres) — 04 NARRATIVE DESCRIPTION

Approximately 1,700 cubic yards of soil was saturated with oil. An additional 75 cubic yards were contaminated with asbestos.

01 ■ G. DRINKING WATER CONTAMINATION — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 34,000 — 04 NARRATIVE DESCRIPTION

None documented. However, contamination of drinking water could affect all of East Chicago, which uses Lake Michigan for drinking water.

01 ■ H. WORKER EXPOSURE/INJURY — 02 □ OBSERVED (DATE: _____) — ■ POTENTIAL — □ ALLEGED

03 WORKERS POTENTIALLY AFFECTED: 11 — 04 NARRATIVE DESCRIPTION

Overall safety of the facility was good. Potential for exposure to vapors exists for tank workers. Open-torch welding, mentioned above, poses potential for injury.

01 □ I. POPULATION EXPOSURE/INJURY — 02 □ OBSERVED (DATE: _____) — □ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None documented.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
IN	IND 095267381

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☒ OBSERVED (DATE: 1976 & 1991) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Former soil contamination occurred in 1976.

PRC inspectors noted that vegetation and grass surrounding tanks was brown and apparently dead.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION (Include name(s) of species)

None documented.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None documented.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

None documented.

01 ☐ N. DAMAGE TO OFF-SITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None documented.

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPS — ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

CITGO discharges stormwater to the Grand Calumet River. The discharge is permitted and monitored under an NPDES permit.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None documented. However, former CERCLA surface impoundment across Cline Avenue from the facility poses question of illegal dumping by CITGO or other nearby facilities.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: approximately 34,000

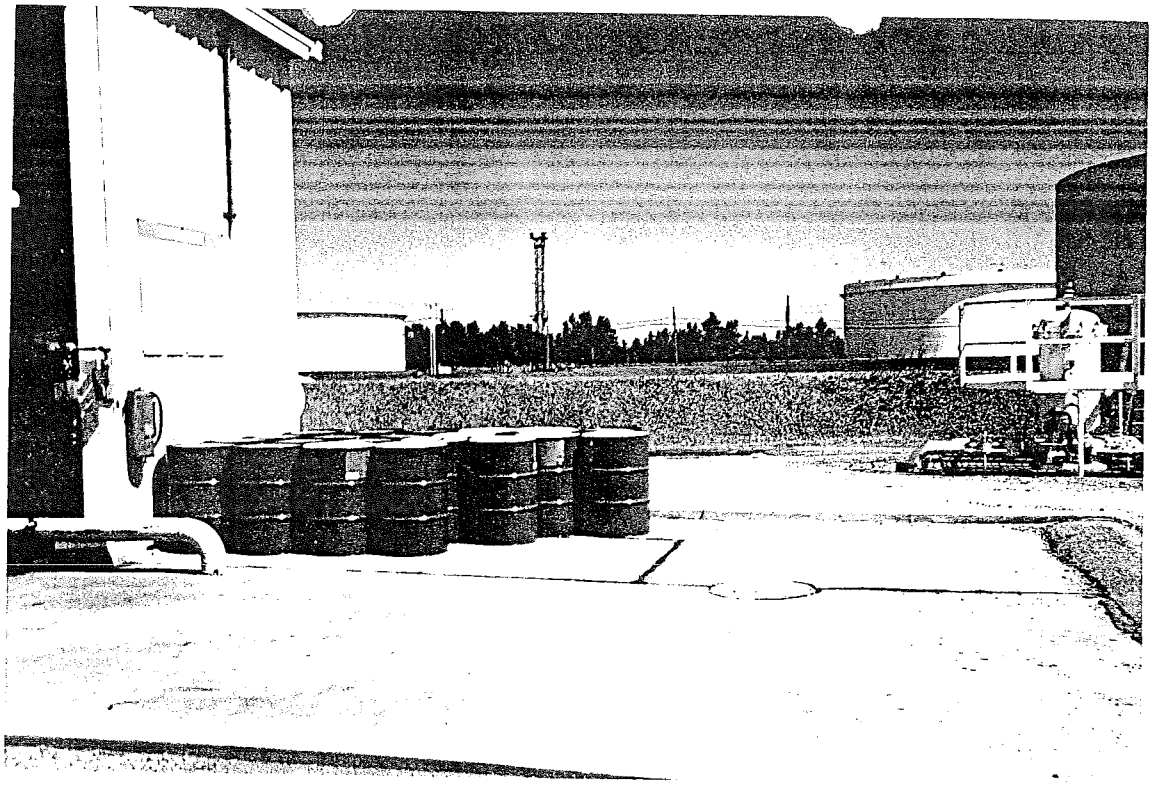
IV. COMMENTS

V. SOURCES OF INFORMATION *(Cite specific references; e.g., state files, sample analysis, reports)*

U.S. EPA Region 5 files, IDEM files, City of East Chicago files, site inspection.

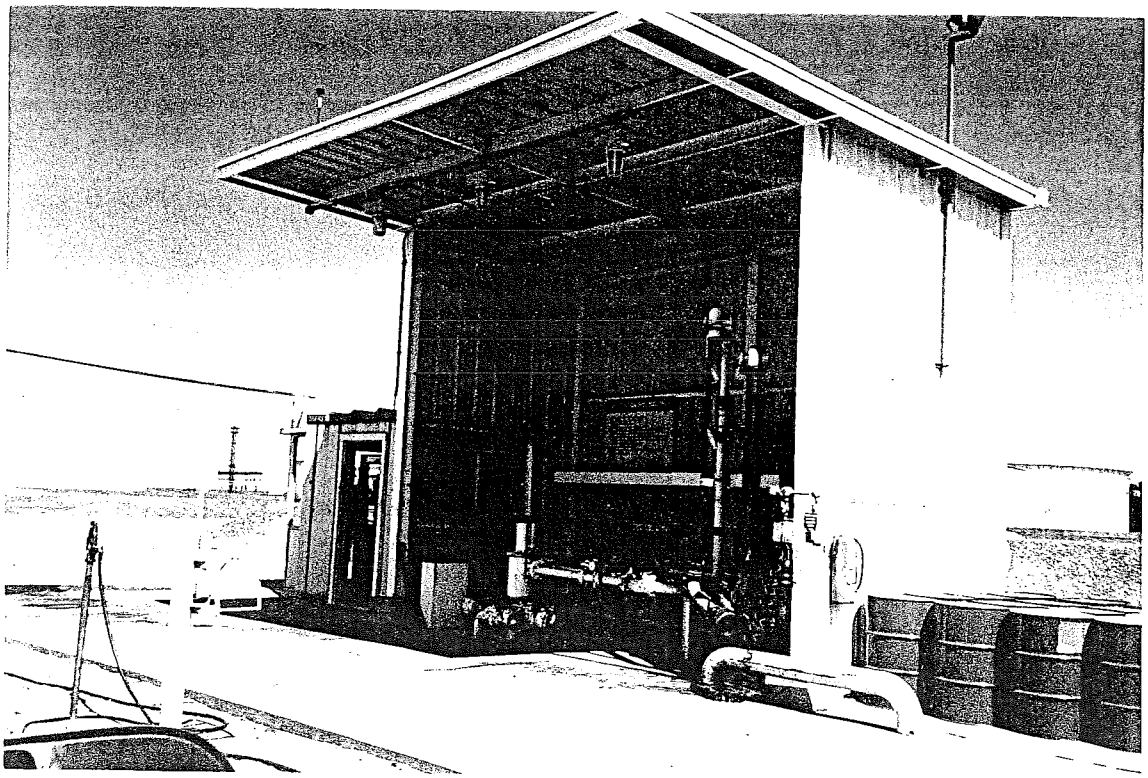
CITGO Petroleum Corporation
2500 East Chicago Avenue
East Chicago, Indiana 46312
IND 095 267 381

Date:	July 10, 1991
Facility Representatives:	Ken Robb, Terminal Manager Dana Burch, Senior Counsel
Inspection Team:	Mary Wojciechowski, PRC Environmental Management, Inc. Laurel Berman, PRC Environmental Management, Inc.
Photographer:	Mary Wojciechowski
Weather Conditions:	Sunny, warm, clear, temperature about 70°F
Summary of Activities:	The VSI began at 8:30 a.m. with an introductory meeting. The inspection team started the meeting with a discussion of the purpose of the VSI and the agenda for the visit. Mr. Robb continued with a discussion of CITGO's current operations. Ms. Burch joined the meeting briefly to provide a history of operations at the facility. Mr. Robb also discussed solid wastes generated because the Consent and the past release history. Most of the information was exchanged on a question-and-answer basis. Mr. Robb provided the inspection team with copies of documents requested. At 10:30 AM, Mr. Robb led the inspection team on a tour of the facility, including solid waste management areas, and possible areas of concern. CITGO has no production capability at the East Chicago site, which limited the tour to the outdoor areas of the site. The inspection team took photographs of all relevant site areas, such as AOCs, SWMUs, and overall facility layout. The tour concluded at 11:15 AM, after which the inspection team held a brief exit meeting with Mr. Robb. The VSI ended at 11:30 AM.



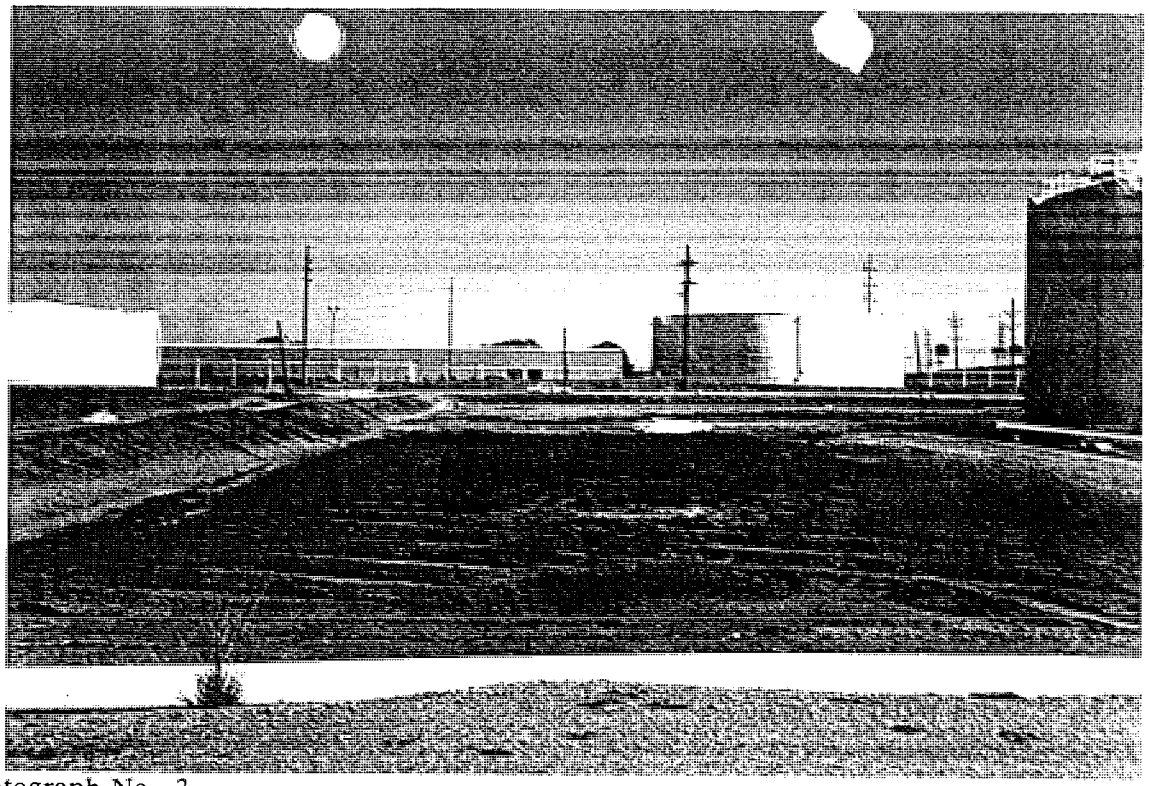
Photograph No. 1
Orientation: Northwest
Description: 15 drums of de-icer stored alongside truck loading rack.

Location: Northeast corner of the facility
Date: July 10, 1991



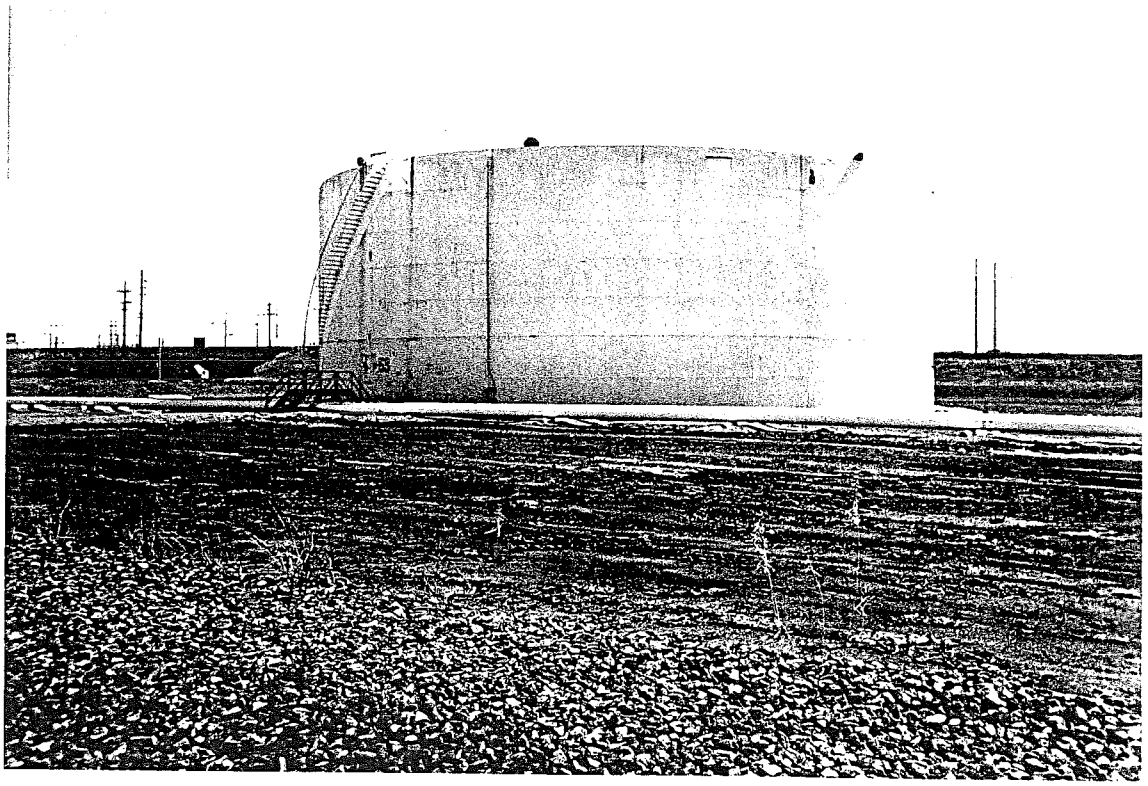
Photograph No. 2
Orientation: Northwest
Description: Truck loading rack.

Location: Northeast corner of the facility
Date: July 10, 1991



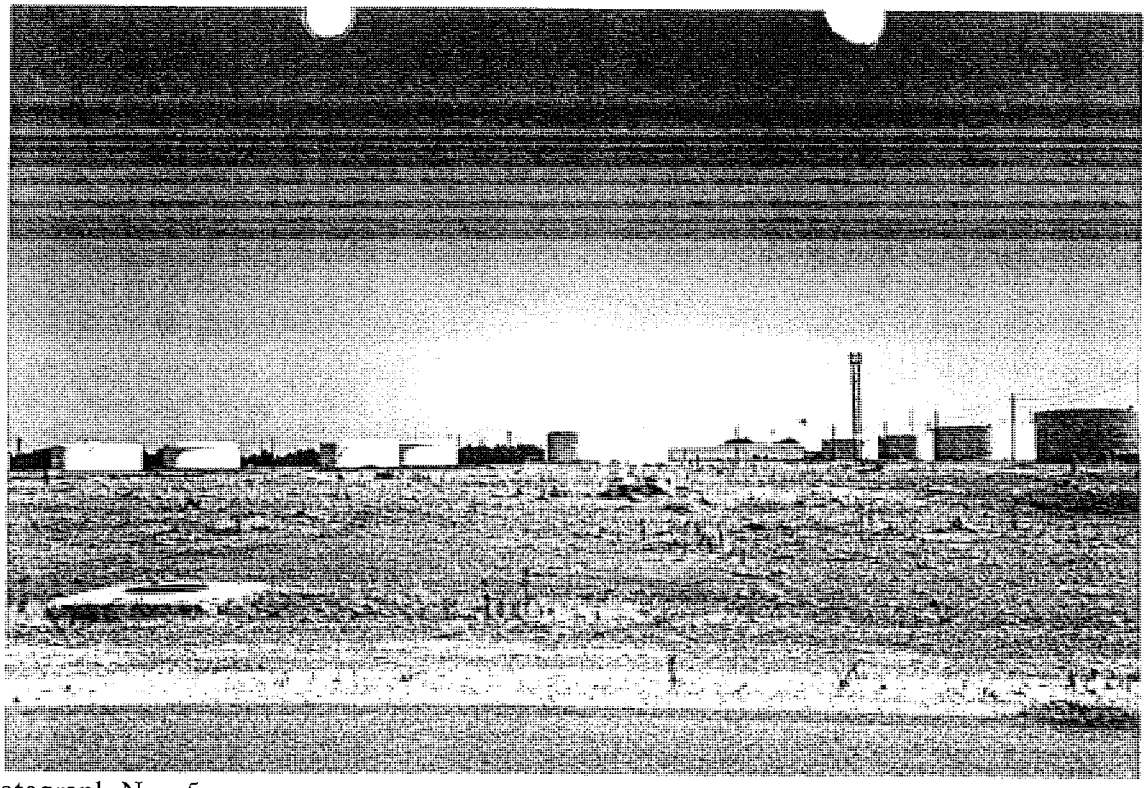
Photograph No. 3
Orientation: North
Description: One of the former oil-saturated soil areas, west of tank No. 54.

Location: AOC 1
Date: July 10, 1991



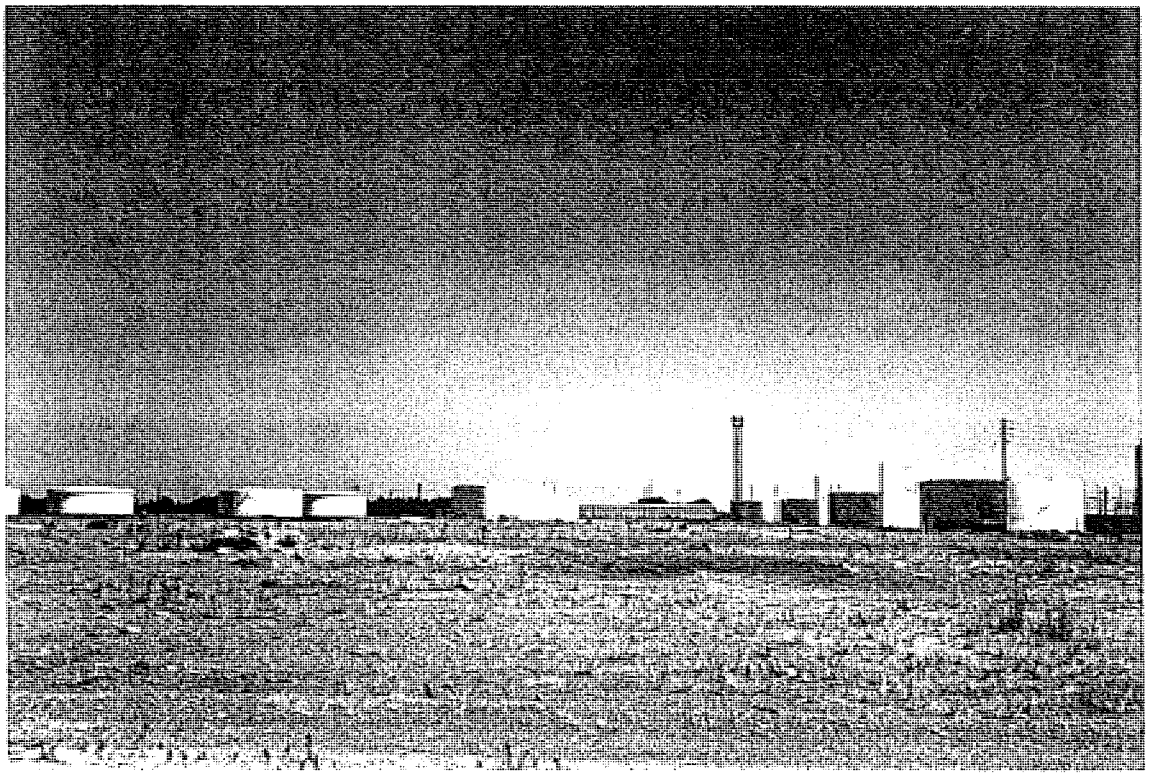
Photograph No. 4
Orientation: North
Description: One of the former oil-saturated soil areas, south of tank No. 53.

Location: AOC 1
Date: July 10, 1991



Photograph No. 5
Orientation: Northwest
Description: Overview of former refinery foundation.

Location: Eastern portion of the facility
Date: July 10, 1991

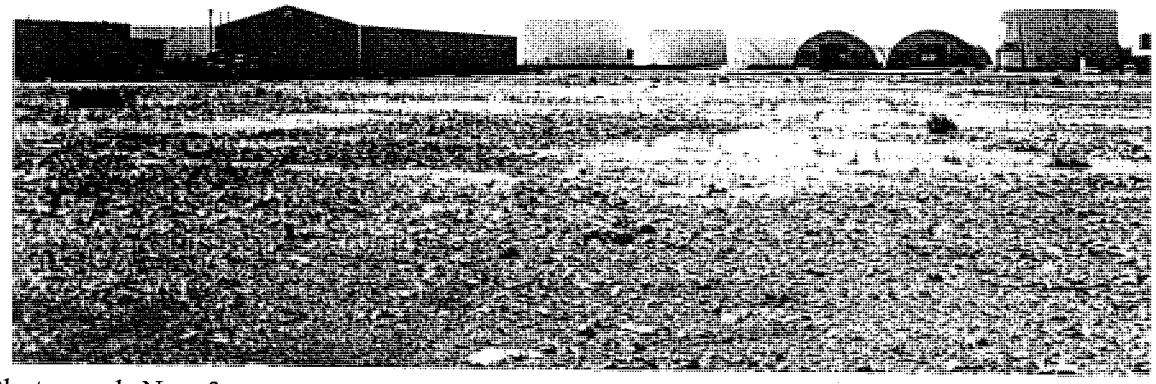


Photograph No. 6
Orientation: Northwest
Description: Overview of former refinery foundation.

Location: Eastern portion of the facility
Date: July 10, 1991

Photograph No. 7
Orientation: West
Description: Overview of former refinery foundation.

Location: Eastern portion of the facility
Date: July 10, 1991



Photograph No. 8
Orientation: West
Description: Overview of former refinery foundation.

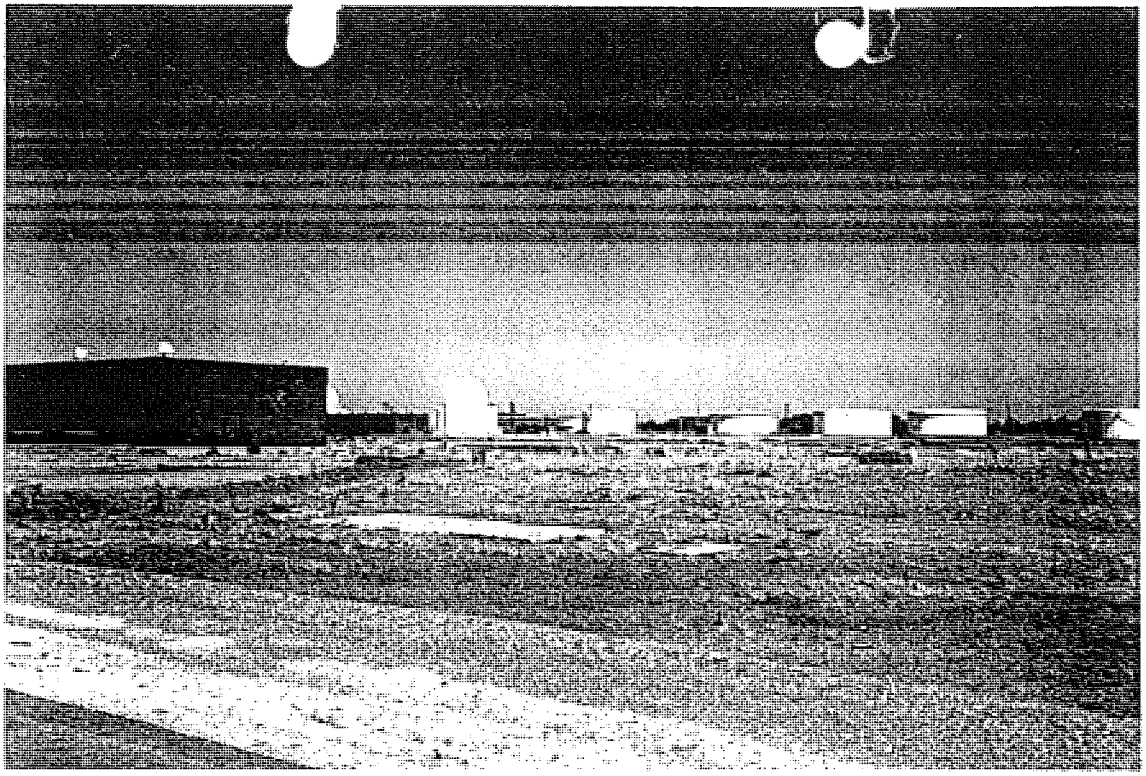
Location: Eastern portion of the facility
Date: July 10, 1991

Photograph No. 9
Orientation: South
Description: Former tank No. 195 site.

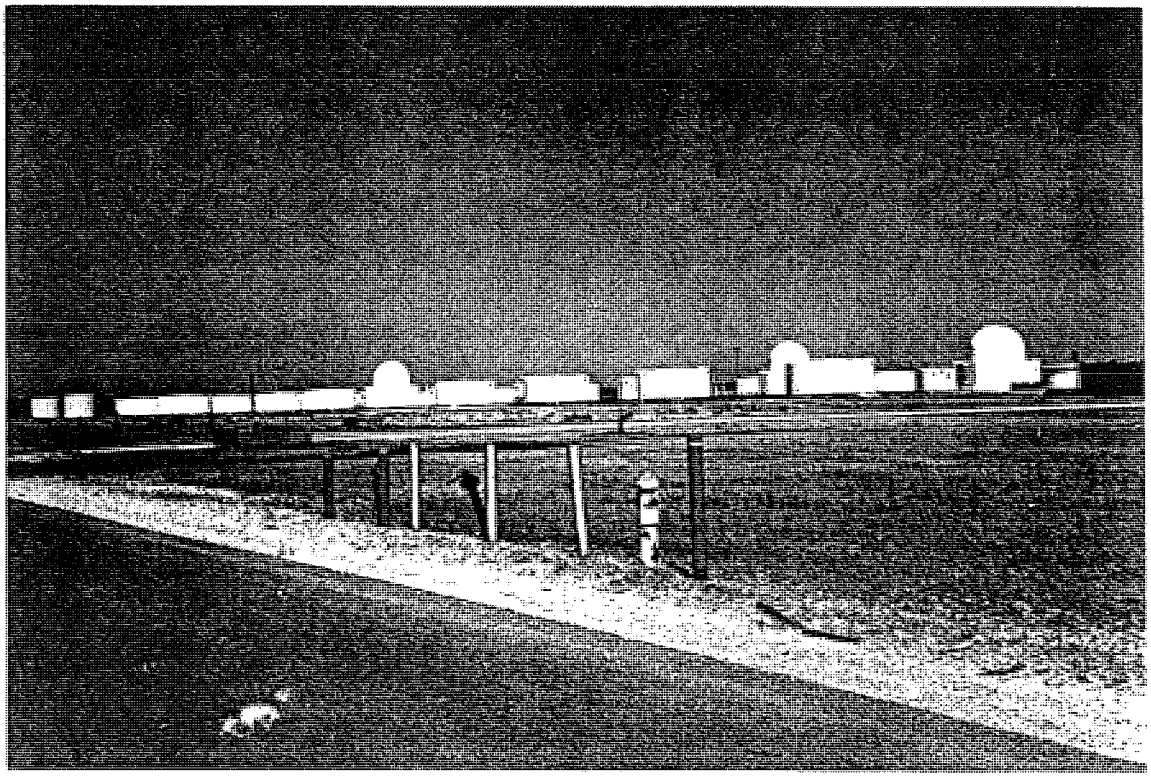
Location: Eastern portion of the facility
Date: July 10, 1991

Photograph No. 10
Orientation: South
Description: Former tank No. 195 site.

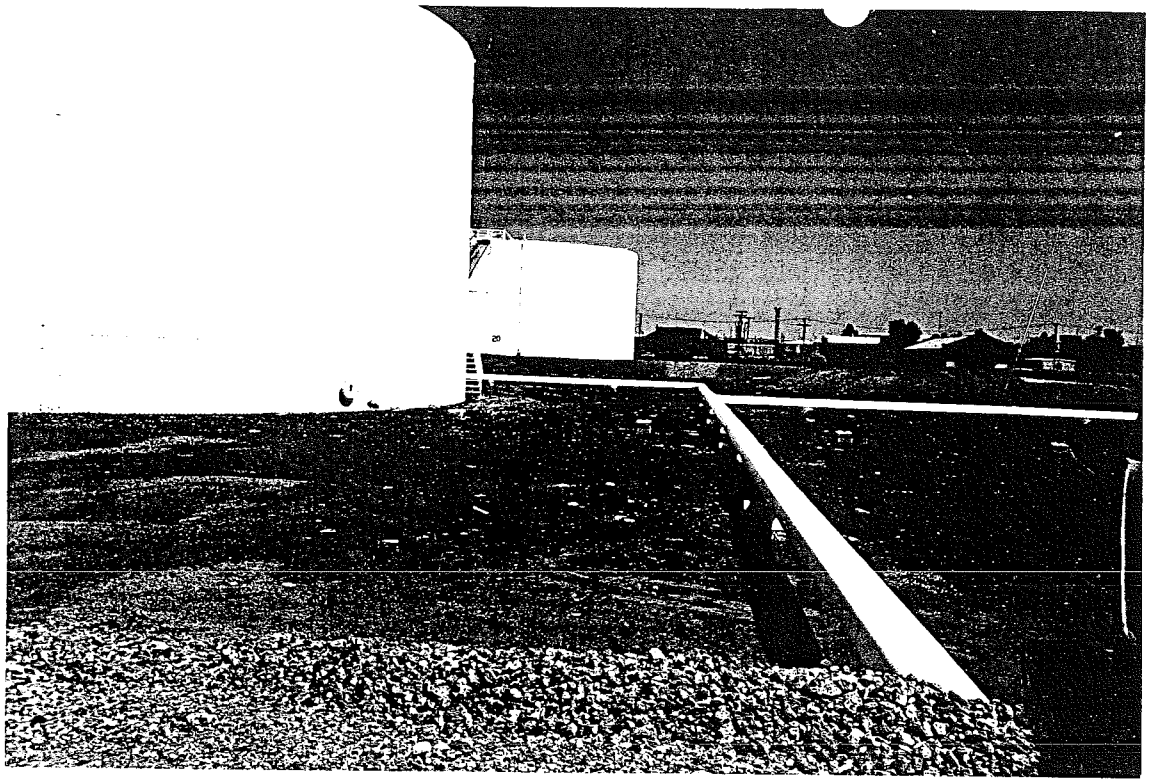
Location: Eastern portion of the facility
Date: July 10, 1991



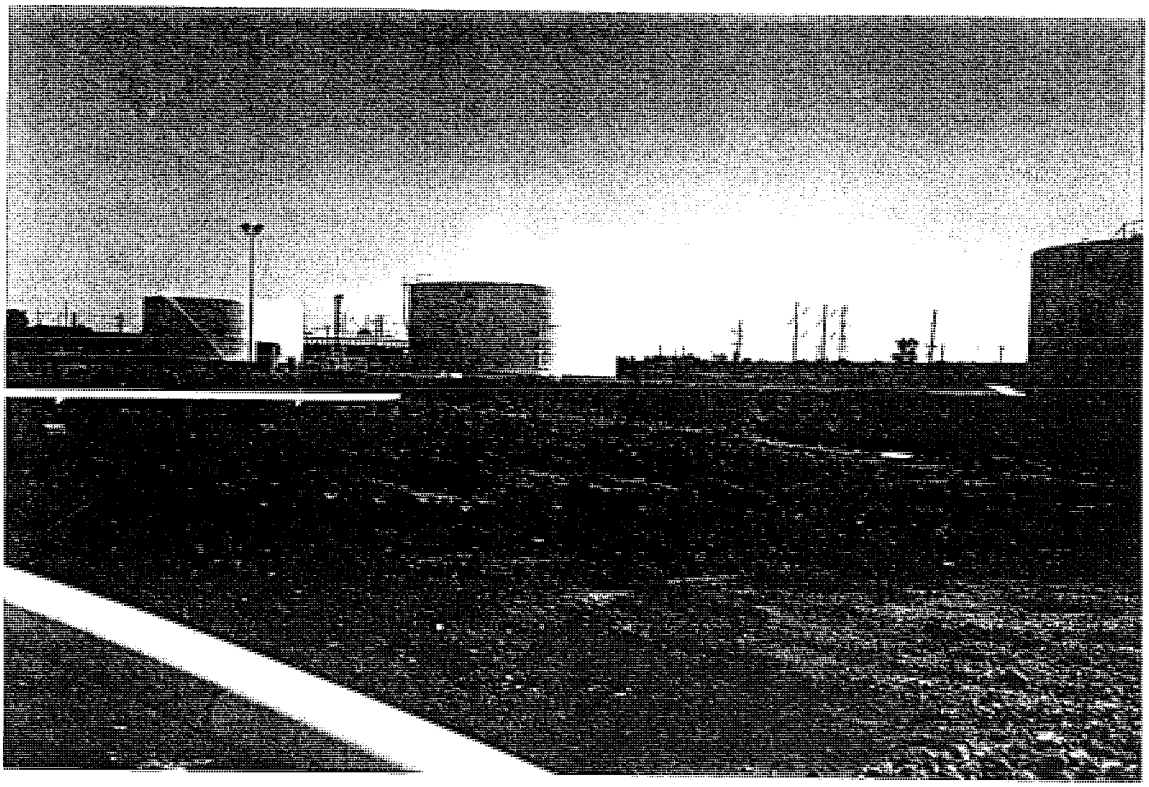
Photograph No. 11 Location: Eastern portion of the facility
Orientation: Northwest Date: July 10, 1991
Description: Overview of refinery foundation.



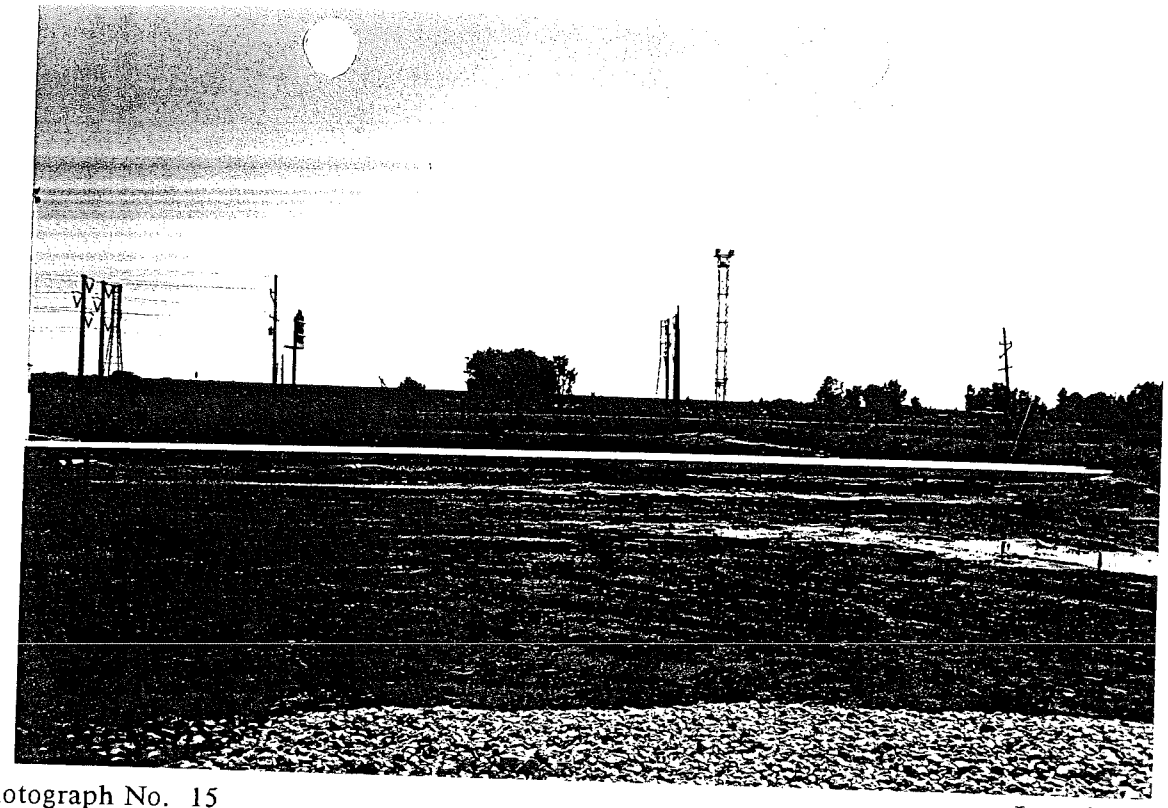
Photograph No. 12 Location: Eastern portion of the facility
Orientation: Northwest Date: July 10, 1991
Description: Overview of tank storage area and former refinery foundation in foreground.



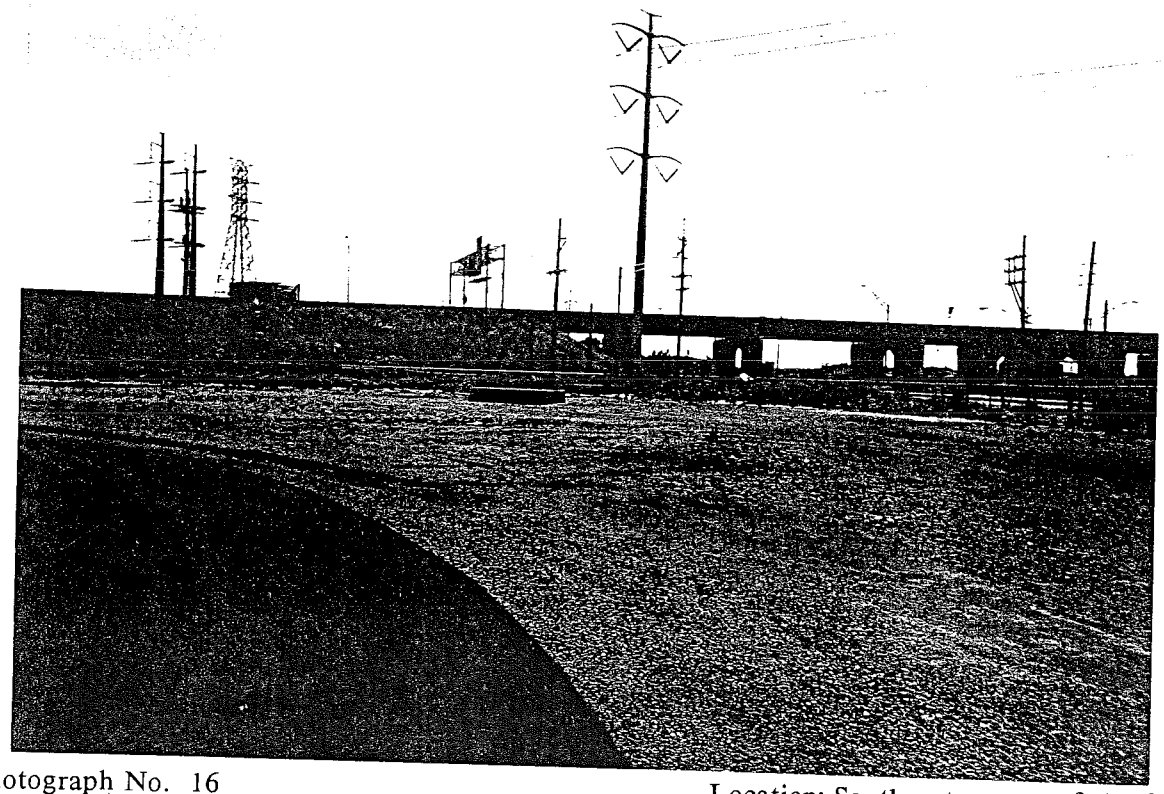
Photograph No. 13 Location: AOC 1
Orientation: East Date: July 10, 1991
Description: One of the former oil-saturated soil areas, between tanks No. 22 and No. 20.



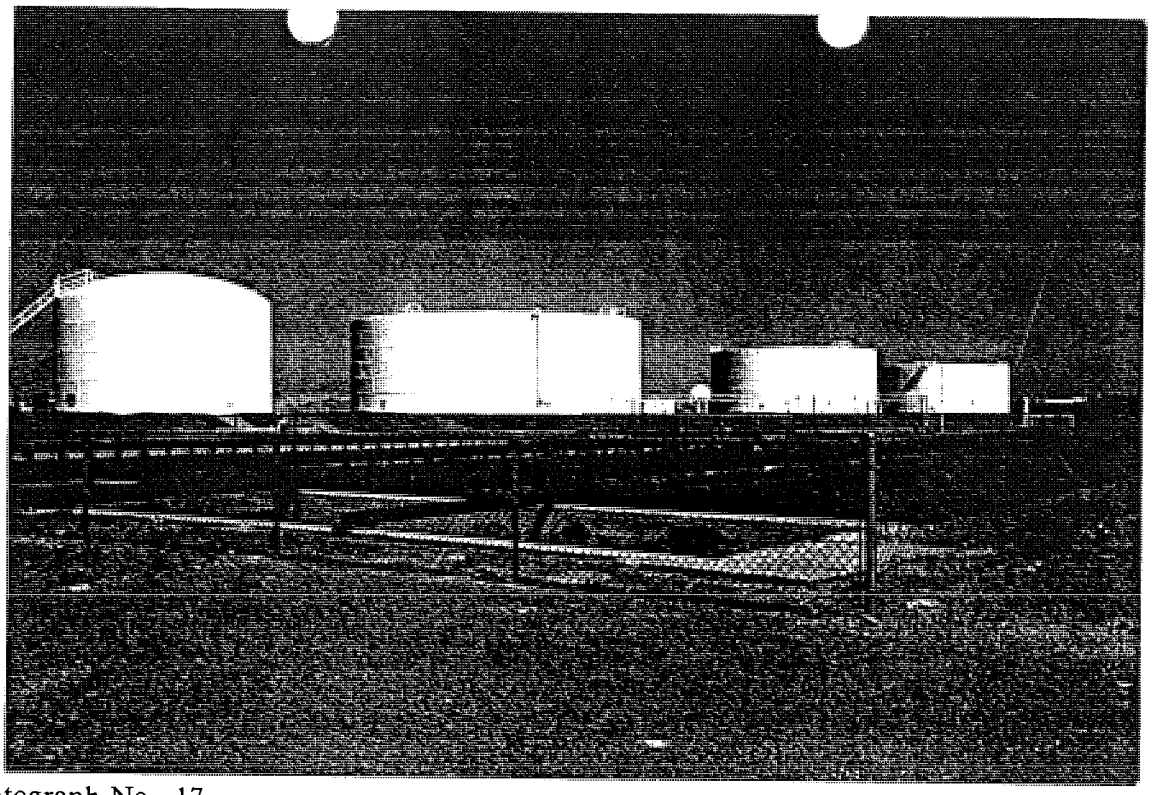
Photograph No. 14 Location: AOC 1
Orientation: East Date: July 10, 1991
Description: One of the former oil-saturated soil areas, east of tank No. 20.



Photograph No. 15
Orientation: East
Location: AOC 1
Date: July 10, 1991
Description: One of the former oil-saturated soil areas, southeast of tank No. 21.

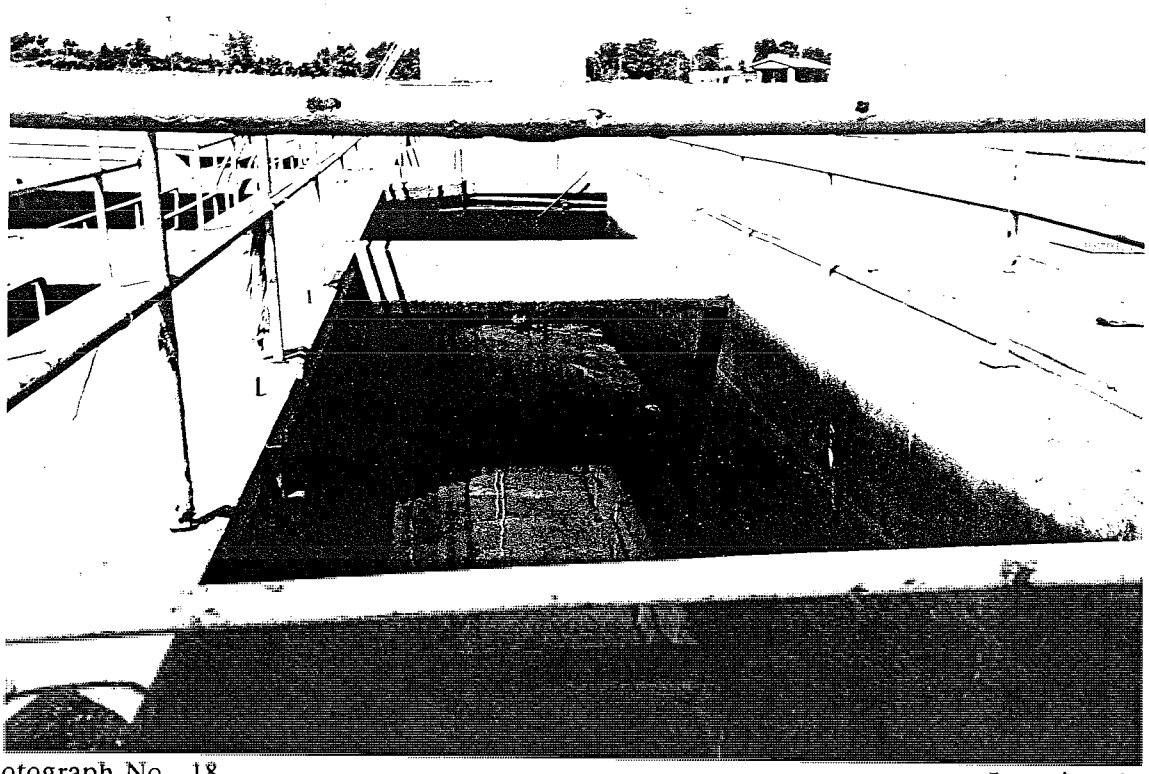


Photograph No. 16
Orientation: Southeast
Location: Southeast corner of the facility
Date: July 10, 1991
Description: Discharge outlet for oil-water separator.



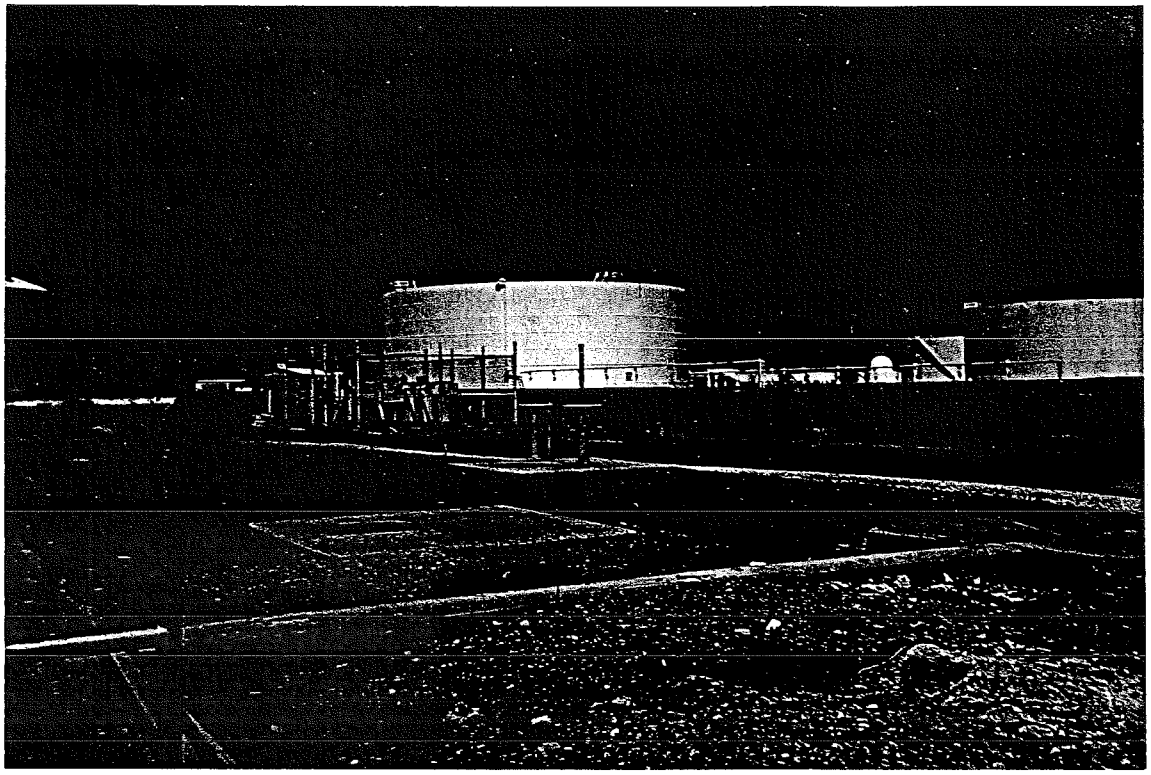
Photograph No. 17
Orientation: South
Description: Overview of final effluent bays of oil-water separator

Location: SWMU 1
Date: July 10, 1991



Photograph No. 18
Orientation: North
Description: Inlet bays of oil-water separator.

Location: SWMU 1
Date: July 10, 1991



Photograph No. 19
Orientation: North
Description: Inlet valves of oil-water separator.

Location: SWMU 1
Date: July 10, 1991

7/10/91 SUNNY, WARM ≈ 70°F, CLEAR
8:30 AM - 10:30 AM

CITGO
KEN ROBB, P.E.

- Disassembled refinery (1 tank)
in 1981 - became RCRA

1/22/82 Haas (Patrick)
inspected closed tank

1986 - Formal closure plan
submitted

1985: Cities sold to Nat'l Wrecking

Cities Service owned & operated
refinery from 1929 - 1972. (1976)
(~~refinery dismantled~~). Dec 31, 1972,
closed refinery. In 1974-76,
Dismantled refinery

1972-1983 : Cities Service

~ 1982 : Bought by Occidental Petrol.

OWNER: CITGO PETROLEUM CORPORATION
which is a subsidiary of Venezuella Gov't
for ~ 5-6 yrs (1985) (PDVSA)

DANA BURCH, ATTY TO CITGO, (Senior Counsel)
FROM TULSA, OK

March 18, 1983 - Citgo Petroleum Corp.
created by Cities Service Co.
- transferred refining, marketing,
& transp. aspect (d/s operations)
- CITGO was subsidiary of Cities
- Done because Occidental Petroleum
Corp (from L.A.) was going
to buy cities, & only wanted
Production aspect
- Occidental closed deal w/
Cities

Occidental
|
Cities
Citgo

(3)

Sept 1, 1983 : Cities sold CITGO
to The Southland Corp.

~~Sep~~ 1982 : Southland sold
1/2 of CITGO operations
to PDVSA

1990 : Other 1/2 sold to PDVSA
Now is wholly owned by
PDVSA (Petroleos de Venezuela, S.A.)
- CITGO operates as a sep
entity w/in PDVSA.

FACILITY MAP : Shows former refinery
area / tank that was disassembled
(we drew in)

11 EMPLOYEES
300 ACRES

FACILITY OPERATION:

- 7 PIPELINES (from Gulf coast) FURNISH: IN, MI, WI, IL
- ROUTED INTO DIFF. TANKS (55) DEPENDING ON PRODUCT
  (55 storage tanks)

- TANKS ARE STEEL, most w/fiberglass bottoms
  (we have diagram of tanks w/capacity in barrels, 1 barrel = 42 gals)
- II° containment is soil berms
- No open top tanks
- Tanks built from 1929 - 1954

- Operating as CITGO since March 18, 1983

- Became terminal facility 1976
  (1972 - 1976 - co. not active - dismantling, nothing else)

WASTES GENERATED

- No process waste

- Every few years (≈ 5 yrs), operate as RCRA generator of HW (high F.P. from gas) (D001). When clean bottoms of tanks

- Currently use Pollution Control Industries of East Chicago to clean distillate tanks. CITGO drains product out, then a crew scrubs the inside of the tank & then vaccumed out by PCIA

- PCIA takes distillate waste to a (cement) kiln - use as low-grade fuel
  If it's gasoline waste - is drummed & taken by someone else

- PCIA also takes gas tank waste
- PCIA vacuums out & transports to various disposal facilities in other states

- Some water accumulates in tank bottoms, CITGO drains & Clean Harbor takes & then to WRDGC
~~CITGO~~ Clean Harbor meets WRDGC stds.

CLEAN HARBOR; 312/646-6202, Jim Banach, Sales Mgr.

1991 MANIFESTS - Clean Harbor sends results to CITGO

~~3/27 LOW GRADE FUEL (DISTILLATES)~~

~~3/27/91 - 3000 gal low grade fuel~~
~~5/28 - 1300~~
~~4/3 - 3000~~
~~5/6/91 - 2500 + 25 drums fuel oil (gas bottoms) rust from~~
~~4/25 - 1550 Non haz - wash water - cleaning bottoms~~

~~1990 MANIFESTS~~

~~7/6 - 1500 gal low grade fuel~~
~~8/2 - 3000~~
~~8/31 - 2500~~
~~9/4 - 2500~~
~~7/3 - 3000~~
~~6/29 - 3000~~
~~4/18 - 1500~~

RCRA:

3 WASTE STREAMS:

(1) Low Grade fuel (Distillates)
(2) Gasoline Products
(3) Waste W from tank bottoms

MANIFESTS - 6

Complete

1991	LOW GRADE FUEL
3/27	3000 gals
5/28	1300
4/3	3000
5/6	2500

1991	OTHER WASTE
5/6	25 drums - rust/gas bottoms
4/25	1550 gals - wash water
5/13	300 - fuel

1990	LOW GRADE FUEL		
7/6	1500 gals	7/3	3000
8/2	3000	6/29	3000
8/31	2500	4/18	1500
9/4	2500		

1990: 120 000 gal of H_2O disposed through Clean Harbor

OIL/WATER SEPERATOR (API seperator)

- Pumps stormwater out
- NPDES permit - but only handles SW b/c no process now
- Inactive - no process water
- Got copy of permit: Discharge to Cal. River

- Some sludge from skimming tank near oil/water seperator. Any oil/fuel residues that collect in seperator after a heavy rain are put in skimming tank. This tank is cleaned when others are cleaned

(3)

SWMU'S

- only 1: oil/water seperator

PAST SWMU'S (POSSIBLE SWMU'S) & AOC'S:

PAST AOC

1981: 8,140 barrels of oil - saturated dirt
- CITGO dug out & hauled off (until visibly gone)
- no sampling done
- The 8140 barrels were from several areas (see map) SOSS → oil sat'd soil

REG HISTORY

- RCRA
- CERCLA
- NPDES
- AIR PERMIT - 2 permits
  (1) City of East Chgo
  (2) State of IN. Air control Emissions for storage tanks
- Gas tanks: Internal floating roofs for control - Have I° &/or II° seals →

- New tanks have both I & II [illegible] seals

Distillate tanks : Cone roofs

- Ea/yr CITGO calculates loss to air as part of permit

- Truckloading rack : no gasolines
  - has permit w/ City of E. Chgo.

- City Permit : Permit for ea/tank (58)
- State : 1 permit - lists all tanks

TO VIEW:

(1) oil/H_2O seperator
(2) Old location of #195 tank & refinery
(3) Former contam. dirt spots
(4) Truck rack
(5) Discharge pipes - SW from seperator

IDEM INSPECTIONS :

- AIR & WATER INSPS.
- ≈ 1 X / YEAR (SPORADIC)

CITY INSPS :

1 or 2 X/YEAR

- Ali Kahn } Health Dept Bldg. on Indianapolis Blvd s/o Fire Dept (near Amoco)

HISTORY :

Surface Impoundment - API sludge
- sold off (across street) ≈ 1975

- Lake Materials owns property now (owned by Hoosier State Bank)
- Soil area

GROUNDS INSPECTION 10:30 AM – 11:10 AM

(1) TRUCK RACK

1985 - main use: Jet fuel for airlines

- Runoff to oil/H_2O sep. (underground pipe)
- 15 drums de-icer use w/ fuel

PHOTO (1) & (2)

(2) OILY/DIRT SITES

PHOTO (3) - BY TANK #54

(4) - BTWN #52 & 53

(3) OVERVIEW OF REFINERY AREA

- Torn down
- Foundation / rubble

(4) Former tank #195

(5) Former "

(6) old refinery fnds

(7) Tank storage

(8) Close up of tank #195

(NOTE: All grass dead in area since gas fuel vapor tunes)

(4) OLD TANK #195

PHOTO (9) Former tank site

9-12 (10) " " "

~~9-13~~ (11) old refinery fnds (

~~(12) tank storage~~ (some domed = for frame of rigors cold)

~~(13) Close up of tank 195~~

(5) OILY DIRT SITES

(SW puddles clear - no oil scum)

PHOTO (13) (Roll 2-1) Dirt spots

(14) by tank #20

(15) By tank #21

(- Dirt is very dark, asphalt-like to begin with)

(6) OIL/WATER SEPERATOR

PHOTO (16) DISCHARGE PIPES (concrete box)

(17) Final effluent

~~(18) Final effluent close up (open to river)~~

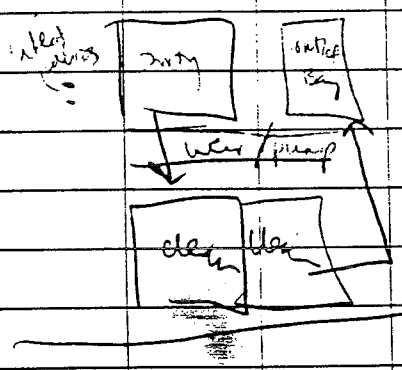
~~(19) Dirty effluent~~

(20) Inlet for oil/water

(21) Inlet valves

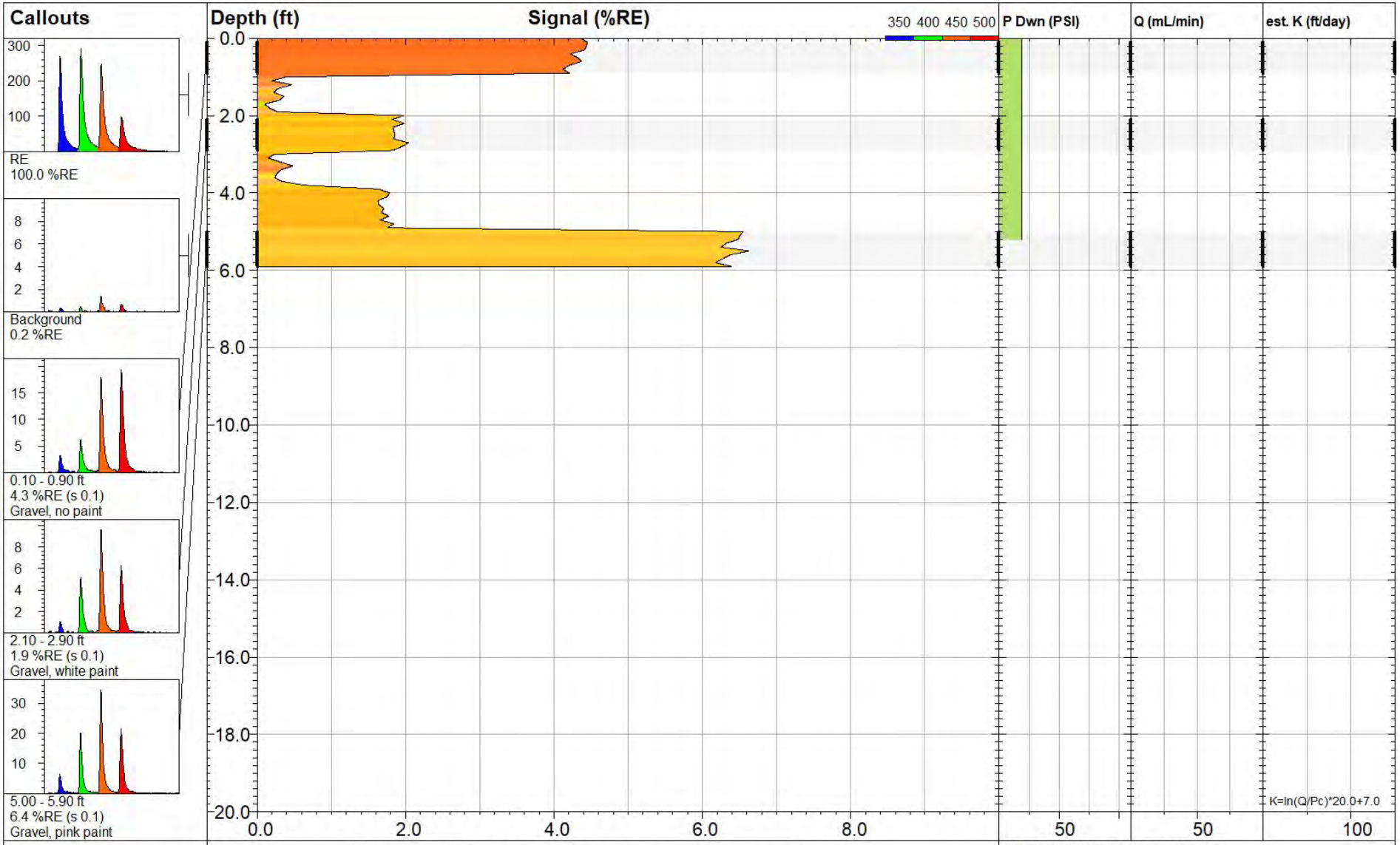
- Inlet valves allow oil/H_2O into sep
- Settles by gravity
- When full, skim "dirty side" then pump to "clean side" — 3 bays
- CITGO Takes samples of clean H_2O
- ~~Pump~~ Flows by gravity to 1st outlet

LAYOUT:



NOTE: CITGO wants copies of photos

Appendix C
Phase I LIF and MIP Logs



Limestone Gravel, Without and With Marking paint

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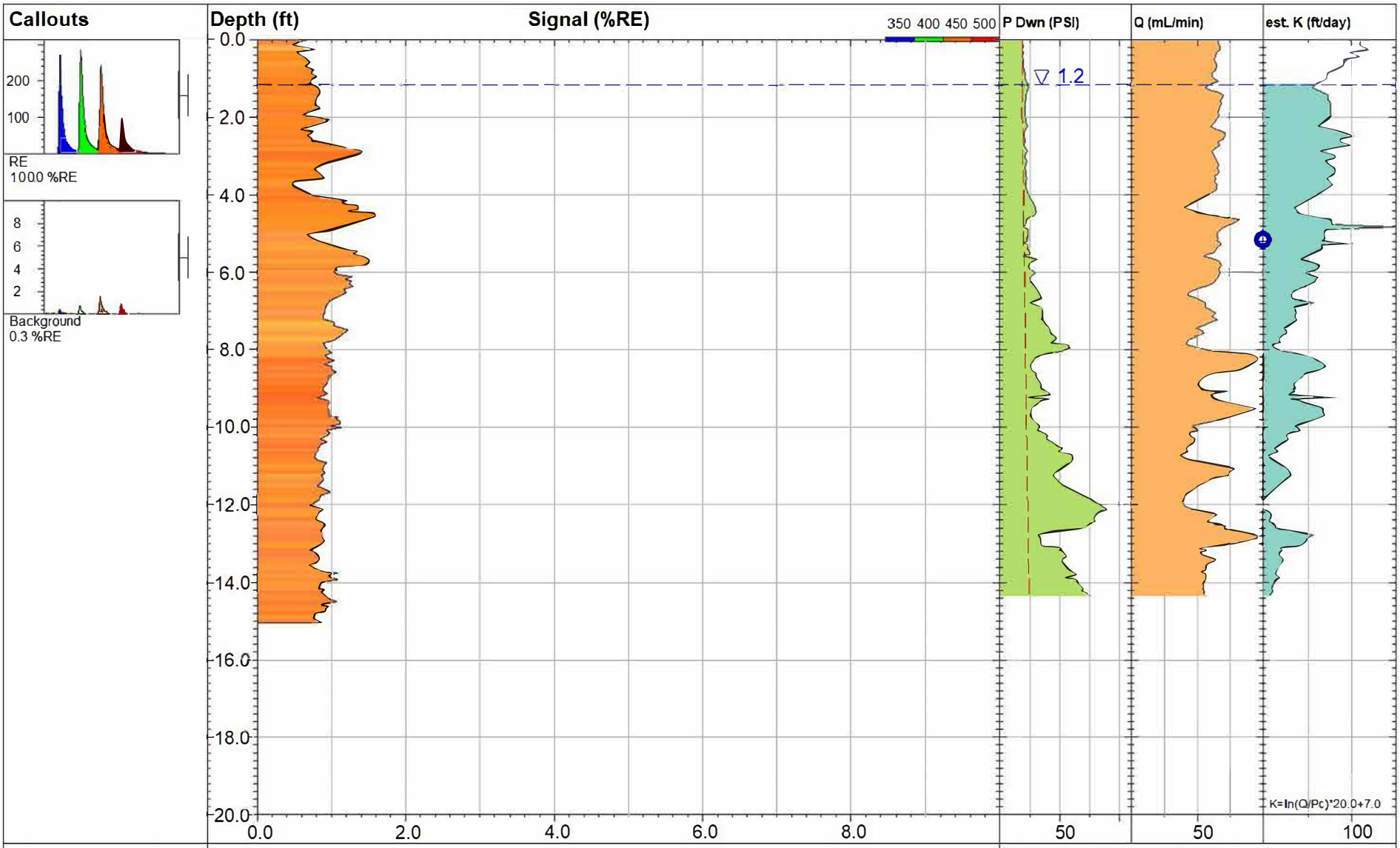
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **5.90 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **6.6 %RE @ 5.50 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-13 16:06 CDT**



LIF/MIP01-19

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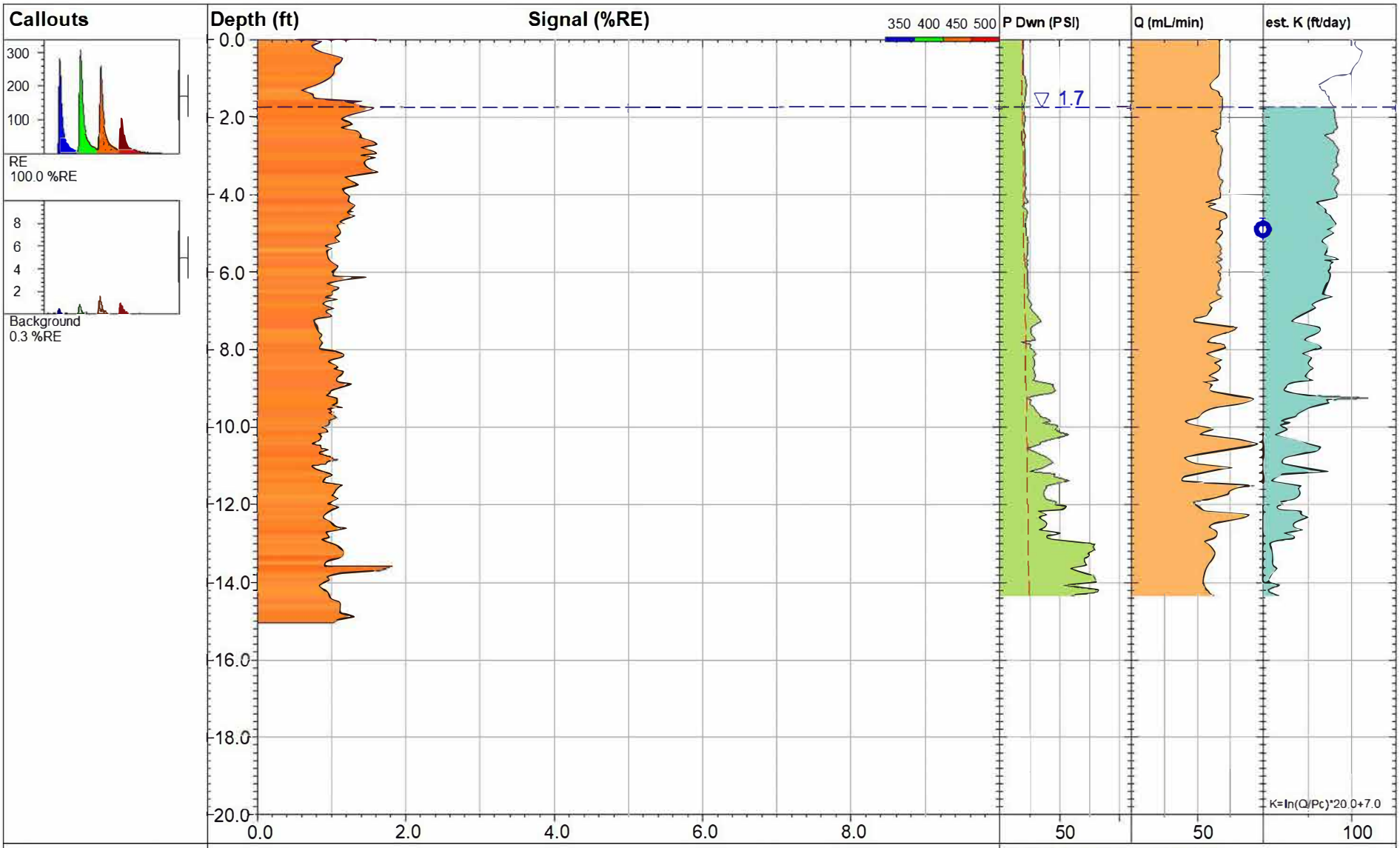
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.6 %RE @ 4.55 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 10:36 CDT**



LIF/MIP02-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 13.58 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 11:31 CDT**

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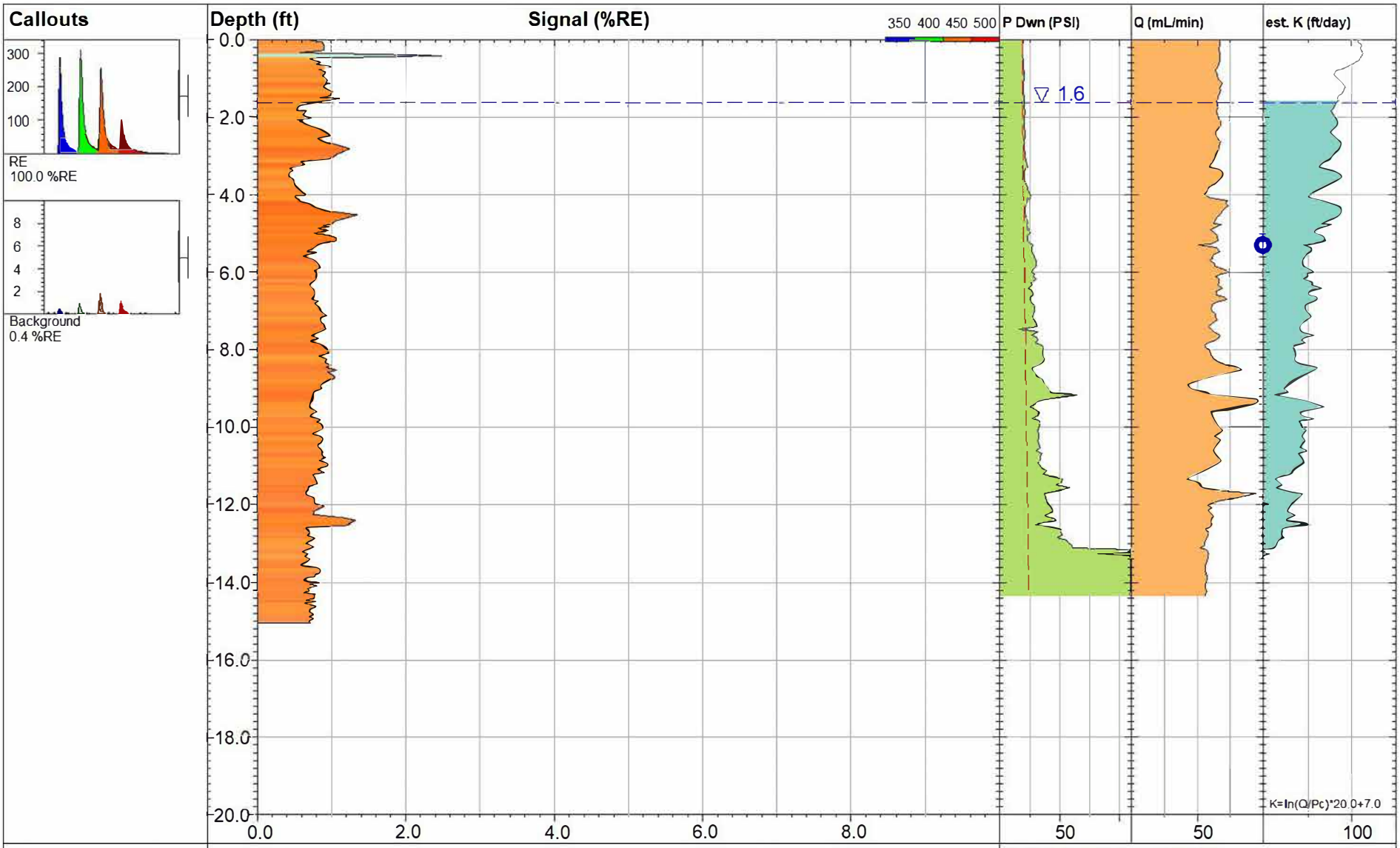

LIF/MIP03-19

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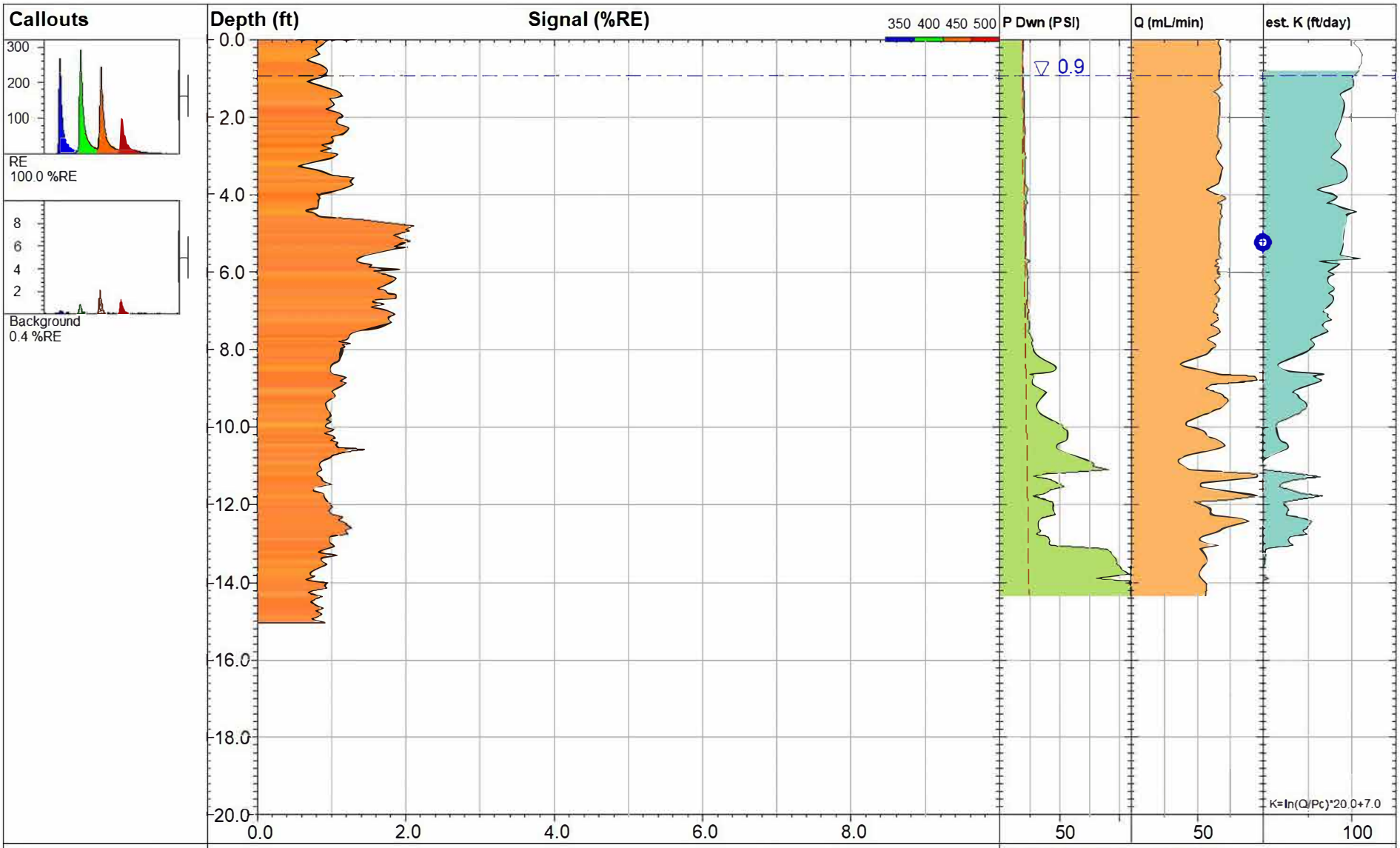
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.5 %RE @ 0.42 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 12:12 CDT**



LIF/MIP04-19

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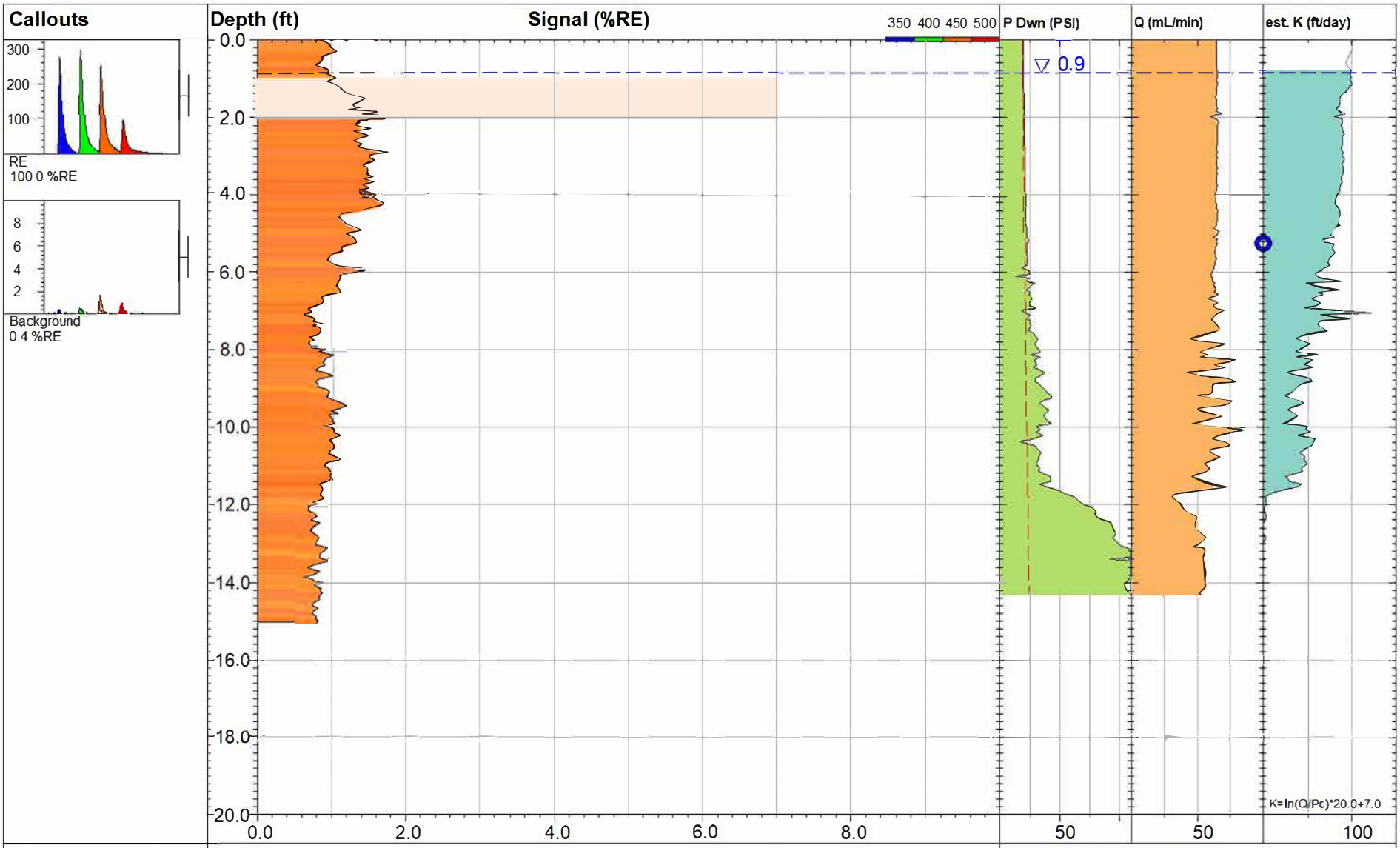
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.5 %RE @ 5.36 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 13:35 CDT**



LIF/MIP05-19

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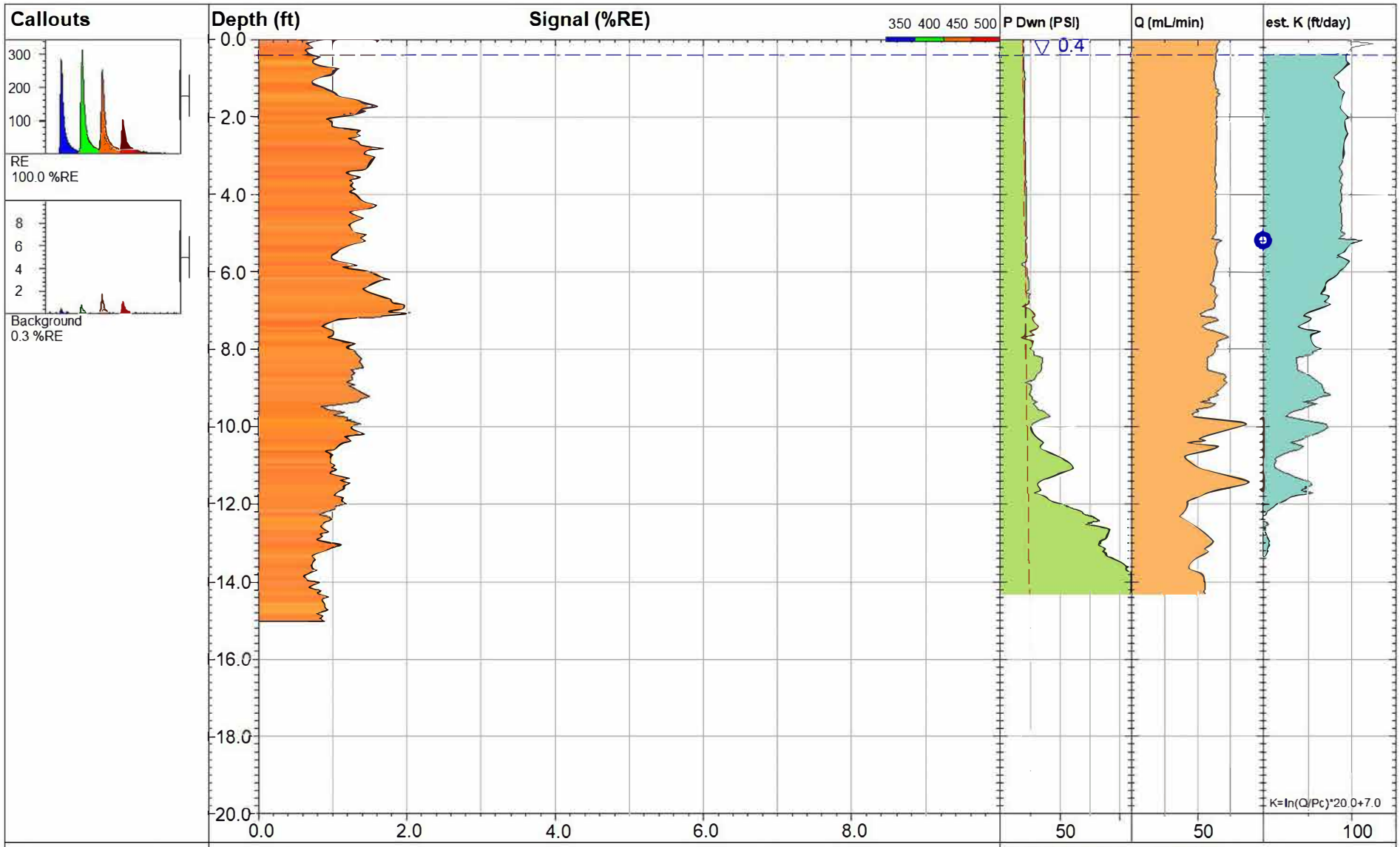
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.9 %RE @ 1.97 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 09:51 CDT**



LIF/MIP06-19

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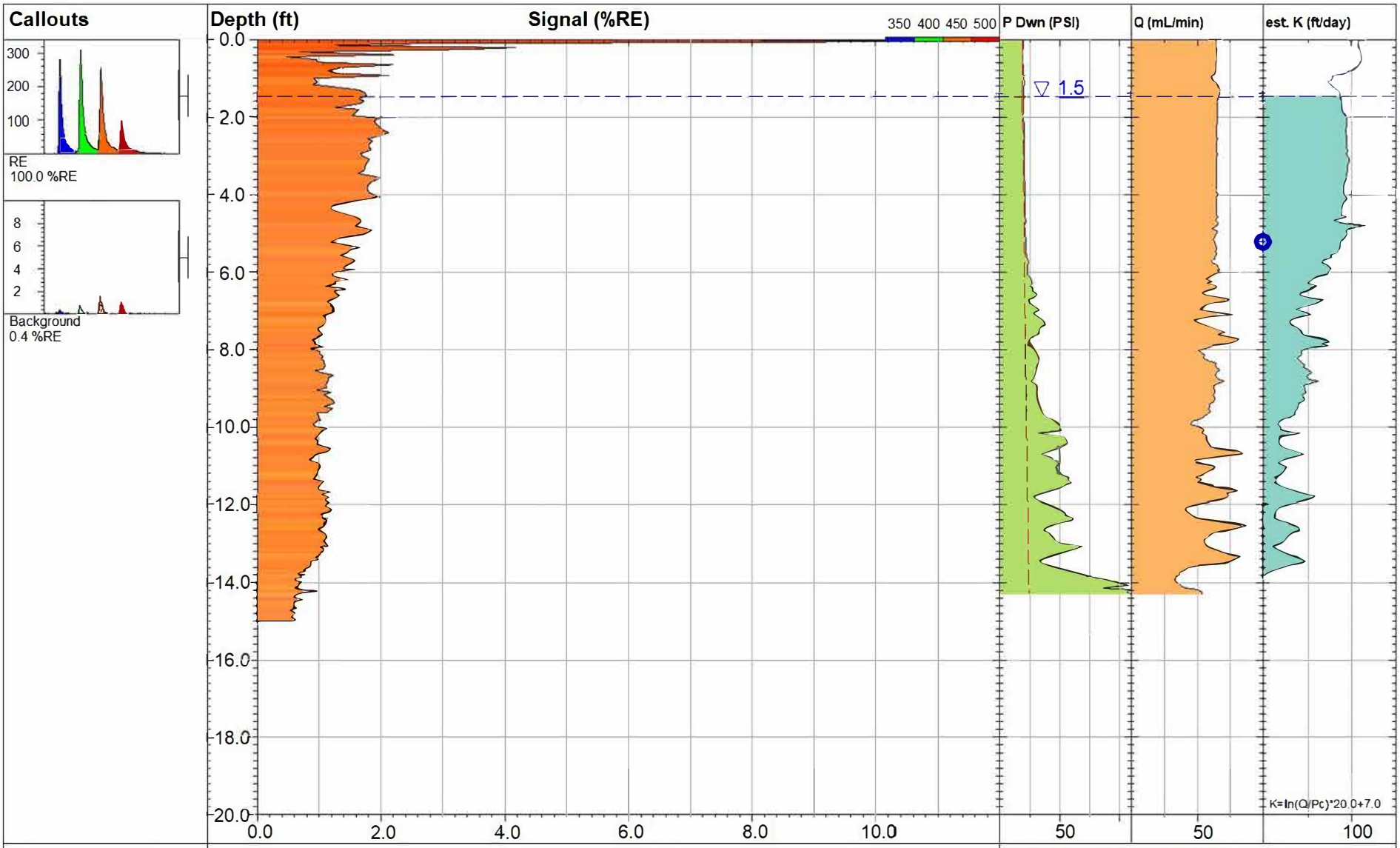
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 7.06 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 10:29 CDT**



LIF/MIP07-19

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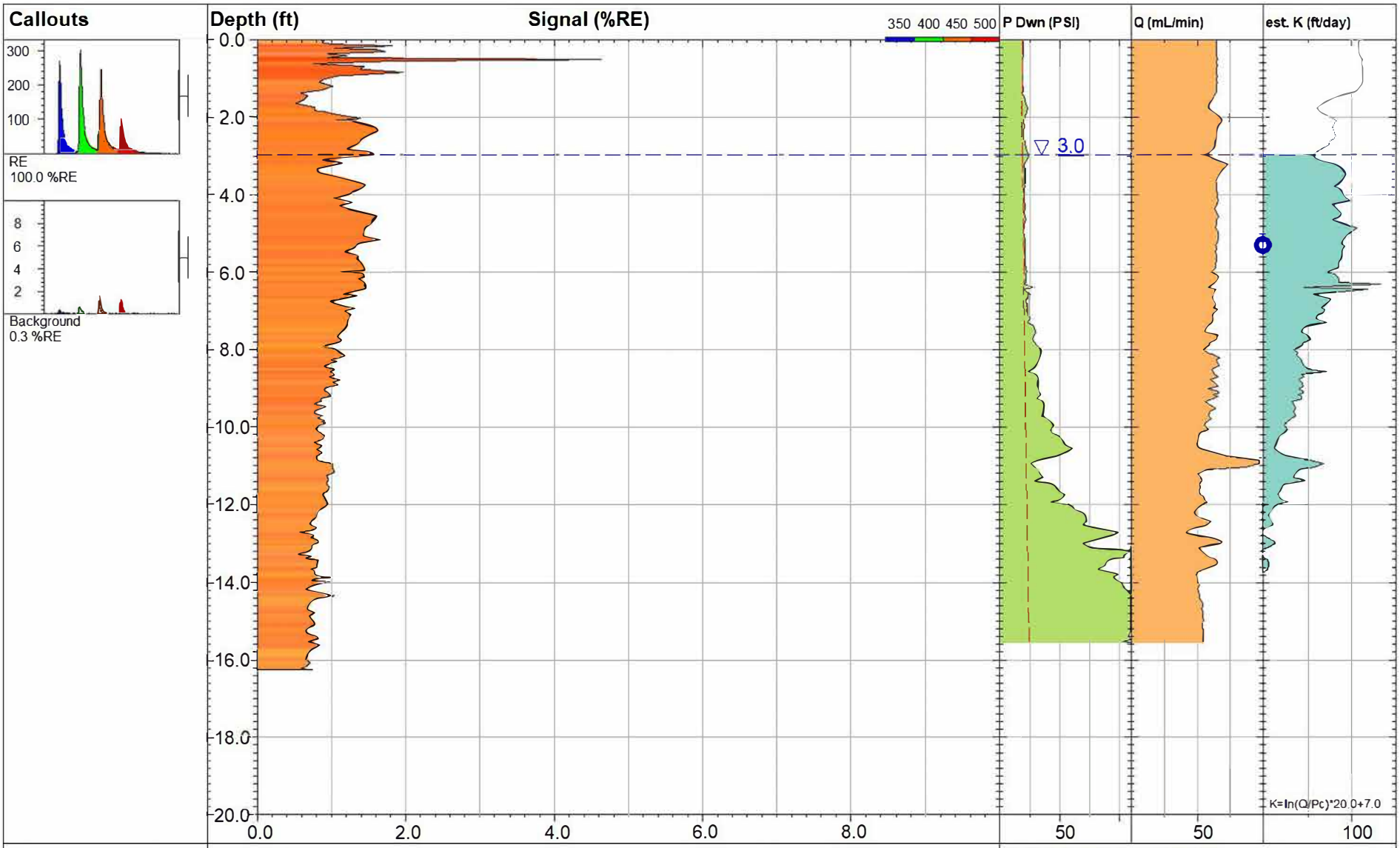
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **11.3 %RE @ 0.05 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 11:04 CDT**



LIF08-19

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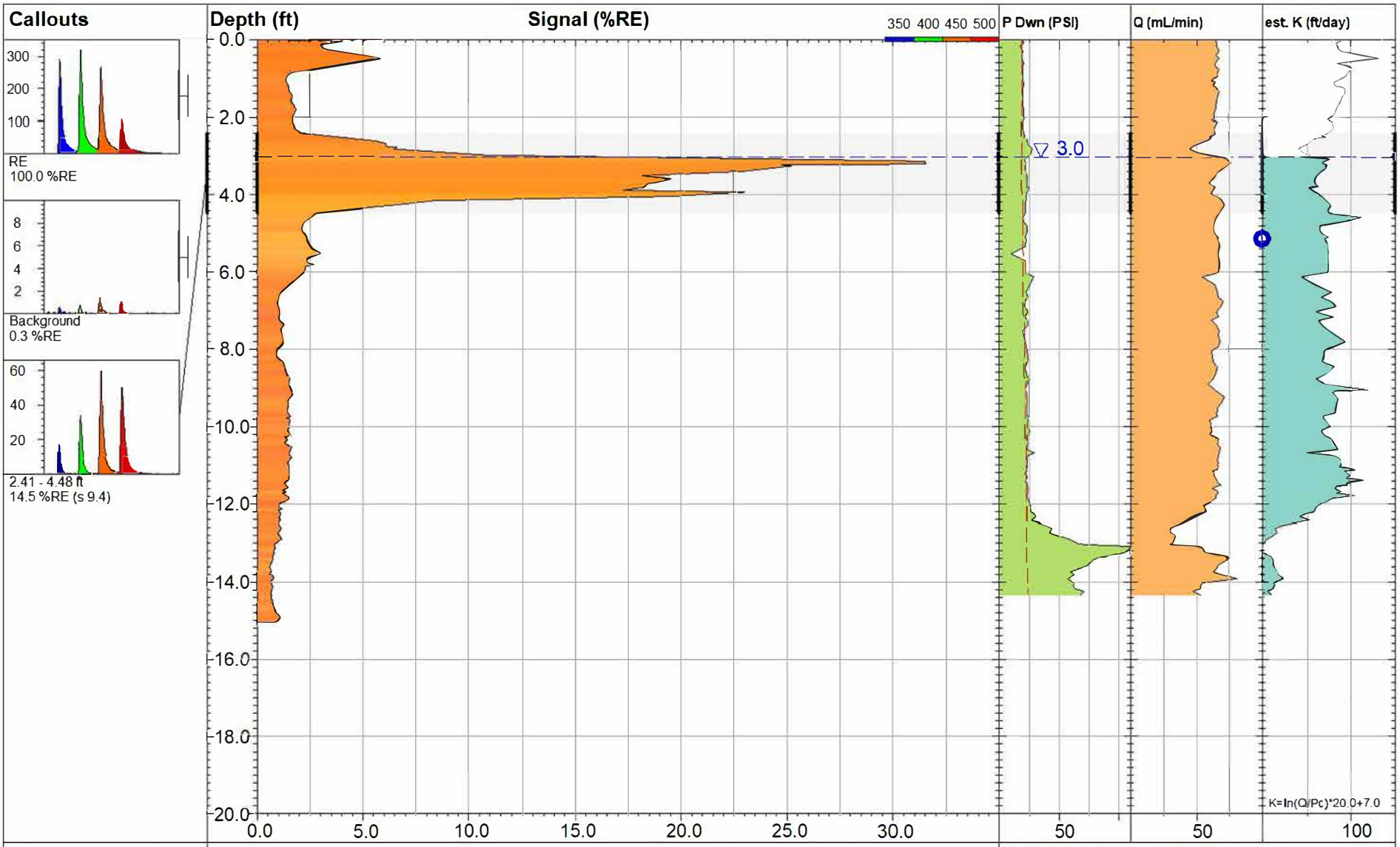
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **16.26 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **4.7 %RE @ 0.52 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 12:05 CDT**



LIF/MIP09-19

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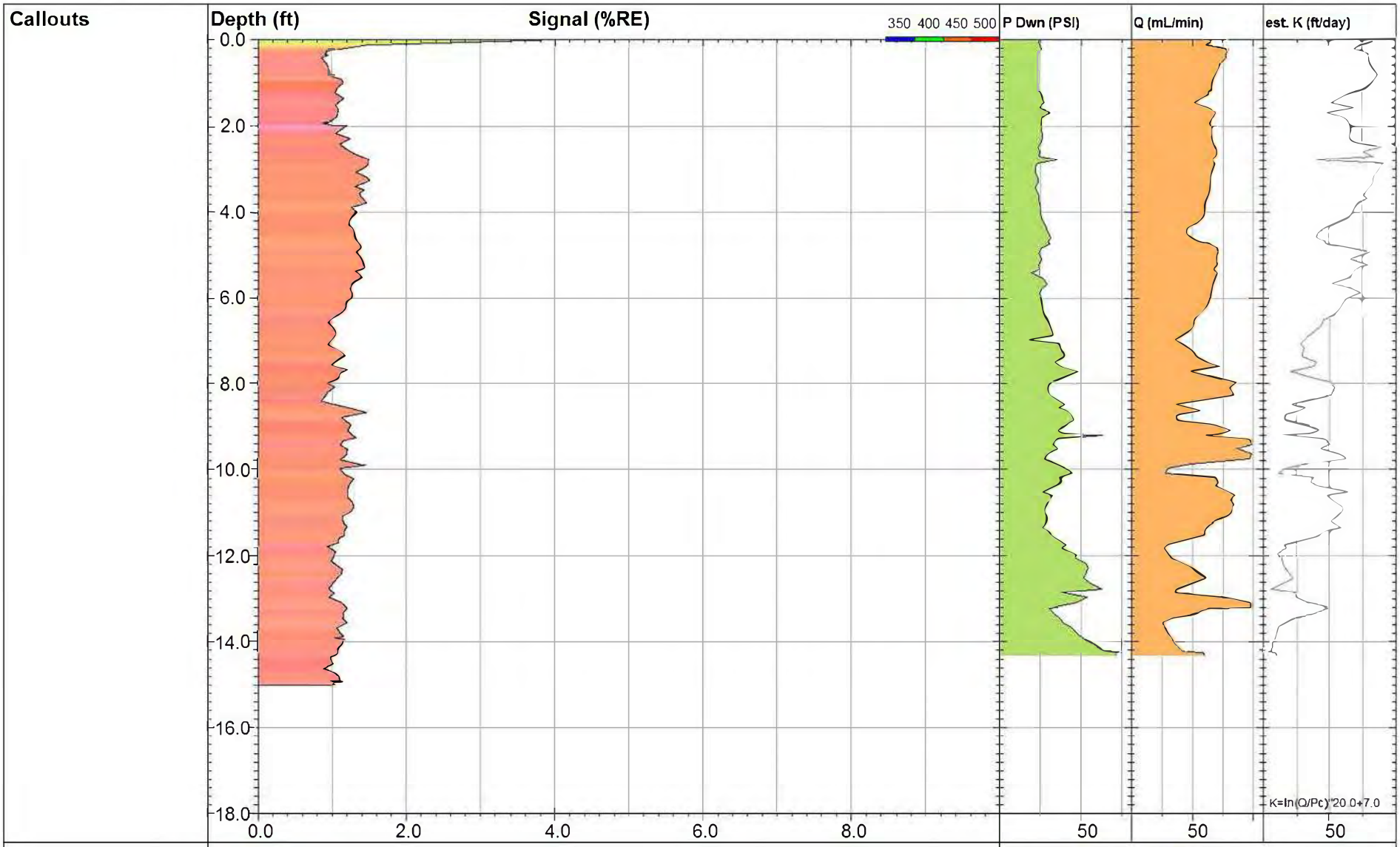
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **31.5 %RE @ 3.20 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-16 16:15 CDT**



LIF09A-19

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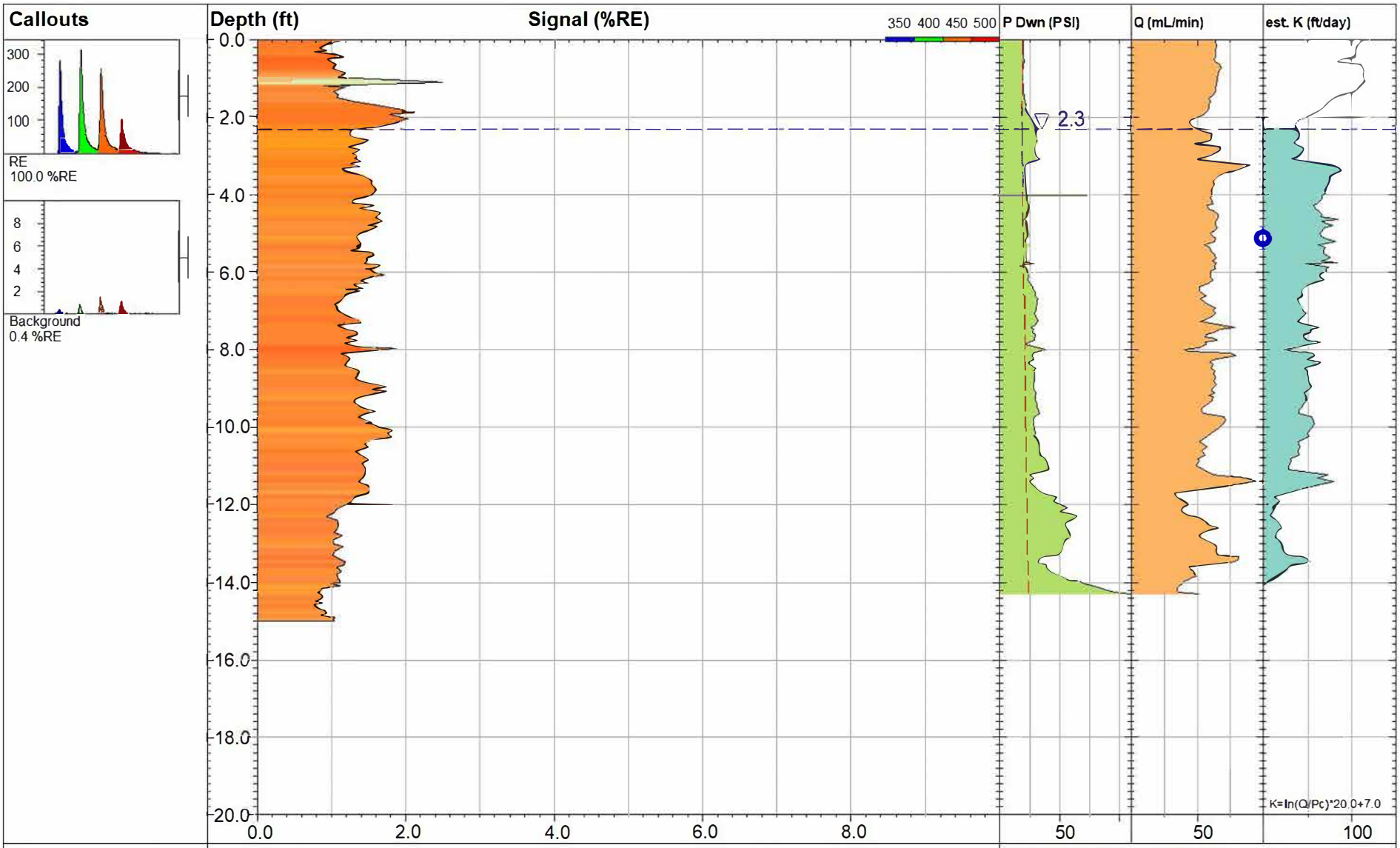
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **4.2 %RE @ 0.00 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-08 14:56 CDT**



LIF10-19

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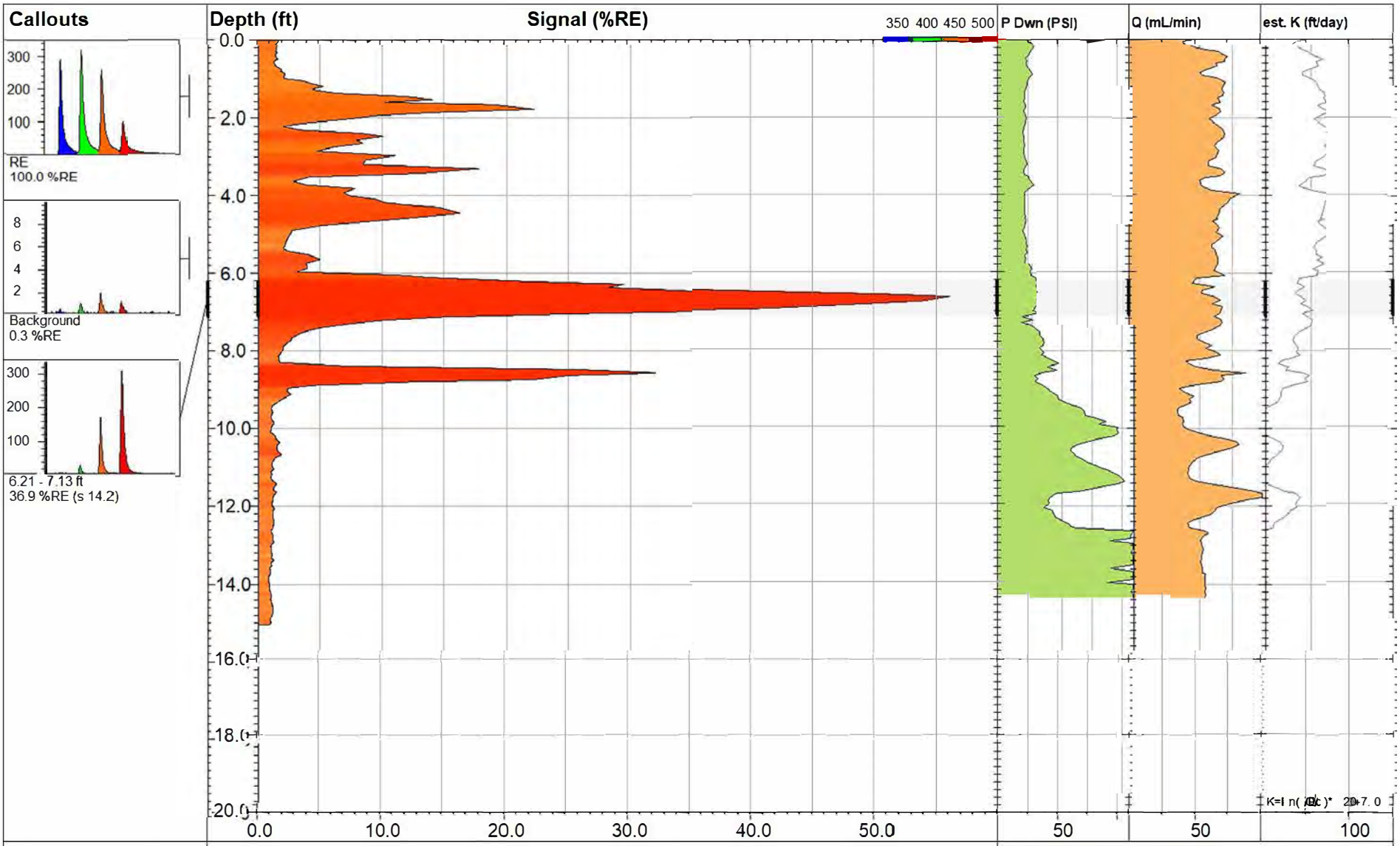
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.5 %RE @ 1.10 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 13:32 CDT**



LIF11-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **56.1 %RE @ 6.64 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 14:16 CDT**

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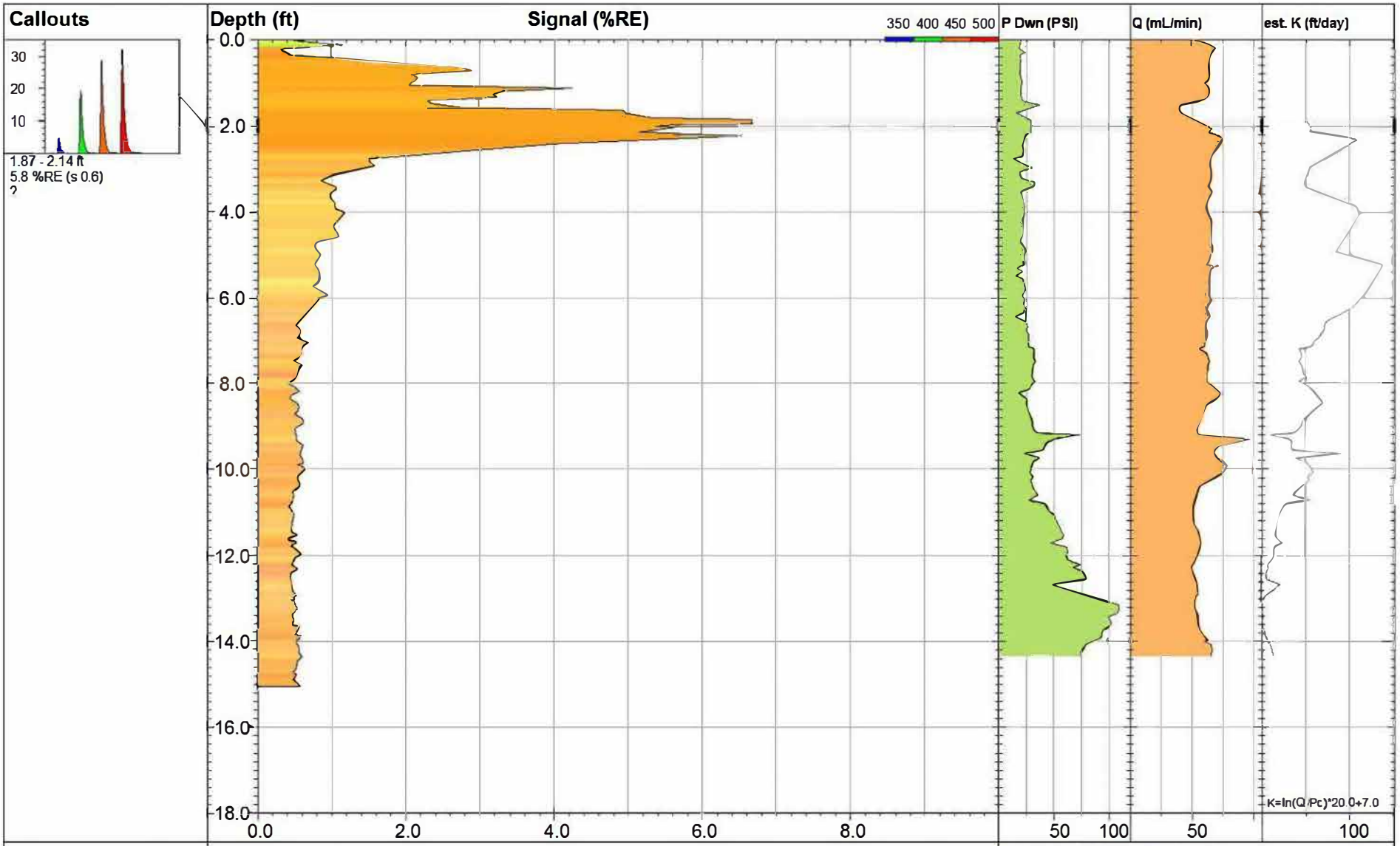

LIF11A-19

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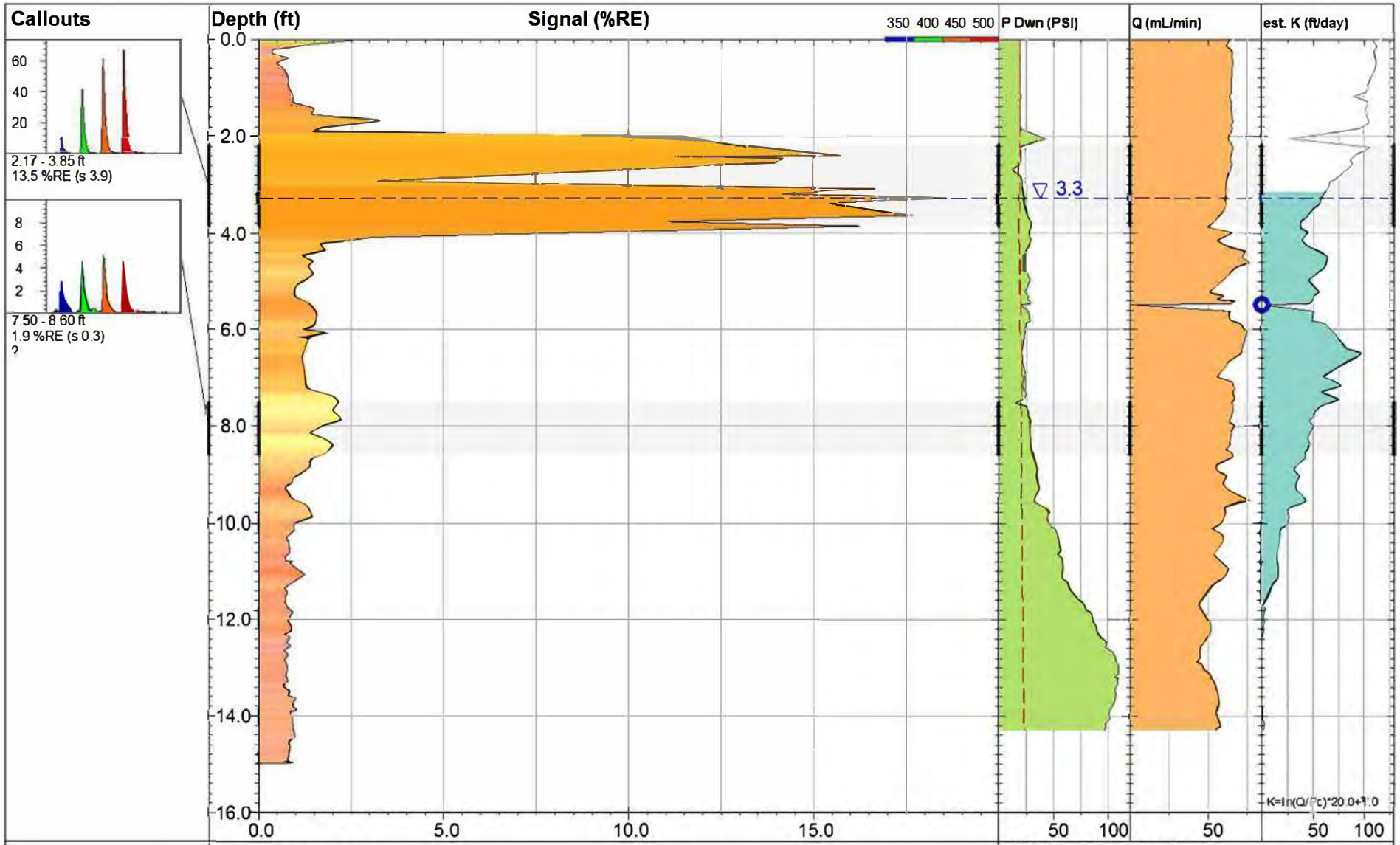
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **6.7 %RE @ 1.94 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-08 09:45 CDT**



LIF11B-19

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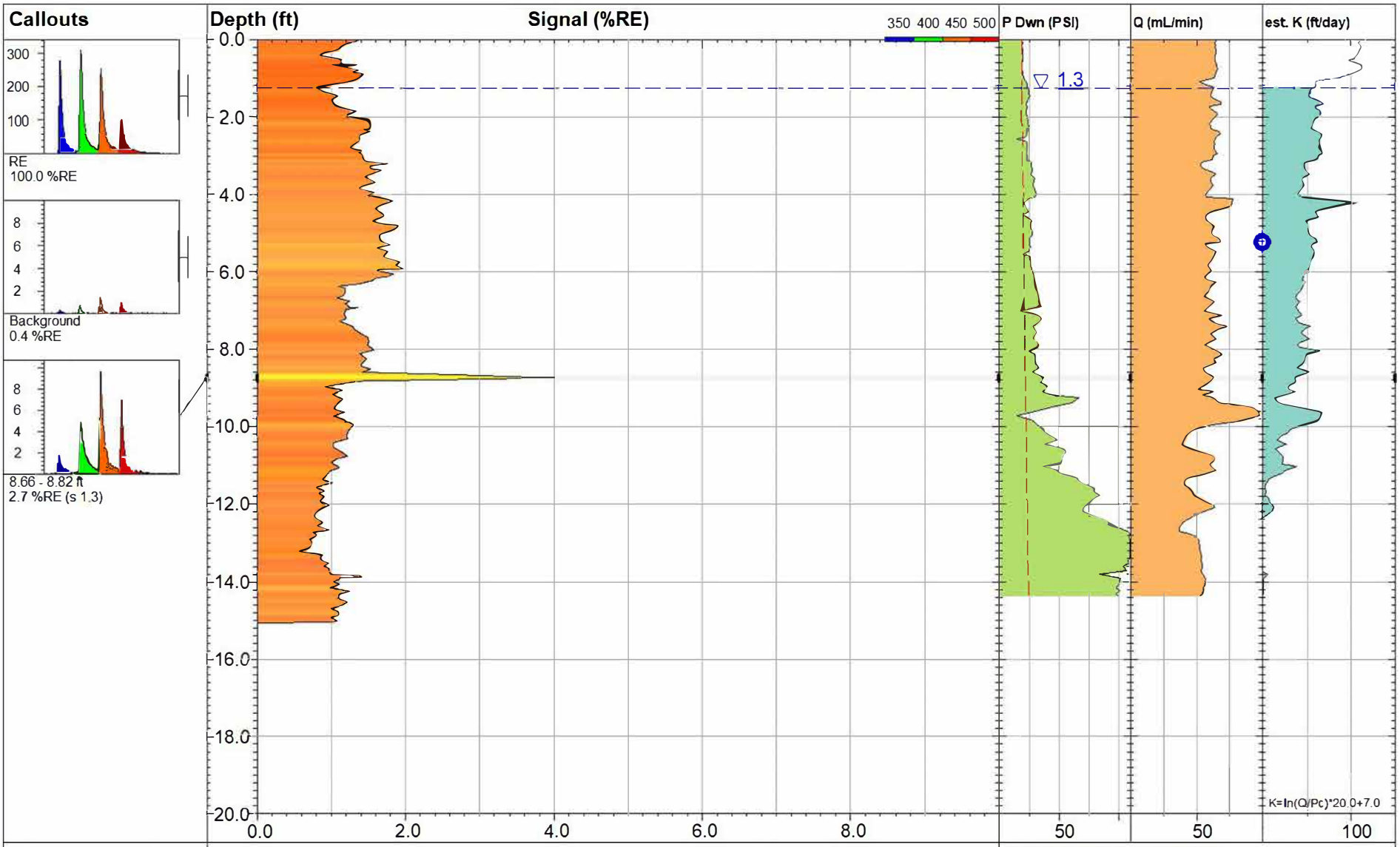
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **18.5 %RE @ 3.27 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-08 10:25 CDT**



LIF12-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.9 %RE @ 8.74 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 14:58 CDT**

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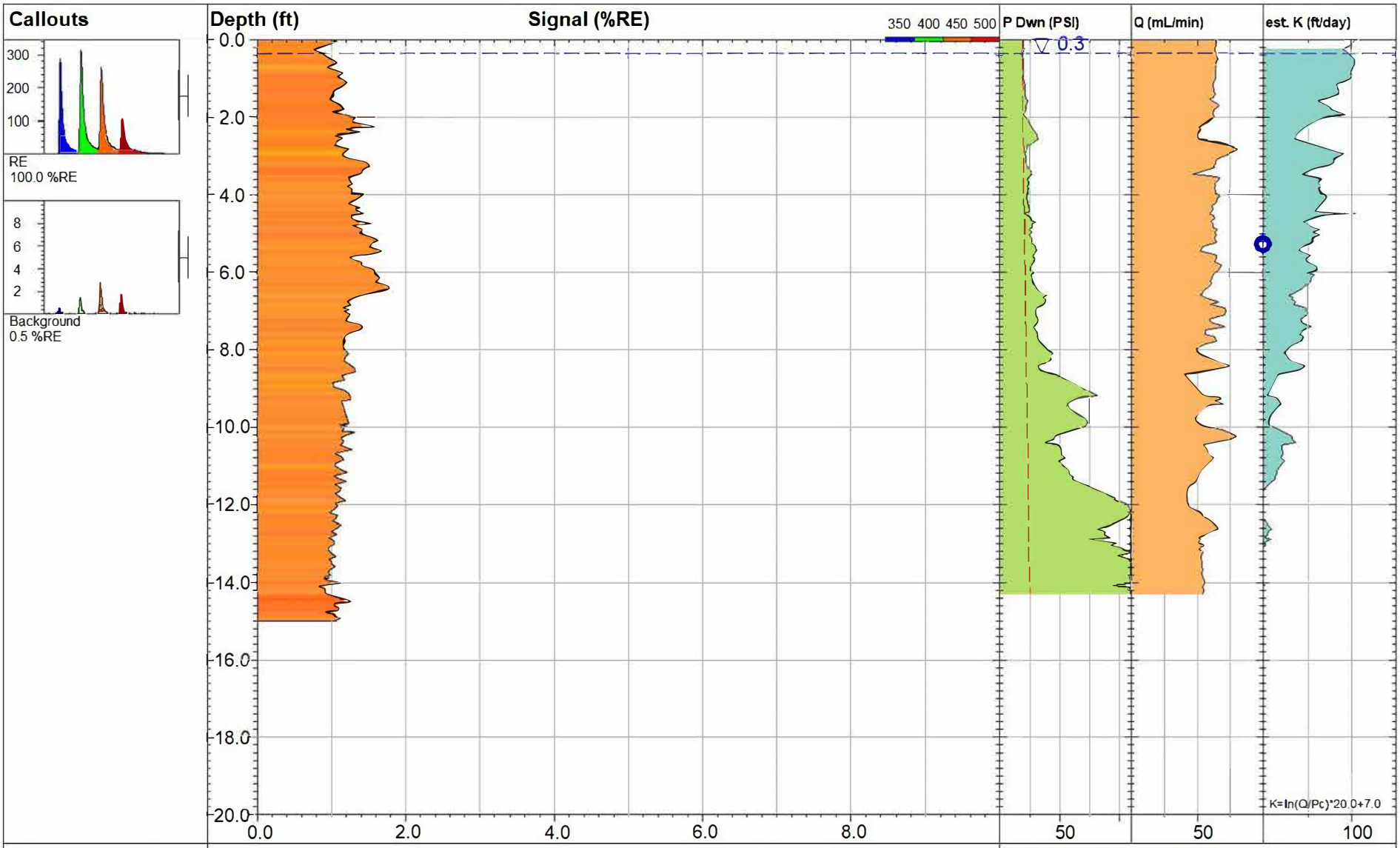

LIF13-19

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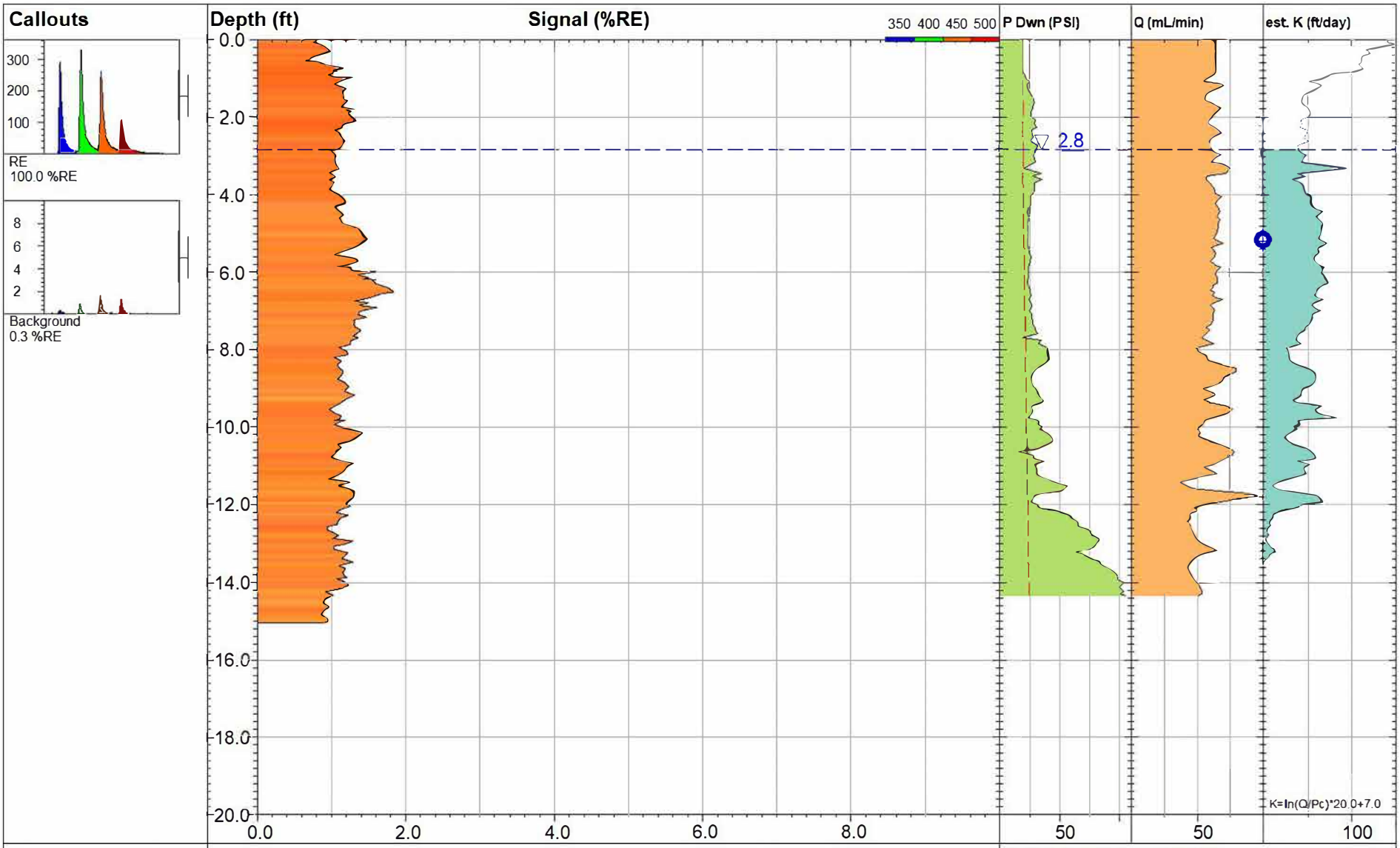
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 6.43 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-24 10:27 CDT**



LIF/MIP14-19

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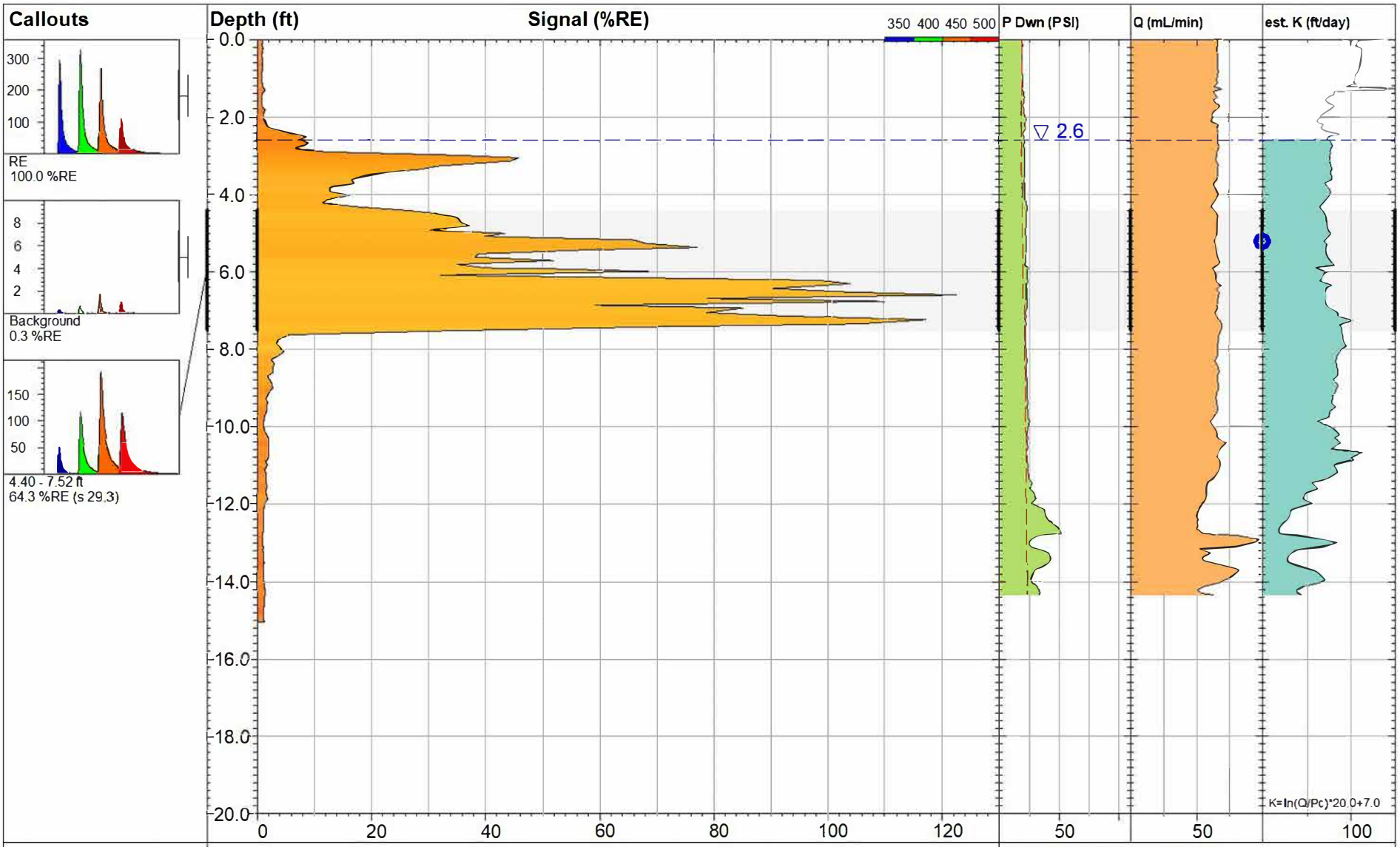
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 6.51 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-22 16:24 CDT**



LIF15-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **122.7 %RE @ 6.60 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-16 12:28 CDT**

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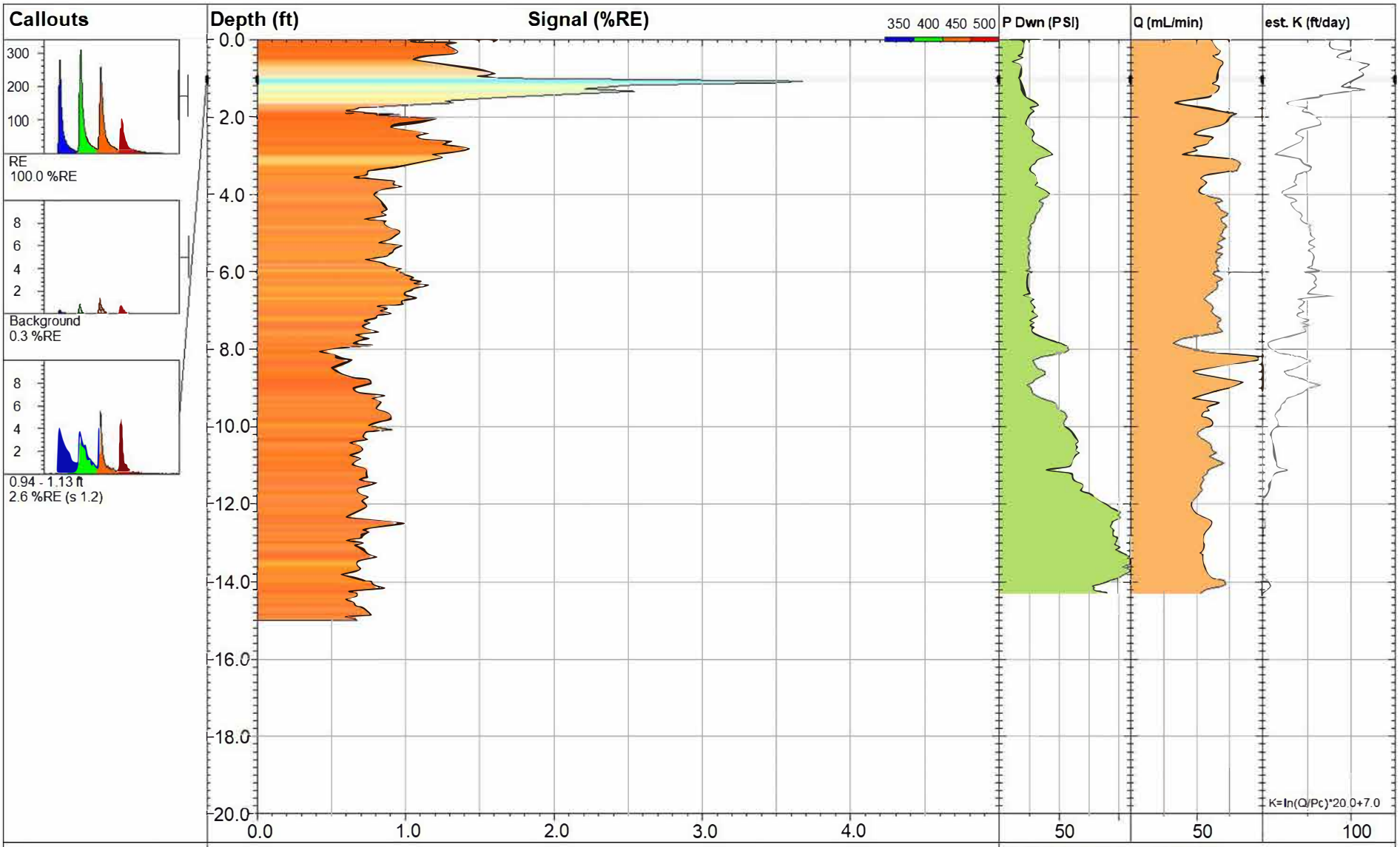

LIF/MIP16-19

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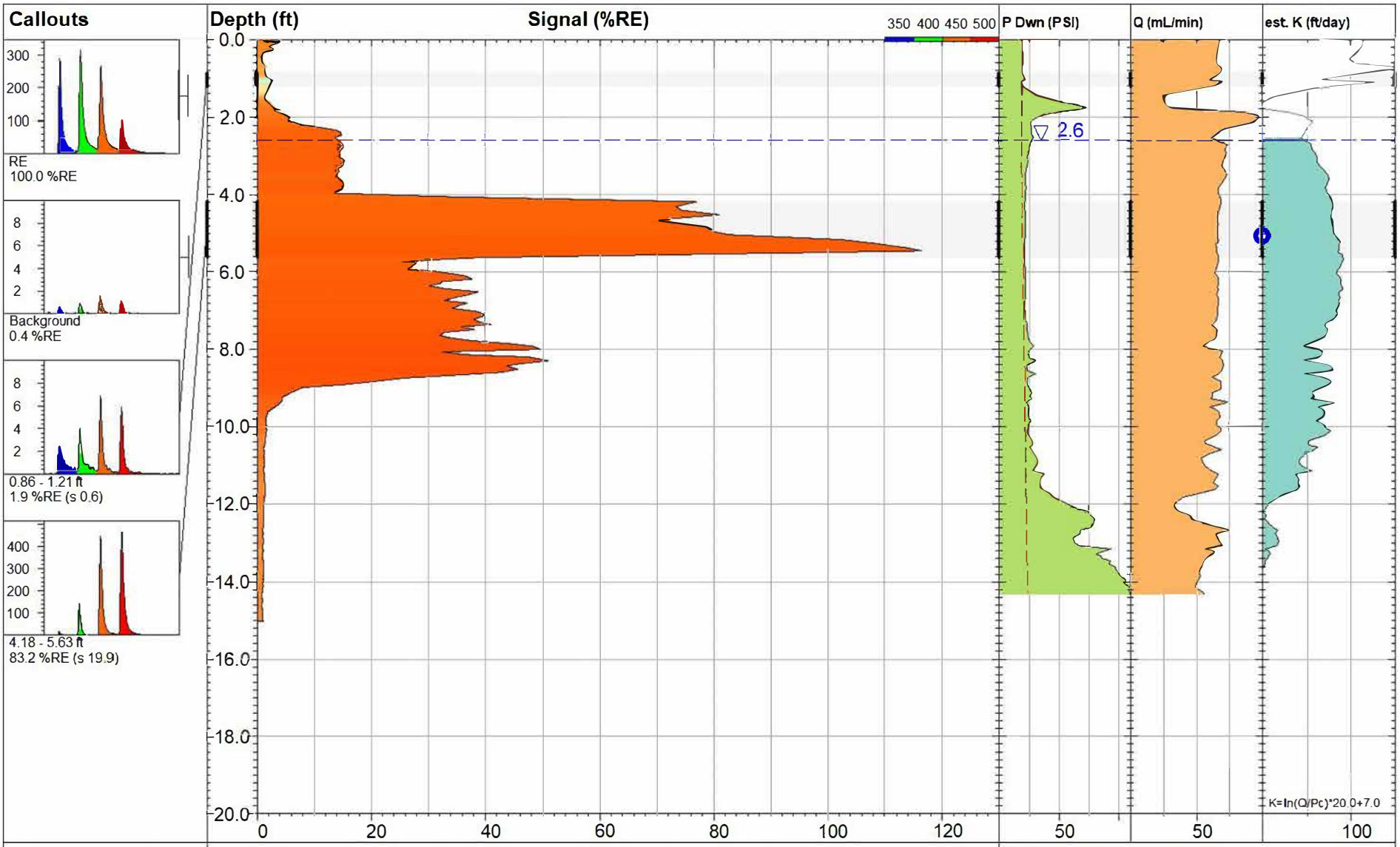
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.7 %RE @ 1.08 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-16 11:21 CDT**



LIF17-19

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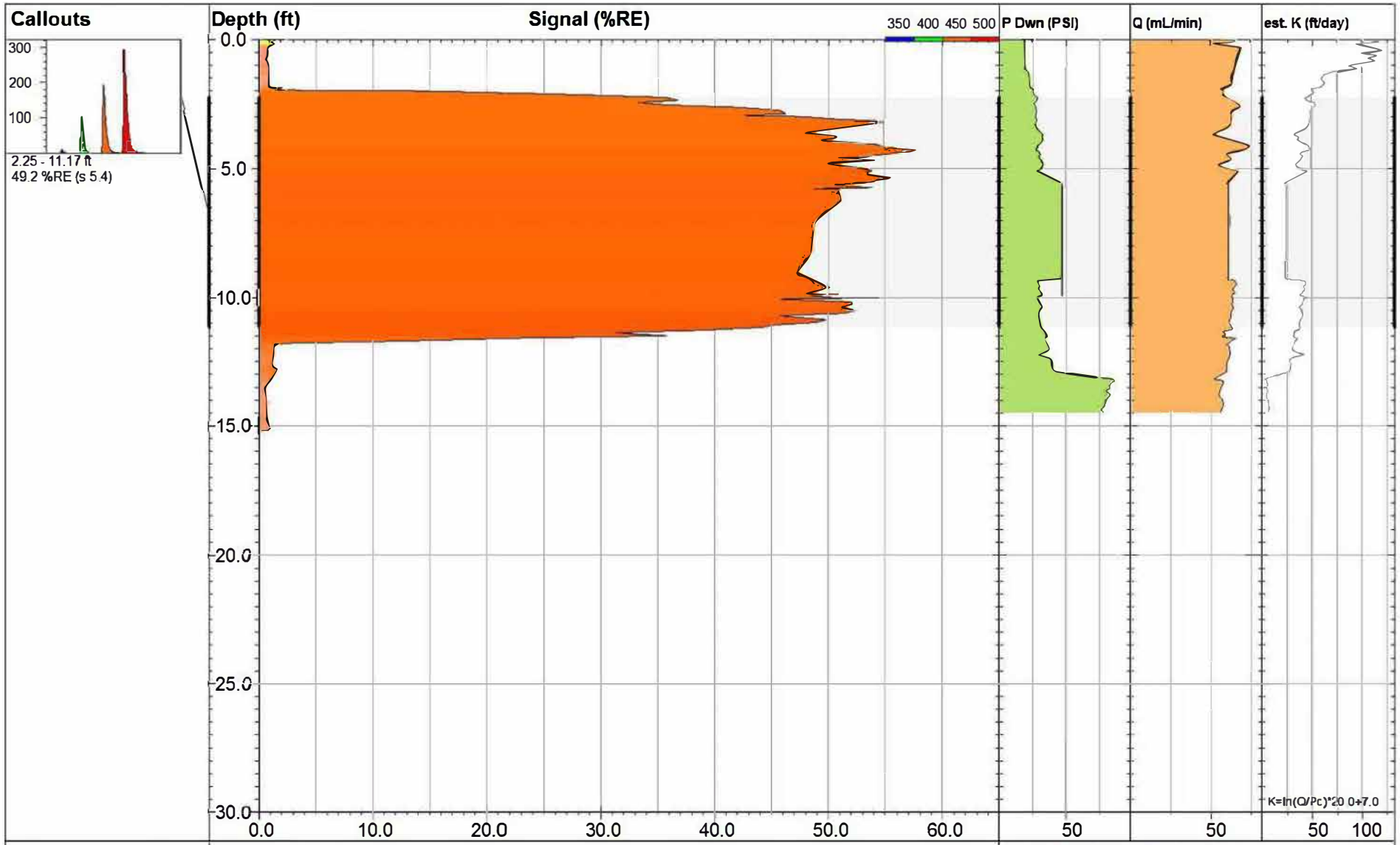
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **116.5 %RE @ 5.45 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-16 10:22 CDT**



LIF17A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.19 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **57.7 %RE @ 4.27 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 13:09 CDT**

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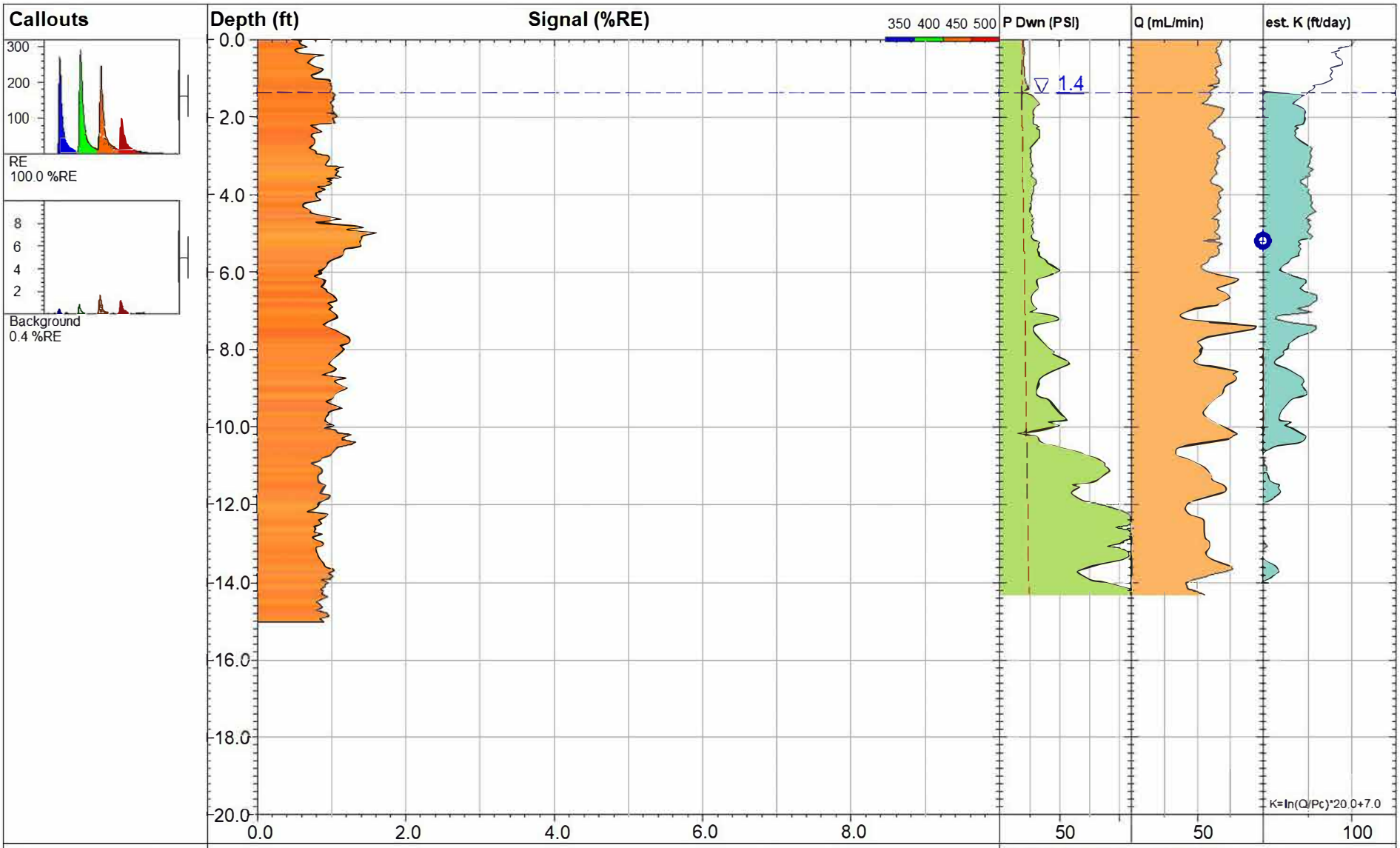

LIF18-19

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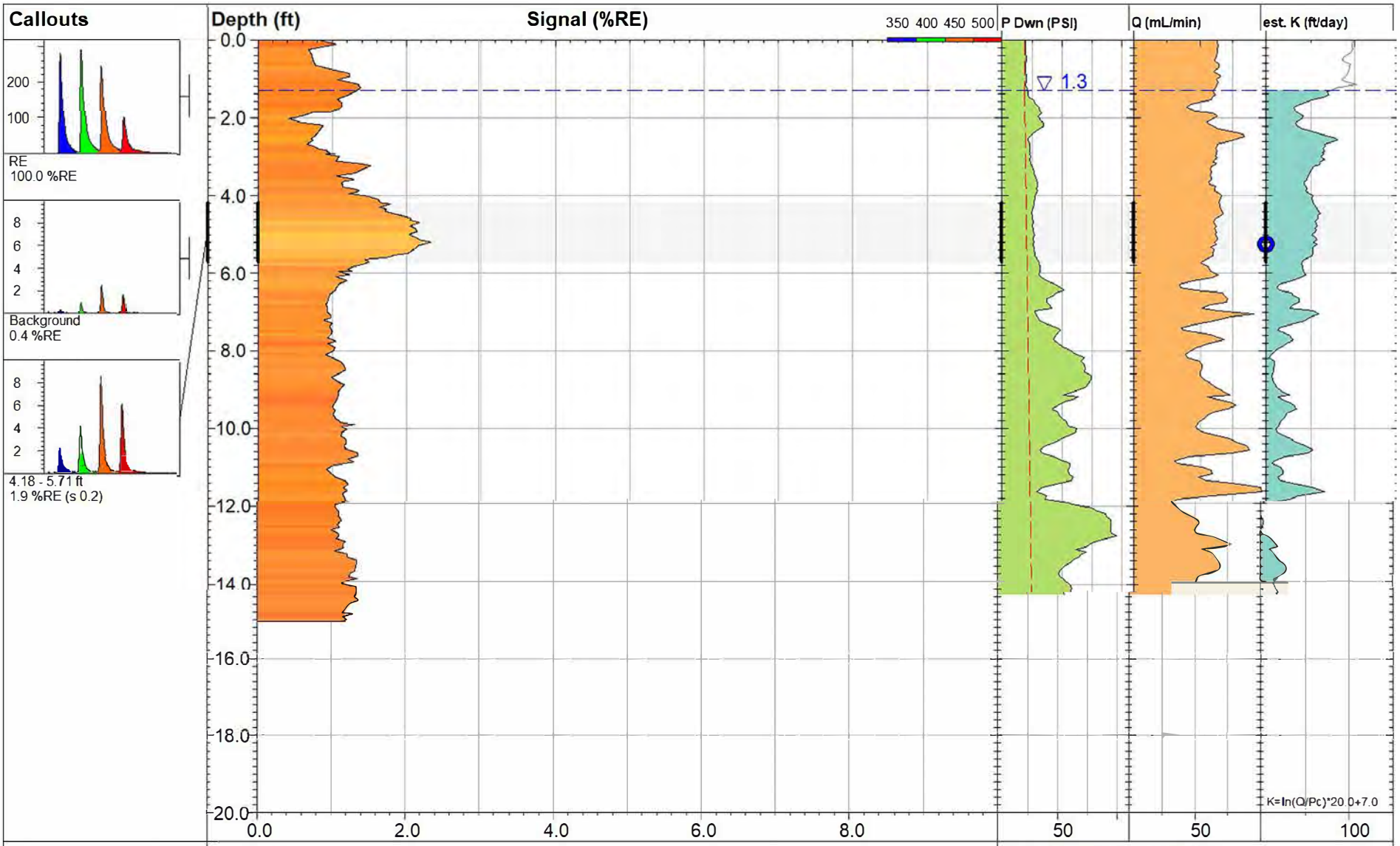
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.6 %RE @ 4.97 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 15:18 CDT**



LIF19-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.3 %RE @ 5.20 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-24 09:07 CDT**

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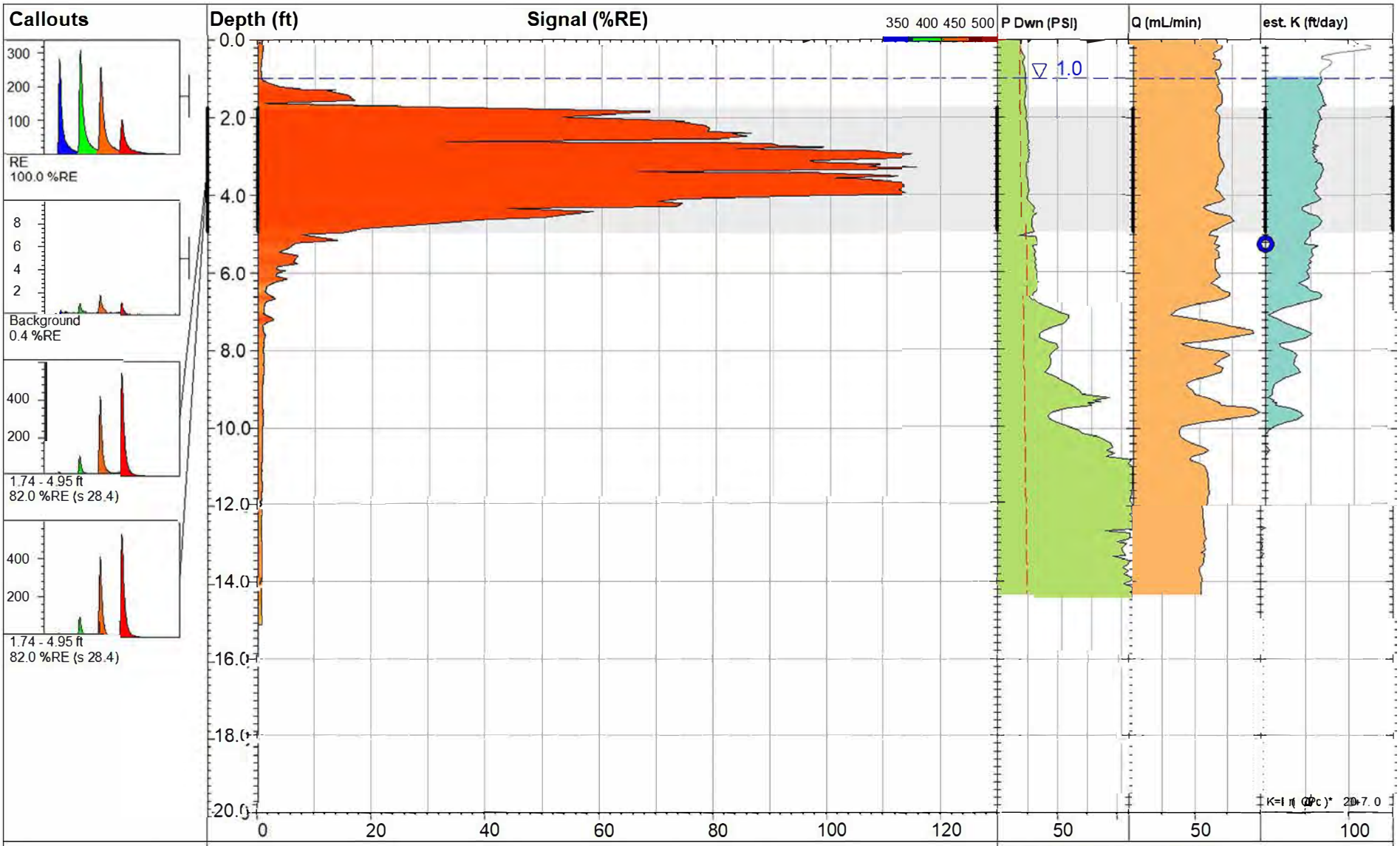

LIF20-19

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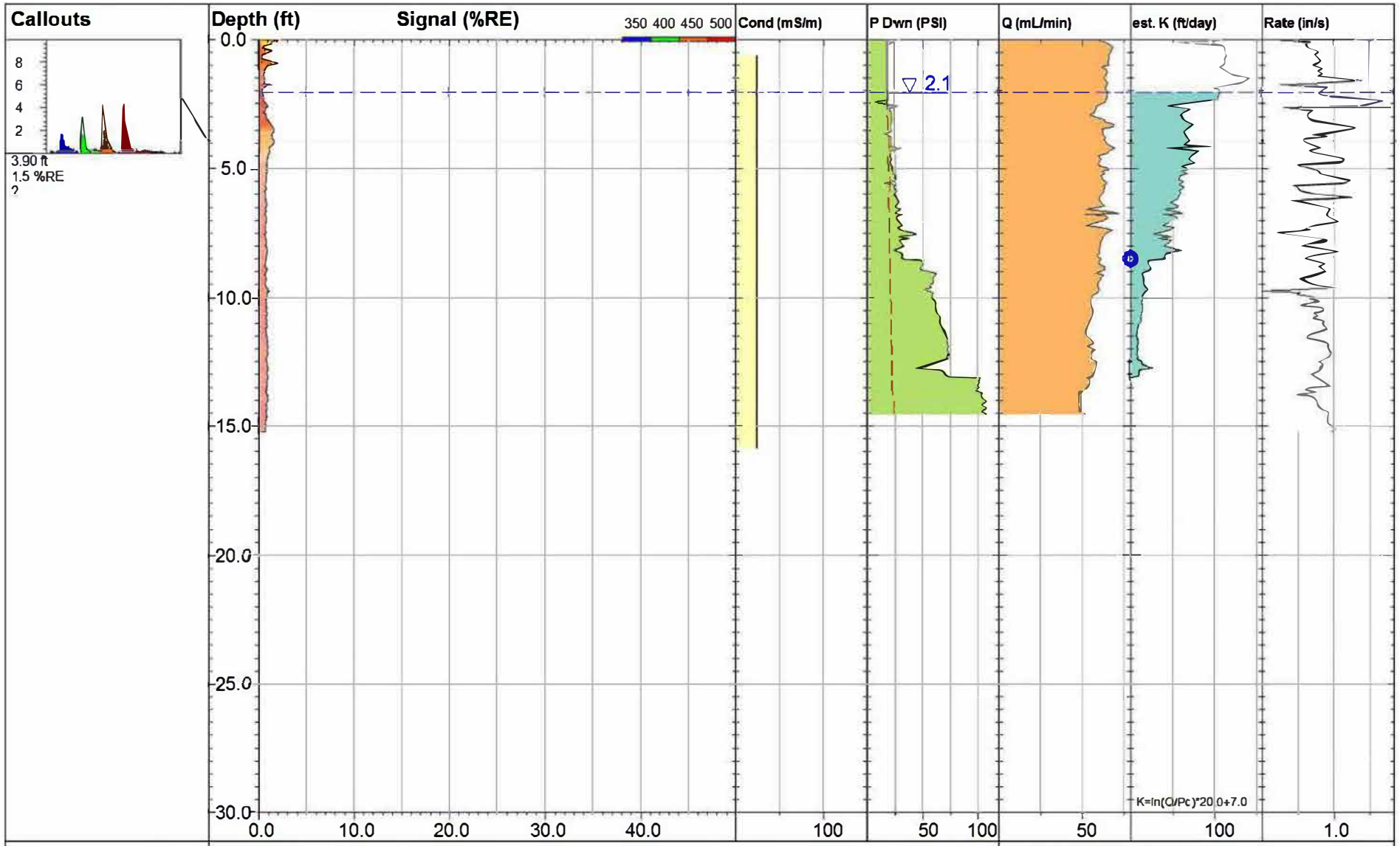
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **115.8 %RE @ 3.28 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-21 16:01 CDT**



LIF20A-19

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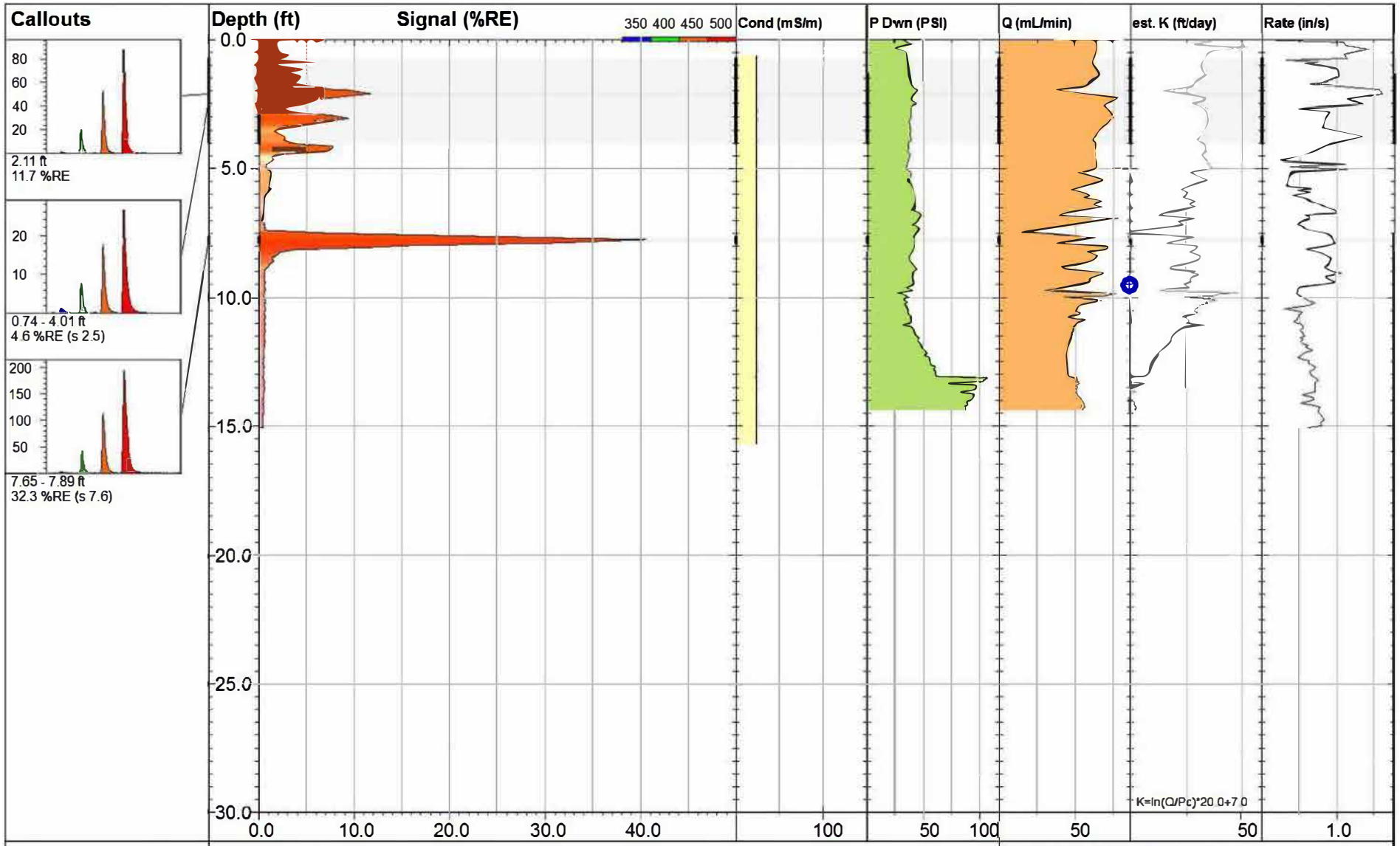
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.25 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.1 %RE @ 0.01 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 10:42 CDT**



LIF20B-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.07 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **40.6 %RE @ 7.75 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 09:57 CDT**

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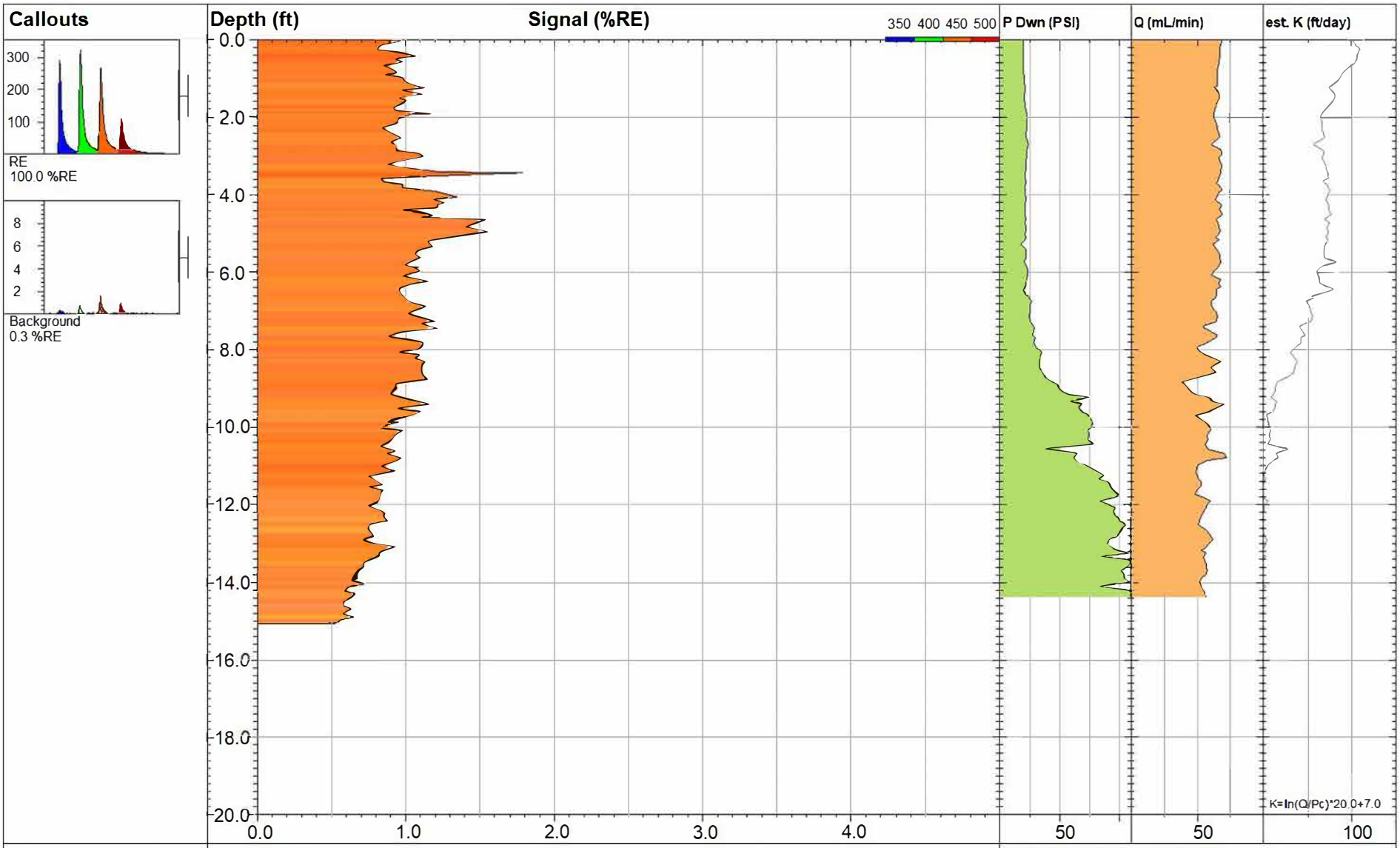

LIF/MIP21-19

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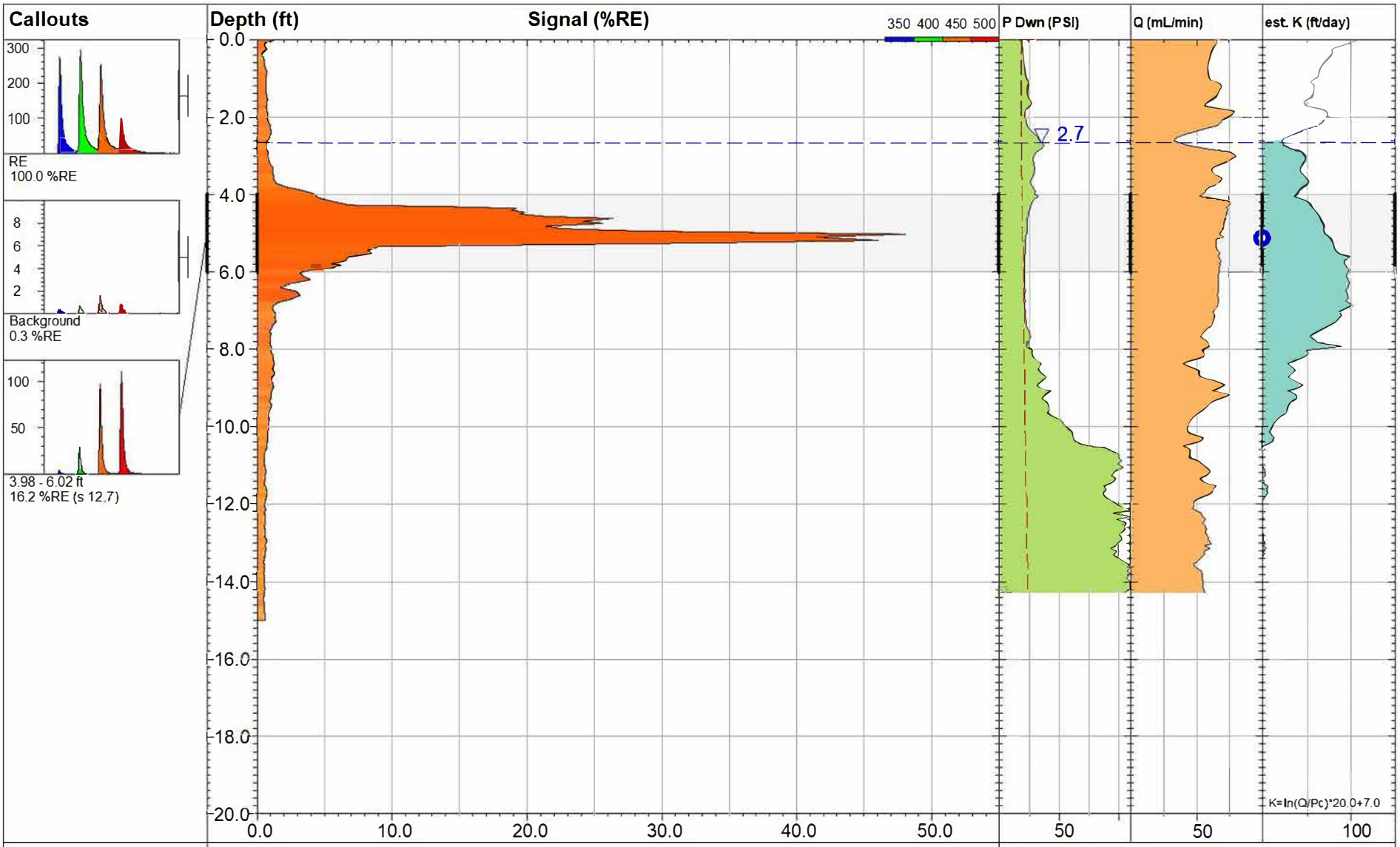
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 3.42 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-15 12:15 CDT**



LIF22-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **48.1 %RE @ 5.02 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-15 10:24 CDT**

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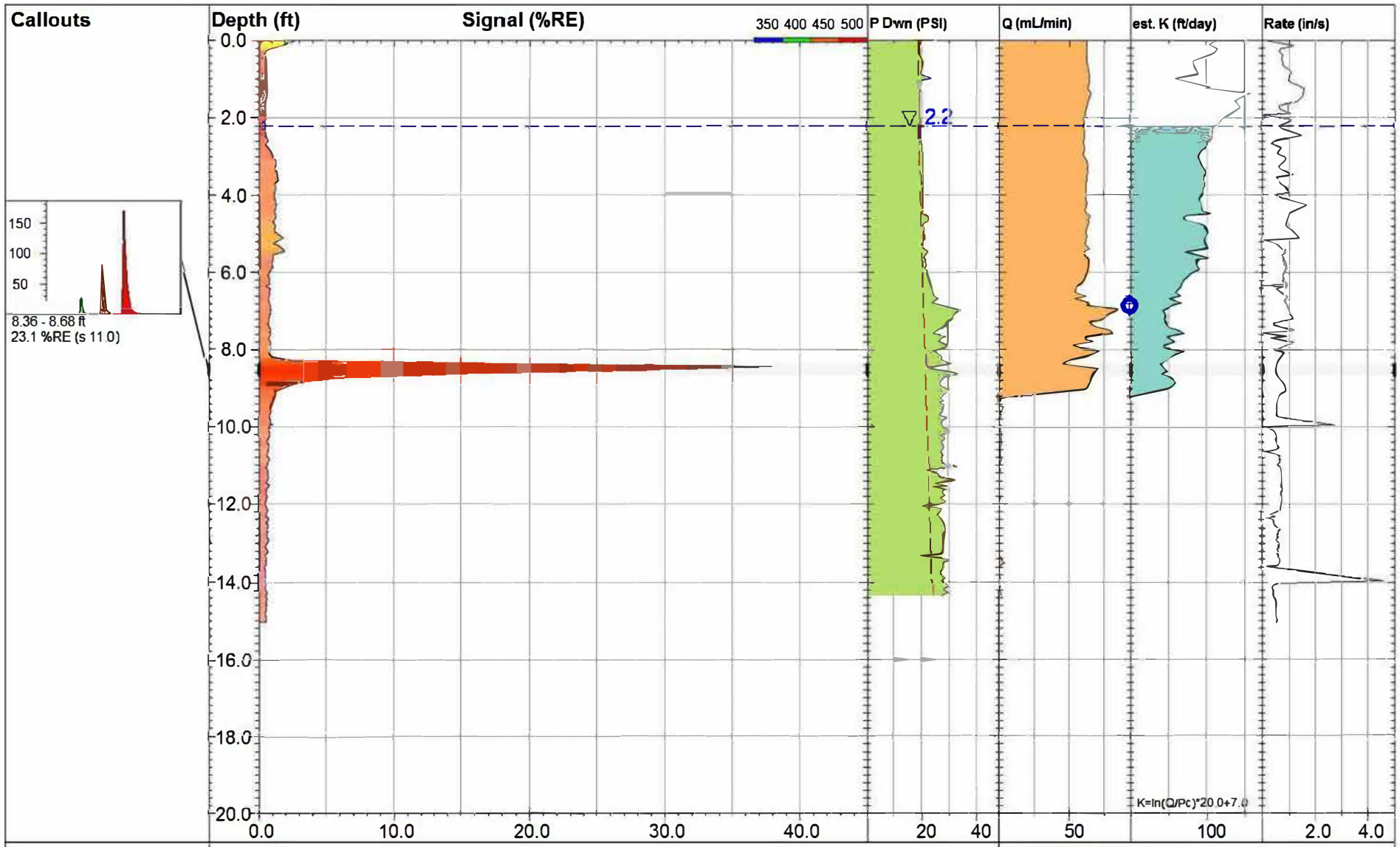

LIF22A-19

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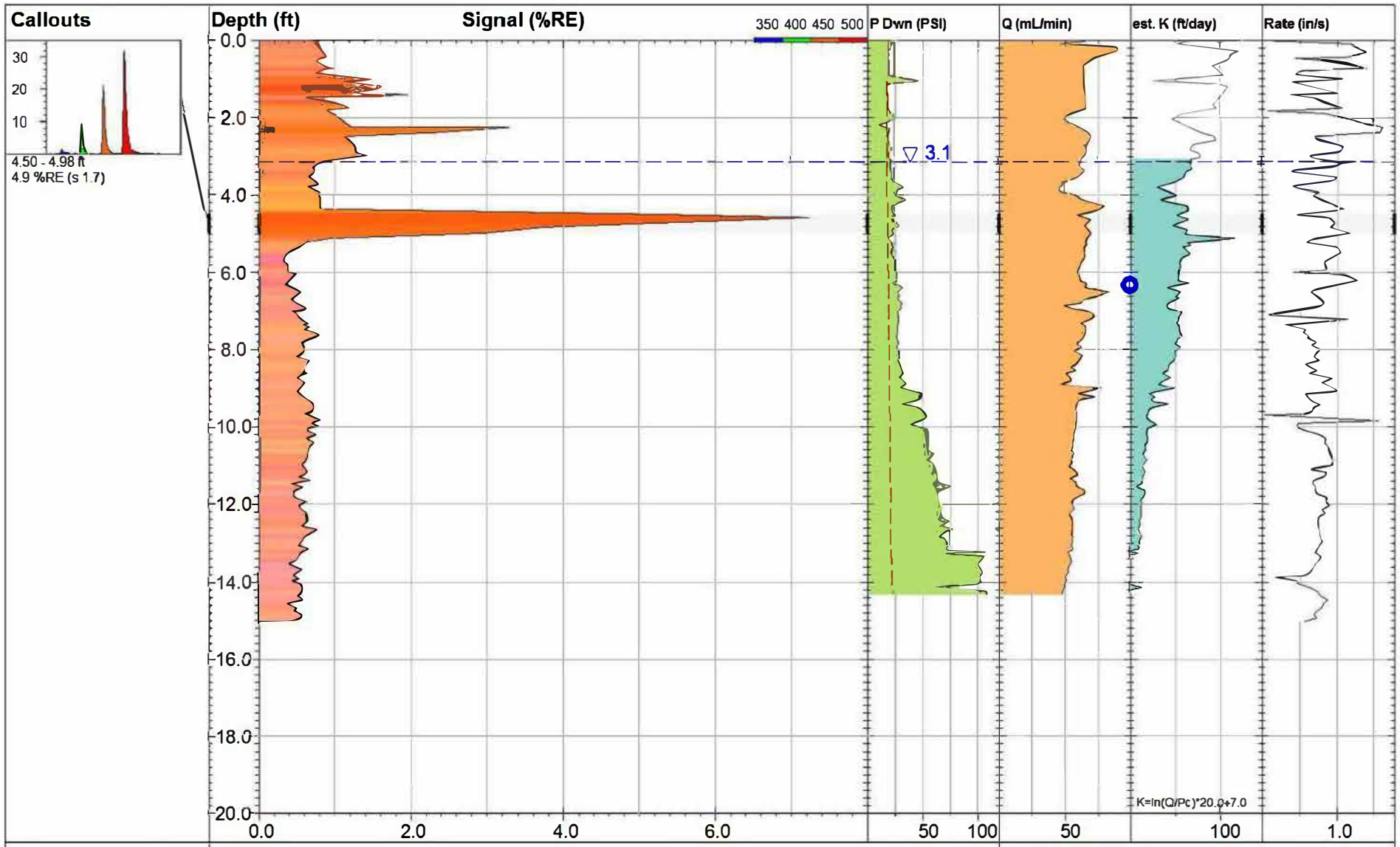
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **38.0 %RE @ 8.44 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 14:31 CDT**



LIF22B-19

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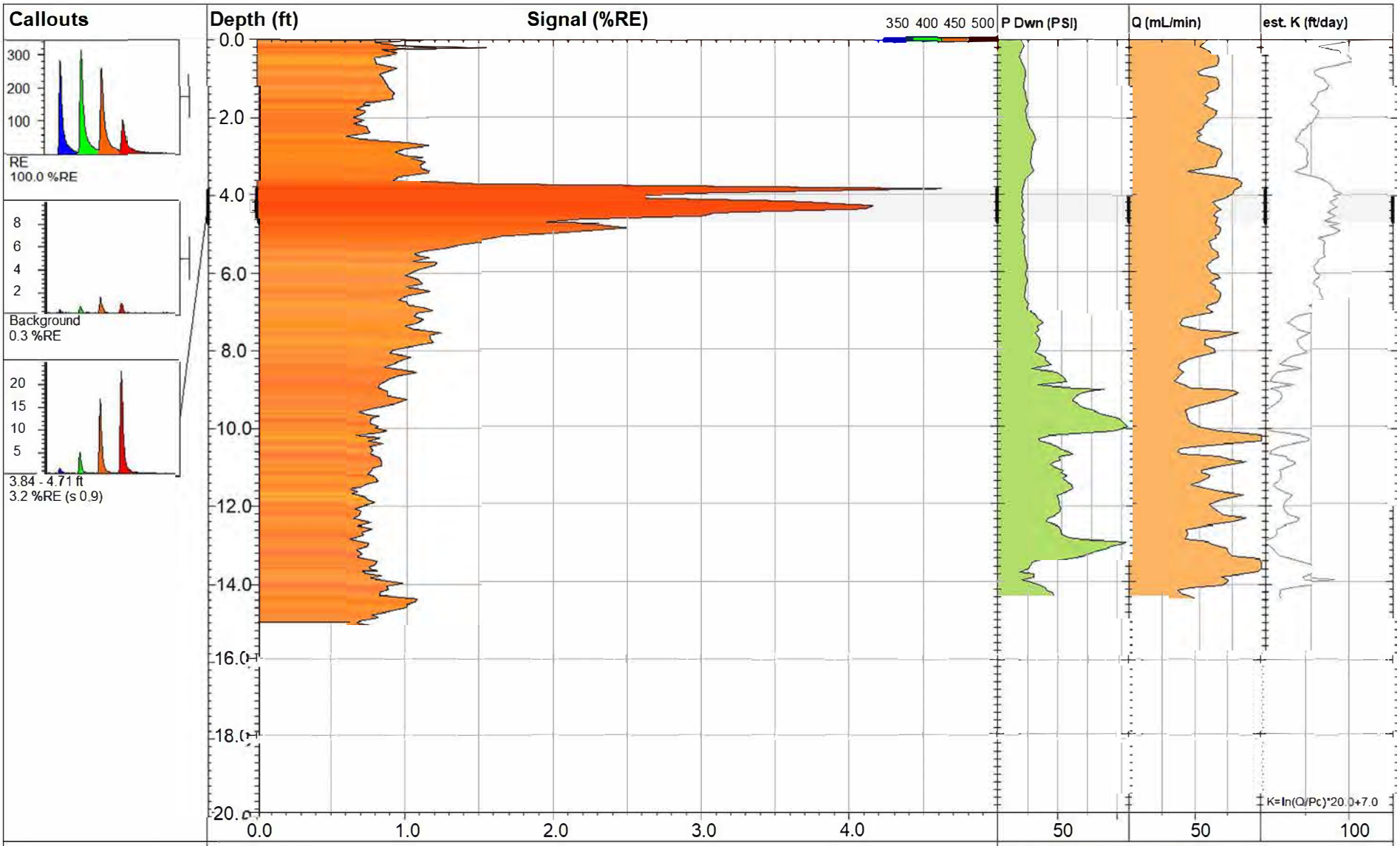
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.01 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **7.3 %RE @ 4.58 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 15:44 CDT**



LIF/MIP23-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.07 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **4.6 %RE @ 3.84 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-15 09:41 CDT**

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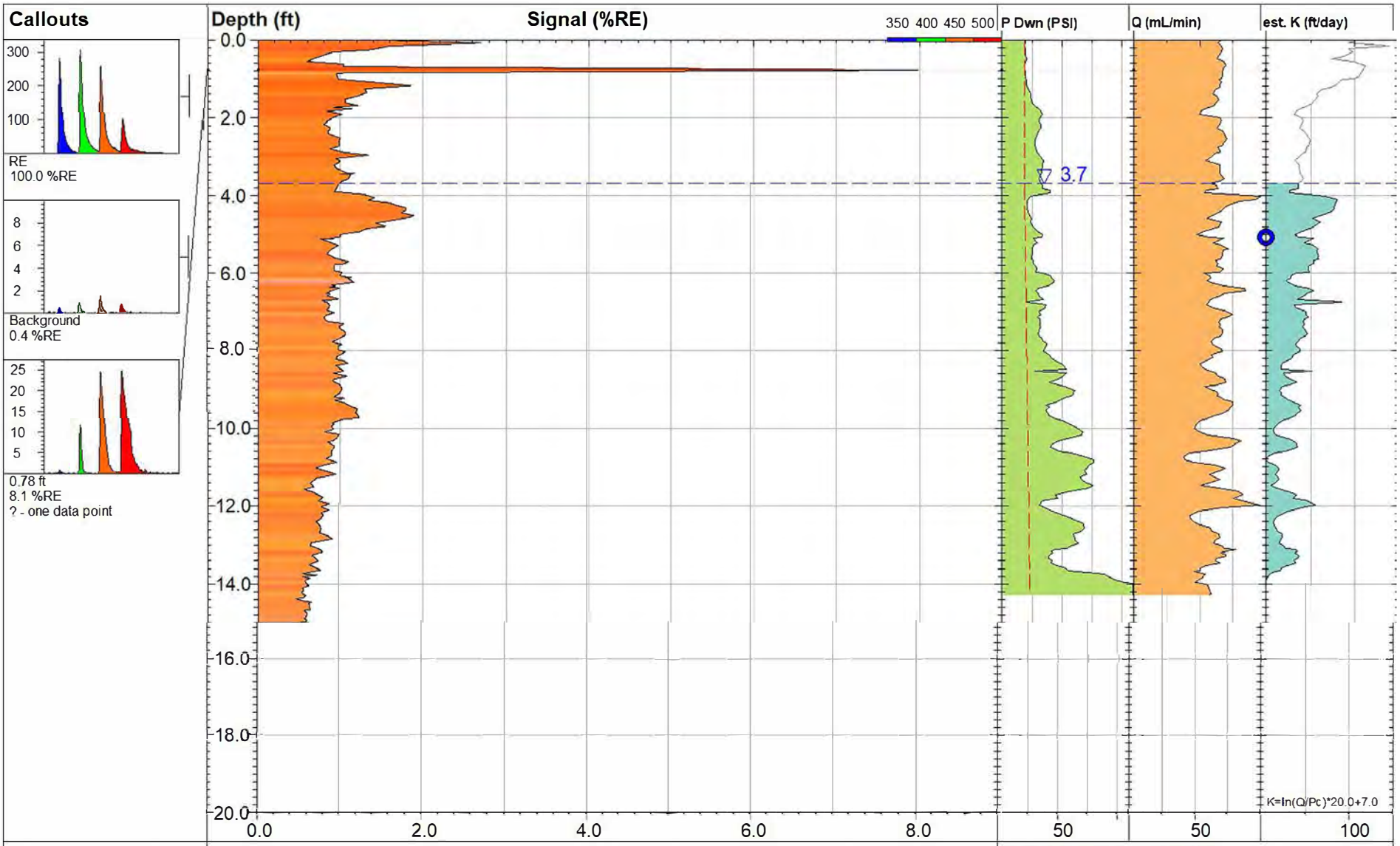

LIF/MIP24-19

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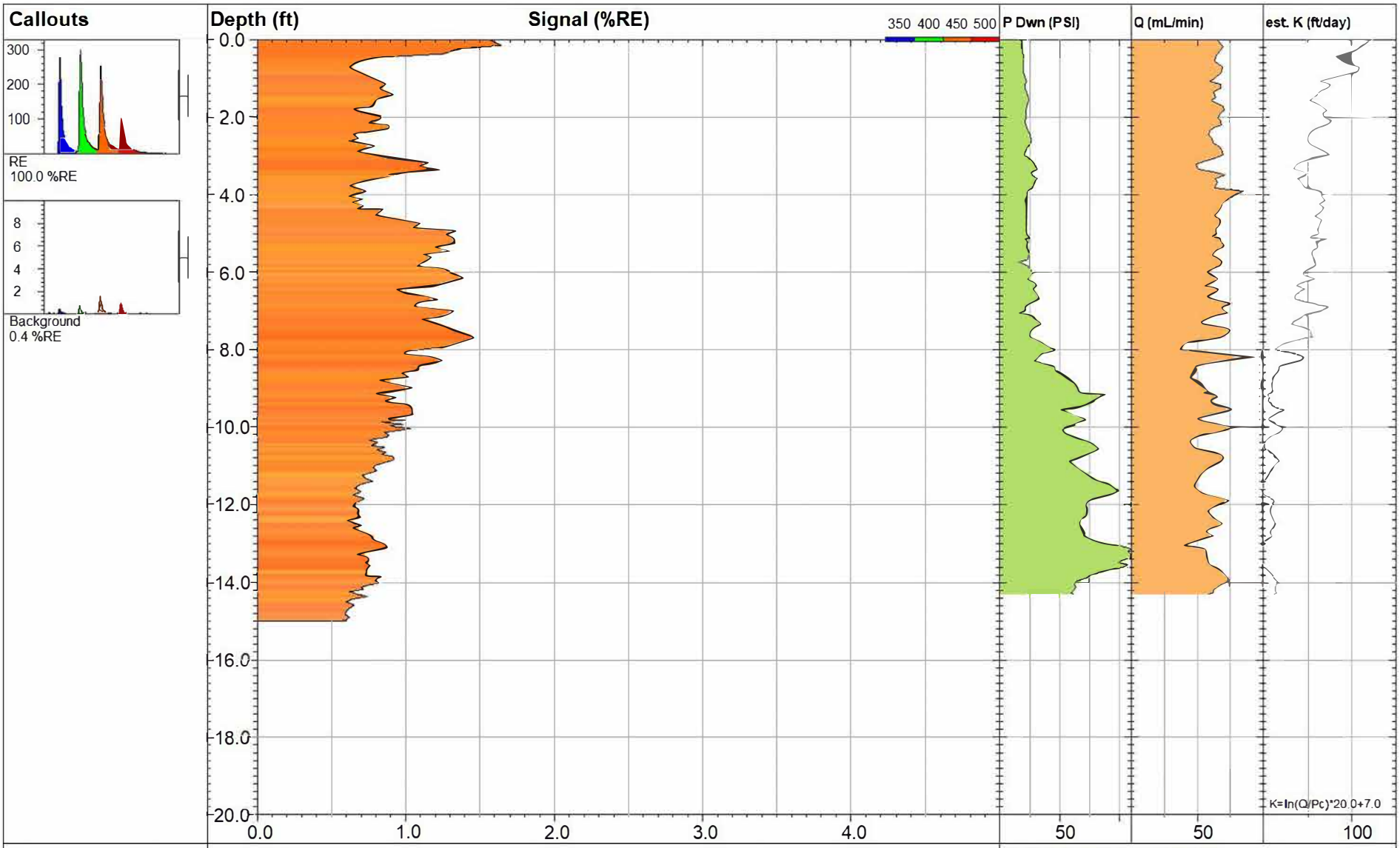
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **8.1 %RE @ 0.78 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-14 16:02 CDT**



LIF/MIP25-19

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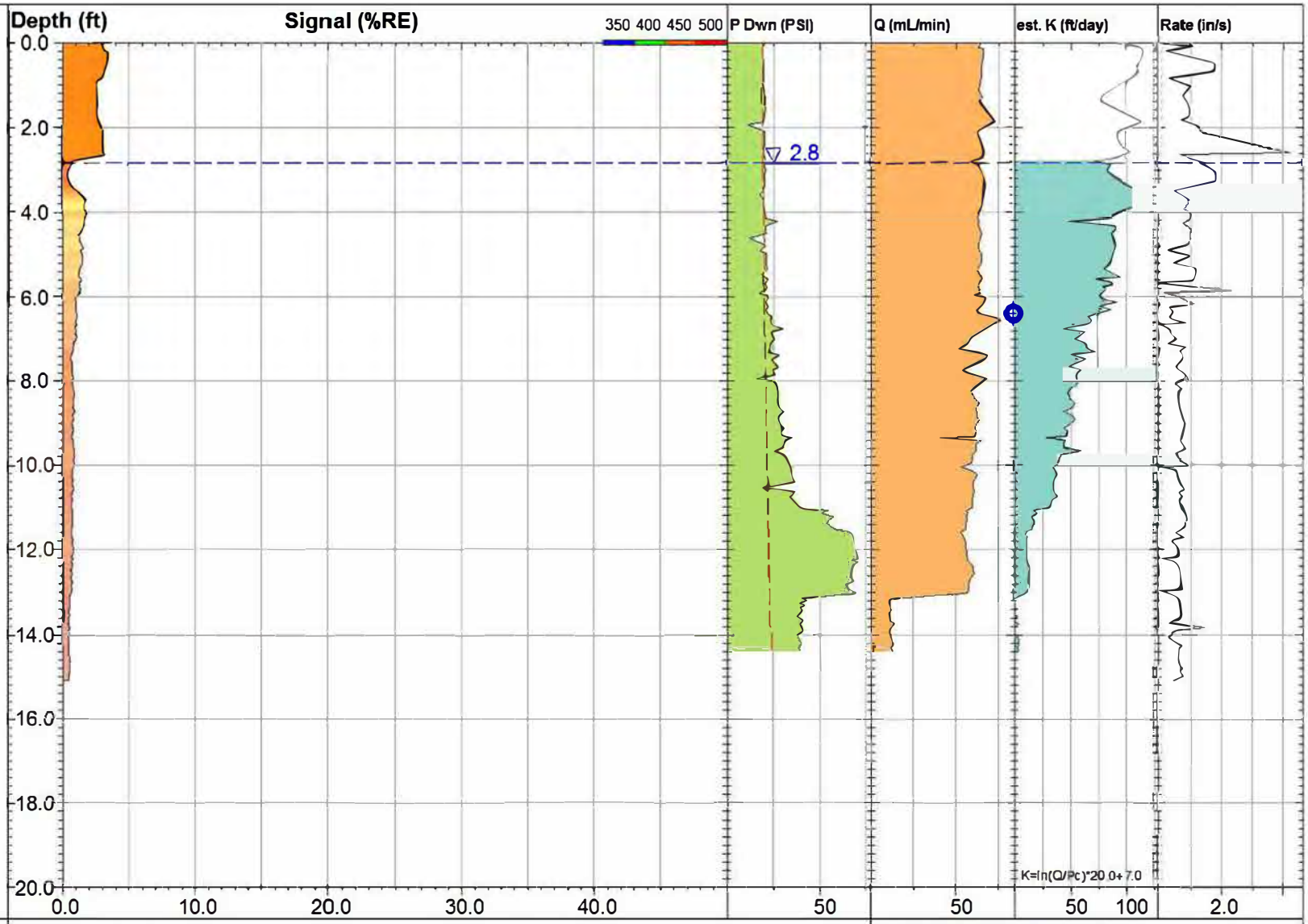
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.7 %RE @ 0.00 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-14 15:31 CDT**



LIF/MIP25A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.08 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.5 %RE @ 0.22 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 11:59 CDT**

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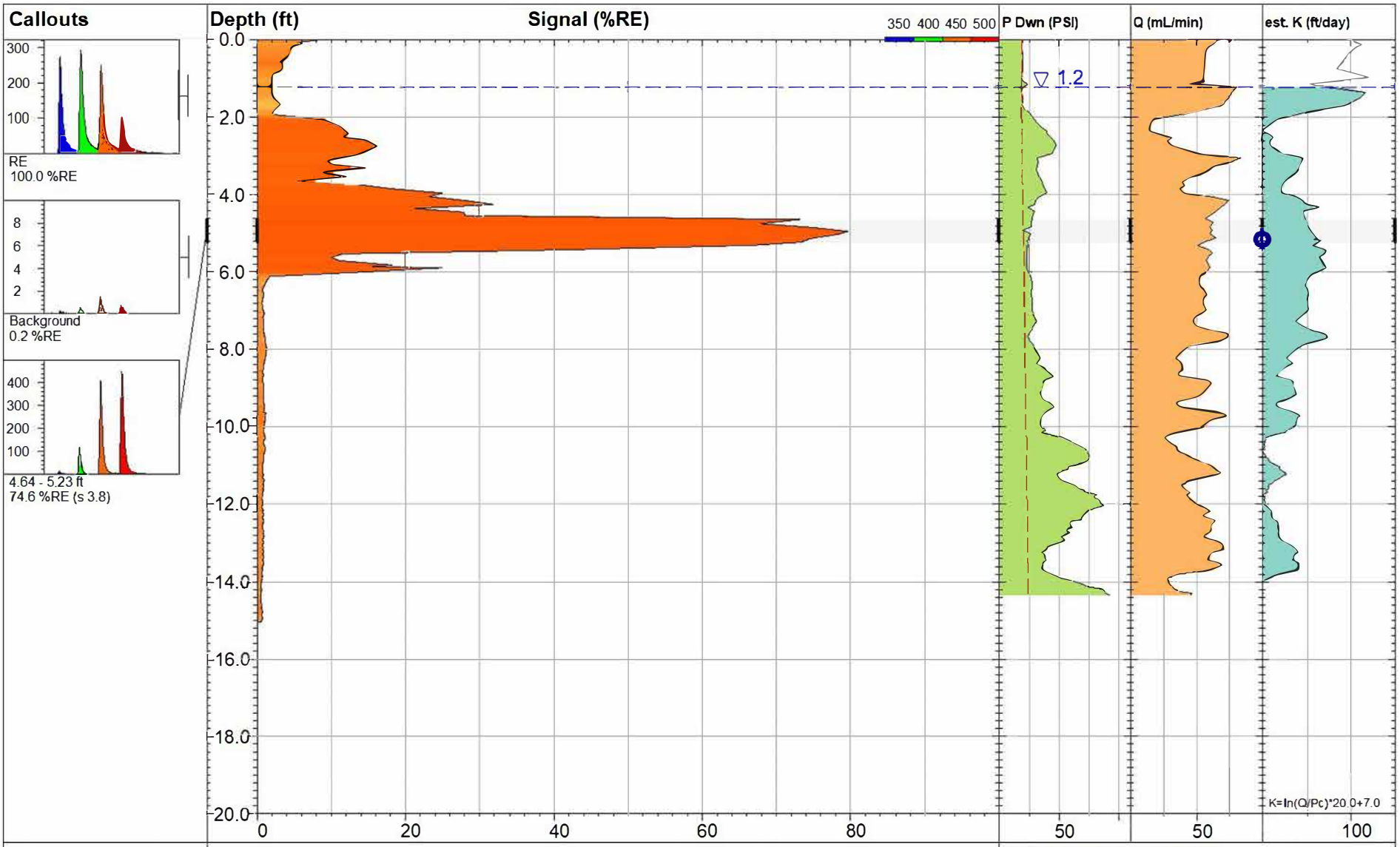

LIF/MIP26-19

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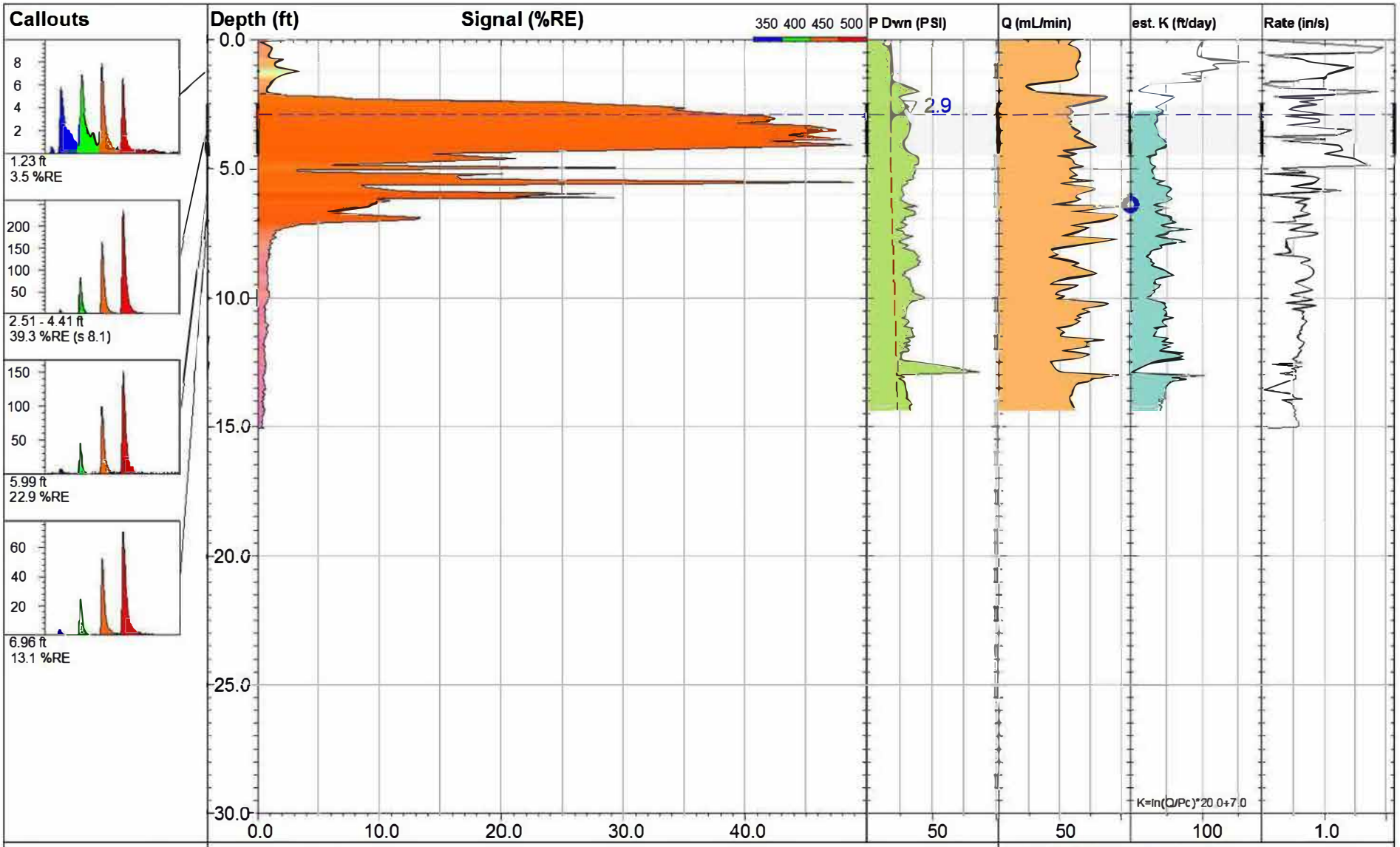
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **79.7 %RE @ 4.95 ft**
Operator / Unit: **AK/SM / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-19 13:53 CDT**



LIF26A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.07 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **49.5 %RE @ 5.51 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 10:48 CDT**

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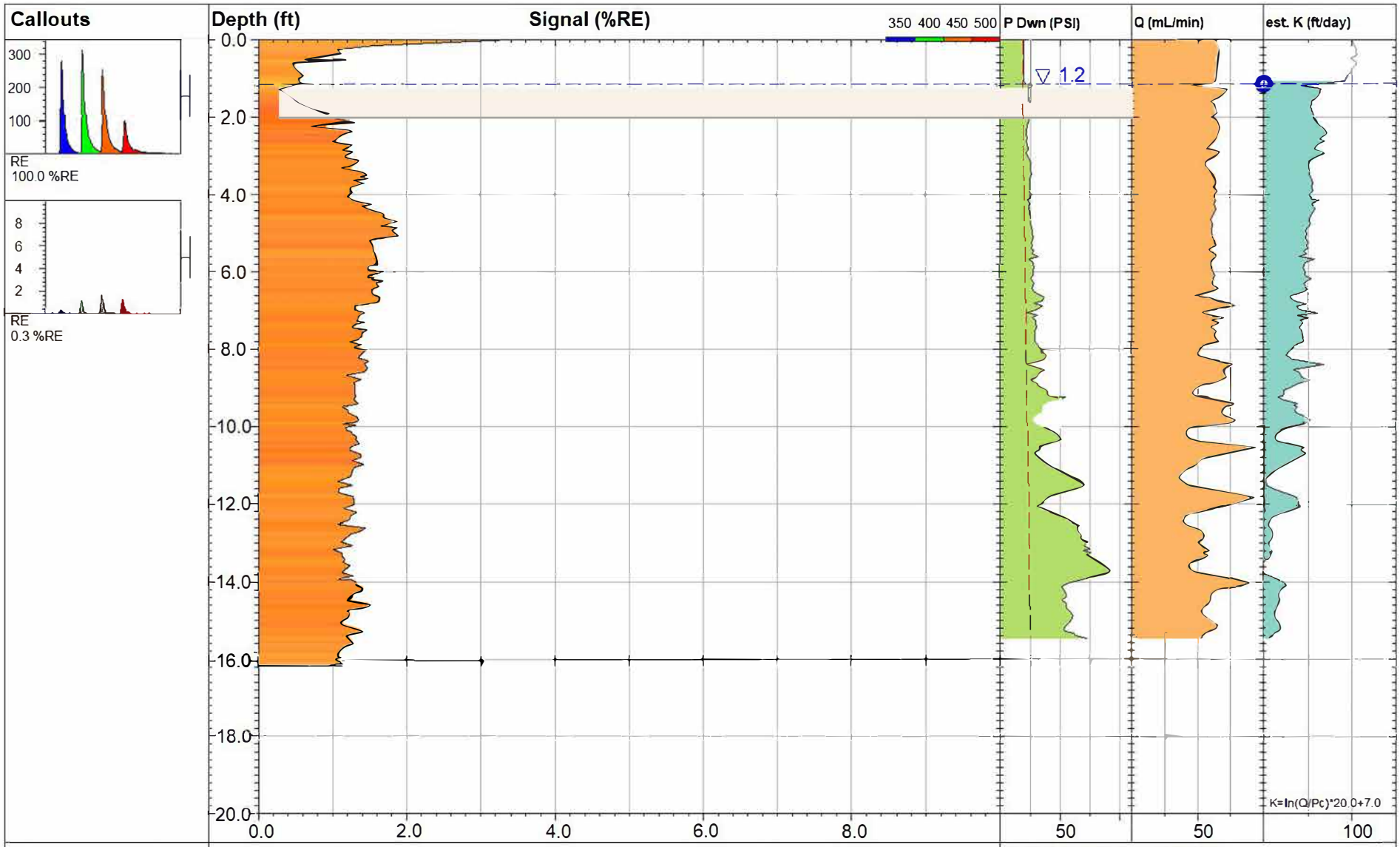

LIF/MIP27-19

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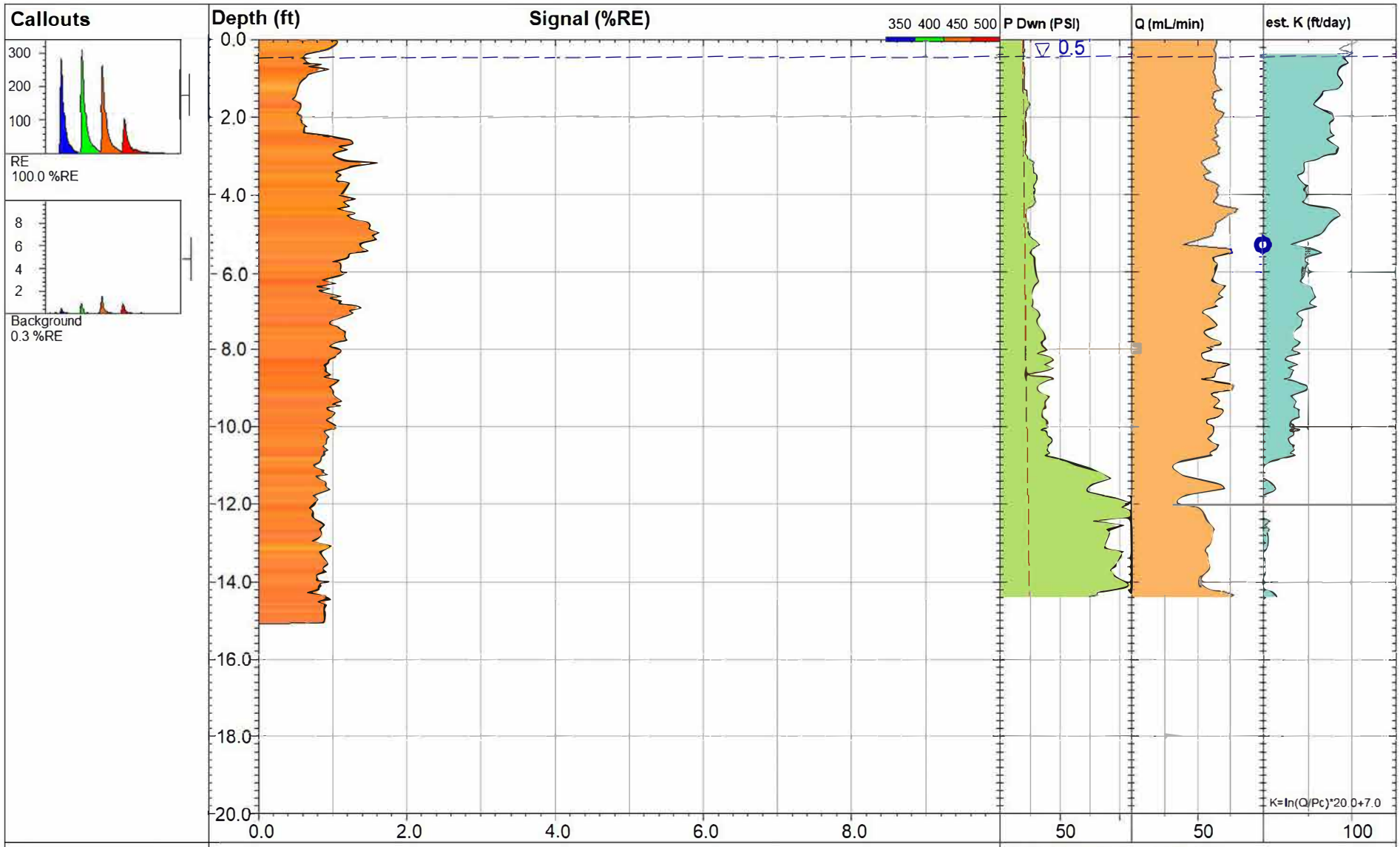
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **16.15 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.3 %RE @ 0.01 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 14:23 CDT**



LIF28-19

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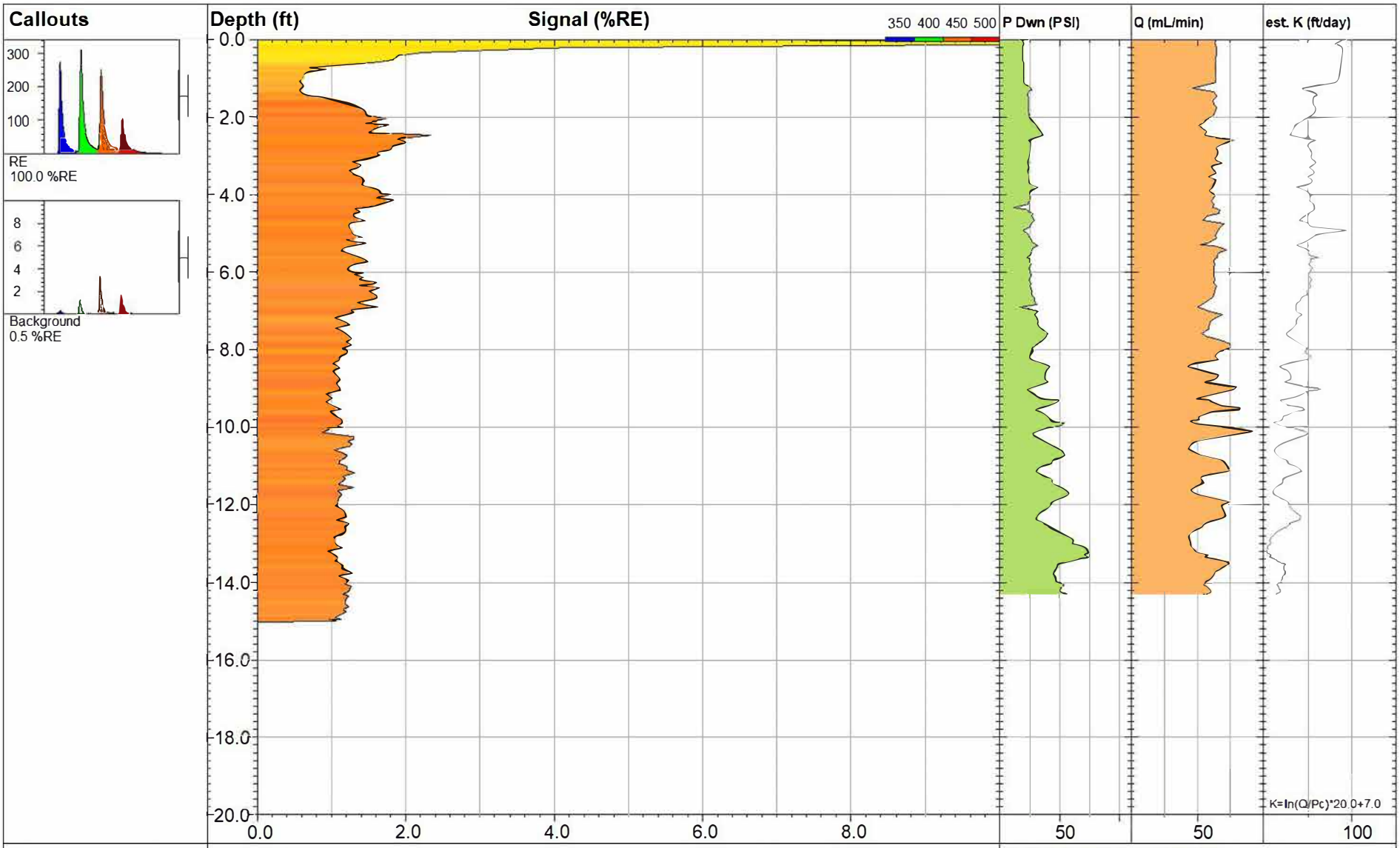
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.08 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.6 %RE @ 4.97 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-20 12:12 CDT**



LIF29-19

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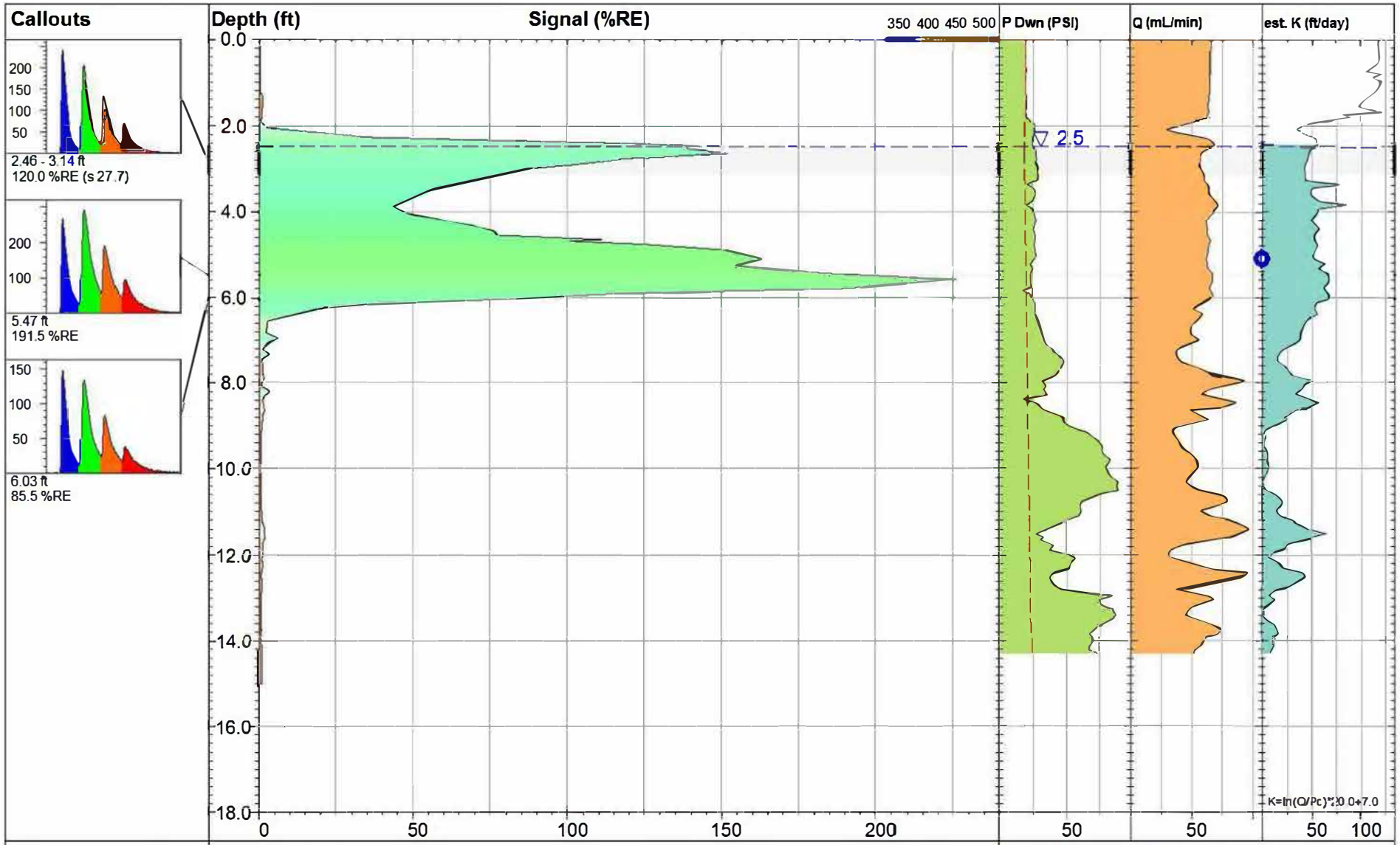
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.01 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **13.2 %RE @ 0.09 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 15:47 CDT**



LIF29A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.01 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **225.8 %RE @ 5.59 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 14:22 CDT**

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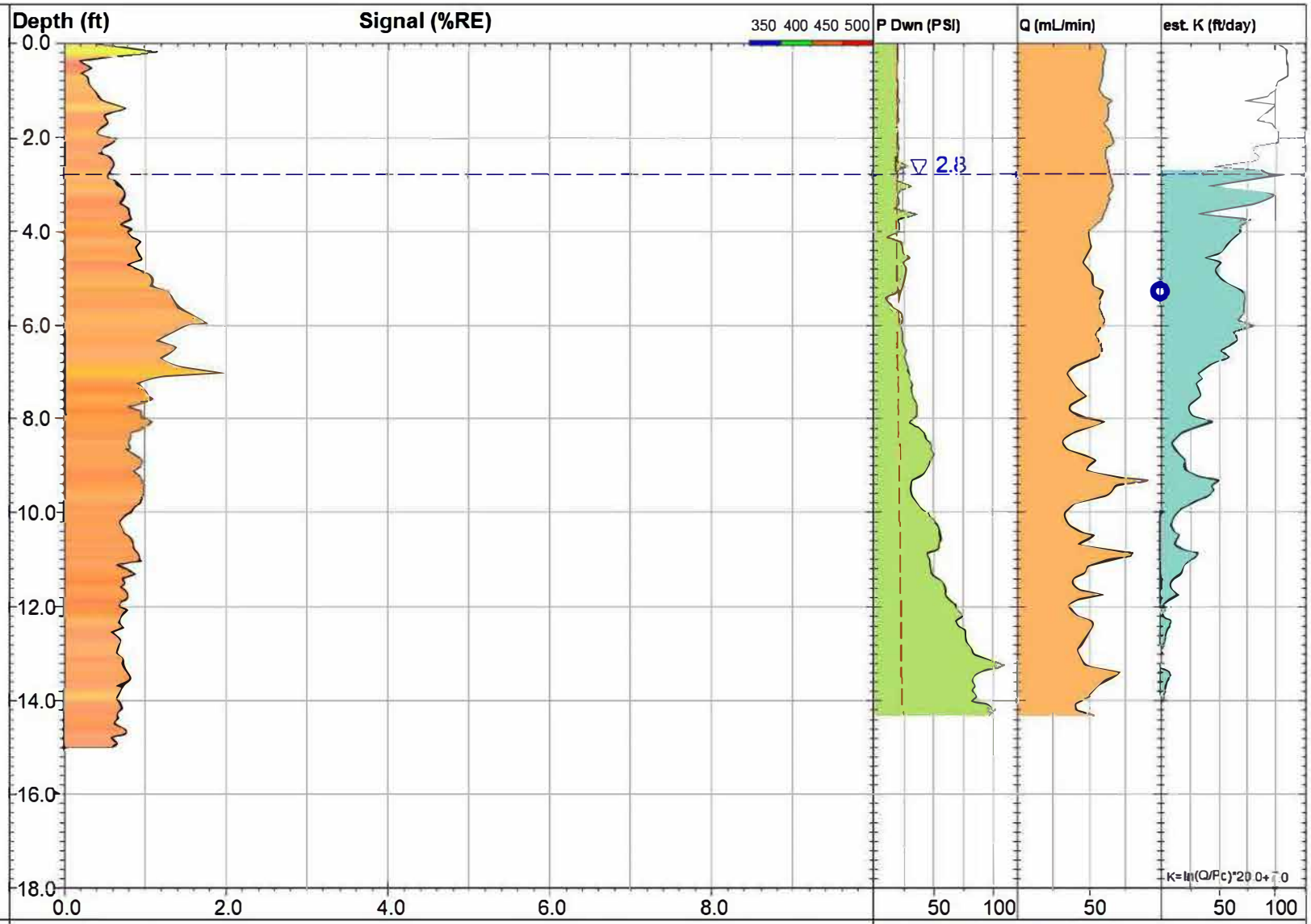

LIF/MIP29B-19

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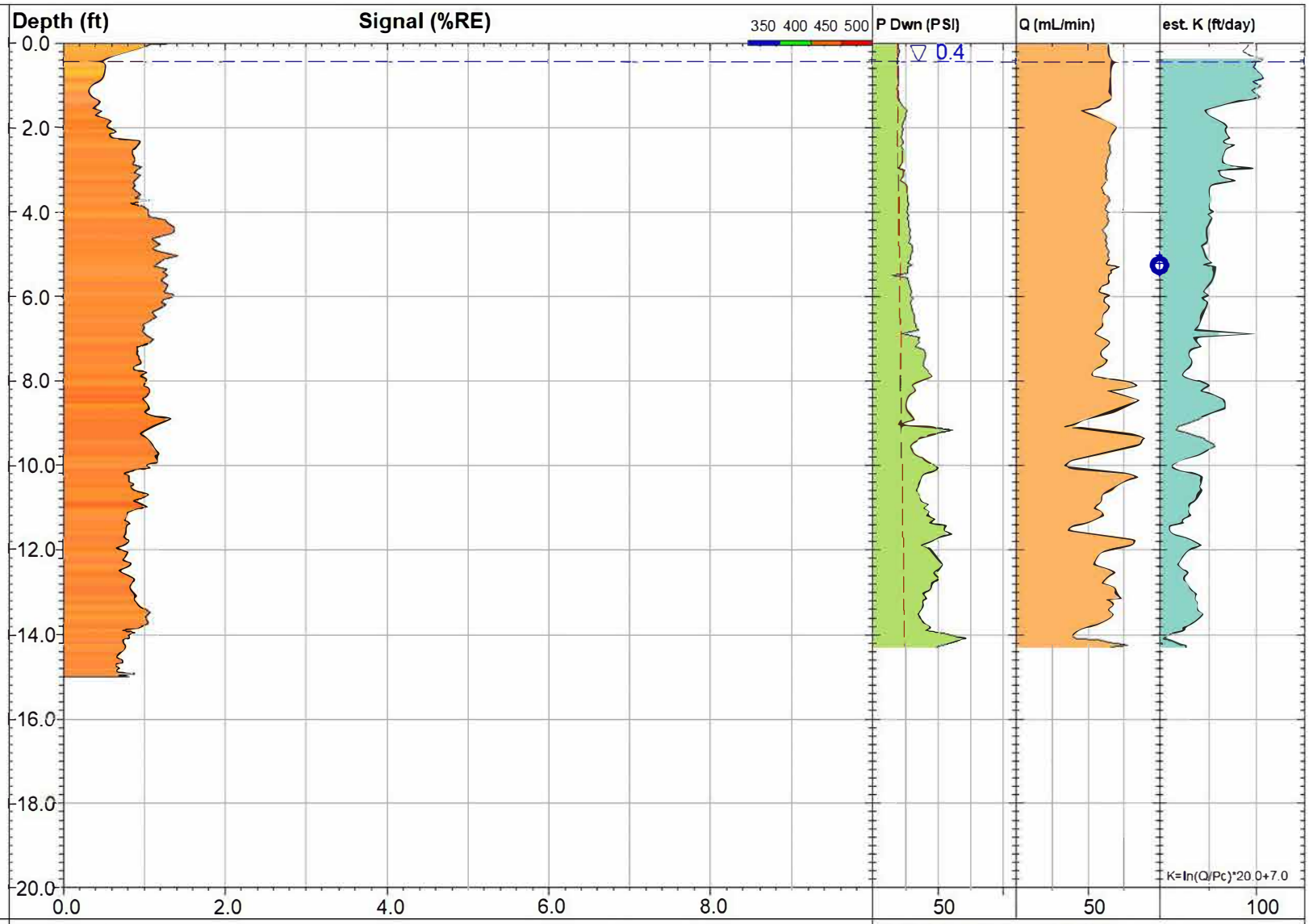
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.01 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 7.03 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 13:48 CDT**



LIF/MIP30-19

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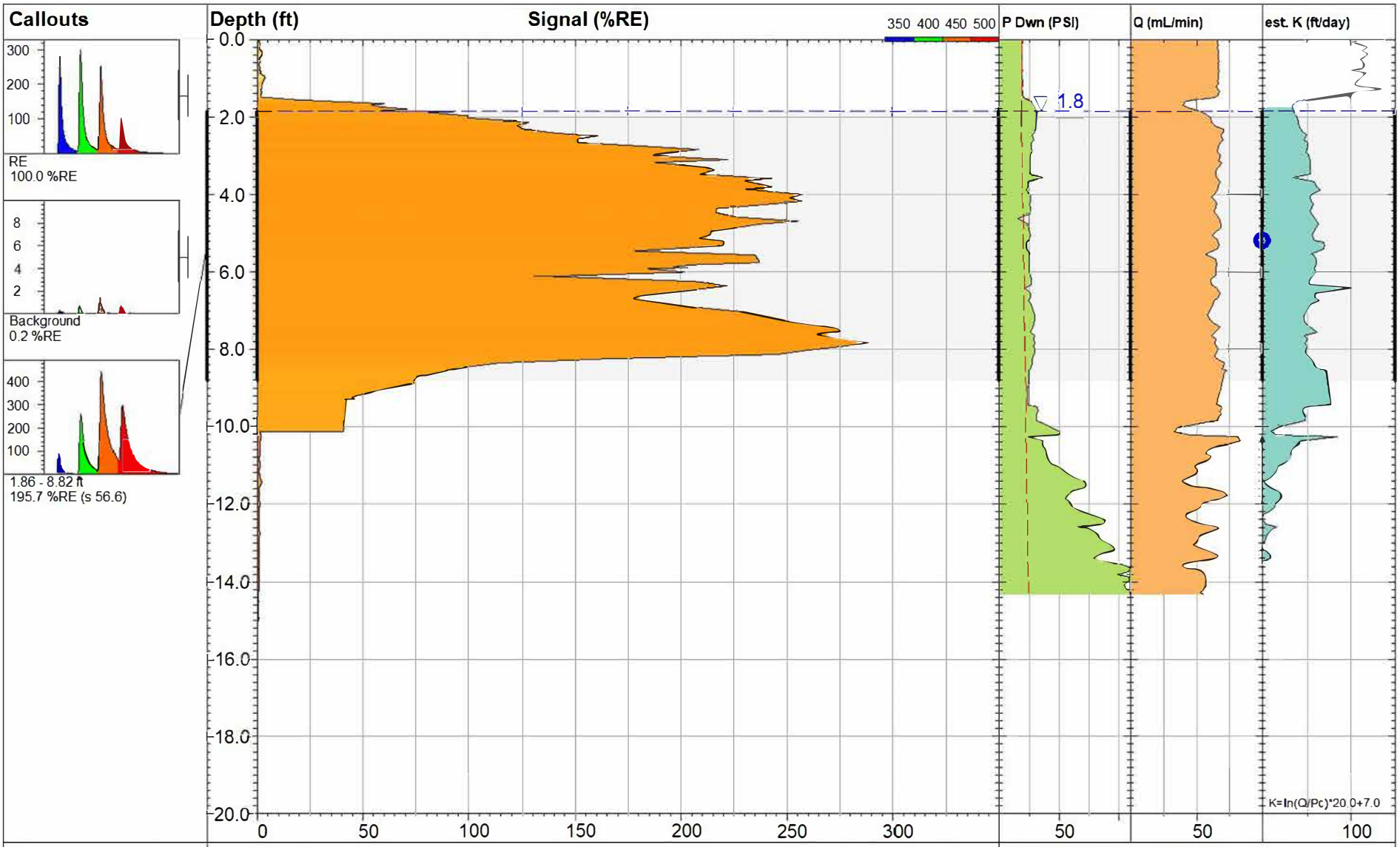
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.6 %RE @ 0.01 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-20 11:27 CDT**



LIF31-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **288.8 %RE @ 7.83 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-15 15:00 CDT**

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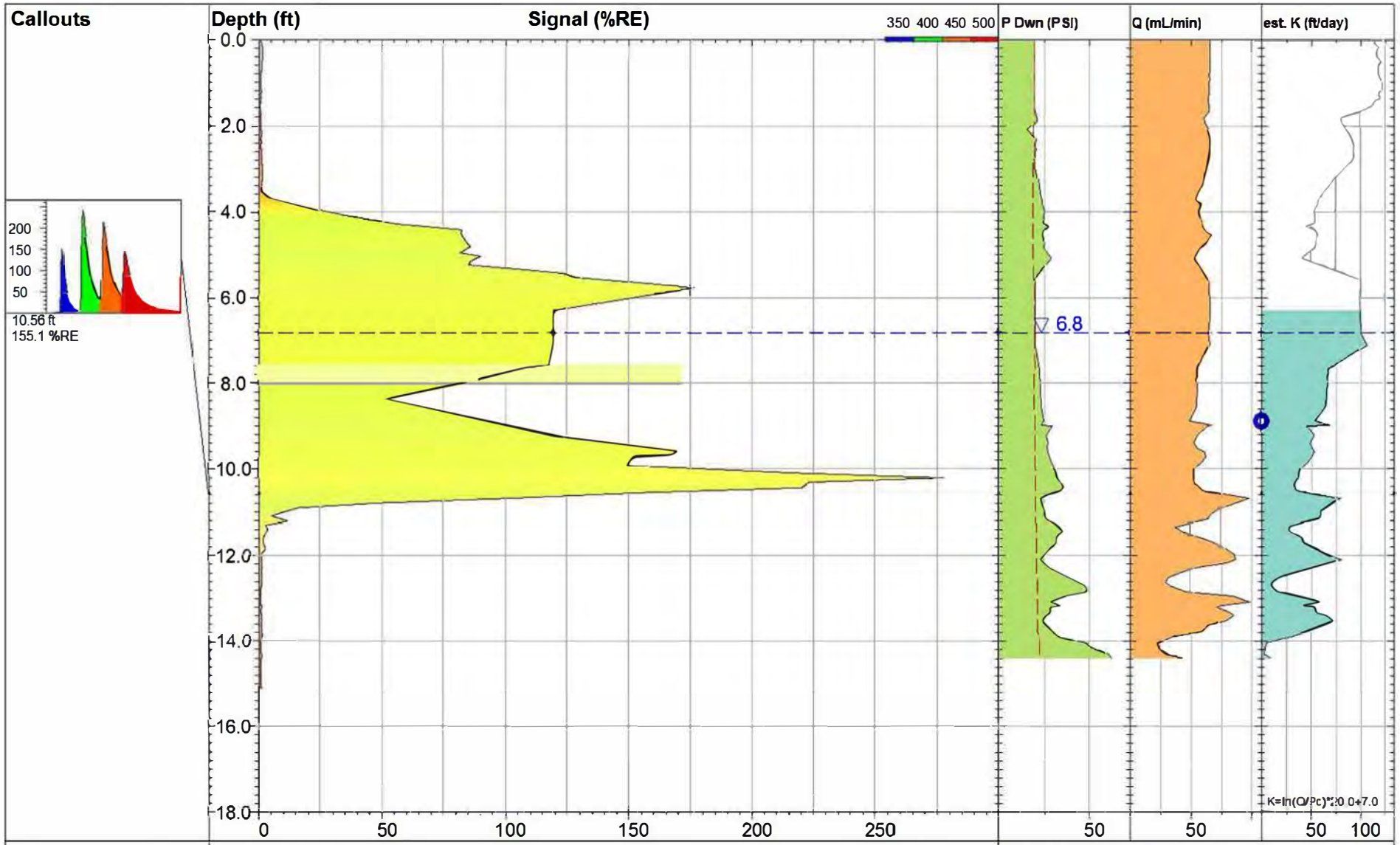

LIF31A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.10 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **277.6 %RE @ 10.21 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 15:12 CDT**

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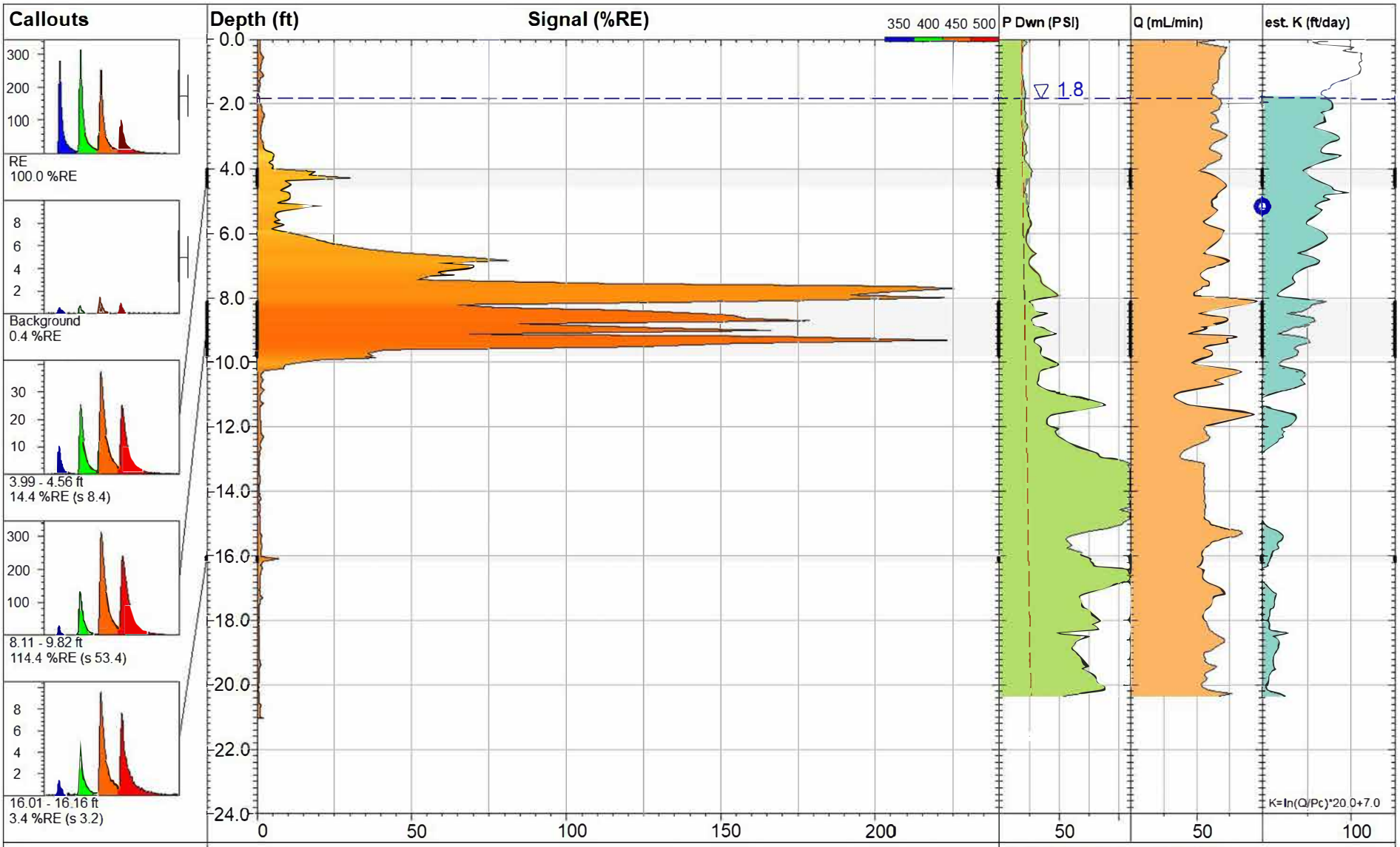

LIF32-19

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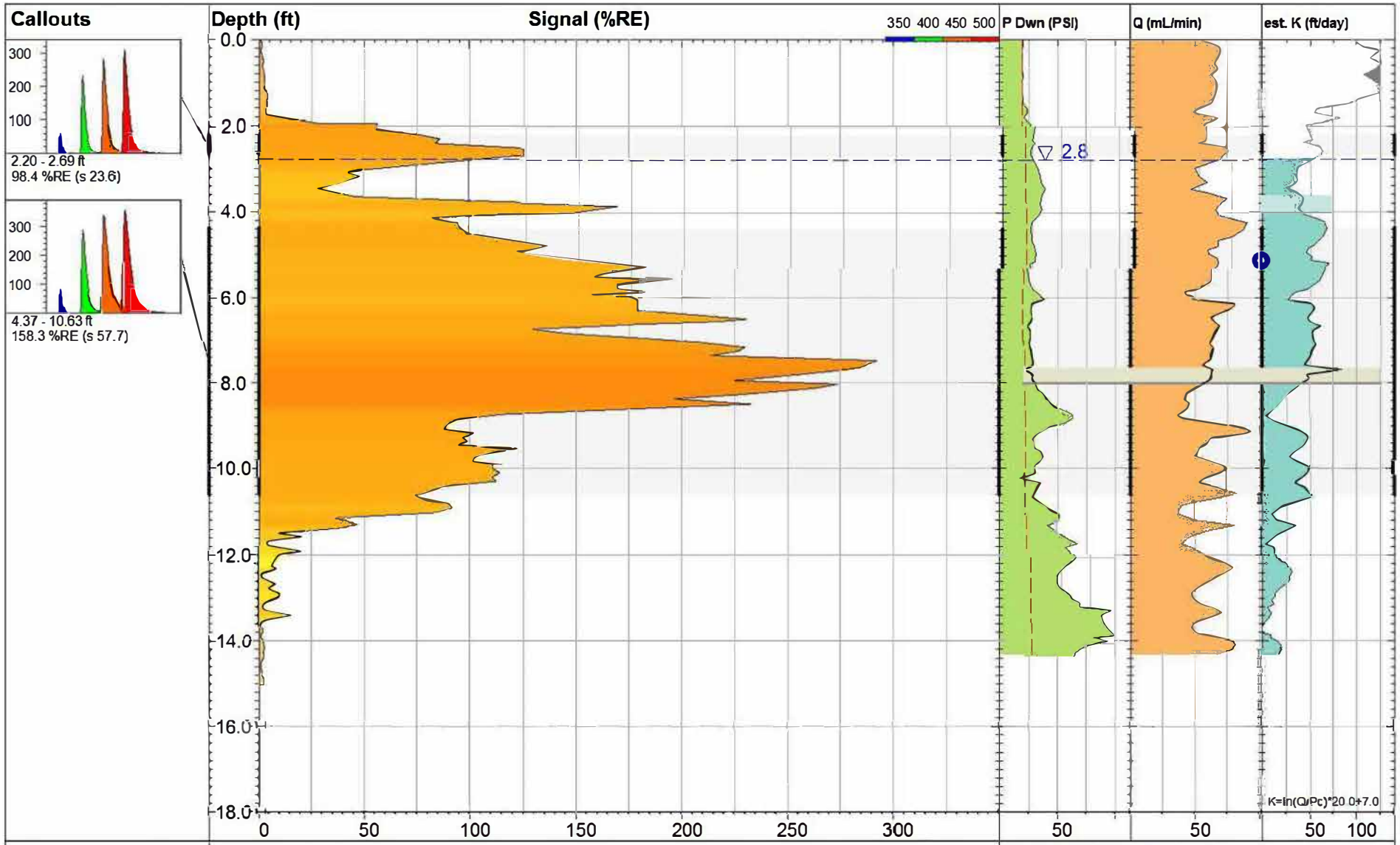
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **21.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **225.2 %RE @ 7.71 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-15 15:52 CDT**



LIF32A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **292.2 %RE @ 7.48 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 16:06 CDT**

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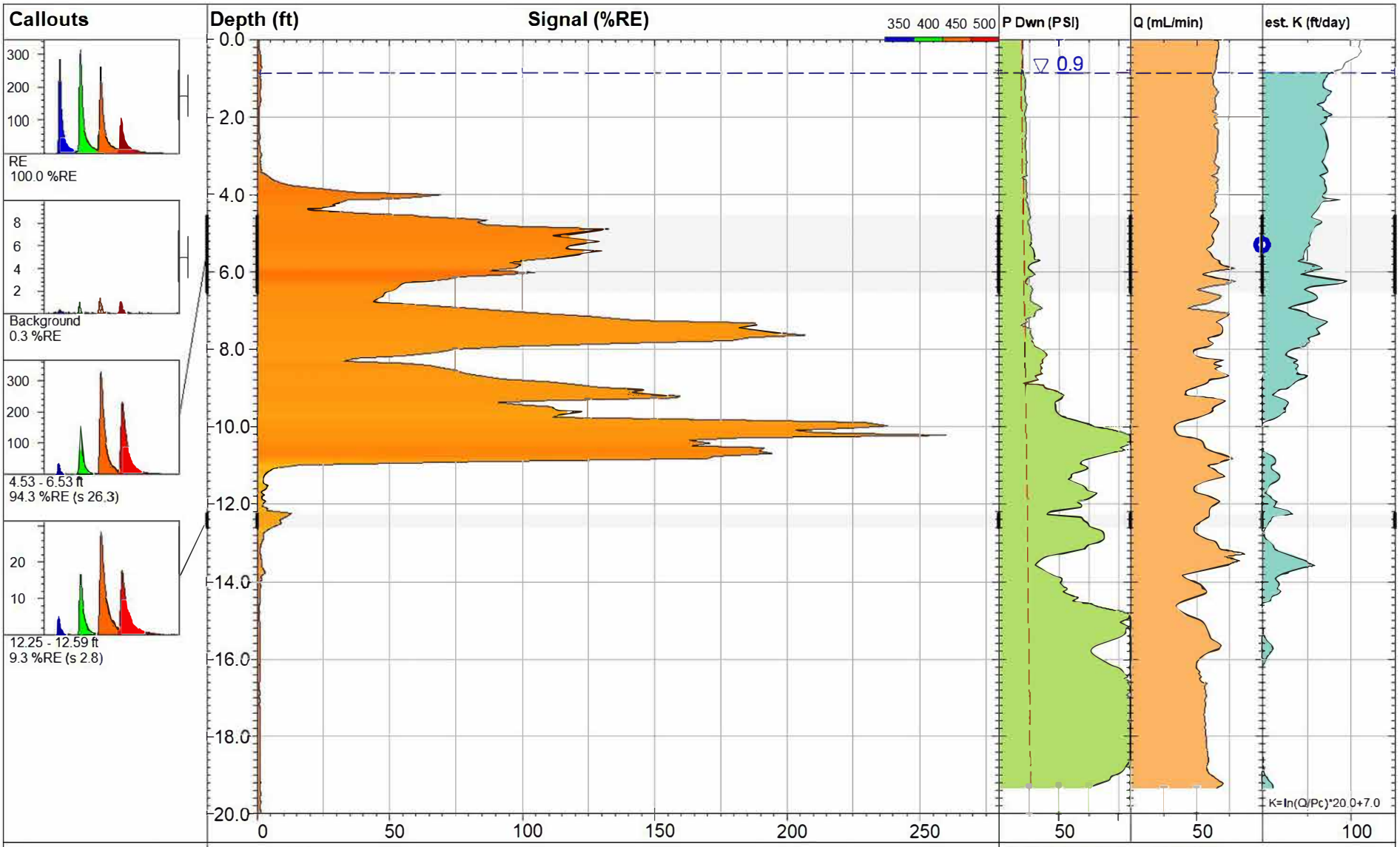

LIF33-19

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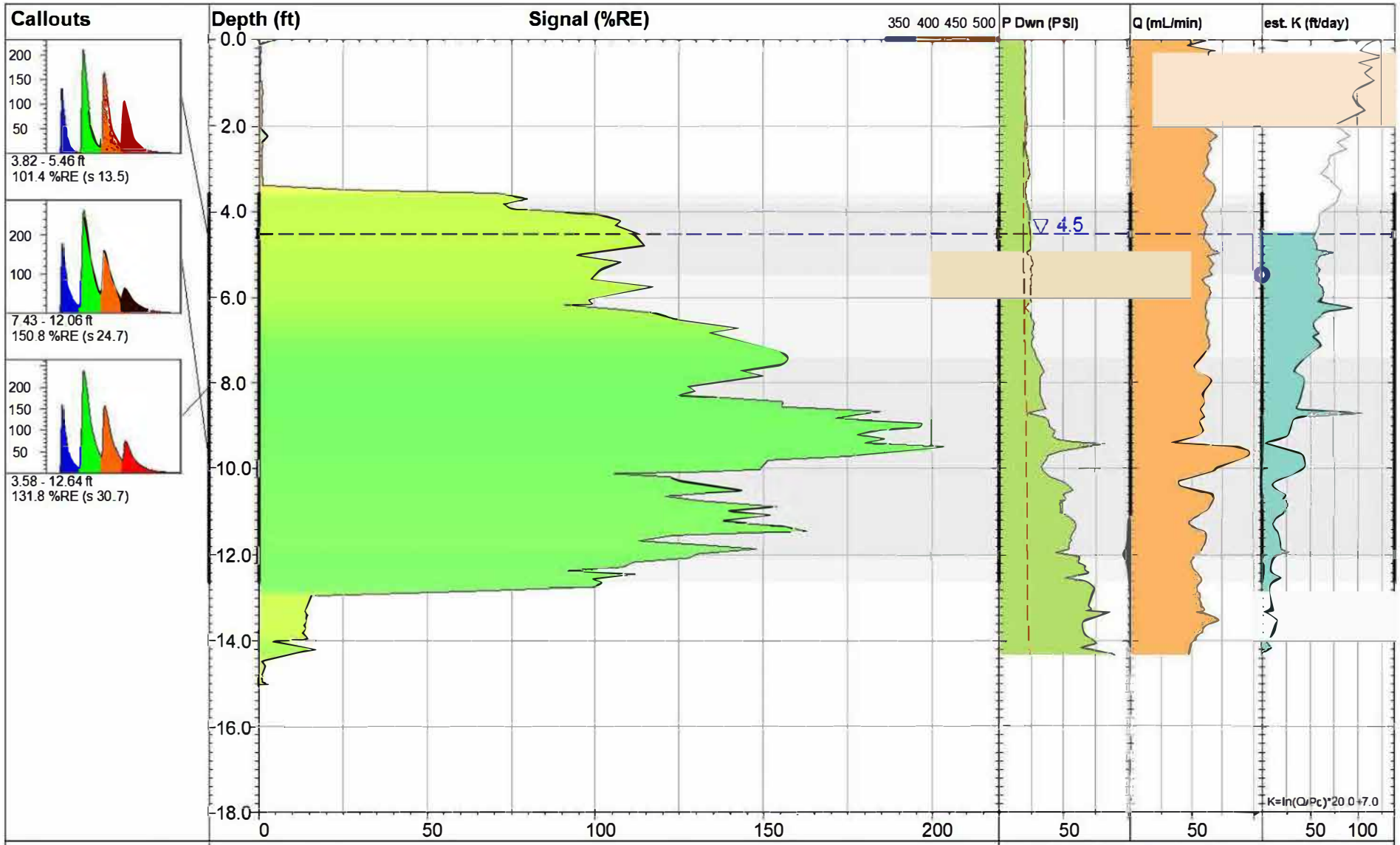
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **20.06 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **261.6 %RE @ 10.23 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-20 13:46 CDT**



LIF33A-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **203.4 %RE @ 9.50 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 09:05 CDT**

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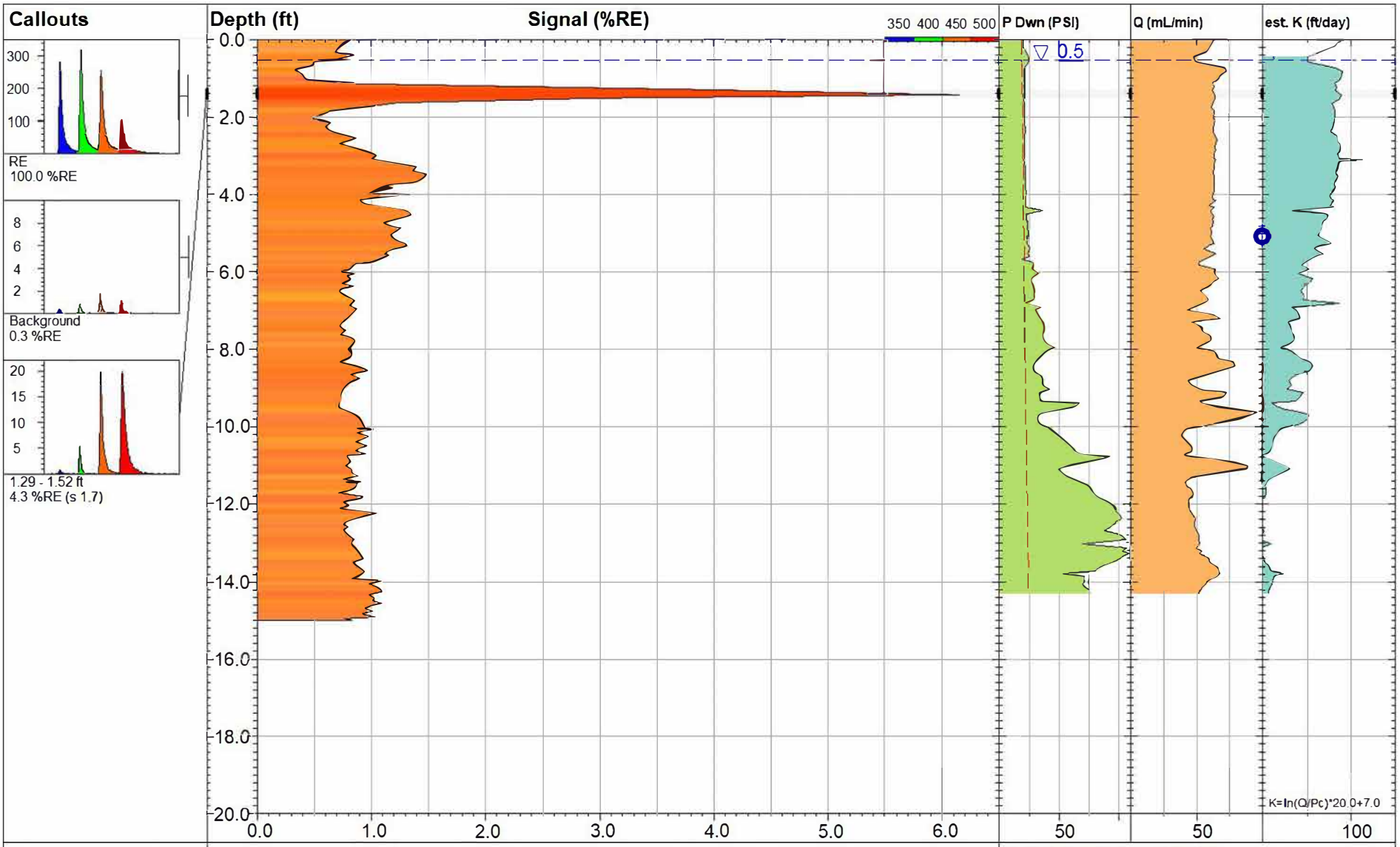

LIF34-19

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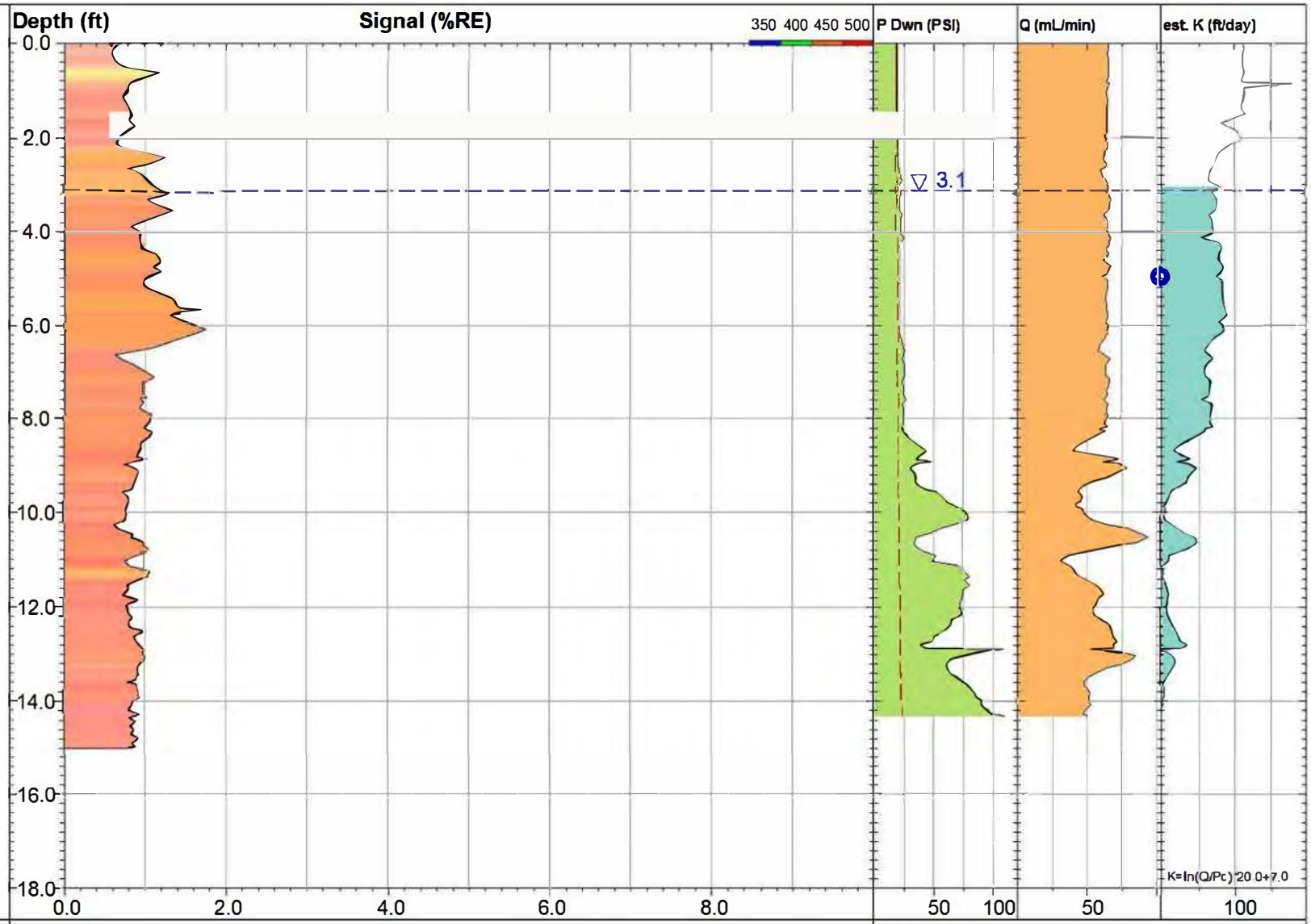
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **6.2 %RE @ 1.43 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 13:08 CDT**



LIF/MIP34A-19

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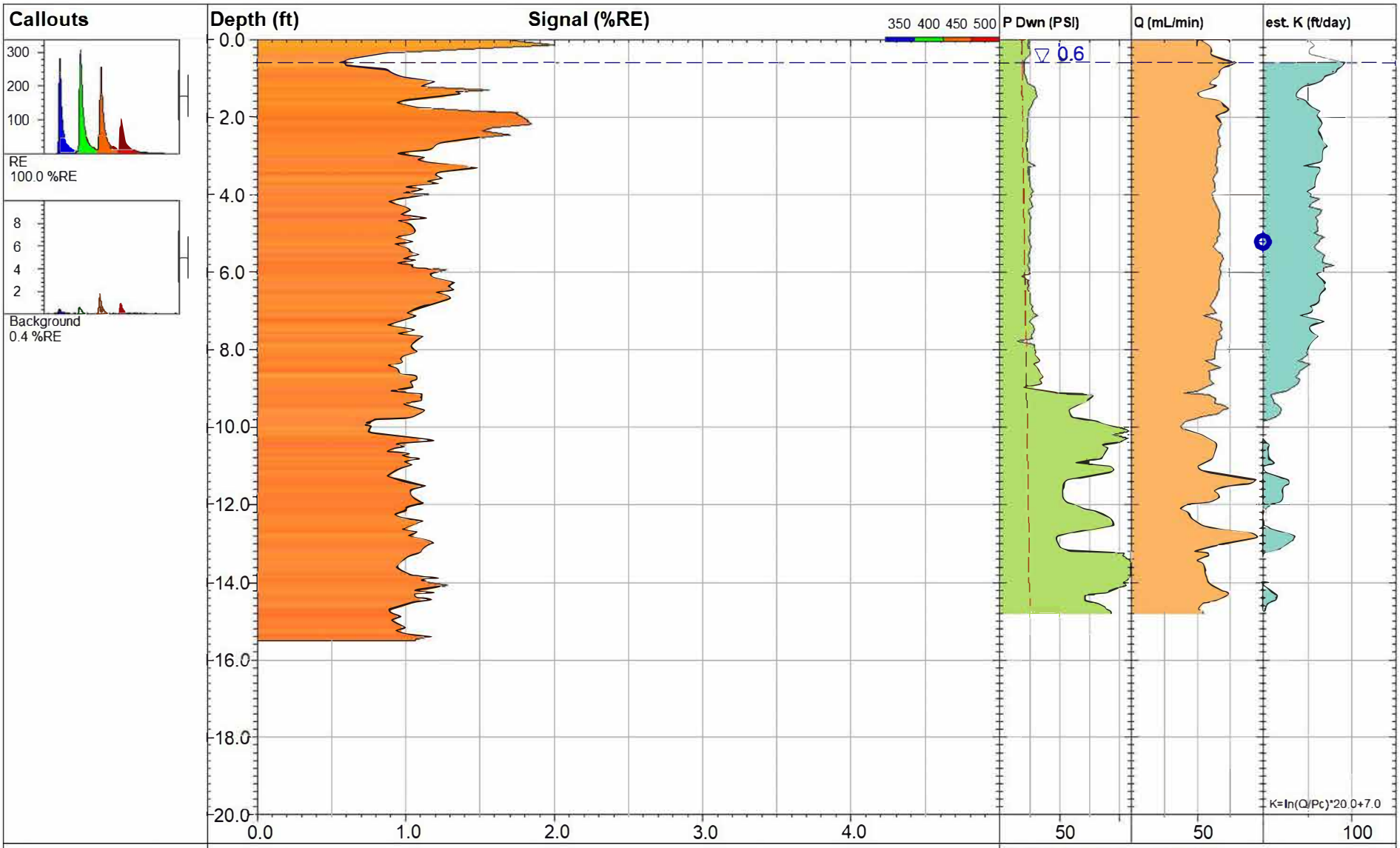
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 6.09 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 09:57 CDT**



LIF35-19

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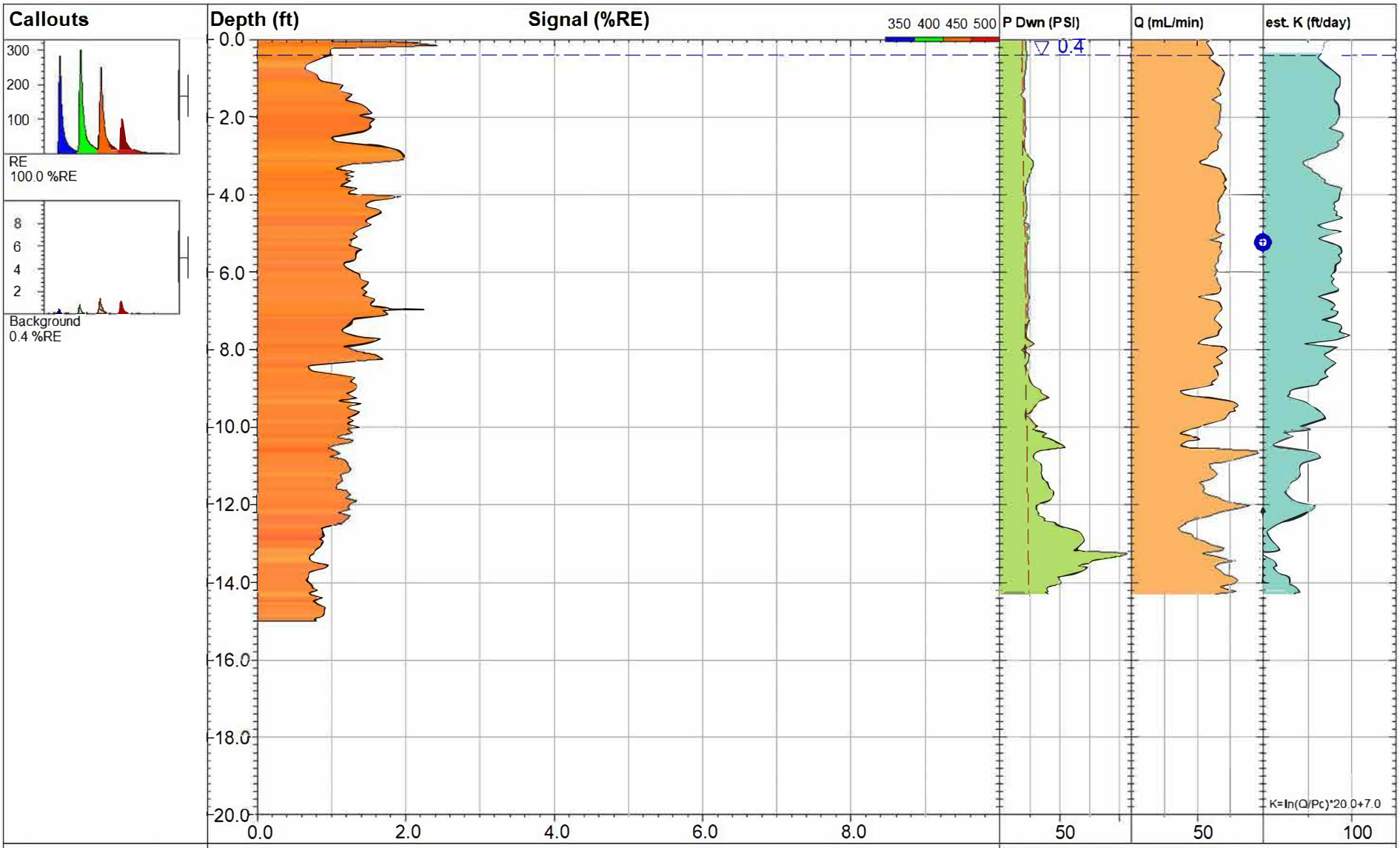
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.51 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 0.14 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-20 14:43 CDT**



LIF/MIP36-19

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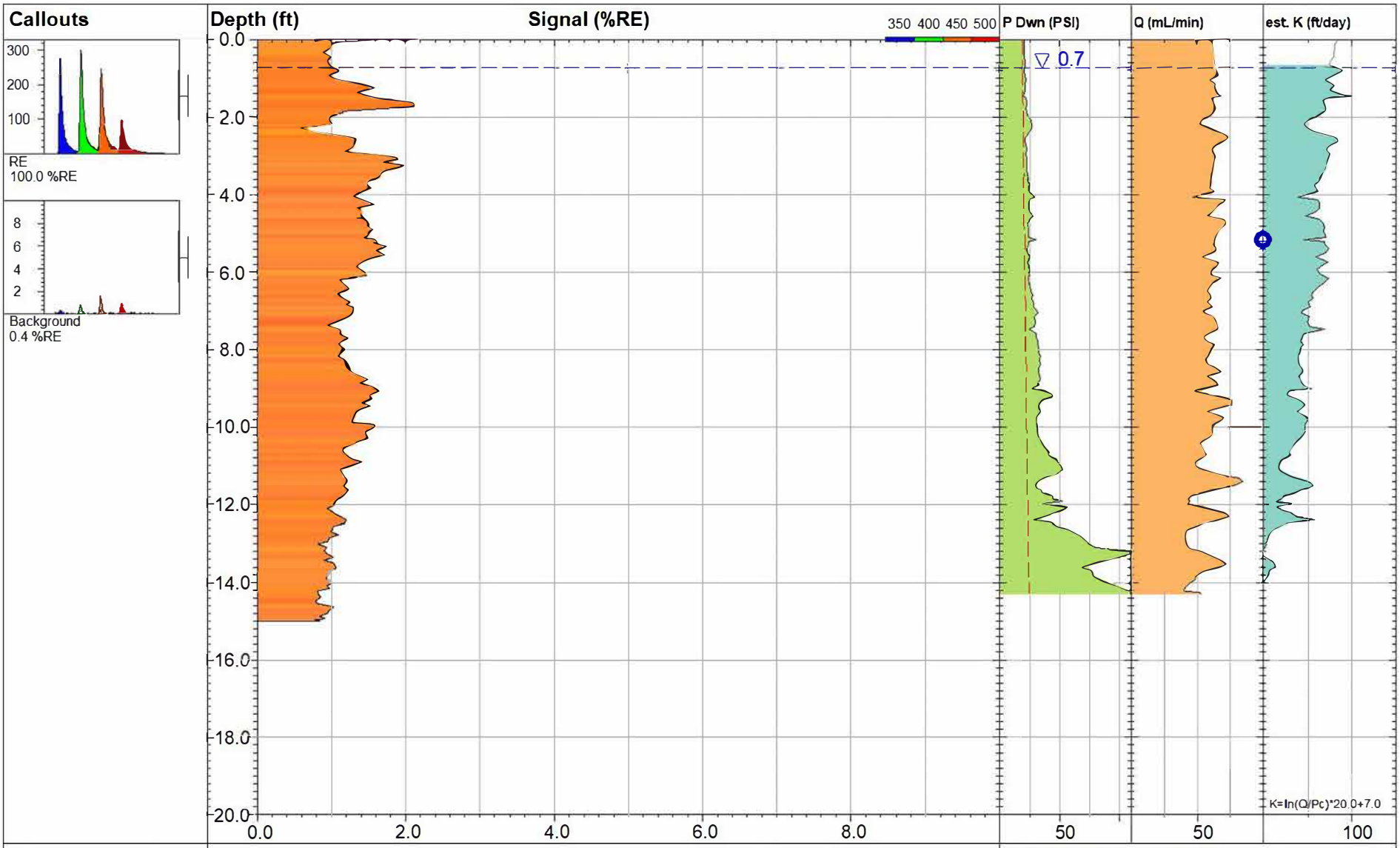
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.4 %RE @ 0.15 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-20 15:36 CDT**



LIF/MIP37-19

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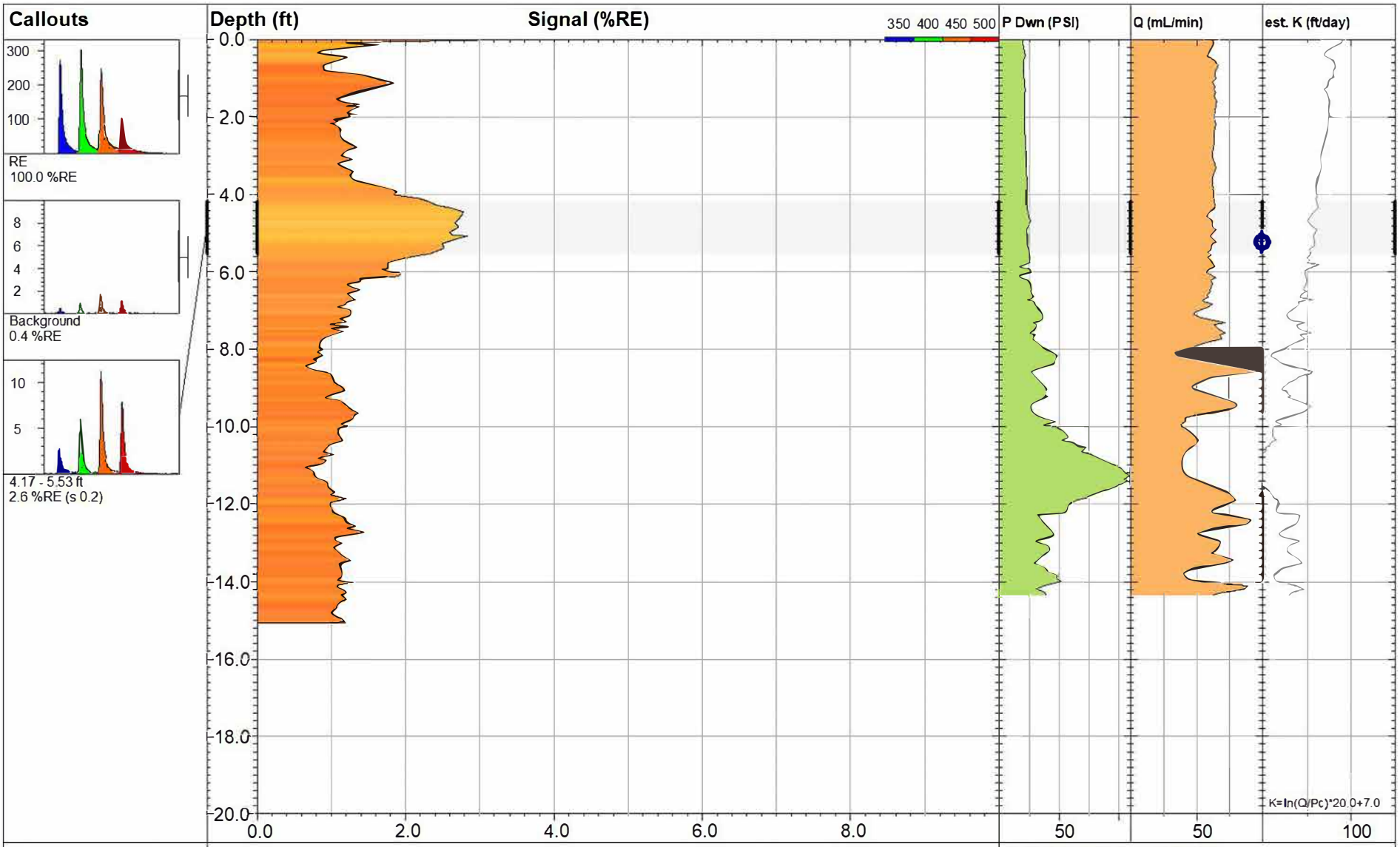
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.1 %RE @ 1.74 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 11:03 CDT**



LIF/MIP38-19

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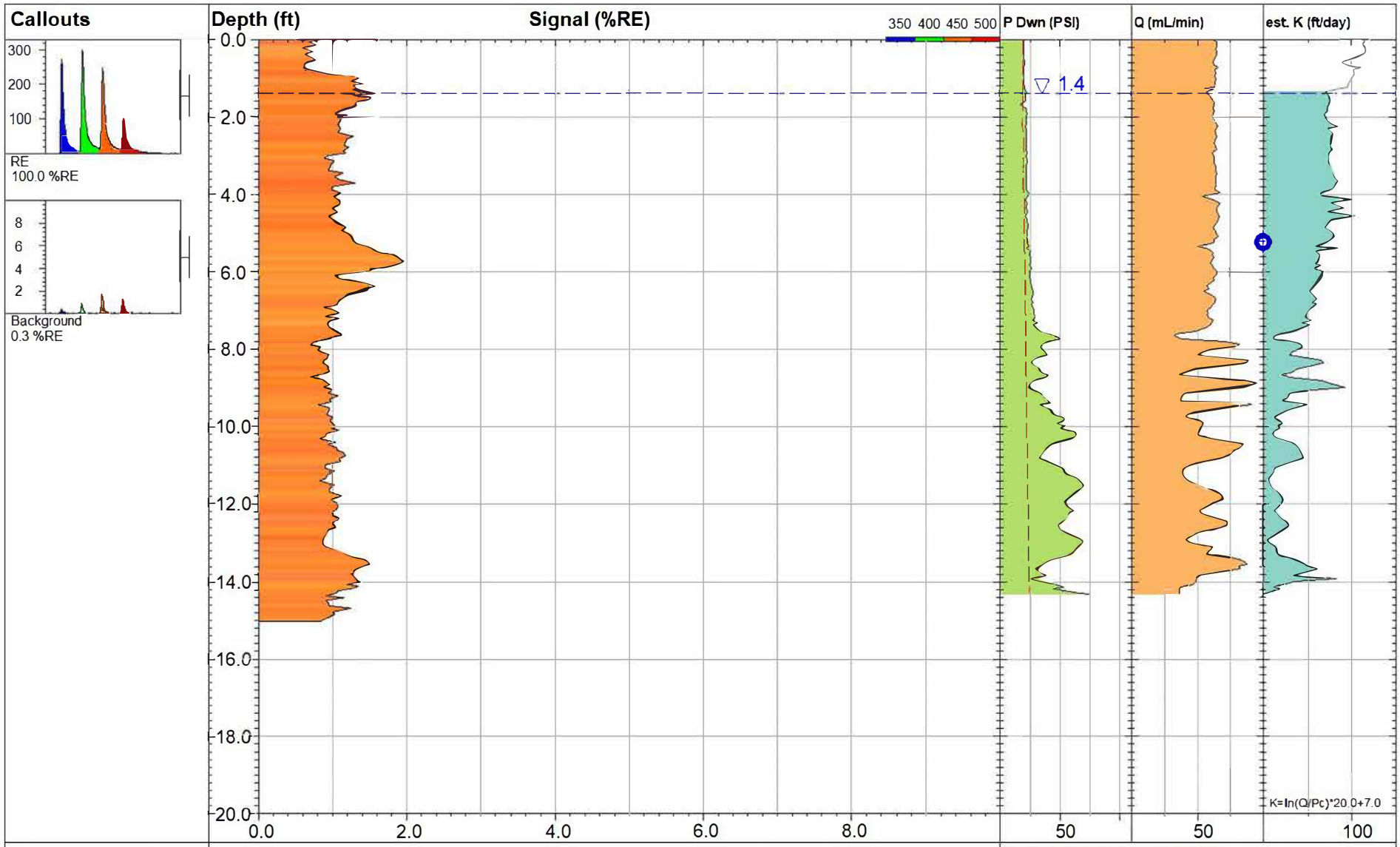
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.4 %RE @ 0.01 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 10:23 CDT**



LIF/MIP39-19

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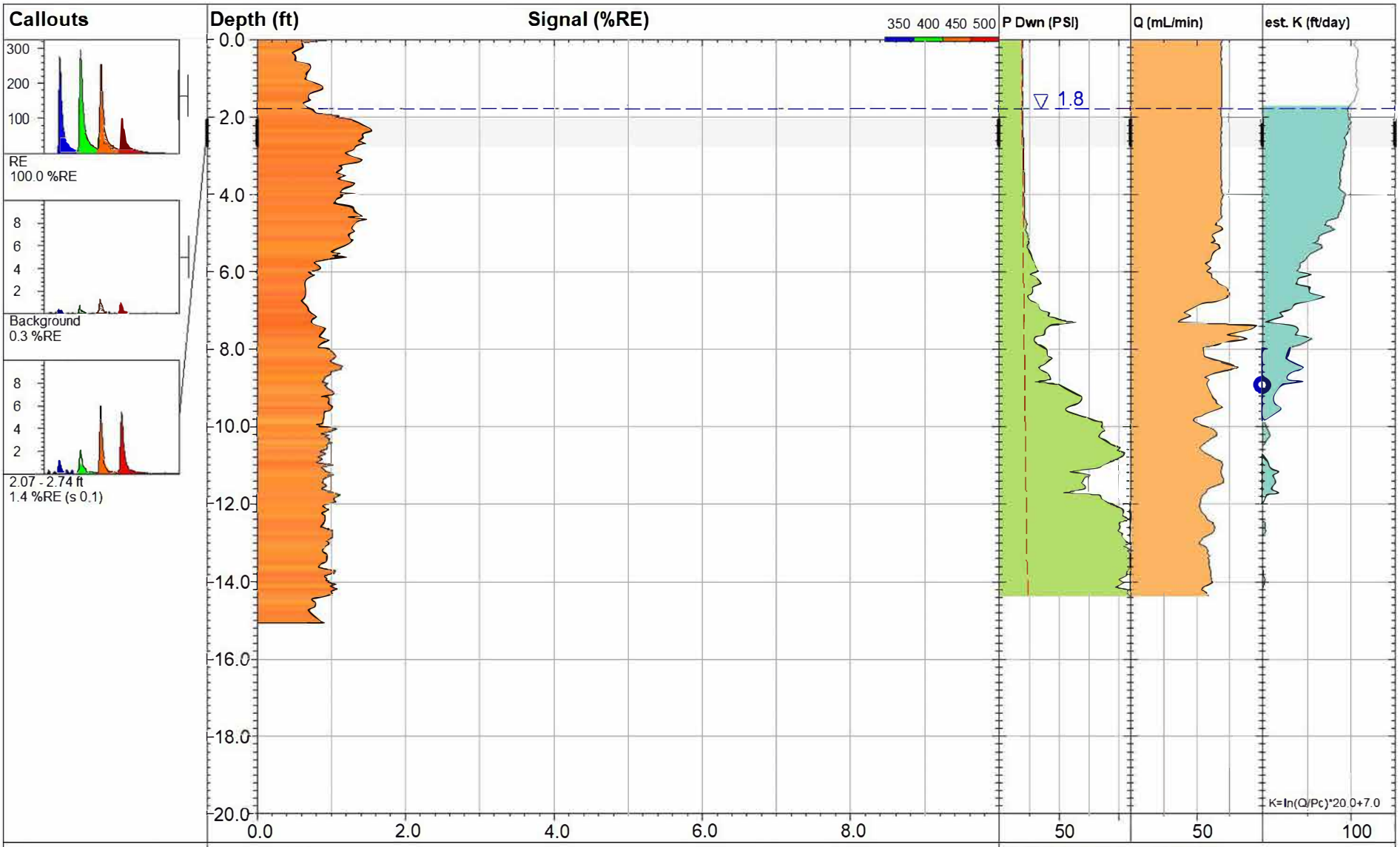
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 5.72 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-23 09:45 CDT**



LIF/MIP40-19

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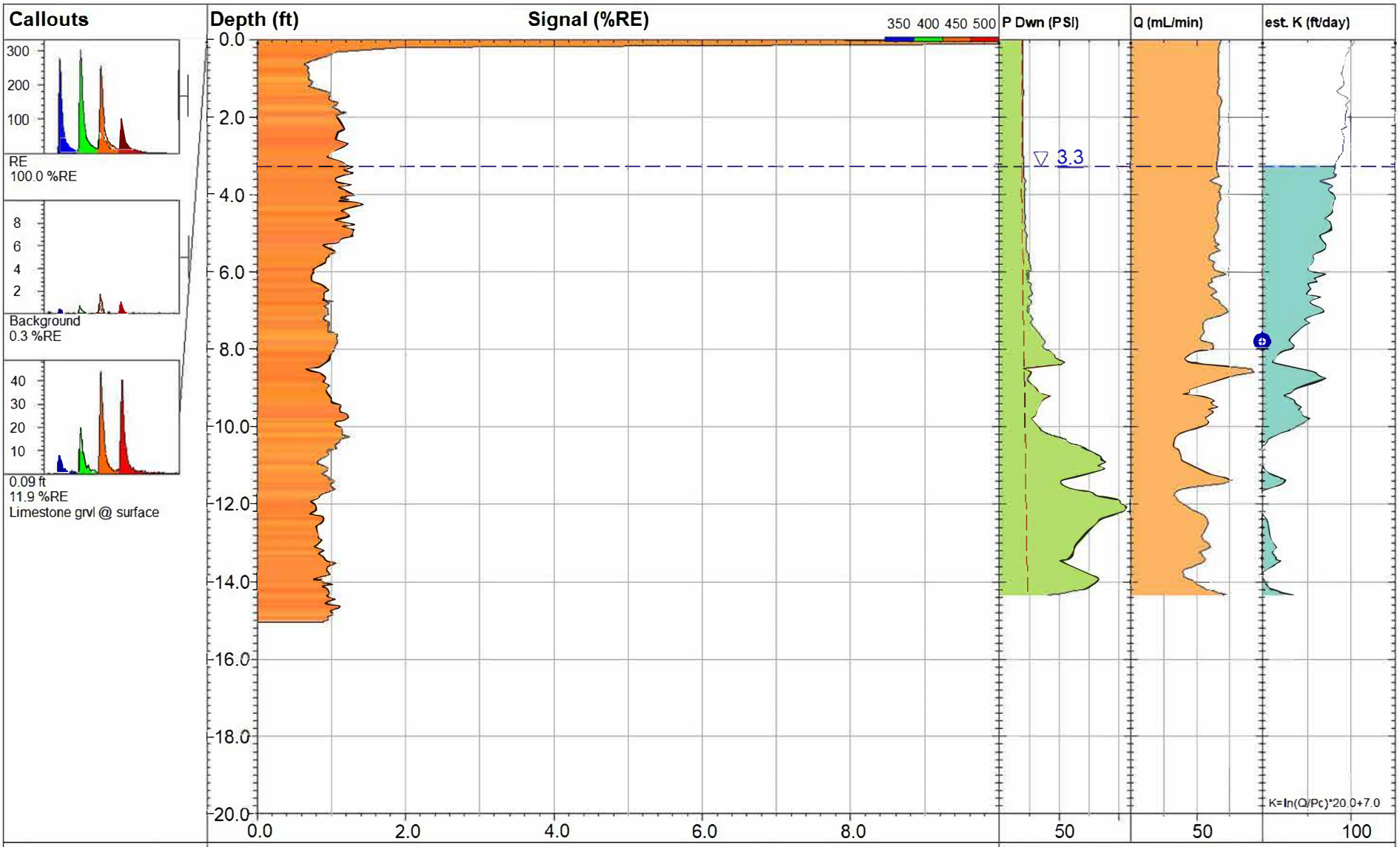
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.6 %RE @ 2.36 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-13 14:13 CDT**



LIF/MIP41-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **11.9 %RE @ 0.09 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-13 13:25 CDT**

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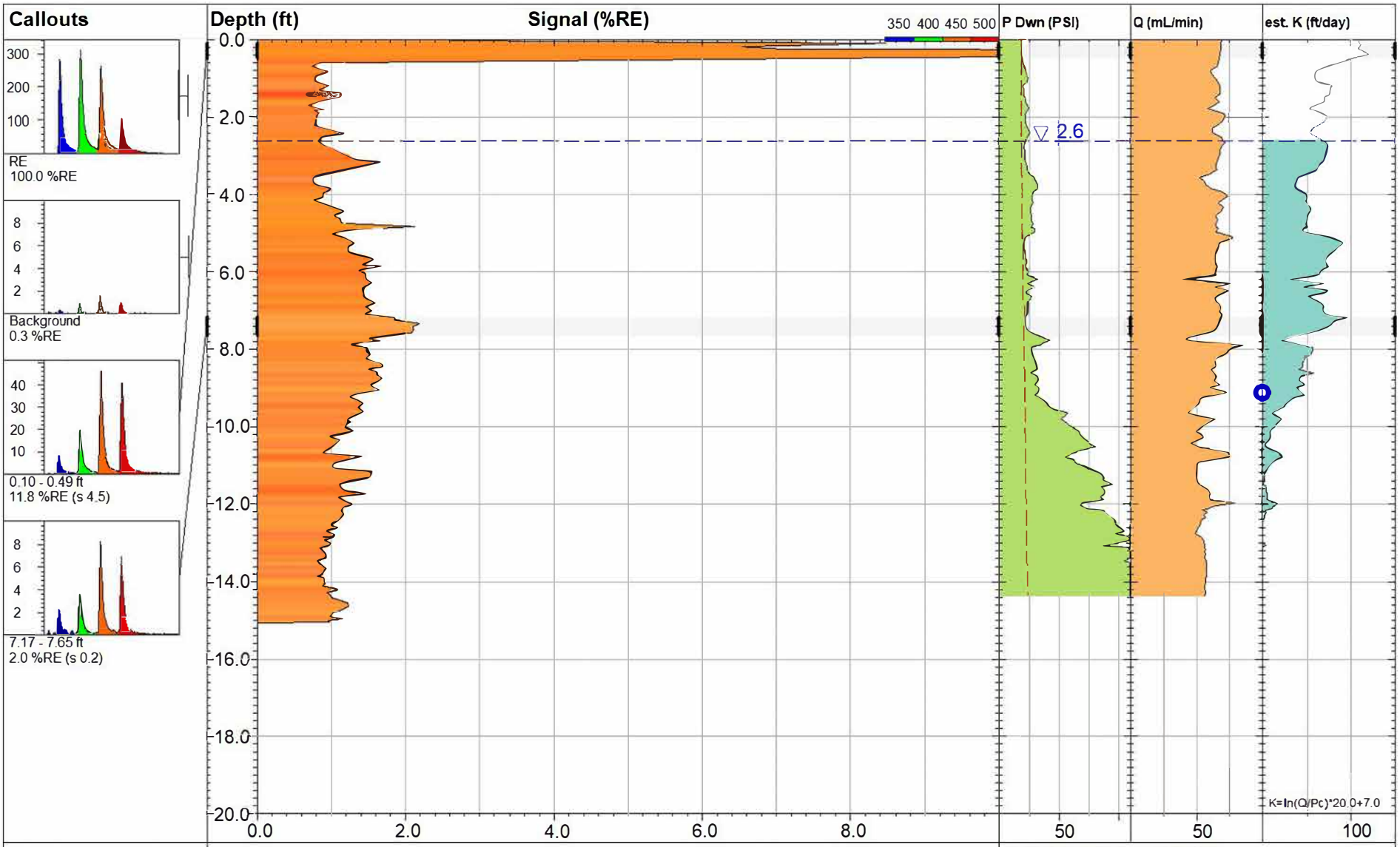

LIF/MIP42-19

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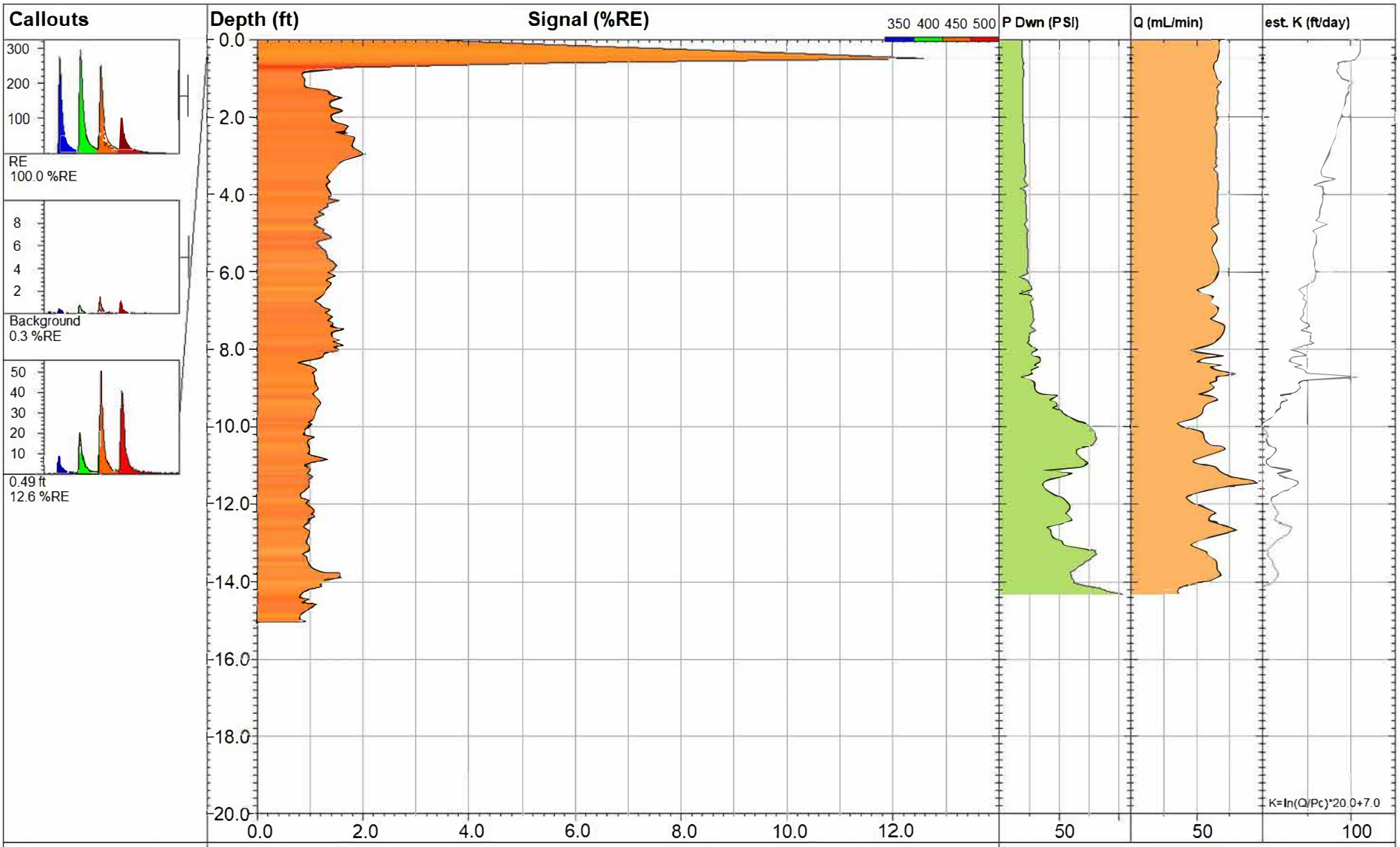
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **18.2 %RE @ 0.32 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-13 15:31 CDT**



LIF/MIP43-19

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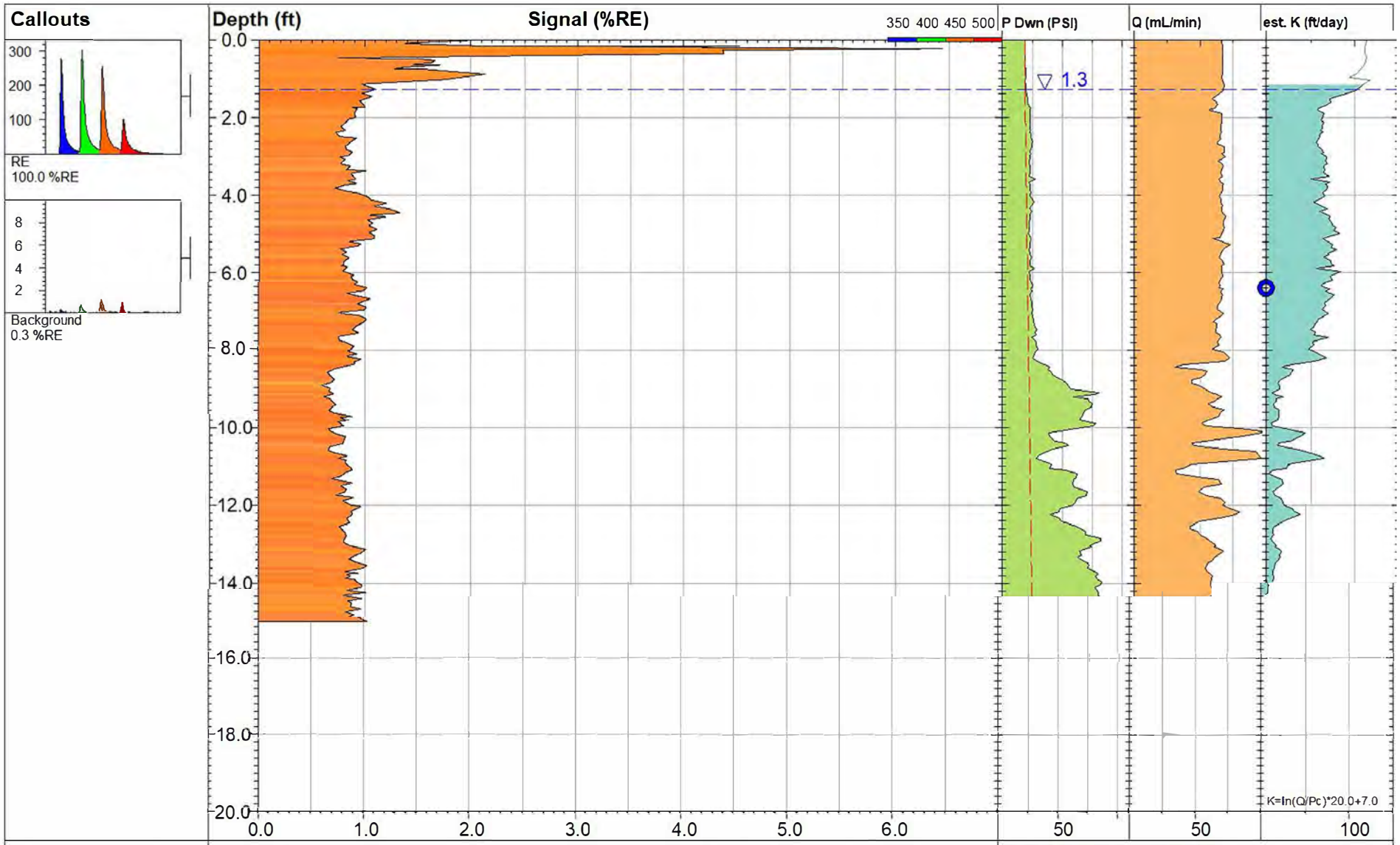
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **12.6 %RE @ 0.49 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-14 09:38 CDT**



LIF/MIP44-19

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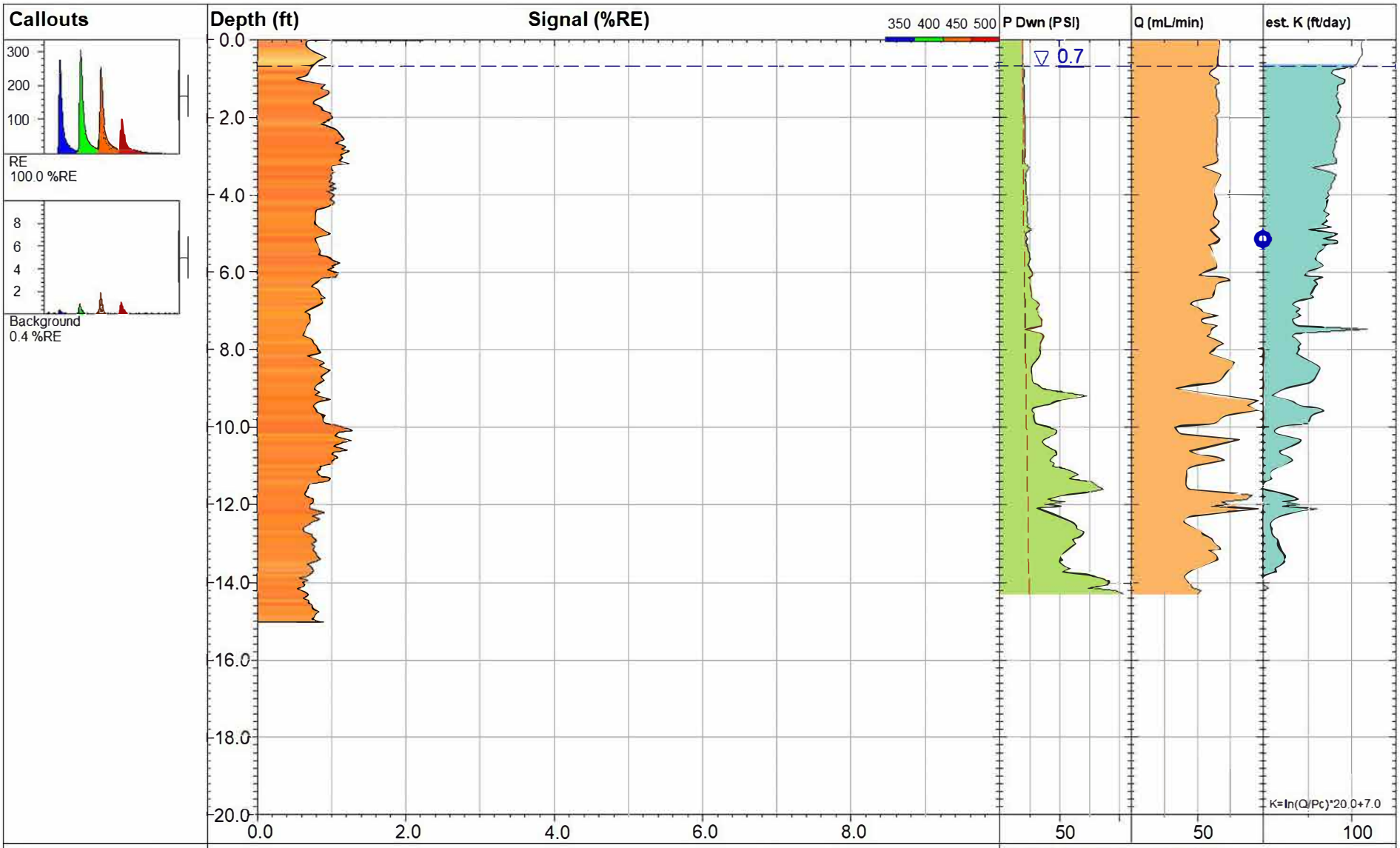
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **6.5 %RE @ 0.23 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-14 10:08 CDT**



LIF/MIP45-19

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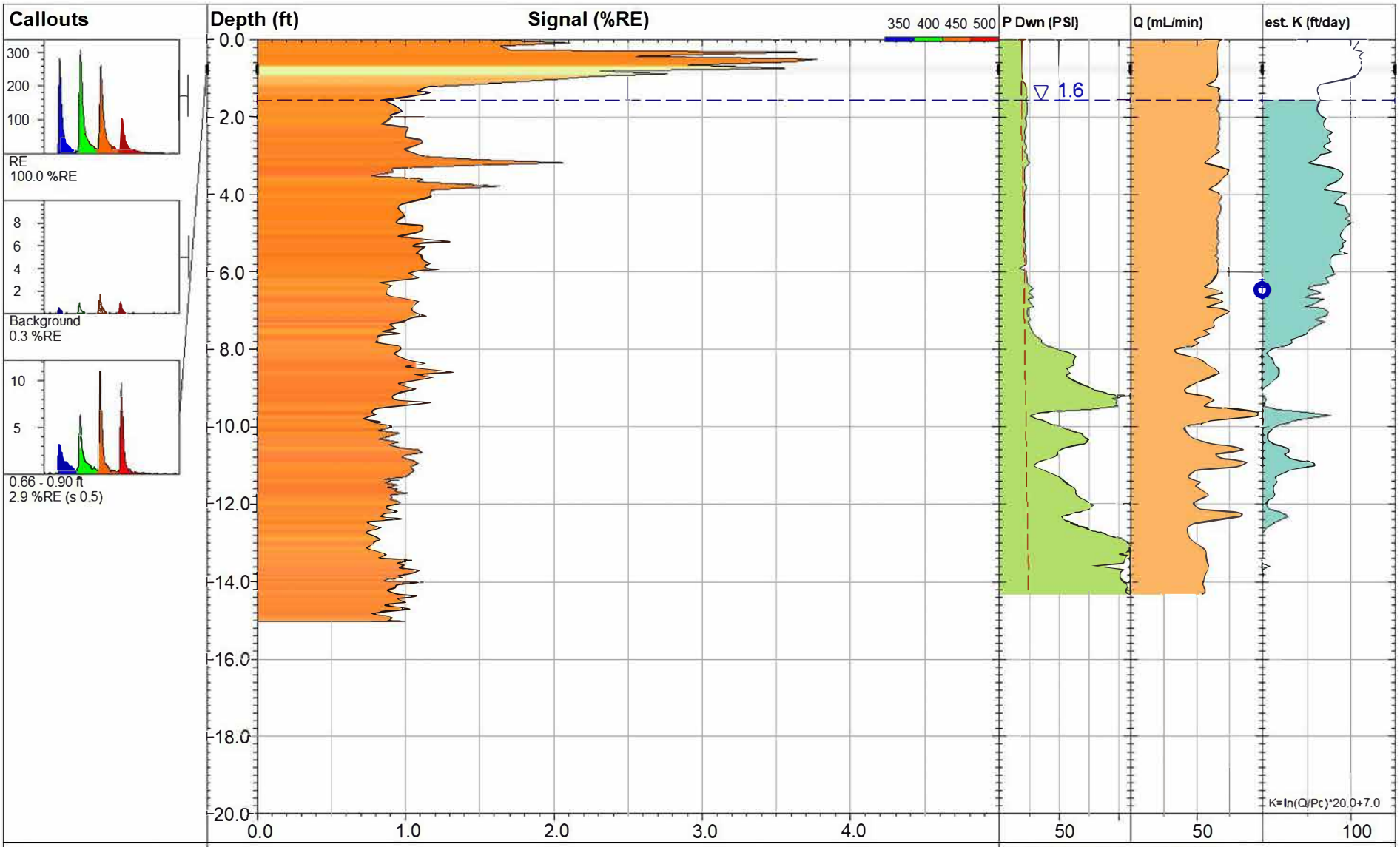
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.4 %RE @ 0.02 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-16 09:03 CDT**



LIF/MIP46-19

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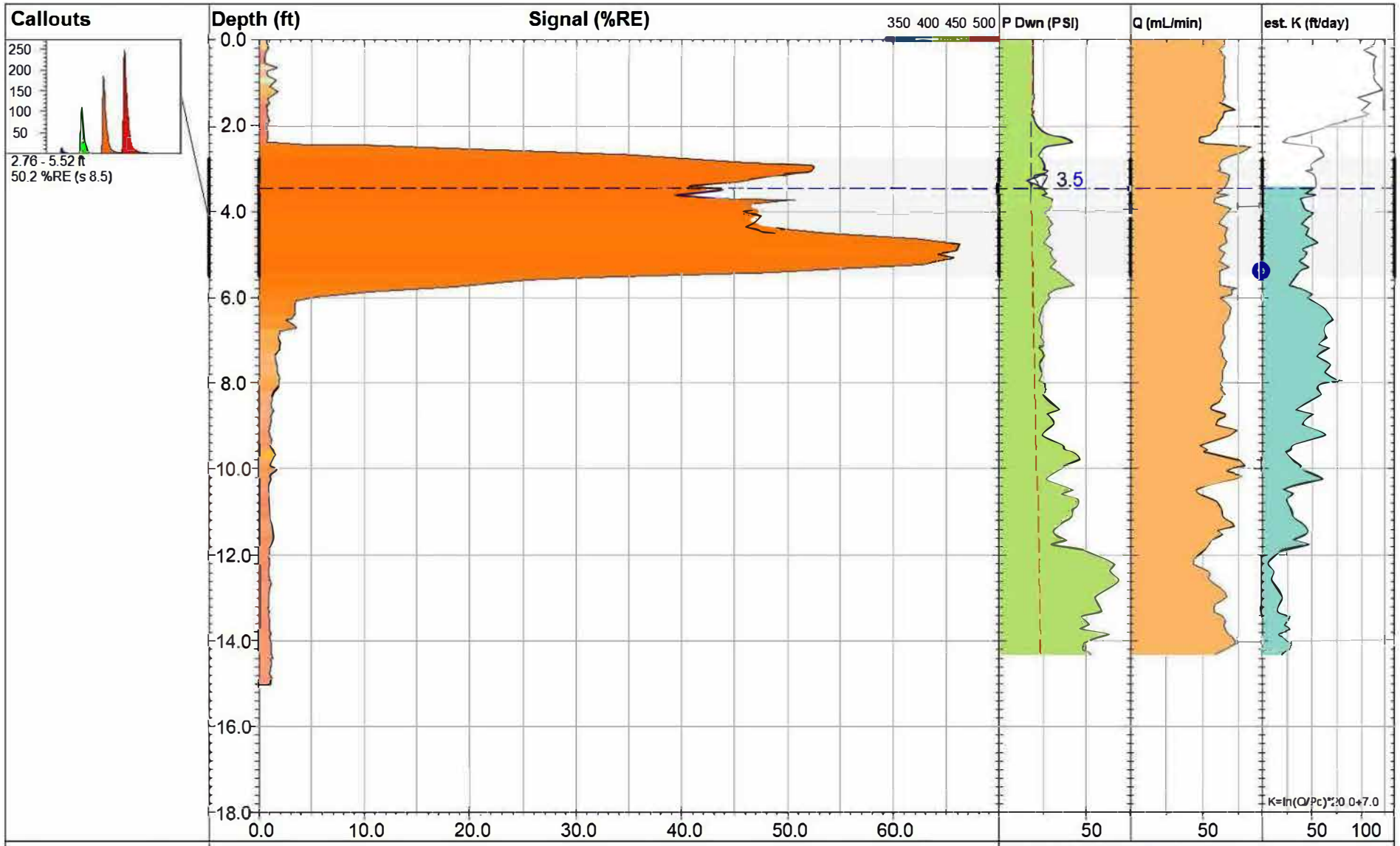
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.01 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.8 %RE @ 0.51 ft**
Operator / Unit: **EM/AK / UVOST1013**	*Elevation:* **Unavailable**	*Date & Time:* **2019-05-14 11:12 CDT**



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LIF47-19

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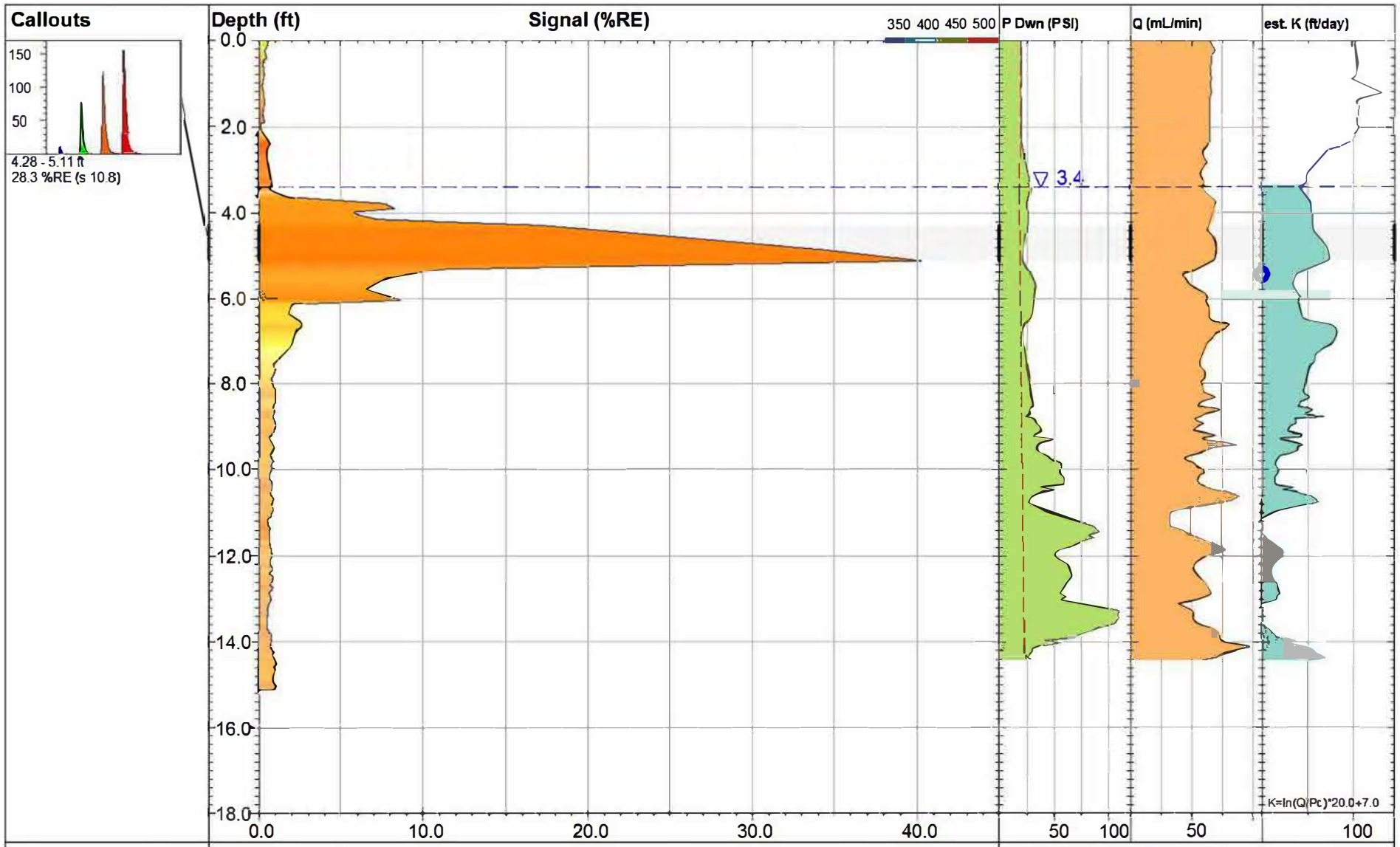
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **66.3 %RE @ 4.76 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 12:14 CDT**



LIF48-19

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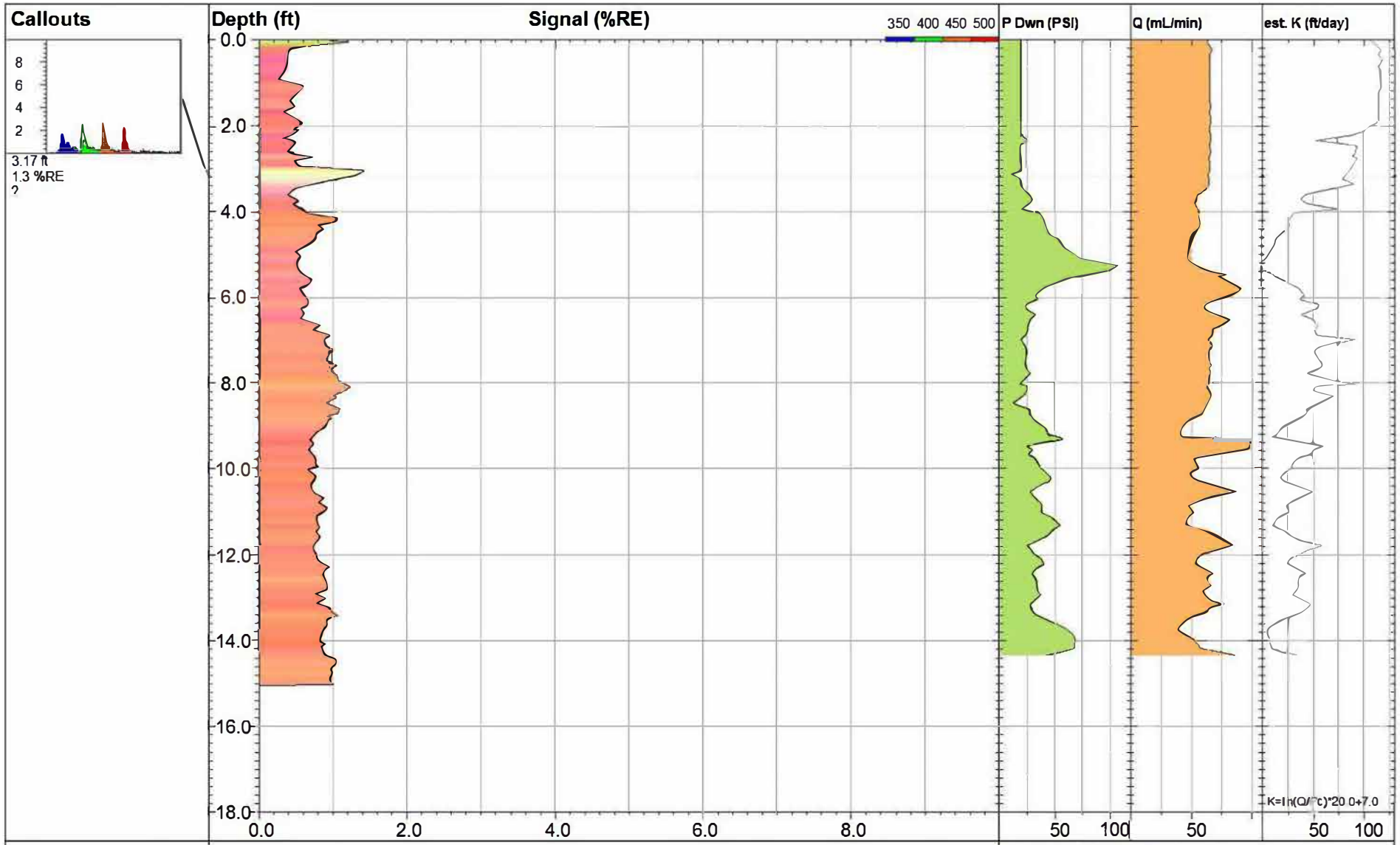
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.11 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **40.3 %RE @ 5.11 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 10:45 CDT**



LIF/MIP49-19

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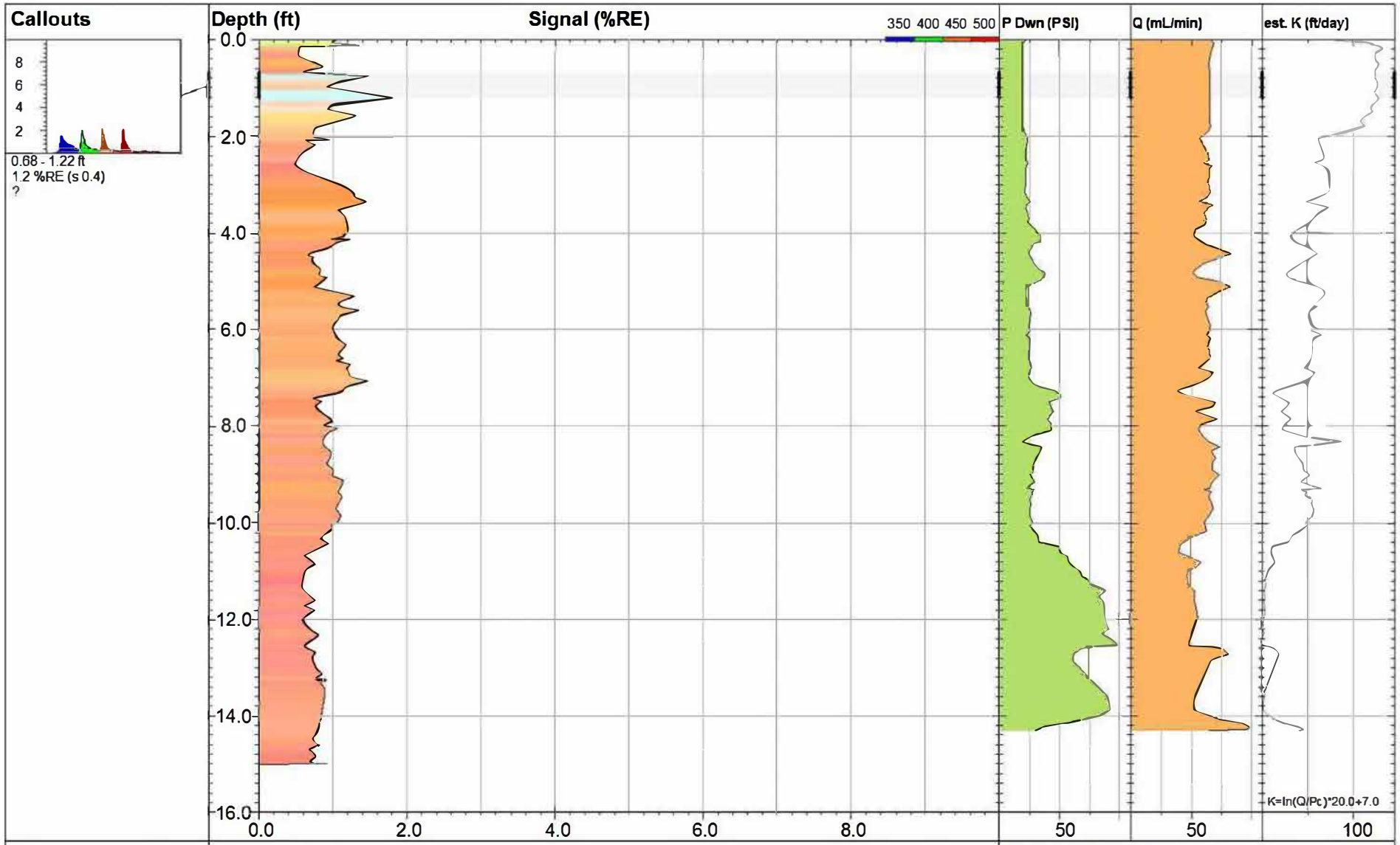
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.4 %RE @ 3.05 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 11:23 CDT**



LIF/MIP50-19

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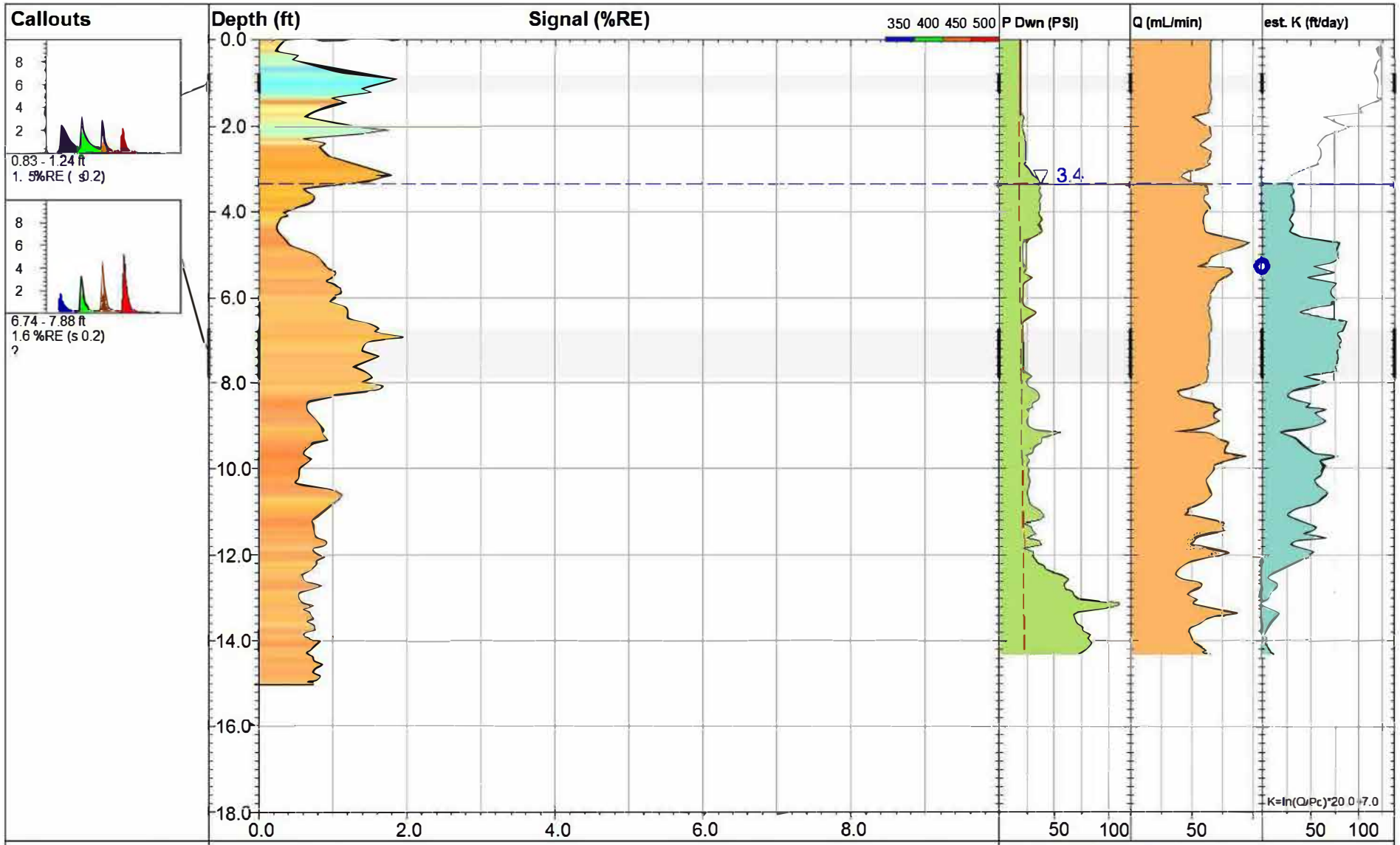
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.8 %RE @ 1.22 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 10:45 CDT**



LIF/MIP51-19

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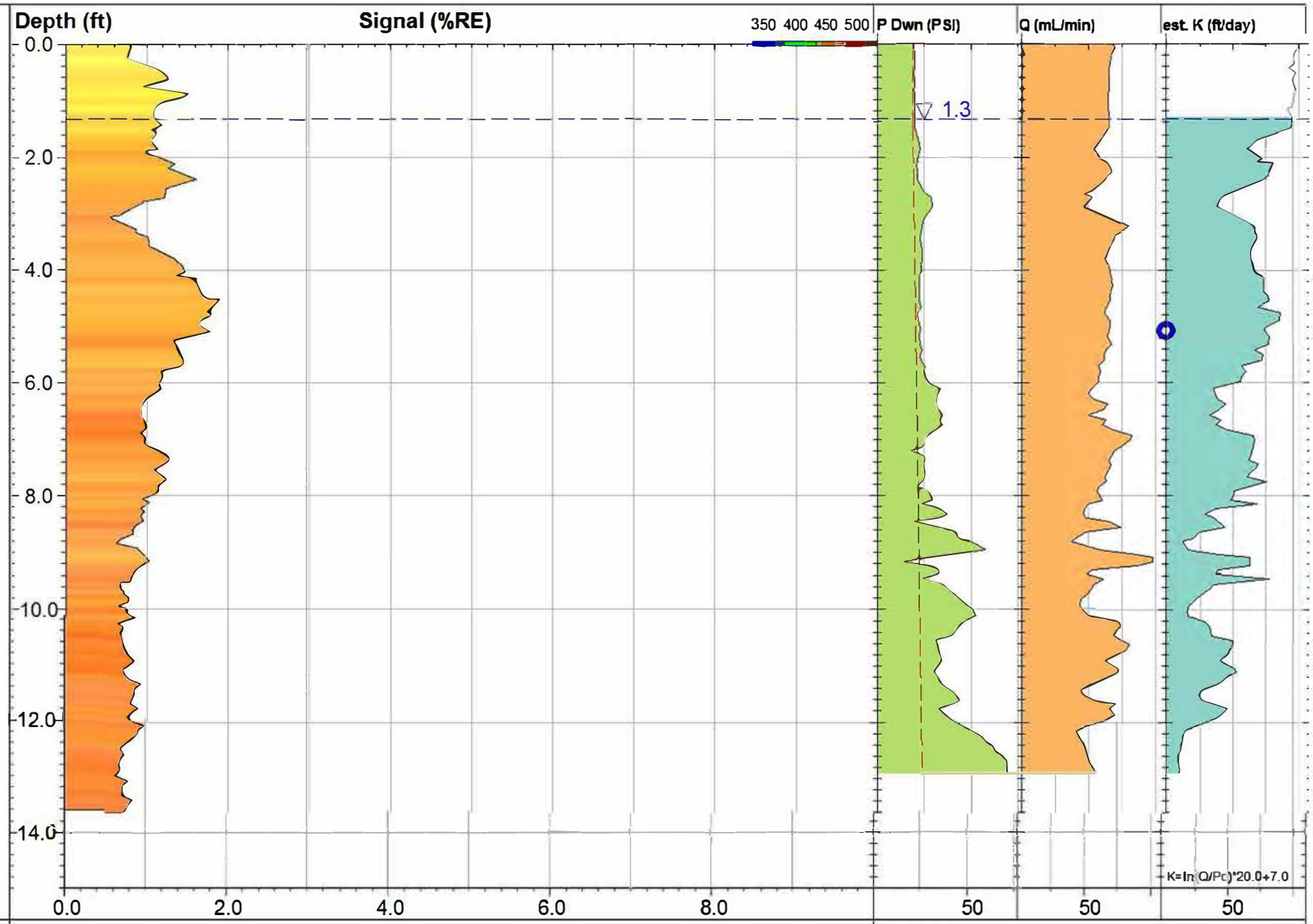
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 6.93 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 10:00 CDT**



LIF/MIP52-19

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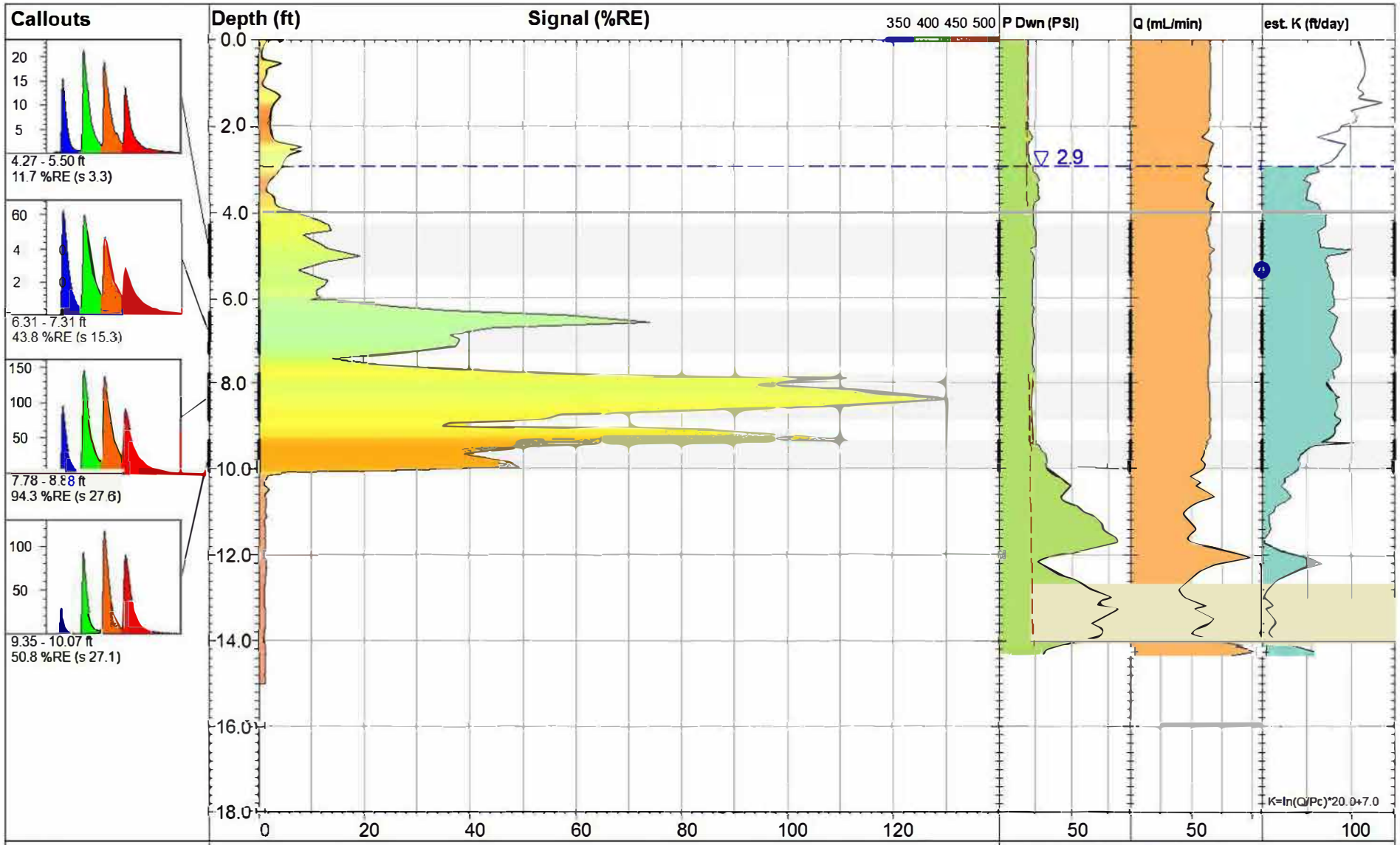
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **13.60 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.9 %RE @ 4.51 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 09:25 CDT**



LIF53-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **130.4 %RE @ 8.37 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-10 14:22 CDT**

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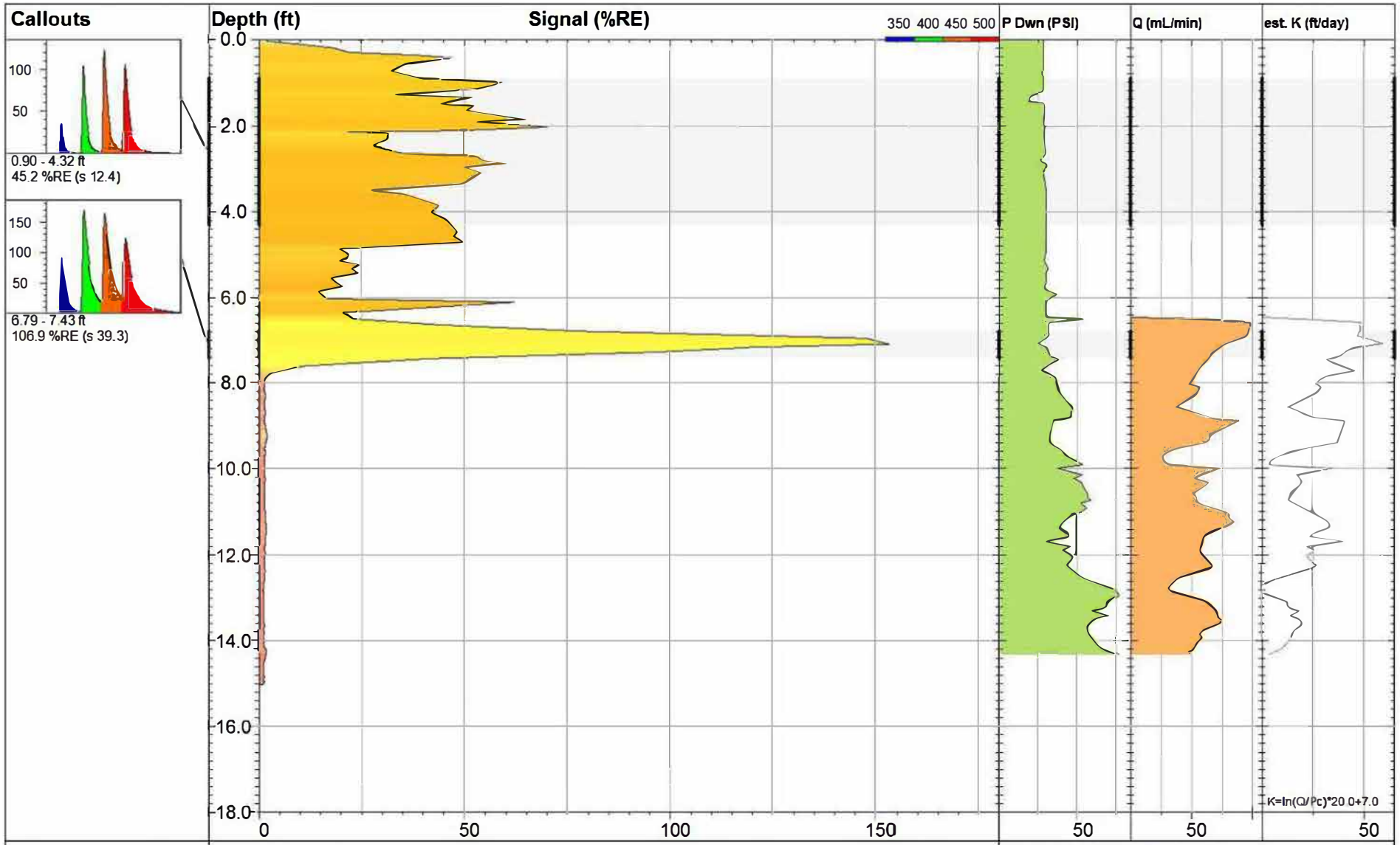

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LIF54-19

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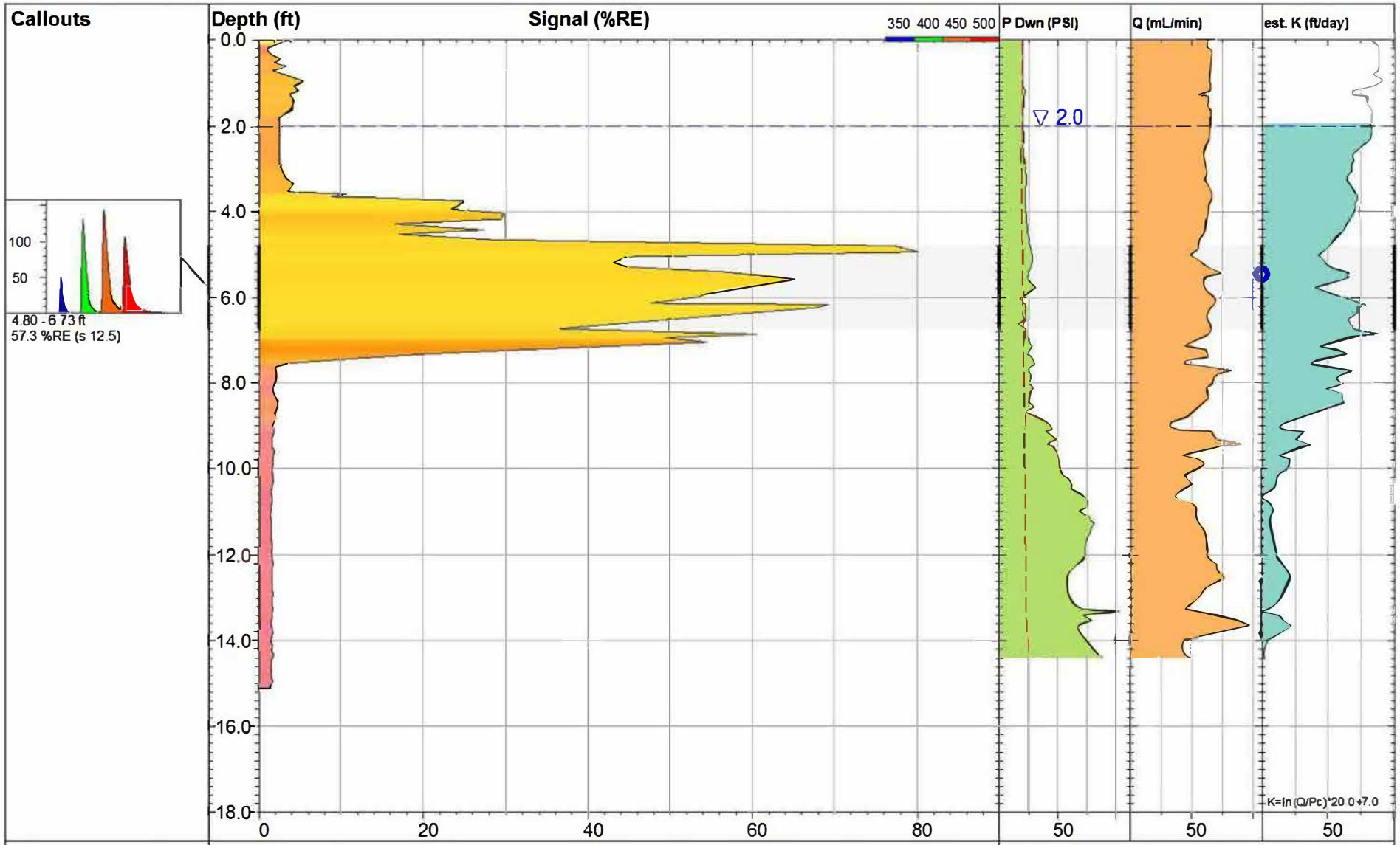
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **153.1 %RE @ 7.09 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-08 16:16 CDT**



LIF55-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.10 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **80.1 %RE @ 4.94 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-08 12:34 CDT**

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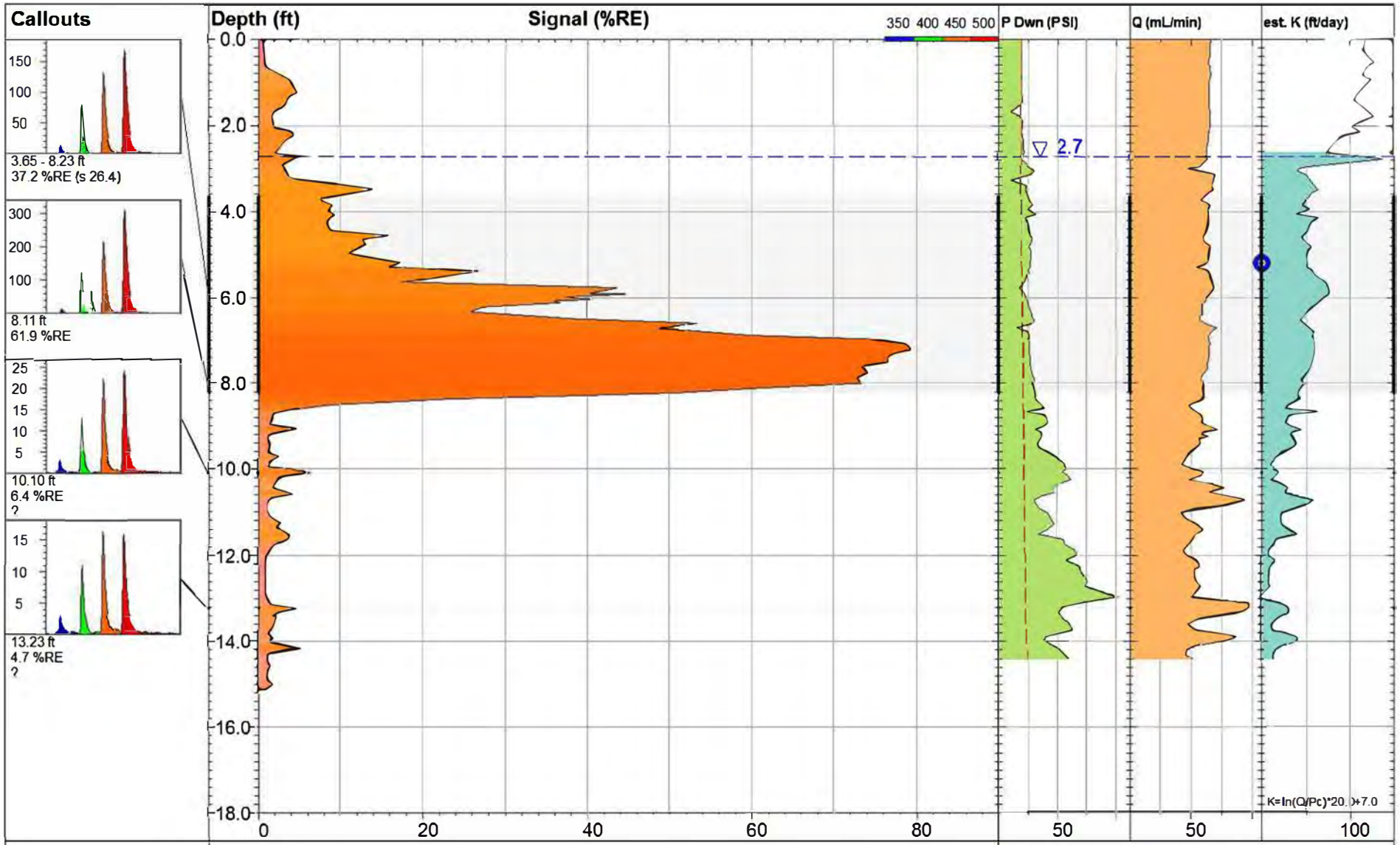

LIF57-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.12 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **79.3 %RE @ 7.23 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-09 11:43 CDT**

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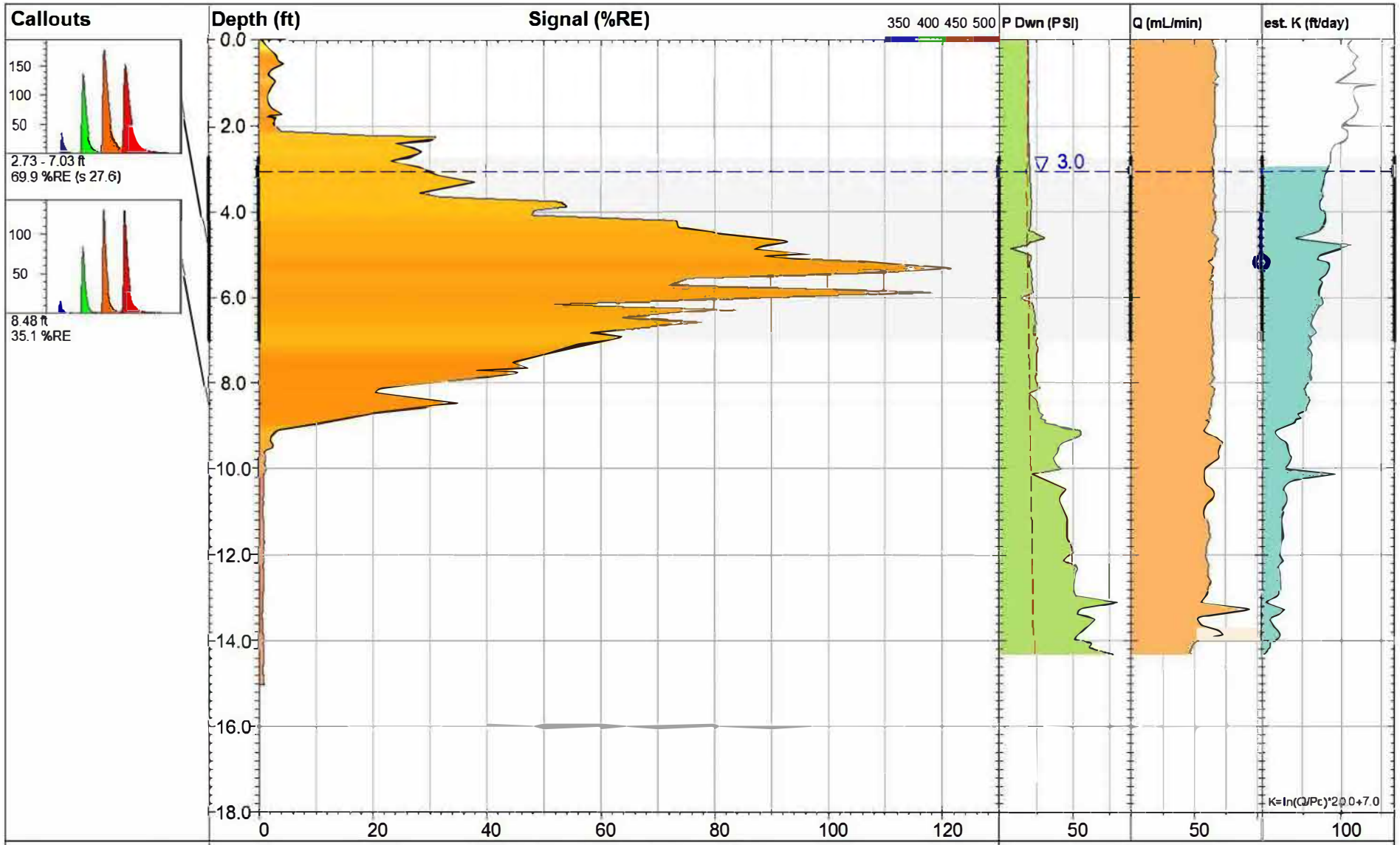

LIF58-19

Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **121.6 %RE @ 5.33 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 16:17 CDT**

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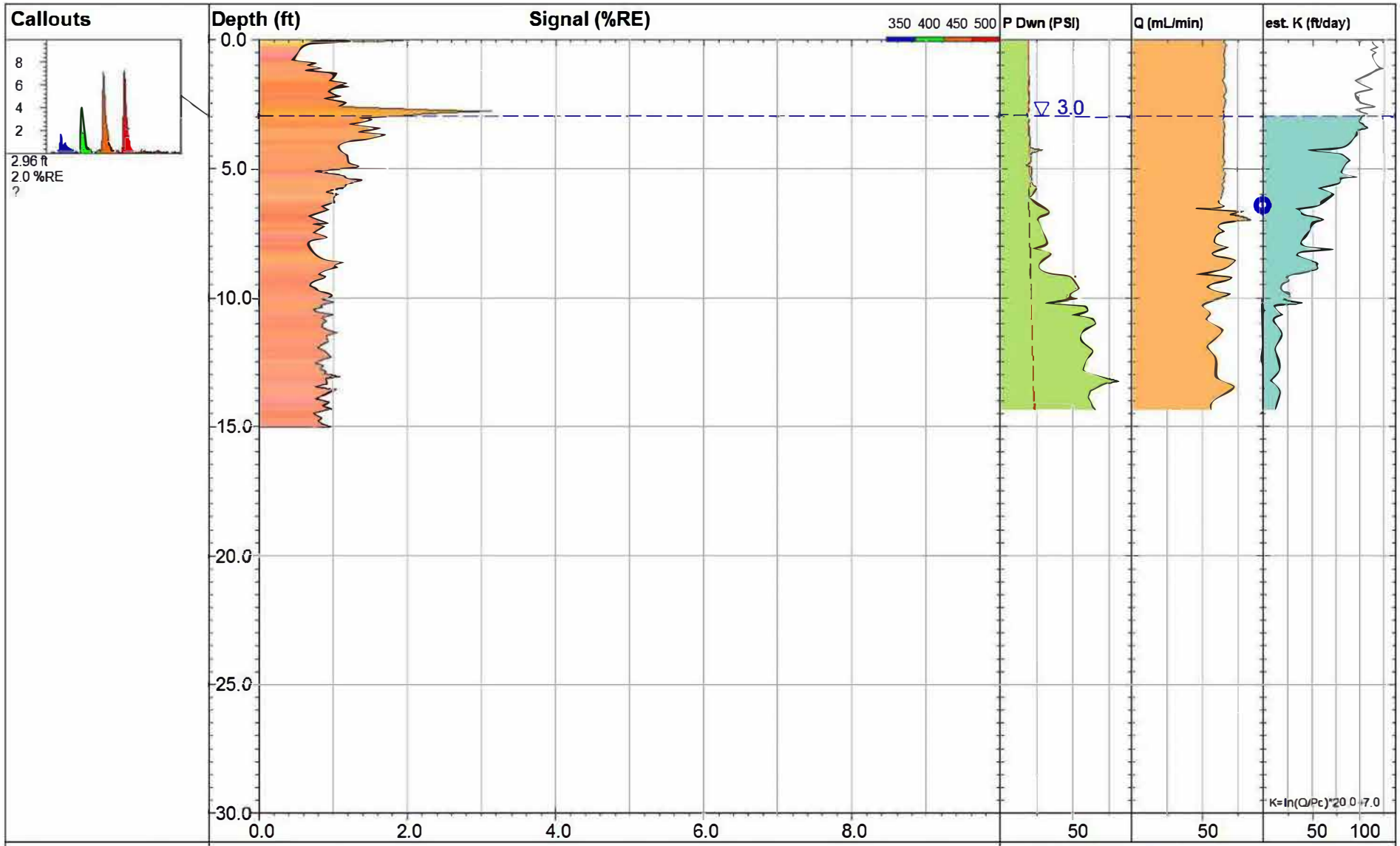

LIF59-19

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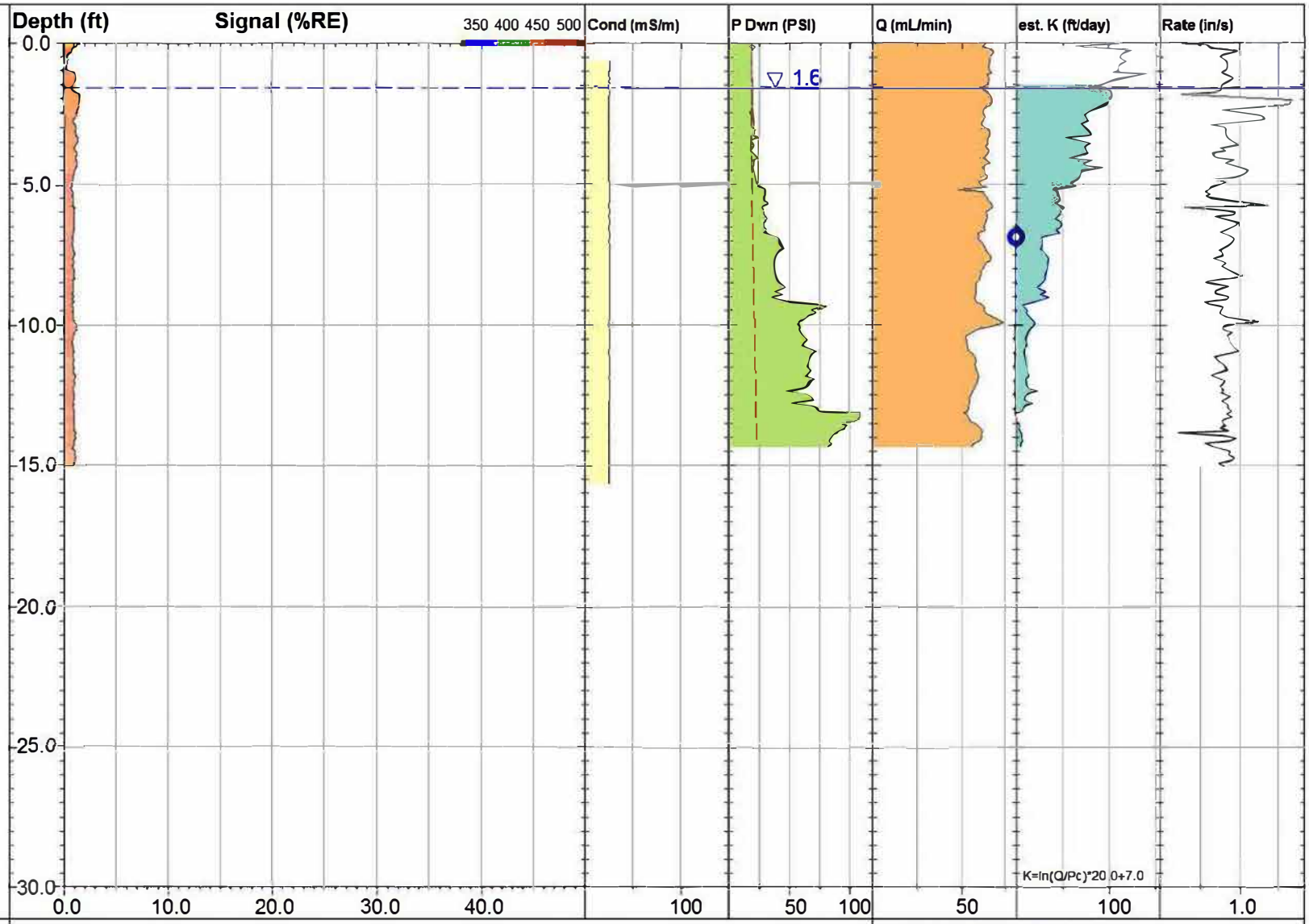
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.2 %RE @ 2.78 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 13:52 CDT**



LIF60-19

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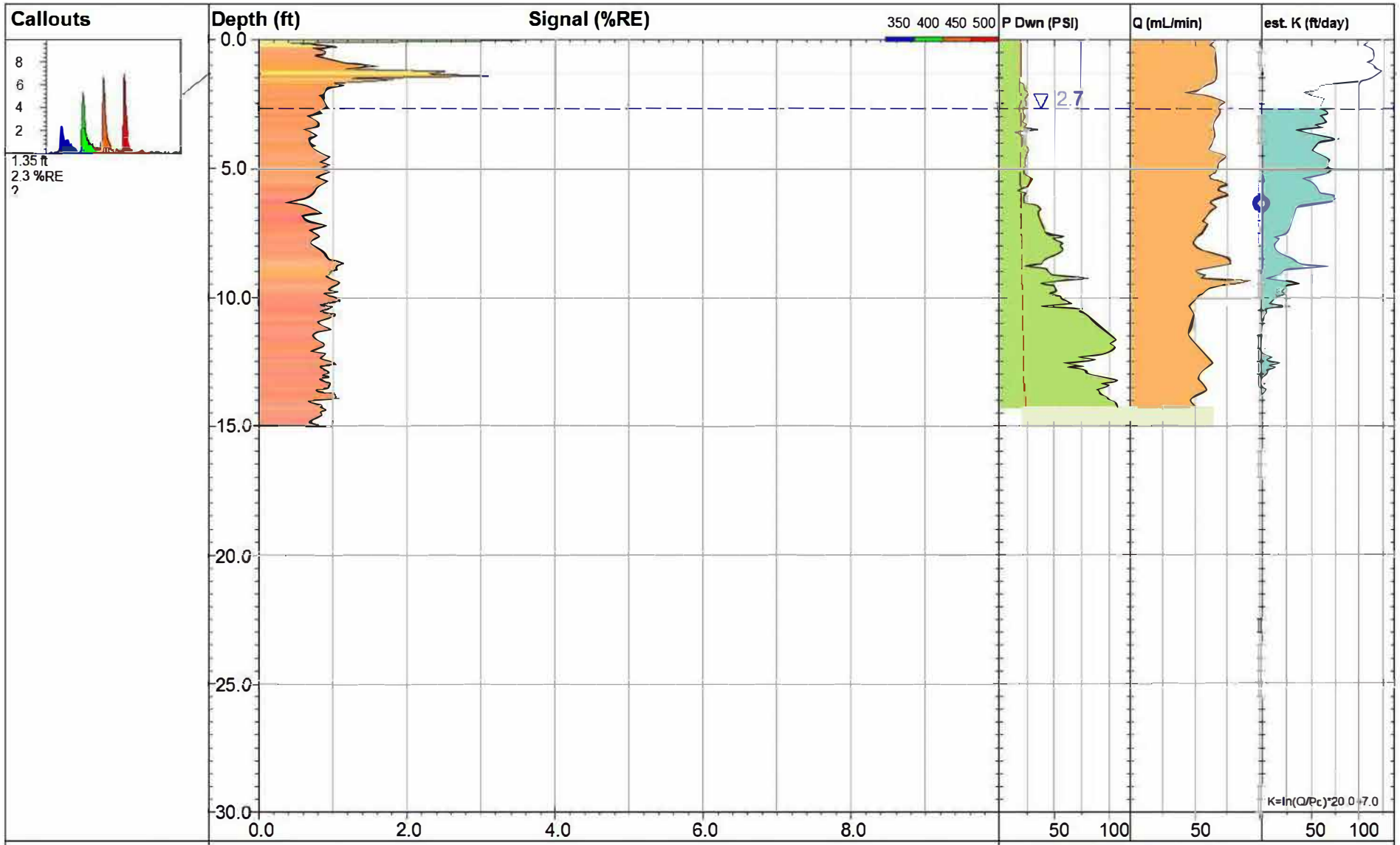
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **2.0 %RE @ 0.00 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 11:37 CDT**



LIF61-19

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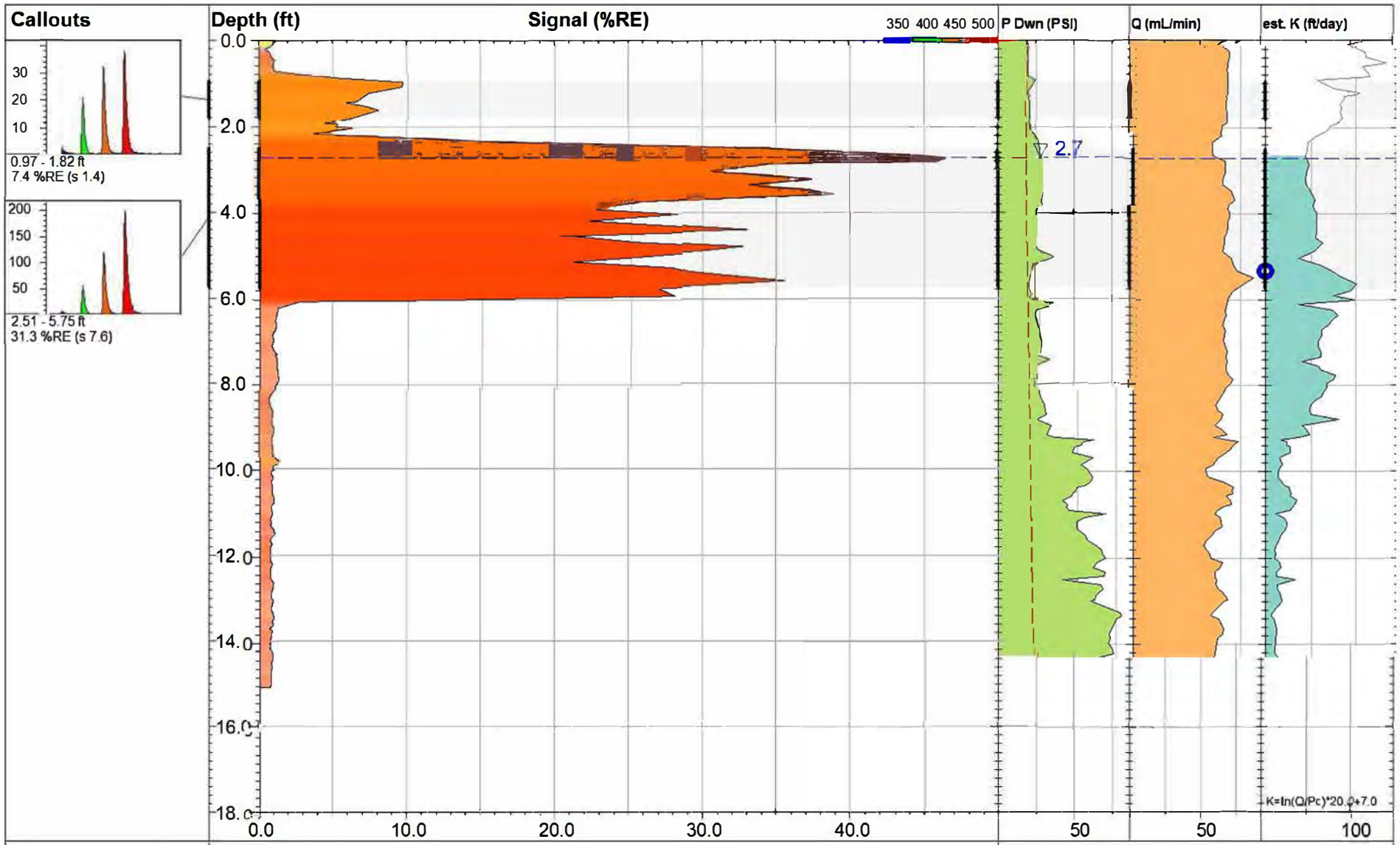
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.6 %RE @ 0.00 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 14:34 CDT**



LIF63-19

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Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **46.5 %RE @ 2.74 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-07 15:13 CDT**

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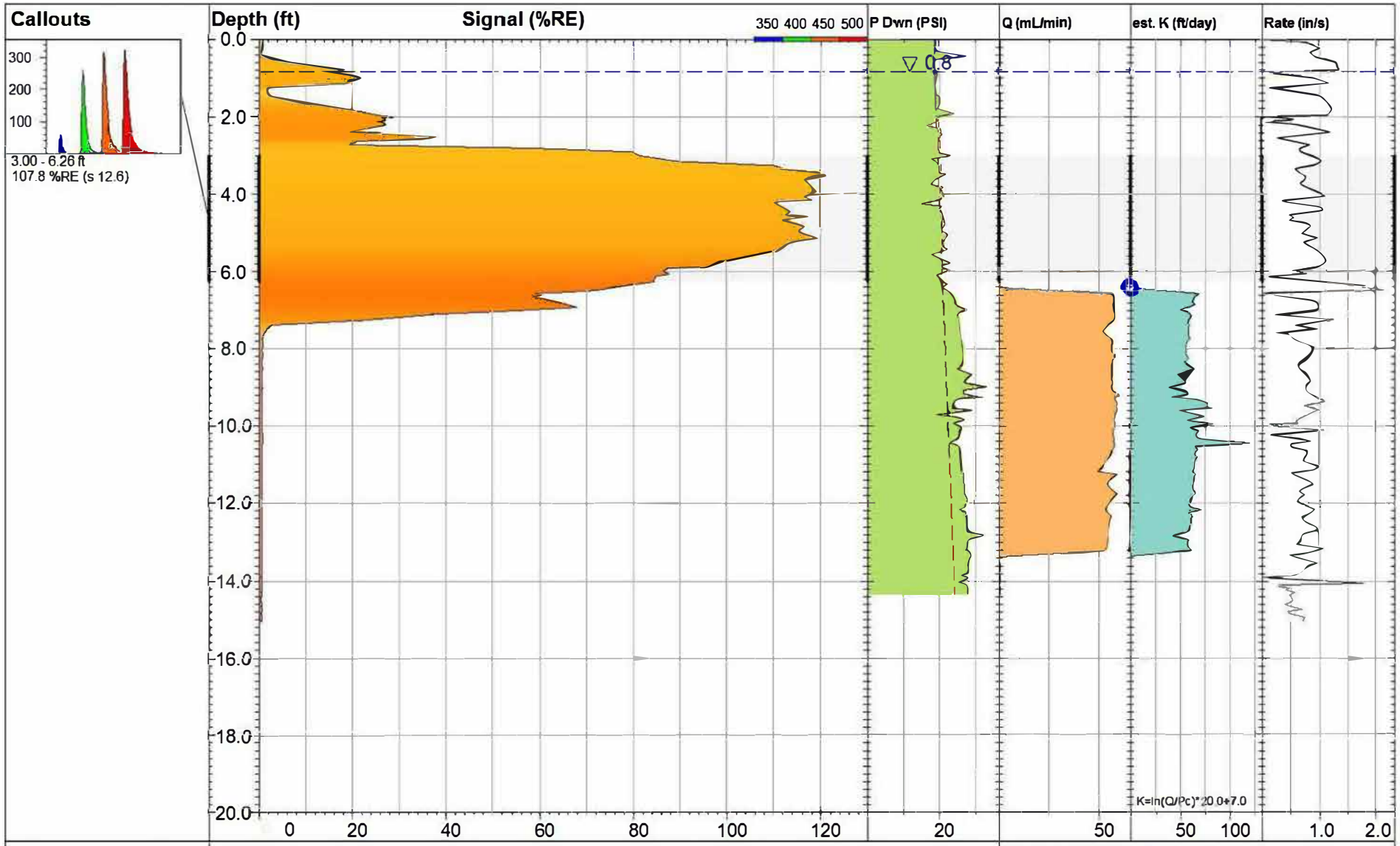

LIF64-19

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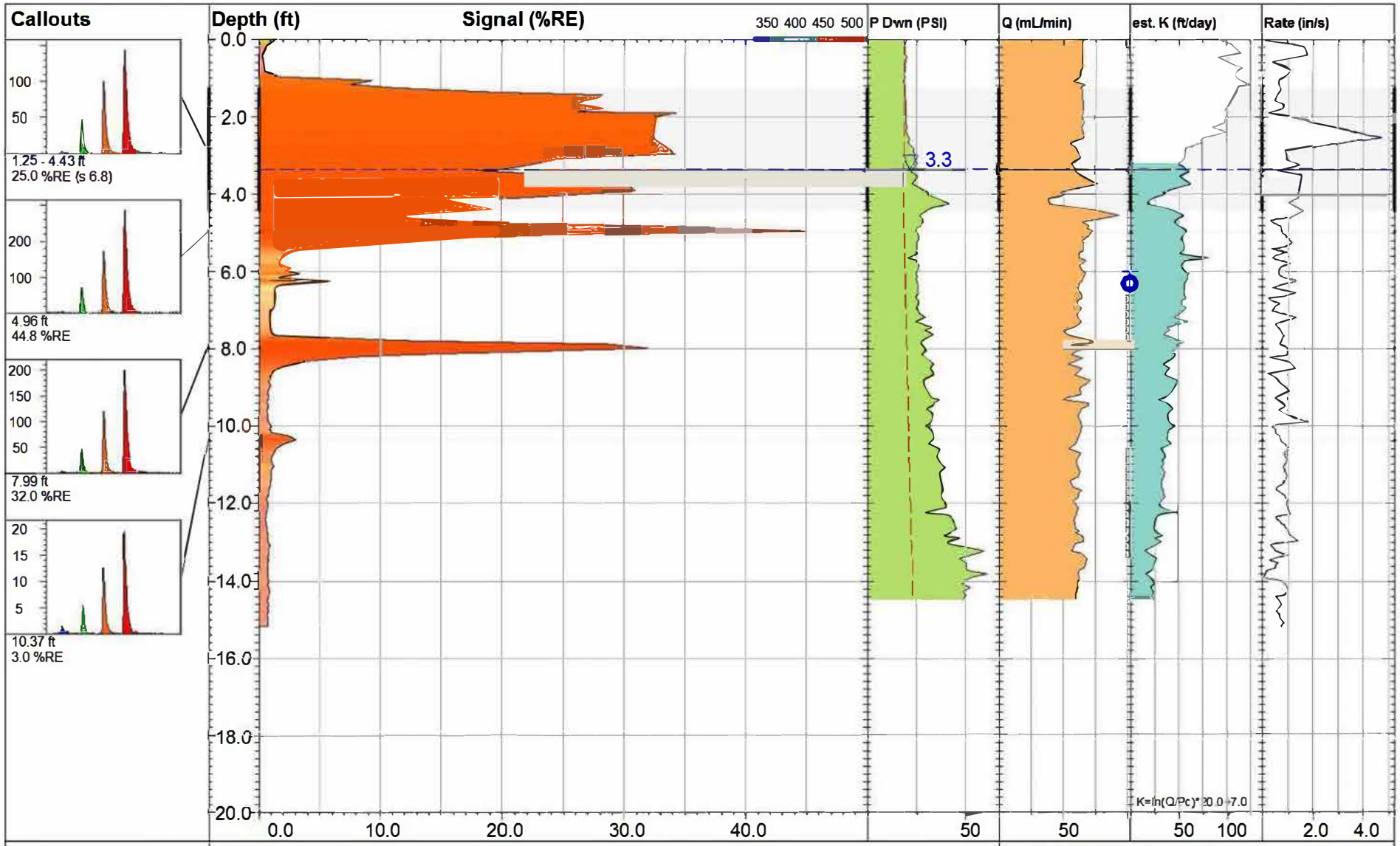
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **121.3 %RE @ 3.52 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 13:32 CDT**



LIF65-19

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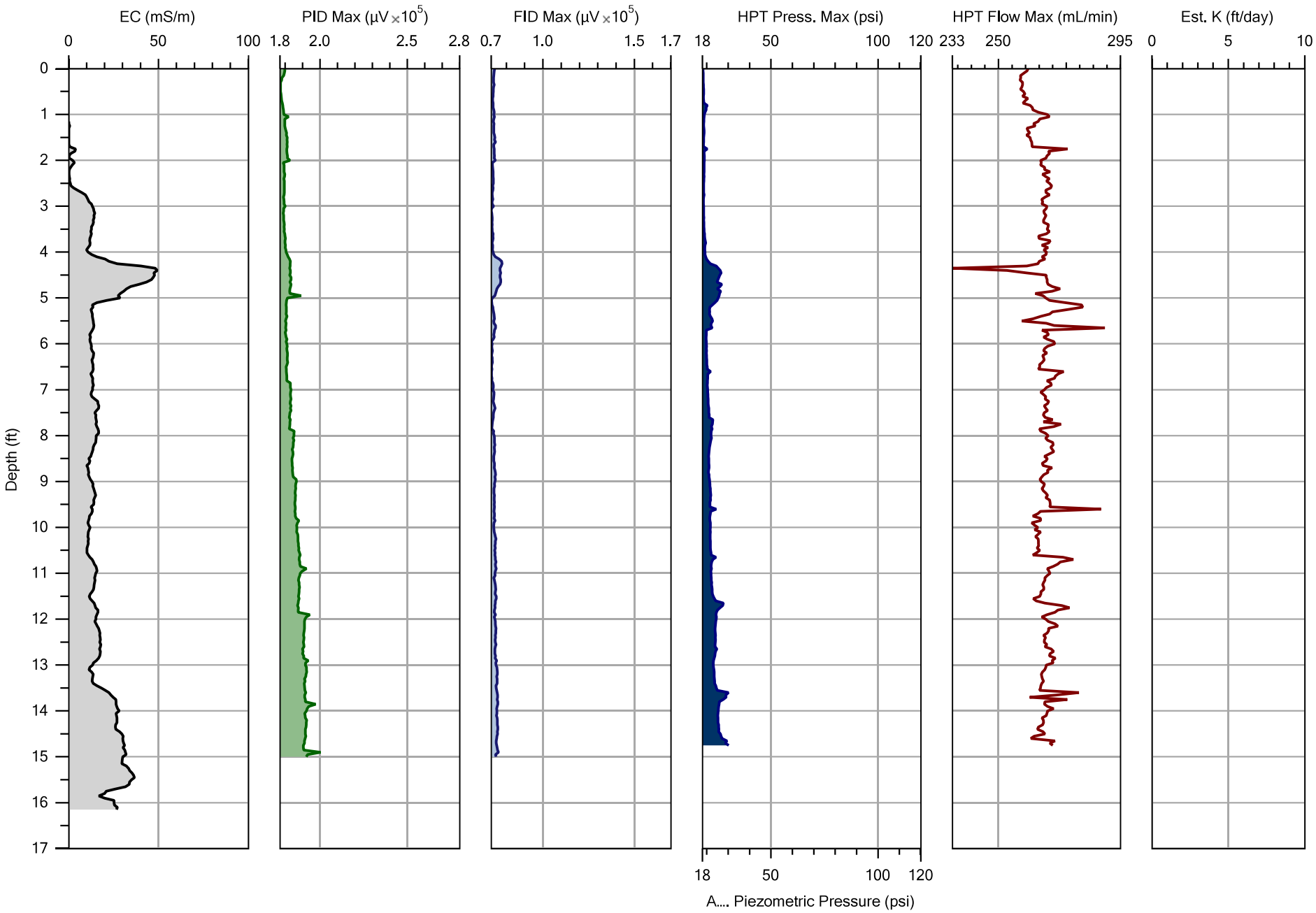
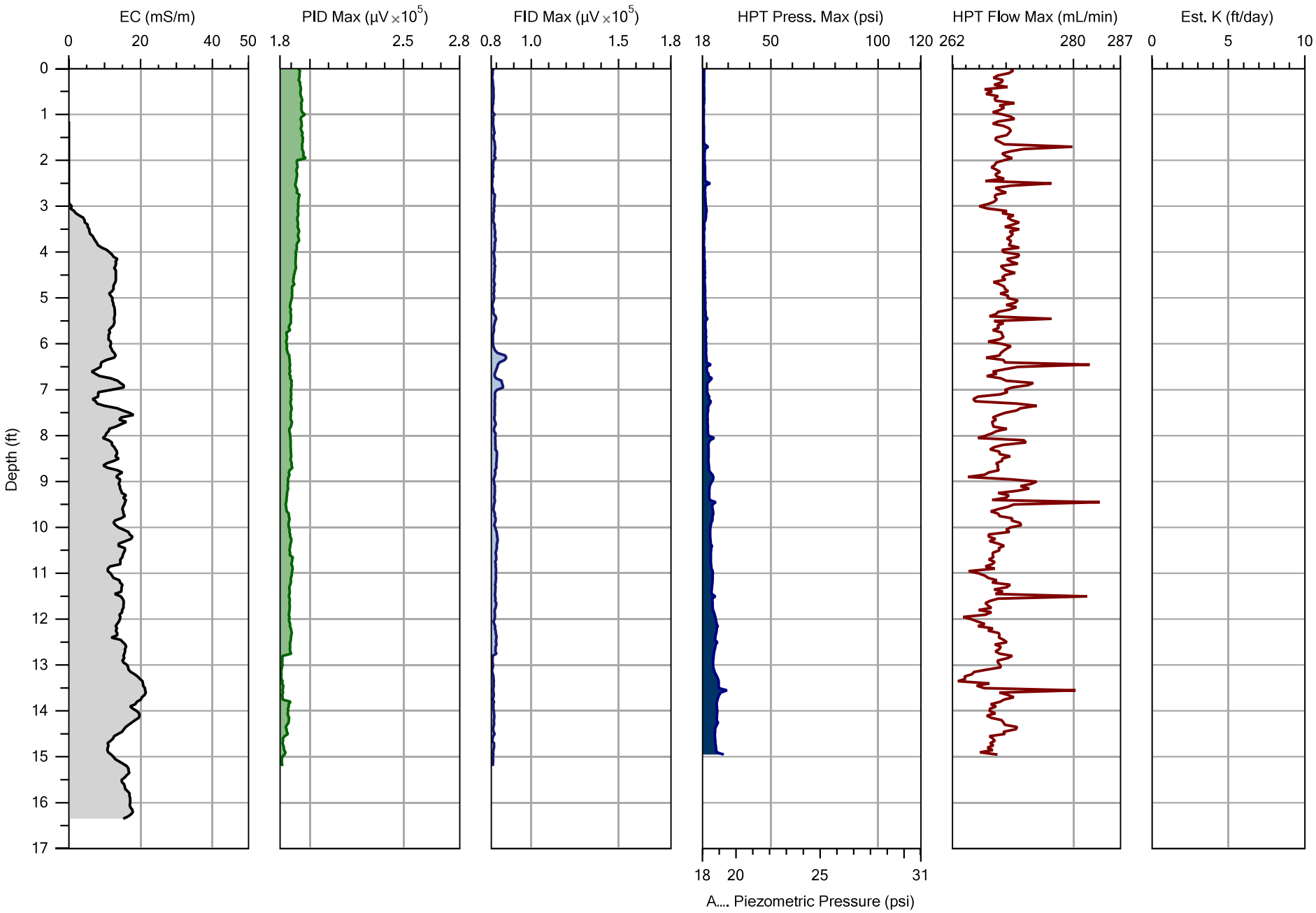
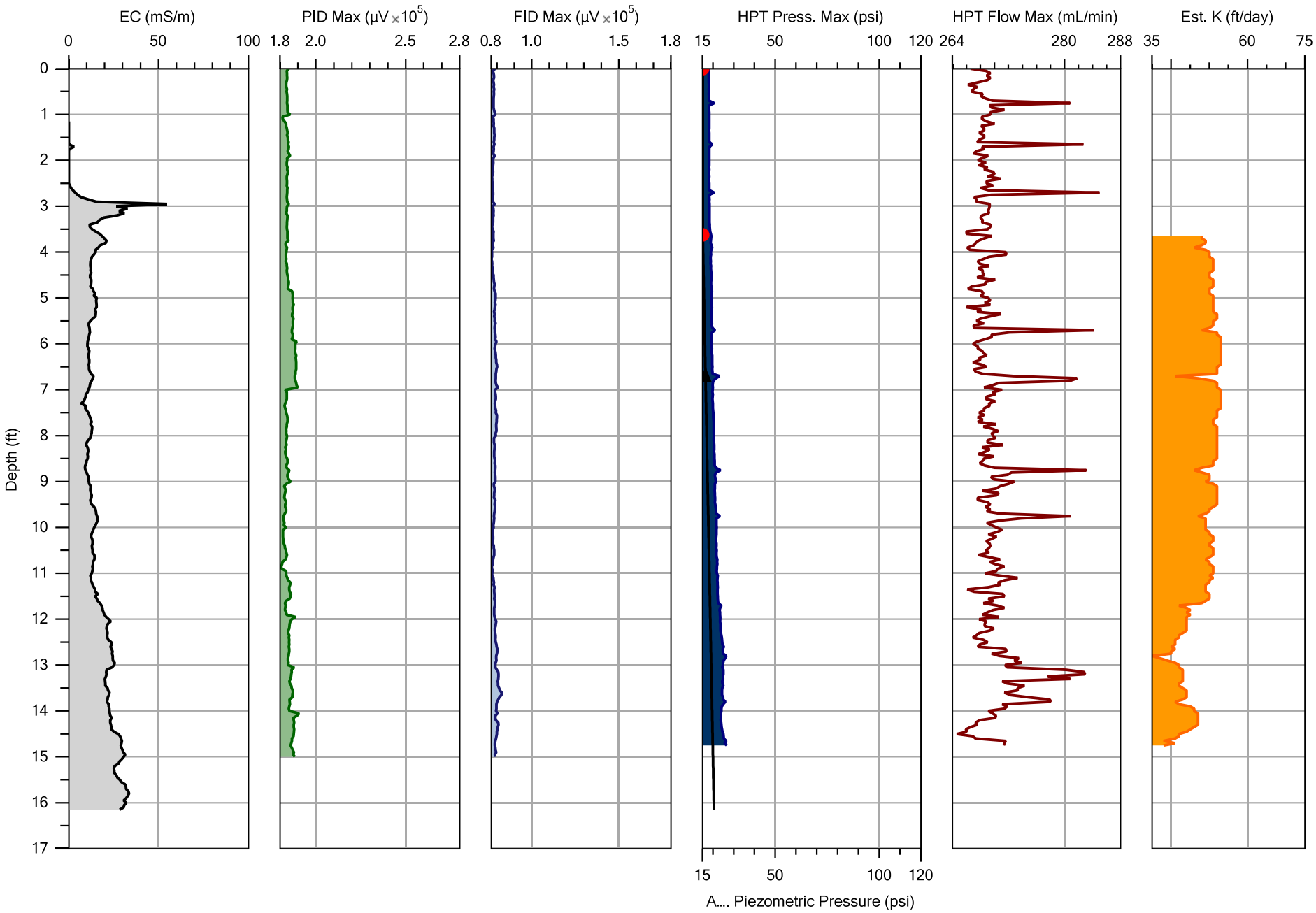
Site: **Fmr. E. Chicago Refinery**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **15.18 ft**
Client / Job: **GHD / 0170.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **44.8 %RE @ 4.96 ft**
Operator / Unit: **MJ/MSjr. / UVOST1004**	*Elevation:* **Unavailable**	*Date & Time:* **2019-08-06 16:06 CDT**



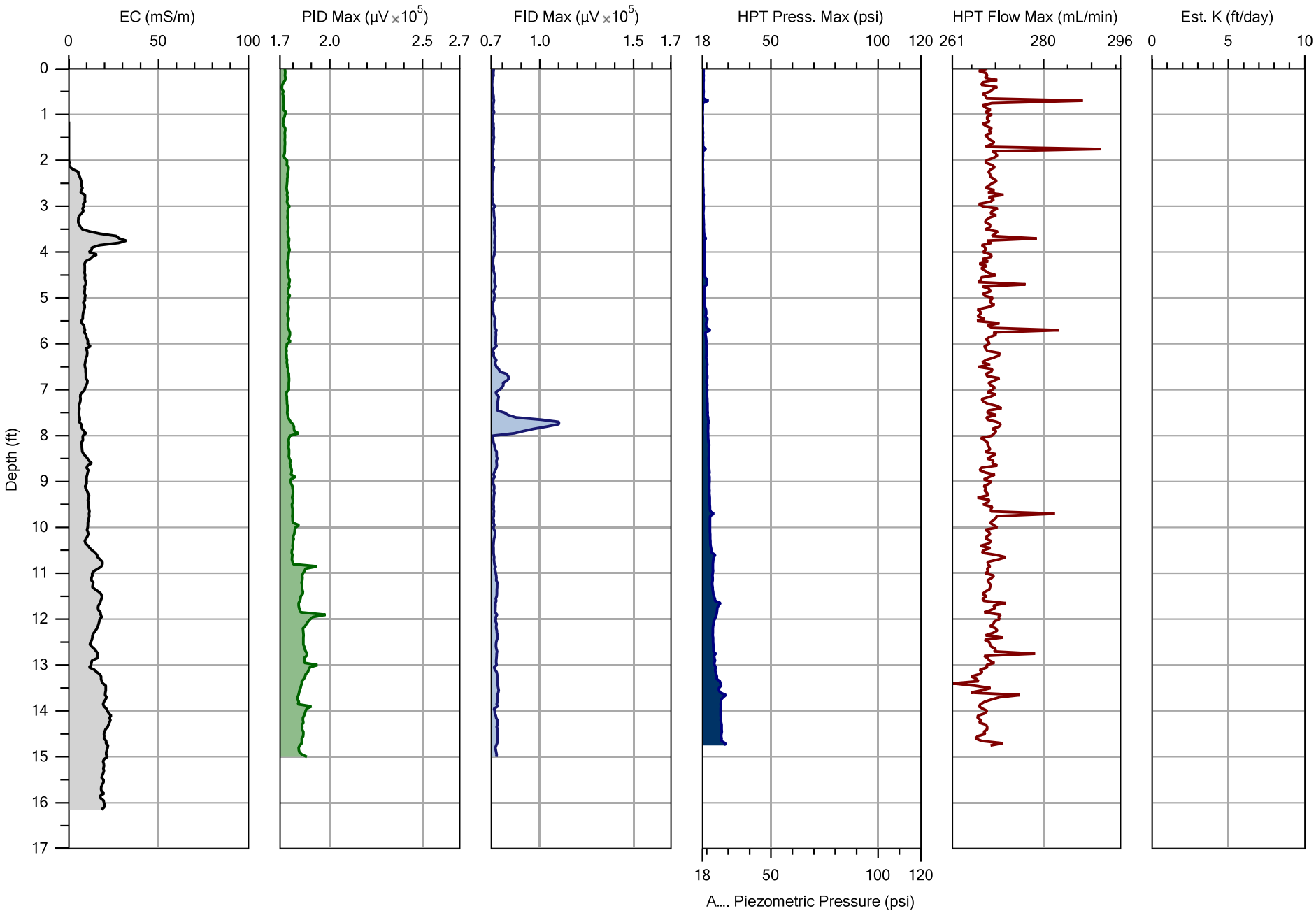
			File: LIF/MIP01-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/7/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



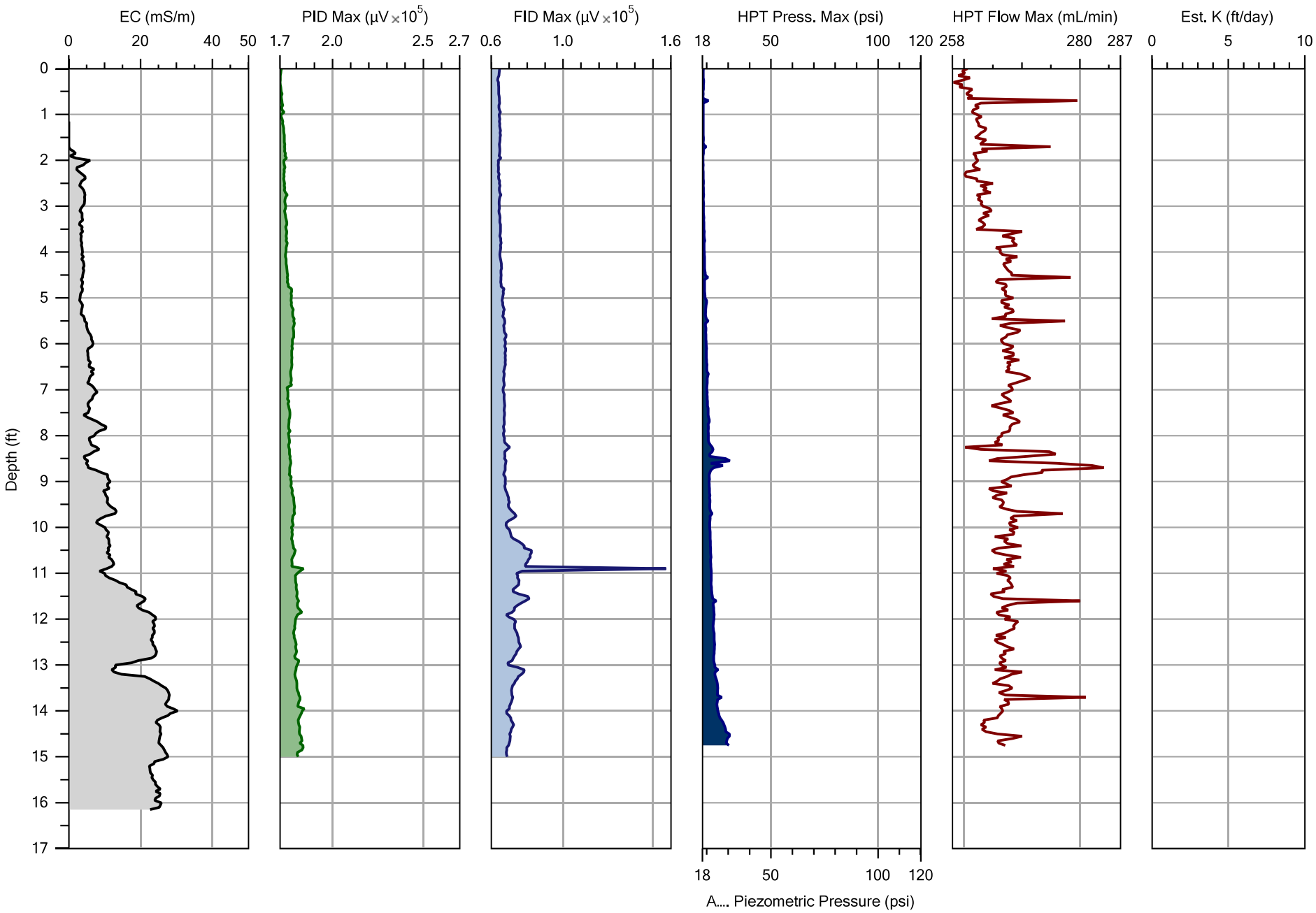
			File: LIF/MIP02-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/7/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



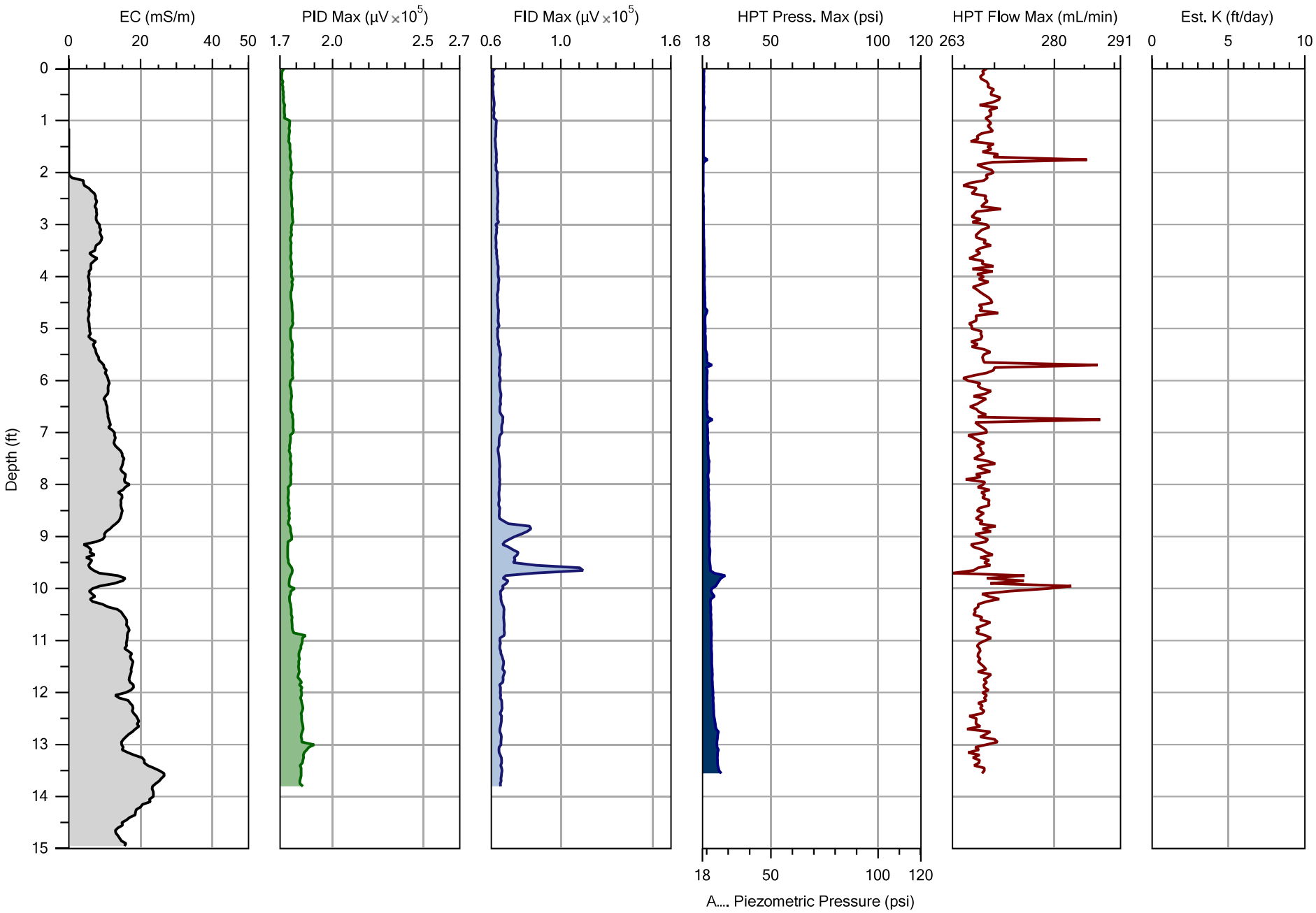
			File: LIF/MIP03-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/7/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



			File: LIF/MIP04-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/7/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



			File: LIF/MIP05-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/8/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



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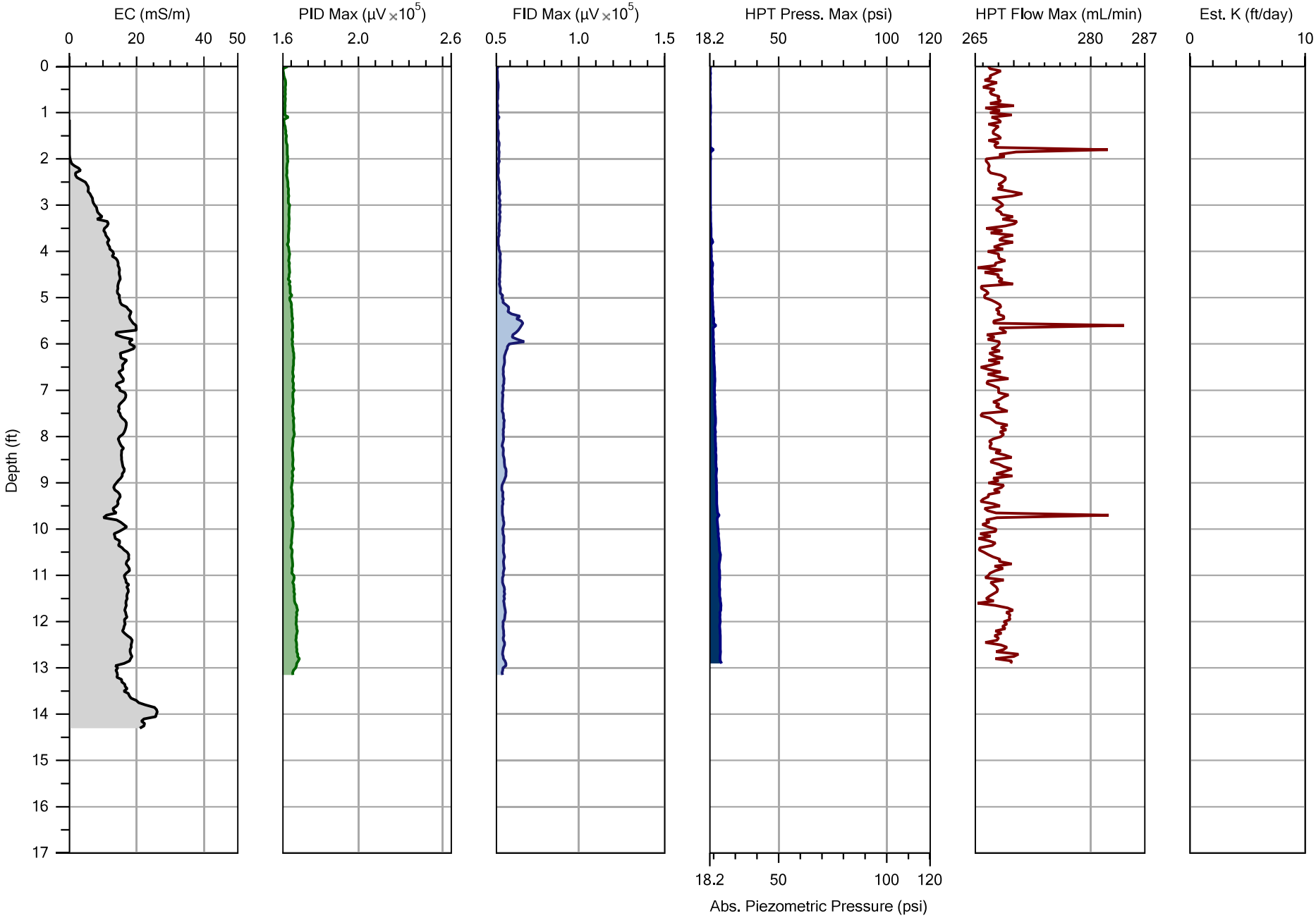
Company: Dakota Technologies	Operator: AK/EM		Date: 8/8/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



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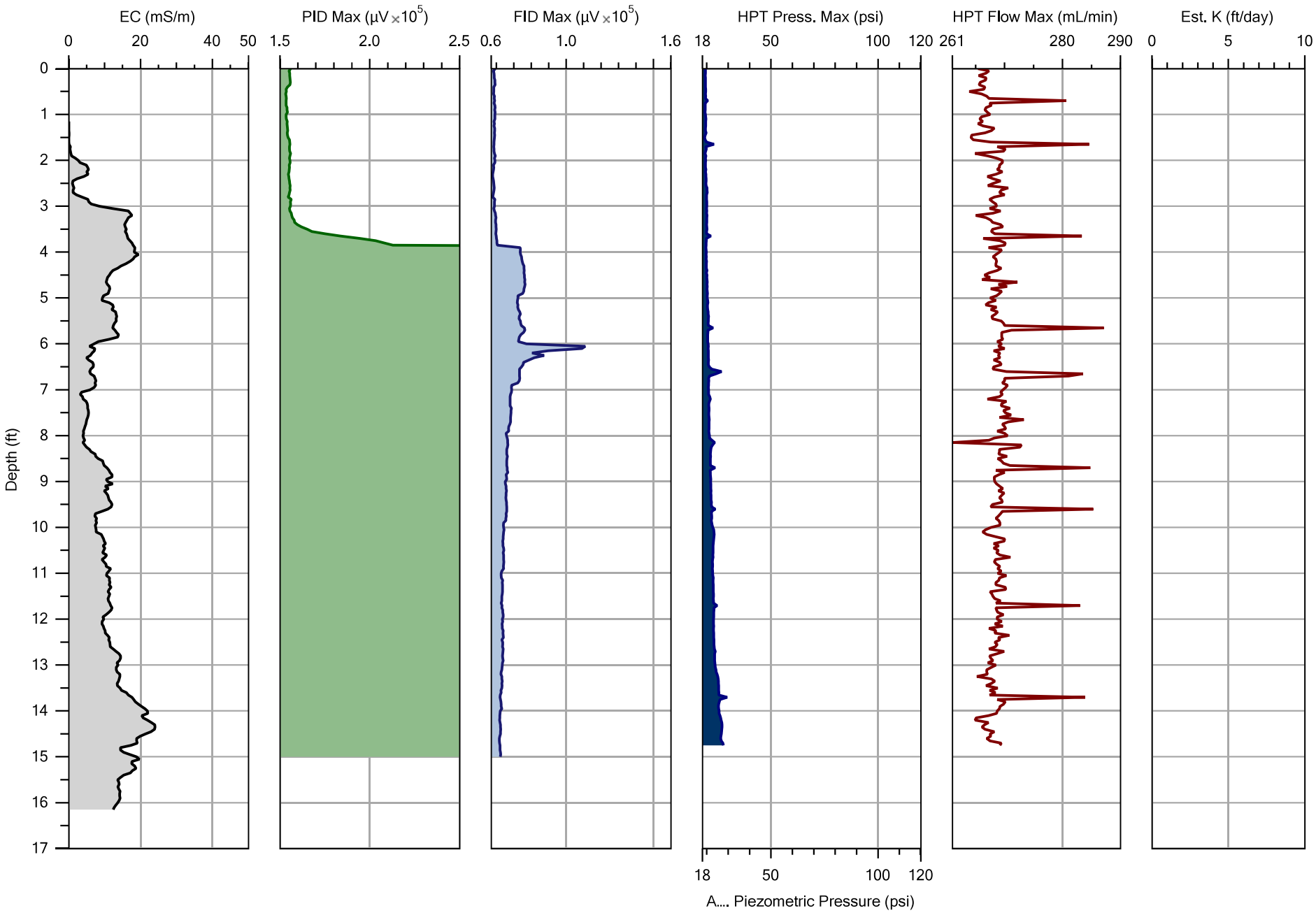
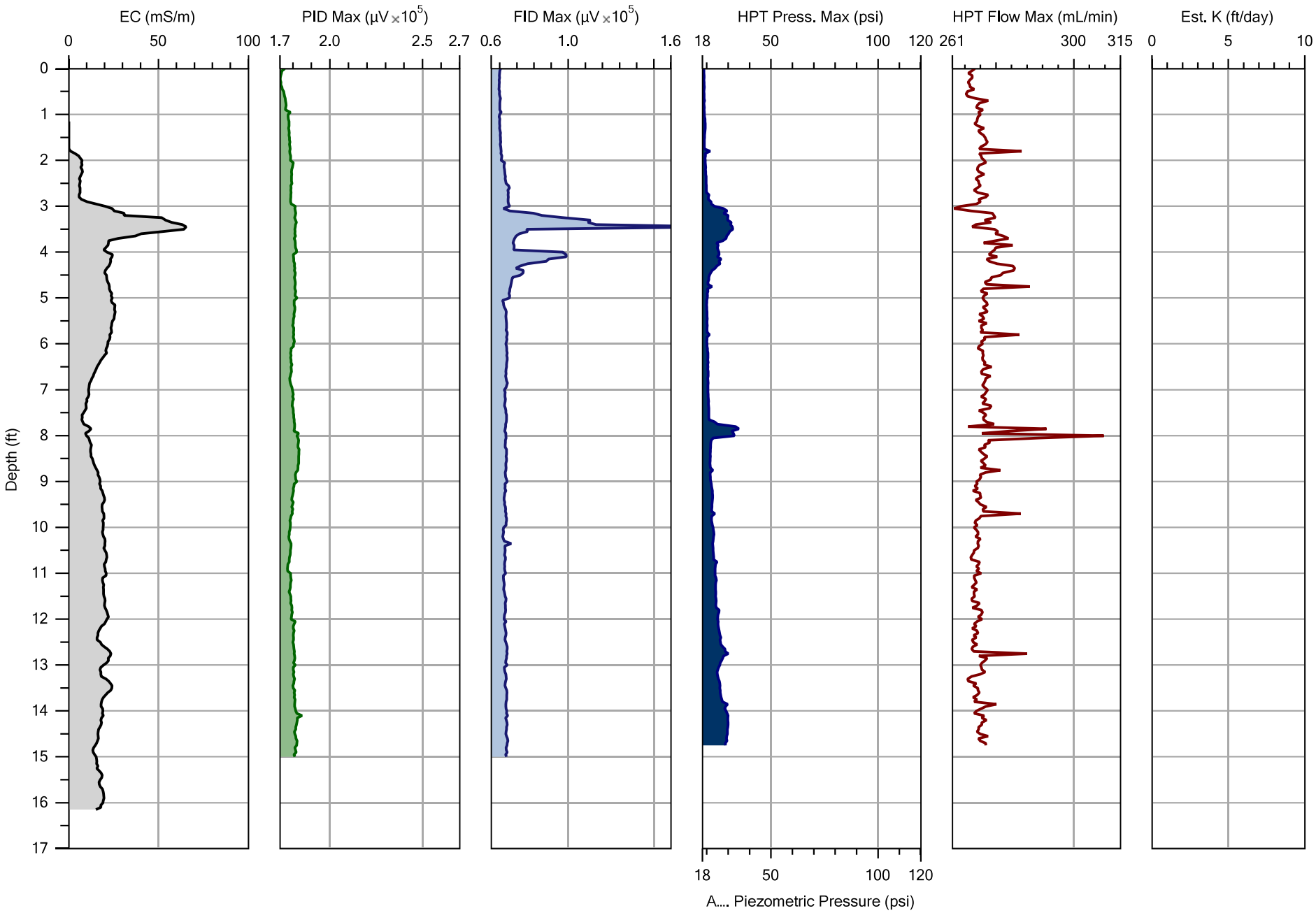
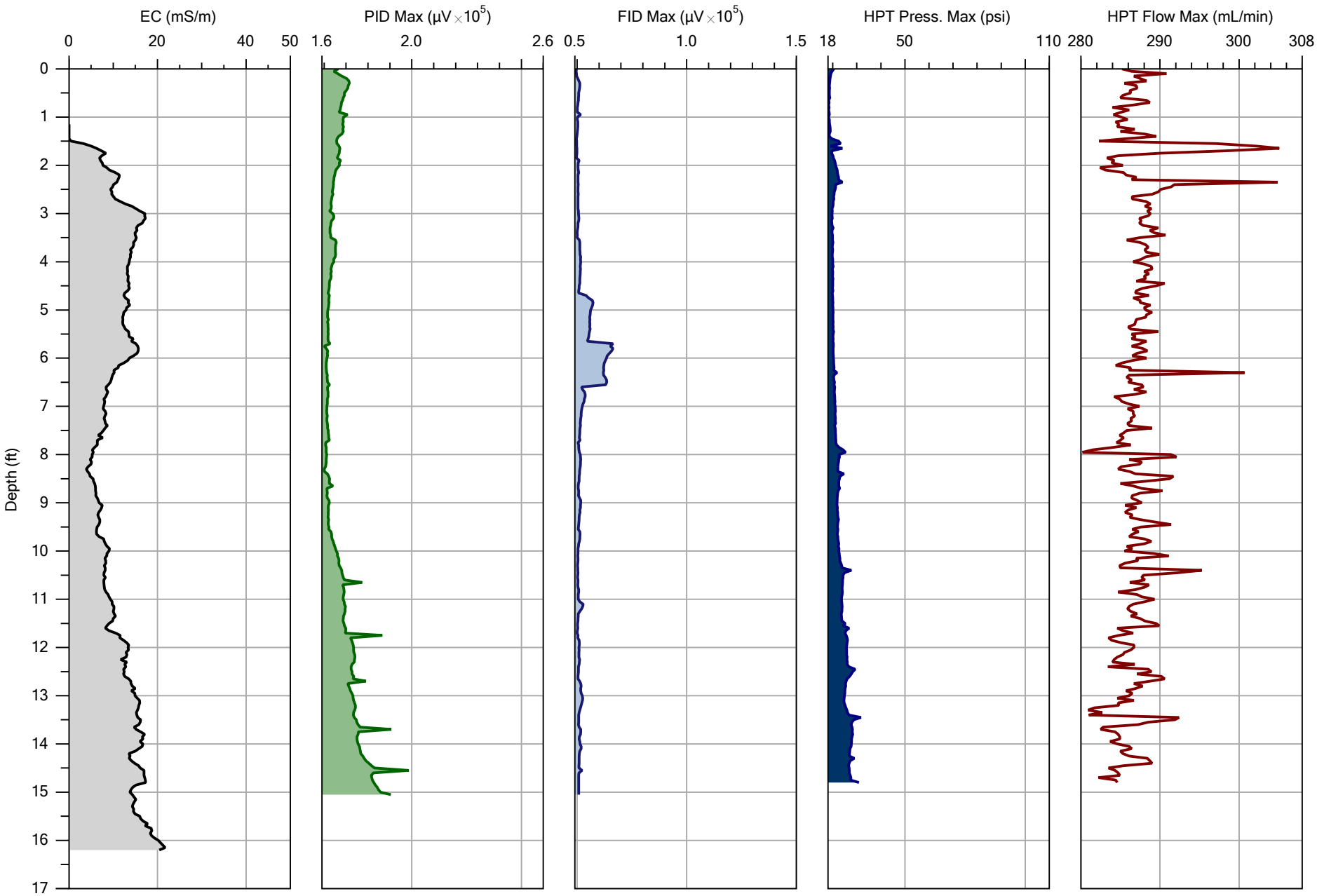
Company: Dakota Technologies	Operator: AK/EM	Date: 8/8/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



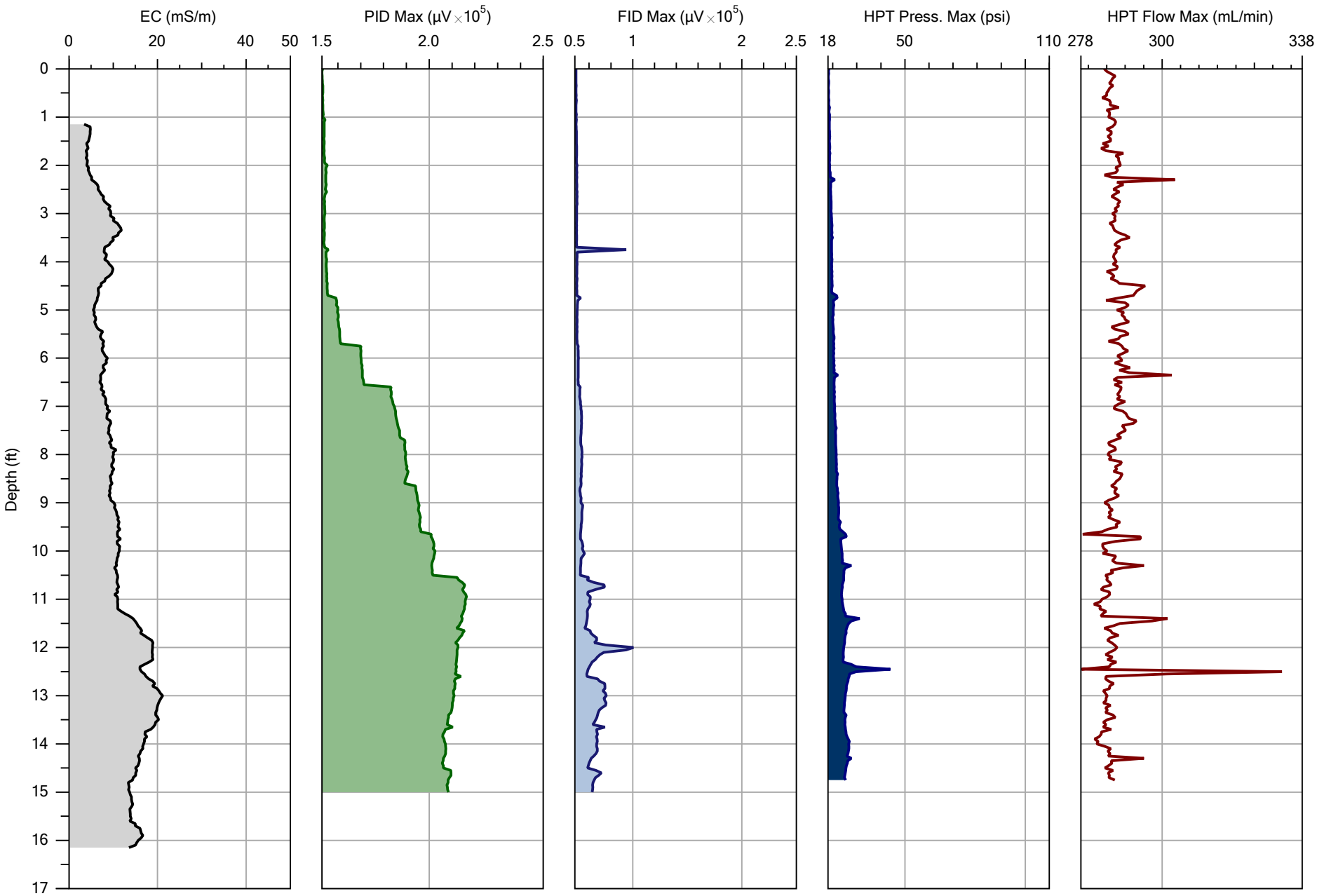
		File: LIF/MIP09-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/8/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



			File: LIF/MIP14-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/12/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



			File: LIF/MIP16-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/19/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



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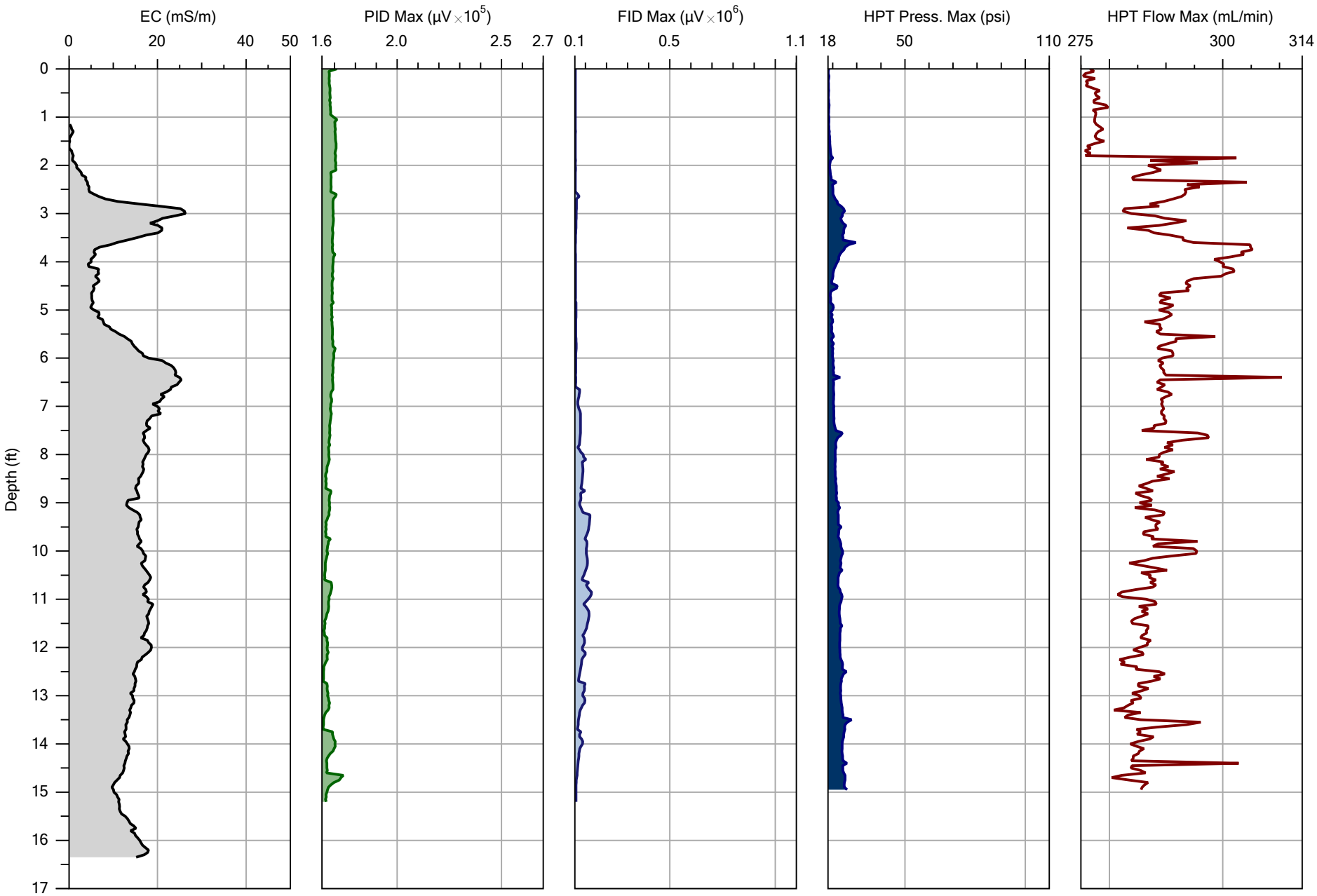
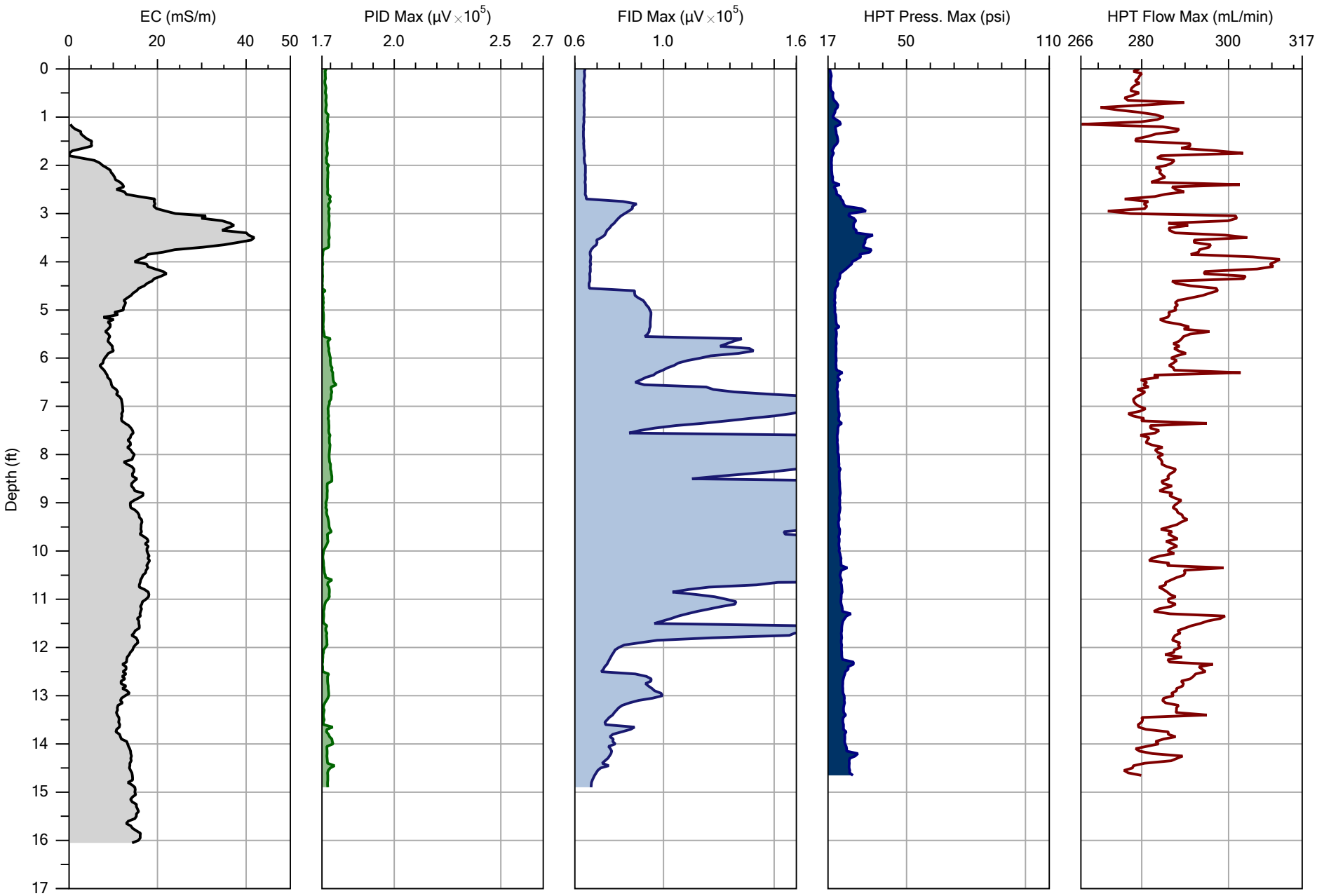
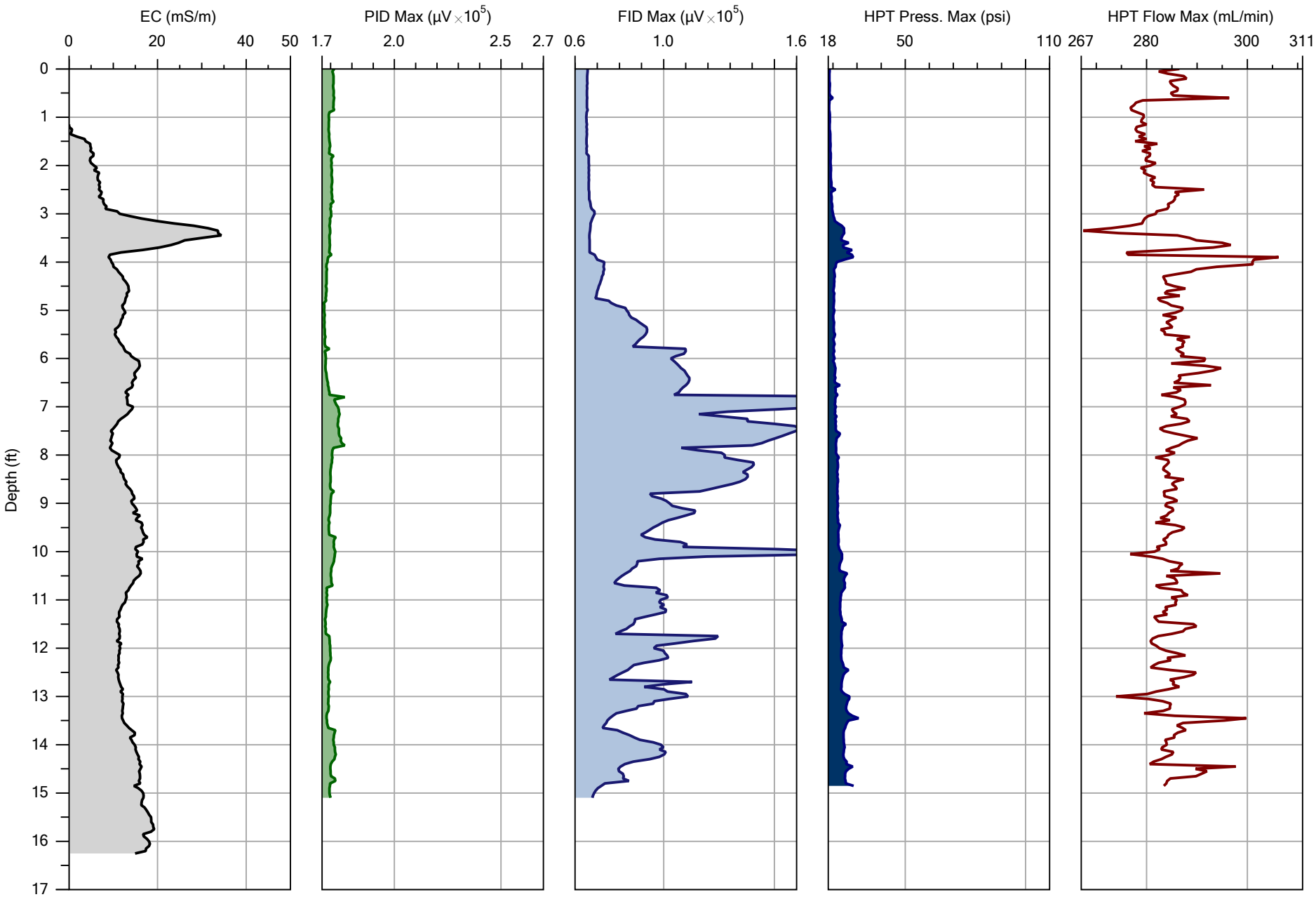
Company: Dakota Technologies	Operator: AK/SM	Date: 5/19/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



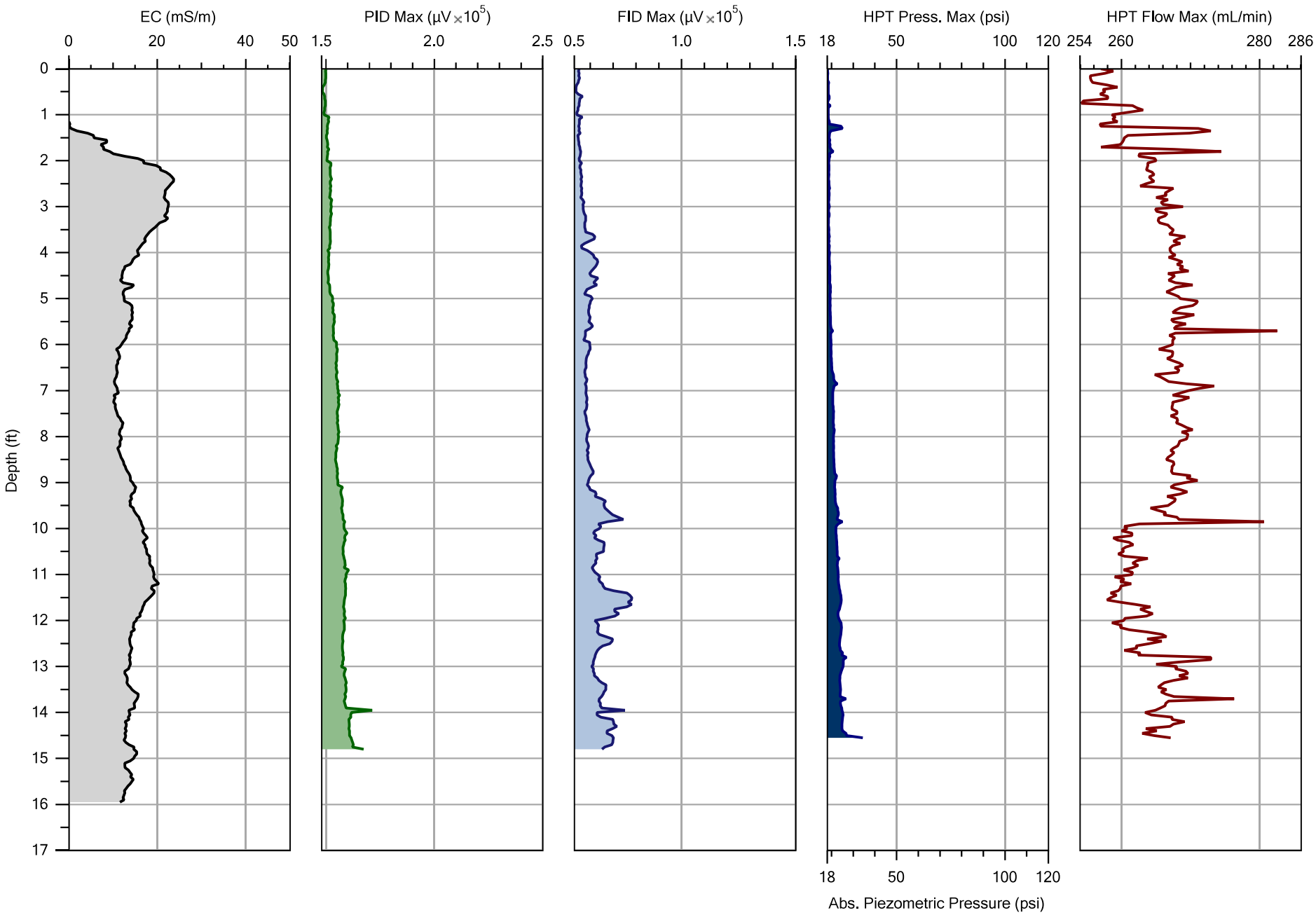
			File: LIF/MIP23-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/19/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



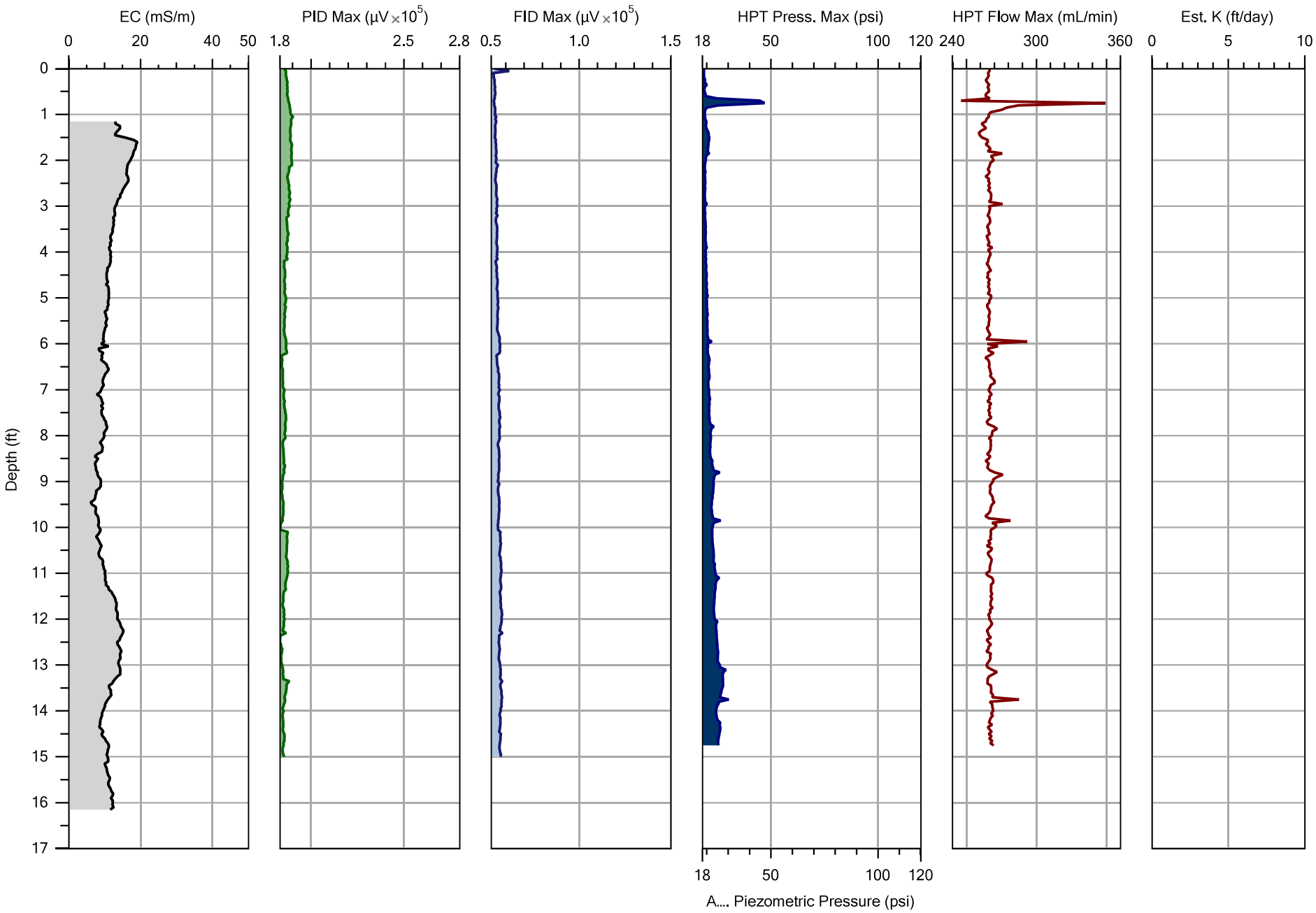
			File: LIF/MIP24-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/18/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



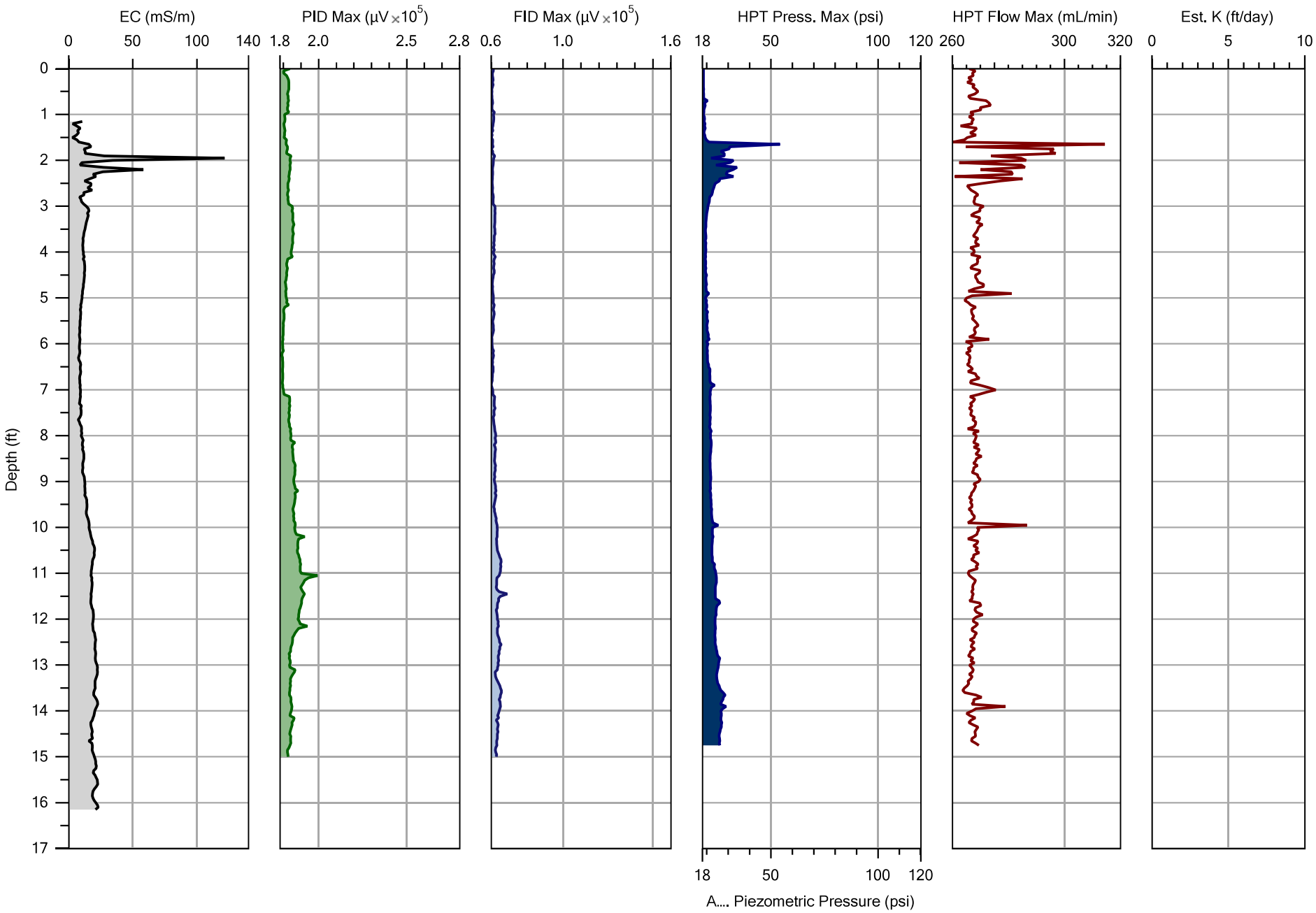
			File: LIF/MIP25-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/18/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



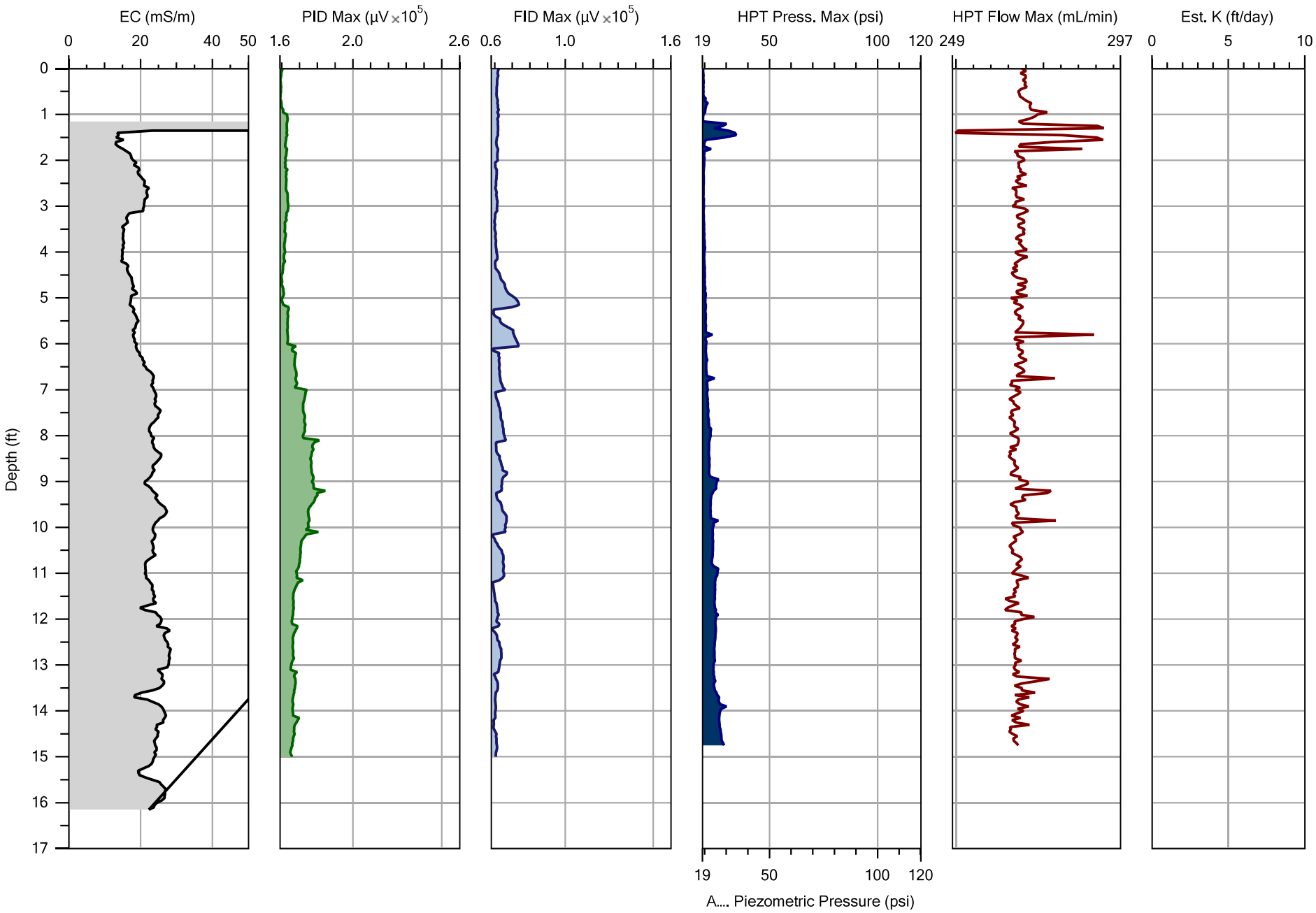
		File: LIF/MIP25A-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/6/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



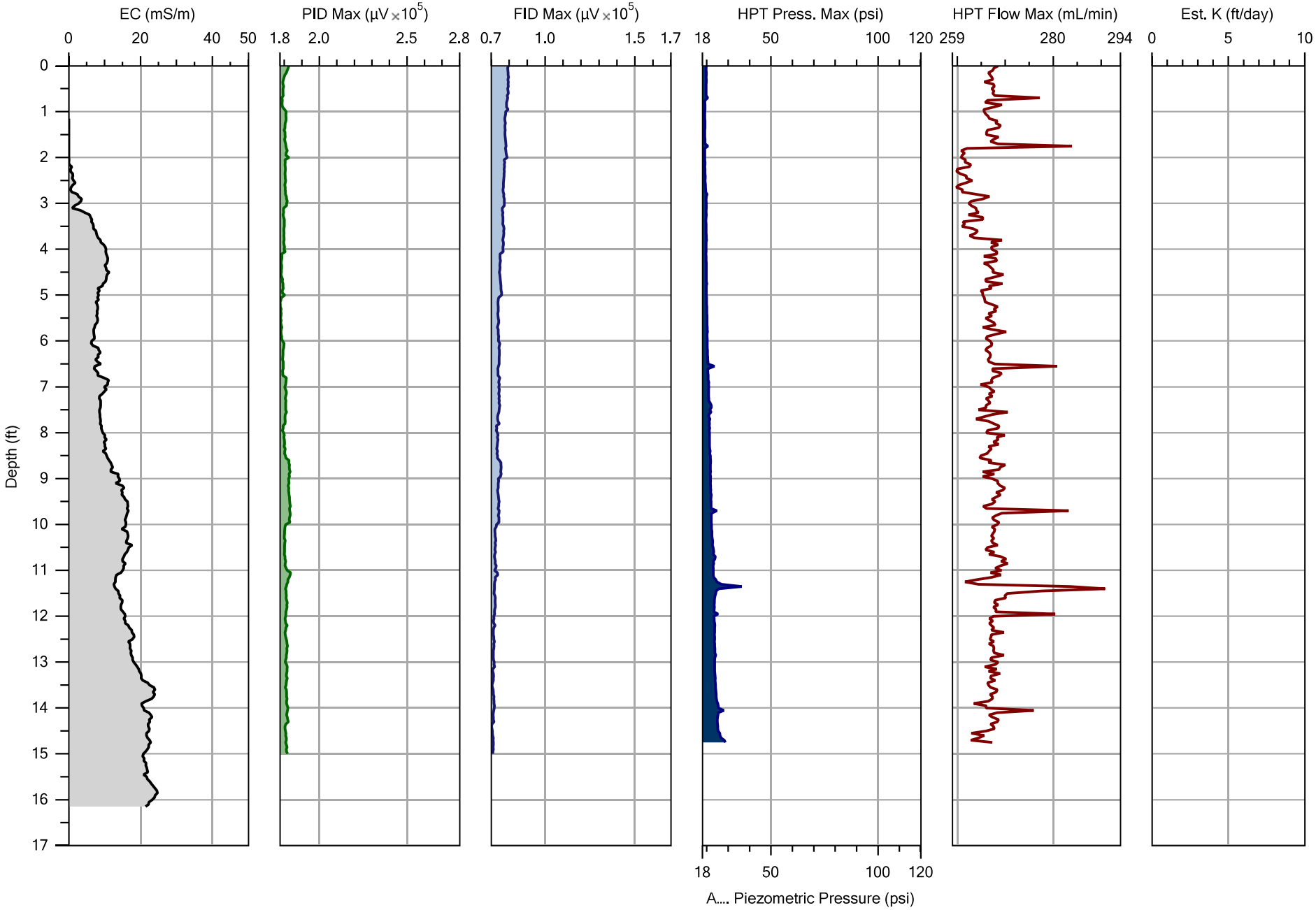
			File: LIF/MIP27-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/10/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



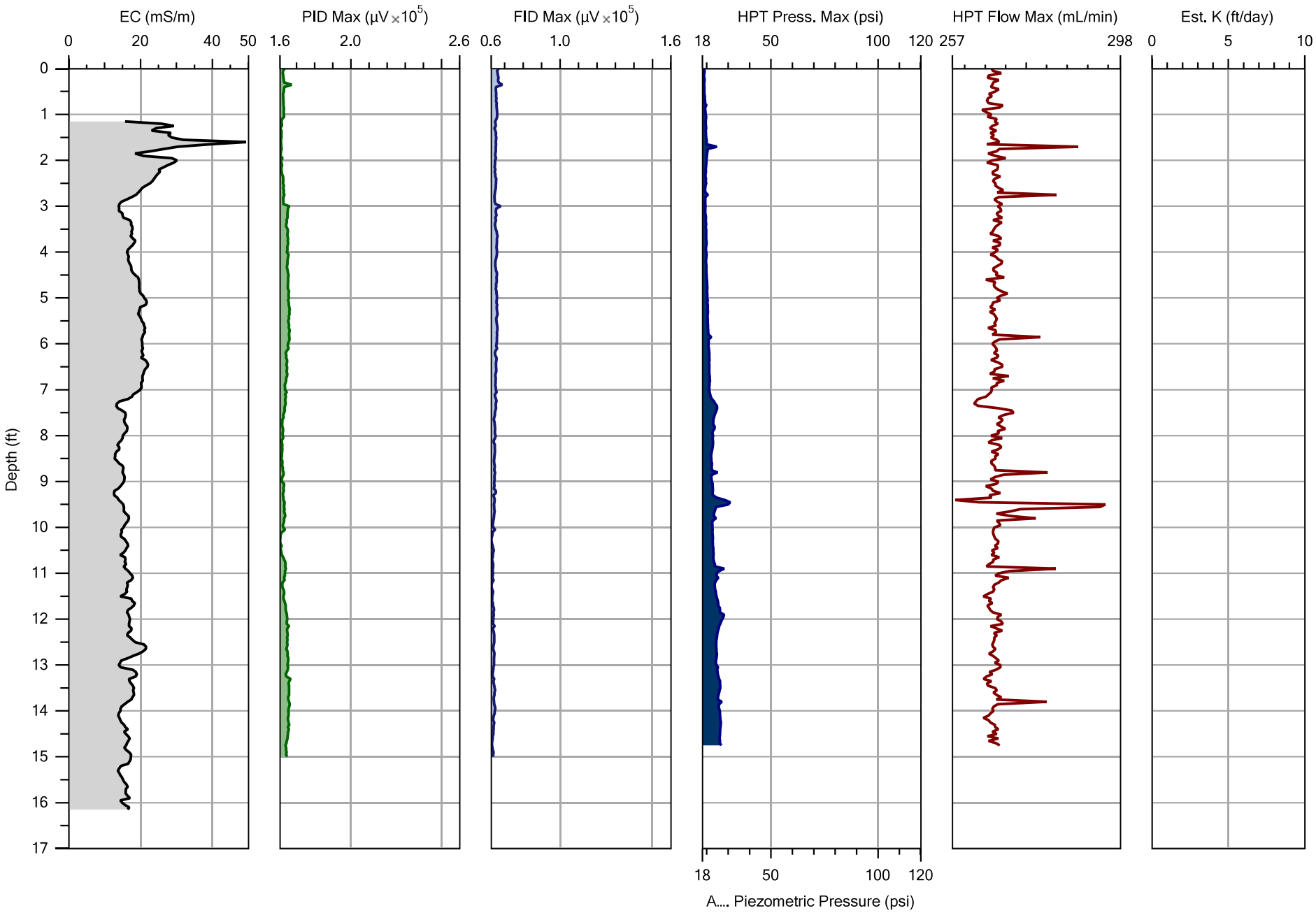
		File: LIF/MIP29B-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/10/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



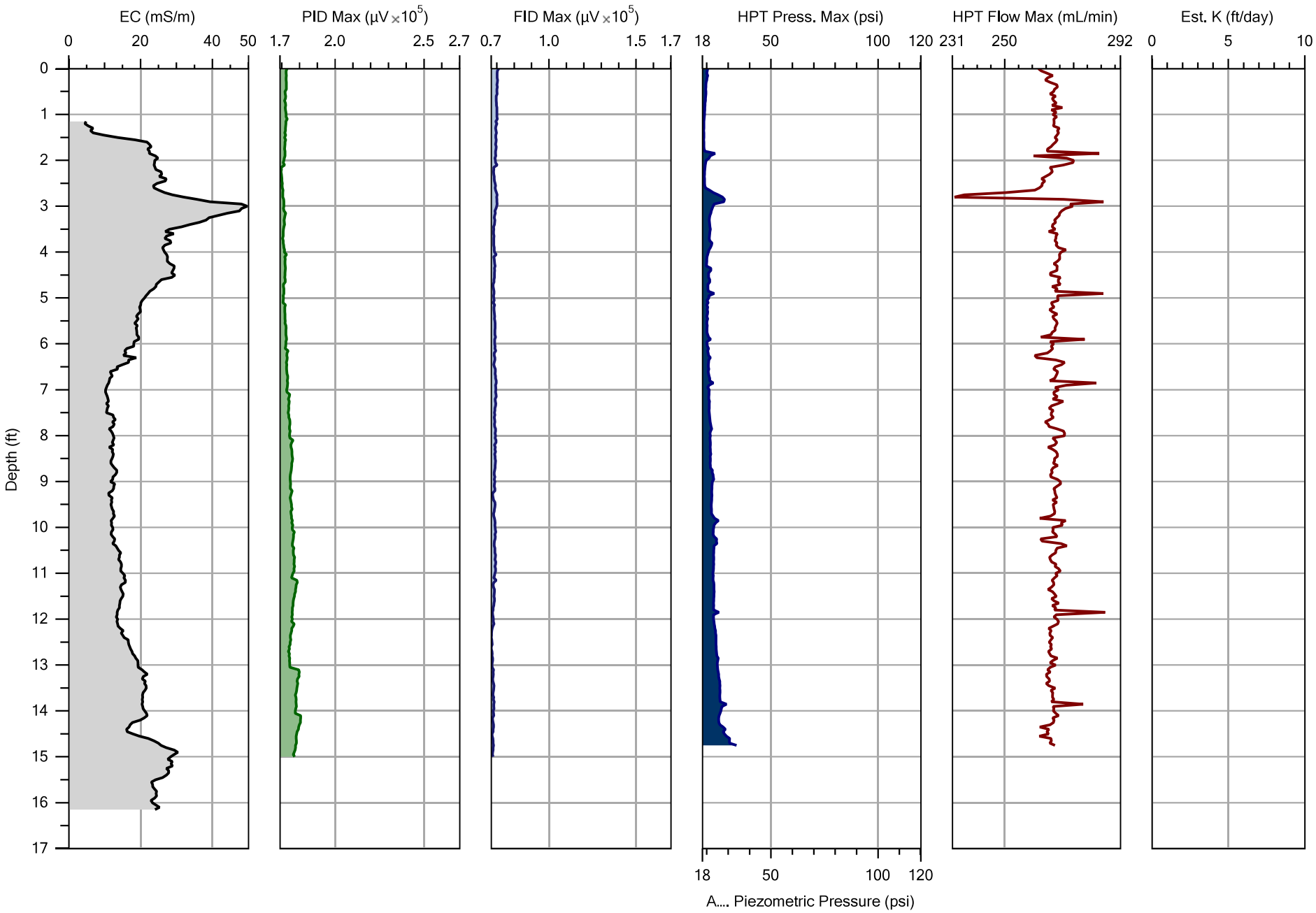
			File: LIF/MIP30-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/9/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



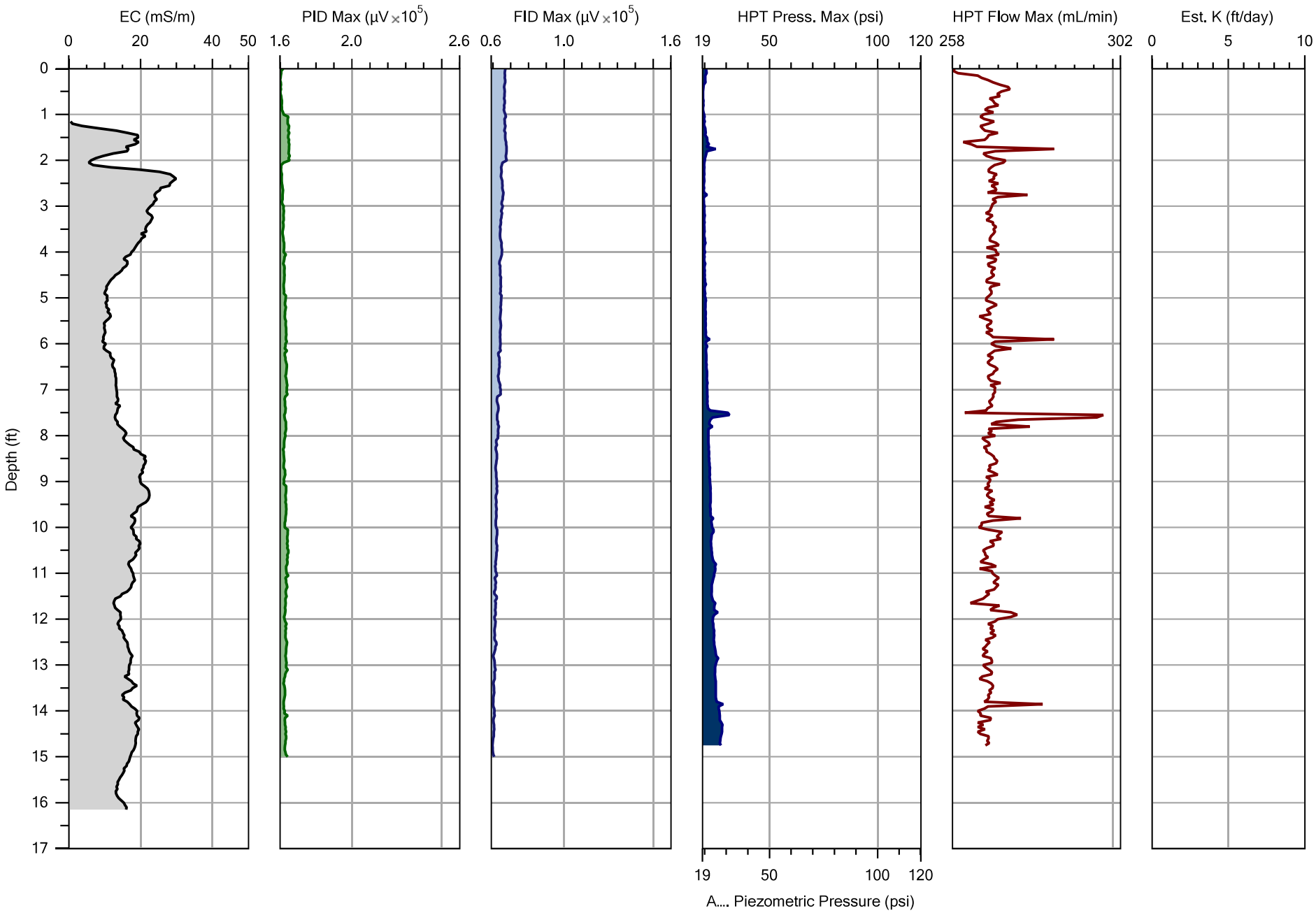
			File: LIF/MIP34A-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/10/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



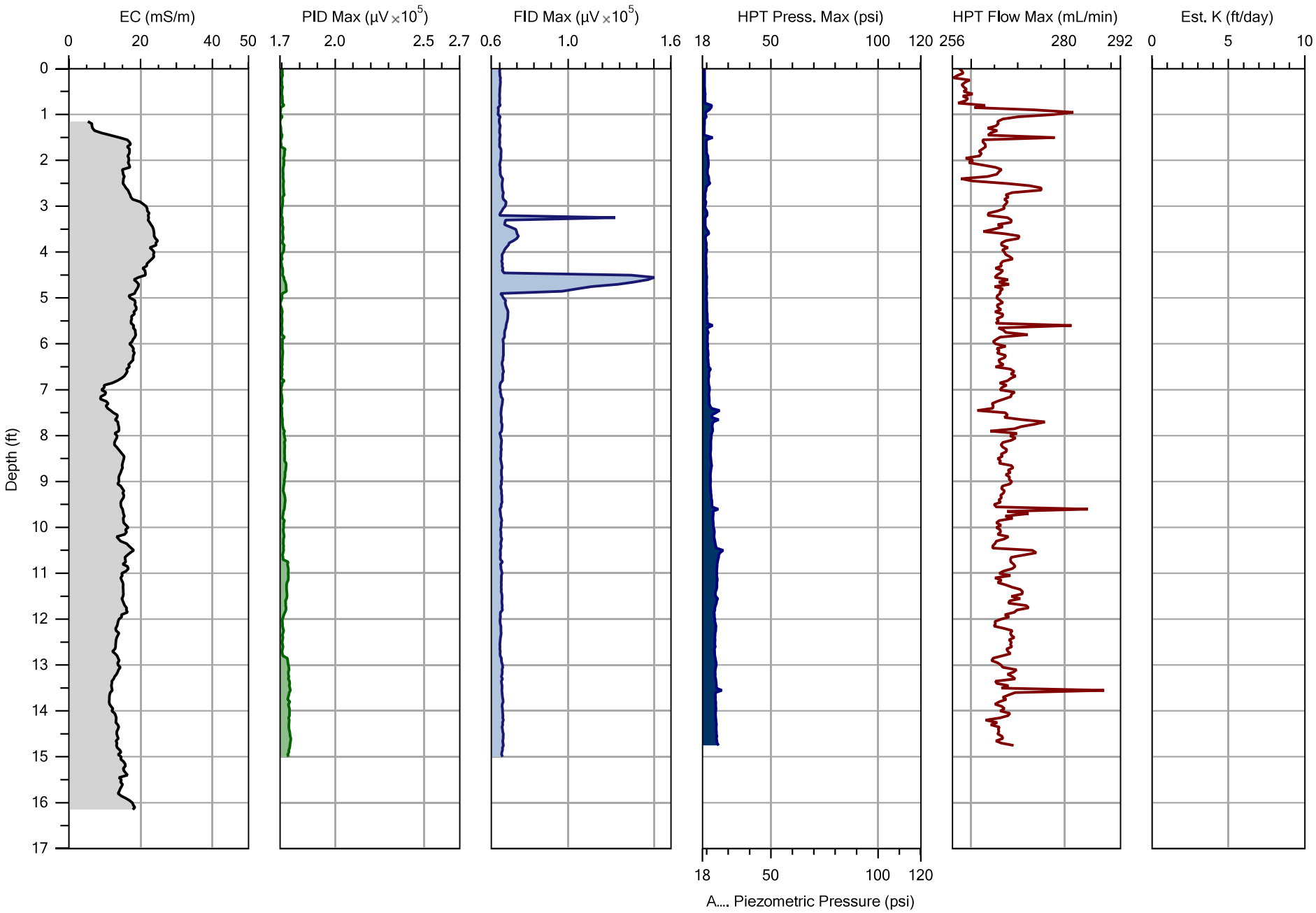
		File: MIP35A-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/9/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



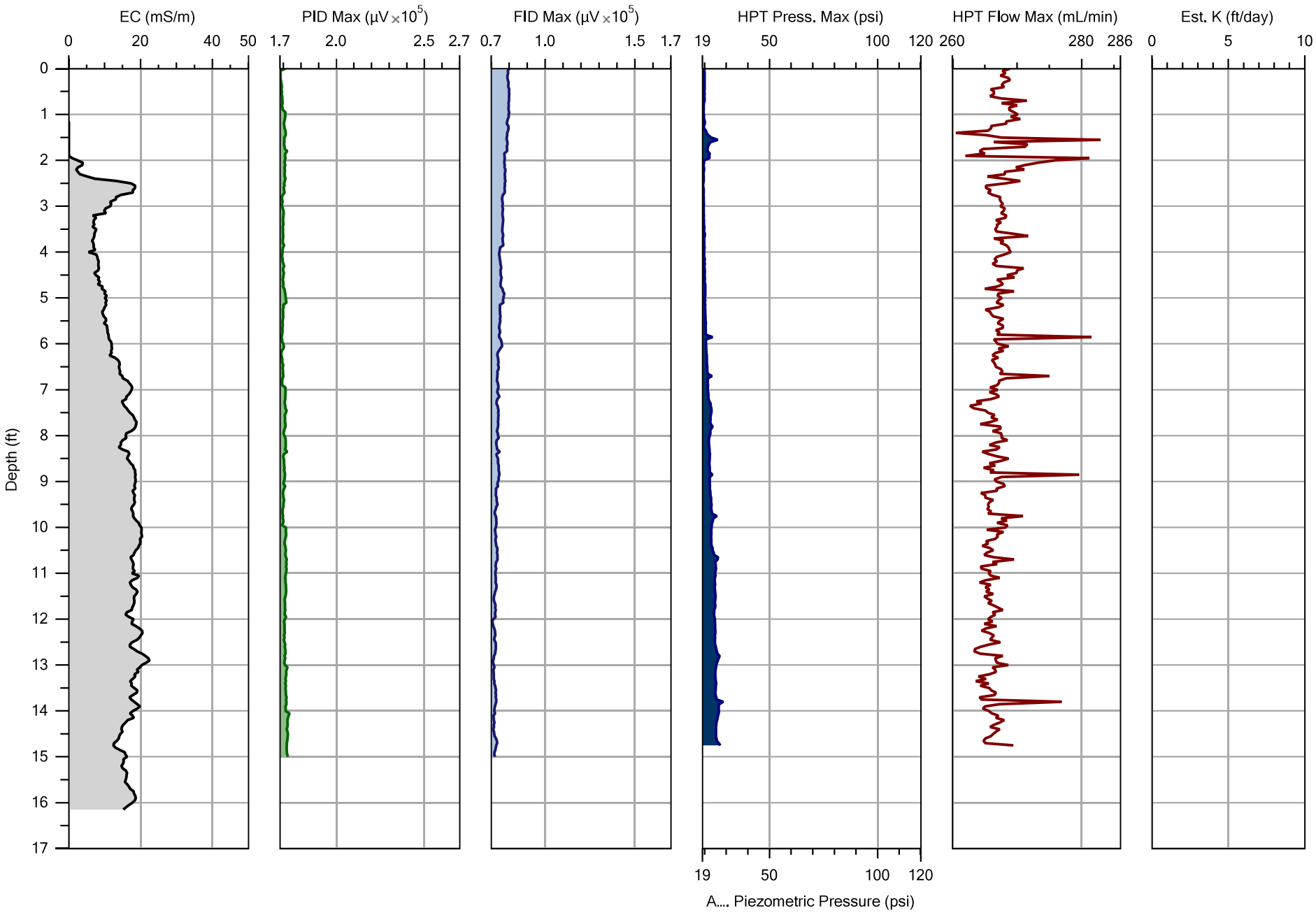
		File: LIF/MIP36-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/9/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



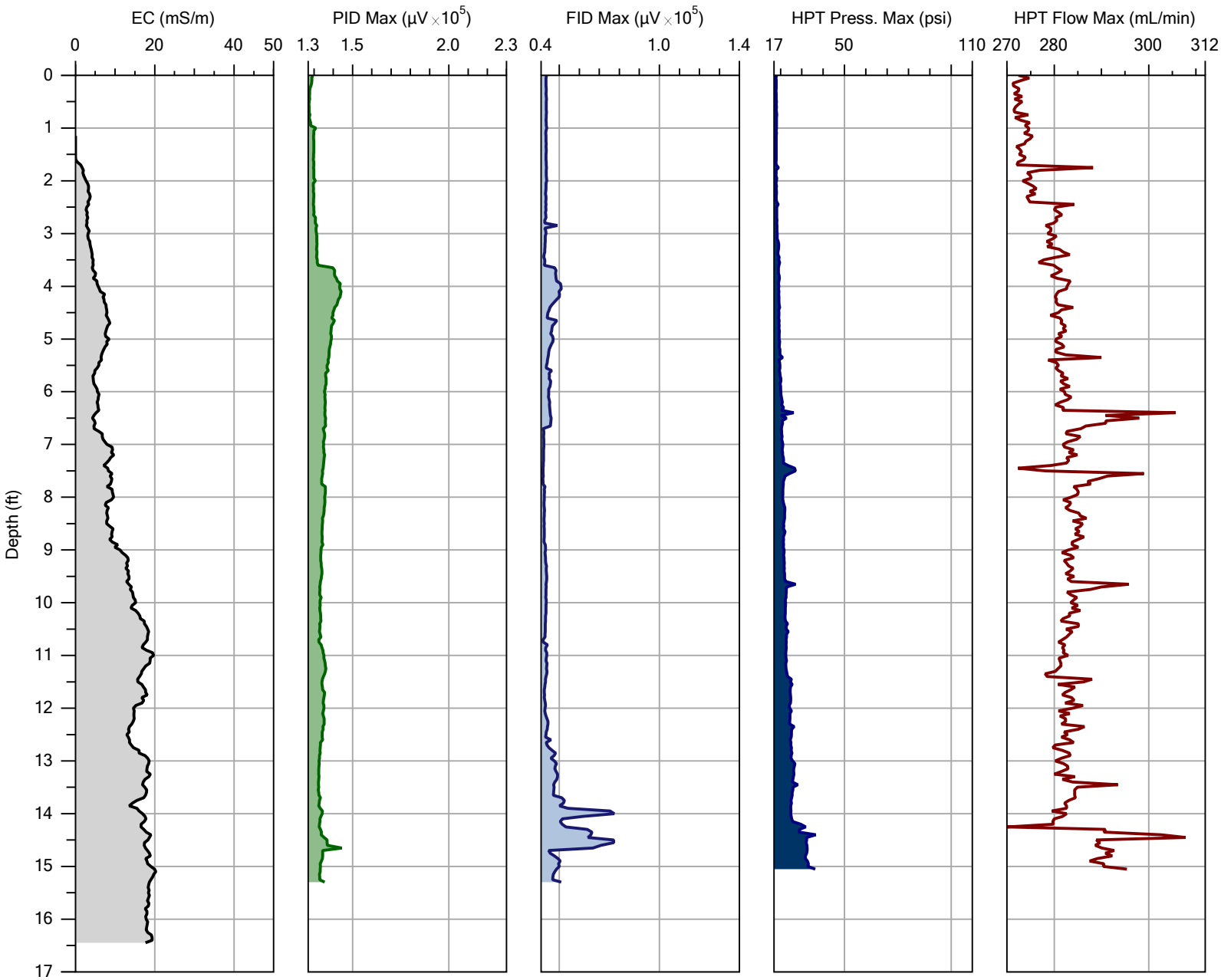
			File: LIF/MIP37-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/10/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



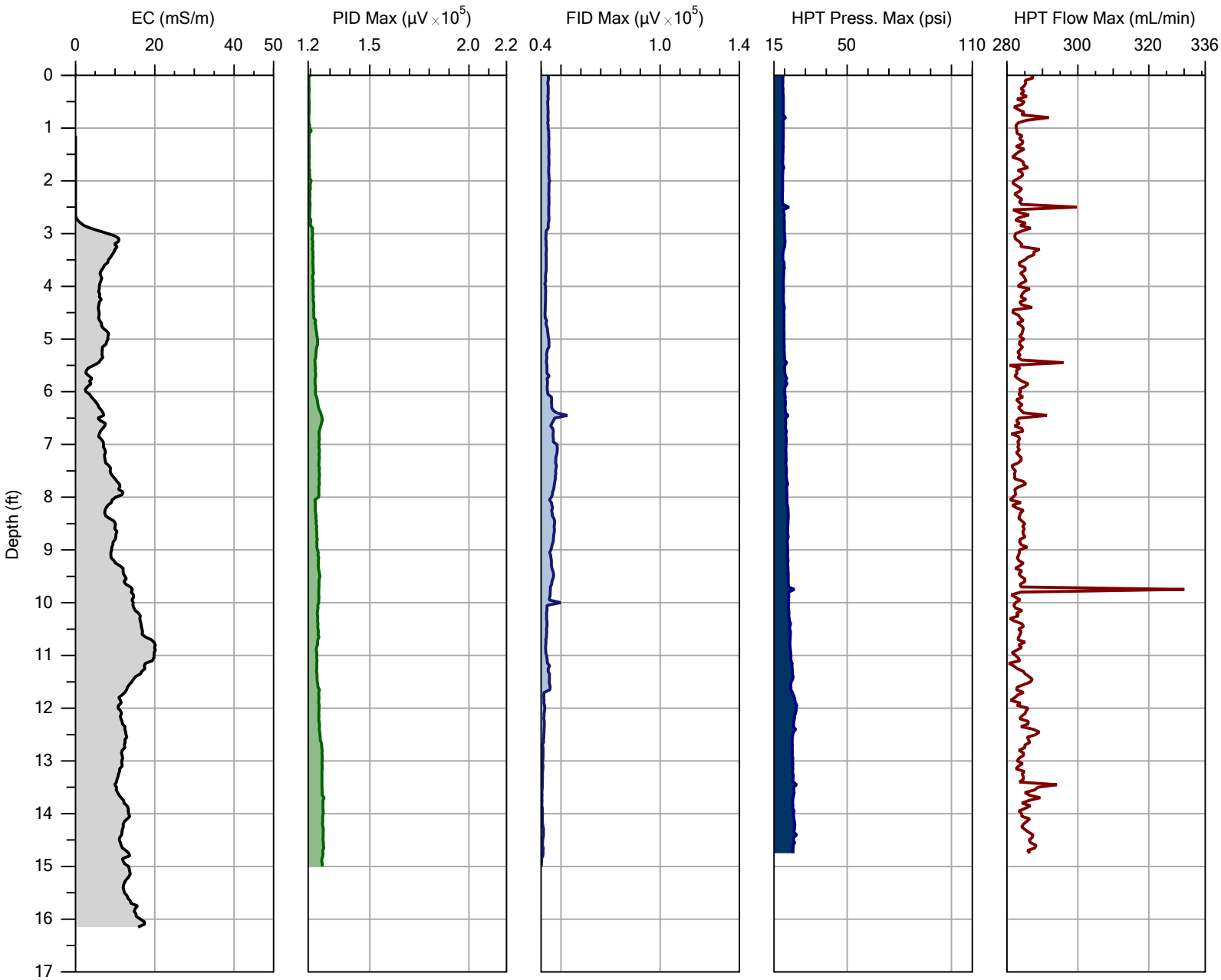
		File: LIF/MIP38-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/9/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



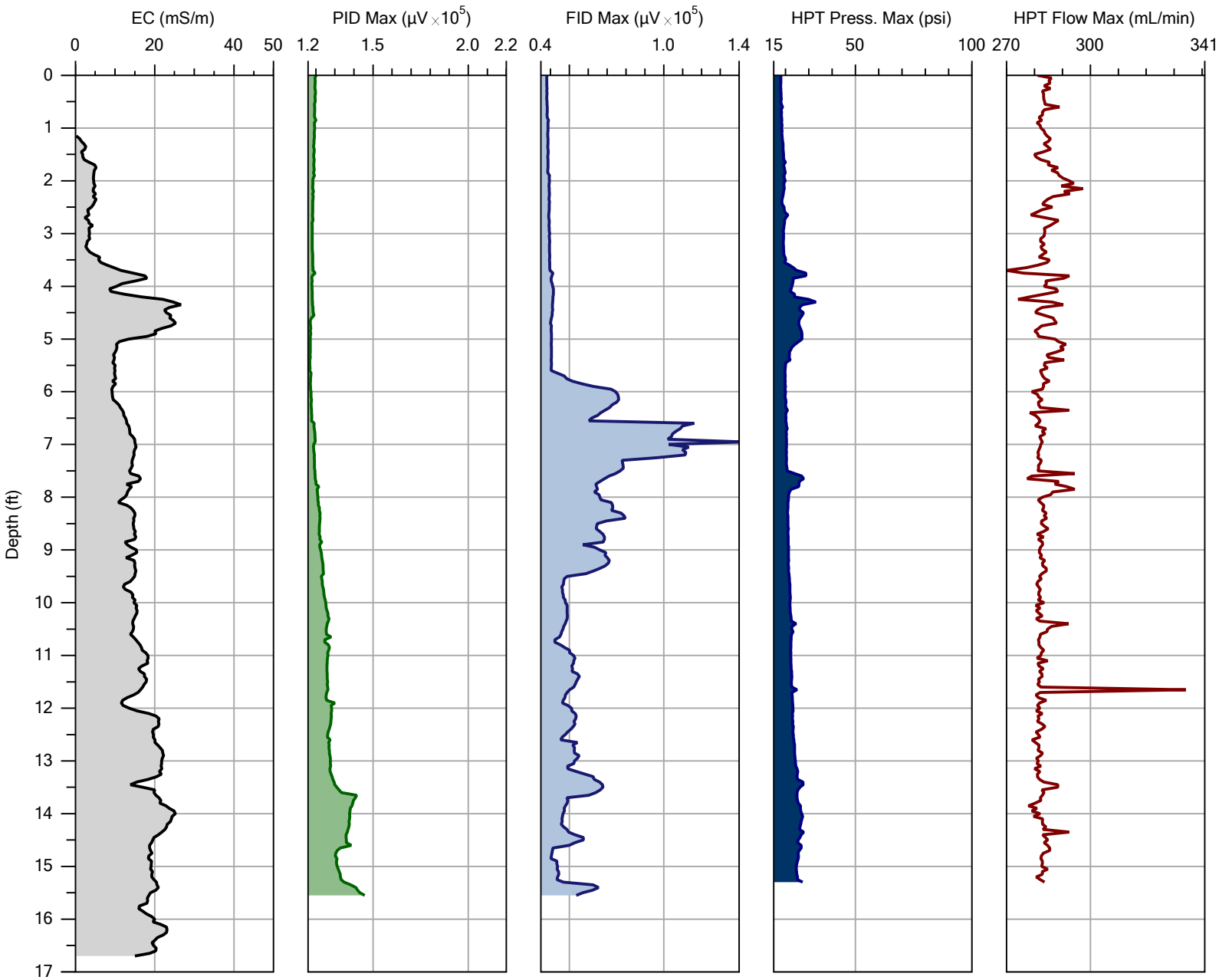
			File: LIF/MIP39-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/10/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



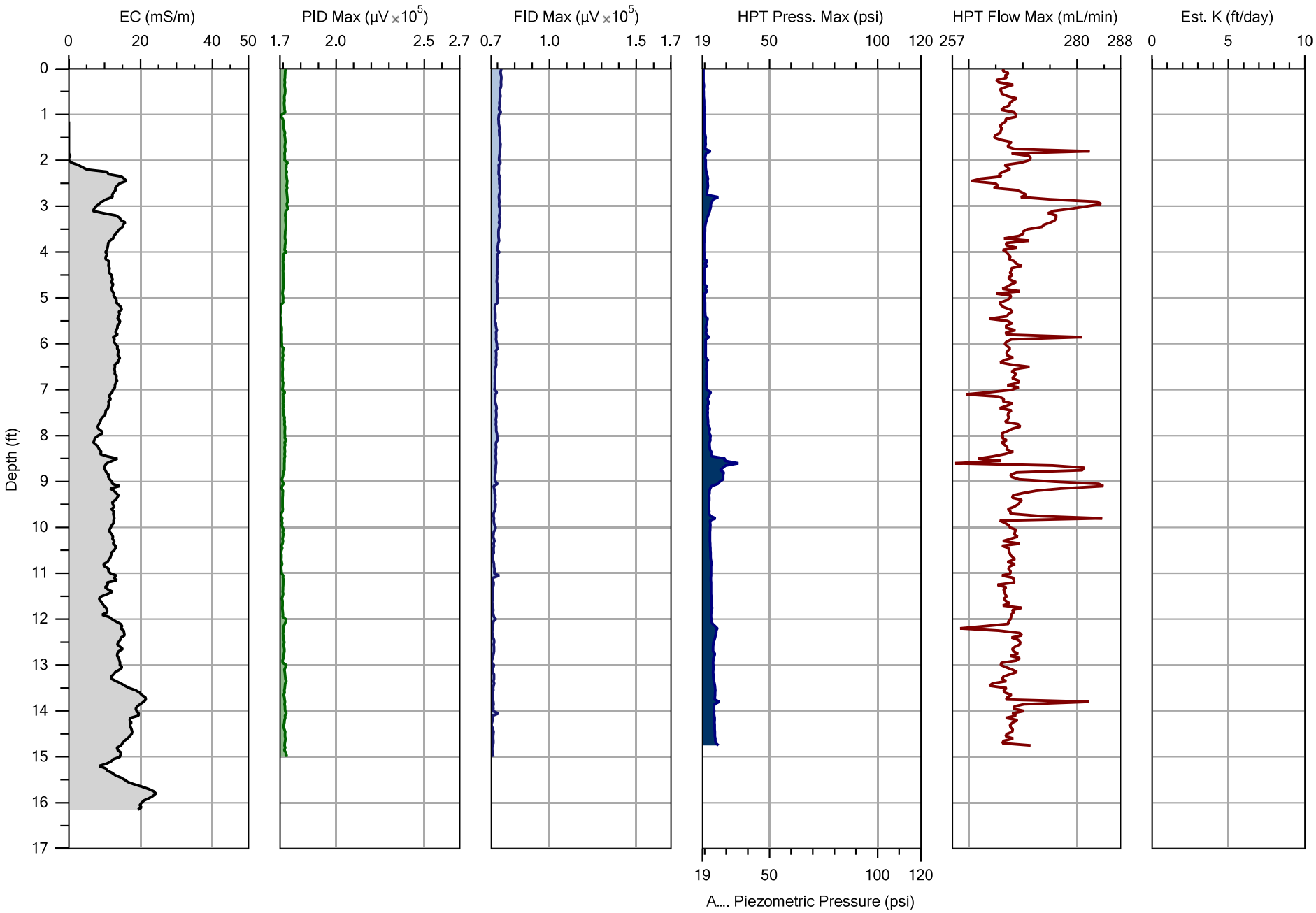
			File: LIF/MIP40-19
Company: Dakota Technologies	Operator: AK/EM		Date: 5/17/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



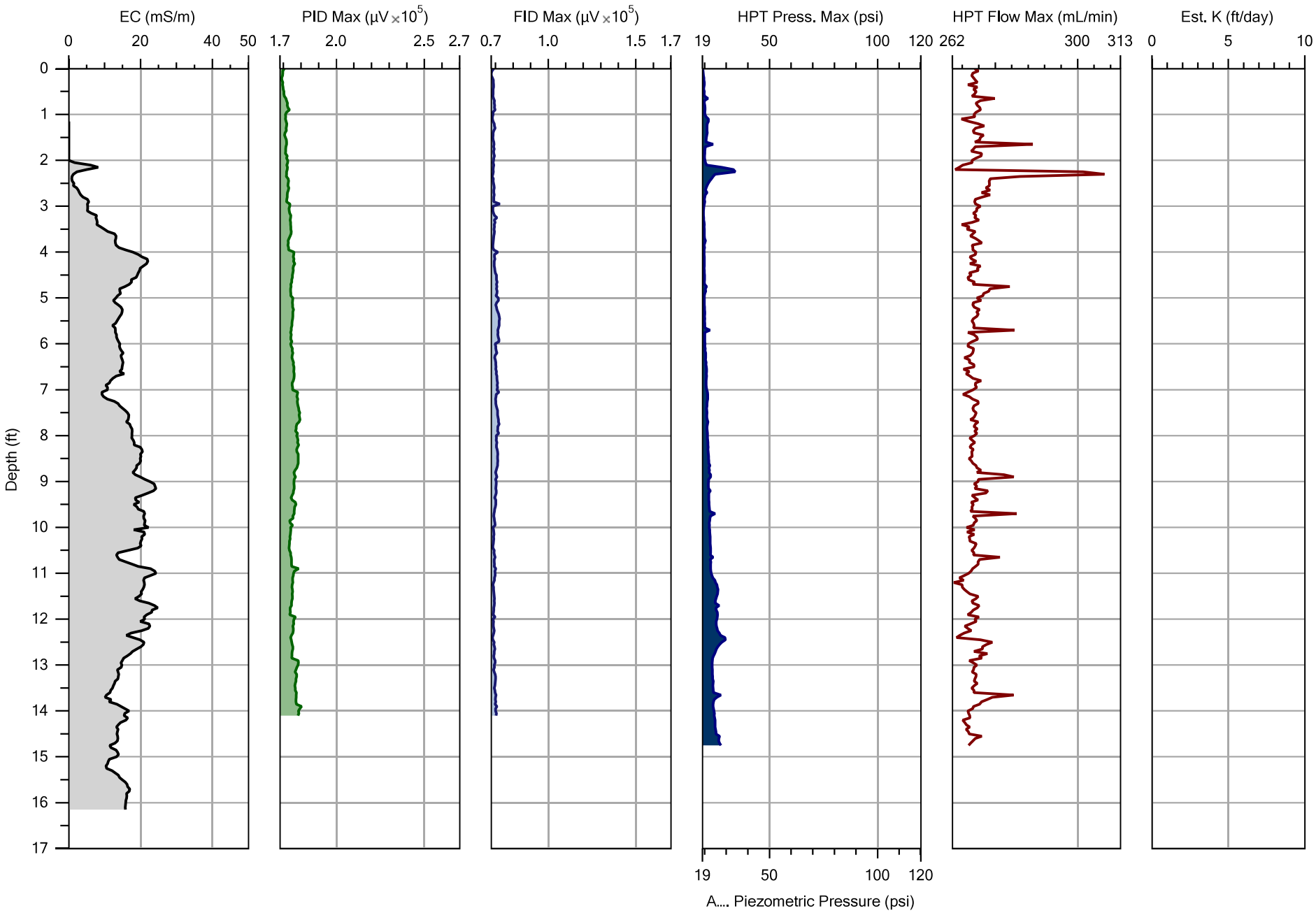
			File: LIF/MIP41-19
Company: Dakota Technologies	Operator: AK/EM		Date: 5/17/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



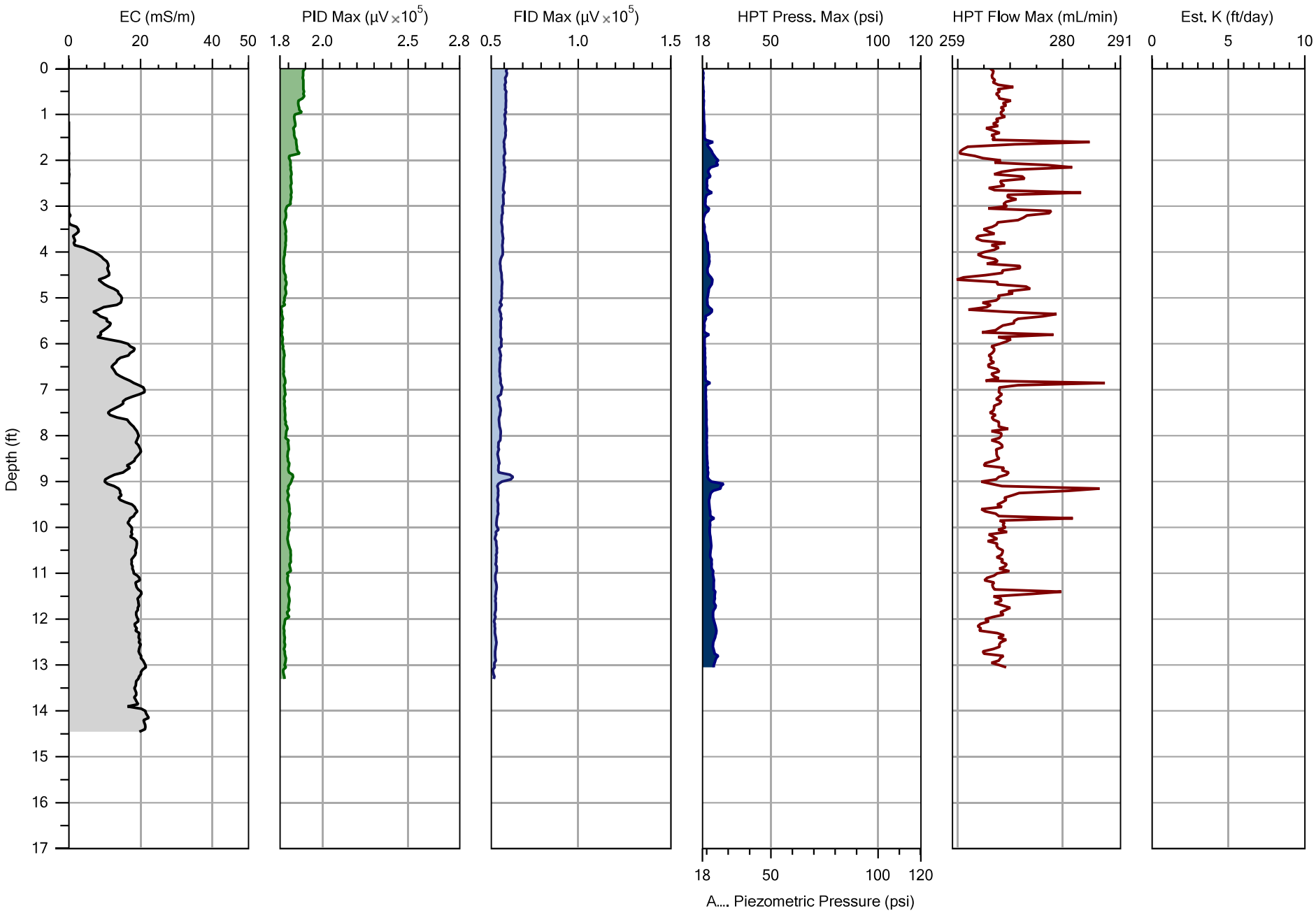
			File: LIF/MIP42-19
Company: Dakota Technologies	Operator: AK/EM		Date: 5/17/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



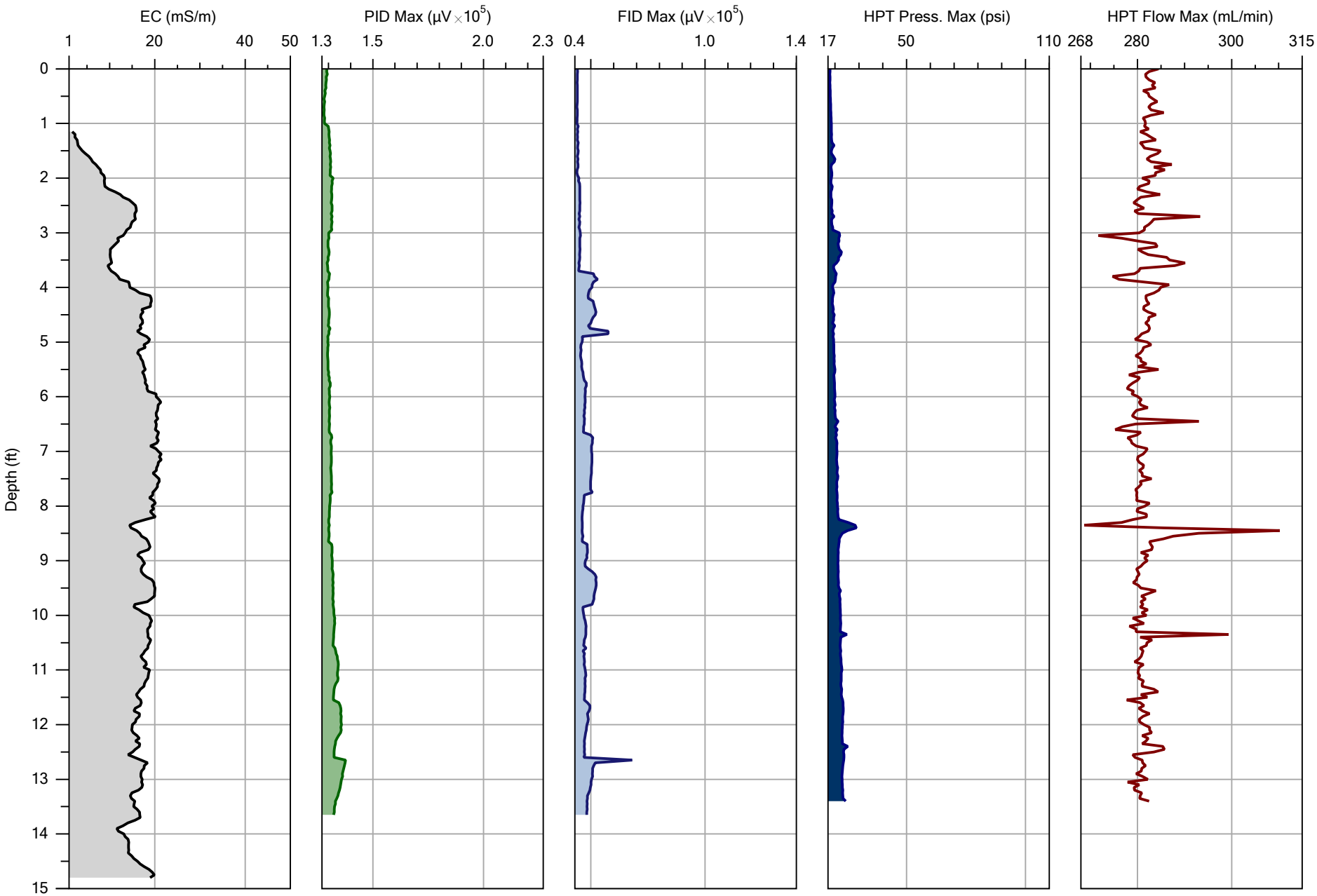
		File: MIP42A-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/12/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



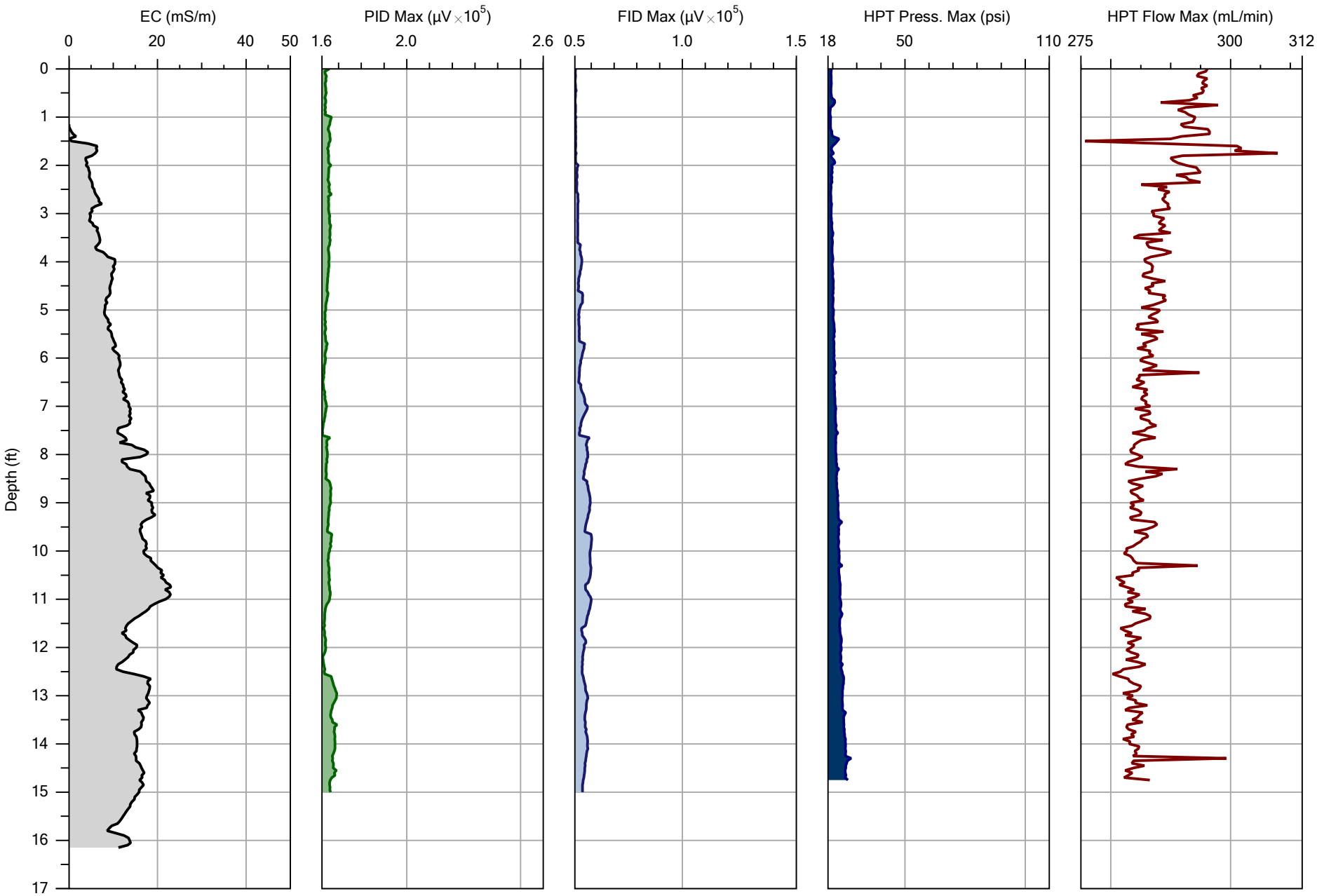
		File: MIP42B-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/12/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



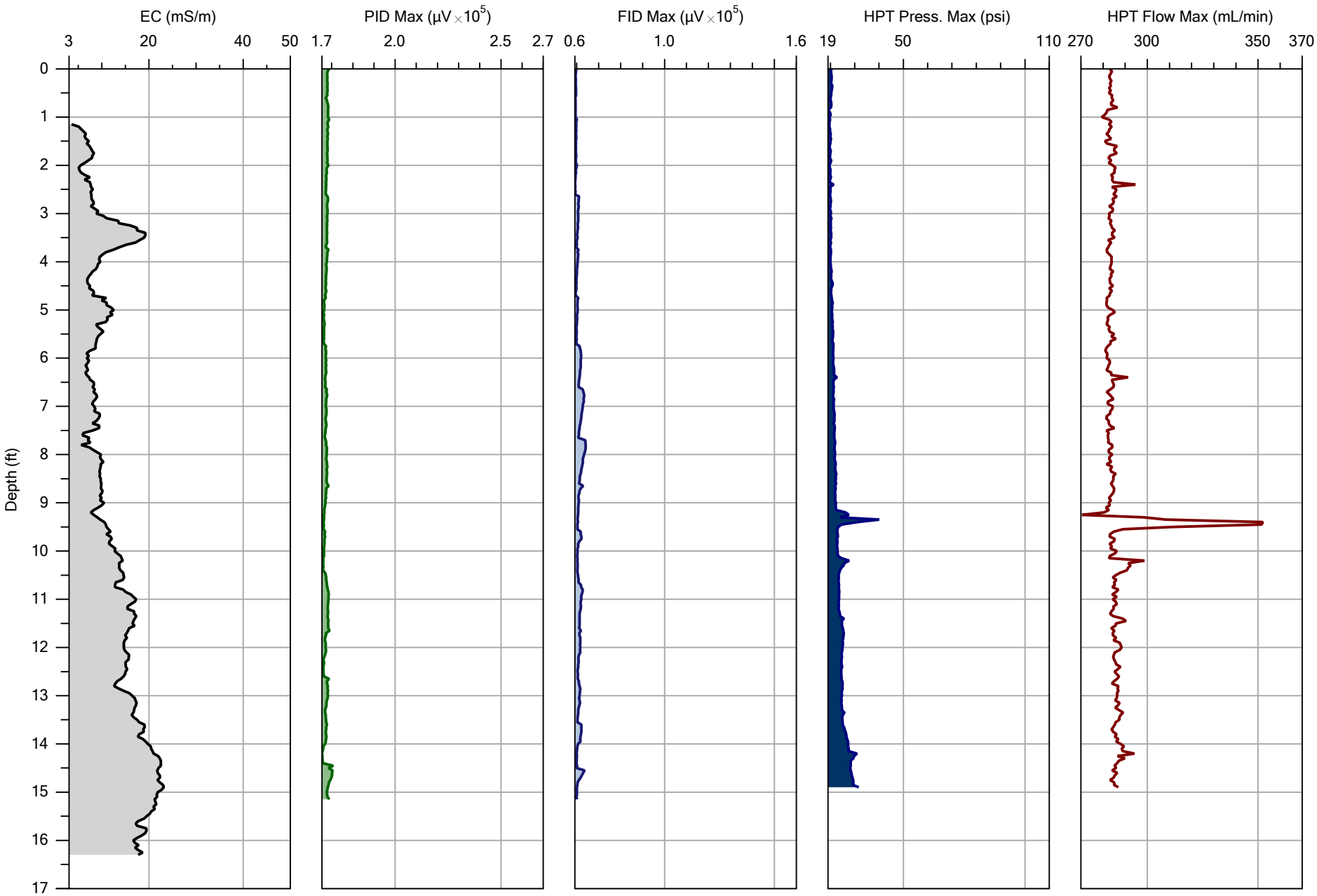
		File: MIP42C-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/8/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



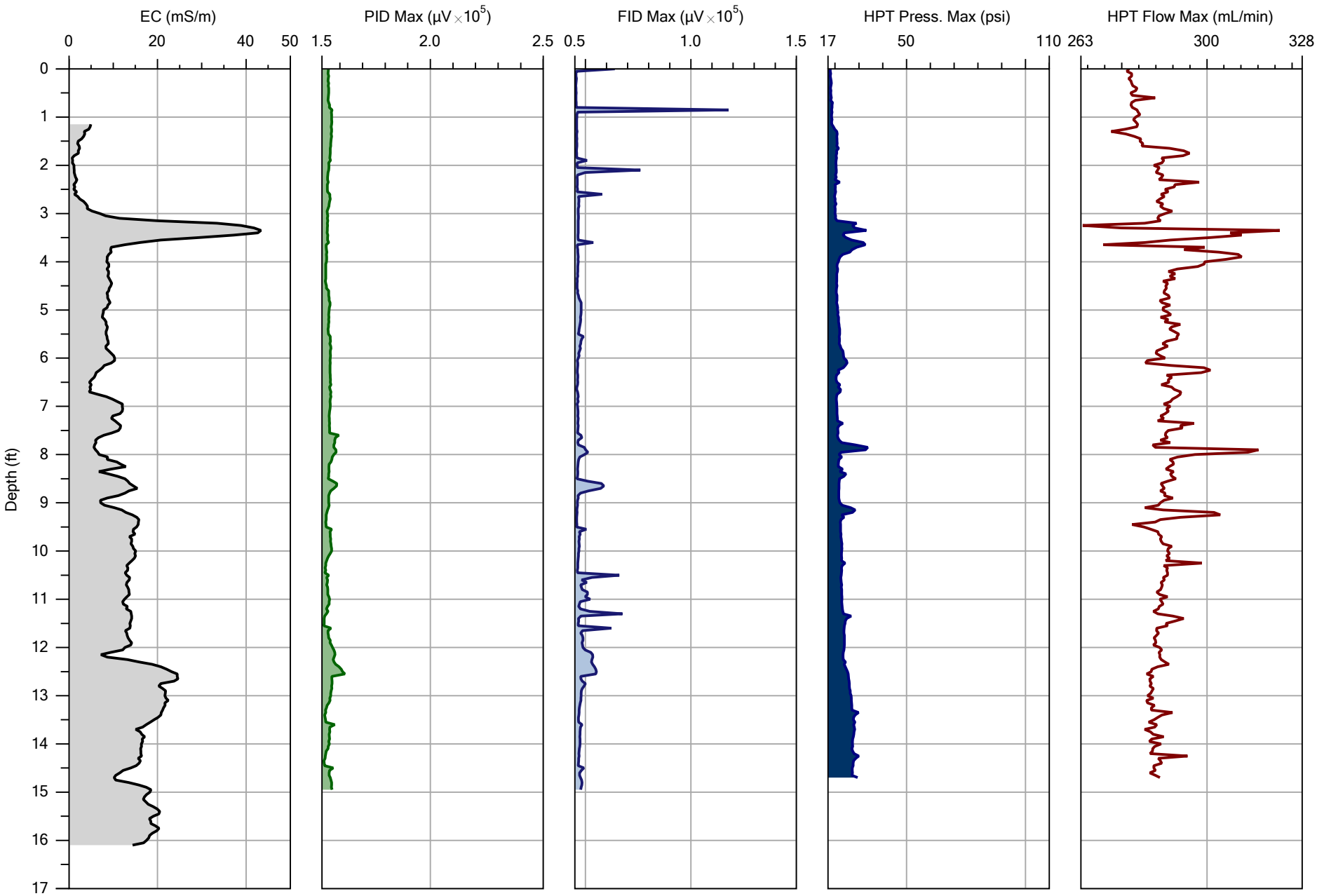
		File: LIF/MIP43-19
Company: Dakota Technologies	Operator: AK/SM	Date: 5/18/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



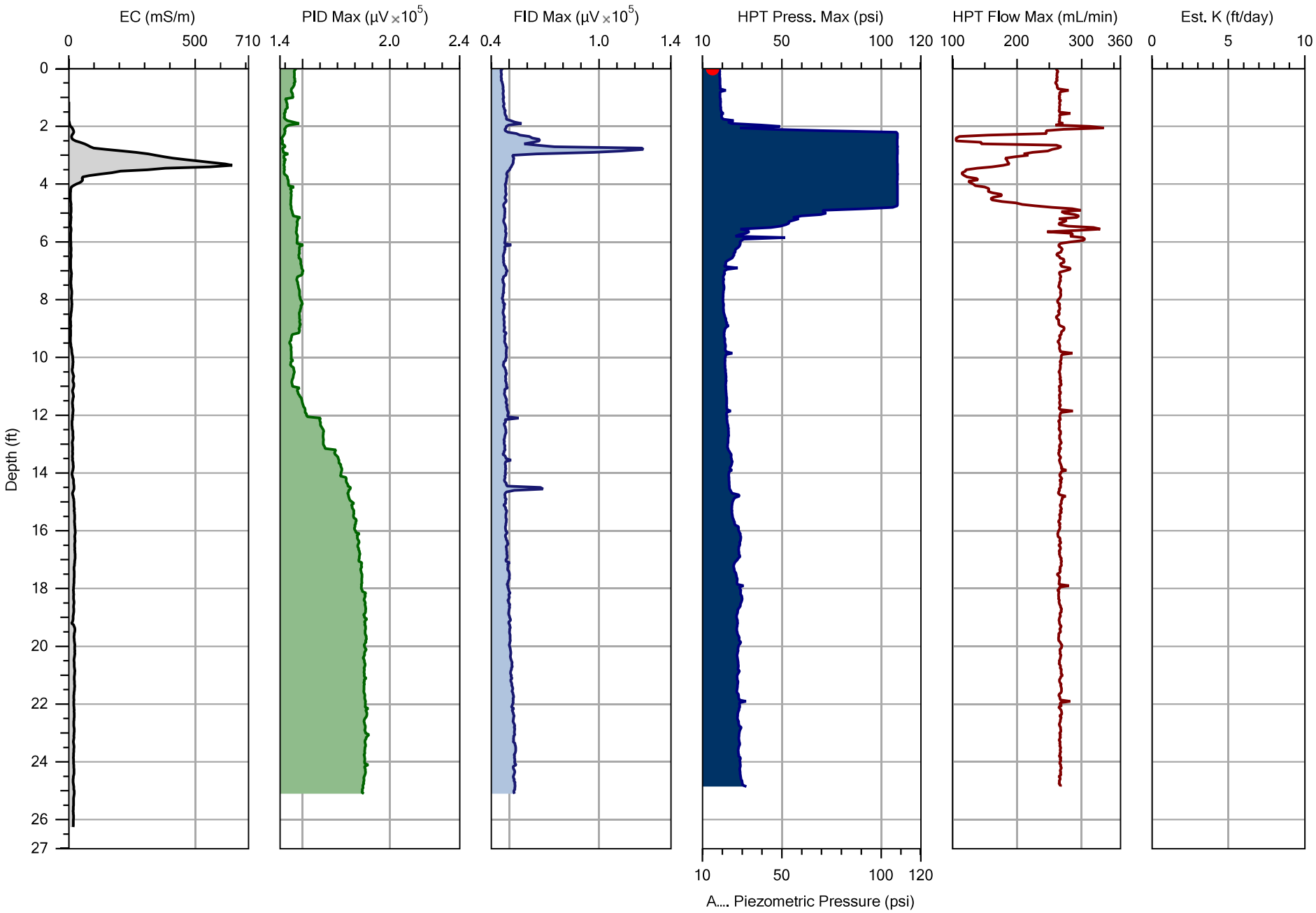
			File: LIF/MIP44-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/18/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



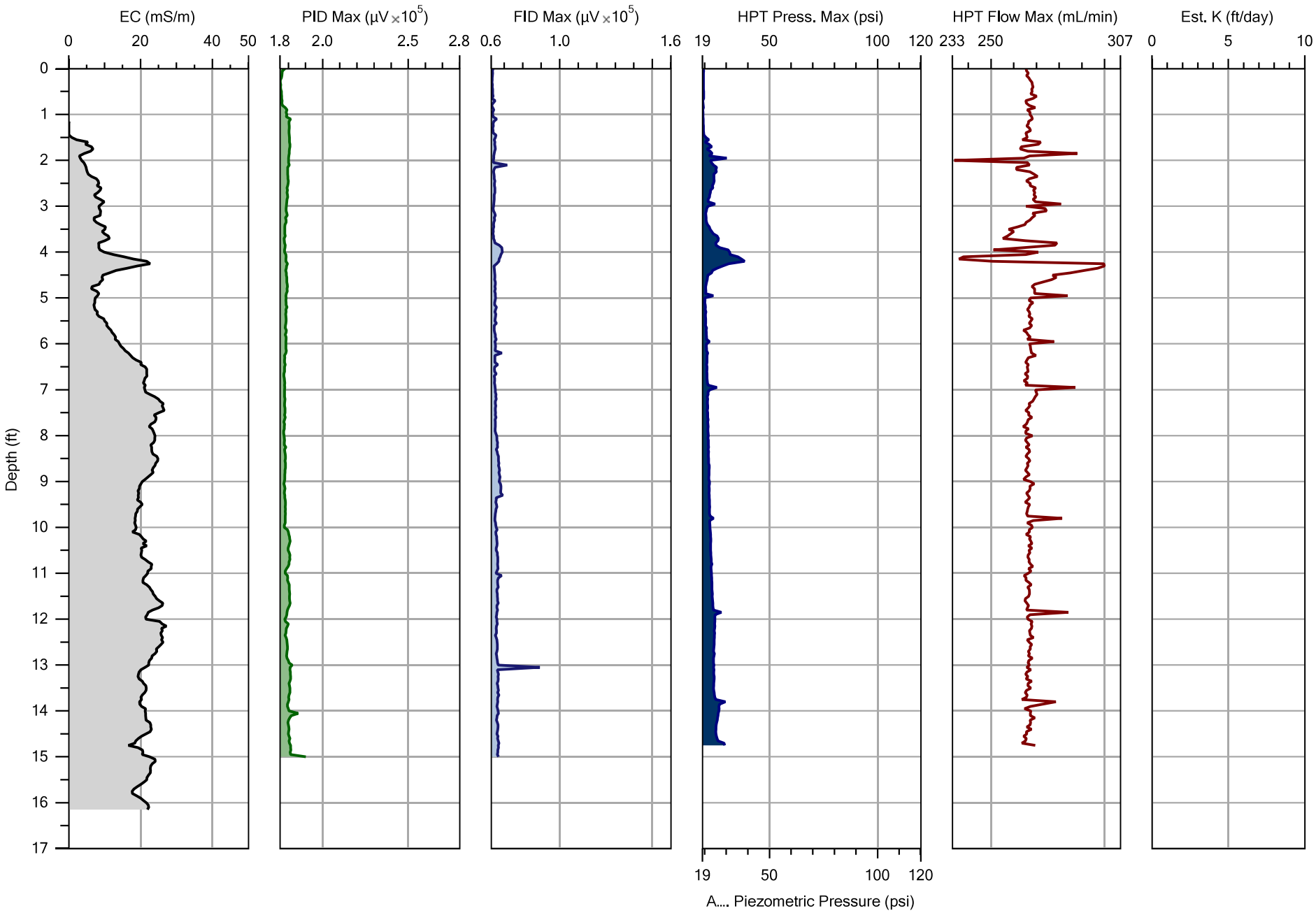
			File: LIF/MIP45-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/18/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



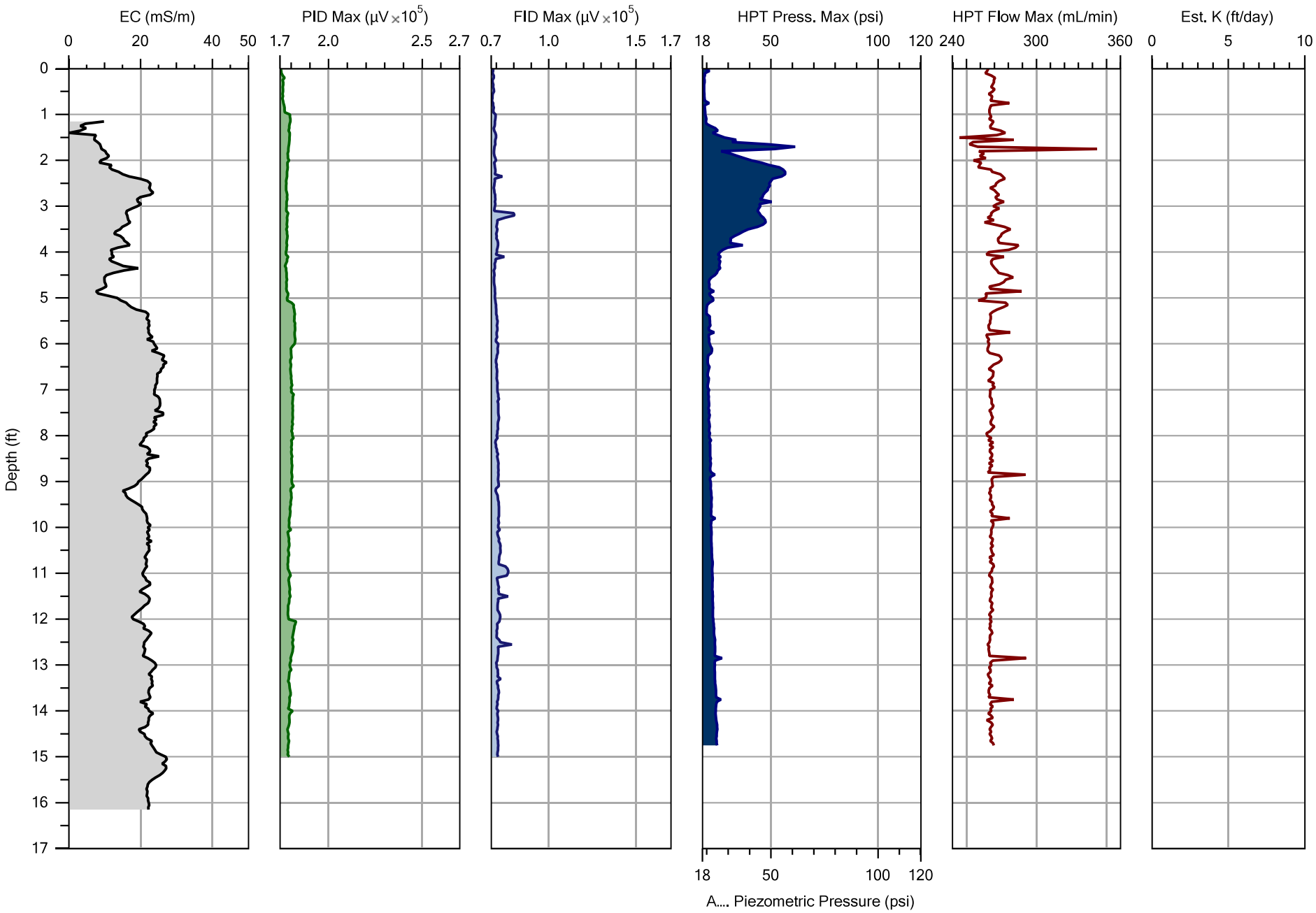
			File: LIF/MIP46-19
Company: Dakota Technologies	Operator: AK/SM		Date: 5/19/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



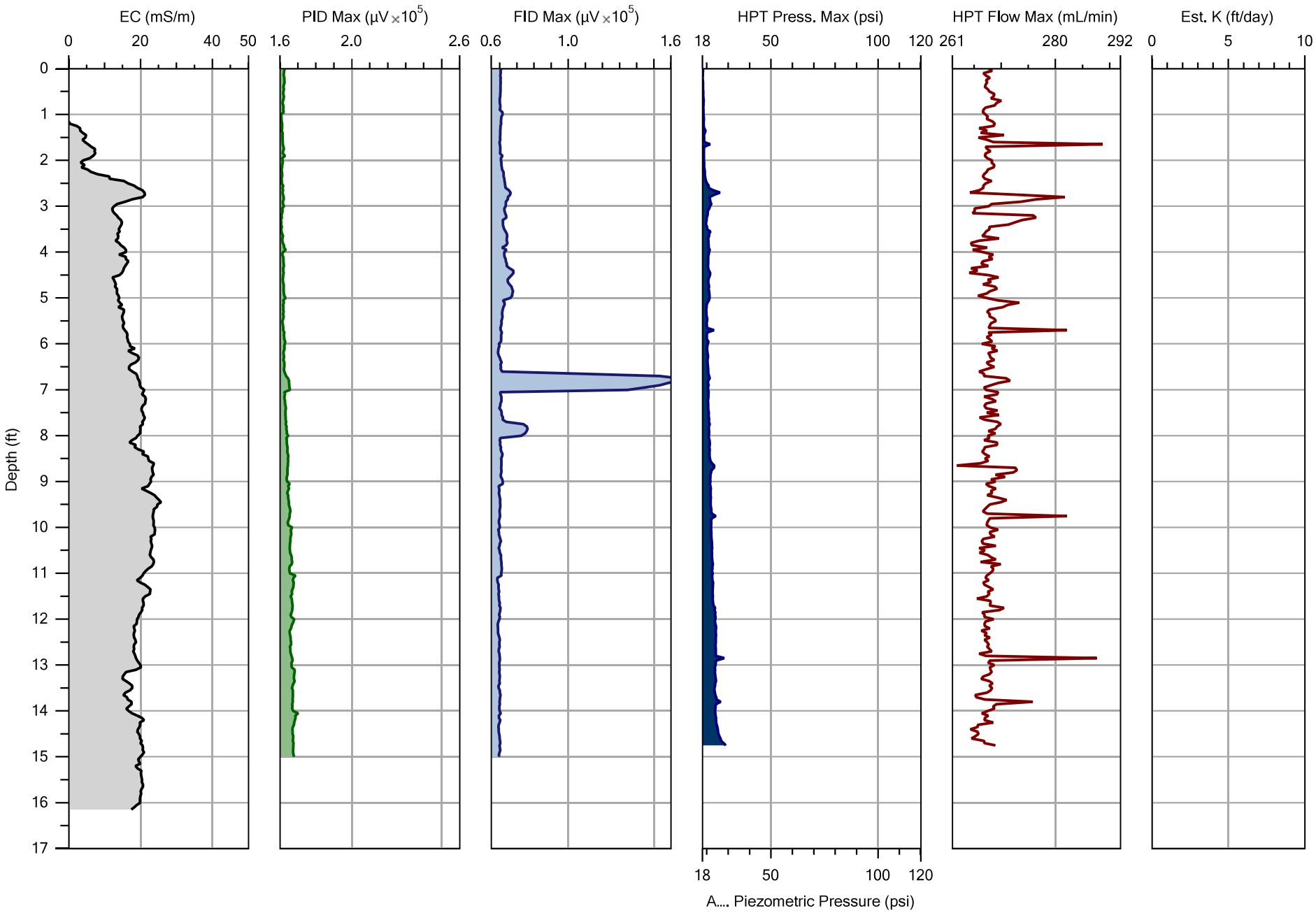
		File: LIF/MIP49 -19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/11/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



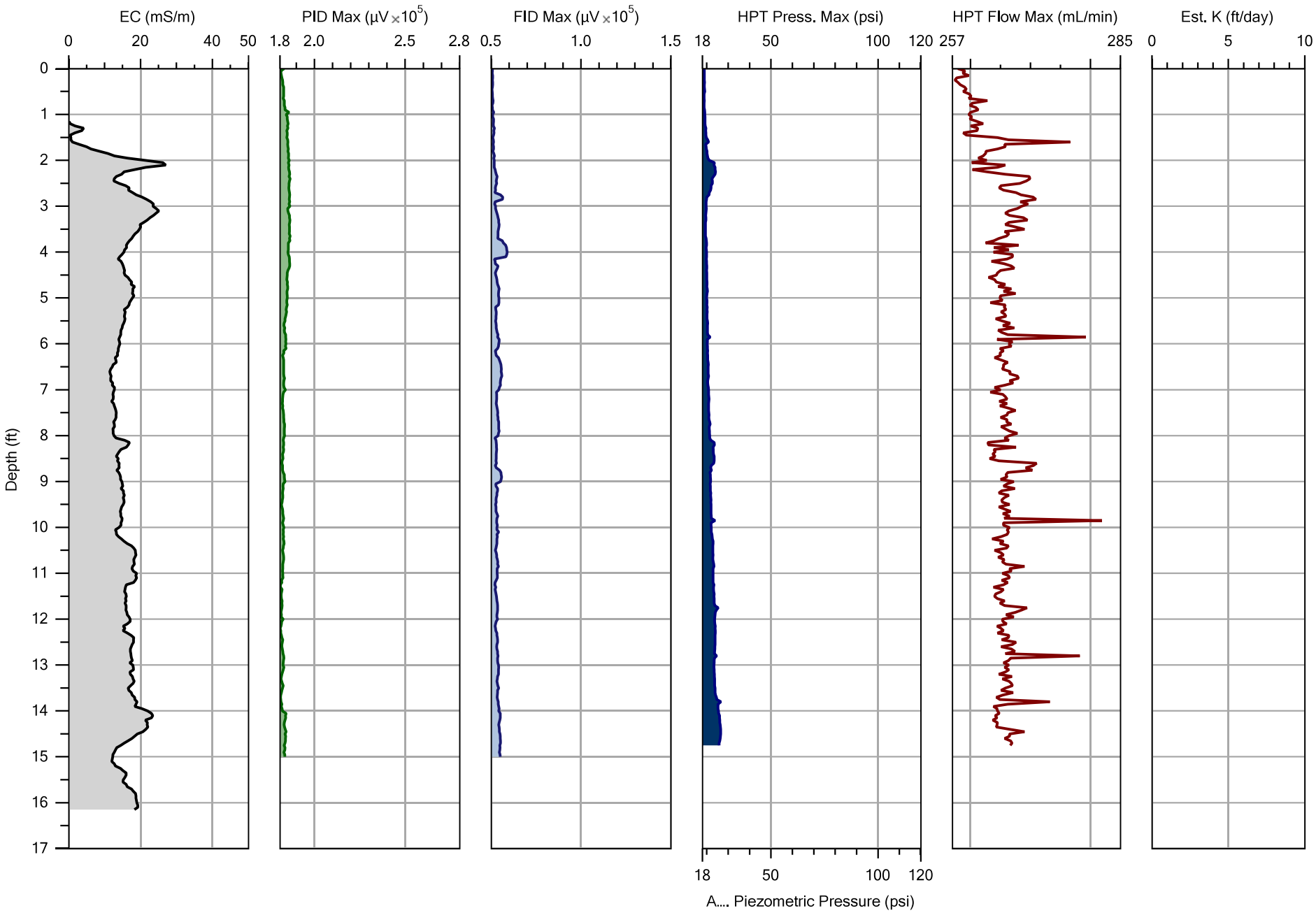
			File: LIF/MIP50-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/11/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



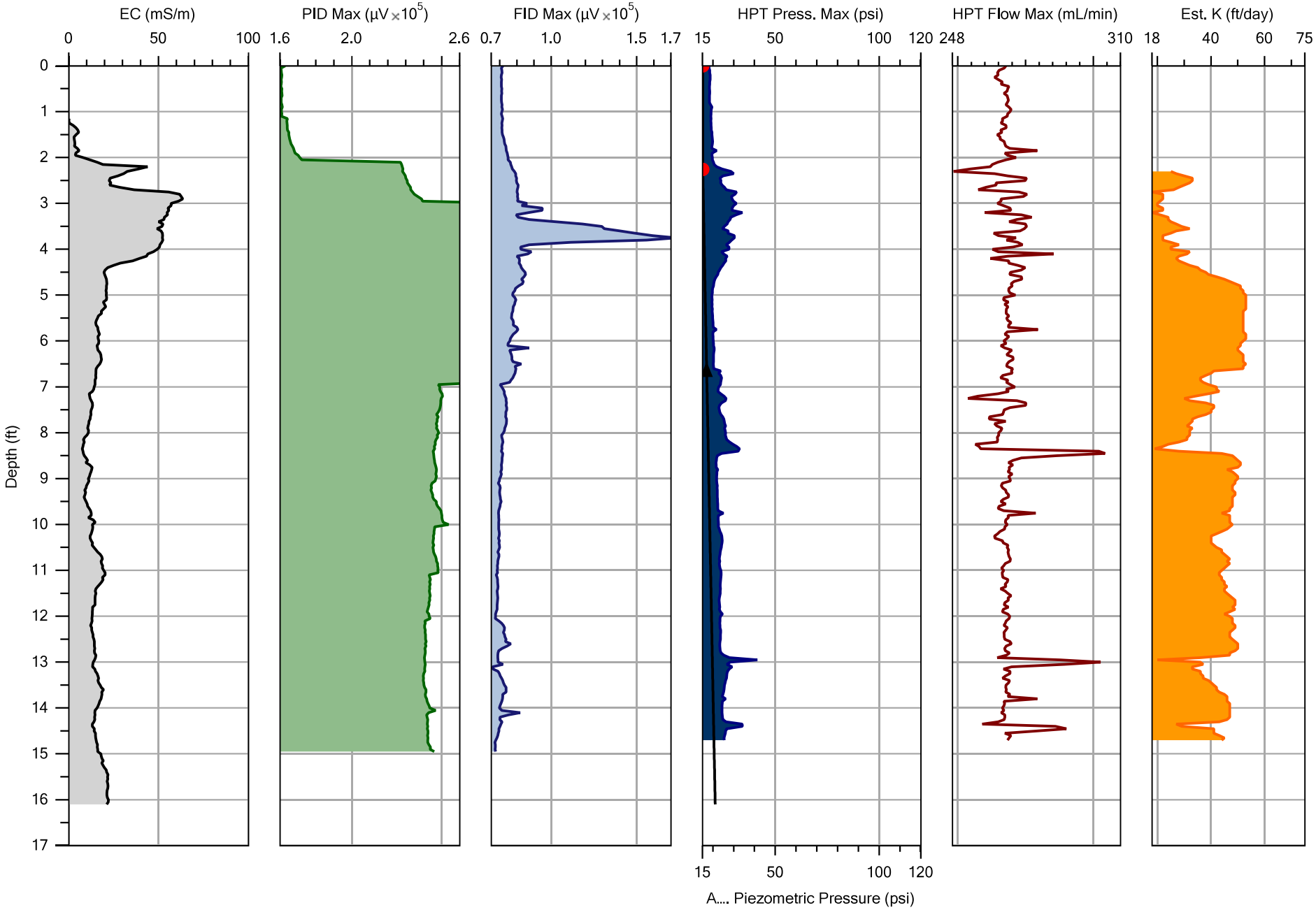
			File: LIF/MIP51-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/11/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



			File: LIF/MIP52-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/9/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery



		File: MIP56-19
Company: Dakota Technologies	Operator: AK/EM	Date: 8/12/2019
Project ID: 170.19	Client: GHD	Location: Fmr.East Chicago Refinery



			File: MIP62-19
Company: Dakota Technologies	Operator: AK/EM		Date: 8/6/2019
Project ID: 170.19	Client: GHD		Location: Fmr.East Chicago Refinery

Appendix D
Historical Stratigraphic Logs

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-1*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SBI-1				SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SBI-3			2					ND						
SBI-5			4					ND						
SBI-7			6					ND						
SBI-9			8					ND						
SBI-11			10					ND						
			12	End of Boring at 12'										
			14											
			16											
			18											
			20											
			22											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-2*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB2-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			24.2						
			2											
SB2-3			3					28.6						
			4											
SB2-5			5					32.5						
			6											
SB2-7			7					28.8						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-3*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB3-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
			2											
SB3-3			3					ND						
			4											
SB3-5			5					ND						
			6											
SB3-7			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-4*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB4-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
			2											
SB4-3			3					ND						
			4											
SB4-5			5					ND						
			6											
SB4-7			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-5*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB5-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			124						
			2											
SB5-3			3					135						
			4											
SB5-5			5					112						
			6											
SB5-7			7					115						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	Natural Resource Technology

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-6*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB6-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			380						
			2											
SB6-3			3					410						
			4											
SB6-5			5					392						
			6											
SB6-7			7					354						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-7*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB7-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB7-3			2, 3					ND						
SB7-5			4, 5					ND						
SB7-7			6, 7					ND						
			8	End of Boring at 8'										
			9, 10, 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-8*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB8-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
			2											
SB8-3			3					ND						
			4											
SB8-5			5					ND						
			6											
SB8-7			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
Logged by Kevin S. Gill	Natural Resource Technology

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*		**Boring Number** *SB-9*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB9-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB9-3			2, 3					ND						
SB9-5			4, 5					ND						
SB9-7			6, 7					ND						
			8	End of Boring at 8'										
			9, 10, 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-10*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB10-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
			2											
SB10-3			3					ND						
			4											
SB10-5			5					ND						
			6											
SB10-7			7					ND						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-11*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB11-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB11-3			2					ND						
SB11-5			3					ND						
SB11-7			4					ND						
			5											
			6											
			7											
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*		**Boring Number** *SB-12*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB12-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			225						
			2											
SB12-3			3					452						
			4											
SB12-5			5					381						
			6											
SB12-7			7					276						
			8	End of Boring at 8'										
			9											
			10											
			11											

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Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

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SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-13*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/03/96*	**Date Drilling Completed** *12/03/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB13-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			320						
SB13-3			2, 3					481						
SB13-5			4, 5					427						
SB13-7			6, 7					210						
			8	End of Boring at 8'										
			9, 10, 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-14*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location **State Plane** Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB14-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			ND						
SB14-3			2, 3					ND						
SB14-5			4, 5					ND						
SB14-7			6, 7					ND						
			8	End of Boring at 8'										
			9, 10, 11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum – East Chicago*			**Boring Number** *SB-15*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N / Feet E	Lat / Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB15-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			284						
			2											
SB15-3			3					305						
			4	End of Boring at 4'										
			5											
			6											
			7											
			8											
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-16*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (If applicable)** ☐ N ☐ E ☐ S ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB16-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			22.4						
			2											
SB16-3			3					18.2						
			4											
SB16-5			5					15.1						
			6											
SB16-7			7					17.8						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

SOIL BORING LOG INFORMATION

Facility/Project Name *Citgo Petroleum - East Chicago*			**Boring Number** *SB-17*
Boring Drilled By (Firm name and name of crew chief) *Terra Trace* *Mike*	**Date Drilling Started** *12/04/96*	**Date Drilling Completed** *12/04/96*	**Drilling Method** *Geoprobe*
Common Well Name	Final Static Water Level *Feet MSL*	Surface Elevation *Feet MSL*	Borehole Diameter *1.5 inches*
Boring Location State Plane Feet N Feet E	Lat Long	**Local Grid Location (if applicable)** ☐ N ☐ S ☐ E ☐ W	
County *Lake County*	**B2State** *Indiana*	**Civil Town/City/ or Village** *East Chicago*	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
SB17-1			1	SAND: Brown to gray, fine to medium grained sands with little coarse sand, little silt, wet at 1.5 feet.	SP			32.1						
			2											
SB17-3			3					24.6						
			4											
SB17-5			5					17.5						
			6											
SB17-7			7					19.7						
			8	End of Boring at 8'										
			9											
			10											
			11											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **Logged by Kevin S. Gill**	Firm **Natural Resource Technology**

This form is based on the generic log form used in the State Wisconsin.

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: SB-1/PZ-1
DATE COMPLETED: March 4, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.7 586.5					
	SW-SAND, little gravel, loose, coarse fine grained, black, moist, slight odor		BENTONITE CHIPS				
	SP-SAND, trace gravel, compact, fine grained, light brown, wet, slight odor	585.5	1" WELL CASING				
2				1GP	P/S		
	- dense at 3.5ft BGS						
4							
	- saturated at 5.5ft BGS						
6			#5 SAND PACK	2GP	P/S		
	- little gravel, gray, strong odor at 7.0ft BGS						
8			1" WELL SCREEN				
10			2.25" BOREHOLE	3GP	P/S		
12	END OF BOREHOLE @ 12.0ft BGS	574.5					
14							
16							

WELL DETAILS
Screened interval:
585.0 to 575.0ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
586.5 to 585.5ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
585.5 to 574.5ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

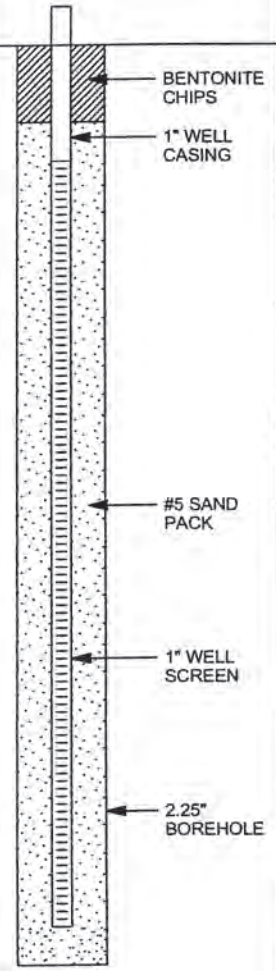
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: PZ-2
DATE COMPLETED: March 4, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	592.3 588.0					



WELL DETAILS
Screened interval:
586.5 to 576.5ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
588.0 to 587.0ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
587.0 to 576.0ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: SB-3/PZ-3
DATE COMPLETED: March 4, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	591.0 588.1					
	GP-GRAVEL, little sand, coarse, loose, gray, moist	587.6	BENTONITE CHIPS				
	SP-SAND, trace gravel, compact, fine grained, light brown, moist, slight odor		1" WELL CASING				
2				1GP	P/S		
4							
	- wet at 4.5ft BGS						
	- no odor at 5.0ft BGS						
6	- saturated at 6.0ft BGS		#5 SAND PACK	2GP	P/S		
8			1" WELL SCREEN				
10			2.25" BOREHOLE	3GP	P/S		
12	END OF BOREHOLE @ 12.0ft BGS	576.1					
14							
16							

WELL DETAILS
Screened interval:
586.6 to 576.6ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
588.1 to 587.1ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
587.1 to 576.1ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

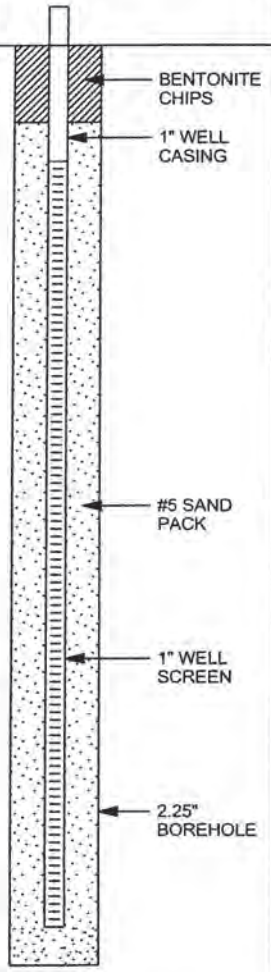
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: PZ-4
DATE COMPLETED: March 4, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	591.9 587.6					



2
4
6
8
10
12
14
16

WELL DETAILS
Screened interval:
586.1 to 576.1ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.6 to 586.6ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
586.6 to 575.6ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

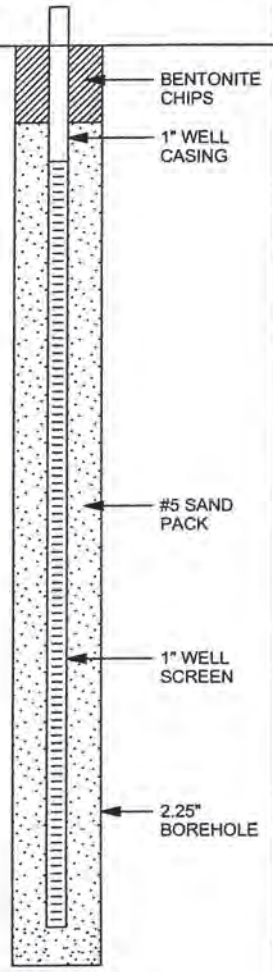
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: PZ-5
DATE COMPLETED: March 4, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	591.3 587.0					



WELL DETAILS
Screened interval:
585.5 to 575.5ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.0 to 586.0ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
586.0 to 575.0ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

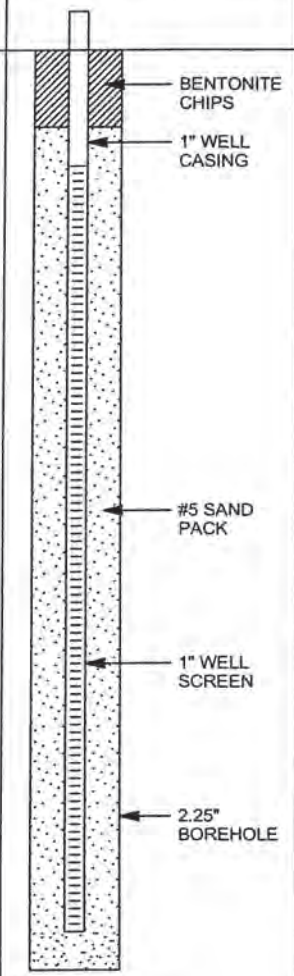
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: GSH-EAST CHICAGO
PROJECT NUMBER: 31532-06
CLIENT: GSH
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: RD-n-P DRILLING

HOLE DESIGNATION: SB-6/PZ-6
DATE COMPLETED: March 3, 2005
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: D. CRUICKSHANK
DRILLER: TONY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
	TOP OF CASING GROUND SURFACE	591.2 587.1					
	TOP SOIL/COKE	586.9					
	GP-GRAVEL, little sand, coarse, loose, gray, wet, strong odor	586.4					
	SP-SAND, trace gravel, fine grained, compact, gray, wet, strong odor						
2	- dense at 2.5ft BGS						
4	- saturated at 4.5ft BGS						
6							
8							
10							
12	END OF BOREHOLE @ 12.0ft BGS	575.1					
14							
16							



WELL DETAILS
Screened interval:
585.6 to 575.6ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.1 to 586.1ft AMSL
0.0 to 1.0ft BGS
Material: BENTONITE CHIPS
Sand Pack:
586.1 to 575.1ft AMSL
1.0 to 12.0ft BGS
Material: NATIVE

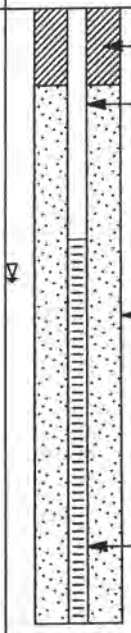
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ C-D 3-4
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke	1.2	BENTONITE CHIPS; 1" WELL CASING	1	P/S	70		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist - light brown at 2.5ft BGS			1	P/S			7.8
4	- wet at 3.5ft BGS - gray, staining, slight odor, sheen at 4.0ft BGS		2" BOREHOLE	2	P/S	100		7.4
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0	1" WELL SCREEN					
10								
12								
14								
16								



WELL DETAILS
Screened interval:
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ F-5
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke		BENTONITE CHIPS					
	SP SAND, loose to compact, fine grained, poorly graded, black, very moist	1.0	1" WELL CASING	1	P/S	90		0
2								
	- brown at 3.0ft BGS			1	P/S			0
4	- gray, wet at 4.3ft BGS		2" BOREHOLE					
	- trace medium grained sand at 4.8ft BGS			2	P/S	90		0
6								
			1" WELL SCREEN	2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

WELL DETAILS
Screened interval:
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ H-4
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	SP SAND, trace peat, compact, very fine to fine grained, poorly graded, dark brown, very moist - loose to compact, tan, very moist to saturated at 1.1ft BGS - saturated at 1.6ft BGS - dark gray at 2.3ft BGS - very fine to medium grained, gray at 2.7ft BGS		BENTONITE CHIPS 1" WELL CASING 2" BOREHOLE SAND PACK 1" WELL SCREEN	1 1 2 2	P/S P/S P/S P/S	80 85	
	END OF BOREHOLE @ 8.0ft BGS	8.0					

WELL DETAILS
Screened interval:
2.6 to 7.6ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ I-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	SP SAND, trace fine gravel, loose to compact, fine grained, poorly graded, dark brown, very moist, odor, trace vegetation		BENTONITE CHIPS; 1" WELL CASING	1	P/S	90		0
2	- black staining, heavy odor at 2.0ft BGS - no black staining at 2.4ft BGS			1	P/S			105
4	- gray at 4.2ft BGS		2" BOREHOLE	2	P/S	70		109
	- wet, black staining at 5.5ft BGS		∇					
6	- no black staining at 6.5ft BGS		SAND PACK; 1" WELL SCREEN	2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

WELL DETAILS
Screened interval:
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ L-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, crushed red brick	0.7	BENTONITE CHIPS; 1" WELL CASING	1	P/S	60		0.5
2	SP SAND, with fine grave, loose to compact, fine grained, poorly graded, dark brown, very moist - trace gravel at 1.0ft BGS			1	P/S			48.8
4	- wet at 3.9ft BGS		2" BOREHOLE	2	P/S	80		20.6
6	- odor at 5.5ft BGS		SAND PACK; 1" WELL SCREEN	2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

WELL DETAILS
Screened interval:
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

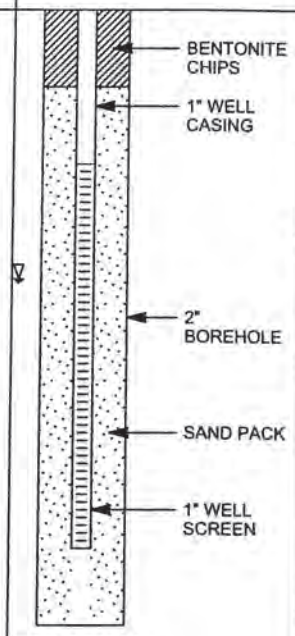
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ M-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, sand, trace fine gravel, loose, fine to medium grained, poorly graded, brown, moist	
	- 0.2 foot of blue gravel at 1.0ft BGS	
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist	1.4
2		
	- wet at 3.5ft BGS	
4		
6		
8	END OF BOREHOLE @ 8.0ft BGS	8.0
10		
12		
14		
16		



WELL DETAILS
Screened interval:
2.0 to 7.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1	P/S	80		0.3
1	P/S			0.3
2	P/S	100		0.4
2	P/S			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ M-8-9
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, compacted coke		BENTONITE CHIPS				
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist	1.0	1" WELL CASING	1	P/S	60	
2				1	P/S		
4	- wet at 3.8ft BGS		2" BOREHOLE	2	P/S	80	
6			SAND PACK				
			1" WELL SCREEN	2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

WELL DETAILS
Screened interval:
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: PZ O-4-5
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, fine to medium grained, poorly graded, dark brown, very moist, trace vegetation	0.8	BENTONITE CHIPS					
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist		1" WELL CASING	1	P/S	70		1.5
2								
	- black at 3.0ft BGS			1	P/S			97.2
4			2" BOREHOLE					
	- wet at 4.6ft BGS		∇	2	P/S	30		107
6			SAND PACK					
			1" WELL SCREEN	2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

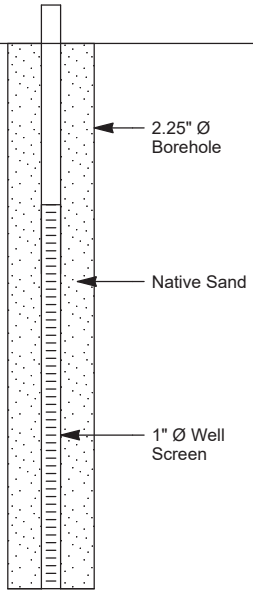
WELL DETAILS
Screened interval:
2.5 to 7.5ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Sand Pack:
1.0 to 8.0ft BGS
Material: #5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-I-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.42 587.49					
	No Sample Collected						
2							
4							
6							
	END OF BOREHOLE @ 7.1ft BGS	580.39					
8							
10							
12							
14							
16							

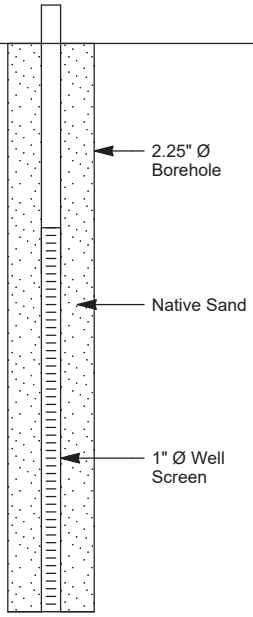
WELL DETAILS
Screened interval:
585.39 to 580.39ft AMSL
2.10 to 7.10ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.49 to 580.39ft AMSL
0.00 to 7.10ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-I-5
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.93 587.38					
	No Sample Collected						
	END OF BOREHOLE @ 7.4ft BGS	579.98					

WELL DETAILS
Screened interval:
584.98 to 579.98ft AMSL
2.40 to 7.40ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.38 to 579.98ft AMSL
0.00 to 7.40ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-J-3
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.03 587.96					
	No Sample Collected						
2			2.25" Ø Borehole				
4			Native Sand				
6			1" Ø Well Screen				
8	END OF BOREHOLE @ 7.9ft BGS	580.06					
10							
12							
14							
16							

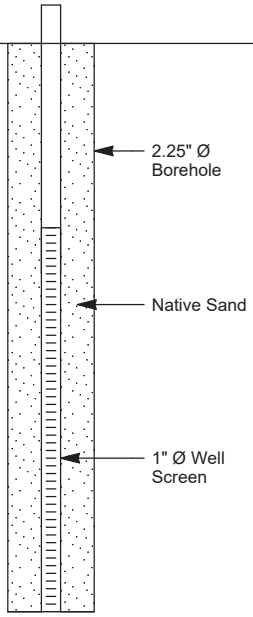
WELL DETAILS
Screened interval:
585.06 to 580.06ft AMSL
2.90 to 7.90ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.96 to 580.06ft AMSL
0.00 to 7.90ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-J-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.29 587.29					
	No Sample Collected						
	END OF BOREHOLE @ 7.4ft BGS	579.89					

WELL DETAILS
Screened interval:
584.89 to 579.89ft AMSL
2.40 to 7.40ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.29 to 579.89ft AMSL
0.00 to 7.40ft BGS
Material: Native Sand

2
4
6
8
10
12
14
16

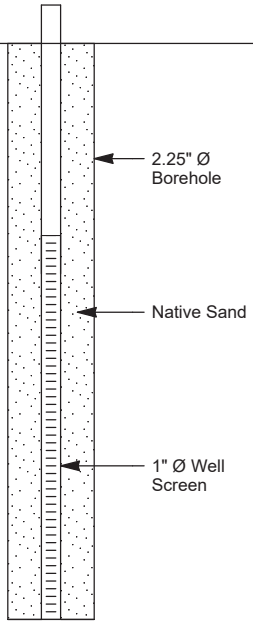
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-J-5
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.48 588.08					
	No Sample Collected						
	END OF BOREHOLE @ 7.5ft BGS	580.58					



WELL DETAILS
Screened interval:
585.58 to 580.58ft AMSL
2.50 to 7.50ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
588.08 to 580.58ft AMSL
0.00 to 7.50ft BGS
Material: Native Sand

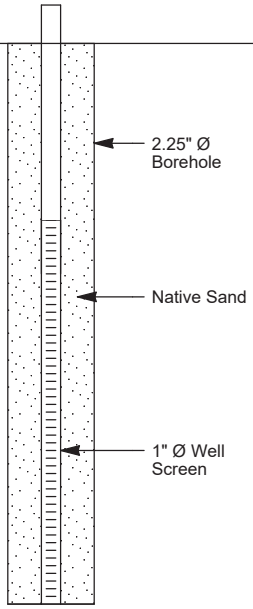
2
4
6
8
10
12
14
16

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-J-7
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.86 587.30					
	No Sample Collected						
	END OF BOREHOLE @ 7.3ft BGS	580.00					

WELL DETAILS
Screened interval:
585.00 to 580.00ft AMSL
2.30 to 7.30ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.30 to 580.00ft AMSL
0.00 to 7.30ft BGS
Material: Native Sand

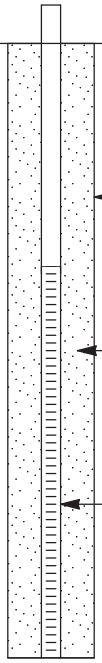
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-K-3
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.00 587.90					
	No Sample Collected						
2			2.25" Ø Borehole				
4			Native Sand				
6			1" Ø Well Screen				
8	END OF BOREHOLE @ 8.0ft BGS	579.90					
10							
12							
14							
16							



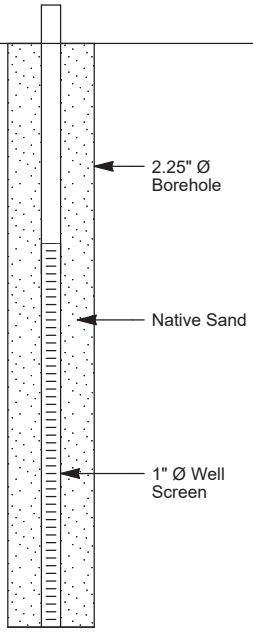
WELL DETAILS
Screened interval:
584.90 to 579.90ft AMSL
3.00 to 8.00ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.90 to 579.90ft AMSL
0.00 to 8.00ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-K-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.57 587.30					
	No Sample Collected						
	END OF BOREHOLE @ 7.6ft BGS	579.70					

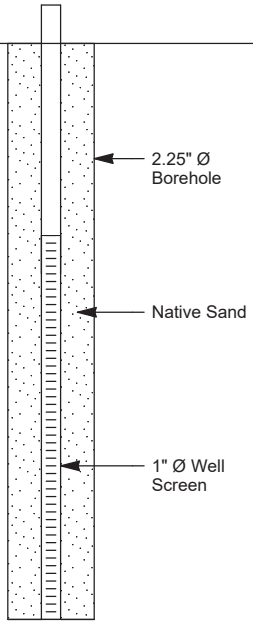
WELL DETAILS
Screened interval:
584.70 to 579.70ft AMSL
2.60 to 7.60ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.30 to 579.70ft AMSL
0.00 to 7.60ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-K-6
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING	598.03 589.85					
	No Sample Collected						
2							
4							
6							
8	END OF BOREHOLE @ 7.5ft BGS	590.53					
10							
12							
14							
16							

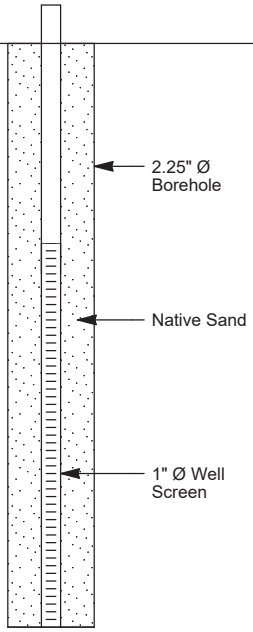
WELL DETAILS
Screened interval:
595.53 to 590.53ft AMSL
2.50 to 7.50ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
598.03 to 590.53ft AMSL
0.00 to 7.50ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-L-3
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.70 587.15					
	No Sample Collected						
	END OF BOREHOLE @ 7.6ft BGS	579.55					

WELL DETAILS
Screened interval:
584.55 to 579.55ft AMSL
2.60 to 7.60ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.15 to 579.55ft AMSL
0.00 to 7.60ft BGS
Material: Native Sand

2 4 6 8 10 12 14 16

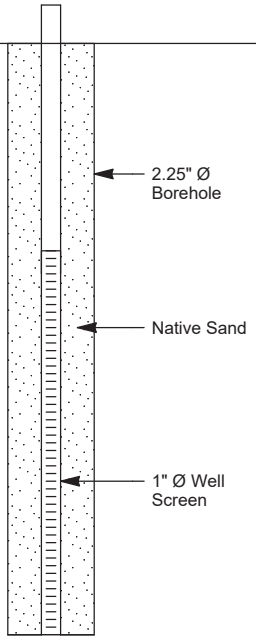
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-L-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.60 587.20					
	No Sample Collected						
8	END OF BOREHOLE @ 7.7ft BGS	579.50					



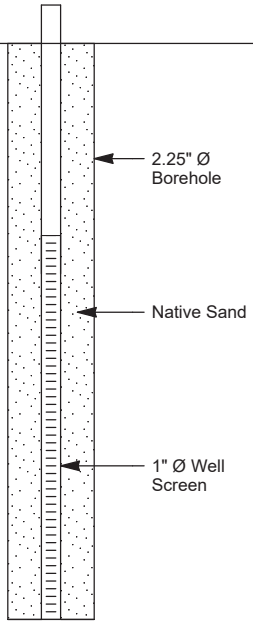
WELL DETAILS
Screened interval:
584.50 to 579.50ft AMSL
2.70 to 7.70ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.20 to 579.50ft AMSL
0.00 to 7.70ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-L-6A
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.01 587.46					
	No Sample Collected						
2							
4							
6							
8	END OF BOREHOLE @ 7.5ft BGS	579.96					
10							
12							
14							
16							

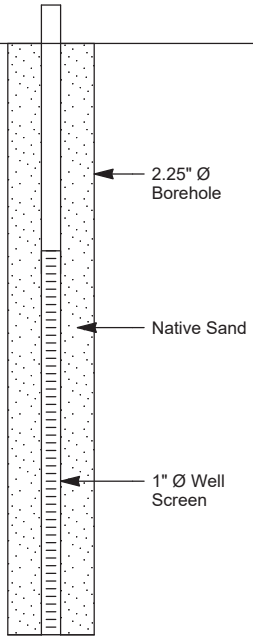
WELL DETAILS
Screened interval:
584.96 to 579.96ft AMSL
2.50 to 7.50ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.46 to 579.96ft AMSL
0.00 to 7.50ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-M-3
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.21 587.86					
	No Sample Collected						
8	END OF BOREHOLE @ 7.7ft BGS	580.16					

WELL DETAILS
Screened interval:
585.16 to 580.16ft AMSL
2.70 to 7.70ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.86 to 580.16ft AMSL
0.00 to 7.70ft BGS
Material: Native Sand

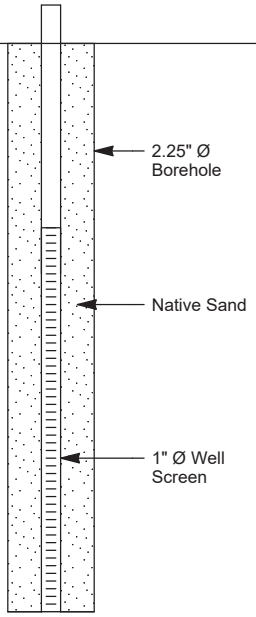
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-M-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.95 587.40					
	No Sample Collected						
	END OF BOREHOLE @ 7.4ft BGS	580.00					



WELL DETAILS
Screened interval:
585.00 to 580.00ft AMSL
2.40 to 7.40ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.40 to 580.00ft AMSL
0.00 to 7.40ft BGS
Material: Native Sand

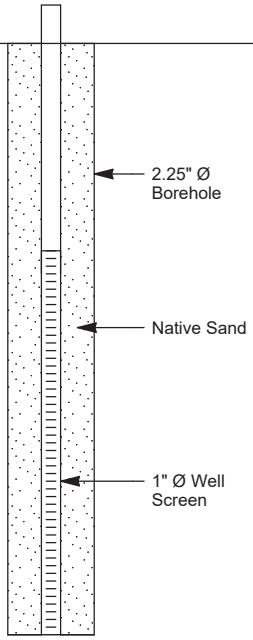
2
4
6
8
10
12
14
16

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-N-3
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.67 587.32					
	No Sample Collected						
	END OF BOREHOLE @ 7.7ft BGS	579.62					

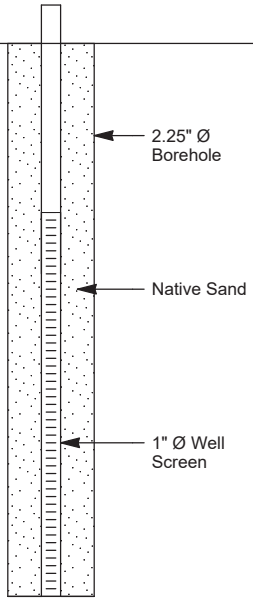
WELL DETAILS
Screened interval:
584.62 to 579.62ft AMSL
2.70 to 7.70ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Sand Pack:
587.32 to 579.62ft AMSL
0.00 to 7.70ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-N-4
DATE COMPLETED: November 15, 2010
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: G. Wesley

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.48 587.65					
	No Sample Collected						
	END OF BOREHOLE @ 7.2ft BGS	580.45	WELL DETAILS Screened interval: 585.45 to 580.45ft AMSL 2.20 to 7.20ft BGS Length: 5ft Diameter: 1in Slot Size: 0.01 Material: PVC Sand Pack: 587.65 to 580.45ft AMSL 0.00 to 7.20ft BGS Material: Native Sand				

2
4
6
8
10
12
14
16

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: PZ-L-2
DATE COMPLETED: September 7, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.1 587.5					
	FILL, slag, cinders, fine grained sand, black		Bentonite Chips				
	SP SAND, fine grained, black	586.5					
2				1GP	P/S		
	- wet at 3.0ft BGS		2" Ø Borehole				
4							
6			Native Sand	2GP	P/S		
8							
			1" Ø Well Screen				
10				3GP	P/S		
12	END OF BOREHOLE @ 12.0ft BGS	575.5					
14							
16							
18							
20							

WELL DETAILS
Screened interval:
586.5 to 576.5ft AMSL
1.0 to 11.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.5 to 587.0ft AMSL
0.0 to 0.5ft BGS
Material: Bentonite Chips
Sand Pack:
587.0 to 575.5ft AMSL
0.5 to 12.0ft BGS
Material: Native Sand

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

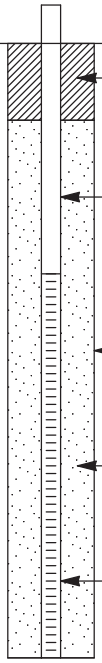
CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-L-6B
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	589.6 587.5						
	FILL, slag, gravel, dark brown	587.0	Bentonite Chips					
	SP SAND, fine grained, light brown, odor							20.3
2	- wet at 2.3ft BGS - black from 2.3 to 5.0ft BGS - slag from 2.5 to 2.8ft BGS		1" Ø Well Riser	1GP	P/S			37.1
4			2.25" Ø Borehole					31.8
6			Native Sand	2GP	P/S			
			1" Ø Well Screen					14.7
8	END OF BOREHOLE @ 8.0ft BGS	579.5						
10								
12								
14								
16								



WELL DETAILS
Screened interval:
584.5 to 579.5ft AMSL
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.5 to 586.5ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
586.5 to 579.5ft AMSL
1.0 to 8.0ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-L-6C
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	590.4 588.4						
	FILL, slag, gravel, dark brown		Bentonite Chips					
	SP SAND, fine grained, black, strong odor	587.4						67.8
2			1" Ø Well Riser	1GP	P/S			
								78.2
4	- light brown/gray, wet at 4.0ft BGS		2.25" Ø Borehole					
			Native Sand					89.3
6				2GP	P/S			
			1" Ø Well Screen					61.7
8	END OF BOREHOLE @ 8.0ft BGS	580.4						
10								
12								
14								
16								

WELL DETAILS
Screened interval:
585.4 to 580.4ft AMSL
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
588.4 to 587.4ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
587.4 to 580.4ft AMSL
1.0 to 8.0ft BGS
Material: Native Sand

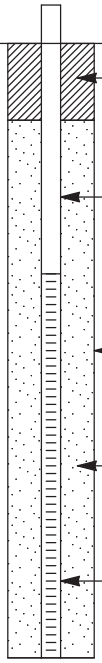
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-L-6D
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	589.3 587.3						
	FILL, fine grained brown sand, crushed red brick		Bentonite Chips					5.3
	SP SAND, fine grained, light brown, wet	585.8						
2			1" Ø Well Riser	1GP	P/S			3.1
4			2.25" Ø Borehole					
			Native Sand					2.8
6				2GP	P/S			
			1" Ø Well Screen					1.5
8	END OF BOREHOLE @ 8.0ft BGS	579.3						
10								
12								
14								
16								



WELL DETAILS
Screened interval:
584.3 to 579.3ft AMSL
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.3 to 586.3ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
586.3 to 579.3ft AMSL
1.0 to 8.0ft BGS
Material: Native Sand

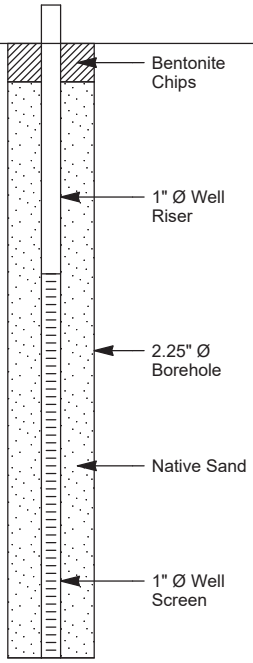
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-L-6E
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	589.6 587.6						
	FILL, sand, broken red brick, cinders, gravel							
	SP SAND, fine grained, black, wet, strong odor	587.1						
2				1GP	P/S			87.7
								78.7
4								
								73.7
6				2GP	P/S			
								68.3
8	END OF BOREHOLE @ 8.0ft BGS	579.6						
10								
12								
14								
16								



WELL DETAILS
Screened interval:
584.6 to 579.6ft AMSL
3.0 to 8.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.6 to 587.1ft AMSL
0.0 to 0.5ft BGS
Material: Bentonite Chips
Sand Pack:
587.1 to 579.6ft AMSL
0.5 to 8.0ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-M-2
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	589.4 587.2						
	FILL, slag, gravel, dark brown		Bentonite Chips					
	SP SAND, fine grained, black, wet, odor	586.4						233
2			1" Ø Well Riser	1GP	P/S			
								187
4			2.25" Ø Borehole					
			Native Sand					63
6				2GP	P/S			
			1" Ø Well Screen					44
8	END OF BOREHOLE @ 8.0ft BGS	579.2						
10								
12								
14								
16								

WELL DETAILS
Screened interval:
584.3 to 579.3ft AMSL
2.9 to 7.9ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
587.2 to 586.2ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
586.2 to 579.2ft AMSL
1.0 to 8.0ft BGS
Material: Native Sand

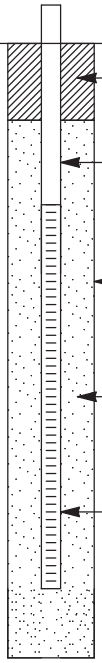
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Probe Works

HOLE DESIGNATION: PZ-N-2
DATE COMPLETED: June 1, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	PIEZOMETER	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING GROUND SURFACE	590.0 586.9						
	TOPSOIL	586.4	Bentonite Chips					
	SP SAND, fine grained, light brown	585.7						5.3
	PT PEAT, black	585.4	1" Ø Well Riser					
2	SP SAND, fine grained, light brown			1GP	P/S			
	- wet at 3.0ft BGS		2.25" Ø Borehole					2.1
4								
			Native Sand					3.1
6			1" Ø Well Screen	2GP	P/S			
								2.8
8	END OF BOREHOLE @ 8.0ft BGS	578.9						
10								
12								
14								
16								



WELL DETAILS
Screened interval:
584.8 to 579.8ft AMSL
2.1 to 7.1ft BGS
Length: 5ft
Diameter: 1in
Slot Size: 0.01
Material: PVC
Seal:
586.9 to 585.9ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
585.9 to 578.9ft AMSL
1.0 to 8.0ft BGS
Material: Native Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB A-B 2-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, loose to compact, fine grained, poorly graded, black, very moist, trace vegetation and red brick			1	P/S	50		0
2	- light brown at 2.5ft BGS			1	P/S			0
	SP SAND, trace gravel, loose to compact, fine grained, poorly graded, brown, wet	3.6	Bentonite Chips and Soil Cuttings					
4				2	P/S	100		0
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB B-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, trace silt and coke, very fine grained, blocky, dark brown to black, moist			1	P/S	70		3.2
2		2.5						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S			
4	- dark gray, saturated, strong odor at 4.5ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	95		15.4
6	- brownish gray at 6.0ft BGS			2	P/S			6.4
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB C-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand with gravel, loose to compact, medium to large gravel, brown, moist	0.5						
	SP SAND, loose to compact, very fine to fine grained, poorly graded			1	P/S	75		0
2	- saturated at 2.5ft BGS		∇					
	- very fine to medium grained, gray, slight odor at 3.3ft BGS			1	P/S			7.7
4			Bentonite Chips and Soil Cuttings					
				2	P/S	75		7.4
6								
				2	P/S			2.3
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB D-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel. loose, fine to medium grained, poorly graded, dark borwn and gray, moist	0.8						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S	80		0
2								
	- saturated at 3.0ft BGS		∇	1	P/S			0
4			Bentonite Chips and Soil Cuttings					
				2	P/S	80		0
	- trace gravel, fine to medium grained sand at 5.5ft BGS							
6								
				2	P/S			0
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB D-4
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, coke			1	P/S	80		0
2		2.5						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, light brown, very moist - wet at 3.4ft BGS - darker brown at 4.0ft BGS		▽ Bentonite Chips and Soil Cuttings	(1)	P/S			0
4				2	P/S	100		0
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB E-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel and peat, loose, fine grained, poorly sorted, dark brown, moist							
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, ,moist to saturated	1.0		1	P/S	70		0
2				1	P/S			0
	- saturated at 3.5ft BGS		∇					
4			Bentonite Chips and Soil Cuttings	2	P/S	70		70.2
6	- strong odor to 6.2 ft at 5.8ft BGS - gray at 6.2ft BGS - peat with trace sand, loose, dark brown to black to 7.0 ft at 6.8ft BGS - laminated at 7.0ft BGS			2	P/S			79.4
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB E-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel, crushed brick, andcoke, loose, fine to medium grained, black to dark brown, very moist			1	P/S	90		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated - saturated at 2.8ft BGS	2.2	∇	1	P/S			0.3
4			Bentonite Chips and Soil Cuttings	2	P/S	85		0
6				2	P/S			
8	- gravelly sand, trace silt, comapct, fine to medium grained, laminations, dark gray, slight odor at 7.6ft BGS	8.0						
	END OF BOREHOLE @ 8.0ft BGS							
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB E-5
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, gravelly sand, trace silt, loose, fine to medium grained, dark brown, moist	0.7						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S	85		0
2								
	- saturated at 3.0ft BGS			1	P/S			0.1
4	- black at 3.8ft BGS - dark gray at 4.2ft BGS		Bentonite Chips and Soil Cuttings					
				2	P/S	80		0.1
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB F-3
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	PT PEAT, trace sand, loose, dark brown, very moist			1	P/S	75		0.6
2	- water table at 2.0ft BGS	2.5						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated - dark gray at 3.0ft BGS - gray at 3.7ft BGS			1	P/S			120
4	- very fine to medium grained at 4.5ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	80		77.2
6				2	P/S			1.4
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB F-4
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke	1.2		1	P/S	80		36.7
2	SP SAND, trace fine gravel, loose to compact, very fine grained, poorly graded, blackened from staining, very moist, trace vegetation			1	P/S			0
4	- wet, odor at 3.9ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	90		10.2
6	- dark brown at 6.0ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB F-5-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke							
	SP SAND, loose to compact, fine grained, poorly graded, brown with minor black staining, very moist, trace vegetation	0.8		1	P/S	100		0
2				1	P/S			0
4	- wet at 4.2ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	90		0
6	- medium graiend at 6.5ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB G-3
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, sand, trace gravel and peat, loose, very fine to medium grained, poorly sorted, dark brown, moist	0.5					
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S	85	
2							
	- gray, saturated at 3.3ft BGS		∇	1	P/S		
4			Bentonite Chips and Soil Cuttings	2	P/S	80	
6				2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB G-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, loose, fine grained, black, moist, coke			1	P/S	85		3.6
	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated	1.1						
2				1	P/S			10.7
	- saturated at 3.5ft BGS		▽					
4			Bentonite Chips and Soil Cuttings					
	- laminations to 7.5 ft at 5.0ft BGS			2	P/S	75		1.2
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB G-5
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel, loose, fine grained, black, moist - crushed concrete at 0.8ft BGS	1.1		1	P/S	85		0.1
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, moist to saturated - 1 inch layer of silty sand, compact, very fine grained, black, moist at 1.9ft BGS			1	P/S			0.2
4	- saturated at 4.0ft BGS		∇ Bentonite Chips and Soil Cuttings	2	P/S	80		0.1
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB G-5-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke							
	SP SAND, trace fine gravel, loose to compact, fine grained, poorly graded, brown with minimal spotty black staining, very moist, trace vegetation	1.0		1	P/S	90		0
2				1	P/S			0
4	- wet at 4.0ft BGS		∇ Bentonite Chips and Soil Cuttings	2	P/S	100		0
6	- medium grained at 6.2ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB H-3
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace silt and gravel, loose, fine grained, poorly graded, dark brown, moist	1.2		1	P/S	85		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S			62.4
	- black at 3.2ft BGS - saturated at 3.3ft BGS		▽					
4	- fine to medium grained, dark gray at 3.6ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	60		54.3
6				2	P/S			7.5
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB H-5
DATE COMPLETED: February 20, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel, loose, fine to medium grained, dark brown to black, very moist	1.6		1	P/S	90		0.1
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, moist to saturated			1	P/S			0.1
	- laminations to 4.1 ft at 3.2ft BGS							
4	- black at 4.1ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	75		0.1
	- fine to coarse grained, gray at 5.2ft BGS							
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB H-5-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, coke	0.9		1	P/S	90		0.6
	SP SAND, trace fine gravel, loose to compact, fine grained, poorly graded, brown with some black staining, very moist, trace vegetation			1	P/S			0.2
2								
	- wet at 3.8ft BGS		▽					
4	- trace silt to 5.5 at 4.0ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	90		0.1
	- medium grained at 5.5ft BGS							
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB I-3
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	SP/PT PEATY SAND, trace gravel, loose, fine to medium grained, dark brown, very moist	1.2		1	P/S	75		3.6
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist to saturated - saturated at 2.5ft BGS			1	P/S			10.1
4	- dark gray at 3.6ft BGS - gray at 4.2ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	75		2.2
6	- fine to medium grained at 7.2ft BGS			2	P/S			0
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB I-4
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, sand, loose, fine to medium grained, black, very moist - 2 inch layer of cruched concrete at 0.6ft BGS	0.8		1	P/S	90	
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, black, moist to saturated - saturated at 1.3ft BGS - tan at 1.6ft BGS			1	P/S		
4	- 1 inch layer of laminations at 3.5ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	80	
6				2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB I-5
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	Topsoil with vegetation	0.2						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, orange brown, moist			1	P/S	50		2.5
2	- gray, strong odor at 2.2ft BGS			1	P/S			117
4	- wet at 4.1ft BGS		Bentonite Chips and Soil Cuttings					
	- thick vsicous fluid with strong odor to 7.2 ft at 5.2ft BGS			2	P/S	90		81.1
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB I-7
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	Topsoil and vegetation	0.3						
	FILL, sand with fine gravel, trace blue stones, loose, fine to medium grained, poorly graded, brown, moist	1.3		1	P/S	70		35.6
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, black, very moist							
	- gray, odor at 2.7ft BGS			1	P/S			106
4	- wet at 4.3ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	80		71.6
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB J-3
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace gravel and peat, loose, fine to medium grained, dark brown, very moist	1.2		1	P/S	80		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, very moist to saturated			1	P/S			17.1
	- gray at 3.5ft BGS							
4			Bentonite Chips and Soil Cuttings					
	- strong odor to 5.4 ft at 5.0ft BGS			2	P/S	85		84.6
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB J-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, sand, trace silt and gravel, compact, very fine to medium grained, dark brown to black, very moist - crushed concrete at 0.4ft BGS	0.7		1	P/S	80	
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, very moist to saturated - gray, saturated at 2.0ft BGS		▽	1	P/S		
4	- very fine to medium grained, gray at 4.5ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	70	
6				2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB J-5
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, trace fine gravel, loose to compact, fine grained, poorly graded, black, moist, trace vegetation - brownish red at 0.4ft BGS - no gravel or vegetation, black at 0.7ft BGS			1	P/S	80		100
2	- odor at 2.0ft BGS			1 (CHEMICAL ANALYSIS)	P/S			132
4	- wet at 3.9ft BGS		∇ Bentonite Chips and Soil Cuttings	2	P/S	70		92.6
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB J-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke, trace vegetation	0.4						
	SP SAND, trace fine gravel, loose to compact, fine grained, poorly graded, dark brown, moist, heavy odor			1	P/S	50		3.3
2				1	P/S			0.2
	- black staining at 3.5ft BGS							
4			Bentonite Chips and Soil Cuttings					
	- gray, wet at 4.5ft BGS		∇	2	P/S	100		103
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB J-7
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, compacted coke	0.6					
	SP SAND, loose to compact, very fine to fine grained, poorly graded,brown, very moist, odor		1	P/S	80		0.6
2			▽ 1	P/S			66.3
	- gray at 3.6ft BGS - wet at 3.8ft BGS						
4			2	P/S	80		55.7
6			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-3
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace peat and silt, loose, fine grained, blocky, brown, moist - coke, black at 1.0ft BGS	1.6		1	P/S	80		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, dark brown, moist to saturated - saturated at 3.4ft BGS - dark gray at 3.5ft BGS		Bentonite Chips and Soil Cuttings	1	P/S			1.9
4				2	P/S	85		0.9
6	- fine to medium grained, gray at 6.3ft BGS			2	P/S			0
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-4
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	PT-PEAT, loose, dark brown, very moist	0.2						
	FILL, sand, crushed concrete, loose, fine grained, dark brown, very moist to saturated			1	P/S	60		0.4
2				1	P/S			57.6
	- saturated at 3.3ft BGS	3.5						
4	SP SAND, loose to compact, very fine to fine grained, poorly graded, dark gray, very moist to saturated, strong odor		Bentonite Chips and Soil Cuttings	2	P/S	60		56.8
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-5
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, fine to medium grained, brown, moist	0.7						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist			1	P/S	70		47.8
2								
	- gray, odor at 3.0ft BGS			1	P/S			51.7
4	- wet, strong odor at 4.2ft BGS		▽ Bentonite Chips and Soil Cuttings					
				2	P/S	80		26.4
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, with fine gravel, loose to compact, fine grained, black, very moist			1	P/S	80		0.7
	- medium gravel at 1.6ft BGS	1.8						
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, black, very moist			1	P/S			58.7
4	- wet at 4.3ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	40		68.9
6	- gray at 6.2ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-7
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, compacted coke - sand, with fine gravel, loose, medium to coarse grained, poorly graded, brown, moist at 0.9ft BGS	1.6		1	P/S	70		23.3
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, gray, very moist, strong odor			1	P/S			37.7
4	- wet at 3.8ft BGS		Bentonite Chips and Soil Cuttings					
	- darker gray at 4.9ft BGS			2	P/S	100		29.9
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB K-7-8
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, compacted coke			1	P/S	80		0
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist	1.1						
2				1	P/S			13.9
4	- wet at 4.2ft BGS - gray at 4.3ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	90		10.9
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-2
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	SP SAND with fine gravel, loose to compact, medium to fine grained, poorly graded, brown, very moist							
	- wet at 0.9ft BGS		∇	1	P/S	60		0.2
2								
	- black, odor at 3.1ft BGS			1	P/S			3.2
4			Bentonite Chips and Soil Cuttings					
				2	P/S	100		3.8
6								
				2	P/S			
	- gravel at 7.8ft BGS							
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-3
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. RATHBUN

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace crushed brick, loose, fine grained, poorly sorted, dark brown, very moist			1	P/S	65		0
	- wet at 1.3ft BGS	1.4	∇					
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, tan, saturated							
	- trace gravel, dark gray at 2.5ft BGS			1	P/S			37.8
4			Bentonite Chips and Soil Cuttings					
				2	P/S	80		35.7
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-4
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BORHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, very fine to fine grained, poorly graded, brown, moist - dry at 0.5ft BGS	0.8		1	P/S	80		1.0
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist							
2	- gray at 2.8ft BGS			1	P/S			0.6
	- wet, odor at 3.6ft BGS		∇					
4			Bentonite Chips and Soil Cuttings	2	P/S	80		0.3
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-5
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, with fine gravel, loose, fine to medium grained, poorly graded, brown, moist							
	SP SAND, loose to compact, very fine to fine grained, poorly graded, gray, moist	0.8		1	P/S	60		27.2
2								
	- black at 3.3ft BGS			1	P/S			81.2
	- wet, odor at 3.8ft BGS		∇					
4			Bentonite Chips and Soil Cuttings					
	- viscous, strong odor at 4.9ft BGS			2	P/S	90		53.1
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-7
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, compacted coke						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, moist	0.7		1	P/S	80	
2				1	P/S		
4	- wet, sheen at 4.4ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	100	
6	- gray at 6.0ft BGS			2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB L-8
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, compacted coke	0.9						
	FILL, sand, with fine gravel, loose, fine to medium grained, poorly graded, light gray, moist	1.3		1	P/S	80		0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded			1	P/S			0
	- wet at 3.5ft BGS		∇					
4			Bentonite Chips and Soil Cuttings	2	P/S	100		0
6	- black and brown at 6.3ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-2
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, fine to coarse grained, poorly graded, brown, moist, trace vegetation	0.8		1	P/S	30		0
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist			1	P/S			0.2
	- wet at 4.1ft BGS - gray/black, strong odor at 4.3ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	100		0.6
				2	P/S			
	END OF BOREHOLE @ 8.0ft BGS	8.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-3
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, trace fine gravel and greenish-blue rock, loose, very fine to fine grained, poorly graded, dark brown, moist, trace vegetation			1	P/S	50		55.6
2	- no gravel or greenish- blue rock, black, very moist, no vegetation at 2.0ft BGS			1	P/S			142
4	- wet, odor at 4.2ft BGS - black liquid to 6.2 ft at 4.5ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	100		130
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-5
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL, trace gravel and vegetation	0.5						
	FILL, sand, with fine gravel, loose, medium grained, poorly graded, gray, moist	0.8		1	P/S	50		29.0
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, black, very moist - no gravel at 1.4ft BGS			1	P/S			65.2
4	- wet, odor at 4.2ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	50		29.3
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-6
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, compacted coke	1.4		1	P/S	60		30.8
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, gray/light brown, very moist			1	P/S			66.8
4	- wet at 4.1ft BGS		∇ Bentonite Chips and Soil Cuttings	2	P/S	100		70.1
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-7
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, compacted coke	0.3						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, dark brown, very moist, odor			1	P/S	85		0.2
2								
	- gray at 3.0ft BGS			1	P/S			0.2
	- wet at 3.7ft BGS		∇					
4			Bentonite Chips and Soil Cuttings					
				2	P/S	90		0.2
6								
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB M-8
DATE COMPLETED: February 21, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, compacted coke with vegetation	0.5						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist, slight odor			1	P/S	60		
2				1	P/S			0.2
4	- wet at 4.3ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	100		
6	- gray, odor at 5.9ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB N-2
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	PT PEAT							
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist	0.9		1	P/S	80		0
2	- gray at 2.8ft BGS - wet at 3.0ft BGS		∇	1 (CHEMICAL ANALYSIS)	P/S			0
4			Bentonite Chips and Soil Cuttings	2	P/S	100		0
6				2	P/S			
	- 3-inch layer of gravel, fine grained, subangular at 7.5ft BGS							
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB N-3
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, fine to coarse grained, brown, moist, trace vegetation	0.8						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, black, very moist			1	P/S	70		0.4
2	- gray, odor at 2.8ft BGS			1	P/S			3.0
	- black, no odor at 3.4ft BGS							
4	- wet, black liquid to 6.0 ft BGS at 4.1ft BGS		← Bentonite Chips and Soil Cuttings	2	P/S	100		9.5
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB N-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, with fine gravel, loose, medium grained, poorly graded, gray, moist, trace vegetation	1.2		1	P/S	60		0.2
2	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist							
	- blackish brown at 3.0ft BGS			1	P/S			3.2
4	- wet at 3.7ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	90		0.4
6	- viscous, black at 6.0ft BGS			2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB N-4-5
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, trace fine gravel, loose, fine to medium grained, poorly graded, brown, moist, trace vegetation	0.9		1	P/S	60		0
	SP SAND, loose to compact, very fine to fine grained, poorly graded, light brown, very moist			1	P/S			0.5
4	- black, wet, strong odor at 4.1ft BGS		Bentonite Chips and Soil Cuttings	2	P/S	70		41.2
				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB O-2
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, trace fine gravel, loose to compact, very fine to fine grained, poorly graded, dark brown, moist, trace vegetation - no gravel or vegetation, black, very moist at 0.5ft BGS			1	P/S	80		0
2	- brown at 2.2ft BGS			1 (circled)	P/S			0
	- gray at 3.5ft BGS							
4	- wet at 4.0ft BGS		∇ Bentonite Chips and Soil Cuttings	2	P/S	90		0
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB O-3
DATE COMPLETED: February 23, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	FILL, sand, with fine gravel, loose, fine to medium grained, poorly graded, brown, moist			1	P/S	50		0
2	- increase in gravel at 2.0ft BGS	2.2						
	SP SAND, loose to compact, very fine to fine grained, poorly graded, brown, very moist			1	P/S			0.1
4			Bentonite Chips and Soil Cuttings					
	- wet at 5.5ft BGS - gray, slight odor at 5.7ft BGS		∇	2	P/S	60		6.2
6				2	P/S			
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENSPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB O-4
DATE COMPLETED: February 22, 2006
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: E. VARNAS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, sand, with fine gravel, loose, medium grained, poorly graded, dark brown, moist, trace vegetation						
	- loose to compact, brown, very moist at 0.6ft BGS	1.0		1	P/S	65	
2	SP SAND, with greenish blue gravel, loose, medium grained, poorly graded, dark brown, moist, trace vegetation						
	- black, no vegatation at 1.5ft BGS			1	P/S		
4			Bentonite Chips and Soil Cuttings				
	- wet, odor at 4.5ft BGS		∇	2	P/S	55	
6				2	P/S		
8	END OF BOREHOLE @ 8.0ft BGS	8.0					
10							
12							
14							
16							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-1
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
2	SP SAND, fine grained, black, oil odor - brown, moist at 2.5ft BGS	2.0	Soil Cuttings	1DPT 2-4'	P/S			0.6
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-2
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, fine grained, black, moist, oil odor							27.0
2	- gray at 2.0ft BGS		Soil Cuttings	1DPT	P/S			
				2-4'				1,344
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-3
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, trace gravel, coarse grained, brown			0-1'				18.5
	- no gravel, fine grained, black, moist, oil odor at 1.0ft BGS							-
2				1DPT	P/S			
								0.8
4	- saturated at 4.0ft BGS		Soil Cuttings					
								21.0
6				2DPT	P/S			
	- gray at 7.0ft BGS							-
								175
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 7/24/08
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-4
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							27.5
	SP SAND, fine grained, black, moist, oil odor	1.0						
2				1DPT (1-4')	P/S			806
4	- saturated at 4.0ft BGS		∇					
								186
6			Soil Cuttings	2DPT	P/S			
								280
8								
								972
	- with fine grained gravel, gray at 9.0ft BGS							-
10				3DPT	P/S			
								4.2
12	END OF BOREHOLE @ 12.0ft BGS	12.0						
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 7/24/08
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-5
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							-
	SP SAND, fine grained, black, moist, oil odor	1.0		1-2' 1DPT	P/S			284
2			Soil Cuttings					1.4
4	- gray at 4.0ft BGS	4.0						-
	END OF BOREHOLE @ 4.0ft BGS							
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-6
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							-
	- fine grained, black, moist, oil odor at 0.6ft BGS			0.6-2'				1,632
2			Soil Cuttings	1DPT	P/S			
								1,333
4	CL CLAY, with fine grained sand, gray, moist	3.8						-
	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-7
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, dry							
	- fine grained, black, moist, oil odor at 1.0ft BGS							1,147
2			Soil Cuttings	1DPT	P/S			
				2-4'				1,358
	- gray at 3.5ft BGS							
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-8
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							-
	- fine grained, black, moist, oil odor at 1.0ft BGS			1-2' 1DPT	P/S			1,924
2			Soil Cuttings					1,027
4	- gray at 3.8ft BGS	4.0						-
	END OF BOREHOLE @ 4.0ft BGS							
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-9
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							-
	- black at 1.0ft BGS			1-2' 1DPT	P/S			1,369
2	- fine grained, moist at 2.0ft BGS		Soil Cuttings					-
4	- gray at 3.9ft BGS	4.0						779
	END OF BOREHOLE @ 4.0ft BGS							
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-10
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							0
	- fine grained, black, moist, oil odor at 1.0ft BGS		Soil Cuttings	1DPT	P/S			98.0
2				2-3'				921
	- refusal at 3.0ft BGS	3.0						
	END OF BOREHOLE @ 3.0ft BGS							
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-11
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							-
	- fine grained, black, moist, oil odor at 1.0ft BGS							109
2			Soil Cuttings	1DPT	P/S			
				2-4'				805
	- brown at 3.7ft BGS - black at 3.8ft BGS - gray at 3.9ft BGS							
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-12
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
2				1DPT	P/S			
	SP SAND. fine grained, black, moist, oil odor	2.5		2.5-4'				591
4			Soil Cuttings					
								78.4
6				2DPT	P/S			
								428
	- gray at 7.5ft BGS							
8	END OF BOREHOLE @ 8.0ft BGS	8.0						
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-13
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND. gravelly, coarse grained, brown							-
	- fine grained, gray, moist at 1.0ft BGS							100
2			Soil Cuttings	1DPT	P/S			
	- black, oil odor at 2.5ft BGS							
	- gray at 3.0ft BGS			2-4'				198
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-14
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND. gravelly, brown, dry							-
	- fine grained, black, moist, oil odor at 0.6ft BGS			0.6-2'				261
2				1DPT	P/S			
								102
4	- saturated at 4.0ft BGS		∇					
								95.0
6			Soil Cuttings	2DPT	P/S			
								101
8								
								5.3
10				3DPT	P/S			
								794
	- gray at 11.5ft BGS							
12	END OF BOREHOLE @ 12.0ft BGS	12.0						
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 7/24/08
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-15
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND. gravelly, brown, dry		Soil Cuttings					-
	- fine grained, black, moist, oil odor at 0.6ft BGS							4.9
2				1DPT	P/S			
				2-4'		105		102
	- gray, saturated at 3.5ft BGS		∇					
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 7/24/08
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-16
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
	SP SAND, fine grained, black, moist, oil odor	1.0		1-2' 1DPT	P/S			350
2								709
4	- saturated at 4.0ft BGS		Soil Cuttings					
				2DPT	P/S			170
6								777
	- refusal at 7.0ft BGS	7.0						
	END OF BOREHOLE @ 7.0ft BGS							
8								
10								
12								
14								
16								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 7/24/08
CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-17
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
2	SP SAND, fine grained, black, moist, oil odor	2.0	Soil Cuttings	1DPT	P/S			
				2-4'				120
4	CL CLAY, sandy, fine grained, gray, moist	3.9						
	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-18
DATE COMPLETED: July 24, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly, brown, dry							
	- fine grained, black, moist, oil odor at 1.0ft BGS							-
2			Soil Cuttings	1DPT	P/S			
				2-4'				251
	- gray at 3.5ft BGS							
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-19
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL	0.6						-
	SP SAND, gravelly, coarse grained, black, moist - fine grained, brown at 1.0ft BGS		Soil Cuttings	1-2' 1DPT	P/S			1.7
2								
	- gray at 3.5ft BGS							0.4
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-20
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL	0.6						-
	SP SAND, gravelly, coarse grained, black, moist - fine grained, brown at 1.0ft BGS		Soil Cuttings	1DPT	P/S			0.3
2				2-4'				0.3
	- gray at 3.8ft BGS	4.0						
4	END OF BOREHOLE @ 4.0ft BGS							
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-21
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL	0.6						-
	SP SAND, gravelly, coarse grained, black, moist							0.1
2	- fine grained, brown at 2.0ft BGS		Soil Cuttings	1DPT	P/S			
				2-4'				0.1
	- gray at 3.8ft BGS	4.0						
4	END OF BOREHOLE @ 4.0ft BGS							
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-22
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							0
	GW GRAVEL, wet	1.5						
2	SP SAND, fine grained, brown, moist	2.0	Soil Cuttings	1DPT	P/S			
	- gray at 2.8ft BGS			2-4'				26.9
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-23
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL	0.6						
	SP SAND, trace gravel, fine grained, black							0
2	- no gravel, brown, moist at 2.0ft BGS		Soil Cuttings	1DPT	P/S			
				2-4'				0
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-24
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							
	SP SAND, gravelly, fine grained, moist	1.0						1.7
2	- gray, oil odor at 2.0ft BGS		Soil Cuttings	1DPT	P/S			
				2-4'				655
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-25
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
2	SP SAND, fine grained, brown, moist - gray, oil odor at 2.5ft BGS	2.0	Soil Cuttings	1DPT 2-4'	P/S			357
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-26
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL	0.6						
	SP SAND, fine grained, brown, moist		Soil Cuttings	1DPT	P/S			260
2	- gray, oil odor at 2.5ft BGS			2-4'				1,180
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-27
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							
	SP SAND, fine grained, brown, moist, oil odor	1.0						198
2	- gray at 2.5ft BGS		Soil Cuttings	1DPT	P/S			
				2-4'				1,419
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-28
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOPSOIL							
	SP SAND, fine grained, brown, moist, oil odor	0.6						209
2			Soil Cuttings	1DPT	P/S			
	- gray at 3.0ft BGS			2-4'				242
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-29
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, fine grained, brown, moist							-
2	- black, oil staining at 2.0ft BGS		Soil Cuttings	1-2' 1DPT	P/S			178
	- no oil staining at 3.0ft BGS							149
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-30
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly							-
	- fine grained, brown, moist, oil odor at 1.0ft BGS			1-2' 1DPT	P/S			1,589
2			Soil Cuttings					
	- gray at 3.0ft BGS							911
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-31
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly							
	- fine grained, brown, moist, oil odor at 1.0ft BGS			0-2'				525
2	- gray at 2.0ft BGS		Soil Cuttings	1DPT	P/S			
								324
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-32
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	No recovery							-
2	SP SAND, fine grained, brown, moist, oil odor - gray at 2.5ft BGS	2.0	Soil Cuttings	1DPT 2-4'	P/S			26.3
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: SB-33
DATE COMPLETED: July 25, 2008
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: J. LUZWICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, gravelly							-
	- fine grained, brown, moist, oil odor at 1.0ft BGS			1-2' 1DPT	P/S			619
2	- gray at 1.5ft BGS - brown at 2.0ft BGS		Soil Cuttings					529
4	END OF BOREHOLE @ 4.0ft BGS	4.0						
6								
8								
10								
12								
14								
16								

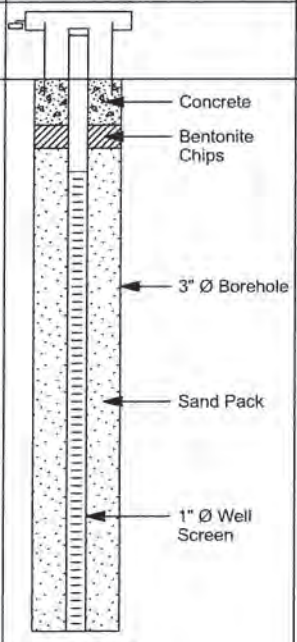
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-1A
DATE COMPLETED: February 22, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28	See MW-1B for stratigraphy						
	END OF BOREHOLE @ 12.0ft BGS	12.0	WELL DETAILS Screened interval: 2.0 to 12.0ft BGS Length: 10ft Diameter: 1in Slot Size: #10 Material: PVC Seal: 0.5 to 1.5ft BGS Sand Pack: 1.5 to 12.0ft BGS Material: #5 Sand around pre-packed screen; native sand above screen				

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-1B
DATE COMPLETED: February 22, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
2	FILL, slag, some fine to coarse gravel, dark brown	1.5	Concrete				
4	FILL, fine grained sand, trace fine gravel, wet, petroleum odor	3.0					
6	SP SAND, fine to very fine grained, black, petroleum odor		Bentonite Grout				
8	- gray at 8.0ft BGS						
10	- black at 11.0ft BGS						
12			3" Ø Borehole				
14	- black and white (salt and pepper) at 15.0ft BGS						
16	- trace silt, gray at 17.0ft BGS						
18			1" Ø Well Casing				
20							
22							
24							
26			Sand Pack				
28			1" Ø Well Screen				
30							
32							
34			Native Sand				
36	CL CLAY, soft, gray	35.0					
38	END OF BOREHOLE @ 36.0ft BGS	36.0					
40	Stratigrapy borehole drilled to 36 ft BGS. Well installed to 31 ft BGS in adjacent borehole.						
42							
44							
46							
48							

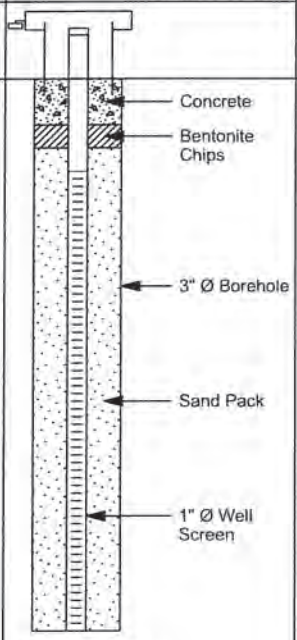
WELL DETAILS
Screened interval:
26.0 to 31.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
1.0 to 24.5ft BGS
Sand Pack:
24.5 to 31.0ft BGS
Material: #5 Sand around pre-packed screen; native sand above screen

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-2A
DATE COMPLETED: February 23, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW-2B for stratigraphy						
12	END OF BOREHOLE @ 12.0ft BGS	12.0	WELL DETAILS Screened interval: 2.0 to 12.0ft BGS Length: 10ft Diameter: 1in Slot Size: #10 Material: PVC Seal: 0.5 to 1.5ft BGS Sand Pack: 1.5 to 12.0ft BGS Material: #5 Sand around pre-packed screen; native sand above screen				

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-2B
DATE COMPLETED: February 23, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
2	FILL, slag, cinders, gravel, dark brown, petroleum odor	2.0	Concrete				
4	FILL, fine grained sand, trace fine to coarse gravel, gray, wet	4.0					
	SP SAND, fine to very fine grained, gray, wet		Bentonite Grout				
16			3" Ø Borehole				
18	- trace silt at 18.0ft BGS						
22			1" Ø Well Casing				
32			1" Ø Well Screen				
34	CL CLAY, trace fine gravel, soft, gray	34.5	Native Sand				
36	END OF BOREHOLE @ 36.0ft BGS	36.0					

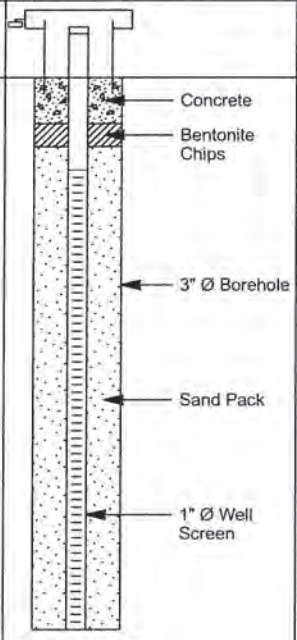
WELL DETAILS
Screened interval:
30.0 to 35.0ft BGS
Length: 5ft ← Sand Pack
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
1.0 to 27.0ft BGS
Sand Pack:
27.0 to 35.0ft BGS
Material: #5 Sand around pre-packed screen; native sand above and below screen

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-3A
DATE COMPLETED: February 23, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	See MW-3B for stratigraphy						
12	END OF BOREHOLE @ 12.0ft BGS	12.0	WELL DETAILS Screened interval: 2.0 to 12.0ft BGS Length: 10ft Diameter: 1in Slot Size: #10 Material: PVC Seal: 0.5 to 1.5ft BGS Sand Pack: 1.5 to 12.0ft BGS Material: #5 Sand around pre-packed screen; native sand above screen				

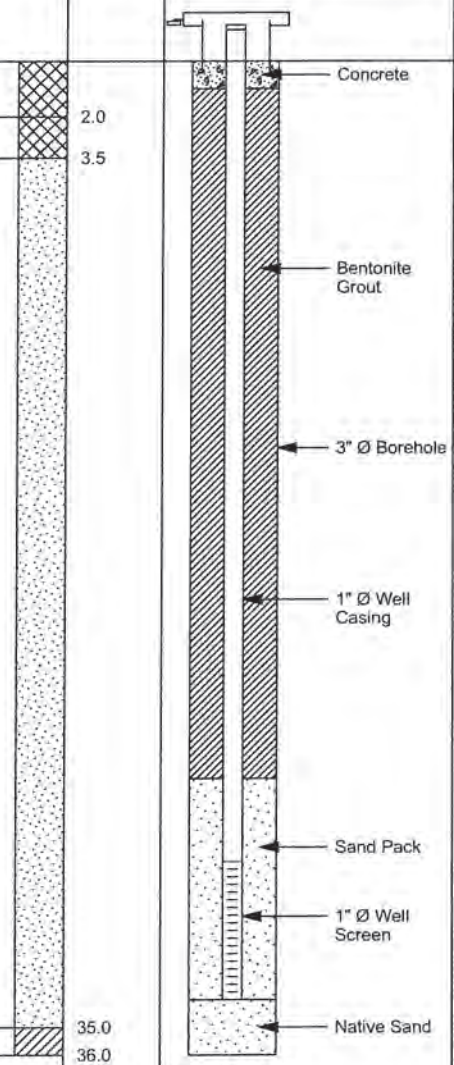
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-3B
DATE COMPLETED: February 23, 2007
DRILLING METHOD: 3" Ø GEOPROBE
FIELD PERSONNEL: J. HARGENS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
2	FILL, slag, cinders, gravel, dark brown	2.0	Concrete				
4	FILL, fine grained sand, some fine to coarse gravel, gray, wet	3.5					
	SP SAND, fine to very fine grained, gray, wet		Bentonite Grout				
14			3" Ø Borehole				
20			1" Ø Well Casing				
22	- trace silt at 22.0ft BGS						
28			Sand Pack				
30			1" Ø Well Screen				
34		35.0	Native Sand				
36	CL CLAY, trace fine gravel, gray, wet	36.0					
	END OF BOREHOLE @ 36.0ft BGS						



WELL DETAILS
Screened interval:
29.0 to 34.0ft BGS
Length: 5ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
1.0 to 26.0ft BGS
Sand Pack:
26.0 to 34.0ft BGS
Material: #5 Sand around pre-packed screen; native sand above and below screen

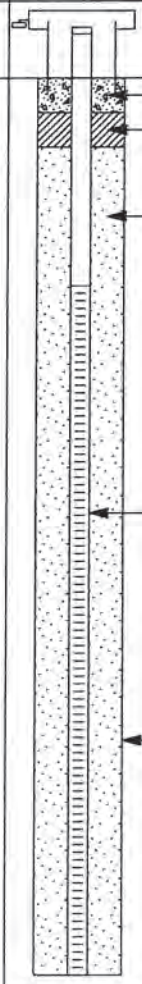
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-4
DATE COMPLETED: March 19, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH/J. GREETIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	SW SAND, loose, fine to coarse grained, black, moist		Concrete; Bentonite Chips				
	SP SAND, trace gravel, compact, light brown, very moist	1.0	Sand Pack	1HA			
2							
4							
	- dense, wet, slight odor at 5.0ft BGS - saturated at 5.5ft BGS						
6			1" Ø Well Screen				
	- little gravel, gray, strong odor at 7.0ft BGS						
8							
			3" Ø Borehole				
10							
12	No sample collected	12.0					
	END OF BOREHOLE @ 13.0ft BGS	13.0					
14	MW-4 hand augered to 5 feet BGS. Stratigraphy from 5 to 12 feet BGS is from PZ-1 installed March 4, 2005.						
16							
18							



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-5
DATE COMPLETED: March 19, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, coke, loose, black, wet		Concrete; Bentonite Chips				
	SP SAND, trace gravel, compact, brown, saturated	1.0	Sand Pack	1HA			
2							
4							
	- loose to compact, very fine to fine grained, gray, staining, slight odor, sheen at 5.0ft BGS		1" Ø Well Screen				
6							
8	No sample collected	8.0	3" Ø Borehole				
10							
12							
	END OF BOREHOLE @ 13.0ft BGS	13.0					
14	MW-5 hand augered to 5 feet BGS. Stratigraphy from 5 to 8 feet BGS is from PZ C-D 3-4 installed February 20, 2006.						
16							
18							

WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

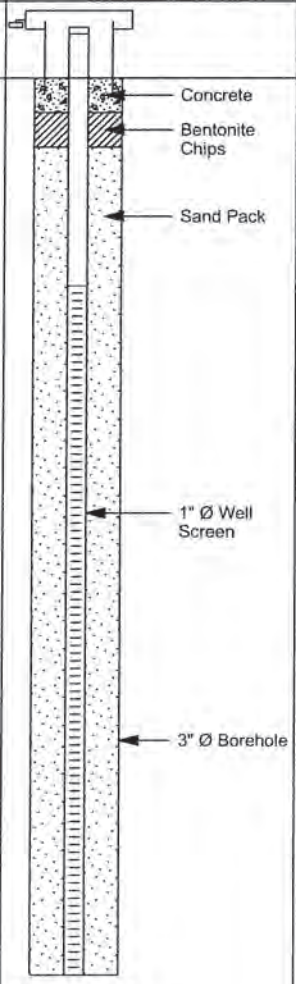
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 3/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-6
DATE COMPLETED: March 19, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, coke, dark brown/black, wet	0.5
	SP SAND, loose, fine to medium grained, light brown, wet to saturated	
	- gravelly at 9.0ft BGS	
	- trace gravel, compact at 10.5ft BGS	
	END OF BOREHOLE @ 13.0ft BGS	13.0



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-2'				0
1HA				
2'-4'				0
4'-6'				0
2GP 6'-8'	P/S	3.5		0
8'-10'				0.1
3GP 10'-12'	P/S	3.5		0

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-7
DATE COMPLETED: March 19, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
2, 4	SM SAND, silty, loose, fine grained, well sorted, dark brown/black, wet - light brown, saturated at 1.5ft BGS	5.0	Concrete Bentonite Chips Sand Pack	1HA			
6, 8, 10, 12	No sample collected	13.0	1" Ø Well Screen 3" Ø Borehole				
14, 16, 18	END OF BOREHOLE @ 13.0ft BGS MW-7 hand augered to 5 feet BGS.						

WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

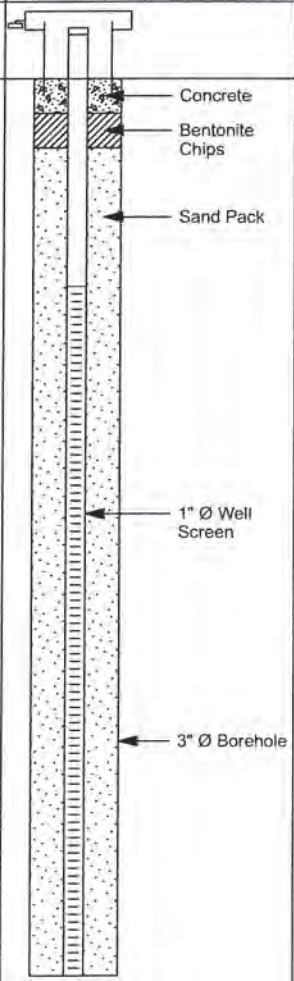
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-8
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, coke, black, wet	0.5	Concrete				
	FILL, gravel, gray, wet	1.0	Bentonite Chips				
2	SP SAND, loose, fine to medium grained, light brown, moist to wet		Sand Pack	1HA			
4		5.0					
	No sample collected						
6			1" Ø Well Screen				
8							
10			3" Ø Borehole				
12							
	END OF BOREHOLE @ 13.0ft BGS	13.0					
14	MW-8 hand augered to 5 feet BGS.						
16							
18							



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

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

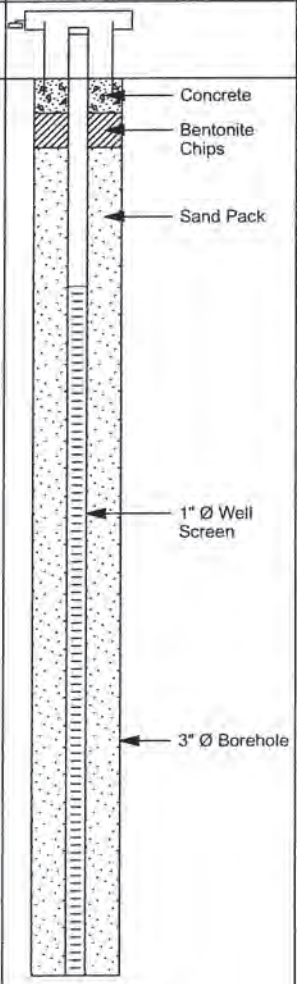
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-9
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	Concrete	
	FILL, gravel, dark brown, slightly moist, petroleum odor	0.8
	SP SAND, trace gravel, compact, fine to medium grained, brown, slightly moist, slight petroleum odor - no gravel, gray, wet, very strong petroleum odor at 2.5ft BGS	1.5
	END OF BOREHOLE @ 13.0ft BGS	13.0

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-2'				608
1HA 2'-4'				1.2
4'-6'				600
2GP 6'-8'	P/S	3.5		840
8'-10'				560
3GP 10'-12'	P/S	4		828

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

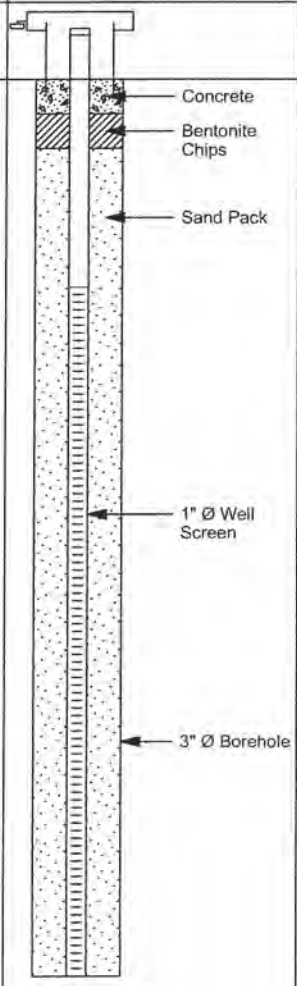
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-10
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, slag, gravel, black, moist, petroleum odor	
2	SP SAND, loose, medium grained, black, wet, petroleum odor	2.0
	- gray at 3.5ft BGS	
4		
6		
8		
10		
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-0.5'				20.9
0.5'-2'				804
1HA				
2'-4'				490
4'-6'				560
2GP 6'-8'	P/S	4		579
8'-10'				640
3GP 10'-12'	P/S	3.5		792

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

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: MW-10A
DATE COMPLETED: September 7, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.3 587.3					
	FILL, slag, cinders, fine grained sand, black	585.8	Bentonite Chips				
2	SP SAND, fine grained, black, odor			1GP	P/S		
	- wet at 3.5ft BGS		4" Ø Borehole				
4	- gray at 4.5ft BGS						
6			Native Sand	2GP	P/S		
8							
			2" Ø Well Screen				
10				3GP	P/S		
12							
14				4GP	P/S		
	END OF BOREHOLE @ 15.0ft BGS	572.3					
16							
18							
20							

WELL DETAILS
Screened interval:
586.3 to 576.3ft AMSL
1.0 to 11.0ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.01
Material: PVC
Seal:
587.3 to 586.8ft AMSL
0.0 to 0.5ft BGS
Material: Bentonite Chips
Sand Pack:
586.8 to 572.3ft AMSL
0.5 to 15.0ft BGS
Material: Native Sand

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: MW-10B
DATE COMPLETED: September 7, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	590.4 587.3					
	FILL, slag, cinders, fine grained sand, black, odor		Bentonite Chips				
	SP SAND, fine grained, odor	586.3					
2				1GP	P/S		
	- wet at 3.5ft BGS		4" Ø Borehole				
4							
	- gray at 5.0ft BGS						
6			Native Sand	2GP	P/S		
8							
			2" Ø Well Screen				
10				3GP	P/S		
12							
14				4GP	P/S		
	END OF BOREHOLE @ 15.0ft BGS	572.3					
16							
18							
20							

WELL DETAILS
Screened interval:
585.8 to 575.8ft AMSL
1.5 to 11.5ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.01
Material: PVC
Seal:
587.3 to 586.8ft AMSL
0.0 to 0.5ft BGS
Material: Bentonite Chips
Sand Pack:
586.8 to 572.3ft AMSL
0.5 to 15.0ft BGS
Material: Native Sand

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

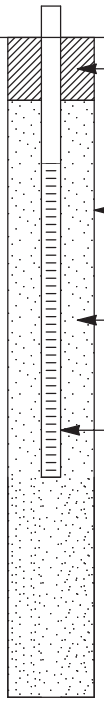
CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: MW-10C
DATE COMPLETED: September 7, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.3 587.2					
	FILL, slag, cinders, fine grained sand, black		Bentonite Chips				
	SP SAND, fine grained, dark gray, odor	586.2					
2				1GP	P/S		
	- wet at 3.0ft BGS		4" Ø Borehole				
4			Native Sand				
6			2" Ø Well Screen	2GP	P/S		
8							
10				3GP	P/S		
	- refusal at 10.5ft BGS	576.7					
	END OF BOREHOLE @ 10.5ft BGS						
12							
14							
16							
18							
20							



WELL DETAILS
Screened interval:
585.2 to 580.2ft AMSL
2.0 to 7.0ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 0.01
Material: PVC
Seal:
587.2 to 586.2ft AMSL
0.0 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
586.2 to 576.7ft AMSL
1.0 to 10.5ft BGS
Material: Native Sand

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: East Chicago
PROJECT NUMBER: 31532
CLIENT: Glenn Springs Holdings, Inc.
LOCATION: East Chicago, Indiana
DRILLING CONTRACTOR: Cabeno

HOLE DESIGNATION: MW-10D
DATE COMPLETED: September 7, 2011
DRILLING METHOD: Geoprobe
FIELD PERSONNEL: J. Hargens

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE	589.8 586.9					
	FILL, slag, cinders, fine grained sand, black		Bentonite Chips				
	SP SAND, fine grained, dark brown	585.9					
2				1GP	P/S		
	- wet at 3.0ft BGS		4" Ø Borehole				
4							
	- gray at 5.0ft BGS						
6			Native Sand	2GP	P/S		
8							
			2" Ø Well Screen				
10				3GP	P/S		
12							
				4GP	P/S		
14	END OF BOREHOLE @ 14.0ft BGS	572.9					
16							
18							
20							

WELL DETAILS
Screened interval:
585.9 to 575.9ft AMSL
1.0 to 11.0ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.01
Material: PVC
Seal:
586.9 to 586.4ft AMSL
0.0 to 0.5ft BGS
Material: Bentonite Chips
Sand Pack:
585.9 to 572.9ft AMSL
1.0 to 14.0ft BGS
Material: Native Sand

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-11
DATE COMPLETED: March 19, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SM SAND, silty, trace medium gravel, loose, fine grained, dark brown/black, saturated, petroleum odor - gray/brown at 0.3ft BGS		Bentonite Chips	0'-2' 1HA 2'-4' 2GP	P/S			0 0
	END OF BOREHOLE @ 6.0ft BGS Refusal at 6 ft BGS so monitoring well not installed.	6.0						

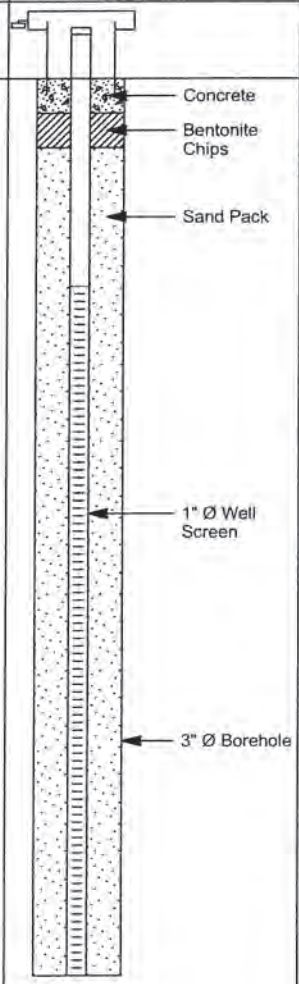
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/19/07

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-7/MW-12
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, slag, gravel, sand, dark brown, moist, petroleum odor	
	SP SAND, compact, medium grained, light brown, wet, petroleum odor	1.5
2		
	- dark brown/gray, strong petroleum odor at 3.5ft BGS	
4	- dark gray at 4.0ft BGS	
6		
8		
10	- gray at 10.5ft BGS	
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-0.5'				5.6
0.5'-2'				52.2
1HA				
2'-4'				260
4'-6'				450
2GP 6'-8'	P/S	3.5		890
8'-10'				1056
3GP 10'-12'	P/S	4		1079

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

CHEMICAL ANALYSIS

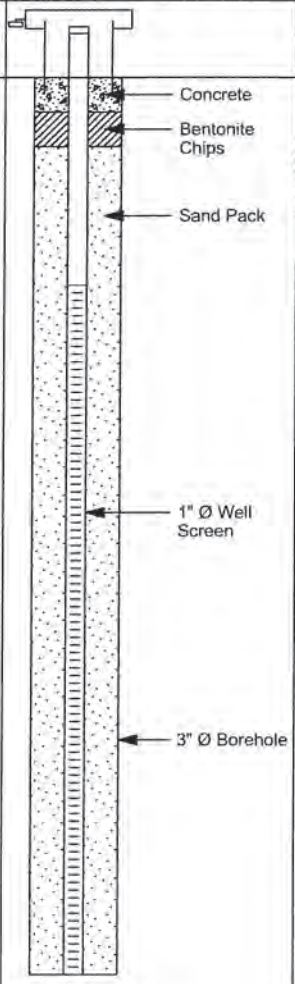
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-8/MW-13
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, gravel, sand, gray, moist	
2	SP SAND, trace gravel, compact, medium rained, dark gray/black, wet, strong petroleum odor	2.0
4		
6	- gravelly at 7.0ft BGS - no gravel at 7.5ft BGS	
8		
10	- gray at 11.0ft BGS	
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0.5'-2'				892
1HA 2'-4'				1017
4'-6'				351
2GP 6'-8'	P/S	3.5		810
8'-10'				405
3GP 10'-12'	P/S	3.5		392

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

CHEMICAL ANALYSIS ◯

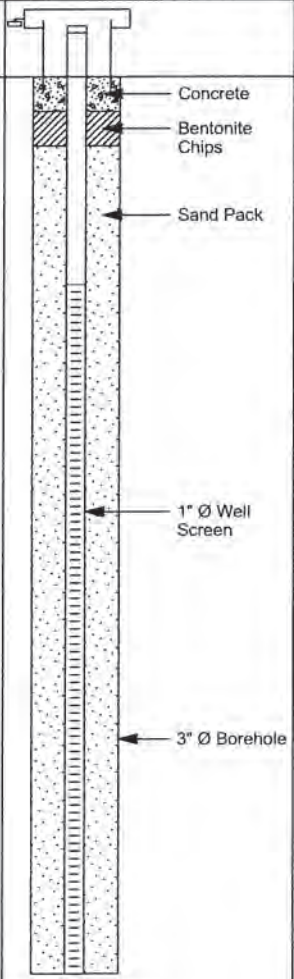
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-14
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, slag, with gravel, black, moist, strong odor	1.5
2	SM SAND, silty, loose, fine to medium grained, gray, wet, very strong petroleum odor - dense at 2.5ft BGS	
4		
6		
8		
10		
12		13.0
	END OF BOREHOLE @ 13.0ft BGS	
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-2'				3.7
1HA				
2'-4'				455
4'-6'				395
2GP 6'-8'	P/S	3.5		420
8'-10'				350
3GP 10'-12'	P/S	3.5		365

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

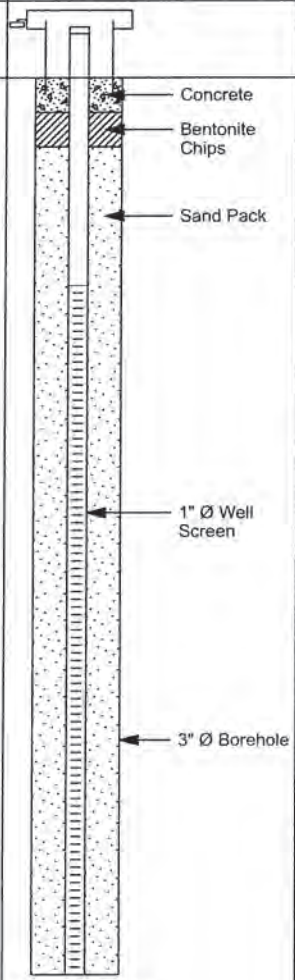
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-15
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, slag, gravel, dark brown/black, petroleum odor	
2	SP SAND, loose, fine to medium grained, light brown, wet, no odor	2.0
4	- gray at 4.0ft BGS	
6		
8		
10	- with gravel at 10.0ft BGS - trace coarse gravel at 10.5ft BGS	
12	- gravelly at 11.8ft BGS	
14	END OF BOREHOLE @ 13.0ft BGS	13.0
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-2'				0.5
1HA 2'-4'				0
4'-6'				0
2GP 6'-8'	P/S	3.5		0
8'-10'				0
3GP 10'-12'	P/S	4		0

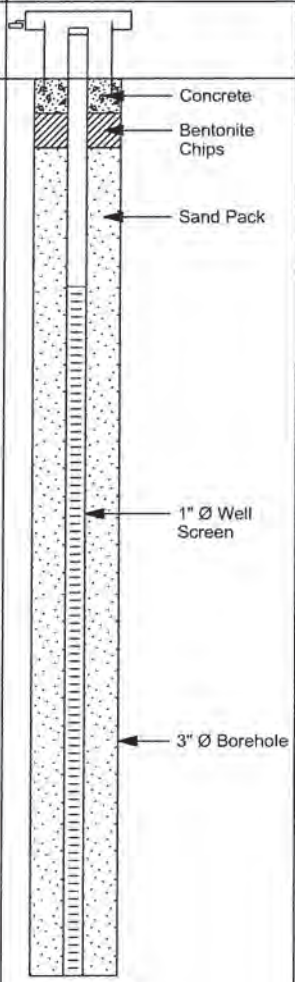
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: MW-16
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	FILL, compacted coke, black, moist		Concrete; Bentonite Chips				
	SP SAND, some gravel, loose, fine to medium grained, light brown, wet	1.0	Sand Pack	1HA			
2	- saturated at 3.0ft BGS						
4	- loose to compact, very fine to fine grained, brown at 5.0ft BGS						
6			1" Ø Well Screen				
8	No sample collected	8.0	3" Ø Borehole				
10							
12							
	END OF BOREHOLE @ 13.0ft BGS	13.0					
14	MW-4 hand augered to 5 feet BGS. Stratigraphy from 5 to 8 feet BGS is from PZ M-8-9 installed February 21, 2005.						
16							
18							



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

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

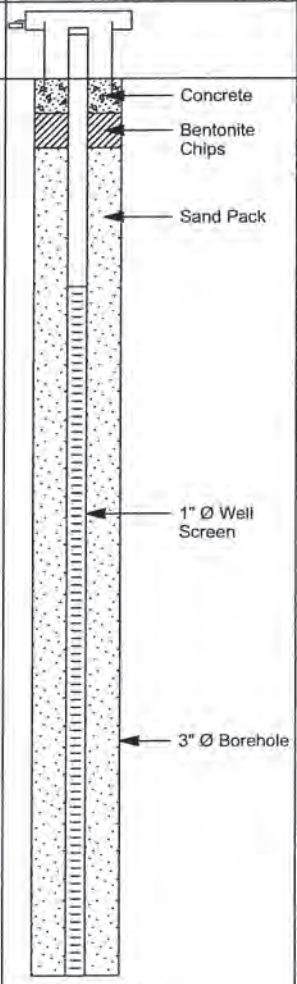
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-10/MW-17
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, sand, gravel, brown/gray, moist	
	SP SAND, trace fine gravel, loose, medium grained, moist	1.5
2		
4	- no gravel, wet, petroleum odor at 4.5ft BGS	
6	- dark gray, strong petroleum odor at 6.5ft BGS	
8	- gravelly at 8.0ft BGS	
10		
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-0.5'				0
0.5'-2'				0
1HA				
2'-4'				0
4'-6'				95.6
2GP 6'-8'	P/S	3		240
8'-10'				362
3GP 10'-12'	P/S	3.5		720

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-1
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, compact, medium grained, brown, wet		Bentonite Chips	0'-0.5'				0.4
				1GP 0.5-2'	P/S			0
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-2
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, coke, black, moist	0.5	Bentonite Chips	0'-0.5'	P/S			6.6
	FILL, gravel, gray, wet	1.0		1GP 0.5-2'				0.8
	SP SAND, loose, fine to medium grained, brown, wet - clayey, black at 1.3ft BGS - no clay, brown at 1.6ft BGS	2.0						
2	END OF BOREHOLE @ 2.0ft BGS							
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-3
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, with medium gravel, loose, fine to medium grained, brown, moist, petroleum odor - trace gravel, light brown at 0.3ft BGS - with gravel fill at 1.0ft BGS - trace gravel at 1.5ft BGS		Bentonite Chips	0'-0.5' 1GP 0.5-2'	P/S			1.7 1210
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-4
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, gravel, gray, moist	0.5	Bentonite Chips	0'-0.5'				1150
	SP SAND, loose, medium grained, black, moist, very strong petroleum odor			1GP 0.5-2'	P/S			1290
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-5
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, slag, some fine to coarse grained gravel, dark brown		Bentonite Chips	0'-0.5'	P/S			3.7
				1GP 0.5-2'				1643
	FILL, fine grained sand, trace gravel, wet, strong petroleum odor	1.5						
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-6
DATE COMPLETED: March 20, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, compact, fine grained, brown, moist, odor	0.2	Bentonite Chips	0'-0.5'	P/S			2.4
	FILL, gravel, sand, black to gray, very strong petroleum odor			1GP 0.5-2'				56.5
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

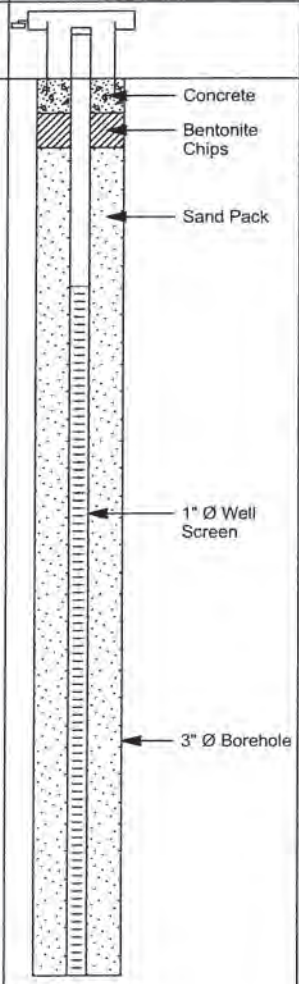
CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-7/MW-12
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, slag, gravel, sand, dark brown, moist, petroleum odor	
	SP SAND, compact, medium grained, light brown, wet, petroleum odor	1.5
2		
	- dark brown/gray, strong petroleum odor at 3.5ft BGS	
4	- dark gray at 4.0ft BGS	
6		
8		
10	- gray at 10.5ft BGS	
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-0.5'				5.6
0.5'-2'				52.2
1HA				
2'-4'				260
4'-6'				450
2GP 6'-8'	P/S	3.5		890
8'-10'				1056
3GP 10'-12'	P/S	4		1079

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

CHEMICAL ANALYSIS

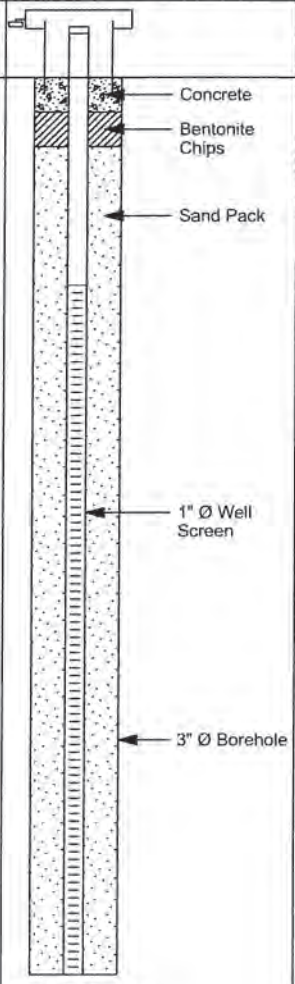
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-8/MW-13
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, gravel, sand, gray, moist	
2	SP SAND, trace gravel, compact, medium rained, dark gray/black, wet, strong petroleum odor	2.0
4		
6	- gravelly at 7.0ft BGS - no gravel at 7.5ft BGS	
8		
10	- gray at 11.0ft BGS	
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0.5'-2'				892
1HA 2'-4'				1017
4'-6'				351
2GP 6'-8'	P/S	3.5		810
8'-10'				405
3GP 10'-12'	P/S	3.5		392

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-9
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, some gravel fill, loose, medium grained, brown, wet, petroleum odor		Bentonite Chips	0'-0.5'				39.6
				1GP 0.5-2'	P/S			405
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ( )

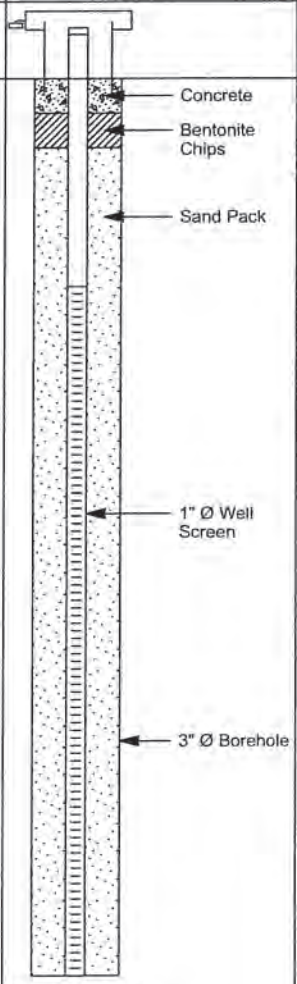
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-10/MW-17
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	FILL, sand, gravel, brown/gray, moist	
	SP SAND, trace fine gravel, loose, medium grained, moist	1.5
2		
4	- no gravel, wet, petroleum odor at 4.5ft BGS	
6	- dark gray, strong petroleum odor at 6.5ft BGS	
8	- gravelly at 8.0ft BGS	
10		
12		
	END OF BOREHOLE @ 13.0ft BGS	13.0
14		
16		
18		

MONITORING WELL



WELL DETAILS
Screened interval:
3.0 to 13.0ft BGS
Length: 10ft
Diameter: 1in
Slot Size: #10
Material: PVC
Seal:
0.5 to 1.0ft BGS
Material: Bentonite Chips
Sand Pack:
1.0 to 13.0ft BGS
Material: #5 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
0'-0.5'				0
0.5'-2'				0
1HA				
2'-4'				0
4'-6'				95.6
2GP 6'-8'	P/S	3		240
8'-10'				362
3GP 10'-12'	P/S	3.5		720

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

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-11
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SP SAND, some gravel, medium grained, brown, moist, odor		Bentonite Chips	0'-0.5'	P/S			13.2
	- black, wet, oily, strong petroleum odor at 1.0ft BGS			1GP 0.5-2'				209
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: EAST CHICAGO
PROJECT NUMBER: 31532
CLIENT: GLENN SPRINGS HOLDINGS, INC.
LOCATION: EAST CHICAGO, INDIANA
DRILLING CONTRACTOR: PARAMOUNT

HOLE DESIGNATION: GP-12
DATE COMPLETED: March 21, 2007
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: S. PUNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	FILL, sand, gravel, brown/gray, moist			0'-0.5'				511
	SP SAND, with gravel, compact, fine to medium grained, brown, wet, petroleum odor - trace gravel, black, strong petroleum odor at 1.5ft BGS	1.0	Bentonite Chips	1GP 0.5-2'	P/S			990
2	END OF BOREHOLE @ 2.0ft BGS	2.0						
4								
6								
8								
10								
12								
14								
16								

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

CHEMICAL ANALYSIS

Appendix E
Historical Soil Particle Size Analysis

STS CONSULTANTS

STS Consultants, Ltd.
750 Corporate Woods Parkway
Vernon Hills, Illinois 60061

voice 847-279-2500
fax 847-279-2510
web www.stsconsultants.com

Rec'd CRA

March 20, 2006

Ms. Julie Czech
CRA Engineering, Inc.
14496 Sheldon Road, Suite 200
Plymouth, MI 48170

RE: Laboratory Testing Program For The East Chicago, Indiana Project CRA Project No. 31532 – STS Project No. 200601731

Dear Ms. Czech:

We are pleased to submit two (2) copies of our laboratory report that pertains to the testing of eight (8) soil samples received in our laboratory March 6, 2006. The samples were in reference to the East Chicago, Indiana Project CRA Project No. 31532. As instructed, STS Consultants, Ltd. performed the following tests on each of the samples:

- Particle Size Analysis – ASTM D 422
- Specific Gravity of Soils – ASTM D 854

The test data included in this report only represent the samples tested and may not reflect actual site materials and/or conditions. The scope of services provided by STS Consultants, Ltd. did not include interpretation of the laboratory test data, and therefore, we are not liable for any interpretation performed by others. If you wish us to provide you with this service, we would be happy to discuss this matter with you at your convenience. Any reproduction of this report must be done in its entirety.

We are pleased to have the opportunity to provide you with our testing services. Should you have any questions, or require additional assistance, please feel free to contact us at any time.

Respectfully,

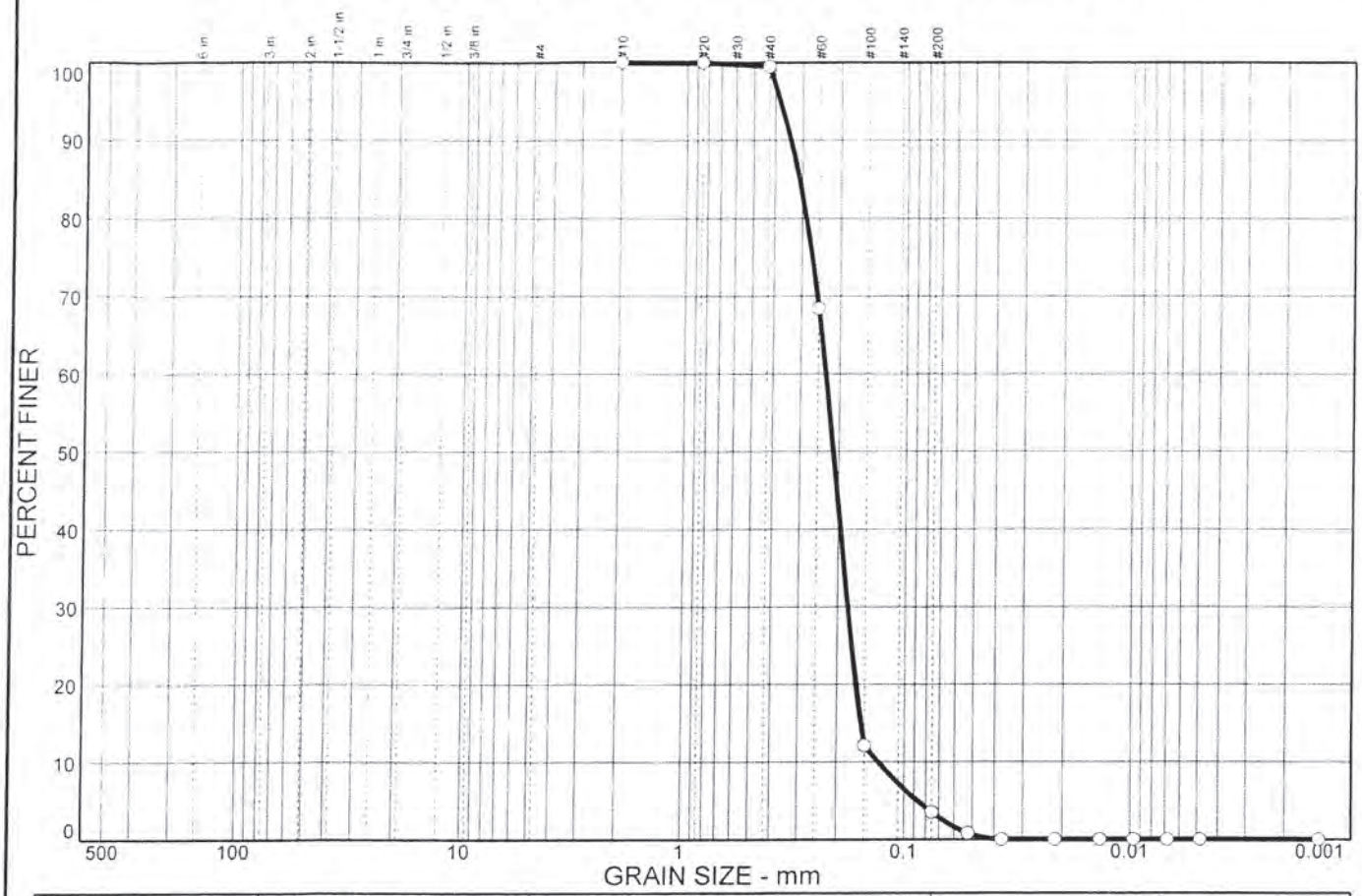
STS CONSULTANTS LTD.

William P. Quinn
Laboratory Manager

Charles W. Pfingsten, PE
Principal Engineer

Encl.

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.5	96.0	3.5	0.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.5		
#60	68.4		
#100	12.1		
#200	3.5		

* (no specification provided)

Soil Description

FINE SAND TRACE SILT - BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.309 D_{60}= 0.231 D_{50}= 0.212
D_{30}= 0.180 D_{15}= 0.156 D_{10}= 0.130
C_u= 1.77 C_c= 1.08

Classification

USCS= SP AASHTO=

Remarks

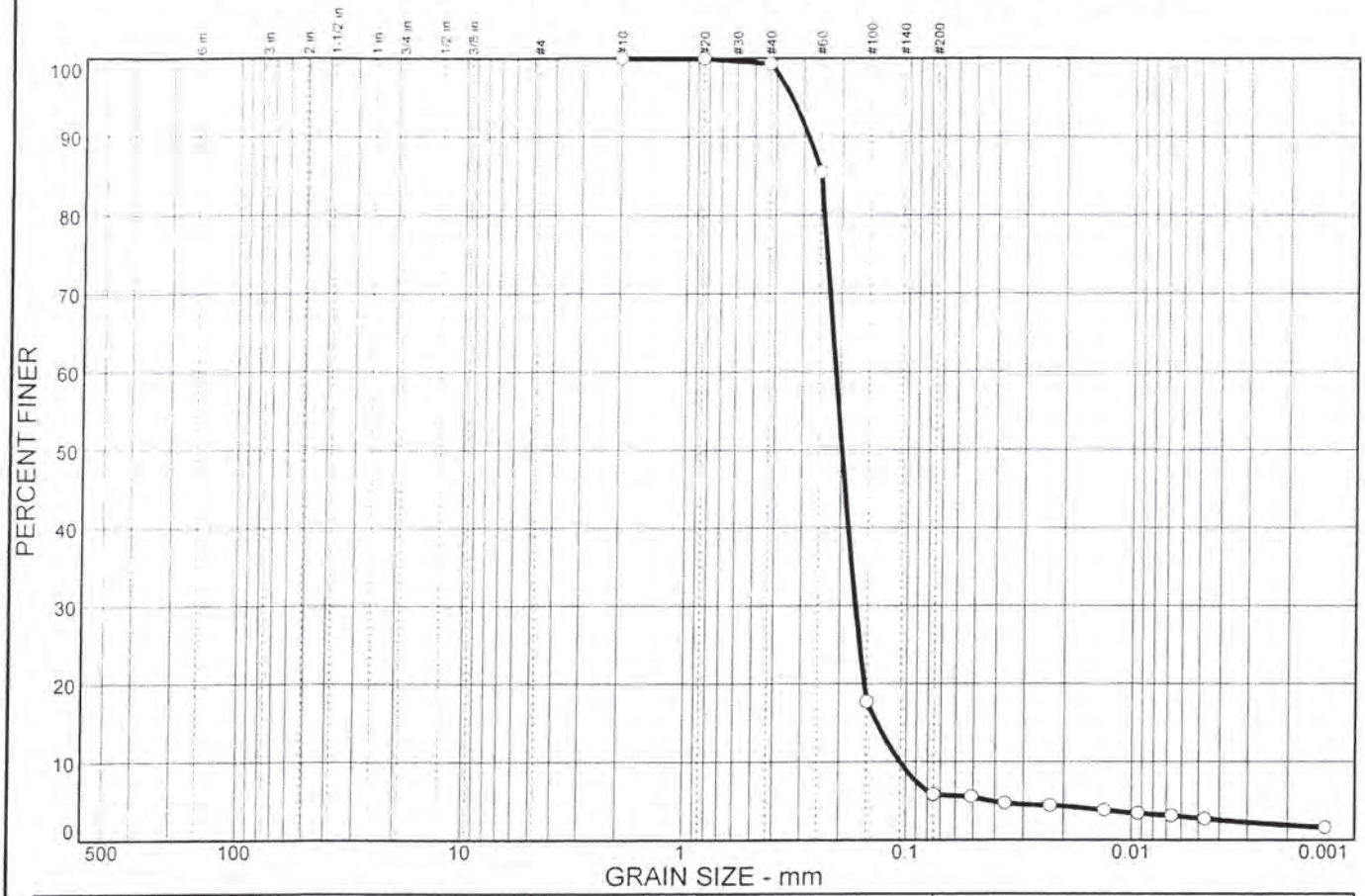
Sample No.: TMW C/D-3/4 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.0-3.5'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.7	93.5	3.0	2.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.3		
#60	85.5		
#100	17.7		
#200	5.8		

* (no specification provided)

Soil Description

FINE SAND TRACE SILT TRACE CLAY - LT. BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.249 D_{60}= 0.212 D_{50}= 0.198
D_{30}= 0.170 D_{15}= 0.135 D_{10}= 0.106
C_u= 1.99 C_c= 1.28

Classification

USCS= SP-SM AASHTO=

Remarks

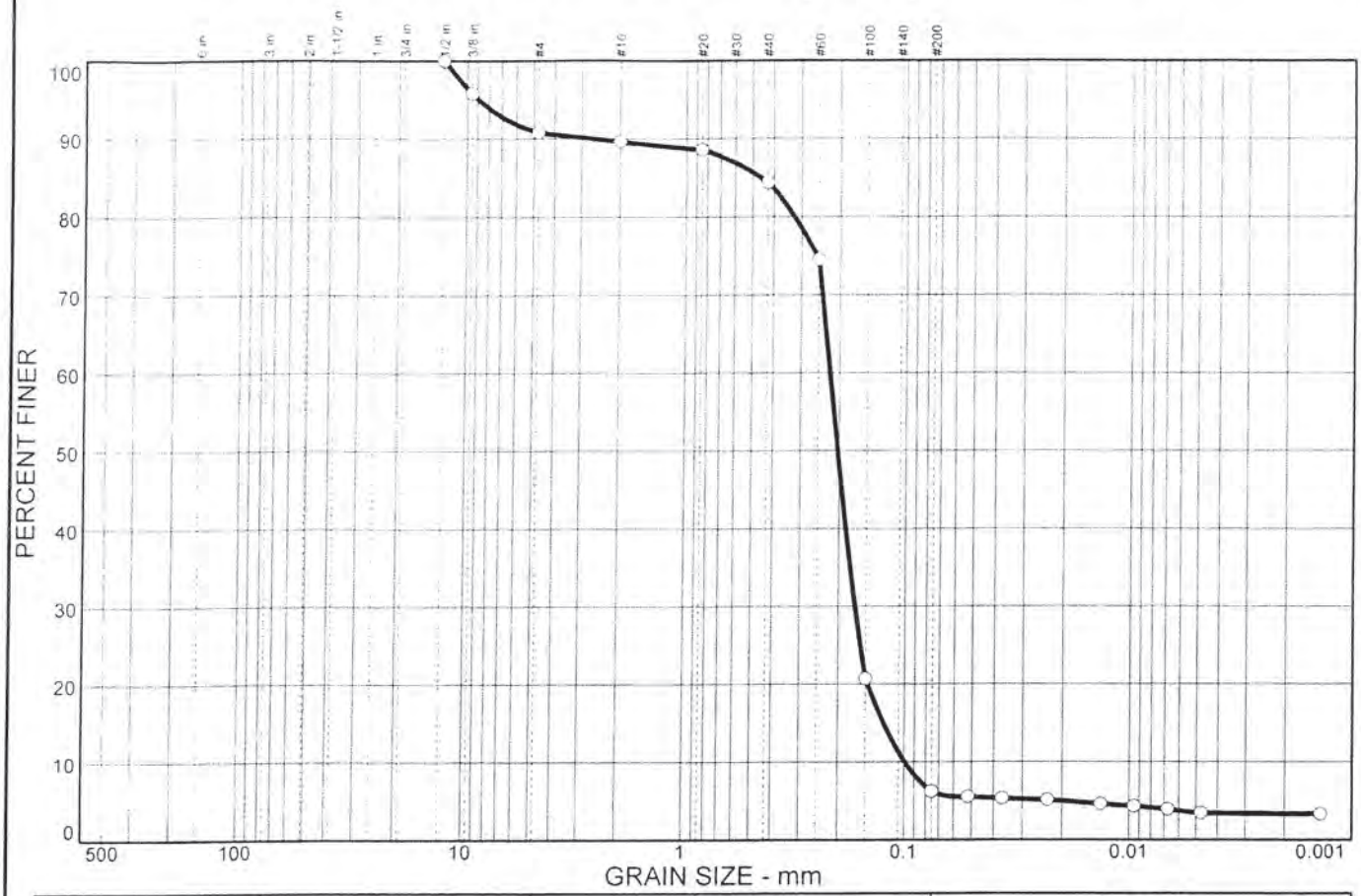
Sample No.: TMW F-5 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.5-4.0'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	9.2	1.2	5.2	78.2	2.7	3.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.50 in.	100.0		
.375 in.	95.8		
#4	90.8		
#10	89.6		
#20	88.6		
#40	84.4		
#60	74.5		
#100	20.7		
#200	6.2		

* (no specification provided)

Soil Description

F-C SAND TRACE FINE GRAVEL TRACE CLAY TRACE SILT - DK. BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.458 D_{60}= 0.222 D_{50}= 0.204
D_{30}= 0.168 D_{15}= 0.124 D_{10}= 0.0993
C_u= 2.23 C_c= 1.29

Classification

USCS= SP-SM AASHTO=

Remarks

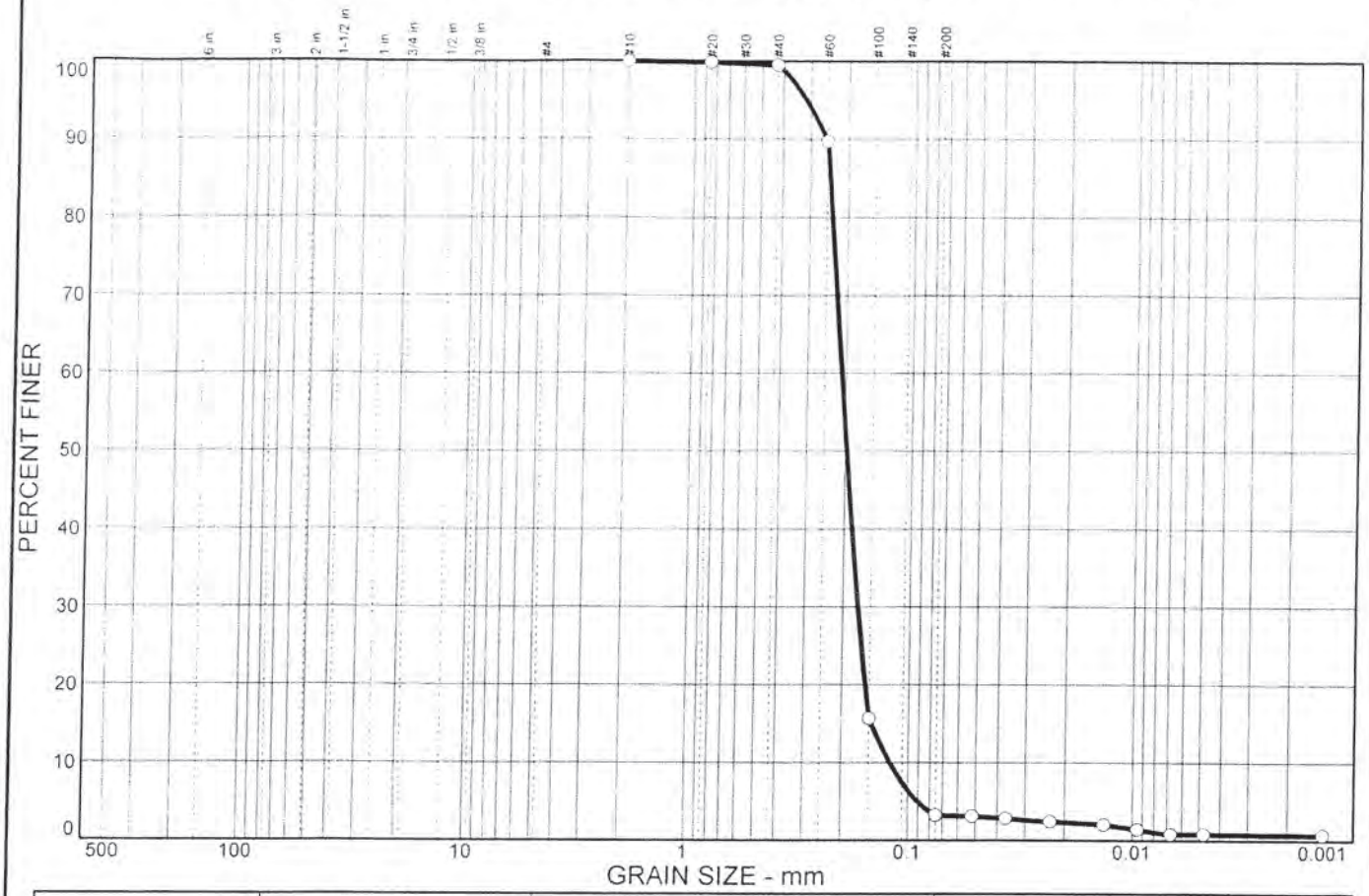
Sample No.: TMW H-4 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 0.0-1.5'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.5	96.3	2.4	0.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.5		
#60	89.7		
#100	15.7		
#200	3.2		

* (no specification provided)

Soil Description

FINE SAND TRACE SILT - BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.243 D_{60}= 0.209 D_{50}= 0.197
D_{30}= 0.171 D_{15}= 0.146 D_{10}= 0.120
C_u= 1.74 C_c= 1.16

Classification

USCS= SP AASHTO=

Remarks

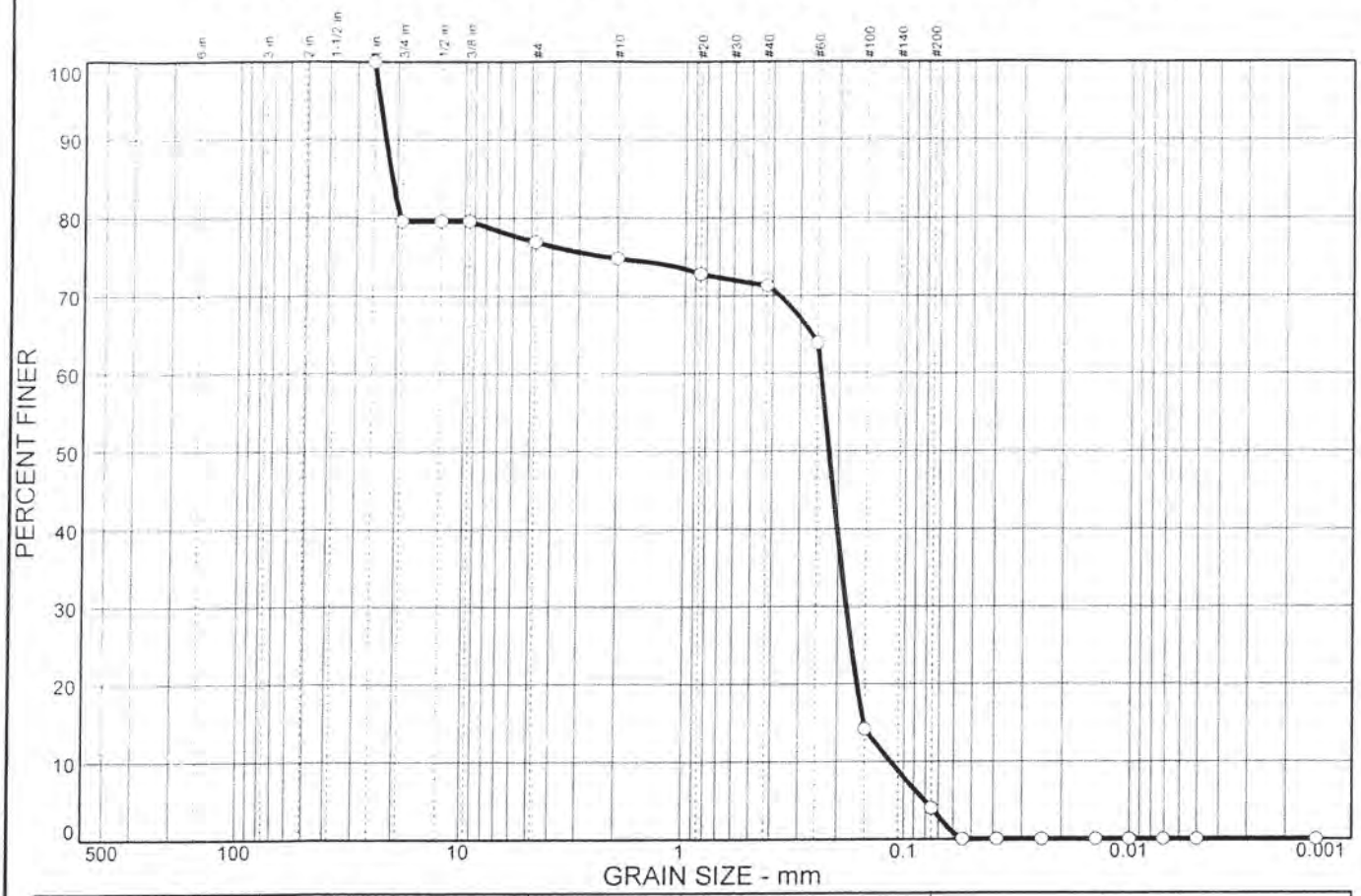
Sample No.: TMW I-6 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.0-3.5'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	20.4	2.7	2.1	3.5	67.3	4.0	0.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0 in.	100.0		
.75 in.	79.6		
.50 in.	79.6		
.375 in.	79.6		
#4	76.9		
#10	74.8		
#20	72.8		
#40	71.3		
#60	63.9		
#100	14.2		
#200	4.0		

* (no specification provided)

Soil Description

FINE TO COARSE SAND SOME FINE TO COARSE GRAVEL TRACE SILT - DK. BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 21.1 D_{60}= 0.242 D_{50}= 0.221
D_{30}= 0.183 D_{15}= 0.152 D_{10}= 0.115
C_u= 2.11 C_c= 1.21

Classification

USCS= SP AASHTO=

Remarks

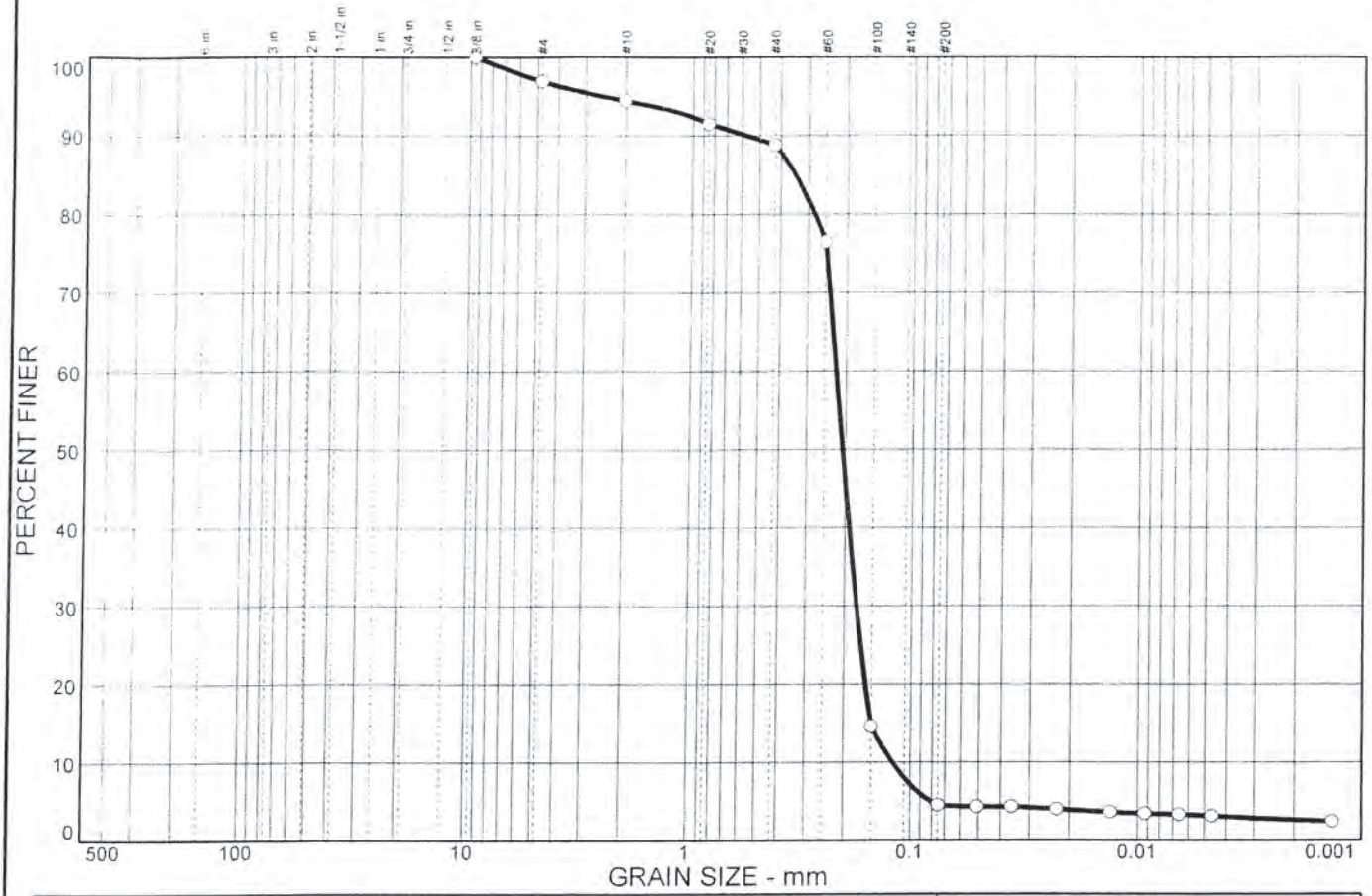
Sample No.: TMW L-6 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.5-4.0'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	3.1	2.5	5.6	84.3	1.4	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	96.9		
#10	94.4		
#20	91.5		
#40	88.8		
#60	76.5		
#100	14.6		
#200	4.5		

* (no specification provided)

Soil Description

F-C SAND TRACE FINE GRAVEL TRACE CLAY TRACE SILT- DK. BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.345 D_{60}= 0.222 D_{50}= 0.207
D_{30}= 0.176 D_{15}= 0.151 D_{10}= 0.120
C_u= 1.85 C_c= 1.16

Classification

USCS= SP AASHTO=

Remarks

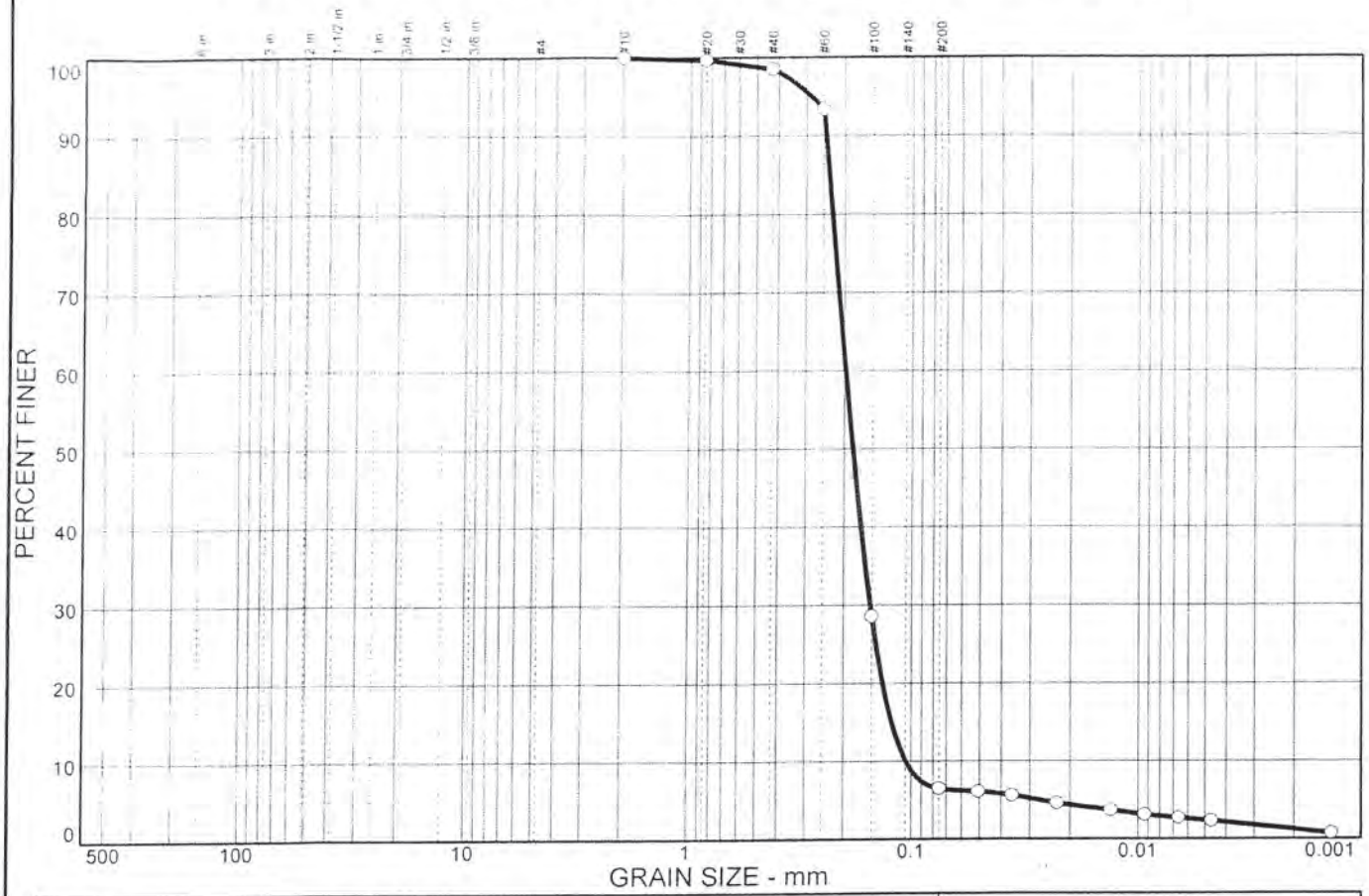
Sample No.: TMW M-4 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.5-4.0'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.5	92.0	4.1	2.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	98.5		
#60	93.4		
#100	28.6		
#200	6.5		

* (no specification provided)

Soil Description

FINE TO MEDIUM SAND TRACE SILT TRACE CLAY - GRAY & BLACK

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.236 D_{60}= 0.198 D_{50}= 0.183
D_{30}= 0.152 D_{15}= 0.122 D_{10}= 0.105
C_u= 1.87 C_c= 1.11

Classification

USCS= SP-SM AASHTO=

Remarks

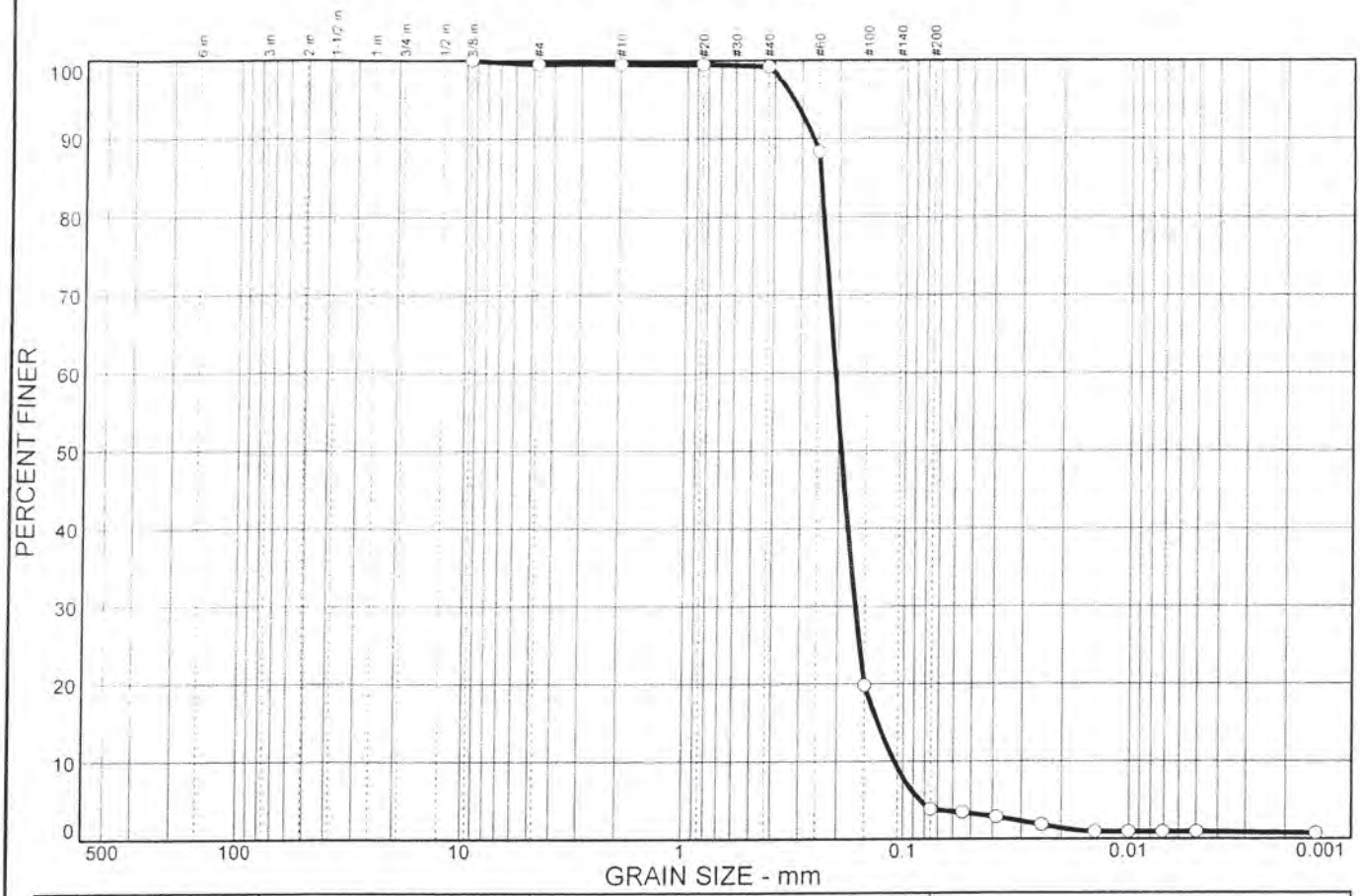
Sample No.: TMW M-8/9 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.5-4.0'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

Particle Size Distribution Report (ASTM D 422)



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.5	0.0	0.3	95.4	2.9	0.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.5		
#10	99.5		
#20	99.5		
#40	99.2		
#60	88.3		
#100	19.8		
#200	3.8		

* (no specification provided)

Soil Description

FINE SAND TRACE SILT - LT. BROWN

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.245 D_{60}= 0.208 D_{50}= 0.194
D_{30}= 0.166 D_{15}= 0.131 D_{10}= 0.110
C_u= 1.90 C_c= 1.21

Classification

USCS= SP AASHTO=

Remarks

Sample No.: TMW O-4/5 Source of Sample: Date: 3/6/06
Location: Elev./Depth: 2.5-4.0'

STS Consultants Ltd.
750 Corporate Woods Parkway
Vernon Hills, IL 60061

Client: CRA ENGINEERING
Project: EAST CHICAGO, IN CRA PROJECT NO. 31532

Project No: 200601731 Plate

STS Consultants Ltd.
Consulting Engineers
Laboratory Services Group *750 Corporate Woods Parkway* *Vernon Hills, IL 60061* *Phone: (847) 279-2500* *Fax: (847) 279-2550*

Specific Gravity of Soils
ASTM D-854

STS Project No.: **200601731** Test Date: **3/6/06**
Project Name: **Conestoga Rovers and Associates**

Boring/Source: TMW - C/D-3/4
Sample No.:
Depth (ft.): 2.0-3.5'
Description:

	Test 1
Flask No.	**SG-1**
Wt. Flask + Soil + Water (W2)	705.04
Wt. Flask + Water (W3)	669.98
Temperature (C)	21.9
Density of Water @ test Tem.	0.99780
Tare No.	**ED-8**
Wt. Tare	610.90
Wt. Tare + Soil	666.44
Wt. Soil (W2-W3)	55.54
(k) Temp. Correction	0.99959
Specific Gravity (Gs)	**2.711**

Boring/Source: WMW - F-5
Sample No.:
Depth (ft.): 2.5-4.0'
Description:

	Test 2
Flask No.	**SG-2**
Wt. Flask + Soil + Water (W2)	723.37
Wt. Flask + Water (W3)	678.85
Temperature (C)	21.9
Density of Water @ test Tem.	0.99780
Tare No.	**ED-3**
Wt. Tare	623.43
Wt. Tare + Soil	694.24
Wt. Soil (W2-W3)	70.81
(k) Temp. Correction	0.99959
Specific Gravity (Gs)	**2.692**

Boring/Source: TMW - H-4
Sample No.:
Depth (ft.): 0.0-1.5'
Description:

	Test 3
Flask No.	**SG-3**
Wt. Flask + Soil + Water (W2)	697.83
Wt. Flask + Water (W3)	669.52
Temperature (C)	22.6
Density of Water @ test Tem.	0.99764
Tare No.	**ED-8**
Wt. Tare	610.89
Wt. Tare + Soil	655.77
Wt. Soil (W2-W3)	44.88
(k) Temp. Correction	0.99943
Specific Gravity (Gs)	**2.707**

Boring/Source: TMW - I-6
Sample No.:
Depth (ft.): 2.0-3.5'
Description:

	Test 4
Flask No.	**SG-4**
Wt. Flask + Soil + Water (W2)	716.51
Wt. Flask + Water (W3)	677.44
Temperature (C)	21.9
Density of Water @ test Tem.	0.99780
Tare No.	**ED-7**
Wt. Tare	581.63
Wt. Tare + Soil	643.42
Wt. Soil (W2-W3)	61.79
(k) Temp. Correction	0.99959
Specific Gravity (Gs)	**2.719**

Technician Ken Proctor Calculated Ken Proctor Checked W. P. Quinn
Date **3/6/06** Date **3/9/06** Date **3/9/06**

STS Consultants Ltd.
Consulting Engineers
Laboratory Services Group *750 Corporate Woods Parkway* *Vernon Hills, IL 60061* *Phone: (847) 279-2500* *Fax: (847) 279-2550*

Specific Gravity of Soils
ASTM D-854

STS Project No.: **200601731** Test Date: **3/7/06**
Project Name: **Conestoga Rovers and Associates**

Boring/Source: TMW - L-6
Sample No.:
Depth (ft.): 2.5-4.0'
Description:

	Test 1
Flask No.	**SG-3**
Wt. Flask + Soil + Water (W2)	712.45
Wt. Flask + Water (W3)	677.36
Temperature (C)	22.6
Density of Water @ test Tem.	0.99764
Tare No.	**ED-5**
Wt. Tare	583.66
Wt. Tare + Soil	639.40
Wt. Soil (W2-W3)	55.74
(k) Temp. Correction	0.99943
Specific Gravity (Gs)	**2.698**

Boring/Source: TMW - M-4
Sample No.:
Depth (ft.): 2.5-4.0'
Description:

	Test 2
Flask No.	**SG-2**
Wt. Flask + Soil + Water (W2)	713.12
Wt. Flask + Water (W3)	678.77
Temperature (C)	22.6
Density of Water @ test Tem.	0.99764
Tare No.	**ED-6**
Wt. Tare	602.07
Wt. Tare + Soil	656.59
Wt. Soil (W2-W3)	54.52
(k) Temp. Correction	0.99943
Specific Gravity (Gs)	**2.701**

Boring/Source: TMW - M-8/9
Sample No.:
Depth (ft.): 2.5-4.0'
Description:

	Test 3
Flask No.	**SG-4**
Wt. Flask + Soil + Water (W2)	708.38
Wt. Flask + Water (W3)	669.60
Temperature (C)	21.9
Density of Water @ test Tem.	0.99780
Tare No.	**ED-4**
Wt. Tare	578.18
Wt. Tare + Soil	639.76
Wt. Soil (W2-W3)	61.58
(k) Temp. Correction	0.99959
Specific Gravity (Gs)	**2.700**

Boring/Source: TMW -O-4/5
Sample No.:
Depth (ft.): 2.5-4.0'
Description:

	Test 4
Flask No.	**SG-4**
Wt. Flask + Soil + Water (W2)	703.85
Wt. Flask + Water (W3)	669.92
Temperature (C)	22.4
Density of Water @ test Tem.	0.99768
Tare No.	**ED-10**
Wt. Tare	619.12
Wt. Tare + Soil	673.17
Wt. Soil (W2-W3)	54.05
(k) Temp. Correction	0.99947
Specific Gravity (Gs)	**2.685**

Technician Ken Proctor Calculated Ken Proctor Checked W. P. Quinn
Date **3/7/06** Date **3/10/06** Date **3/10/06**

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

14496 Sheldon Road, Suite #200
Plymouth, Michigan 48170
Telephone: (734) 453-5123 Fax: (734) 453-5201
www.CRAworld.com

MEMORANDUM

TO: Sean Grady, CRA - Indianapolis

REF. NO.: 31532-05

FROM: Michael C. Gentner, PE

DATE: January 7, 2005

C.C.:

RE: **East Chicago Site Soil Testing**

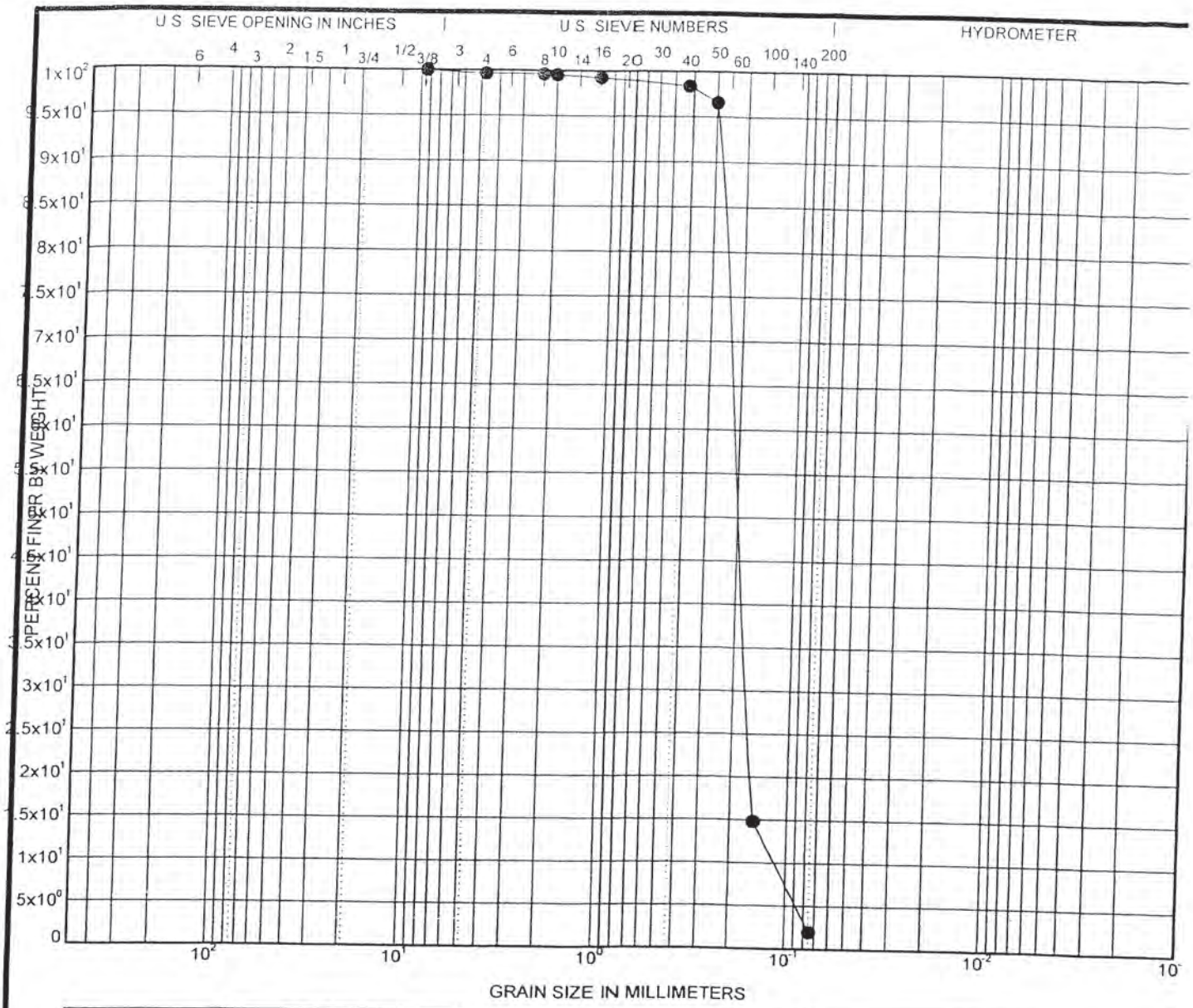
Enclosed are the results of the grain size analyses and permeability tests completed on samples received in our Plymouth, Michigan laboratory. The grain size analyses were completed in the Plymouth lab in general accordance with ASTM D-422. The permeability tests were completed in the Inspec-Sol laboratory in Waterloo, Ontario in general accordance with ASTM D-2434.

The results of the grain size analyses indicate poorly graded clean sands (SP) with the amount of fines passing the #200 sieve (grain size 0.075 mm) on the order of 1 to 3%. The exceptions are sand tested from TP-2 and TP-15. The sample from TP-2 is classified a silty sand (SM), with approximately 20% fines passing the #200 sieve, and TP-15 a fine sand with little silt (SP-SM) with approximately 8% passing the #200 sieve.

The permeability as determined by ASTM D-2434 on three samples, TP-1, TP-4, and TP-8 are very consistent, and range from 1.3×10^{-2} cm/s to 2.2×10^{-2} cm/s. The estimated permeability as calculated by the formula $k=(D_{10})^2$ range from 1.2×10^{-2} cm/s to 6.9×10^{-3} cm/s, in which D_{10} equals the grain size diameter that 10% is smaller, by weight. The measured permeability results compare well to the estimated results as shown in the summary table. Note that the k value for TP-2 was estimated, since the above noted formula is generally valid for clean sands on the order of less than 5% passing the #200 sieve, by weight. The permeability tests were completed using the "Minimum Density" or "0% Relative Density" method as described in ASTM D-2434. Slight changes may be seen in the in-situ permeability if field density conditions differ from those in the lab; however the changes are not anticipated to be significant.

Overall, the soil conditions at the site can be considered as having good drainage characteristics based on the grain size analyses and the permeability test results.

EQUAL EMPLOYMENT OPPORTUNITY EMPLOYER



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● TP-1	0.30	**(SP) Fine SAND, trace medium to coarse sand and silt.**				**1.14**	**1.9**

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TP-1	0.30	**9.375**	**0.22**	**0.171**	**0.116**	**0.4**	**97.7**	**2.0**	

GRAIN SIZE 31532.GPJ CRA CORP.GDT 11/29/04

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZ
ANALYSIS OF SOIL
(ASTM D 422-63

CLIENT: CRA, Inc. Chicago office LAB NO: 158
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-1 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, trace medium to coarse sand and silt - Brown.

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 396.0 g
Weight after washing: 388.6 g
Loss by wash: 7.4 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0	0.0%	100.0%
	1"	0	0.0%	100.0%
	3/4"	0	0.0%	100.0%
	1/2"	0	0.0%	100.0%
	3/8"	0	0.0%	100.0%
SAND	#4	1.5	0.4%	99.6%
	#8	0.1	0.0%	99.6%
	#10	0.3	0.1%	99.5%
	#16	1.1	0.3%	99.2%
	#40	3.4	0.9%	98.4%
	#50	7.1	1.8%	96.6%
	#100	323.8	81.8%	14.8%
	#200	50.9	12.9%	2.0%
	pan	0.4	2.0%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	12	
Soil wet + Tare	116.3	
Soil dry + Tare	96.4	
Weight water	19.9	
Tare	25.0	
Weight dry soil	71.4	
W%	27.9%	

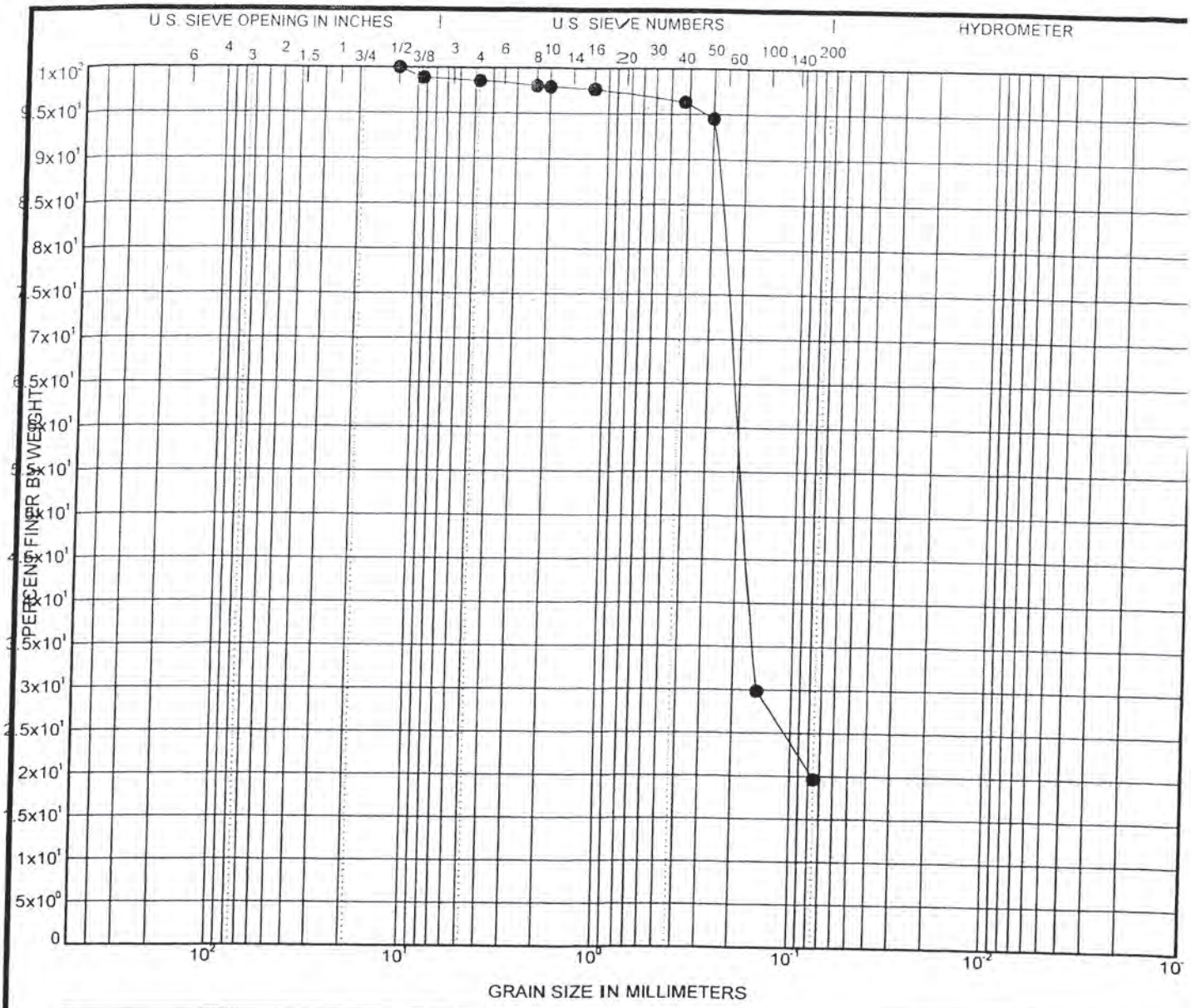
$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

Dmm = K $\sqrt{L/T}$ L is function of (R + meniscus) R'
Dr = ☐ measured ☐ estimated
a =

DISPERSING AGENT:
CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	C
● TP-2	0.30	**(SM) Silty fine SAND, trace medium to coarse sand and fine gravel.**					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Cla
● TP-2	0.30	**12.5**	**0.207**	**0.15**		**1.4**	**78.9**	**19.7**	

GRAIN SIZE 31532.GPJ CRA CORP.GDT 11/29/04

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZ
ANALYSIS OF SOIL
(ASTM D 422-6

CLIENT: CRA, Inc. Chicago office LAB NO: 159
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-2 DEPTH:
SOIL DESCRIPTION: (SM) Silty fine SAND, trace medium to coarse sand and fine gravel - Brown

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 422.1 g
Weight after washing: 340.5 g
Loss by wash: 81.6 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	0.0	0.0%	100.0%
	3/8"	4.7	1.1%	98.9%
SAND	#4	1.4	0.3%	98.6%
	#8	2.2	0.5%	98.0%
	#10	0.4	0.1%	97.9%
	#16	1.0	0.2%	97.7%
	#40	5.7	1.4%	96.4%
	#50	7.6	1.8%	94.6%
	#100	273	64.7%	29.9%
	#200	43.1	10.2%	19.7%
	pan	1.4	19.7%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	6	
Soil wet + Tare	124.9	
Soil dry + Tare	85.3	
Weight water	39.6	
Tare	20.7	
Weight dry soil	64.6	
W%	61.3%	

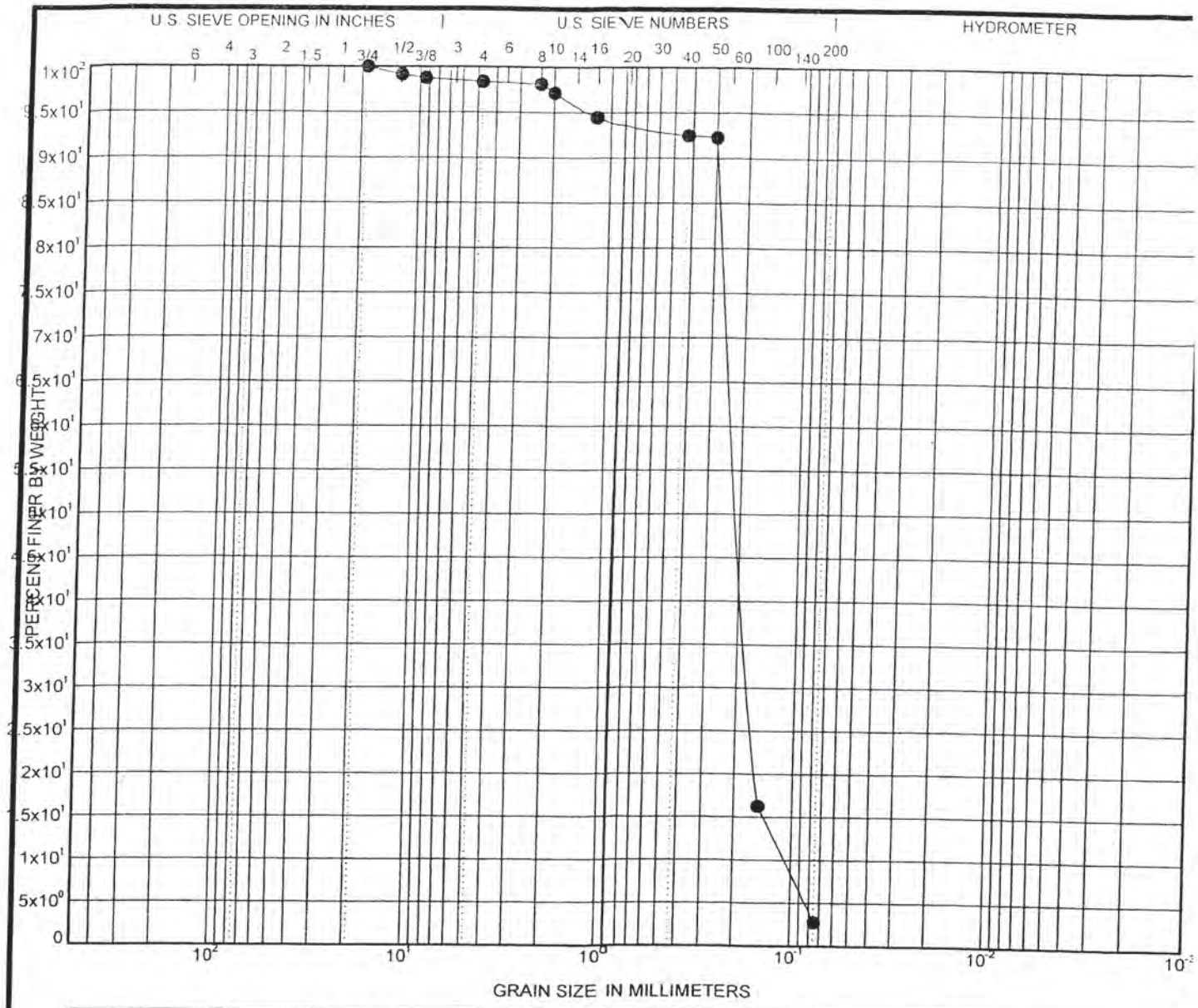
$$P\% = \frac{(R - \delta R)\,a}{Ms} \times 100$$

Dmm = K $\sqrt{L/T}$ L is function of (R + meniscus) R'
Dr = ☐ measured ☐ estimated
a =

DISPERSING AGENT:
CONCENTRATION: g/L

REMARKS Some topsoil/organics noted.

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-3	0.30	**(SP) Fine SAND, trace medium to coarse sand, fine gravel and silt.**				**1.19**	**2.0**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-3	0.30	**18.75**	**0.223**	**0.17**	**0.109**	**1.6**	**95.6**	**2.8**	

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

GRAIN SIZE 31532.GPJ CRA CORP.GDT 11/29/04

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZE ANALYSIS OF SOILS (ASTM D 422-63

CLIENT: CRA, Inc. Chicago office LAB NO: 160
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-3 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, trace medium to coarse sand, fine gravel and silt - Black

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 356.2 g
Weight after washing: 347.5 g
Loss by wash: 8.7 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	3.1	0.9%	99.1%
	3/8"	1.3	0.4%	98.8%
SAND	#4	1.4	0.4%	98.4%
	#8	0.9	0.3%	98.1%
	#10	3.4	1.0%	97.2%
	#16	9.6	2.7%	94.5%
	#40	6.9	1.9%	92.5%
	#50	0.8	0.2%	92.3%
	#100	270.8	76.0%	16.3%
	#200	48.1	13.5%	2.8%
	pan	1.2	2.8%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	20	
Soil wet + Tare	107.0	
Soil dry + Tare	76.1	
Weight water	30.9	
Tare	20.7	
Weight dry soil	55.4	
W%	55.8%	

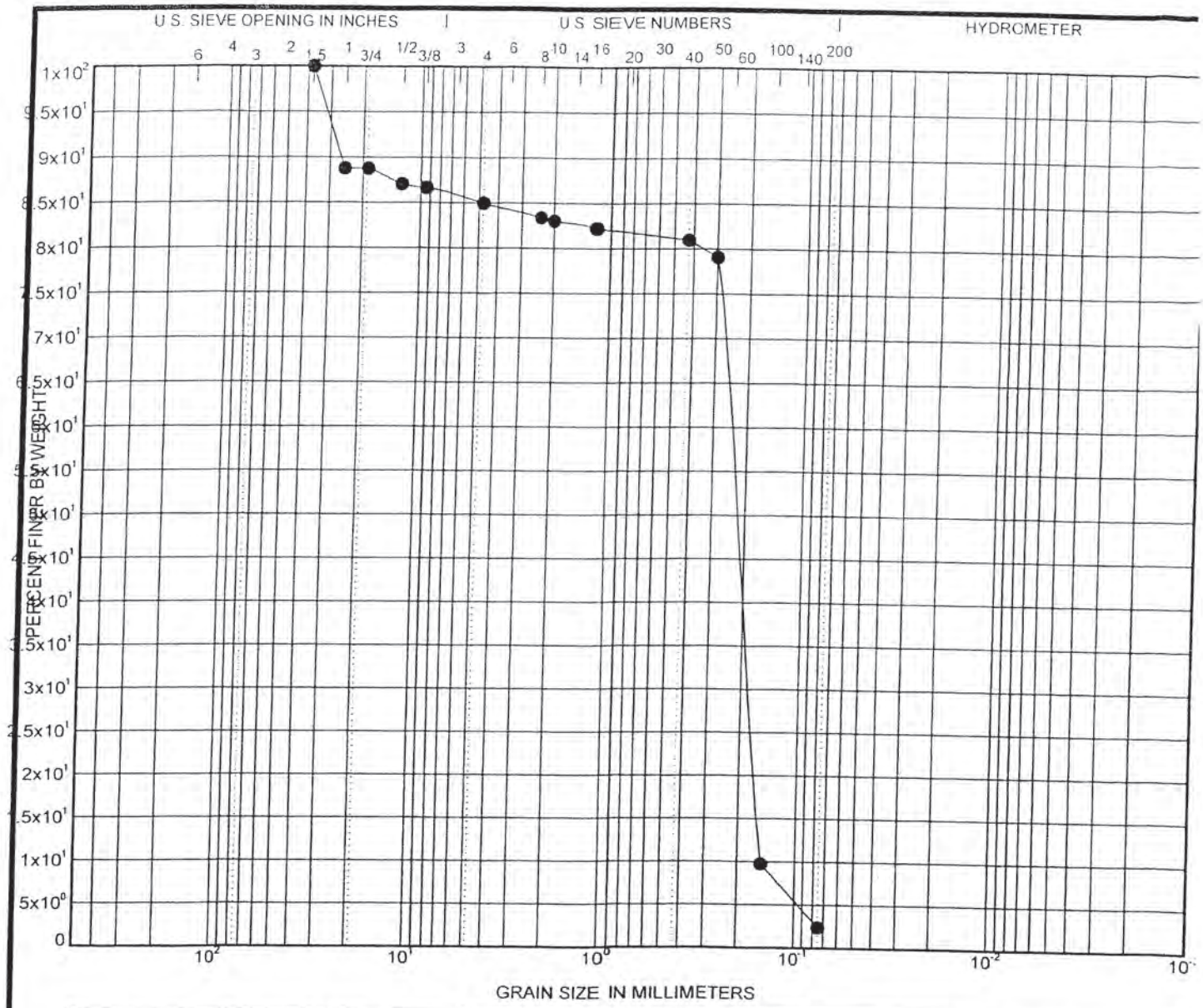
$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

Dmm = K $\sqrt{L/T}$ L is function of (R + meniscus) R'
Dr = ☐ measured ☐ estimated
a =

DISPERSING AGENT:
CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-4	0.30	(SP) Fine SAND, little medium to coarse sand and gravel, trace silt.				0.90	1.6

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-4	0.30	37.5	0.248	0.184	0.15	15.0	82.6	2.4	

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

GRAIN SIZE 31532.GPJ CRA CORP GDT 11/29/04

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZE ANALYSIS OF SOILS (ASTM D 422-63)

CLIENT: CRA, Inc. Chicago office LAB NO: 161
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-4 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, little medium to coarse sand and gravel, trace silt - Brown

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 463.0 g
Weight after washing: 452.7 g
Loss by wash: 10.3 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	51.9	11.2%	88.8%
	3/4"	0.0	0.0%	88.8%
	1/2"	7.9	1.7%	87.1%
	3/8"	1.9	0.4%	86.7%
SAND	#4	7.8	1.7%	85.0%
	#8	7.3	1.6%	83.4%
	#10	1.7	0.4%	83.0%
	#16	3.7	0.8%	82.2%
	#40	5.9	1.3%	81.0%
	#50	8.7	1.9%	79.1%
	#100	321.0	69.3%	9.8%
	#200	34.0	7.3%	2.4%
	pan	0.9	2.4%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	5	
Soil wet + Tare	119.7	
Soil dry + Tare	110.9	
Weight water	8.8	
Tare	20.8	
Weight dry soil	90.1	
W%	9.8%	

$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

$Dmm = K \sqrt{L/T}$ L is function of (R + meniscus) R'

Dr = ☐ measured ☐ estimated

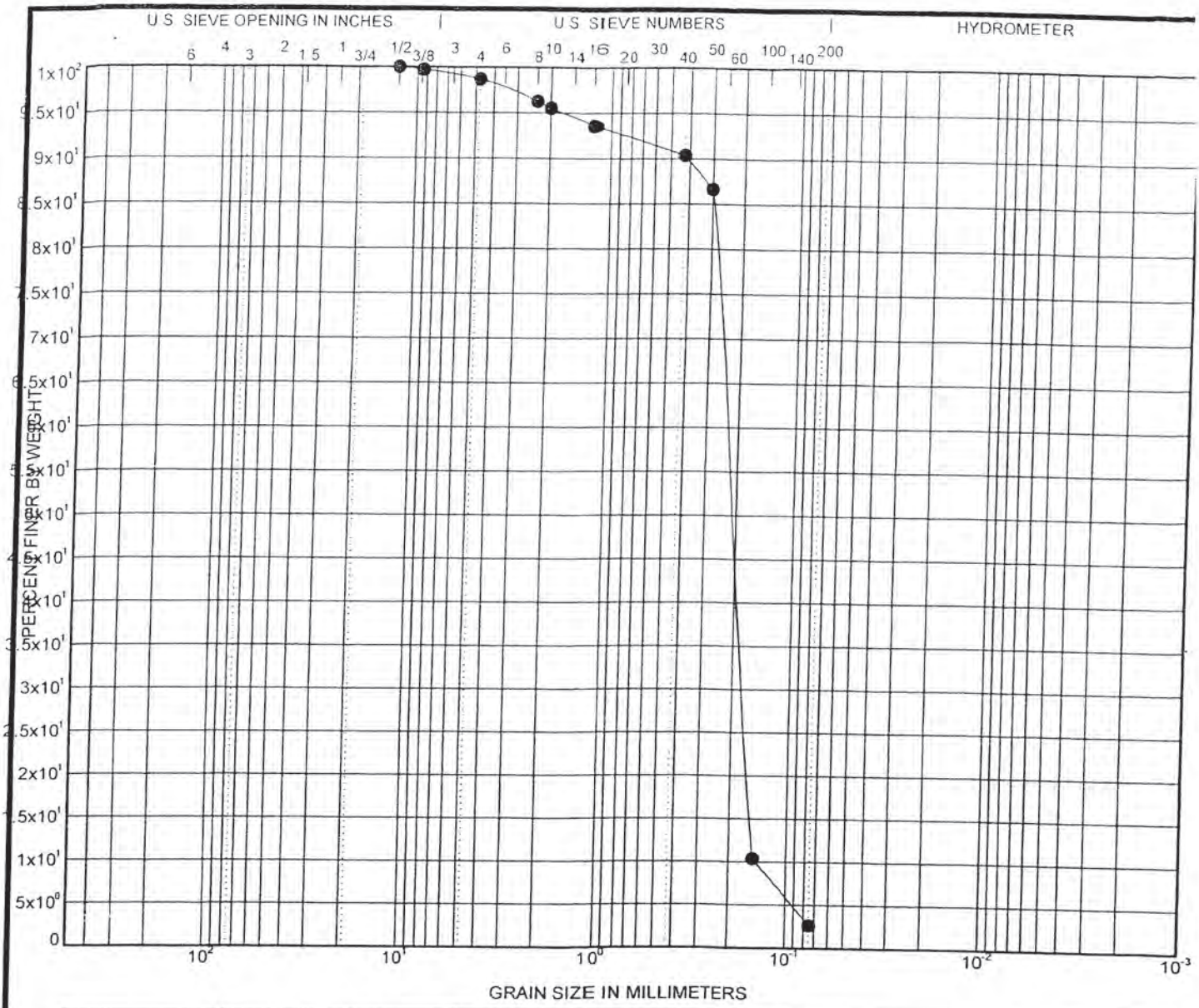
a =

DISPERSING AGENT:

CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-5	0.30	(SP) Fine SAND, little medium to coarse sand, trace fine gravel and silt.				0.94	1.6

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-5	0.30	12.5	0.235	0.179	0.145	1.3	96.0	2.7	

GRAIN SIZE 31532 GPJ CRA CORP GDT 11/29/04

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZE ANALYSIS OF SOILS (ASTM D 422-63

CLIENT: CRA, Inc. Chicago office LAB NO: 162
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-5 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, little medium to coarse sand, trace fine gravel and silt - Brown and black

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 435.3 g
Weight after washing: 424.7 g
Loss by wash: 10.6 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	0.0	0.0%	100.0%
	3/8"	1.3	0.3%	99.7%
SAND	#4	4.4	1.0%	98.7%
	#8	10.5	2.4%	96.3%
	#10	3.3	0.8%	95.5%
	#16	8.4	1.9%	93.6%
	#40	13.9	3.2%	90.4%
	#50	16.2	3.7%	86.7%
	#100	332.0	76.3%	10.4%
	#200	33.7	7.7%	2.7%
	pan	1.0	2.7%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	M	
Soil wet + Tare	137.1	
Soil dry + Tare	118.0	
Weight water	19.1	
Tare	25.6	
Weight dry soil	92.4	
W%	20.7%	

$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

$Dmm = K \sqrt{L/T}$ L is function of (R + meniscus) R¹

Dr = ☐ measured ☐ estimated

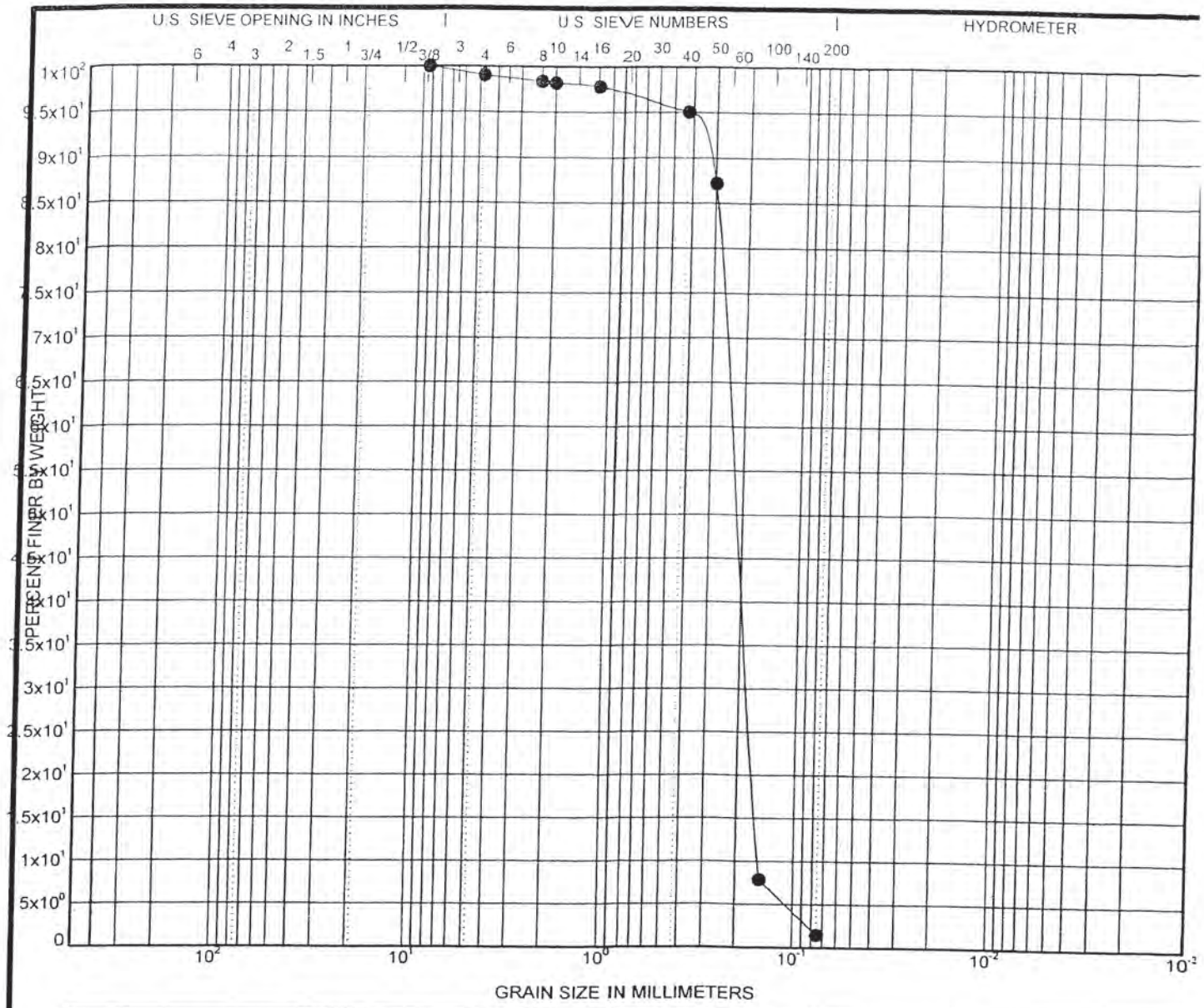
a =

DISPERSING AGENT:

CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● TP-11	0.30	**(SP) Fine SAND, trace medium to coarse sand and silt.**				**0.92**	**1.5**

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TP-11	0.30	**9.375**	**0.237**	**0.182**	**0.153**	**1.0**	**97.6**	**1.5**	

GRAIN SIZE 31532.GPJ CRA CORP GDT 11/29/04

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZ ANALYSIS OF SOIL (ASTM D 422-6

CLIENT: CRA, Inc. Chicago office LAB NO: 163
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-11 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, trace medium to coarse sand and silt - brown

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 418.3 g
Weight after washing: 412.9 g
Loss by wash: 5.4 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	0.0	0.0%	100.0%
	3/8"	0.0	0.0%	100.0%
SAND	#4	4.0	1.0%	99.0%
	#8	2.8	0.7%	98.4%
	#10	0.7	0.2%	98.2%
	#16	1.5	0.4%	97.8%
	#40	11.5	2.7%	95.1%
	#50	32.9	7.9%	87.2%
	#100	331.8	79.3%	7.9%
	#200	26.9	6.4%	1.5%
	pan	0.8	1.5%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	15	
Soil wet + Tare	112.0	
Soil dry + Tare	94.6	
Weight water	17.4	
Tare	20.6	
Weight dry soil	74.0	
W%	23.5%	

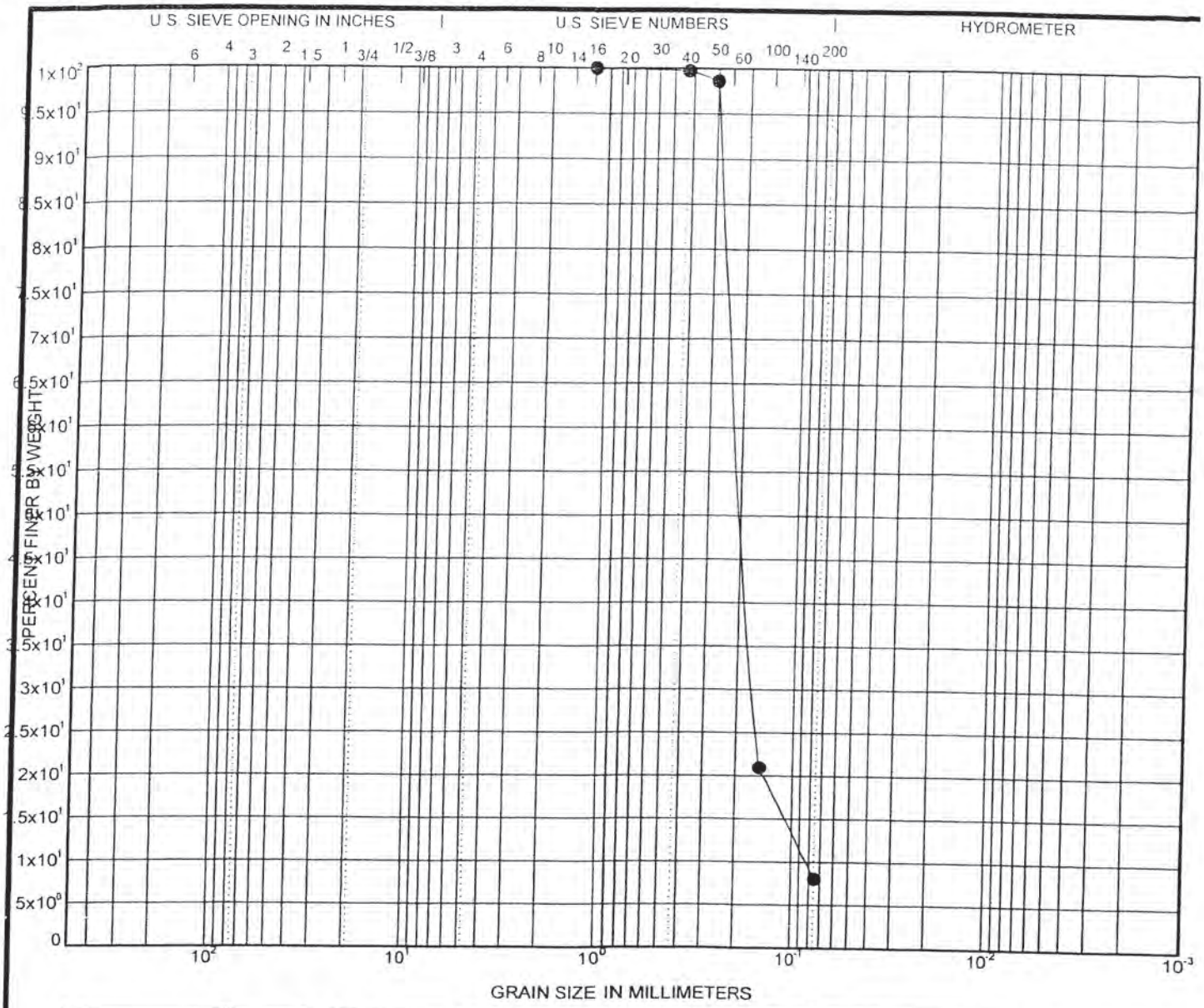
$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

Dmm = K $\sqrt{L/T}$ L is function of (R + meniscus) R'
Dr = ☐ measured ☐ estimated
a =

DISPERSING AGENT:
CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-15	0.30	(SP-SM) Fine SAND, little silt.				1.49	2.5

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-15	0.30	1.18	0.213	0.163	0.083	0.0	91.9	8.1	

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

GRAIN SIZE 31532.GPJ CRA CORP.GDT 11/29/04

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZ
ANALYSIS OF SOIL
(ASTM D 422-63

CLIENT: CRA, Inc. Chicago office LAB NO: 164
PROJECT / SITE: East Chicago Site PROJECT NO: 31532

BORING NO: SAMPLE NO: TP-15 DEPTH:
SOIL DESCRIPTION: (SP-SM) Fine SAND, little silt - brown

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 454.4 g
Weight after washing: 418.3 g
Loss by wash: 36.1 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	0.0	0.0%	100.0%
	3/8"	0.0	0.0%	100.0%
SAND	#4	0.0	0.0%	100.0%
	#8	0.0	0.0%	100.0%
	#10	0.0	0.0%	100.0%
	#16	0.0	0.0%	100.0%
	#40	1.3	0.3%	99.7%
	#50	4.9	1.1%	98.6%
	#100	353.0	77.7%	21.0%
	#200	58.7	12.9%	8.0%
	pan	0.4	8.0%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT

CAN No:	IN	
Soil wet + Tare	123.2	
Soil dry + Tare	104.9	
Weight water	18.3	
Tare	25.3	
Weight dry soil	79.6	
W%	23.0%	

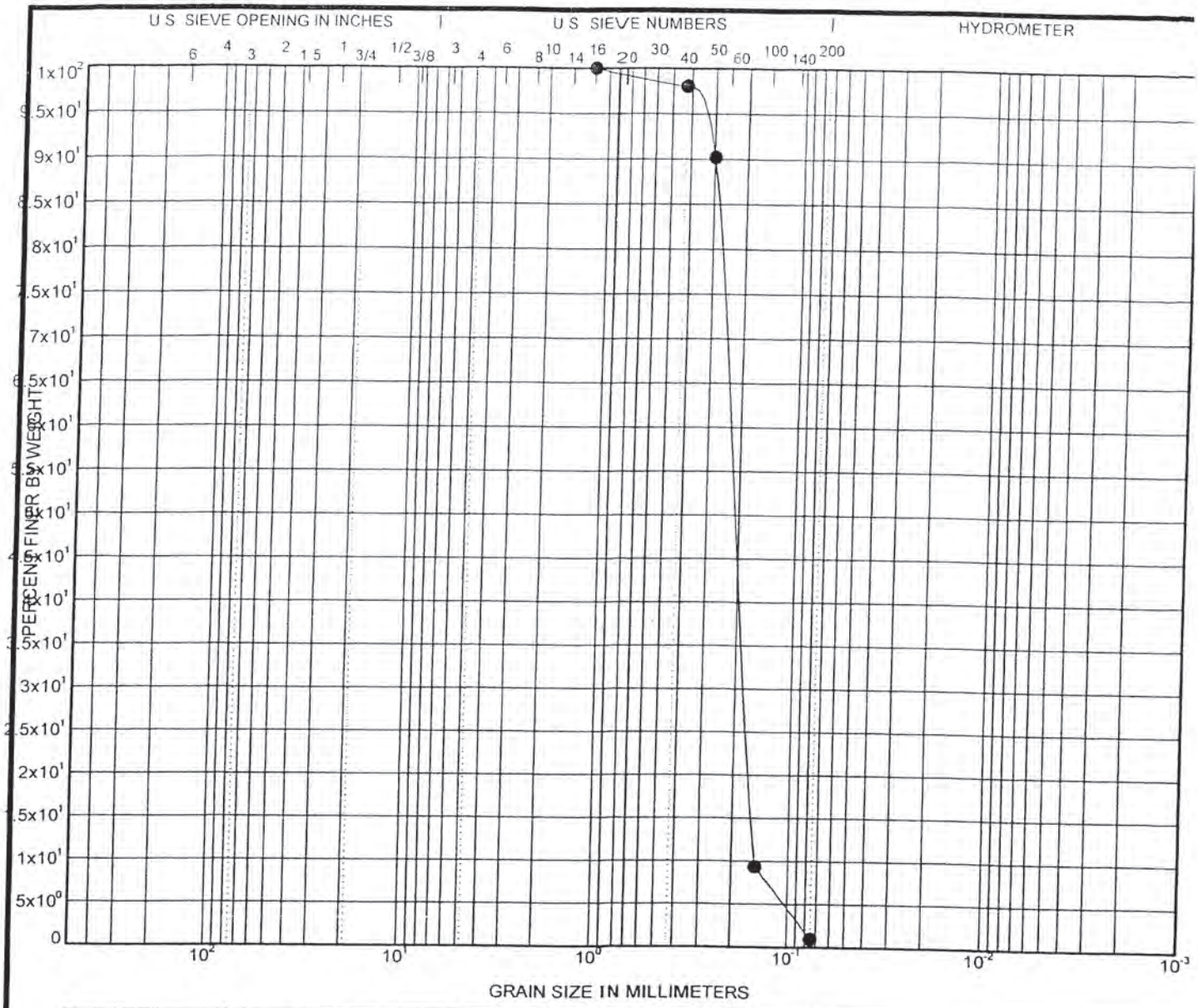
$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

Dmm = K $\sqrt{L/T}$ L is function of (R + meniscus) R'
Dr = ☐ measured ☐ estimated
a =

DISPERSING AGENT:
CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-19	0.30	(SP) Fine SAND, trace silt.				0.92	1.5

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-19	0.30	1.18	0.231	0.179	0.151	0.0	99.0	1.0	

CONESTOGA-ROVERS & ASSOCIATES

GRAIN SIZE DISTRIBUTION

Project Name: East Chicago Site
Project Number: 31532-05
Client: CRA Inc.
Location: East Chicago, Indiana

GRAIN SIZE 31532.GPJ CRA CORP GDT 11/29/04

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PARTICLE-SIZE
ANALYSIS OF SOILS
(ASTM D 422-63)

CLIENT: CRA, Inc. Chicago office LAB NO: 165
PROJECT / SITE: East Chicago Site PROJECT NO: 31532-05

BORING NO: SAMPLE NO: TP-19 DEPTH:
SOIL DESCRIPTION: (SP) Fine SAND, trace silt - brown

APPARATUS:
Balance No: Sieve No: Hydrometer No:
Oven No: 1000ml Cylinder No.: Hydrometer Jar No:

SIEVING

TOTAL DRY WEIGHT: 423.2 g
Weight after washing: 419.4 g
Loss by wash: 3.8 g

WEIGHT OF SAMPLE USED ON PASSING #10:
DRY g
HUMID g
% PASSING #10

	SIEVE SIZE	WEIGHT RETAINED (g)	% RETAINED	% TOTAL PASSING
GRAVEL	3"	0.0	0.0%	100.0%
	1"	0.0	0.0%	100.0%
	3/4"	0.0	0.0%	100.0%
	1/2"	0.0	0.0%	100.0%
	3/8"	0.0	0.0%	100.0%
	#4	0.0	0.0%	100.0%
SAND	#8	0.0	0.0%	100.0%
	#10	0.0	0.0%	100.0%
	#16	0.0	0.0%	100.0%
	#40	8.2	1.9%	98.1%
	#50	33.1	7.8%	90.2%
	#100	342.2	80.9%	9.4%
	#200	35.6	8.4%	1.0%
	pan	0.3	1.0%	0.0%

HYDROMETER

°C	T min	R	δR	R - δR	L	L / T	K	D	P%
	0.5								
	1								
	2								
	5								
	15								
	30								
	60								
	120								
	240								
	480								
	1440								

WATER CONTENT		
CAN No:	18	
Soil wet + Tare	114.0	
Soil dry + Tare	101.8	
Weight water	12.2	
Tare	20.8	
Weight dry soil	81.0	
W%	15.1%	

$$P\% = \frac{(R - \delta R)\, a}{Ms} \times 100$$

$Dmm = K \sqrt{L/T}$ L is function of (R + meniscus) R'

Dr = ☐ measured ☐ estimated

a =

DISPERSING AGENT:

CONCENTRATION: g/L

REMARKS

PERFORMED BY: Dan Kribs DATE: 11/22/2004
CHECKED BY: M. Gentner DATE: 11/28/2004

Permeability Summary
East Chicago Site
CRA Project No. 31532-05

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

Permeability calculated by Hazen's formula $k=(D_{10})^2$				Test results
No.	ID of sample	D_{10}, mm	k, cm/sec	k, cm/sec
1	TP-1, 0.3	0.116	1.3E-02	$1.3x10^{-2}$
2*	TP-2, 0.3		1.0E-03 to 1.0E-04	---
3	TP-3, 0.3	0.109	1.2E-02	---
4	TP-4, 0.3	0.15	2.3E-02	$1.6x10^{-2}$
5	TP-5, 0.3	0.145	2.1E-02	---
6	TP-11, 0.3	0.153	2.3E-02	---
7	TP-15, 0.3	0.083	6.9E-03	---
8	TP-19, 0.3	0.15	2.3E-02	$2.2x10^{-2}$

*Formula not valid for % passing #200 sieve >5%. K value range is estimated.

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PERMEABILITY TEST ON
GRANULAR SOILS
ASTM D 2434

PROJECT: East Chicago Site
LOCATION: East Chicago, Indiana
CLIENT : CRA, Inc (Chicago office)
PROJECT NO.: 31532

SAMPLE DATE: 29-Nov-04
SAMPLE LOCATION: TP-1
SAMPLE No.: Composite
SAMPLE DEPTH: 2-6'
SAMPLED BY: Sean Grady

TEST DATE: 3-Jan-05
TESTED BY: DO
LAB No. : WL 242-1

Description of Soil: (SP) Fine SAND, trace medium to coarse sand and silt

Unit Weight Determination:

Diameter D (cm): 6.3
Area A (cm^2): 31.17
Sample height H (cm): 12.75
Dry weight (g): 578.7

Moisture content during compaction in the cell: 0%
Dry Density (lb/ft^3): 90.9
Ratio of standard Proctor : ---

Distance between Manometer outlets L (cm): 6.5

Permeability Test Results

Test No.	Manometers h_1	Manometers h_2	Head 'h' cm	Q cm^3	t (sec)	Q/At	h/L	Permeability k (cm/sec)
1	26.2	54.3	28.1	300	176	0.0546811	4.3230769	1.3E-02
2	25.2	51.3	26.1	300	190	0.050652	4.0153846	1.3E-02
3	18.7	32.2	13.5	300	342	0.02814	2.0769231	1.4E-02
4	12.5	23.5	11	300	436	0.0220731	1.6923077	1.3E-02

AVERAGE 1.3E-02

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PERMEABILITY TEST ON
GRANULAR SOILS
ASTM D 2434

PROJECT: East Chicago Site
LOCATION: East Chicago, Indiana
CLIENT : CRA, Inc (Chicago office)
PROJECT NO.: 31532

SAMPLE DATE: 29-Nov-04
SAMPLE LOCATION: TP-4
SAMPLE No.: Composite
SAMPLE DEPTH: 0.5-2'
SAMPLED BY: Sean Grady

TEST DATE: 4-Jan-05
TESTED BY: DO
LAB No. : WL 242-2

Description of Soil: (SP) Fine SAND, little medium to coarse sand and gravel, trace silt

Unit Weight Determination:

Diameter D (cm): 6.3
Area A (cm^2): 31.17
Sample height H (cm): 12.75
Dry weight (g): 549.8
Distance between Manometer outlets L (cm): 6.5

Moisture content during compaction in the cell: 0%
Dry Density (lb/ft^3): 86.3
Ratio of standard Proctor : --

Permeability Test Results

Test No.	Manometers h_1	Manometers h_2	Head 'h' cm	Q cm^3	t (sec)	Q/At	h/L	Permeability k (cm/sec)
1	33.3	61.8	28.5	300	125	0.0769911	4.3846154	1.8E-02
2	31.2	55.5	24.3	300	153	0.0629012	3.7384615	1.7E-02
3	26.8	42.1	15.3	300	243	0.0396045	2.3538462	1.7E-02
4	25.3	37.4	12.1	300	320	0.0300746	1.8615385	1.6E-02
5	24.8	35.4	10.6	300	374	0.0257323	1.6307692	1.6E-02
6	23.3	30.9	7.6	200	353	0.0181754	1.1692308	1.6E-02

AVERAGE 1.6E-02

CRA ENGINEERING INC.
GEOTECHNICAL GROUP

PERMEABILITY TEST ON
GRANULAR SOILS
ASTM D 2434

PROJECT: East Chicago Site
LOCATION: East Chicago, Indiana
CLIENT : CRA, Inc (Chicago office)
PROJECT NO.: 31532

SAMPLE DATE: 29-Nov-04
SAMPLE LOCATION: TP-19
SAMPLE No.: Composite
SAMPLE DEPTH: 1-6'
SAMPLED BY: Sean Grady

TEST DATE: 4-Jan-05
TESTED BY: DO
LAB No. : WL 242-3

Description of Soil: (SP) Fine SAND, trace silt

Unit Weight Determination:

Diameter D (cm): 6.3
Area A (cm^2): 31.17
Sample height H (cm): 12.75
Dry weight (g): 602.5
Distance between Manometer outlets L (cm): 6.5

Moisture content during compaction in the cell: 0%
Dry Density (lb/ft^3): 94.6
Ratio of standard Proctor : ---

Permeability Test Results

Test No.	Manometers h_1	Manometers h_2	Head 'h' cm	Q cm^3	t (sec)	Q/At	h/L	Permeability k (cm/sec)
1	35.1	60.9	25.8	300	105	0.091656	3.9692308	2.3E-02
2	33.4	55.8	22.4	300	123	0.0782429	3.4461538	2.3E-02
3	27.9	42.5	14.6	300	202	0.047643	2.2461538	2.1E-02
4	25.8	36.4	10.6	300	283	0.0340066	1.6307692	2.1E-02
5	25.0	34.5	9.5	350	377	0.0297821	1.4615385	2.0E-02
6	23.8	30.0	6.2	300	455	0.0211514	0.9538462	2.2E-02

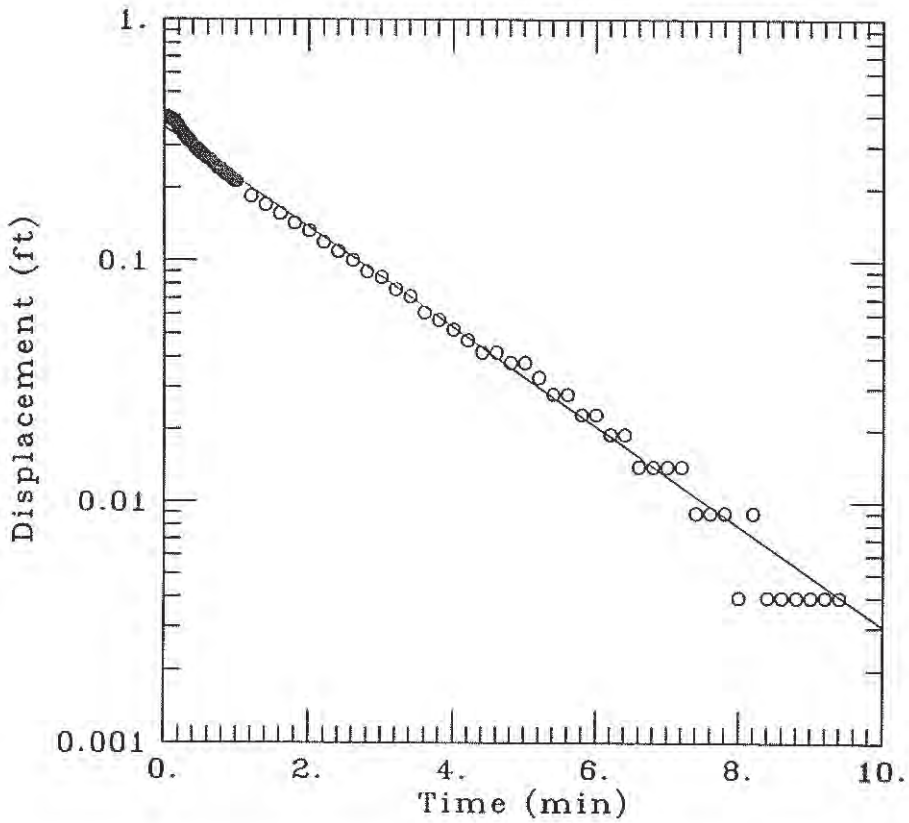
AVERAGE 2.2E-02

Appendix F
Historical Aquifer Testing, Gauging Data, and Contours

CITGO Terminal Aquifer Testing

Natural Resource Technology	Client: Citgo East Chicago Terminal
Project No.: 1195	Location: East Chicago, IN

MW-1



DATA SET:
mw1.dat
02/26/97

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST WELL:
MW-1

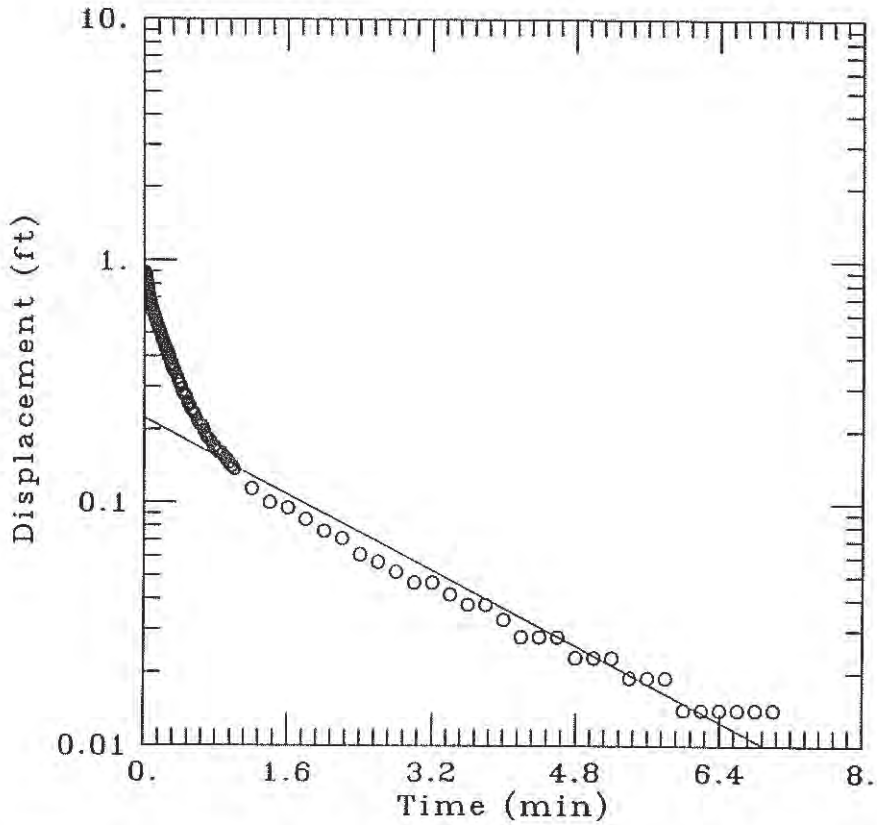
OBS. WELL:
MW-1

ESTIMATED PARAMETERS:
K = 0.00153 ft/min
y0 = 0.3579 ft

TEST DATA:
H0 = 0.395 ft
rc = 0.17 ft
rw = 0.42 ft
L = 10. ft
b = 10. ft
H = 9.5 ft

Natural Resource Technology	Client: Citgo East Chicago Terminal
Project No.: 1195	Location: East Chicago, IN

MW-2



DATA SET:
mw2.dat
02/26/97

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST WELL:
MW-2

OBS. WELL:
MW-2

ESTIMATED PARAMETERS:
K = 0.001444 ft/min
y0 = 0.2225 ft

TEST DATA:
H0 = 0.891 ft
rc = 0.17 ft
rw = 0.42 ft
L = 10. ft
b = 10. ft
H = 9.5 ft

HORIZONTAL HYDRAULIC GRADIENT CALCULATIONS

Site:	CITGO East Chicago Terminal	Prepared by:	TEM
Project:	CITGO East Chicago Terminal	Checked by:	KMJ
Project #:	1195	Page:	1 of 1

Hydraulic Gradient = dh/dL
dh=change in elevation between two chosen water table or piezometric surface elevation contours on a given date.
dL=change in distance between two chosen water table or piezometric surface elevation contours on a given date.

Water Table Observation Wells

26-Dec-96

$$dh/dL = \frac{dh = 93.80 \text{ feet} - 93.60 \text{ feet}}{dL = 45 \text{ feet}} = 4.4E\text{-}03 \text{ west-northwest}$$

Notes: Horizontal hydraulic gradient is a unitless value.

GROUNDWATER AVERAGE LINEAR VELOCITY CALCULATIONS

Site: CITGO East Chicago Terminal, East Chicago, Indiana
Project: CITGO East Chicago Terminal
Project #: 1195

WATER TABLE MONITORING WELLS

Monitoring Well	Hydraulic Conductivity (K) feet/minute	K (cm/sec)	V=Ki / n (feet/minute)	V=Ki / n (feet/year)
MW-1	1.5E-03	7.8E-04	3.4E-05	1.8E+01
MW-2	1.4E-03	7.3E-04	3.2E-05	1.7E+01
MW-3	2.3E-03	1.2E-03	5.2E-05	2.7E+01
Geometric mean:	1.73E-03 (ft/min)	8.79E-04 (cm/sec)		

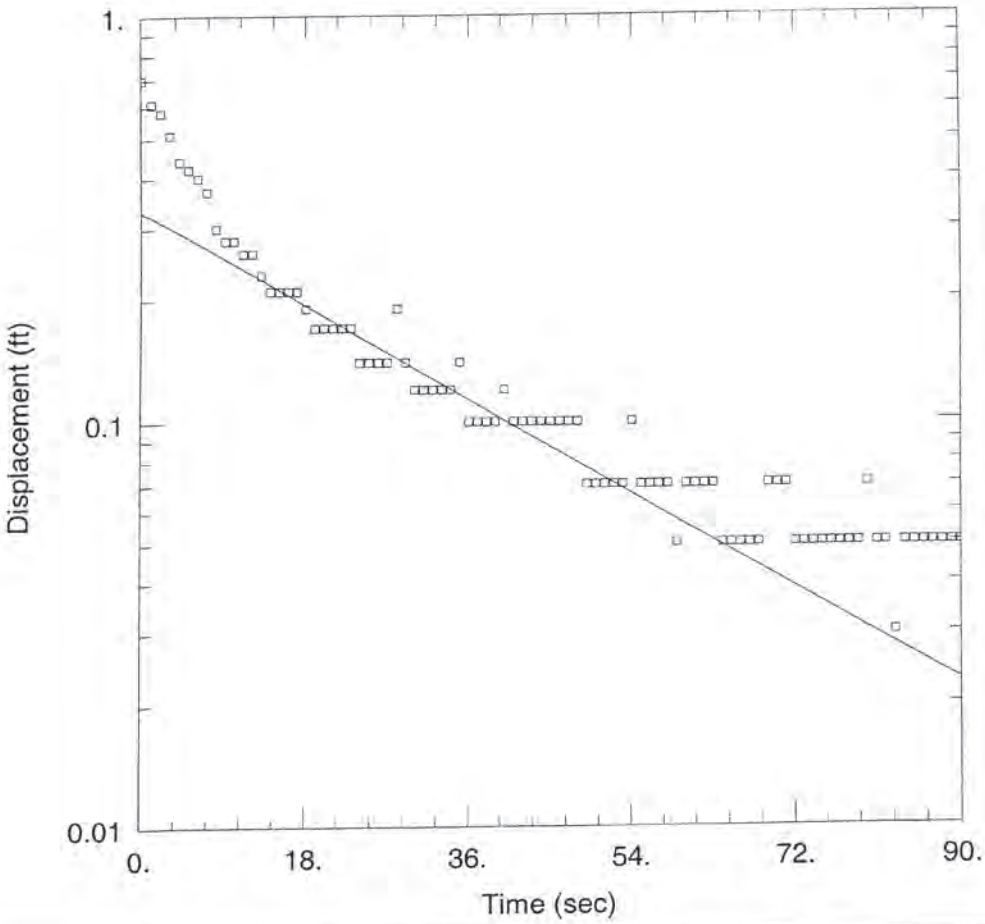
Average linear velocity - monitoring wells

3.8E-05 (ft/min) 2.0E-05 (cm/sec)	2.0E+01 feet/year

$V = K i / n$

V = Groundwater Velocity
K = Hydraulic Conductivity
i = gradient (unitless)
n = 20% = estimate of average porosity

Former Cities Refinery Aquifer Testing



MW-1A TEST-1

Data Set: U:\31532PRN\mw1at1.aqt
Date: 03/08/07
Time: 14:41:46

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-1A
Test Date: 3/2/07

AQUIFER DATA

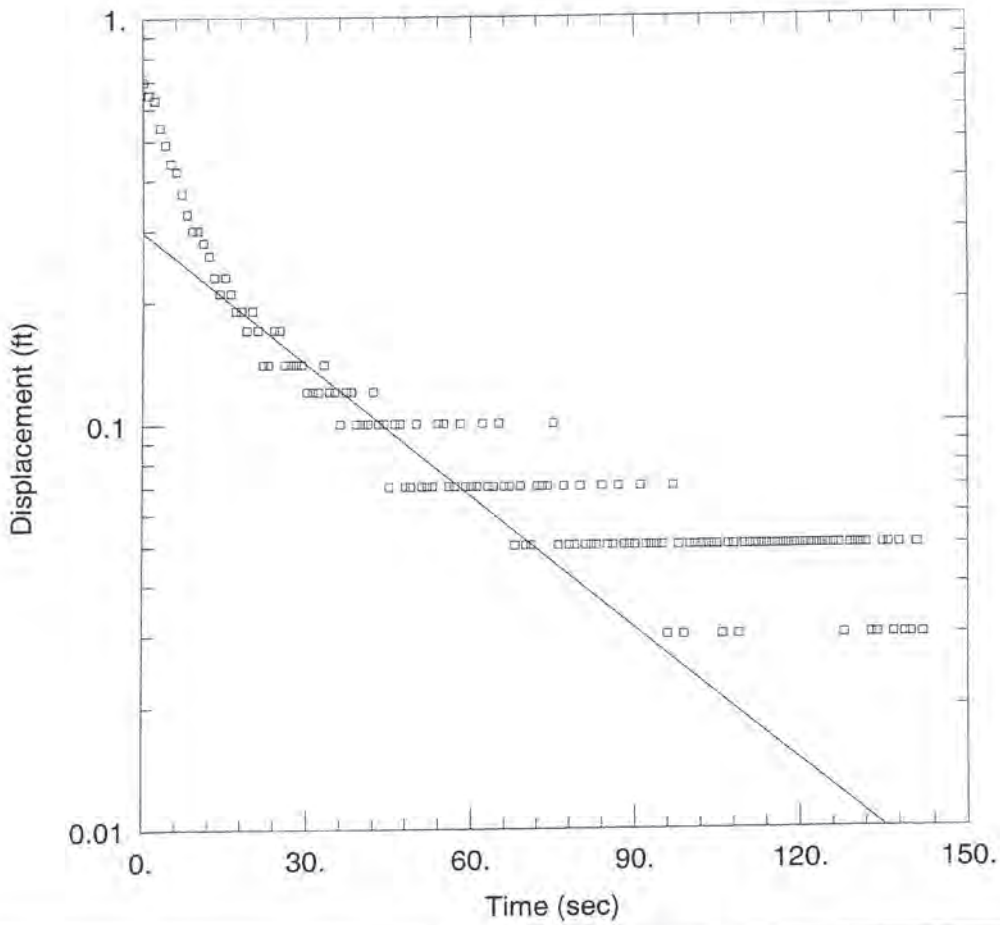
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-1A)

Initial Displacement: 0.7 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0003138 cm/sec
y0 = 0.3311 ft



MW-1A TEST-2

Data Set: U:\31532PRN\mw1at2.aqt
Date: 03/08/07 Time: 14:54:08

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-1A
Test Date: 3/2/07

AQUIFER DATA

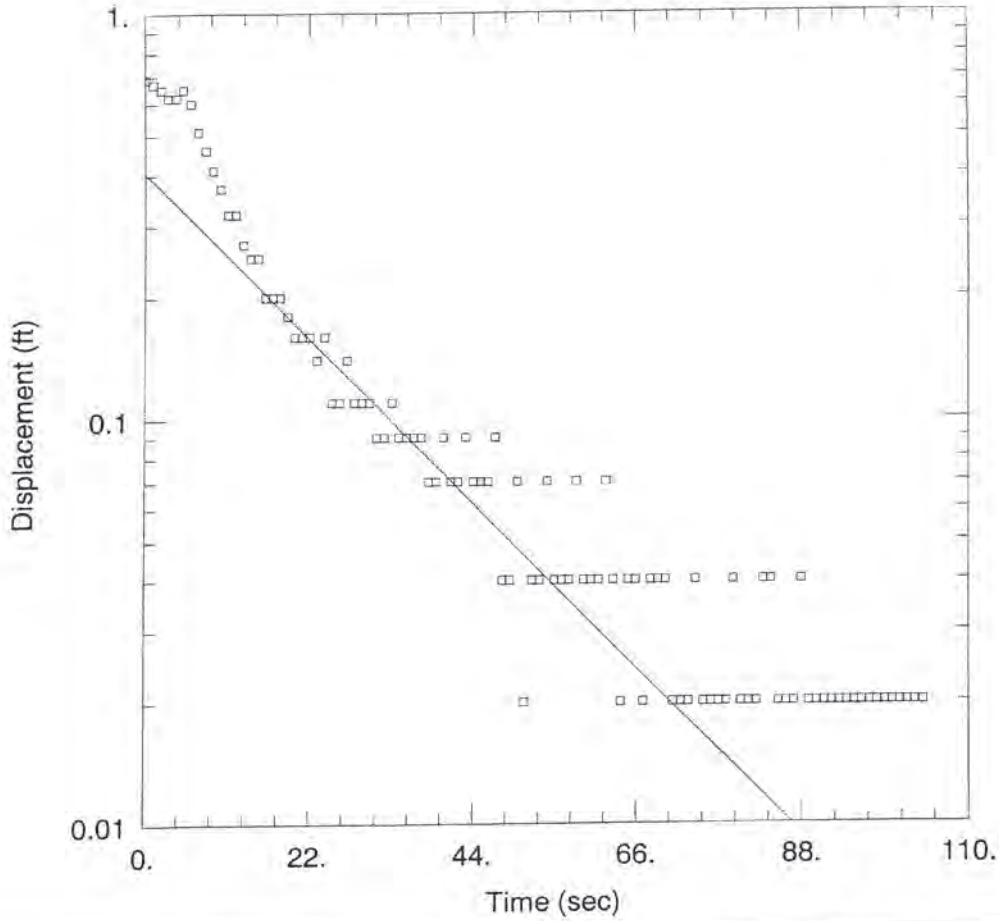
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-1A)

Initial Displacement: 0.7 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002639 cm/sec
y0 = 0.2969 ft



MW-1A TEST-3

Data Set: U:\31532PRN\mw1at3.aqt
Date: 03/08/07 Time: 14:57:53

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-1A
Test Date: 3/2/07

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

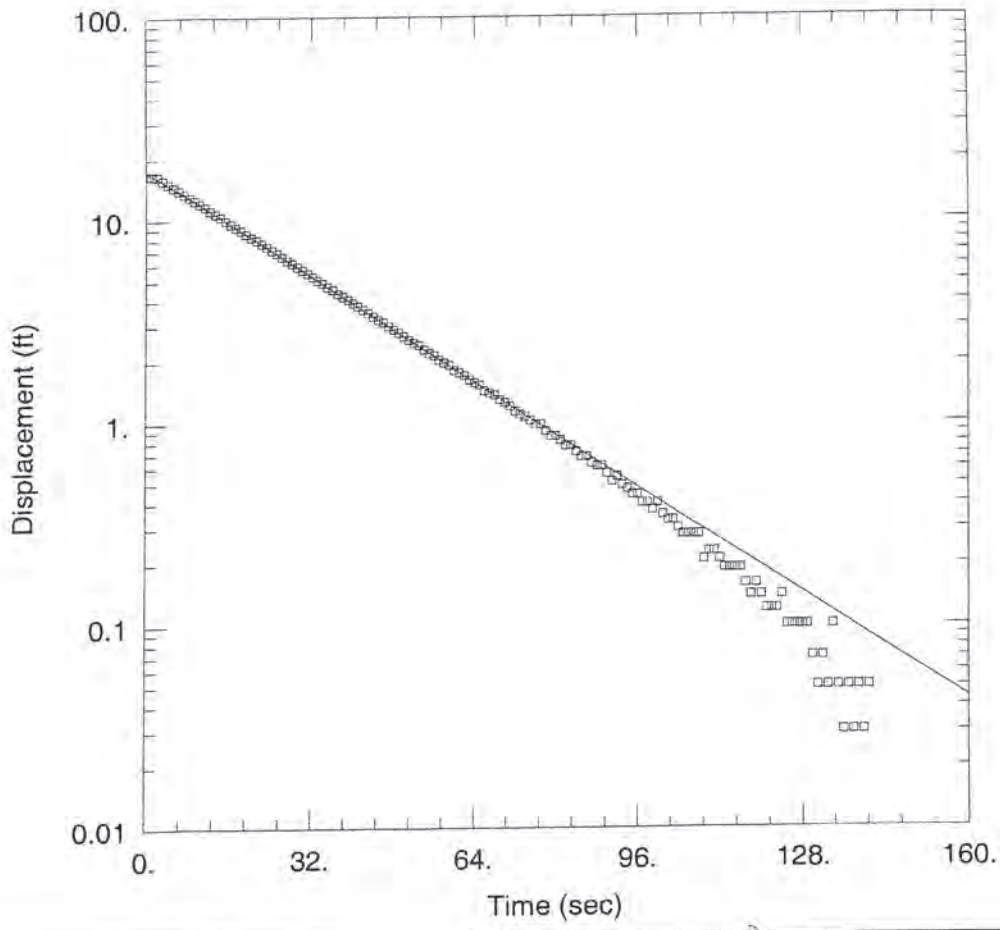
WELL DATA (CRA-MW-1A)

Initial Displacement: 0.69 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004494 cm/sec 4.49×10^{-4}
y0 = 0.4033 ft



MW-1B TEST-2 - Deep

Data Set: U:\31532PRN\mw1bt2.aqt
Date: 03/07/07 Time: 16:07:42

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-1B
Test Date: 3/2/07

AQUIFER DATA

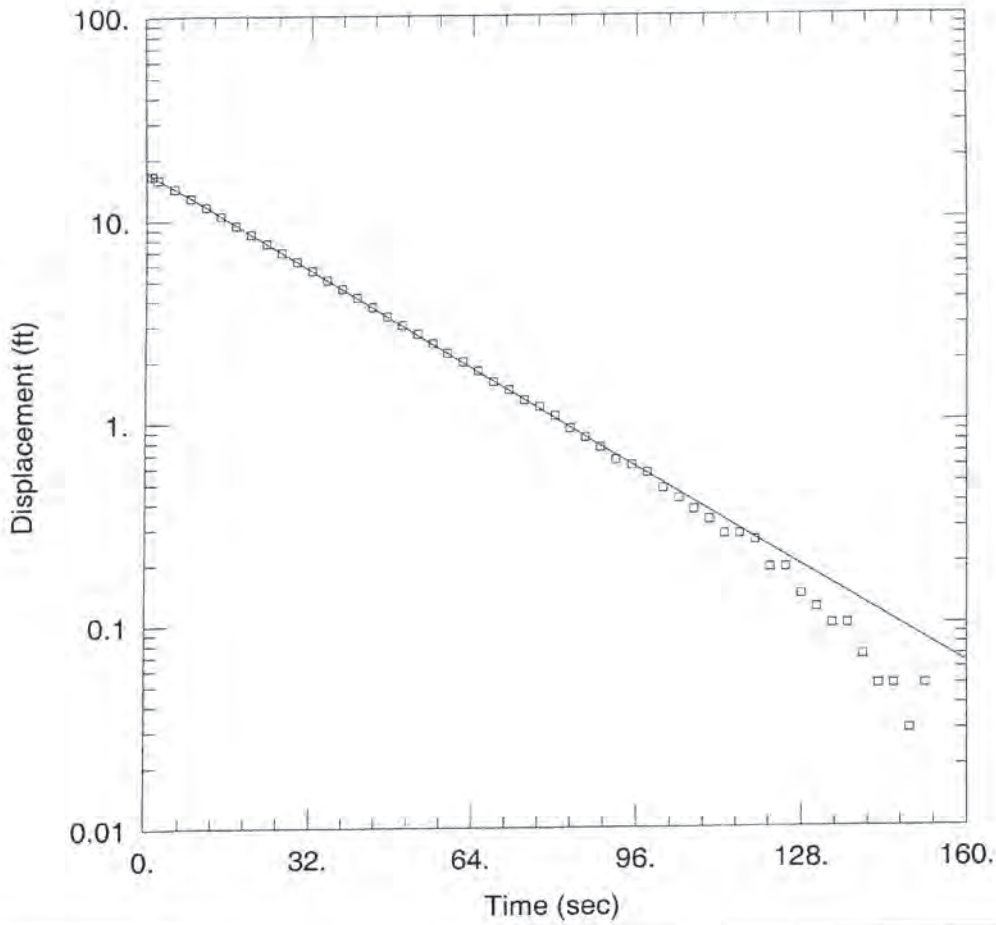
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-1B)

Initial Displacement: 16.63 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.042 ft
Static Water Column Height: 30. ft
Screen Length: 5. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0009822 cm/sec 9.8x10^-4
y0 = 17.43 ft



MW-1B TEST-3

Data Set: U:\31532PRN\mw1bt3.aqt
Date: 03/07/07 Time: 16:05:31

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-1B
Test Date: 3/2/07

AQUIFER DATA

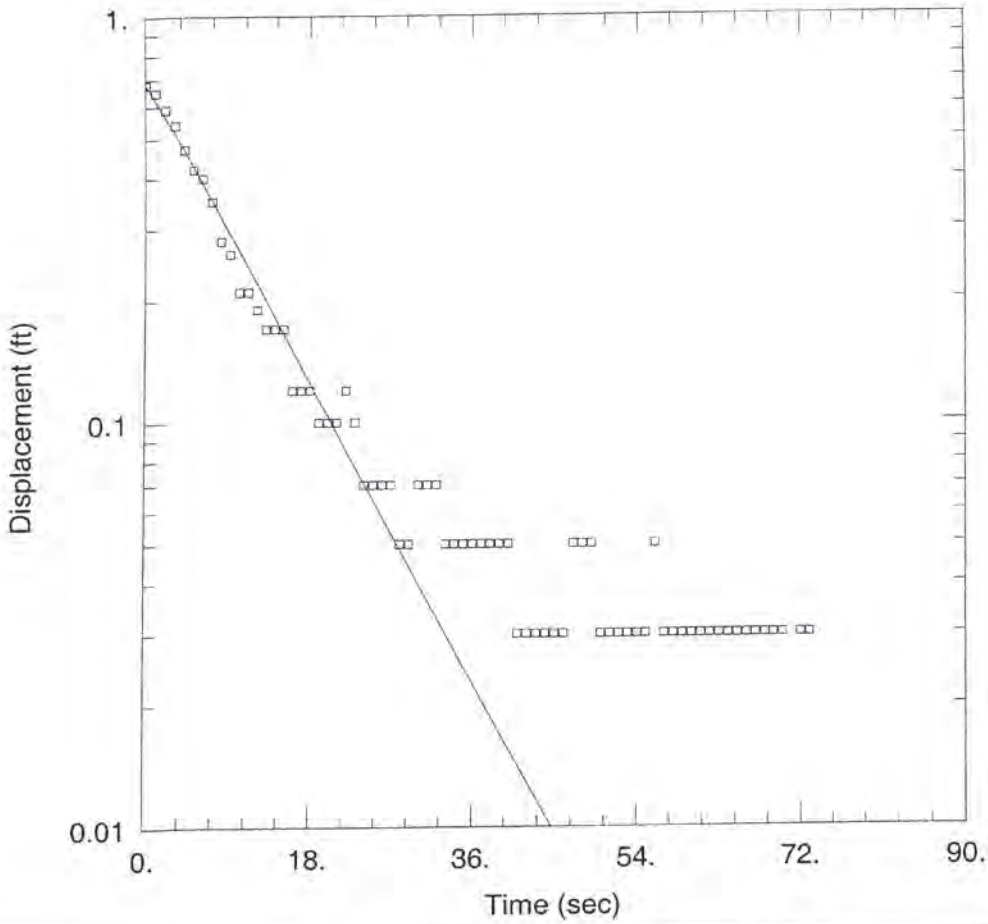
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-1B)

Initial Displacement: 16.61 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.042 ft
Static Water Column Height: 30. ft
Screen Length: 5. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0009168 cm/sec 9.1×10^{-4}
y0 = 17.09 ft



MW-2A TEST-1

Data Set: U:\31532PRN\mw2at1.aqt
Date: 03/07/07 Time: 16:03:31

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2A
Test Date: 3/2/07

AQUIFER DATA

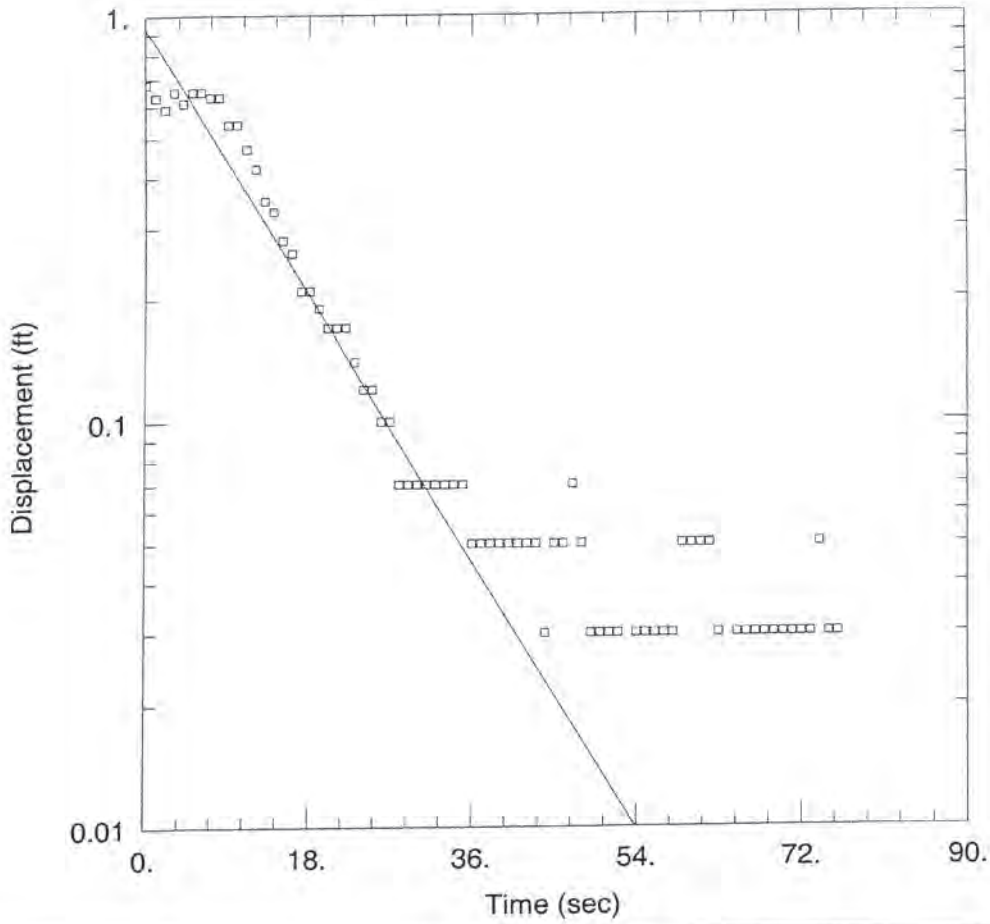
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-2A)

Initial Displacement: 0.68 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.000995 cm/sec 9.95x10^-4
y0 = 0.6818 ft



MW-2A TEST-2

Data Set: U:\31532PRN\mw2at2.aqt
Date: 03/08/07
Time: 14:38:17

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2A
Test Date: 3/2/07

AQUIFER DATA

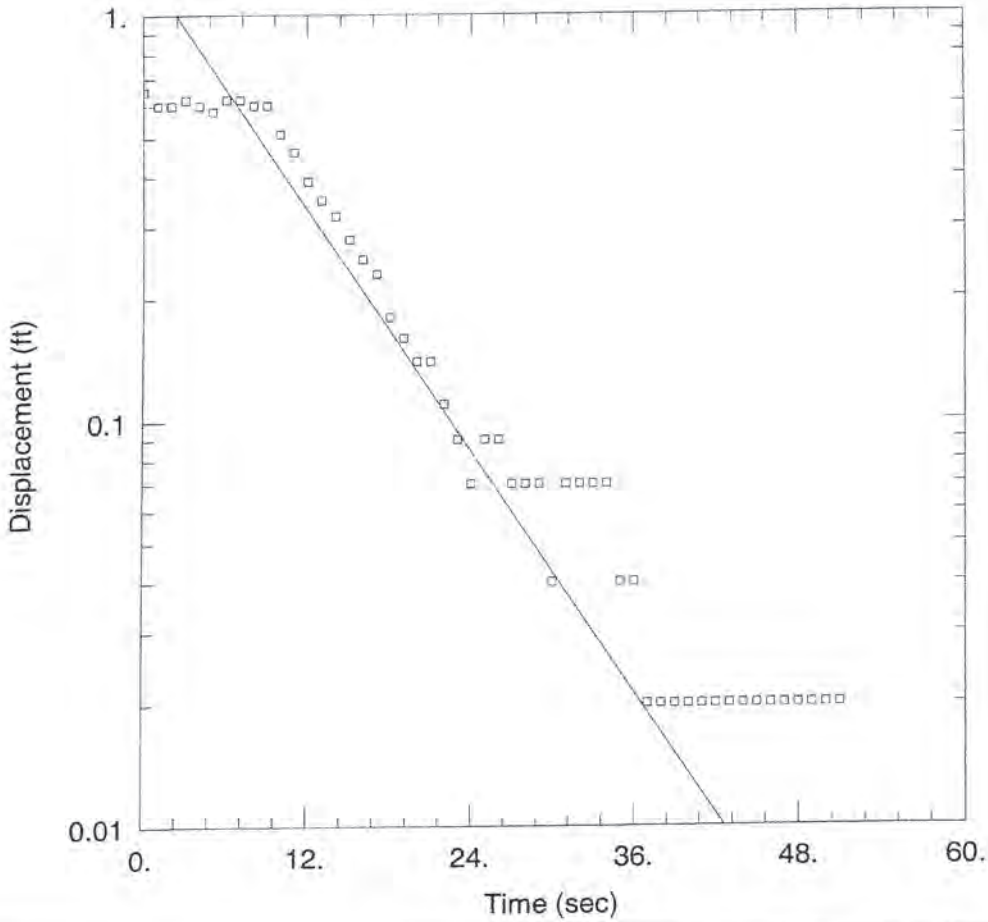
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-2A)

Initial Displacement: 0.68 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0008862 cm/sec
y0 = 0.9261 ft



MW-2A TEST-3

Data Set: U:\31532PRN\mw2at3.aqt
Date: 03/08/07 Time: 14:40:34

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2A
Test Date: 3/2/07

AQUIFER DATA

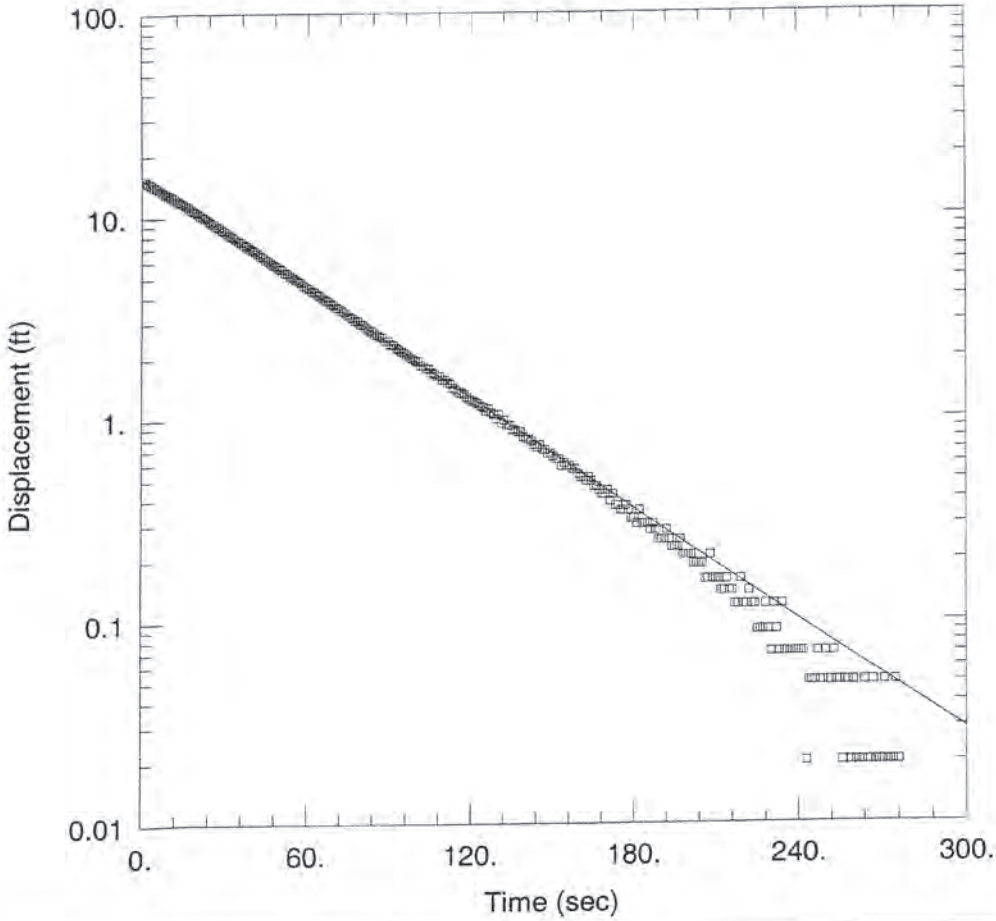
Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-2A)

Initial Displacement: 0.65 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.042 ft
Static Water Column Height: 10. ft
Screen Length: 10. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001206 cm/sec 1.2×10^{-3}
y0 = 1.305 ft



MW-2B TEST-1

Data Set: U:\31532PRN\mw2bt1.aqt
Date: 03/07/07 Time: 15:52:47

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2B
Test Date: 3/2/07

AQUIFER DATA

Saturated Thickness: 35. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-2B)

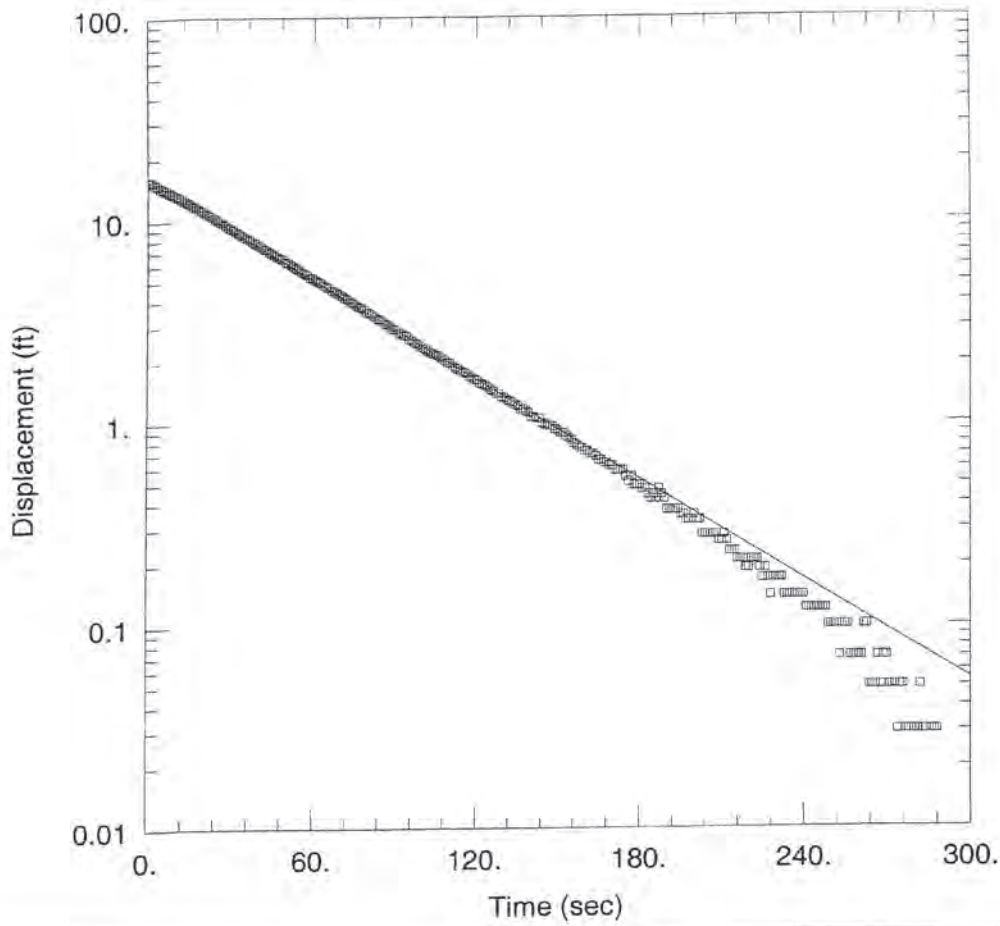
Initial Displacement: 15.12 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.042 ft

Static Water Column Height: 30. ft
Screen Length: 5. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
K = 0.0005498 cm/sec 5.5×10^{-4}

Solution Method: Bouwer-Rice
y0 = 15.51 ft



MW-2B TEST-2

Data Set: U:\31532PRN\mw2bt2.aqt
Date: 03/07/07
Time: 15:51:30

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2B
Test Date: 3/2/07

AQUIFER DATA

Saturated Thickness: 35. ft
Anisotropy Ratio (Kz/Kr): 1.

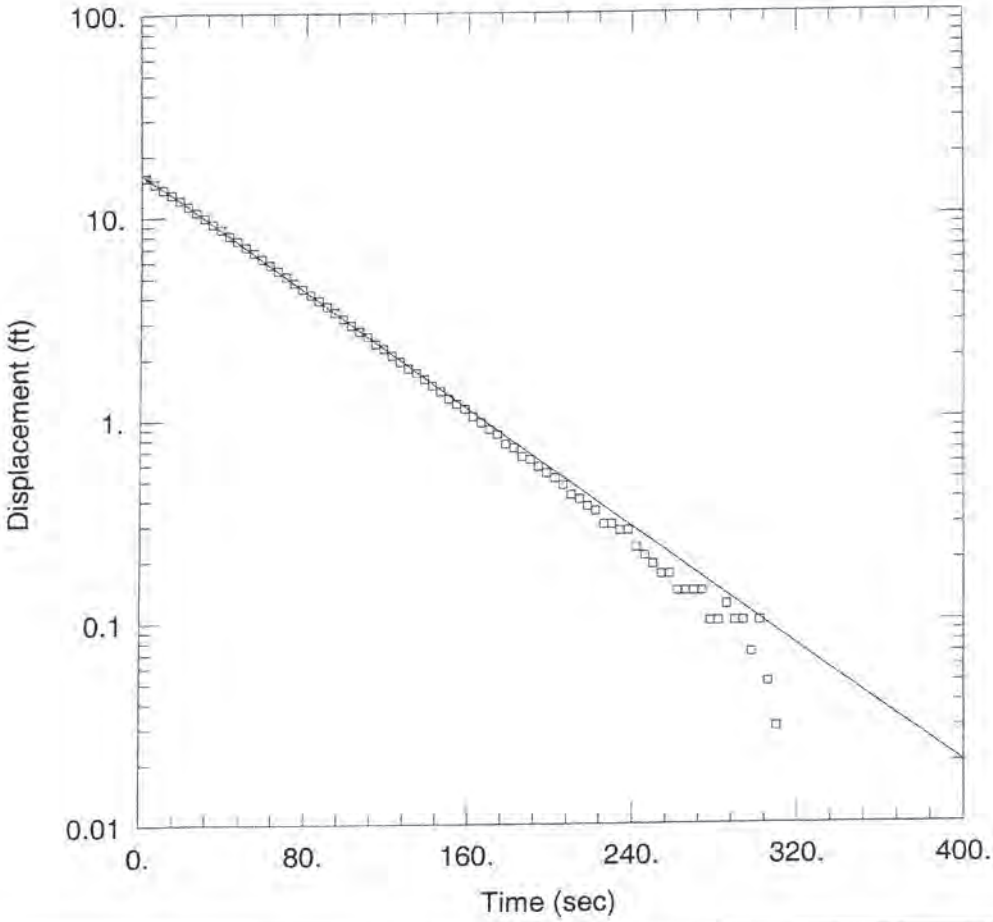
WELL DATA (CRA-MW-2B)

Initial Displacement: 15.7 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.042 ft
Static Water Column Height: 32. ft
Screen Length: 5. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000497 cm/sec
4.97×10^{-4}
y0 = 15.88 ft



MW-2B TEST-3

Data Set: U:\31532PRN\mw2bt3.aqt
Date: 03/07/07 Time: 15:49:36

PROJECT INFORMATION

Company: CRA
Client: Glenn Springs Holding Inc.
Project: 031532
Location: East Chicago, Indiana
Test Well: MW-2B
Test Date: 3/2/07

AQUIFER DATA

Saturated Thickness: 35. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (CRA-MW-2B)

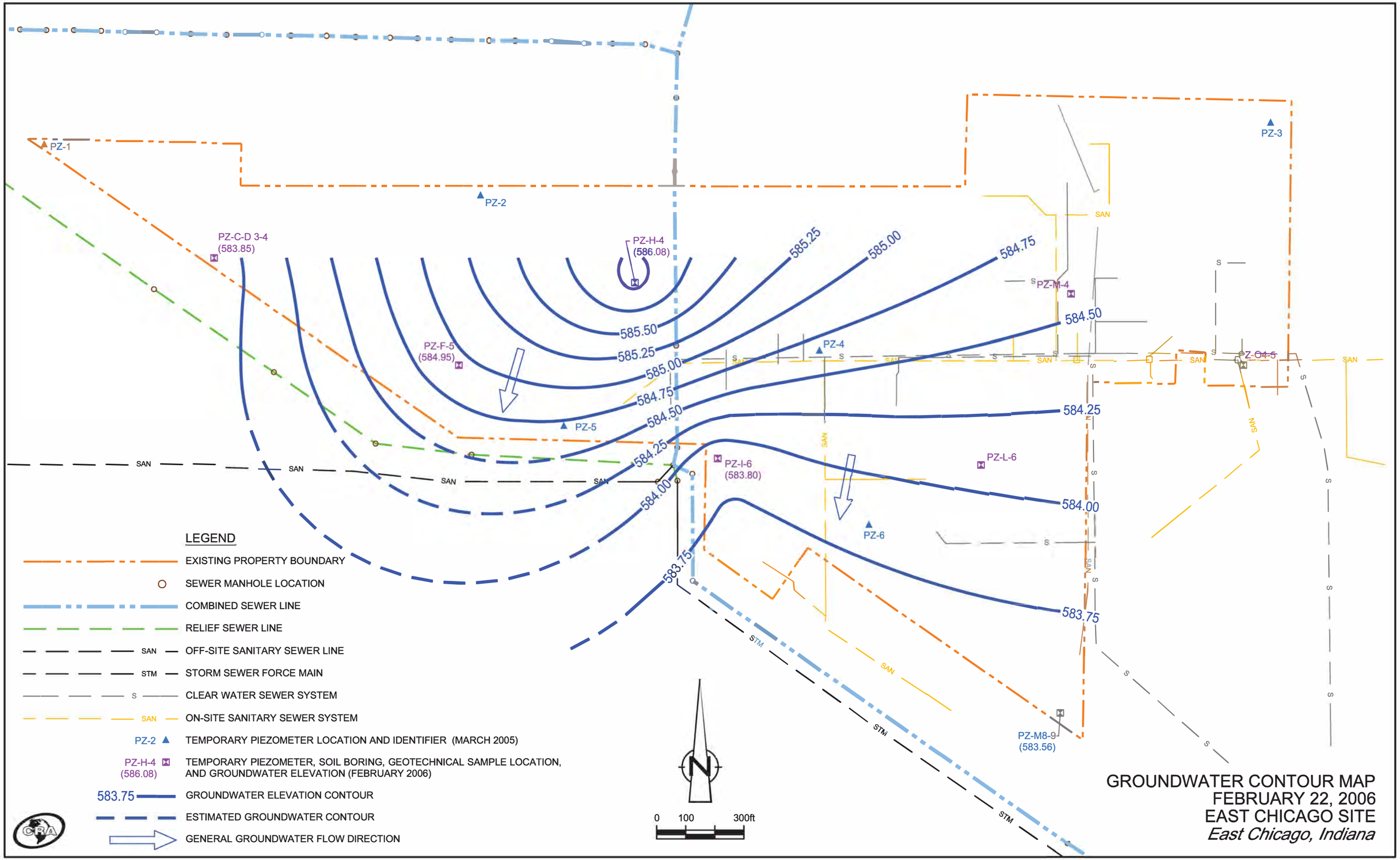
Initial Displacement: 15.68 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.042 ft
Static Water Column Height: 30. ft
Screen Length: 5. ft
Wellbore Radius: 0.042 ft
Gravel Pack Porosity: 0.4

SOLUTION

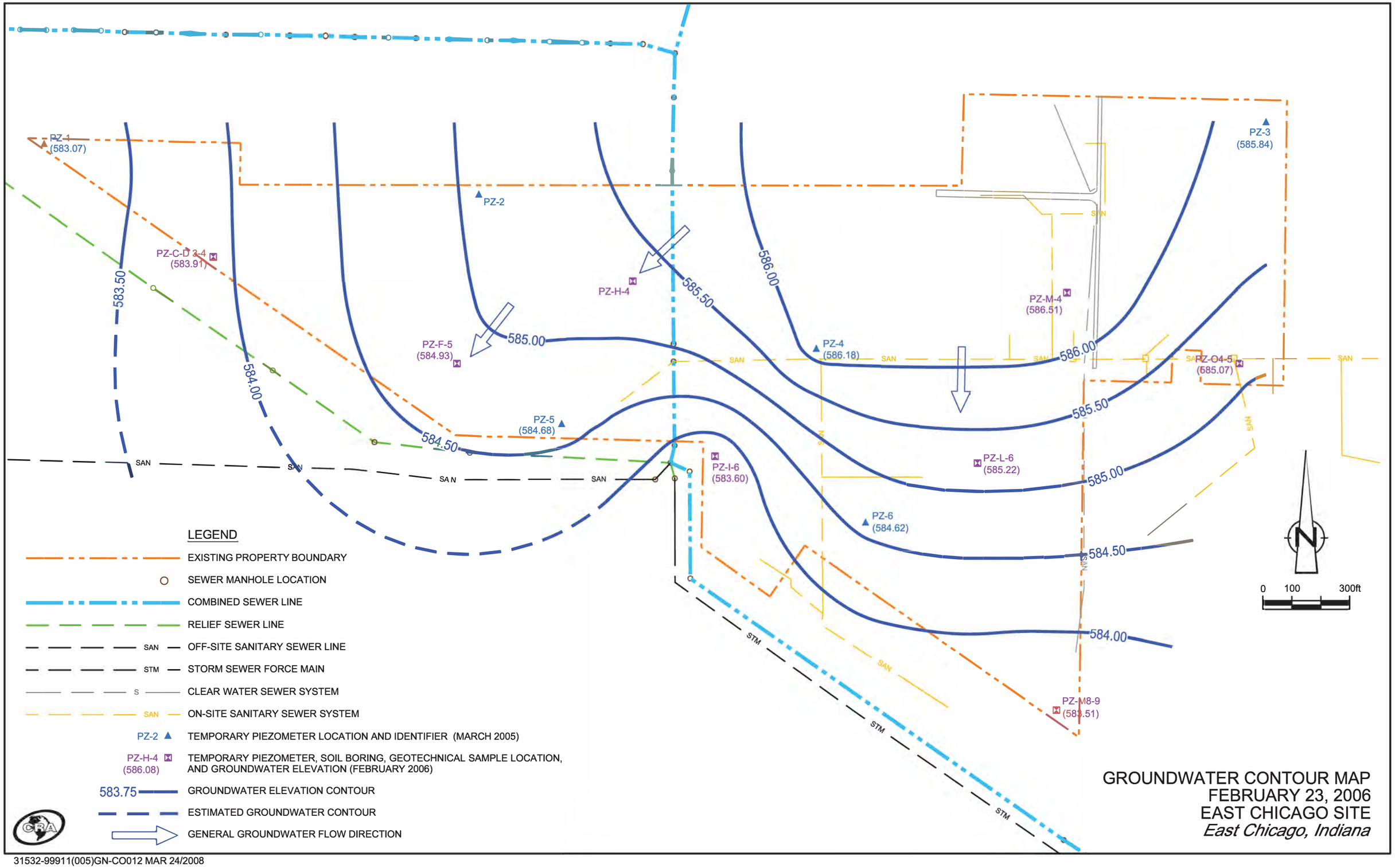
Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0004397 cm/sec 4.4×10^{-4} y0 = 16.2 ft

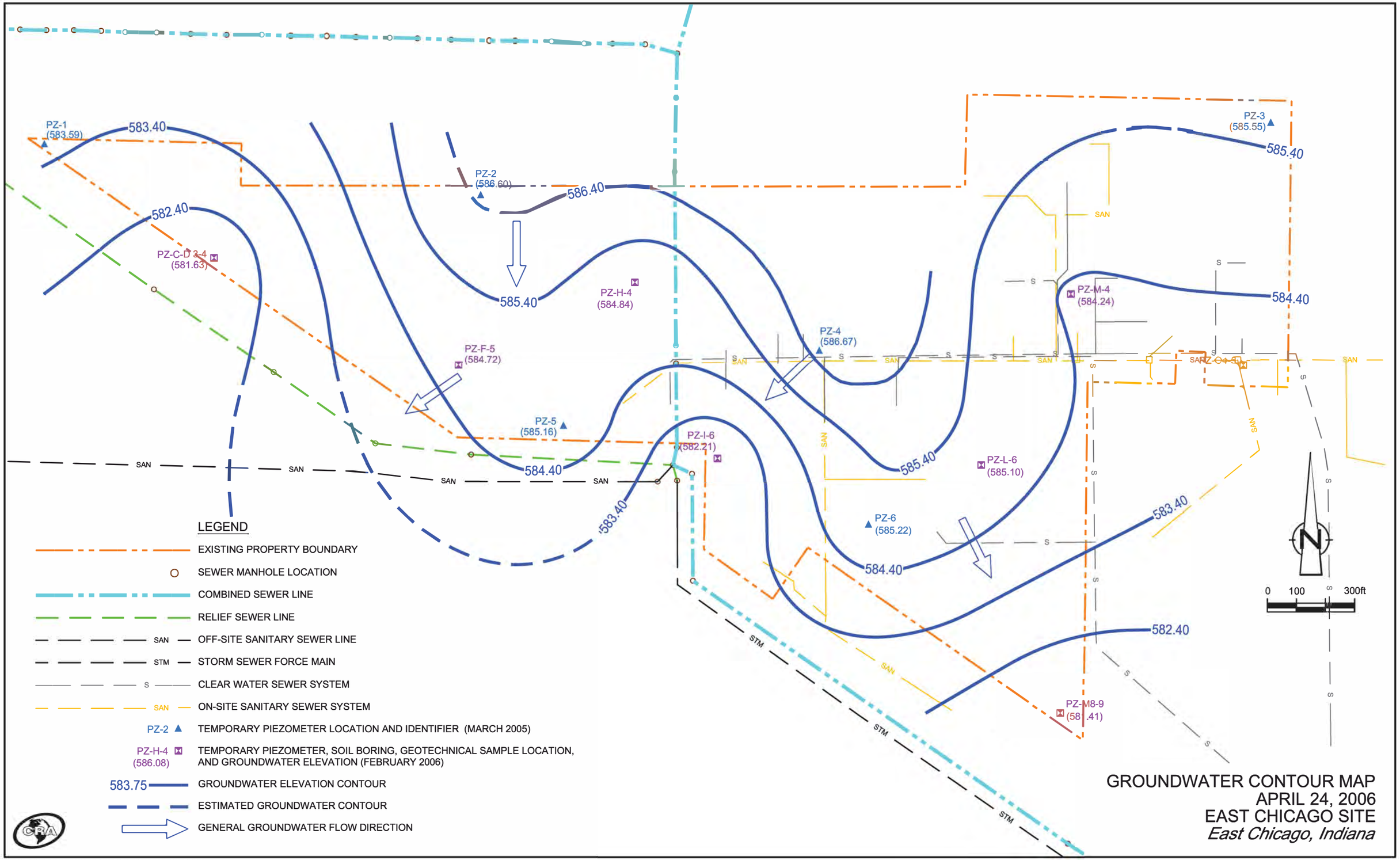
Historical Groundwater Contour Figures



31532-99911(005)GN-CO011 APR 02/2008

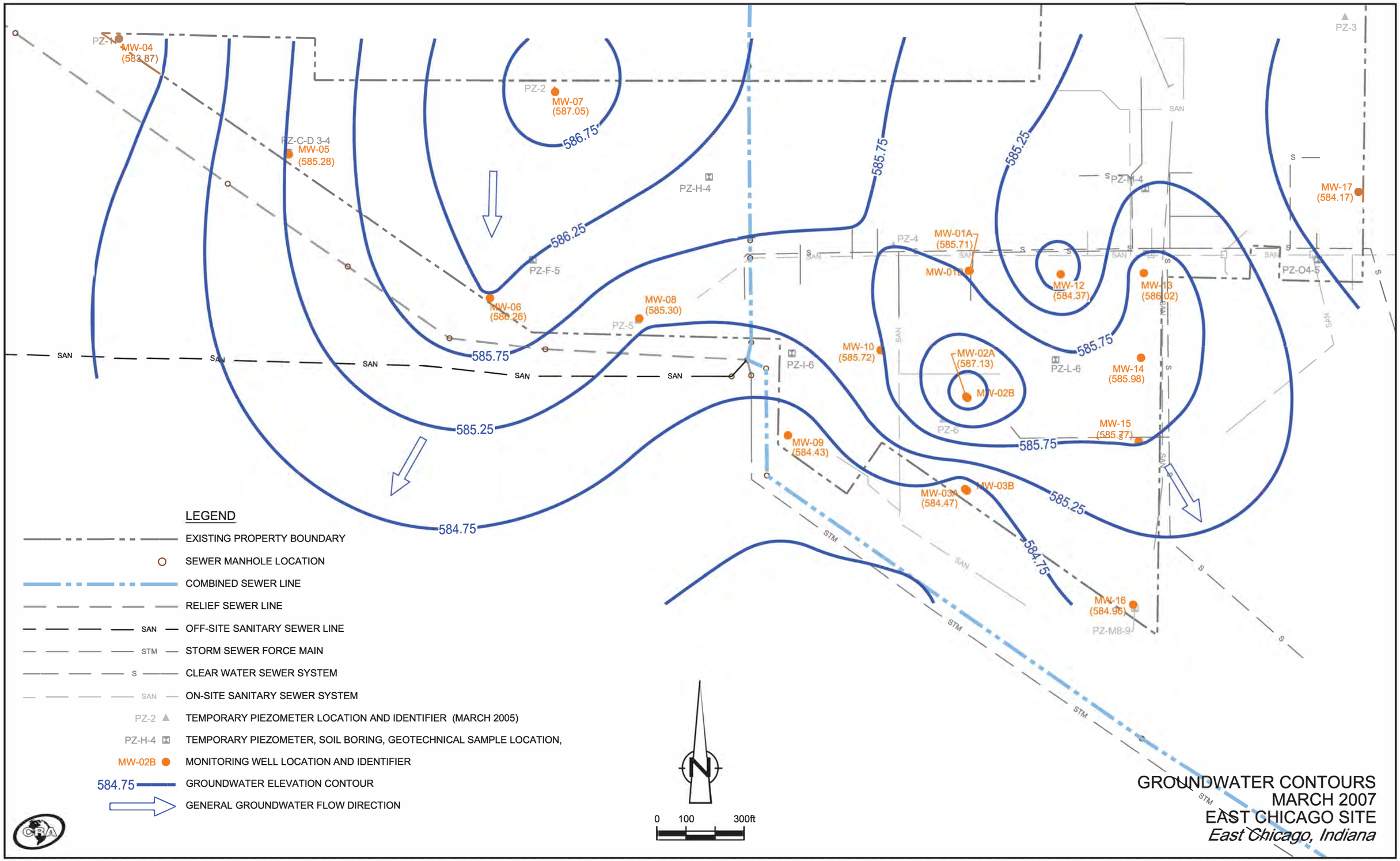


31532-99911(005)GN-CO012 MAR 24/2008



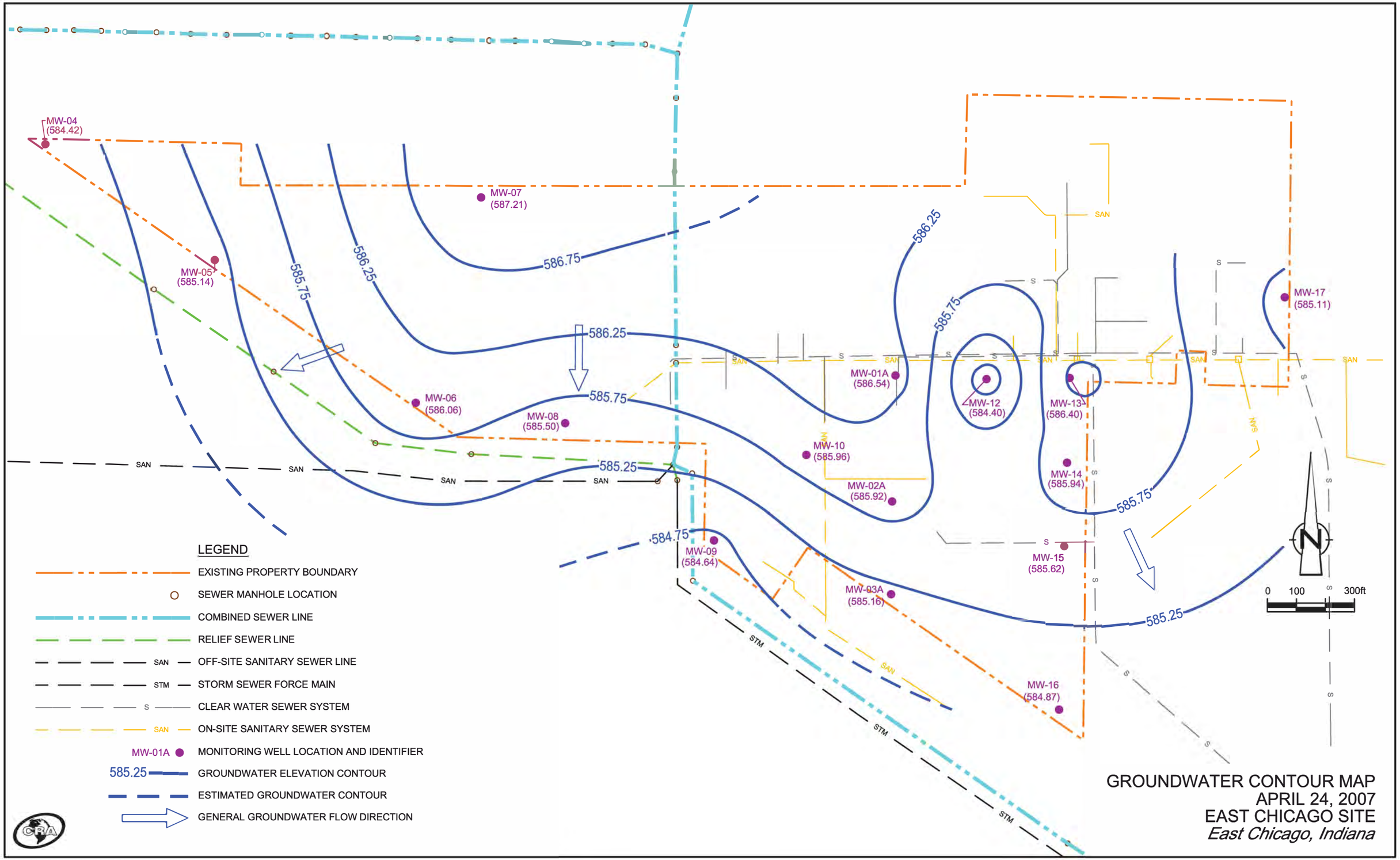
GROUNDWATER CONTOUR MAP
APRIL 24, 2006
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO013 MAY 21/2008



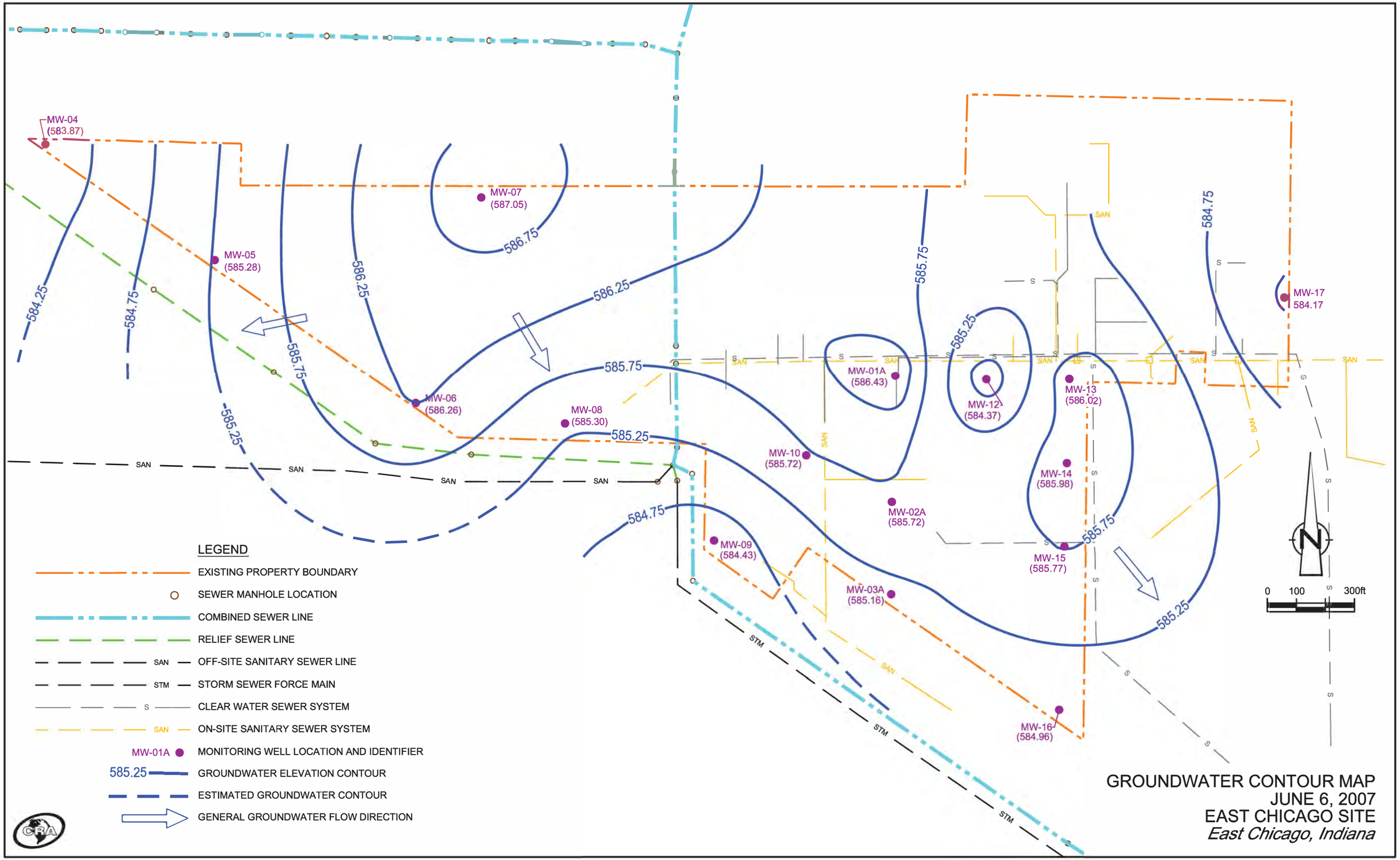
GROUNDWATER CONTOURS
MARCH 2007
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO014 MAY 21/2008



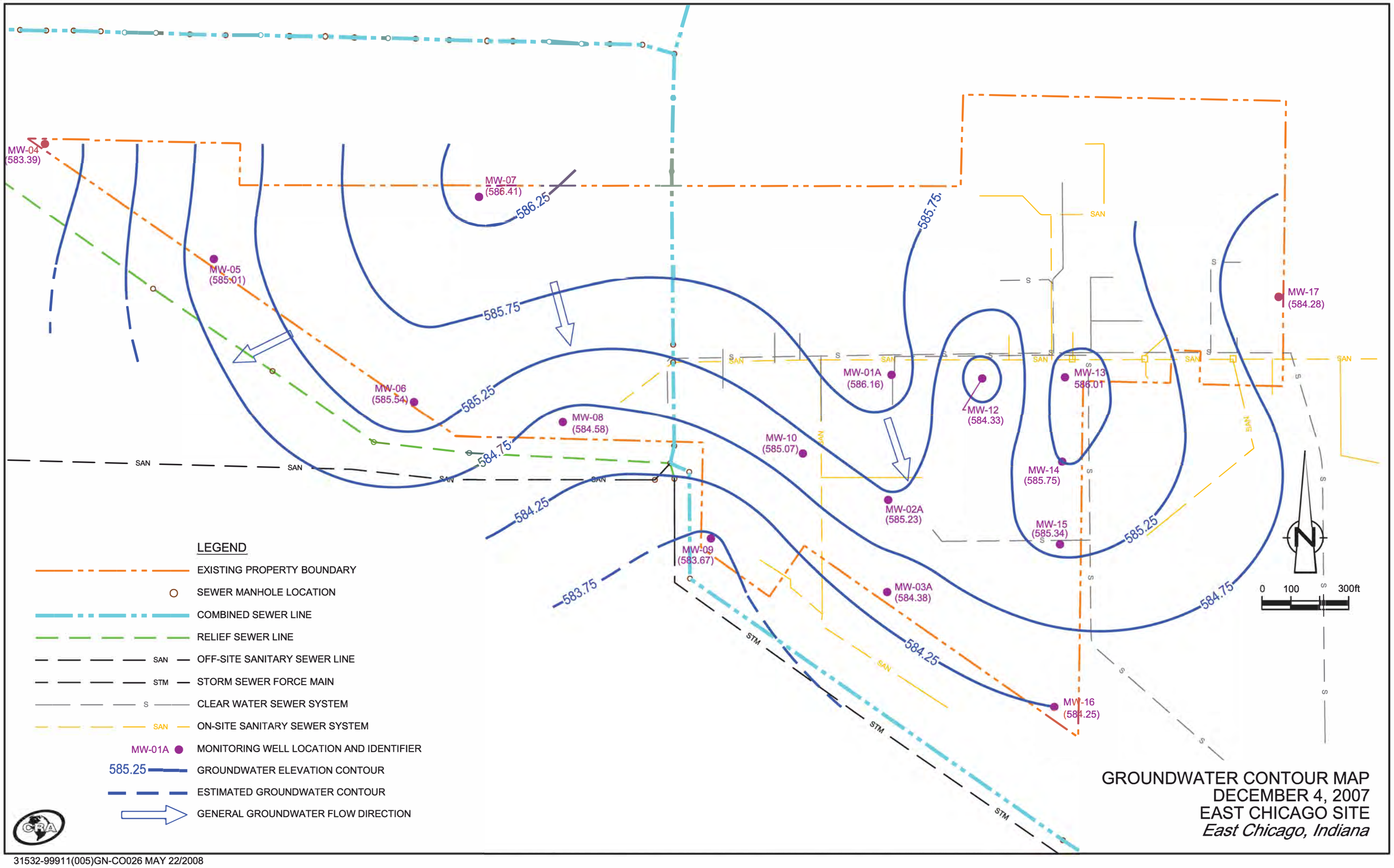
GROUNDWATER CONTOUR MAP
APRIL 24, 2007
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO024 MAY 21/2008



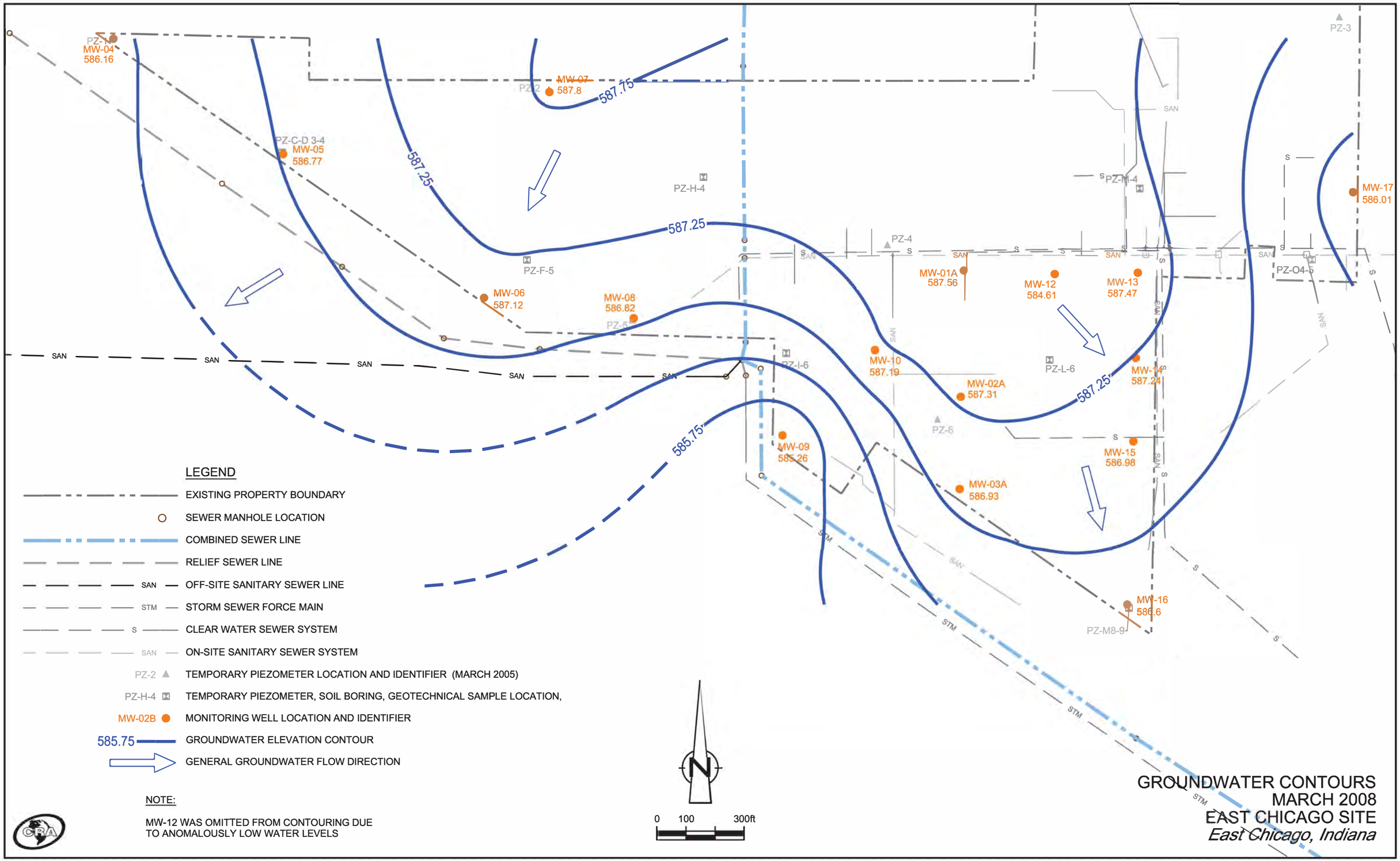
GROUNDWATER CONTOUR MAP
JUNE 6, 2007
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO025 APR 14/2008

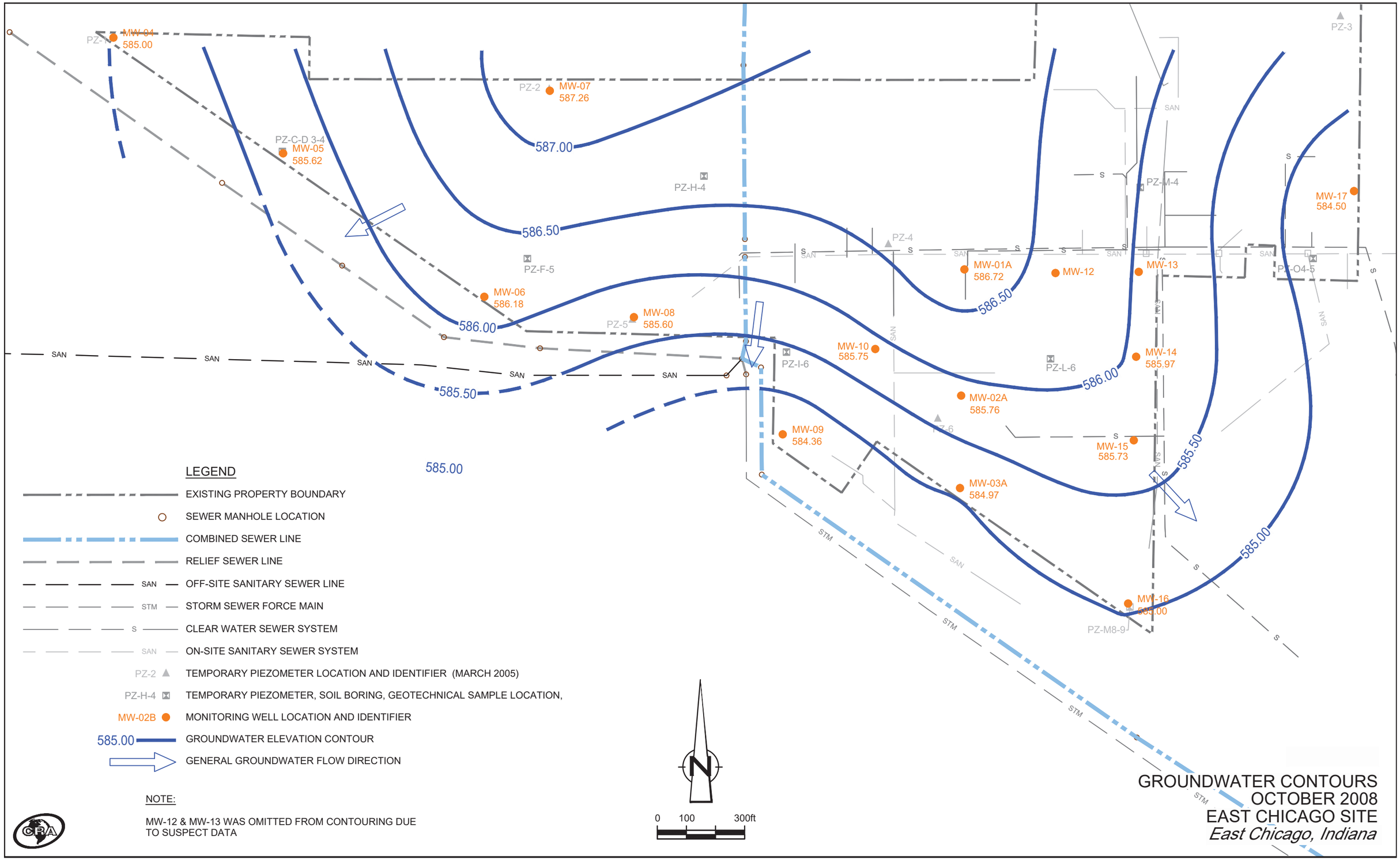


GROUNDWATER CONTOUR MAP
DECEMBER 4, 2007
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO026 MAY 22/2008

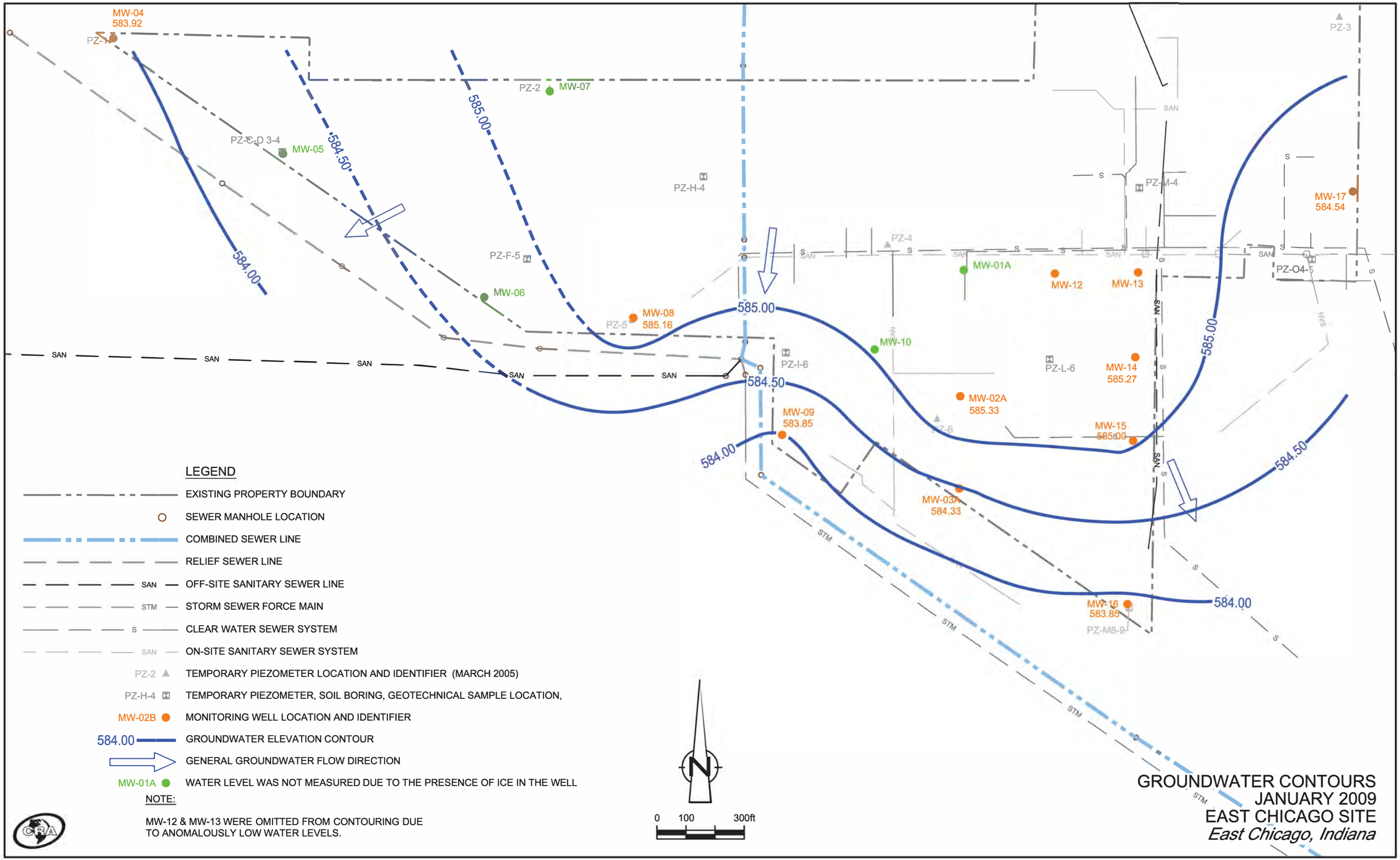


31532-99911(005)GN-CO027 JUL 15/2008

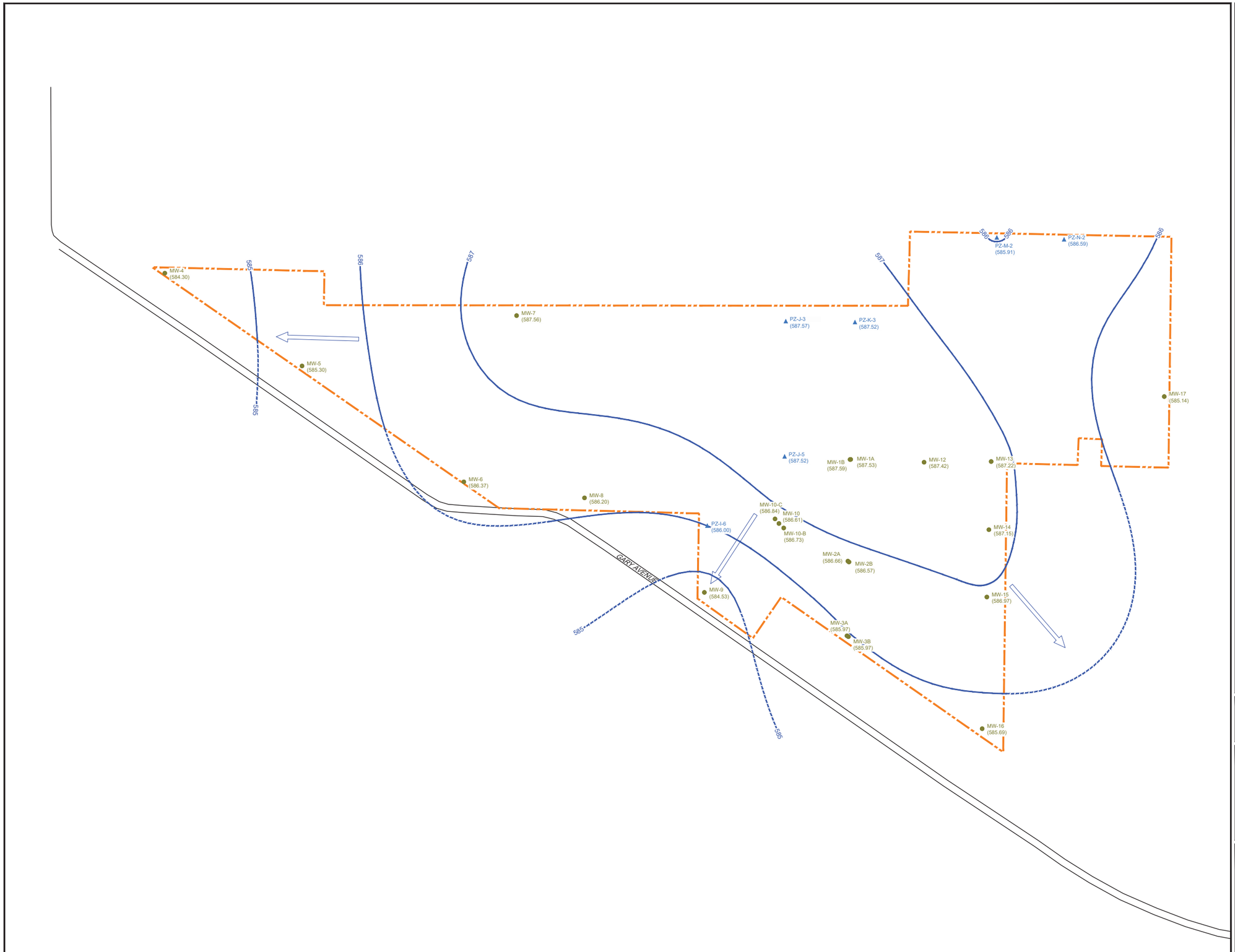


GROUNDWATER CONTOURS
OCTOBER 2008
EAST CHICAGO SITE
East Chicago, Indiana

31532-99911(005)GN-CO030 DEC 07/2008



31532-99911(005)GN-CO031 JAN 28/2009



0 100 200ft

Coordinate System:
Indiana West State Plane NAD83,
and NAVD88 vertical datum

LEGEND

- EXISTING PROPERTY BOUNDARY
- 586 GROUNDWATER CONTOURS
- GENERAL GROUNDWATER FLOW DIRECTION
- PZ-2 TEMPORARY PIEZOMETER LOCATION AND IDENTIFIER
- MW-02B MONITORING WELL LOCATION AND IDENTIFIER

SCALE VERIFICATION

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

GLENN SPRINGS HOLDINGS INC.
EAST CHICAGO, INDIANA

GROUNDWATER CONTOURS
APRIL 3, 2019

GHD

Source Reference: CM LAVOIE & ASSOCIATES SURVEY DATED APRIL 3, 2019			
Project Manager: M. TOMKA	Reviewed By: J. PARDYS	Date: APRIL 2019	
Scale: 1"=200'	Project Nº: 31532-D41105	Report Nº: PRES010	Drawing Nº: figure 1

P:\drawings\31000s\31532\31532-PRES\31532-D41105\PRES010\31532-D41105\PRES010\GN\31532-D41105\PRES010\GN-WA001.DWG Plot Date: APR 05, 2019

Appendix G
Historical Forensic Sampling

GW/S ENVIRONMENTAL CONSULTING

GENE W. SCHMIDT, CGWP & PHG
Specializing in Forensics of Petroleum Hydrocarbon Contamination of Groundwater and Soils

11619 S.Hudson Place
Tulsa, OK 74137-8532
envirodog@aol.com

(O) 918-581-3021
(H) 918-298-9849
Fax 918-581-3015

GW/S ENVIRONMENTAL CONSULTING
Facsimile Transmittal Sheet

To: JULIE CZECH

From: Gene W. Schmidt

Phone:

Pages: 7

Fax: 828-0202

Date: 23 JULY 07

cc:

Phone

Fax Phone

Notes/Comments

This message and all documents are intended solely for the use of the intended receiver identified by GW/S ENVIRONMENTAL CONSULTING. The message and attachments may be PRIVILEDGE AND CONFIDENTIAL, and/or may contain confidential ATTORNEY-CONSULTANT COMMUNICATION, confidential TRIAL PREPARATION MATERIALS, and/or MATERIALS PREPARED IN ANTICIPATION OF LITITGATION AND TRIAL. If you are not the intended recipient, you are hereby notified that any dissemination of this communication is prohibited. If you have received this communication in error, please notify the sender at GW/S ENVIRONMENTAL CONSULTING (918-298-9849).

GW/S ENVIRONMENTAL CONSULTING

GENE W. SCHMIDT, CGWP & PHG

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Tulsa, OK 74137-8532
envirodog@aol.com

(O) 918-581-3021
(H) 918-298-9849
Fax 918-581-3015

19 July 2007

Julie E. Czech
CRA
11004 East 51th Street
Tulsa, OK 74137

Project 031532, GSHI

Attached are the gas chromatograms (GC) for petroleum product sample, 031532-060707-JO-20, collected on 6-7-07 and received by us for our analytical examination on 7-17-07.

The subject sample is composed of more than 95 percent of a very highly degraded (most of the normal paraffins removed and only the isoprenoids remain) distillate and less than 5 percent of gasoline boiling range hydrocarbons. The distillate is most likely a fuel oil (but could be a furnace oil) because it appears to be too "heavy" of a cut for a #2 diesel fuel for that location (climate). The nC17/pristine ratio is 0.07 which indicates that it has undergone maximum biodegradation and was probably released more than 20 years ago.

The very small amount of gasoline present is very highly weathered and degraded, therefore, no conclusion can be made relative as to grade or age (release date). The presence of gasoline is confirmed by the presence of isooctane (224TMP).

Gene W. Schmidt

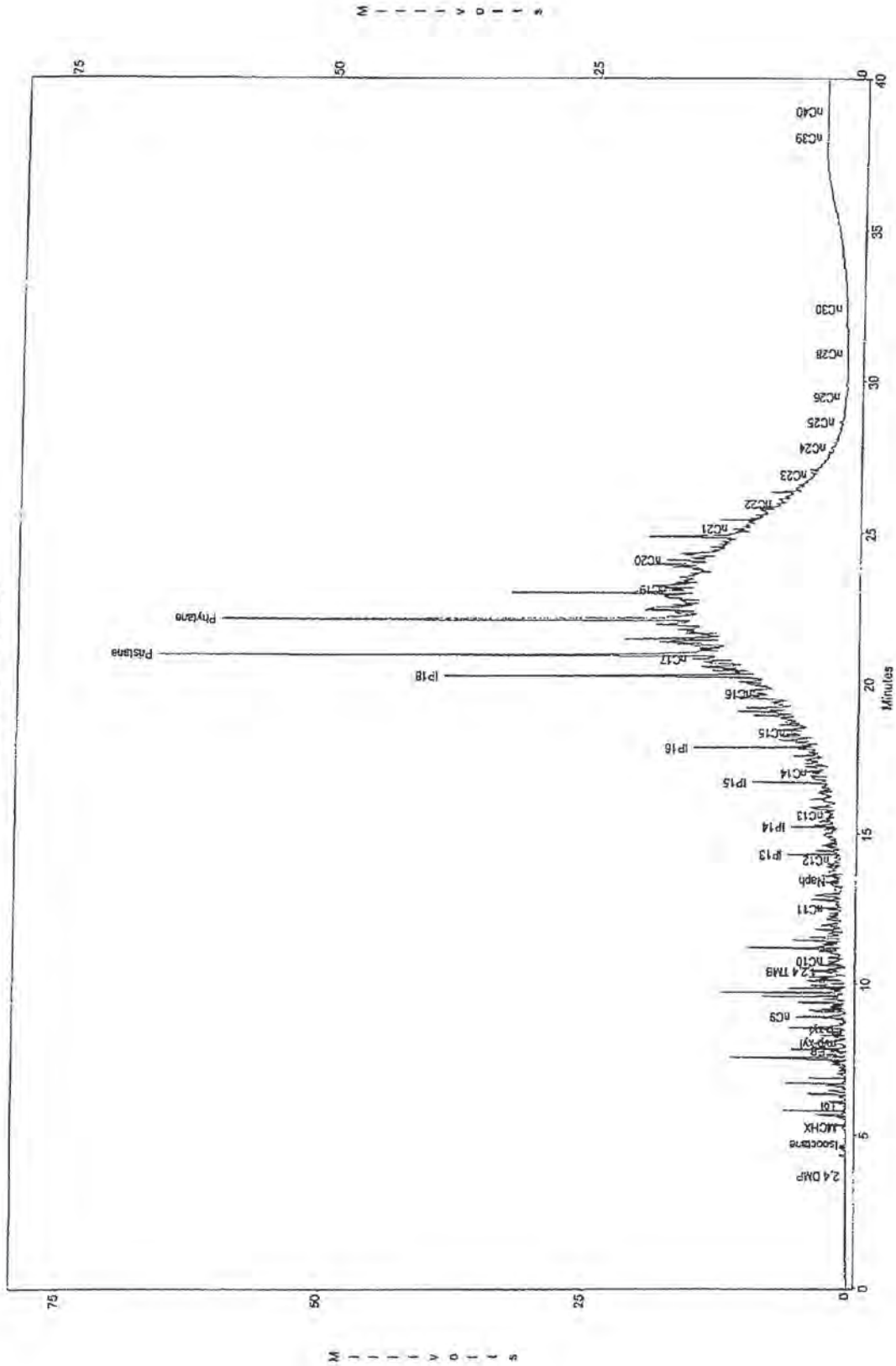
Gene W. Schmidt
GWS

Attachments

Torkelson Geochemistry, Inc.

Project 031532 - GSHI, E. Chicago, IN
Sample ID : 031532-060707-JO-20
Acquired : Jul 18, 2007 16:19:08

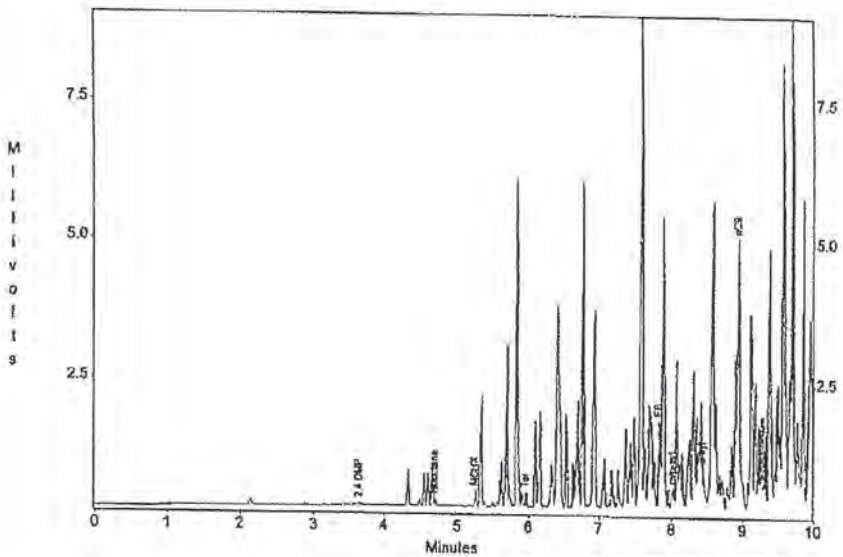
c:\lezchrom\chrom\071108\jo-20 – Channel A



Torkelson Geochemistry, Inc.

Project 031532 - GSHI, E. Chicago, IN
Sample ID : 031532-060707-JO-20
Acquired : Jul 18, 2007 16:19:08

c:\ezchrom\chrom\07108\jo-20 – Channel A



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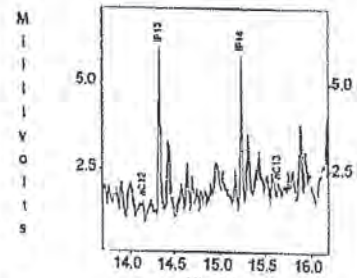

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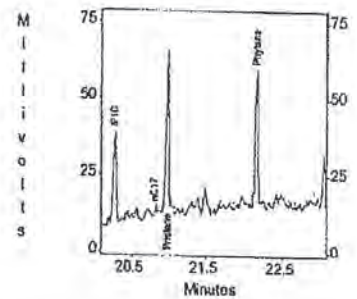

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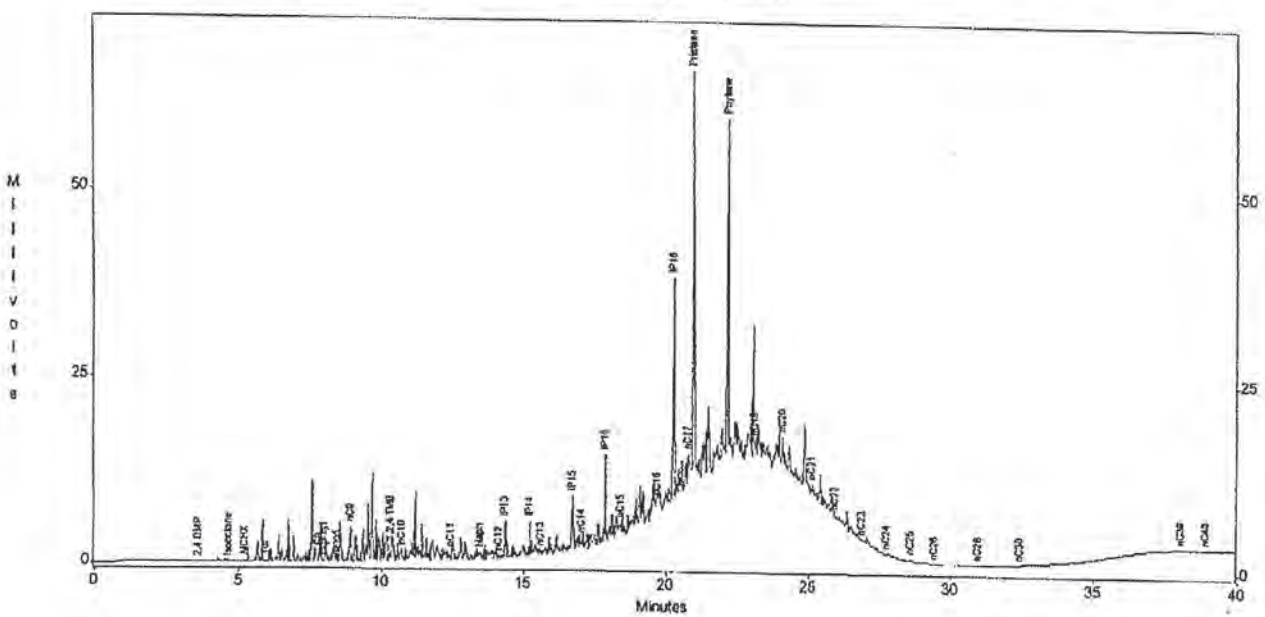


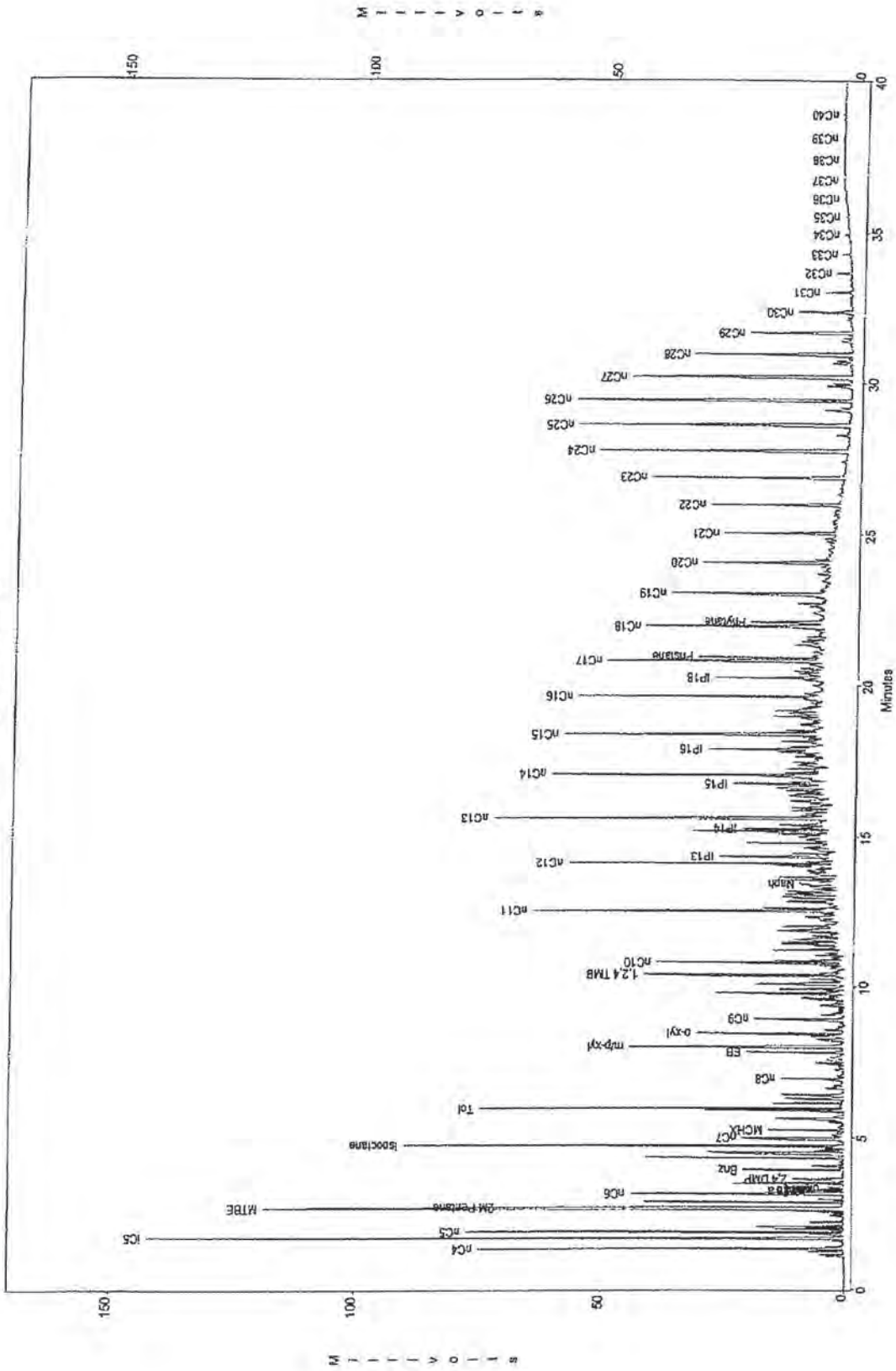
Channel A Results

Peak	Area	Height
nC4	0	0
nC5	0	0
nC6	0	0
Ethe	0	0
2M Pentane	0	0
nC6	0	0
olefin a	0	0
olefin b	0	0
olefin c	0	0
2,4 DMP	43	40
Bnz	0	0
Isooctane	157	115
nC7	0	0
MCHX	322	268
Tol	321	223
nC8	0	0
EB	1919	1497
m/p-xyl	501	342
o-xyl	1211	721
nC9	7338	4797
1,2,4 TMB	3781	2146
nC10	3005	1534
nC11	2723	1201
Naph	2475	1084
nC12	755	556
IP13	8117	8962
IP14	6974	4500
nC13	1568	688
IP15	10953	7306
nC14	3152	1158
IP16	24777	11916
nC15	7143	1721
nC16	3857	2040
IP18	68746	29831
nC17	8273	3740
Pristane	137638	53573
nC18	0	0
Phytane	129149	45867
nC19	12680	2692
nC20	19133	5426
nC21	10770	2467
nC22	3302	910
nC23	432	211
nC24	1630	242
nC25	1317	279
nC26	303	100
nC27	0	0
nC28	141	28
nC29	0	0
nC30	74	28
nC31	0	0
nC32	0	0
nC33	0	0
nC34	0	0
nC35	0	0
nC36	0	0
nC37	0	0
nC38	0	0
nC39	29	13
nC40	41	9

Torkelson Geochemistry, Inc.

Project 031532 - GSHI, E. Chicago, IN
Sample ID : Gas/Dies/Wax std
Acquired : Jul 18, 2007 09:31:08

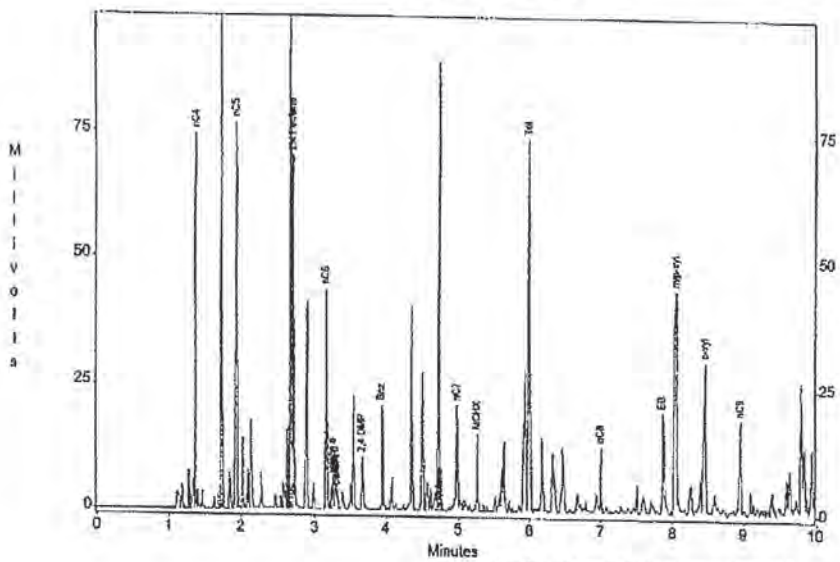
c:\ezchrom\chrom\071108\gsdiwax – Channel A



Torkelson Geochemistry, Inc.

Project 031532 - GSHI, E. Chicago, IN
Sample ID : Gas/Dies/Wax std
Acquired : Jul 18, 2007 09:31:08

c:\ezchrom\chrom\07108\gadiwax -- Channel A



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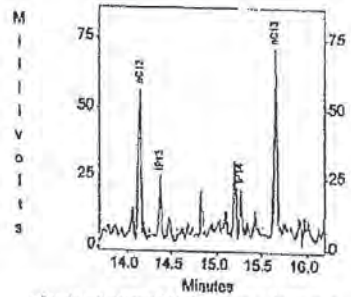
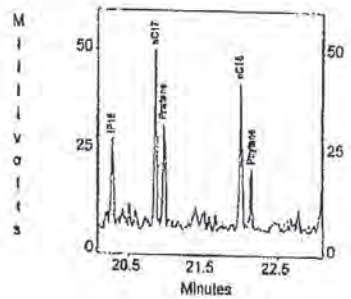
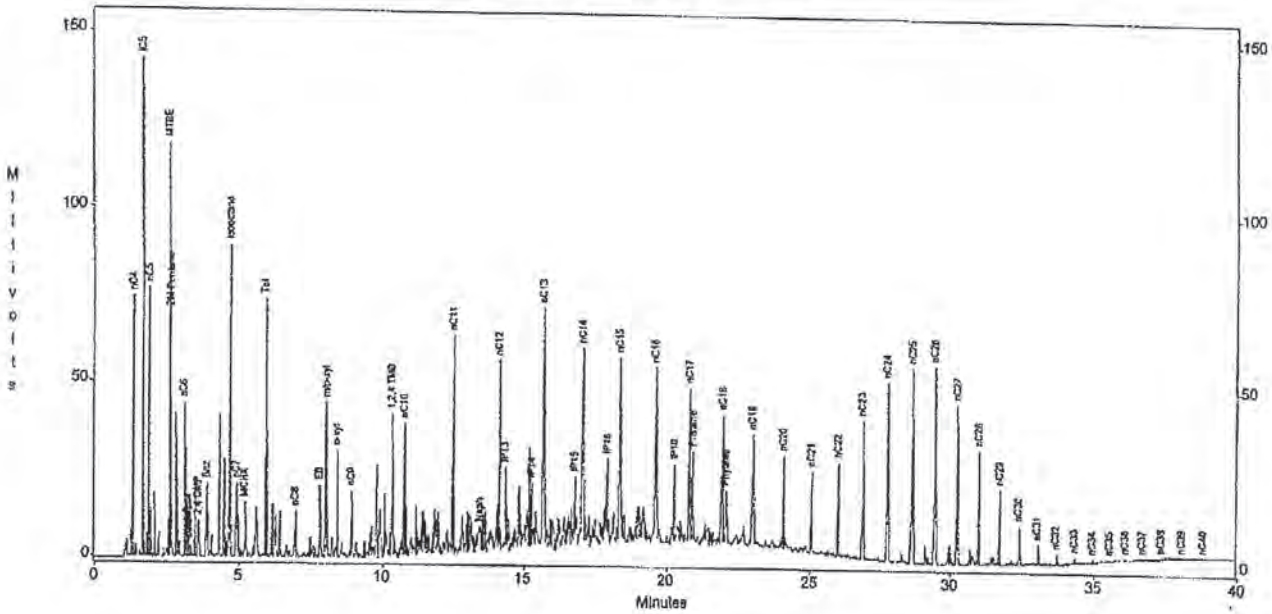


c:\ezchrom\chrom\07108\gadiwax -- Channel A



c:\ezchrom\chrom\07108\gadiwax -- Channel A



Channel A Results

Peak	Area	Height
nC4	40121	74649
iC5	95711	142419
nC5	54540	77152
MTBE	102336	110575
2M Pentane	62233	70280
nC6	42161	43662
olefin a	7334	6446
olefin b	5201	5250
olefin c	4551	3909
2,4 DMP	10406	10412
Bnz	26210	20956
Isooctane	124053	89650
nC7	25795	21063
MCHX	18859	15597
Tol	108263	74321
nC8	15709	12990
EB	27384	20157
m/p-xyl	94512	68274
o-xyl	43714	30297
nC9	25555	18605
1,2,4 TMB	69052	40933
nC10	57517	39242
nC11	105485	62462
Naph	16736	7429
nC12	99350	54745
IP13	43297	23750
IP14	30798	16882
nC13	135237	69490
IP15	24547	17763
nC14	139348	56374
IP16	57711	23756
nC15	112392	52911
nC16	110450	50342
IP18	38050	22352
nC17	98432	44852
Pristane	55966	26156
nC18	74611	36413
Phytane	27906	14713
nC19	73665	32247
nC20	47653	26398
nC21	42628	22971
nC22	52709	26914
nC23	81139	39509
nC24	121337	51109
nC25	143134	55574
nC26	145605	56302
nC27	111463	45243
nC28	70608	32266
nC29	39445	20879
nC30	18333	10815
nC31	9743	5459
nC32	5081	2922
nC33	2749	1565
nC34	1566	834
nC35	803	388
nC36	515	258
nC37	378	142
nC38	1112	87
nC39	162	60
nC40	143	36

CONESTOGA-ROVERS & ASSOCIATES
8615 W. Bryn Mawr Avenue
Chicago, Illinois 60631
(773)380-9933 phone
(773)380-6421 fax

SHIPPED TO (Laboratory Name):

CHAIN-OF-CUSTODY RECORD

REFERENCE NUMBER: 031532

PROJECT NAME: 031532- GSHI E Chicago IN

SAMPLER'S SIGNATURE: [signature] for Judd Olson **PRINTED NAME:** Judd Olson

SEQ. No.	DATE	TIME	SAMPLE IDENTIFICATION No.	SAMPLE MATRIX	No. OF CONTAINERS	PARAMETERS: LPH Fingerprint	REMARKS
1	6/7/07	0930	FP-031532-060707-JO-20	LPH*	1	X	* LIQUID PHASE HYDROCARBON

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
① [signature] for Judd Olson	DATE: 6/8/07 TIME: 15:00	② [signature]	DATE: 6/8/07 TIME: 15:00
② [signature]	DATE: 6/14/07 TIME: 1400	③ Gene W. Schmidt	DATE: 7.17.07 TIME: 11:45a
② Gene W. Schmidt	DATE: 7.17.07 TIME: 12:45p	④ [signature]	DATE: 7-17-07 TIME: 1145

METHOD OF SHIPMENT: US Mail **AIR BILL No.** N/A

White -Fully Executed Copy
Yellow -Receiving Laboratory Copy
Pink -Shipper Copy
Goldenrod -Sampler Copy

SAMPLE TEAM: Judd Olson

RECEIVED FOR LABORATORY BY:

DATE: TIME:

№ 2345

1001-00(SOURCE)GN-CO004

Appendix H
Historical Soil and Groundwater Analytical Data

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample ID:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample Date:		**12/26/1996**	**12/26/1996**	**12/26/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/4/1996**	**12/4/1996**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	1.8 U	44	27	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	170	2	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	1.8 U	10	10	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	350	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	1.8 U	9 U	9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	36 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Acenaphthylene	µg/L	2.3 U	12 U	12 U	2.3 U	2.3 U	2.3 U	2.3 U	3	55	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.66 U	3.3 U	3.3 U	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U	13.2 U	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.013 U	0.065 U	0.065 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.26 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzo(a)pyrene	µg/L	0.023 U	0.12 U	0.12 U	0.023 U	0.023 U	0.023 U	0.023 U	0.023 U	0.46 U	0.023 U	0.023 U	0.023 U	0.023 U	0.023 U	0.023 U
Benzo(b)fluoranthene	µg/L	0.018 U	0.090 U	0.090 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.36 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U
Benzo(g,h,i)perylene	µg/L	0.076 U	0.38 U	0.38 U	0.076 U	0.076 U	0.076 U	0.076 U	0.076 U	1.5 U	0.076 U	0.076 U	0.076 U	0.076 U	0.076 U	0.076 U
Benzo(k)fluoranthene	µg/L	0.017 U	0.085 U	0.085 U	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.34 U	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.15 U	0.75 U	0.75 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	3.0 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.030 U	0.15 U	0.15 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.6 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.21 U	1.1 U	1.1 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	4.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Fluorene	µg/L	0.21 U	1.1 U	1.1 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	6	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
Indeno(1,2,3-cd)pyrene	µg/L	0.043 U	0.22 U	0.22 U	0.043 U	0.043 U	0.043 U	0.043 U	0.043 U	0.86 U	0.043 U	0.043 U	0.043 U	0.043 U	0.043 U	0.043 U
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	1.8 U	9 U	9 U	1.8 U	1.8 U	1.8 U	1.8 U	8	300	10	6	1.8 U	1.8 U	6	7
Phenanthrene	µg/L	0.64 U	3.2 U	3.2 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	12.8 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U
Pyrene	µg/L	0.27 U	1.4 U	1.4 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	5.4 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample ID:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample Date:		**12/26/1996**	**12/26/1996**	**12/26/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/4/1996**	**12/4/1996**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample ID:		**CITGO-MW-1**	**CITGO-MW-2**	**CITGO-MW-3**	**CITGO-SB-1**	**CITGO-SB-2**	**CITGO-SB-3**	**CITGO-SB-4**	**CITGO-SB-5**	**CITGO-SB-6**	**CITGO-SB-7**	**CITGO-SB-8**	**CITGO-SB-9**	**CITGO-SB-10**	**CITGO-SB-11**	**CITGO-SB-14**
Sample Date:		**12/26/1996**	**12/26/1996**	**12/26/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/3/1996**	**12/4/1996**	**12/4/1996**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		CITGO-SB-15	CITGO-SB-16	CITGO-SB-17	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1B
Sample ID:		CITGO-SB-15	CITGO-SB-16	CITGO-SB-17	GW-022707-JO-004	GW-032207-JO-009	GW-060507-JO-05	GW-120607-SP-010	GW-030508-KW-005	GW-080410-LP-02	GW-080410-LP-03	GW-060211-JH-16	GW-110211-JH-42	W-31532-052418-JH-1	W-31532-052418-JH-1	GW-022707-JO-005
Sample Date:		12/4/1996	12/4/1996	12/4/1996	2/27/2007	3/22/2007	6/5/2007	12/6/2007	3/5/2008	8/4/2010	8/4/2010	6/2/2011	11/2/2011	5/24/2018	5/24/2018	2/27/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)				(Duplicate)	
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,1-Dichloroethane	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	20 U	20 U	40 U	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,2-Dichloroethane	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
1,4-Dioxane	µg/L	-	-	-	2000 U	-	1800 U	2000 U	1000 U	-	-	-	-	-	-	200 U
1-Methylnaphthalene	µg/L	160	1.8 U	1.8 U	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	100 U	-	6.6 J	100 U	50 U	-	-	-	100 U	26 J	34 J	10 U
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	100 U	100 U	200 U	-
2-Methylnaphthalene	µg/L	380	1.8 U	1.8 U	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	100 U	100 U	200 U	-
Acenaphthene	µg/L	36 U	1.8 U	1.8 U	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	78	10	3	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	100 U	88 J	200 U	-
Anthracene	µg/L	13.2 U	0.66 U	0.66 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	120	-	250	85	95	-	-	-	200	260	360 J	0.94 J
Benzo(a)anthracene	µg/L	0.26 U	0.013 U	0.013 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.46 U	0.023 U	0.023 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	0.36 U	0.018 U	0.018 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1.52 U	0.076 U	0.076 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.34 U	0.017 U	0.017 U	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Carbon disulfide	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Chlorobenzene	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Chloroform (Trichloromethane)	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Chrysene	µg/L	3.0 U	0.15 U	0.15 U	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	210	340	410 J	-
Dibenz(a,h)anthracene	µg/L	0.6 U	0.030 U	0.030 U	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Ethylbenzene	µg/L	-	-	-	81	-	62	75	83	-	-	-	45	35	37 J	1.1
Fluoranthene	µg/L	4.2 U	0.21 U	0.21 U	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	6	0.21 U	0.21 U	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.86 U	0.043 U	0.043 U	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	49	48	48 J	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	100 U	100 U	200 U	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	210	280	340 J	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	50 U	-	45 U	50 U	25 U	-	-	-	50 U	10 U	20 U	5.0 U
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	50 U	100 U	-
Naphthalene	µg/L	280	9	8	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	12.8 U	0.64 U	0.64 U	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	5.4 U	0.27 U	0.27 U	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Tetrachloroethene	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Toluene	µg/L	-	-	-	39	-	41	39	39	-	-	-	35	39	49 J	0.76 J
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Trichloroethene	µg/L	-	-	-	10 U	-	9.1 U	10 U	5.0 U	-	-	-	10 U	10 U	20 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	10 U	20 U	-
Xylenes (total)	µg/L	-	-	-	210	-	160	230	240	-	-	-	160	170	170 J	2.4
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	-	-	-	290	280	310	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	48	47	51	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	40	38	39	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	150	150	150	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		CITGO-SB-15	CITGO-SB-16	CITGO-SB-17	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1A	MW-1B
Sample ID:		CITGO-SB-15	CITGO-SB-16	CITGO-SB-17	GW-022707-JO-004	GW-032207-JO-009	GW-060507-JO-05	GW-120607-SP-010	GW-030508-KW-005	GW-080410-LP-02	GW-080410-LP-03	GW-060211-JH-16	GW-110211-JH-42	W-31532-052418-JH-1	W-31532-052418-JH-1	GW-022707-JO-005
Sample Date:		12/4/1996	12/4/1996	12/4/1996	2/27/2007	3/22/2007	6/5/2007	12/6/2007	3/5/2008	8/4/2010	8/4/2010	6/2/2011	11/2/2011	5/24/2018	5/24/2018	2/27/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)				(Duplicate)	
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
2,4-Dimethylphenol	µg/L	-	-	-	-	7.7 J	15 J	8.4 J	9.7 J	-	-	-	9.5 U	7.4	8.1	-
2,4-Dinitrophenol	µg/L	-	-	-	-	250 U	1000 U	120 U	100 U	-	-	-	24 U	24 U	24 U	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	39	6.6	6.6	-
2-Methylphenol	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	4.8 U	2.4 U	2.4 U	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
3-Methylphenol	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4-Methylphenol	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.5 U	4.8 U	4.8 U	-
4-Nitrophenol	µg/L	-	-	-	-	250 U	1000 U	120 U	100 U	-	-	-	24 U	24 U	24 U	-
Acenaphthene	µg/L	-	-	-	-	2.0 J	200 U	2.1 J	1.3 J	-	-	-	1.2	1.1	1.0	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.95 U	0.48 U	0.48 U	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Anthracene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.32 J	0.37 J	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	4.8 U	4.8 U	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	4.8 U	4.8 U	-
Benzo(a)anthracene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Benzo(a)pyrene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.95 U	0.48 U	0.48 U	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	9.5 U	12 U	12 U	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	4.8 U	4.8 U	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	12 U	12 U	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	1.2 J	-
Chrysene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Diethyl phthalate	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	4.8 U	12 U	12 U	-
Dimethyl phthalate	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	4.8 U	4.8 U	4.8 U	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	4.8 U	12 U	12 U	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	4.8 U	4.8 U	-
Fluoranthene	µg/L	-	-	-	-	50 U	200 U	25 U	0.51 J	-	-	-	0.95 U	0.51	0.53	-
Fluorene	µg/L	-	-	-	-	2.0 J	200 U	2.4 J	1.4 J	-	-	-	1.7	1.3	1.4	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.95 U	0.48 U	0.48 U	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	48 U	24 U	24 U	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	0.95 U	0.48 U	0.48 U	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Naphthalene	µg/L	-	-	-	-	44 J	44 J	50	52	-	-	-	11	4.0	4.6	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	4.8 U	2.4 U	2.4 U	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	24 U	24 U	24 U	-
Phenanthrene	µg/L	-	-	-	-	4.1 J	8.5 J	5.1 J	4.4 J	-	-	-	3.8	2.6	2.7	-
Phenol	µg/L	-	-	-	-	50 U	200 U	25 U	20 U	-	-	-	4.8 U	2.4 U	1.4 J	-
Pyrene	µg/L	-	-	-	-	50 U	200 U	25 U	0.58 J	-	-	-	0.95 U	0.45 J	0.61	-
Pyridine	µg/L	-	-	-	-	100 U	400 U	50 U	40 U	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**CITGO-SB-15**	**CITGO-SB-16**	**CITGO-SB-17**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1A**	**MW-1B**
Sample ID:		**CITGO-SB-15**	**CITGO-SB-16**	**CITGO-SB-17**	**GW-022707-JO-004**	**GW-032207-JO-009**	**GW-060507-JO-05**	**GW-120607-SP-010**	**GW-030508-KW-005**	**GW-080410-LP-02**	**GW-080410-LP-03**	**GW-060211-JH-16**	**GW-110211-JH-42**	**W-31532-052418-JH-1**	**W-31532-052418-JH-1**	**GW-022707-JO-005**
Sample Date:		**12/4/1996**	**12/4/1996**	**12/4/1996**	**2/27/2007**	**3/22/2007**	**6/5/2007**	**12/6/2007**	**3/5/2008**	**8/4/2010**	**8/4/2010**	**6/2/2011**	**11/2/2011**	**5/24/2018**	**5/24/2018**	**2/27/2007**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
											(Duplicate)				**(Duplicate)**	
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	200 U	50 U	50 U	-
Antimony	µg/L	-	-	-	-	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	10 U	0.73 J	0.60 J	-
Arsenic	µg/L	-	-	-	-	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	10 U	5.0 U	0.79 J	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	188 J	284	207	150 J	-	-	-	240	260	260	-
Beryllium	µg/L	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	1.0 U	-
Cadmium	µg/L	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.0 U	1.0 U	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	160000	250000	260000	-
Chromium	µg/L	-	-	-	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	2.0 U	2.0 U	-
Cobalt	µg/L	-	-	-	-	50.0 U	2.9 J	50.0 U	50.0 U	-	-	-	7.0 U	0.37 J	0.34 J	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	25 U	2.5	10	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	7900	6800	6800	-
Lead	µg/L	-	-	-	-	3.0 U	3.0 U	3.0 U	4.8	-	-	-	3.0 U	1.5	1.4	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	28000	48000	49000	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	1200	1500	1500	-
Mercury	µg/L	-	-	-	-	0.20 U	0.20 U	0.20	0.39 U	-	-	-	0.33	0.21	0.17 J	-
Nickel	µg/L	-	-	-	-	40.0 U	2.0 J	40.0 U	40.0 U	-	-	-	40 U	2.0 U	2.0 U	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	6000	4800	4900	-
Selenium	µg/L	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	-
Silver	µg/L	-	-	-	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U	1.0 U	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5000 U	4300	4500	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	1.0 U	1.0 U	-
Vanadium	µg/L	-	-	-	-	50.0 U	50.0 U	0.87 J	1.5 J	-	-	-	7.0 U	1.1 J	1.5 J	-
Zinc	µg/L	-	-	-	-	20.0 U	20.0 U	20.0 U	20.0 U	-	-	-	50 U	20 U	20 U	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	0.098 U	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	10 U	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A
Sample ID:		GW-032207-JO-010	GW-060507-JO-04	GW-120607-SP-009	GW-030508-KW-004	GW-060211-JH-18	GW-110211-JH-40	W-31532-052418-JH-1	GW-022707-JO-007	GW-032607-JO-011	GW-060607-JO-07	GW-120607-SP-012	GW-030608-KW-014	GW-080410-LP-01	GW-060211-JH-29	GW-110211-JH-39
Sample Date:		3/22/2007	6/5/2007	12/6/2007	3/5/2008	6/2/2011	11/2/2011	5/24/2018	2/27/2007	3/26/2007	6/6/2007	12/6/2007	3/6/2008	8/4/2010	6/2/2011	11/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,1-Dichloroethane	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
1,1-Dichloroethene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	2.0 U	10 U	-	-	-	-	-	-	-	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,2-Dichloroethane	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
1,2-Dichloropropane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
1,4-Dioxane	µg/L	-	1000 U	400 U	200 U	-	-	-	1300 U	-	200 U	1000 U	200 U	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	50 U	20 U	10 U	-	10 U	50 U	67 U	-	7.8 J	50 U	1.4 J	-	-	10 U
2-Hexanone	µg/L	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-	-	10 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-	-	10 U
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-	-	10 U
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	5.0 U	0.52 J	1.0 U	-	1.0 U	5.0 U	110	-	71	110	3.3	-	-	7.0
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Bromoform	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Carbon disulfide	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Carbon tetrachloride	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Chlorobenzene	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Chloroethane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Chloroform (Trichloromethane)	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Cyclohexane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	3.3
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Ethylbenzene	µg/L	-	5.0 U	2.0 U	0.23 J	-	1.0 U	5.0 U	6.9	-	2.5	3.8 J	0.37 J	-	-	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Methyl acetate	µg/L	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-	-	10 U
Methyl cyclohexane	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	-	25 U	10 U	5.0 U	-	5.0 U	5.0 U	33 U	-	5.0 U	25 U	5.0 U	-	-	5.0 U
Methylene chloride	µg/L	-	-	-	-	-	1.0 U	25 U	-	-	-	-	-	-	-	1.0 U
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Tetrachloroethene	µg/L	-	5.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Toluene	µg/L	-	5.0 U	2.0 U	0.26 J	-	1.0 U	5.0 U	40	-	27	40	3.1	-	-	1.0 U
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Trichloroethene	µg/L	-	1.4 J	2.0 U	1.0 U	-	1.0 U	5.0 U	6.7 U	-	1.0 U	5.0 U	1.0 U	-	-	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Vinyl chloride	µg/L	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-	-	1.0 U
Xylenes (total)	µg/L	-	10 U	4.0 U	0.39 J	-	2.0 U	10 U	32	-	6.1	15	2.1	-	-	2.0 U
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0	-
Ethylbenzene	µg/L	-	-	-	-	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-
Xylenes (total)	µg/L	-	-	-	-	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-1B	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A	MW-2A
Sample ID:		GW-032207-JO-010	GW-060507-JO-04	GW-120607-SP-009	GW-030508-KW-004	GW-060211-JH-18	GW-110211-JH-40	W-31532-052418-JH-1	GW-022707-JO-007	GW-032607-JO-011	GW-060607-JO-07	GW-120607-SP-012	GW-030608-KW-014	GW-080410-LP-01	GW-060211-JH-29	GW-110211-JH-39
Sample Date:		3/22/2007	6/5/2007	12/6/2007	3/5/2008	6/2/2011	11/2/2011	5/24/2018	2/27/2007	3/26/2007	6/6/2007	12/6/2007	3/6/2008	8/4/2010	6/2/2011	11/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
1,3-Dichlorobenzene	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
1,4-Dichlorobenzene	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
2,4-Dichlorophenol	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
2,4-Dimethylphenol	µg/L	40 U	100 U	25 U	40 U	-	7.7 U	2.0 U	-	25 U	50 U	10 U	10 U	-	-	2.0 U
2,4-Dinitrophenol	µg/L	200 U	500 U	120 U	200 U	-	19 U	9.8 U	-	120 U	250 U	50 U	50 U	-	-	5.0 U
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
2-Chloronaphthalene	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
2-Chlorophenol	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	0.77 U	0.20 U	-	-	-	-	-	-	-	0.20 U
2-Methylphenol	µg/L	40 U	100 U	25 U	40 U	-	3.8 U	0.98 U	-	25 U	50 U	10 U	10 U	-	-	1.0 U
2-Nitroaniline	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
2-Nitrophenol	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
3&4-Methylphenol	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
3-Methylphenol	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4-Chloroaniline	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4-Methylphenol	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	7.7 U	2.0 U	-	-	-	-	-	-	-	2.0 U
4-Nitrophenol	µg/L	200 U	500 U	120 U	200 U	-	19 U	9.8 U	-	120 U	250 U	50 U	50 U	-	-	5.0 U
Acenaphthene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	1.3 J	50 U	1.6 J	10 U	-	-	0.20 U
Acenaphthylene	µg/L	-	-	-	-	-	0.77 U	0.20 U	-	-	-	-	-	-	-	0.20 U
Acetophenone	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Anthracene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Atrazine	µg/L	-	-	-	-	-	3.8 U	2.0 U	-	-	-	-	-	-	-	1.0 U
Benzaldehyde	µg/L	-	-	-	-	-	3.8 U	2.0 U	-	-	-	-	-	-	-	1.0 U
Benzo(a)anthracene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Benzo(a)pyrene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Benzo(b)fluoranthene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Benzo(b)pyridine (Quinoline)	µg/L	40 U	100 U	25 U	40 U	-	-	-	-	25 U	50 U	10 U	10 U	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	0.77 U	0.20 U	-	-	-	-	-	-	-	0.20 U
Benzo(k)fluoranthene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	40 U	100 U	25 U	40 U	-	7.7 U	4.9 U	-	25 U	50 U	10 U	10 U	-	-	2.0 U
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	3.8 U	2.0 U	-	-	-	-	-	-	-	1.0 U
Caprolactam	µg/L	-	-	-	-	-	19 U	4.9 U	-	-	-	-	-	-	-	5.0 U
Carbazole	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Chrysene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	0.30 J	-	-	0.20 U
Dibenz(a,h)anthracene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Dibenzofuran	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Diethyl phthalate	µg/L	40 U	100 U	25 U	40 U	-	3.8 U	4.9 U	-	25 U	50 U	10 U	10 U	-	-	1.0 U
Dimethyl phthalate	µg/L	40 U	100 U	25 U	40 U	-	3.8 U	2.0 U	-	25 U	50 U	10 U	10 U	-	-	1.0 U
Di-n-butylphthalate (DBP)	µg/L	40 U	100 U	25 U	40 U	-	3.8 U	4.9 U	-	25 U	50 U	10 U	10 U	-	-	1.0 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	3.8 U	2.0 U	-	-	-	-	-	-	-	1.0 U
Fluoranthene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Fluorene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	3.1 J	4.9 J	2.9 J	0.29 J	-	-	0.20 U
Hexachlorobenzene	µg/L	-	-	-	-	-	0.77 U	0.20 U	-	-	-	-	-	-	-	0.20 U
Hexachlorobutadiene	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	38 U	9.8 U	-	-	-	-	-	-	-	10 U
Hexachloroethane	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Indeno(1,2,3-cd)pyrene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	25 U	50 U	10 U	10 U	-	-	0.20 U
Isophorone	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Naphthalene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	1.3 J	50 U	10 U	10 U	-	-	0.20 U
Nitrobenzene	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	3.8 U	0.98 U	-	-	-	-	-	-	-	1.0 U
Pentachlorophenol	µg/L	-	-	-	-	-	19 U	9.8 U	-	-	-	-	-	-	-	5.0 U
Phenanthrene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	11 J	7.8 J	7.3 J	10 U	-	-	0.20 U
Phenol	µg/L	40 U	100 U	25 U	40 U	-	3.8 U	0.98 U	-	25 U	50 U	10 U	10 U	-	-	1.0 U
Pyrene	µg/L	40 U	100 U	25 U	40 U	-	0.77 U	0.20 U	-	1.0 J	50 U	0.73 J	0.50 J	-	-	0.20 U
Pyridine	µg/L	80 U	200 U	50 U	80 U	-	-	-	-	50 U	100 U	20 U	20 U	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-1B**	**MW-1B**	**MW-1B**	**MW-1B**	**MW-1B**	**MW-1B**	**MW-1B**	**MW-2A**	**MW-2A**	**MW-2A**	**MW-2A**	**MW-2A**	**MW-2A**	**MW-2A**	**MW-2A**
Sample ID:		**GW-032207-JO-010**	**GW-060507-JO-04**	**GW-120607-SP-009**	**GW-030508-KW-004**	**GW-060211-JH-18**	**GW-110211-JH-40**	**;W-31532-052418-JH-1**	**GW-022707-JO-007**	**GW-032607-JO-011**	**GW-060607-JO-07**	**GW-120607-SP-012**	**GW-030608-KW-014**	**GW-080410-LP-01**	**GW-060211-JH-29**	**GW-110211-JH-39**
Sample Date:		**3/22/2007**	**6/5/2007**	**12/6/2007**	**3/5/2008**	**6/2/2011**	**11/2/2011**	**5/24/2018**	**2/27/2007**	**3/26/2007**	**6/6/2007**	**12/6/2007**	**3/6/2008**	**8/4/2010**	**6/2/2011**	**11/2/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	200 U	50 U	-	-	-	-	-	-	-	200 U
Antimony	µg/L	60.0 U	60.0 U	60.0 U	60.0 U	-	10 U	2.0 U	-	60.0 U	5.3 J	60.0 U	60.0 U	-	-	10 U
Arsenic	µg/L	35.9	36.2	33.8	35.4	-	40	38	-	19.8	31.8	24.5	10.4	10.0 U	-	14
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	230	230	208	246	-	200	180	-	62.4 J	77.2 J	52.4 J	41.4 J	-	-	200 U
Beryllium	µg/L	0.56 J	5.0 U	5.0 U	5.0 U	-	5.0 U	1.0 U	-	5.0 U	0.32 J	5.0 U	5.0 U	-	-	5.0 U
Cadmium	µg/L	5.0 U	5.0 U	5.0 U	0.99 J	-	2.0 U	1.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	2.0 U
Calcium	µg/L	-	-	-	-	-	120000	120000	-	-	-	-	-	-	-	100000
Chromium	µg/L	10.0 U	10.0 U	10.0 U	10.0 U	-	5.0 U	2.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	5.0 U
Cobalt	µg/L	50.0 U	50.0 U	50.0 U	50.0 U	-	7.0 U	1.0 U	-	50.0 U	50.0 U	50.0 U	50.0 U	-	-	7.0 U
Copper	µg/L	-	-	-	-	-	25 U	2.0 U	-	-	-	-	-	-	-	25 U
Iron	µg/L	-	-	-	-	-	21000	22000	-	-	-	-	-	-	-	1400
Lead	µg/L	3.0 U	3.0 U	3.0 U	3.0 U	-	3.0 U	1.0 U	-	3.0 U	2.8 J	2.0 J	4.4	-	-	3.0 U
Magnesium	µg/L	-	-	-	-	-	9700	13000	-	-	-	-	-	-	-	5000 U
Manganese	µg/L	-	-	-	-	-	150	170	-	-	-	-	-	-	-	92
Mercury	µg/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
Nickel	µg/L	40.0 U	40.0 U	40.0 U	40.0 U	-	40 U	2.0 U	-	40.0 U	40.0 U	40.0 U	6.8 J	-	-	40 U
Potassium	µg/L	-	-	-	-	-	5000 U	1600	-	-	-	-	-	-	-	5000 U
Selenium	µg/L	5.0 U	2.6 J	5.0 U	5.0 U	-	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	5.0 U
Silver	µg/L	10.0 U	10.0 U	10.0 U	10.0 U	-	5.0 U	1.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	5.0 U
Sodium	µg/L	-	-	-	-	-	6300	4900	-	-	-	-	-	-	-	5000 U
Thallium	µg/L	-	-	-	-	-	10 U	1.0 U	-	-	-	-	-	-	-	10 U
Vanadium	µg/L	50.0 U	50.0 U	50.0 U	0.95 J	-	7.0 U	5.0 U	-	50.0 U	2.6 J	1.2 J	50.0 U	-	-	7.0 U
Zinc	µg/L	20.0 U	20.0 U	20.0 U	20.0 U	-	50 U	20 U	-	20.0 U	20.0 U	20.0 U	20.0 U	-	-	50 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	0.48 U	0.0095 U	-	-	-	-	-	-	-	0.50 U
Wet																
Cyanide (total)	µg/L	10 U	10 U	10 U	10 U	-	10 U	-	-	10 U	10 U	10 U	10 U	-	-	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-2A	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-3A	MW-3A	MW-3A	MW-3A	MW-3A	MW-3A
Sample ID:		GW-31532-052418-JH-1	GW-022707-JO-006	GW-032607-JO-012	GW-060607-JO-08	GW-120607-SP-011	GW-030608-KW-013	GW-060211-JH-27	GW-110211-JH-37	GW-31532-052418-JH-1	GW-022607-JO-001	GW-022607-JO-002	GW-032607-JO-013	GW-060607-JO-12	GW-120607-SP-013	GW-030708-KW-016
Sample Date:		5/24/2018	2/27/2007	3/26/2007	6/6/2007	12/6/2007	3/6/2008	6/2/2011	11/2/2011	5/24/2018	2/26/2007	2/26/2007	3/26/2007	6/6/2007	12/6/2007	3/7/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
												(Duplicate)				
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
1,1-Dichloroethene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	2.0 U	-	-	-	-	-	-	2.0 U	10 U	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
1,2-Dichlorobenzene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
1,2-Dichloropropane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	200 U	-	200 U	400 U	200 U	-	-	-	330 U	330 U	-	200 U	500 U	200 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	10 U	10 U	-	10 U	20 U	1.3 J	-	10 U	50 U	17 U	17 U	-	4.5 J	25 U	10 U
2-Hexanone	µg/L	10 U	-	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	10 U	-	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	10 U	-	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	2.1	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.1 J	1.1 J	-	1.4	0.86 J	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Bromoform	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Carbon disulfide	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.4 U
Carbon tetrachloride	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Chlorobenzene	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
Chloroethane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Cyclohexane	µg/L	4.5	-	-	-	-	-	-	1.2	5.0 U	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Ethylbenzene	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	0.24 J	-	1.0 U	5.0 U	1.7 U	1.7 U	-	0.19 J	2.5 U	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	0.17 J	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Methyl acetate	µg/L	10 U	-	-	-	-	-	-	10 U	50 U	-	-	-	-	-	-
Methyl cyclohexane	µg/L	1.0 U	-	-	-	-	-	-	4.8	5.0 U	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	1.0 U	5.0 U	-	5.0 U	10 U	5.0 U	-	5.0 U	5.0 U	8.4 U	8.4 U	-	5.0 U	12 U	5.0 U
Methylene chloride	µg/L	5.0 U	-	-	-	-	-	-	1.0 U	25 U	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
Tetrachloroethene	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
Toluene	µg/L	0.84 J	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	0.97 J	0.86 J	-	1.4	1.5 J	0.44 J
trans-1,2-Dichloroethene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Trichloroethene	µg/L	1.0 U	1.0 U	-	1.0 U	2.0 U	1.0 U	-	1.0 U	5.0 U	1.7 U	1.7 U	-	1.0 U	2.5 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Vinyl chloride	µg/L	1.0 U	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-	-	-
Xylenes (total)	µg/L	0.16 J	2.0 U	-	2.0 U	4.0 U	2.0 U	-	2.0 U	10 U	2.5 J	2.4 J	-	3.8	3.2 J	2.3
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	-	1.0 U	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	1.0 U	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	1.0 U	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	2.0 U	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-2A	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-2B	MW-3A	MW-3A	MW-3A	MW-3A	MW-3A	MW-3A
Sample ID:		GW-31532-052418-JH-1	GW-022707-JO-006	GW-032607-JO-012	GW-060607-JO-08	GW-120607-SP-011	GW-030608-KW-013	GW-060211-JH-27	GW-110211-JH-37	GW-31532-052418-JH-1	GW-022607-JO-001	GW-022607-JO-002	GW-032607-JO-013	GW-060607-JO-12	GW-120607-SP-013	GW-030708-KW-016
Sample Date:		5/24/2018	2/27/2007	3/26/2007	6/6/2007	12/6/2007	3/6/2008	6/2/2011	11/2/2011	5/24/2018	2/26/2007	2/26/2007	3/26/2007	6/6/2007	12/6/2007	3/7/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
												(Duplicate)				
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	10 U	10 U	10 U	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	1.9 U	-	40 U	50 U	10 U	25 U	-	7.9 U	2.0 U	-	-	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	µg/L	9.7 U	-	200 U	250 U	50 U	120 U	-	20 U	9.9 U	-	-	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
2-Chlorophenol	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	0.19 U	-	-	-	-	-	-	1.2	0.70	-	-	-	-	-	-
2-Methylphenol	µg/L	0.97 U	-	40 U	50 U	10 U	25 U	-	4.0 U	0.99 U	-	-	10 U	10 U	10 U	10 U
2-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
2-Nitrophenol	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
3&4-Methylphenol	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	3.0 J	1.3 J	10 U	10 U
3-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	4.9 U	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4-Chloroaniline	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	3.0 J	1.3 J	10 U	10 U
4-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	7.9 U	2.0 U	-	-	-	-	-	-
4-Nitrophenol	µg/L	9.7 U	-	200 U	250 U	50 U	120 U	-	20 U	9.9 U	-	-	50 U	50 U	50 U	50 U
Acenaphthene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	0.84 J	0.72 J	1.2 J	10 U
Acenaphthylene	µg/L	0.19 U	-	-	-	-	-	-	0.79 U	0.20 U	-	-	-	-	-	-
Acetophenone	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Anthracene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.16 J	-	-	10 U	10 U	10 U	10 U
Atrazine	µg/L	1.9 U	-	-	-	-	-	-	4.0 U	2.0 U	-	-	-	-	-	-
Benzaldehyde	µg/L	1.9 U	-	-	-	-	-	-	4.0 U	2.0 U	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Benzo(a)pyrene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	40 U	50 U	10 U	25 U	-	-	-	-	-	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	µg/L	0.19 U	-	-	-	-	-	-	0.79 U	0.20 U	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Biphenyl (1,1-Biphenyl)	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	4.9 U	-	40 U	50 U	10 U	25 U	-	7.9 U	5.0 U	-	-	10 U	28 U	10 U	10 U
Butyl benzylphthalate (BBP)	µg/L	1.9 U	-	-	-	-	-	-	4.0 U	2.0 U	-	-	-	-	-	-
Caprolactam	µg/L	0.33 J	-	-	-	-	-	-	20 U	5.0 U	-	-	-	-	-	-
Carbazole	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Chrysene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Dibenzofuran	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Diethyl phthalate	µg/L	4.9 U	-	40 U	50 U	10 U	25 U	-	4.0 U	5.0 U	-	-	10 U	10 U	10 U	10 U
Dimethyl phthalate	µg/L	1.9 U	-	40 U	50 U	10 U	25 U	-	4.0 U	2.0 U	-	-	10 U	10 U	10 U	10 U
Di-n-butylphthalate (DBP)	µg/L	4.9 U	-	40 U	50 U	10 U	25 U	-	4.0 U	5.0 U	-	-	10 U	10 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	1.9 U	-	-	-	-	-	-	4.0 U	2.0 U	-	-	-	-	-	-
Fluoranthene	µg/L	0.19 U	-	0.84 J	50 U	10 U	25 U	-	0.79 U	0.27	-	-	10 U	10 U	10 U	10 U
Fluorene	µg/L	0.19 U	-	2.2 J	2.6 J	1.7 J	1.0 J	-	0.79 U	0.20 U	-	-	0.52 J	0.79 J	0.91 J	10 U
Hexachlorobenzene	µg/L	0.19 U	-	-	-	-	-	-	0.79 U	0.20 U	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	9.7 U	-	-	-	-	-	-	40 U	9.9 U	-	-	-	-	-	-
Hexachloroethane	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.19 U	-	40 U	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	10 U
Isophorone	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Naphthalene	µg/L	0.19 U	-	1.2 J	50 U	10 U	25 U	-	0.79 U	0.20 U	-	-	10 U	10 U	10 U	58
Nitrobenzene	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	0.97 U	-	-	-	-	-	-	4.0 U	0.99 U	-	-	-	-	-	-
Pentachlorophenol	µg/L	9.7 U	-	-	-	-	-	-	20 U	9.9 U	-	-	-	-	-	-
Phenanthrene	µg/L	0.19 U	-	16 J	9.5 J	7.8 J	8.3 J	-	4.1	2.8	-	-	0.24 J	10 U	10 U	10 U
Phenol	µg/L	0.97 U	-	40 U	50 U	10 U	25 U	-	4.0 U	0.99 U	-	-	10 U	10 U	10 U	10 U
Pyrene	µg/L	0.19 U	-	2.1 J	50 U	0.91 J	1.1 J	-	0.84	0.60	-	-	0.41 J	10 U	10 U	10 U
Pyridine	µg/L	-	-	80 U	100 U	20 U	50 U	-	-	-	-	-	20 U	20 U	20 U	20 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-2A**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-2B**	**MW-3A**	**MW-3A**	**MW-3A**	**MW-3A**	**MW-3A**	**MW-3A**
Sample ID:		**GW-31532-052418-JH-1**	**GW-022707-JO-006**	**GW-032607-JO-012**	**GW-060607-JO-08**	**GW-120607-SP-011**	**GW-030608-KW-013**	**GW-060211-JH-27**	**GW-110211-JH-37**	**GW-31532-052418-JH-1**	**GW-022607-JO-001**	**GW-022607-JO-002**	**GW-032607-JO-013**	**GW-060607-JO-12**	**GW-120607-SP-013**	**GW-030708-KW-016**
Sample Date:		**5/24/2018**	**2/27/2007**	**3/26/2007**	**6/6/2007**	**12/6/2007**	**3/6/2008**	**6/2/2011**	**11/2/2011**	**5/24/2018**	**2/26/2007**	**2/26/2007**	**3/26/2007**	**6/6/2007**	**12/6/2007**	**3/7/2008**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
												(Duplicate)				
Parameters	**Units**															
Metals																
Aluminum	µg/L	34 J	-	-	-	-	-	-	200 U	50 U	-	-	-	-	-	-
Antimony	µg/L	2.0 U	-	60.0 U	60.0 U	60.0 U	60.0 U	-	10 U	2.0 U	-	-	60.0 U	4.7 J	60.0 U	60.0 U
Arsenic	µg/L	2.8 J	-	30.9	39.0	35.5	34.2	-	41	40	-	-	5.4 J	7.0 J	6.9 J	8.4 J
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	33	-	305	375	362	372	-	380	340	-	-	17.0 J	17.5 J	19.4 J	34.2 J
Beryllium	µg/L	1.0 U	-	5.0 U	0.34 J	5.0 U	5.0 U	-	5.0 U	1.0 U	-	-	5.0 U	0.42 J	5.0 U	5.0 U
Cadmium	µg/L	1.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	2.0 U	1.0 U	-	-	5.0 U	5.0 U	5.0 U	5.0 U
Calcium	µg/L	95000	-	-	-	-	-	-	160000	160000	-	-	-	-	-	-
Chromium	µg/L	2.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	5.0 U	2.0 U	-	-	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	µg/L	1.0 U	-	50.0 U	50.0 U	50.0 U	50.0 U	-	7.0 U	0.35 J	-	-	50.0 U	1.4 J	50.0 U	50.0 U
Copper	µg/L	3.0	-	-	-	-	-	-	25 U	2.3	-	-	-	-	-	-
Iron	µg/L	100 U	-	-	-	-	-	-	9800	14000	-	-	-	-	-	-
Lead	µg/L	1.0 U	-	3.0 U	3.0 U	3.0 U	3.0 U	-	3.0 U	1.0 U	-	-	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium	µg/L	3900	-	-	-	-	-	-	33000	35000	-	-	-	-	-	-
Manganese	µg/L	22	-	-	-	-	-	-	46	67	-	-	-	-	-	-
Mercury	µg/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
Nickel	µg/L	2.0 U	-	40.0 U	40.0 U	40.0 U	40.0 U	-	40 U	2.0 U	-	-	40.0 U	40.0 U	40.0 U	40.0 U
Potassium	µg/L	2200	-	-	-	-	-	-	5700	5800	-	-	-	-	-	-
Selenium	µg/L	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	-	-	3.4 J	5.0 U	5.0 U	5.0 U
Silver	µg/L	1.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	5.0 U	1.0 U	-	-	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	µg/L	2000	-	-	-	-	-	-	27000	15000	-	-	-	-	-	-
Thallium	µg/L	1.0 U	-	-	-	-	-	-	10 U	1.0 U	-	-	-	-	-	-
Vanadium	µg/L	2.2 J	-	50.0 U	50.0 U	50.0 U	50.0 U	-	7.0 U	5.0 U	-	-	50.0 U	50.0 U	50.0 U	0.98 J
Zinc	µg/L	20 U	-	20.0 U	20.0 U	20.0 U	20.0 U	-	50 U	20 U	-	-	20.0 U	20.0 U	20.0 U	5.6 J
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	0.10 U	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	10 U	10 U	10 U	10 U	-	10 U	-	-	-	10 U	10 U	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-3A	MW-3A	MW-3A	MW-3A	MW-3A	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-4
Sample ID:		GW-103008-KW-006	GW-080510-TW-11	GW-060611-JH-47	GW-110211-JH-35	GW-31532-052418-JH-2	GW-022607-JO-003	GW-032607-JO-014	GW-060607-JO-13	GW-120607-SP-014	GW-030708-KW-017	GW-103008-KW-007	GW-060611-JH-48	GW-110211-JH-33	GW-31532-052418-JH-2	GW-032107-JO-015
Sample Date:		10/30/2008	8/5/2010	6/6/2011	11/2/2011	5/24/2018	2/26/2007	3/26/2007	6/6/2007	12/6/2007	3/7/2008	10/30/2008	6/6/2011	11/2/2011	5/24/2018	3/21/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,1,2-Trichloroethane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,1-Dichloroethane	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
1,1-Dichloroethene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	5.0 U	4.0 U	-	-	-	-	-	-	-	2.0 U	10 U	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,2-Dichloroethane	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
1,2-Dichloropropane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,3-Dichlorobenzene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,4-Dichlorobenzene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
1,4-Dioxane	µg/L	-	-	-	-	-	200 U	-	200 U	200 U	200 U	-	-	-	-	200 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	25 U	20 U	10 U	-	10 U	10 U	10 U	-	-	10 U	50 U	10 U
2-Hexanone	µg/L	-	-	-	25 U	20 U	-	-	-	-	-	-	-	10 U	50 U	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	25 U	20 U	-	-	-	-	-	-	-	10 U	50 U	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	25 U	20 U	-	-	-	-	-	-	-	10 U	50 U	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Bromoform	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Carbon disulfide	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Carbon tetrachloride	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Chlorobenzene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Chloroethane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Chloroform (Trichloromethane)	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
cis-1,3-Dichloropropene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Cyclohexane	µg/L	-	-	-	70	39	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Ethylbenzene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	2.5 U	1.0 J	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Methyl acetate	µg/L	-	-	-	25 U	20 U	-	-	-	-	-	-	-	10 U	50 U	-
Methyl cyclohexane	µg/L	-	-	-	39	25	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	13 U	2.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U	-	-	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	-	-	-	2.5 U	10 U	-	-	-	-	-	-	-	1.0 U	25 U	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Tetrachloroethene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Toluene	µg/L	-	-	-	2.5 U	0.47 J	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
trans-1,3-Dichloropropene	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Trichloroethene	µg/L	-	-	-	2.5 U	2.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	-	-	1.0 U	5.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Vinyl chloride	µg/L	-	-	-	2.5 U	2.0 U	-	-	-	-	-	-	-	1.0 U	5.0 U	-
Xylenes (total)	µg/L	-	-	-	5.0 U	0.52 J	2.0 U	-	2.0 U	2.0 U	2.0 U	-	-	2.0 U	10 U	2.0 U
VOAs - BTEX																
Benzene	µg/L	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-
Ethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1.2	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-
Xylenes (total)	µg/L	3.7	2.0	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-3A	MW-3A	MW-3A	MW-3A	MW-3A	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-3B	MW-4
Sample ID:		GW-103008-KW-006	GW-080510-TW-11	GW-060611-JH-47	GW-110211-JH-35	GW-31532-052418-JH-2	GW-022607-JO-003	GW-032607-JO-014	GW-060607-JO-13	GW-120607-SP-014	GW-030708-KW-017	GW-103008-KW-007	GW-060611-JH-48	GW-110211-JH-33	GW-31532-052418-JH-2	GW-032107-JO-015
Sample Date:		10/30/2008	8/5/2010	6/6/2011	11/2/2011	5/24/2018	2/26/2007	3/26/2007	6/6/2007	12/6/2007	3/7/2008	10/30/2008	6/6/2011	11/2/2011	5/24/2018	3/21/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
2,4,5-Trichlorophenol	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
2,4,6-Trichlorophenol	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
2,4-Dichlorophenol	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
2,4-Dimethylphenol	µg/L	-	-	-	2.0 U	2.0 U	-	10 U	10 U	10 U	10 U	-	-	2.0 U	2.0 U	10 U
2,4-Dinitrophenol	µg/L	-	-	-	5.0 U	9.8 U	-	50 U	50 U	50 U	50 U	-	-	5.0 U	9.8 U	50 U
2,4-Dinitrotoluene	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
2,6-Dinitrotoluene	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
2-Chloronaphthalene	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
2-Chlorophenol	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
2-Methylnaphthalene	µg/L	-	-	-	0.20 U	0.20 U	-	-	-	-	-	-	-	0.20 U	0.20 U	-
2-Methylphenol	µg/L	-	-	-	1.0 U	0.98 U	-	10 U	10 U	10 U	10 U	-	-	0.99 U	0.98 U	10 U
2-Nitroaniline	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
2-Nitrophenol	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
3&4-Methylphenol	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
3-Methylphenol	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
3-Nitroaniline	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4-Chloro-3-methylphenol	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4-Chloroaniline	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4-Methylphenol	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
4-Nitroaniline	µg/L	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-
4-Nitrophenol	µg/L	-	-	-	5.0 U	9.8 U	-	50 U	50 U	50 U	50 U	-	-	5.0 U	9.8 U	50 U
Acenaphthene	µg/L	-	-	-	0.20 U	1.1	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Acenaphthylene	µg/L	-	-	-	0.20 U	0.20 U	-	-	-	-	-	-	-	0.20 U	0.20 U	-
Acetophenone	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Anthracene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Atrazine	µg/L	-	-	-	1.0 U	2.0 U	-	-	-	-	-	-	-	0.99 U	2.0 U	-
Benzaldehyde	µg/L	-	-	-	1.0 U	2.0 U	-	-	-	-	-	-	-	0.99 U	2.0 U	-
Benzo(a)anthracene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Benzo(a)pyrene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Benzo(b)fluoranthene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U
Benzo(g,h,i)perylene	µg/L	-	-	-	0.20 U	0.20 U	-	-	-	-	-	-	-	0.20 U	0.20 U	-
Benzo(k)fluoranthene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	2.0 U	4.9 U	-	10 U	10 U	10 U	10 U	-	-	2.0 U	4.9 U	1.2 J
Butyl benzylphthalate (BBP)	µg/L	-	-	-	1.0 U	2.0 U	-	-	-	-	-	-	-	0.99 U	2.0 U	-
Caprolactam	µg/L	-	-	-	5.0 U	4.9 U	-	-	-	-	-	-	-	5.0 U	4.9 U	-
Carbazole	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Chrysene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Dibenz(a,h)anthracene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Dibenzofuran	µg/L	-	-	-	1.0 U	0.66 J	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Diethyl phthalate	µg/L	-	-	-	1.0 U	4.9 U	-	10 U	10 U	10 U	10 U	-	-	0.99 U	4.9 U	10 U
Dimethyl phthalate	µg/L	-	-	-	1.0 U	2.0 U	-	10 U	10 U	10 U	10 U	-	-	0.99 U	2.0 U	10 U
Di-n-butylphthalate (DBP)	µg/L	-	-	-	1.0 U	4.9 U	-	10 U	10 U	10 U	10 U	-	-	0.99 U	4.9 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	1.0 U	2.0 U	-	-	-	-	-	-	-	0.99 U	2.0 U	-
Fluoranthene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Fluorene	µg/L	-	-	-	0.66	0.78	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Hexachlorobenzene	µg/L	-	-	-	0.20 U	0.20 U	-	-	-	-	-	-	-	0.20 U	0.20 U	-
Hexachlorobutadiene	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Hexachlorocyclopentadiene	µg/L	-	-	-	10 U	9.8 U	-	-	-	-	-	-	-	9.9 U	9.8 U	-
Hexachloroethane	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Isophorone	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Naphthalene	µg/L	-	-	-	0.20 U	0.20 U	-	10 U	10 U	10 U	0.30 J	-	-	0.20 U	0.20 U	10 U
Nitrobenzene	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
N-Nitrosodiphenylamine	µg/L	-	-	-	1.0 U	0.98 U	-	-	-	-	-	-	-	0.99 U	0.98 U	-
Pentachlorophenol	µg/L	-	-	-	5.0 U	9.8 U	-	-	-	-	-	-	-	5.0 U	9.8 U	-
Phenanthrene	µg/L	-	-	-	0.20 U	0.25	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Phenol	µg/L	-	-	-	1.0 U	0.98 U	-	10 U	10 U	10 U	10 U	-	-	0.99 U	0.98 U	10 U
Pyrene	µg/L	-	-	-	0.20 U	0.26	-	10 U	10 U	10 U	10 U	-	-	0.20 U	0.20 U	10 U
Pyridine	µg/L	-	-	-	-	-	-	20 U	20 U	20 U	20 U	-	-	-	-	20 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-3A**	**MW-3A**	**MW-3A**	**MW-3A**	**MW-3A**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-3B**	**MW-4**
Sample ID:		**GW-103008-KW-006**	**GW-080510-TW-11**	**GW-060611-JH-47**	**GW-110211-JH-35**	**GW-31532-052418-JH-2**	**GW-022607-JO-003**	**GW-032607-JO-014**	**GW-060607-JO-13**	**GW-120607-SP-014**	**GW-030708-KW-017**	**GW-103008-KW-007**	**GW-060611-JH-48**	**GW-110211-JH-33**	**GW-31532-052418-JH-2**	**GW-032107-JO-015**
Sample Date:		**10/30/2008**	**8/5/2010**	**6/6/2011**	**11/2/2011**	**5/24/2018**	**2/26/2007**	**3/26/2007**	**6/6/2007**	**12/6/2007**	**3/7/2008**	**10/30/2008**	**6/6/2011**	**11/2/2011**	**5/24/2018**	**3/21/2007**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	200 U	50 U	-	-	-	-	-	-	-	200 U	50 U	-
Antimony	µg/L	-	-	-	10 U	2.0 U	-	60.0 U	5.2 J	60.0 U	4.5 J	-	-	10 U	2.0 U	60.0 U
Arsenic	µg/L	-	10.0 U	-	10 U	4.8 J	-	31.1	34.7	64.7	35.5	-	-	39	37	10.0 U
Arsenic (dissolved)	µg/L	10.7	-	-	-	-	-	-	-	-	-	42.9	-	-	-	-
Barium	µg/L	-	-	-	200 U	25	-	262	281	38.3 J	261	-	-	240	190	19.5 J
Beryllium	µg/L	-	-	-	5.0 U	1.0 U	-	5.0 U	0.41 J	5.0 U	5.0 U	-	-	5.0 U	1.0 U	5.0 U
Cadmium	µg/L	-	-	-	2.0 U	1.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	2.0 U	1.0 U	5.0 U
Calcium	µg/L	-	-	-	71000	89000	-	-	-	-	-	-	-	140000	110000	-
Chromium	µg/L	-	-	-	5.0 U	2.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	5.0 U	2.0 U	10.0 U
Cobalt	µg/L	-	-	-	7.0 U	1.0 U	-	50.0 U	50.0 U	50.0 U	50.0 U	-	-	7.0 U	0.19 J	50.0 U
Copper	µg/L	-	-	-	25 U	2.0 U	-	-	-	-	-	-	-	25 U	2.0 U	-
Iron	µg/L	-	-	-	6800	7500	-	-	-	-	-	-	-	7600	5800	-
Lead	µg/L	-	-	-	3.0 U	0.46 J	-	3.0 U	3.0 U	3.0 U	3.0 U	-	-	3.0 U	1.0 U	3.0 U
Magnesium	µg/L	-	-	-	17000	22000	-	-	-	-	-	-	-	34000	26000	-
Manganese	µg/L	-	-	-	240	270	-	-	-	-	-	-	-	48	40	-
Mercury	µg/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
Nickel	µg/L	-	-	-	40 U	2.0 U	-	40.0 U	40.0 U	40.0 U	40.0 U	-	-	40 U	2.0 U	2.3 J
Potassium	µg/L	-	-	-	5000 U	1000	-	-	-	-	-	-	-	5000 U	1900	-
Selenium	µg/L	-	-	-	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	5.0 U	5.0 U	5.0 U
Silver	µg/L	-	-	-	5.0 U	1.0 U	-	10.0 U	10.0 U	10.0 U	10.0 U	-	-	5.0 U	1.0 U	10.0 U
Sodium	µg/L	-	-	-	5000 U	1200	-	-	-	-	-	-	-	27000	20000	-
Thallium	µg/L	-	-	-	10 U	1.0 U	-	-	-	-	-	-	-	10 U	1.0 U	-
Vanadium	µg/L	-	-	-	7.0 U	5.0 U	-	50.0 U	50.0 U	50.0 U	50.0 U	-	-	7.0 U	5.0 U	50.0 U
Zinc	µg/L	-	-	-	50 U	20 U	-	20.0 U	20.0 U	20.0 U	5.5 J	-	-	50 U	20 U	277
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	0.53 U	0.097 U	-	-	-	-	-	-	-	0.50 U	0.098 U	-
Wet																
Cyanide (total)	µg/L	-	-	-	10 U	-	-	10 U	10 U	10 U	10 U	-	-	10 U	-	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5
Sample ID:		GW-060707-JO-18	GW-120407-SP-001	GW-030508-KW-001	GW-102908-KW-001	GW-080610-TW-15	GW-060111-JH-06	GW-110111-JH-19	iW-31532-052318-JH-(	GW-032107-JO-016	GW-060707-JO-17	GW-120407-SP-002	GW-030508-KW-002	GW-102908-KW-002	GW-080610-TW-14	GW-060111-JH-07
Sample Date:		6/7/2007	12/4/2007	3/5/2008	10/29/2008	8/6/2010	6/1/2011	11/1/2011	5/23/2018	3/21/2007	6/7/2007	12/4/2007	3/5/2008	10/29/2008	8/6/2010	6/1/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/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	1.0 U	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/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	1.0 U	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/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	1.0 U	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/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	1.0 U	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	200 U	200 U	200 U	-	-	-	-	-	200 U	200 U	200 U	200 U	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	10 U	10 U	10 U	-	-	-	10 U	10 U	1.5 J	10 U	10 U	10 U	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.9	0.62 J	1.0 U	0.84 J	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Carbon disulfide	µg/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	1.0 U	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Chlorobenzene	µg/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	1.0 U	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/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	1.0 U	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Ethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.2	1.3	0.23 J	0.24 J	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	1.0 U	7.0 J	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/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	1.0 U	-	-	-
Tetrachloroethene	µg/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	1.0 U	-	-	-
Toluene	µg/L	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.2	0.66 J	1.3	1.1	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Trichloroethene	µg/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	1.0 U	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-
Xylenes (total)	µg/L	2.0 U	2.0 U	2.0 U	-	-	-	2.0 U	2.0 U	7.8	5.2	7.1	8.4	-	-	-
VOAs - BTEX																
Benzene	µg/L	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U
Ethylbenzene	µg/L	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	0.76 J	1.0 U	1.0 U
Xylenes (total)	µg/L	-	-	-	2.0 U	2.0 U	2.0 U	-	-	-	-	-	-	3.7	2.4	4.2

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5
Sample ID:		GW-060707-JO-18	GW-120407-SP-001	GW-030508-KW-001	GW-102908-KW-001	GW-080610-TW-15	GW-060111-JH-06	GW-110111-JH-19	iW-31532-052318-JH-(	GW-032107-JO-016	GW-060707-JO-17	GW-120407-SP-002	GW-030508-KW-002	GW-102908-KW-002	GW-080610-TW-14	GW-060111-JH-07
Sample Date:		6/7/2007	12/4/2007	3/5/2008	10/29/2008	8/6/2010	6/1/2011	11/1/2011	5/23/2018	3/21/2007	6/7/2007	12/4/2007	3/5/2008	10/29/2008	8/6/2010	6/1/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	10 U	10 U	10 U	-	-	-	-	-	25 U	10 U	25 UJ	10 U	-	-	-
1,3-Dichlorobenzene	µg/L	10 U	10 U	10 U	-	-	-	-	-	25 U	10 U	25 UJ	10 U	-	-	-
1,4-Dichlorobenzene	µg/L	10 U	10 U	10 U	-	-	-	-	-	25 U	10 U	25 UJ	10 U	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	5.2 U	4.8 U	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	5.2 U	4.8 U	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	10 U	10 U	10 U	-	-	-	2.1 U	1.9 U	3.3 J	10 U	25 UJ	10 U	-	-	-
2,4-Dinitrophenol	µg/L	50 U	50 U	50 U	-	-	-	5.2 U	9.5 U	120 U	50 U	120 UJ	50 U	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	5.2 U	4.8 U	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	5.2 U	4.8 U	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	0.21 U	0.19 U	-	-	-	-	-	-	-
2-Methylphenol	µg/L	10 U	10 U	10 U	-	-	-	1.0 U	0.95 U	12 J	10 U	25 UJ	10 U	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	R	4.8 U	-	-	-	-	-	-	-
3-Methylphenol	µg/L	10 U	10 U	10 U	-	-	-	-	-	10 J	10 U	25 UJ	10 U	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	5.2 U	4.8 U	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4-Methylphenol	µg/L	10 U	10 U	10 U	-	-	-	-	-	10 J	10 U	25 UJ	10 U	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	2.1 U	1.9 U	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	50 U	50 U	50 U	-	-	-	5.2 U	9.5 U	120 U	50 U	120 UJ	50 U	-	-	-
Acenaphthene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	1.3 J	1.2 J	1.2 J	1.1 J	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	0.21 U	0.19 U	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Anthracene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	1.0 U	1.9 U	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	1.0 U	1.9 U	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Benzo(a)pyrene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Benzo(b)fluoranthene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10 U	10 U	10 U	-	-	-	-	-	25 U	10 U	25 UJ	10 U	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	0.21 U	0.19 U	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	10 U	10 U	10 U	-	-	-	2.1 U	4.8 U	25 U	2.2 J	25 UJ	10 U	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	1.0 U	1.9 U	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	5.2 U	0.19 J	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Chrysene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Dibenz(a,h)anthracene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	10 U	10 U	10 U	-	-	-	1.0 U	4.8 U	25 U	10 U	25 UJ	10 U	-	-	-
Dimethyl phthalate	µg/L	10 U	10 U	10 U	-	-	-	1.0 U	1.9 U	25 U	10 U	25 UJ	10 U	-	-	-
Di-n-butylphthalate (DBP)	µg/L	10 U	10 U	10 U	-	-	-	1.0 U	4.8 U	25 U	10 U	25 UJ	10 U	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	1.0 UJ	1.9 U	-	-	-	-	-	-	-
Fluoranthene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Fluorene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	3.5 J	5.0 J	5.4 J	4.3 J	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	0.21 U	0.19 U	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	10 U	9.5 U	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Naphthalene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	0.68 J	10 U	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	1.0 U	0.95 U	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	5.2 U	9.5 U	-	-	-	-	-	-	-
Phenanthrene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Phenol	µg/L	10 U	10 U	10 U	-	-	-	1.0 U	0.95 U	15 J	10 U	25 UJ	10 U	-	-	-
Pyrene	µg/L	10 U	10 U	10 U	-	-	-	0.21 U	0.19 U	25 U	10 U	25 UJ	10 U	-	-	-
Pyridine	µg/L	20 U	20 U	20 U	-	-	-	-	-	50 U	20 U	50 UJ	20 U	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-4**	**MW-4**	**MW-4**	**MW-4**	**MW-4**	**MW-4**	**MW-4**	**MW-4**	**MW-5**	**MW-5**	**MW-5**	**MW-5**	**MW-5**	**MW-5**	**MW-5**
Sample ID:		**GW-060707-JO-18**	**GW-120407-SP-001**	**GW-030508-KW-001**	**GW-102908-KW-001**	**GW-080610-TW-15**	**GW-060111-JH-06**	**GW-110111-JH-19**	**iW-31532-052318-JH-(**	**GW-032107-JO-016**	**GW-060707-JO-17**	**GW-120407-SP-002**	**GW-030508-KW-002**	**GW-102908-KW-002**	**GW-080610-TW-14**	**GW-060111-JH-07**
Sample Date:		**6/7/2007**	**12/4/2007**	**3/5/2008**	**10/29/2008**	**8/6/2010**	**6/1/2011**	**11/1/2011**	**5/23/2018**	**3/21/2007**	**6/7/2007**	**12/4/2007**	**3/5/2008**	**10/29/2008**	**8/6/2010**	**6/1/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	200 U	50 U	-	-	-	-	-	-	-
Antimony	µg/L	60.0 U	60.0 U	60.0 U	-	-	-	10 U	3.4	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-
Arsenic	µg/L	10.0 U	10.0 U	10.0 U	-	10.0 U	-	10 U	5.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	10.0 U	-
Arsenic (dissolved)	µg/L	-	-	-	3.3 J	-	-	-	-	-	-	-	-	4.3 J	-	-
Barium	µg/L	13.2 J	19.0 J	9.5 J	-	-	-	200 U	7.8	32.5 J	30.7 J	32.0 J	29.7 J	-	-	-
Beryllium	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-
Cadmium	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-
Calcium	µg/L	-	-	-	-	-	-	76000	39000	-	-	-	-	-	-	-
Chromium	µg/L	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	2.0 U	1.6 J	10.0 U	2.9 J	10.0 U	-	-	-
Cobalt	µg/L	1.3 J	50.0 U	50.0 U	-	-	-	7.0 U	0.19 J	50.0 U	1.4 J	50.0 U	50.0 U	-	-	-
Copper	µg/L	-	-	-	-	-	-	25 U	3.3	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	1400	100 U	-	-	-	-	-	-	-
Lead	µg/L	3.0 U	3.0 U	3.0 U	-	-	-	3.0 U	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	13000	8000	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	210	18	-	-	-	-	-	-	-
Mercury	µg/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	-	-	-
Nickel	µg/L	40.0 U	40.0 U	40.0 U	-	-	-	40 U	2.0 U	2.6 J	40.0 U	40.0 U	40.0 U	-	-	-
Potassium	µg/L	-	-	-	-	-	-	5000 U	710 J	-	-	-	-	-	-	-
Selenium	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-
Silver	µg/L	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-
Sodium	µg/L	-	-	-	-	-	-	5000 U	1500	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	10 U	1.0 U	-	-	-	-	-	-	-
Vanadium	µg/L	50.0 U	1.6 J	50.0 U	-	-	-	7.0 U	5.0 U	2.0 J	50.0 U	2.1 J	1.6 J	-	-	-
Zinc	µg/L	61.7	26.3	20.0 U	-	-	-	50 U	20 U	520	40.5	20.3	20.0 U	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	10 U	10 U	10 U	-	-	-	10 U	-	10 U	10 U	10 U	10 U	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-5	MW-5	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-7	MW-7	MW-7	MW-7
Sample ID:		GW-110111-JH-21	GW-31532-052318-JH-0	GW-032607-JO-019	GW-060707-JO-16	GW-120507-SP-004	GW-030508-KW-003	GW-102908-KW-003	GW-080610-TW-13	GW-060311-JH-36	GW-110111-JH-23	GW-31532-052318-JH-0	GW-032207-JO-018	GW-060707-JO-19	GW-120507-SP-003	GW-030608-KW-008
Sample Date:		11/1/2011	5/23/2018	3/26/2007	6/7/2007	12/5/2007	3/5/2008	10/29/2008	8/6/2010	6/3/2011	11/1/2011	5/23/2018	3/22/2007	6/7/2007	12/5/2007	3/6/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,1-Dichloroethane	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,2-Dichloroethane	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,4-Dichlorobenzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
1,4-Dioxane	µg/L	-	-	200 U	200 U	200 U	200 U	-	-	-	-	-	200 U	200 U	200 U	200 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	10 U	10 U	10 U	1.1 J	10 U	10 U	-	-	-	10 U	10 U	10 U	3.3 J	10 U	10 U
2-Hexanone	µg/L	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	1.0 U	0.50 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Bromoform	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Carbon disulfide	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Chlorobenzene	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Chloroform (Trichloromethane)	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Cyclohexane	µg/L	11	5.8	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Ethylbenzene	µg/L	1.0 U	0.11 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	6.2	2.3	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Methyl acetate	µg/L	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-	-	-
Methyl cyclohexane	µg/L	15	6.6	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	0.25 J	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	1.0 U	8.3	-	-	-	-	-	-	-	1.0 U	6.7	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1.2	0.92 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Trichloroethene	µg/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	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Vinyl chloride	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-	-	-
Xylenes (total)	µg/L	7.1	2.9	2.0 U	2.0 U	2.0 U	2.0 U	-	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	2.0 U	2.0 U	2.0 U	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-5	MW-5	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-7	MW-7	MW-7	MW-7
Sample ID:		GW-110111-JH-21	W-31532-052318-JH-0	GW-032607-JO-019	GW-060707-JO-16	GW-120507-SP-004	GW-030508-KW-003	GW-102908-KW-003	GW-080610-TW-13	GW-060311-JH-36	GW-110111-JH-23	W-31532-052318-JH-0	GW-032207-JO-018	GW-060707-JO-19	GW-120507-SP-003	GW-030608-KW-008
Sample Date:		11/1/2011	5/23/2018	3/26/2007	6/7/2007	12/5/2007	3/5/2008	10/29/2008	8/6/2010	6/3/2011	11/1/2011	5/23/2018	3/22/2007	6/7/2007	12/5/2007	3/6/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
1,3-Dichlorobenzene	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
1,4-Dichlorobenzene	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
2,4,5-Trichlorophenol	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
2,4,6-Trichlorophenol	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
2,4-Dichlorophenol	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
2,4-Dimethylphenol	µg/L	1.9 U	9.5 U	10 U	10 U	10 U	10 U	-	-	-	1.9 U	1.9 U	10 U	25 U	10 U	10 U
2,4-Dinitrophenol	µg/L	4.9 U	48 U	50 U	50 U	50 U	50 U	-	-	-	4.8 U	9.5 U	50 U	120 U	50 U	50 U
2,4-Dinitrotoluene	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
2,6-Dinitrotoluene	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
2-Chloronaphthalene	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
2-Chlorophenol	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
2-Methylnaphthalene	µg/L	0.19 U	0.95 U	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-	-	-
2-Methylphenol	µg/L	0.97 U	1.2 J	10 U	10 U	10 U	10 U	-	-	-	0.95 U	0.95 U	10 U	25 U	10 U	10 U
2-Nitroaniline	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
2-Nitrophenol	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
3&4-Methylphenol	µg/L	1.9 U	1.4 J	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
3-Methylphenol	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
3-Nitroaniline	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4-Chloro-3-methylphenol	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4-Chloroaniline	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4-Methylphenol	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
4-Nitroaniline	µg/L	1.9 U	9.5 U	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-	-	-
4-Nitrophenol	µg/L	4.9 U	48 U	50 U	50 U	50 U	50 U	-	-	-	4.8 U	9.5 U	50 U	120 U	50 U	50 U
Acenaphthene	µg/L	1.3	2.2	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	0.73 J	25 U	10 U	0.27 J
Acenaphthylene	µg/L	0.19 U	0.95 U	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-	-	-
Acetophenone	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Anthracene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	0.35 J	25 U	10 U	10 U
Atrazine	µg/L	0.97 U	9.5 U	-	-	-	-	-	-	-	0.95 U	1.9 U	-	-	-	-
Benzaldehyde	µg/L	0.97 U	9.5 U	-	-	-	-	-	-	-	0.95 U	1.9 U	-	-	-	-
Benzo(a)anthracene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Benzo(a)pyrene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Benzo(b)fluoranthene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	25 U	10 U	10 U
Benzo(g,h,i)perylene	µg/L	0.19 U	0.95 U	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Biphenyl (1,1-Biphenyl)	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	1.9 U	24 U	10 U	1.2 J	0.94 J	10 U	-	-	-	1.9 U	4.8 U	10 U	4.8 J	10 U	10 U
Butyl benzylphthalate (BBP)	µg/L	0.97 U	9.5 U	-	-	-	-	-	-	-	0.95 U	1.9 U	-	-	-	-
Caprolactam	µg/L	4.9 U	24 U	-	-	-	-	-	-	-	4.8 U	4.8 U	-	-	-	-
Carbazole	µg/L	1.0	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Chrysene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	0.29 J
Dibenz(a,h)anthracene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Dibenzofuran	µg/L	2.9	3.5 J	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Diethyl phthalate	µg/L	0.97 U	24 U	10 U	10 U	10 U	10 U	-	-	-	0.95 U	4.8 U	10 U	25 U	10 U	10 U
Dimethyl phthalate	µg/L	0.97 U	9.5 U	10 U	10 U	10 U	10 U	-	-	-	0.95 U	1.9 U	10 U	25 U	10 U	10 U
Di-n-butylphthalate (DBP)	µg/L	0.97 U	24 U	10 U	10 U	10 U	10 U	-	-	-	0.95 U	4.8 U	10 U	25 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	0.97 U	9.5 U	-	-	-	-	-	-	-	0.95 U	1.9 U	-	-	-	-
Fluoranthene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	0.21 J
Fluorene	µg/L	5.9	6.6	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	2.4 J	25 U	0.66 J	0.84 J
Hexachlorobenzene	µg/L	0.19 U	0.95 U	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-	-	-
Hexachlorobutadiene	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Hexachlorocyclopentadiene	µg/L	9.7 U	48 U	-	-	-	-	-	-	-	9.5 U	9.5 U	-	-	-	-
Hexachloroethane	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	25 U	10 U	10 U
Isophorone	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Naphthalene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	0.72 J	25 U	10 U	10 U
Nitrobenzene	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
N-Nitrosodiphenylamine	µg/L	0.97 U	4.8 U	-	-	-	-	-	-	-	0.95 U	0.95 U	-	-	-	-
Pentachlorophenol	µg/L	4.9 U	48 U	-	-	-	-	-	-	-	4.8 U	9.5 U	-	-	-	-
Phenanthrene	µg/L	0.59	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	6.1 J	3.9 J	1.8 J	1.8 J
Phenol	µg/L	0.97 U	4.8 U	10 U	10 U	10 U	10 U	-	-	-	0.95 U	0.95 U	10 U	25 U	10 U	10 U
Pyrene	µg/L	0.19 U	0.95 U	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	0.33 J	25 U	0.32 J	0.50 J
Pyridine	µg/L	-	-	20 U	20 U	20 U	20 U	-	-	-	-	-	20 U	50 U	20 U	20 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-5**	**MW-5**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-6**	**MW-7**	**MW-7**	**MW-7**	**MW-7**
Sample ID:		**GW-110111-JH-21**	**W-31532-052318-JH-0**	**GW-032607-JO-019**	**GW-060707-JO-16**	**GW-120507-SP-004**	**GW-030508-KW-003**	**GW-102908-KW-003**	**GW-080610-TW-13**	**GW-060311-JH-36**	**GW-110111-JH-23**	**W-31532-052318-JH-0**	**GW-032207-JO-018**	**GW-060707-JO-19**	**GW-120507-SP-003**	**GW-030608-KW-008**
Sample Date:		**11/1/2011**	**5/23/2018**	**3/26/2007**	**6/7/2007**	**12/5/2007**	**3/5/2008**	**10/29/2008**	**8/6/2010**	**6/3/2011**	**11/1/2011**	**5/23/2018**	**3/22/2007**	**6/7/2007**	**12/5/2007**	**3/6/2008**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	200 U	50 U	-	-	-	-	-	-	-	200 U	50 U	-	-	-	-
Antimony	µg/L	10 U	0.62 J	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	10 U	2.0 U	60.0 U	60.0 U	60.0 U	60.0 U
Arsenic	µg/L	10 U	2.4 J	10.0 U	10.0 U	10.0 U	3.8 J	-	10.0 U	-	10 U	1.9 J	16.5	20.3	30.4	22.7
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	5.6 J	-	-	-	-	-	-	-	-
Barium	µg/L	200 U	71	33.0 J	40.3 J	30.9 J	24.7 J	-	-	-	200 U	22	57.9 J	72.2 J	64.2 J	60.2 J
Beryllium	µg/L	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cadmium	µg/L	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Calcium	µg/L	82000	150000	-	-	-	-	-	-	-	93000	93000	-	-	-	-
Chromium	µg/L	5.0 U	2.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	2.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	µg/L	7.0 U	1.0 U	1.5 J	50.0 U	50.0 U	50.0 U	-	-	-	7.0 U	0.19 J	50.0 U	50.0 U	50.0 U	50.0 U
Copper	µg/L	25 U	2.0 U	-	-	-	-	-	-	-	25 U	2.0 U	-	-	-	-
Iron	µg/L	5800	14000	-	-	-	-	-	-	-	5800	3700	-	-	-	-
Lead	µg/L	3.0 U	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-	3.0 U	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium	µg/L	8600	21000	-	-	-	-	-	-	-	13000	14000	-	-	-	-
Manganese	µg/L	380	630	-	-	-	-	-	-	-	580	580	-	-	-	-
Mercury	µg/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
Nickel	µg/L	40 U	2.0 U	40.0 U	40.0 U	40.0 U	40.0 U	-	-	-	40 U	2.0 U	40.0 U	40.0 U	40.0 U	40.0 U
Potassium	µg/L	5000 U	1500	-	-	-	-	-	-	-	5000 U	290 J	-	-	-	-
Selenium	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	µg/L	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	µg/L	5000 U	1600	-	-	-	-	-	-	-	5000 U	2900	-	-	-	-
Thallium	µg/L	10 U	1.0 U	-	-	-	-	-	-	-	10 U	1.0 U	-	-	-	-
Vanadium	µg/L	7.0 U	1.5 J	50.0 U	50.0 U	0.98 J	50.0 U	-	-	-	7.0 U	5.0 U	50.0 U	50.0 U	2.1 J	50.0 U
Zinc	µg/L	50 U	20 U	113	20.0 U	20.0 U	20.0 U	-	-	-	50 U	20 U	68.6	20.0 U	20.0 U	7.4 J
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-	-	-
Wet																
Cyanide (total)	µg/L	10 U	-	10 U	10 U	10 U	10 U	-	-	-	10 U	-	10 U	10 U	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-7	MW-7	MW-7	MW-7	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-9	MW-9
Sample ID:		GW-080610-TW-16	GW-060611-JH-44	GW-110111-JH-25	W-31532-052318-JH-0	GW-032607-JO-017	GW-060607-JO-15	GW-120507-SP-005	GW-030608-KW-009	GW-102908-KW-004	GW-080610-TW-12	GW-060111-JH-05	GW-110211-JH-29	W-31532-052318-JH-1	GW-032207-JO-020	GW-032207-JO-021
Sample Date:		8/6/2010	6/6/2011	11/1/2011	5/23/2018	3/26/2007	6/6/2007	12/5/2007	3/6/2008	10/29/2008	8/6/2010	6/1/2011	11/2/2011	5/23/2018	3/22/2007	3/22/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
																(Duplicate)
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/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	1.7 U	1.4 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,1,2-Trichloroethane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,1-Dichloroethane	µg/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	1.7 U	1.4 U
1,1-Dichloroethene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/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	1.7 U	1.4 U
1,2-Dichlorobenzene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,2-Dichloroethane	µg/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	1.7 U	1.4 U
1,2-Dichloropropane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,3-Dichlorobenzene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,4-Dichlorobenzene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
1,4-Dioxane	µg/L	-	-	-	-	200 U	200 U	200 U	200 U	-	-	-	-	-	330 U	290 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	10 U	10 U	10 U	10 U	10 U	10 U	-	-	-	10 U	10 U	4.1 J	14 U
2-Hexanone	µg/L	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	6.4 J	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/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	4.8	4.8
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Bromoform	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Carbon disulfide	µg/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	1.7 U	1.4 U
Carbon tetrachloride	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Chlorobenzene	µg/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	1.7 U	1.4 U
Chloroethane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Chloroform (Trichloromethane)	µg/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	1.7 U	1.4 U
Chloromethane (Methyl chloride)	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
cis-1,3-Dichloropropene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Cyclohexane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Ethylbenzene	µg/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	11	9.6
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Methyl acetate	µg/L	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U	-	-
Methyl cyclohexane	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	8.4 U	7.2 U
Methylene chloride	µg/L	-	-	1.0 U	7.6	-	-	-	-	-	-	-	1.0 U	6.7	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/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	1.7 U	1.4 U
Tetrachloroethene	µg/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	1.7 U	1.4 U
Toluene	µg/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	1.5 J	1.4
trans-1,2-Dichloroethene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
trans-1,3-Dichloropropene	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Trichloroethene	µg/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	1.7 U	1.4 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Vinyl chloride	µg/L	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U	-	-
Xylenes (total)	µg/L	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	-	-	-	2.0 U	2.0 U	6.9	6.2
VOAs - BTEX																
Benzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-
Ethylbenzene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-	-	-
Xylenes (total)	µg/L	2.0 U	2.0 U	-	-	-	-	-	-	2.0 U	2.0 U	2.0 U	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-7	MW-7	MW-7	MW-7	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-9	MW-9
Sample ID:		GW-080610-TW-16	GW-060611-JH-44	GW-110111-JH-25	W-31532-052318-JH-0	GW-032607-JO-017	GW-060607-JO-15	GW-120507-SP-005	GW-030608-KW-009	GW-102908-KW-004	GW-080610-TW-12	GW-060111-JH-05	GW-110211-JH-29	W-31532-052318-JH-1	GW-032207-JO-020	GW-032207-JO-021
Sample Date:		8/6/2010	6/6/2011	11/1/2011	5/23/2018	3/26/2007	6/6/2007	12/5/2007	3/6/2008	10/29/2008	8/6/2010	6/1/2011	11/2/2011	5/23/2018	3/22/2007	3/22/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
																(Duplicate)
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
2,4,5-Trichlorophenol	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
2,4,6-Trichlorophenol	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
2,4-Dichlorophenol	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
2,4-Dimethylphenol	µg/L	-	-	2.0 U	1.9 UJ	10 U	10 U	10 U	10 U	-	-	-	1.9 U	1.9 U	10 U	10 U
2,4-Dinitrophenol	µg/L	-	-	4.9 U	9.5 UJ	50 U	50 U	50 U	50 U	-	-	-	4.9 U	9.5 U	50 U	50 U
2,4-Dinitrotoluene	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
2,6-Dinitrotoluene	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
2-Chloronaphthalene	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
2-Chlorophenol	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
2-Methylnaphthalene	µg/L	-	-	0.20 U	0.19 UJ	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-
2-Methylphenol	µg/L	-	-	0.98 U	0.95 UJ	10 U	10 U	10 U	10 U	-	-	-	0.97 U	0.95 U	10 U	10 U
2-Nitroaniline	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
2-Nitrophenol	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
3&4-Methylphenol	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
3-Methylphenol	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
3-Nitroaniline	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4-Chloro-3-methylphenol	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4-Chloroaniline	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4-Methylphenol	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
4-Nitroaniline	µg/L	-	-	2.0 U	1.9 UJ	-	-	-	-	-	-	-	1.9 U	1.9 U	-	-
4-Nitrophenol	µg/L	-	-	4.9 U	9.5 UJ	50 U	50 U	50 U	50 U	-	-	-	4.9 U	9.5 U	50 U	50 U
Acenaphthene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	3.5 J	3.8 J
Acenaphthylene	µg/L	-	-	0.20 U	0.19 UJ	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-
Acetophenone	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Anthracene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	0.32 J	-	-	-	0.19 U	0.13 J	0.38 J	0.32 J
Atrazine	µg/L	-	-	0.98 U	1.9 UJ	-	-	-	-	-	-	-	0.97 U	1.9 U	-	-
Benzaldehyde	µg/L	-	-	0.98 U	1.9 UJ	-	-	-	-	-	-	-	0.97 U	1.9 U	-	-
Benzo(a)anthracene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Benzo(a)pyrene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Benzo(b)fluoranthene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	10 U	10 U	10 U	10 U	-	-	-	-	-	10 U	10 U
Benzo(g,h,i)perylene	µg/L	-	-	0.20 U	0.19 UJ	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	2.0 U	4.8 UJ	10 U	10 U	10 U	10 U	-	-	-	1.9 U	4.8 U	10 U	10 U
Butyl benzylphthalate (BBP)	µg/L	-	-	0.98 U	1.9 UJ	-	-	-	-	-	-	-	0.97 U	1.9 U	-	-
Caprolactam	µg/L	-	-	4.9 U	4.8 UJ	-	-	-	-	-	-	-	4.9 U	4.8 U	-	-
Carbazole	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Chrysene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Dibenz(a,h)anthracene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Dibenzofuran	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Diethyl phthalate	µg/L	-	-	0.98 U	4.8 UJ	10 U	10 U	10 U	10 U	-	-	-	0.97 U	4.8 U	10 U	10 U
Dimethyl phthalate	µg/L	-	-	0.98 U	1.9 UJ	10 U	10 U	10 U	10 U	-	-	-	0.97 U	1.9 U	10 U	10 U
Di-n-butylphthalate (DBP)	µg/L	-	-	0.98 U	4.8 UJ	10 U	10 U	10 U	10 U	-	-	-	0.97 U	4.8 U	1.0 J	0.87 J
Di-n-octyl phthalate (DnOP)	µg/L	-	-	0.98 U	1.9 UJ	-	-	-	-	-	-	-	0.97 U	1.9 U	-	-
Fluoranthene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Fluorene	µg/L	-	-	0.69	0.72 J	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	3.3 J	3.7 J
Hexachlorobenzene	µg/L	-	-	0.20 U	0.19 UJ	-	-	-	-	-	-	-	0.19 U	0.19 U	-	-
Hexachlorobutadiene	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Hexachlorocyclopentadiene	µg/L	-	-	9.8 U	9.5 UJ	-	-	-	-	-	-	-	9.7 U	9.5 U	-	-
Hexachloroethane	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	10 U	10 U
Isophorone	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Naphthalene	µg/L	-	-	0.20 U	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	37	40
Nitrobenzene	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
N-Nitrosodiphenylamine	µg/L	-	-	0.98 U	0.95 UJ	-	-	-	-	-	-	-	0.97 U	0.95 U	-	-
Pentachlorophenol	µg/L	-	-	4.9 U	9.5 UJ	-	-	-	-	-	-	-	4.9 U	9.5 U	-	-
Phenanthrene	µg/L	-	-	0.85	0.19 UJ	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	7.6 J	7.8 J
Phenol	µg/L	-	-	0.98 U	0.95 UJ	10 U	10 U	10 U	10 U	-	-	-	0.97 U	0.95 U	10 U	10 U
Pyrene	µg/L	-	-	0.28	0.32 J	10 U	10 U	10 U	10 U	-	-	-	0.19 U	0.19 U	0.40 J	0.34 J
Pyridine	µg/L	-	-	-	-	20 U	20 U	20 U	20 U	-	-	-	-	-	20 U	20 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-7**	**MW-7**	**MW-7**	**MW-7**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-8**	**MW-9**	**MW-9**
Sample ID:		**GW-080610-TW-16**	**GW-060611-JH-44**	**GW-110111-JH-25**	**W-31532-052318-JH-0**	**GW-032607-JO-017**	**GW-060607-JO-15**	**GW-120507-SP-005**	**GW-030608-KW-009**	**GW-102908-KW-004**	**GW-080610-TW-12**	**GW-060111-JH-05**	**GW-110211-JH-29**	**W-31532-052318-JH-1**	**GW-032207-JO-020**	**GW-032207-JO-021**
Sample Date:		**8/6/2010**	**6/6/2011**	**11/1/2011**	**5/23/2018**	**3/26/2007**	**6/6/2007**	**12/5/2007**	**3/6/2008**	**10/29/2008**	**8/6/2010**	**6/1/2011**	**11/2/2011**	**5/23/2018**	**3/22/2007**	**3/22/2007**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
																(Duplicate)
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	200 U	35 J	-	-	-	-	-	-	-	200 U	50 U	-	-
Antimony	µg/L	-	-	10 U	2.0 U	60.0 U	5.5 J	60.0 U	60.0 U	-	-	-	10 U	2.0 U	60.0 U	60.0 U
Arsenic	µg/L	41.7	-	39	15	10.0 U	10.0 U	10.0 U	3.7 J	-	10.0 U	-	10 U	1.9 J	10.0 U	10.0 U
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	3.4 J	-	-	-	-	-	-
Barium	µg/L	-	-	200 U	52	30.6 J	35.6 J	34.5 J	50.7 J	-	-	-	200 U	43	25.4 J	24.8 J
Beryllium	µg/L	-	-	5.0 U	1.0 U	5.0 U	0.38 J	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U
Cadmium	µg/L	-	-	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.0 U	5.0 U	5.0 U
Calcium	µg/L	-	-	180000	110000	-	-	-	-	-	-	-	120000	100000	-	-
Chromium	µg/L	-	-	5.0 U	2.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	2.0 U	10.0 U	2.0 J
Cobalt	µg/L	-	-	7.0 U	1.0 U	1.6 J	50.0 U	50.0 U	50.0 U	-	-	-	7.0 U	1.0 U	50.0 U	1.7 J
Copper	µg/L	-	-	25 U	2.0 U	-	-	-	-	-	-	-	25 U	2.0 U	-	-
Iron	µg/L	-	-	13000	14000	-	-	-	-	-	-	-	9900	11000	-	-
Lead	µg/L	-	-	3.0 U	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-	3.0 U	1.0 U	3.0 U	3.0 U
Magnesium	µg/L	-	-	14000	9800	-	-	-	-	-	-	-	20000	19000	-	-
Manganese	µg/L	-	-	1300	1500	-	-	-	-	-	-	-	350	560	-	-
Mercury	µg/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
Nickel	µg/L	-	-	40 U	2.0 U	1.5 J	40.0 U	40.0 U	40.0 U	-	-	-	40 U	2.0 U	40.0 U	40.0 U
Potassium	µg/L	-	-	5000 U	1100	-	-	-	-	-	-	-	5000 U	1300	-	-
Selenium	µg/L	-	-	5.0 U	5.0 U	5.0 U	3.4 J	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U
Silver	µg/L	-	-	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U	10.0 U	10.0 U
Sodium	µg/L	-	-	5000 U	2000	-	-	-	-	-	-	-	5000 U	1900	-	-
Thallium	µg/L	-	-	10 U	1.0 U	-	-	-	-	-	-	-	10 U	1.0 U	-	-
Vanadium	µg/L	-	-	7.0 U	1.5 J	50.0 U	50.0 U	1.5 J	50.0 U	-	-	-	7.0 U	5.0 U	6.0 J	7.0 J
Zinc	µg/L	-	-	50 U	20 U	20.0 U	20.0 U	6.0 J	20.0 U	-	-	-	50 U	20 U	6.9 J	20.0 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	0.50 U	0.095 U	-	-	-	-	-	-	-	0.49 U	0.095 U	-	-
Wet																
Cyanide (total)	µg/L	-	-	10 U	-	10 U	10 U	10 U	10 U	-	-	-	10 U	-	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10	MW-10
Sample ID:		GW-060607-JO-14	GW-120507-SP-006	GW-120507-SP-007	GW-030608-KW-011	GW-030608-KW-012	GW-103008-KW-005	GW-080510-TW-10	GW-060311-JH-34	GW-060311-JH-35	GW-110311-JH-47	W-31532-052418-JH-1	GW-032307-JO-022	GW-060507-JO-06	GW-120507-SP-008	GW-030608-KW-010
Sample Date:		6/6/2007	12/5/2007	12/5/2007	3/6/2008	3/6/2008	10/30/2008	8/5/2010	6/3/2011	6/3/2011	11/3/2011	5/24/2018	3/23/2007	6/5/2007	12/5/2007	3/6/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				(Duplicate)		(Duplicate)				(Duplicate)						
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,1-Dichloroethane	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	10 U	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,2-Dichloroethane	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
1,4-Dioxane	µg/L	400 U	500 U	500 U	200 U	200 U	-	-	-	-	-	-	5000 U	2500 U	4000 U	5000 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	6.1 J	25 U	25 U	10 U	10 U	-	-	-	-	10 U	9.6 J	250 U	120 U	200 U	250 U
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	10 U	50 U	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	10 U	50 U	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	10 U	27 J	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	11	17	17	1.1	1.0	-	-	-	-	6.7	41	630	840	670	730
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Carbon disulfide	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Chlorobenzene	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Chloroform (Trichloromethane)	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	14	44	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Ethylbenzene	µg/L	20	23	24	0.96 J	0.57 J	-	-	-	-	1.0 U	3.5 J	410	600	470	520
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	2.5	6.0	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	10 U	50 U	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	2.8	6.1	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	10 U	12 U	12 U	5.0 U	5.0 U	-	-	-	-	5.0 U	5.0 U	120 U	62 U	100 U	120 U
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	25 U	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Tetrachloroethene	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Toluene	µg/L	2.4	3.4	3.5	0.24 J	0.20 J	-	-	-	-	1.1	3.4 J	120	180	120	130
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Trichloroethene	µg/L	2.0 U	2.5 U	2.5 U	1.0 U	1.0 U	-	-	-	-	1.0 U	5.0 U	25 U	12 U	20 U	25 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	5.0 U	-	-	-	-
Xylenes (total)	µg/L	11	9.6	9.9	1.3 J	0.61 J	-	-	-	-	2.0 U	2.4 J	870	1200	840	950
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	14	1.4	8.4	9.7	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	2.2	1.0 U	1.1	1.1	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	2.4	1.0 U	1.9	2.1	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	1.8 J	2.0 U	2.0 U	2.0 U	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9	MW-10	MW-10	MW-10	MW-10
Sample ID:		GW-060607-JO-14	GW-120507-SP-006	GW-120507-SP-007	GW-030608-KW-011	GW-030608-KW-012	GW-103008-KW-005	GW-080510-TW-10	GW-060311-JH-34	GW-060311-JH-35	GW-110311-JH-47	iW-31532-052418-JH-1	GW-032307-JO-022	GW-060507-JO-06	GW-120507-SP-008	GW-030608-KW-010
Sample Date:		6/6/2007	12/5/2007	12/5/2007	3/6/2008	3/6/2008	10/30/2008	8/5/2010	6/3/2011	6/3/2011	11/3/2011	5/24/2018	3/23/2007	6/5/2007	12/5/2007	3/6/2008
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				(Duplicate)		(Duplicate)				(Duplicate)						
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
1,3-Dichlorobenzene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
1,4-Dichlorobenzene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
2,4-Dimethylphenol	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	2.0 U	4.8 U	13 J	100 U	7.3 J	6.5 J
2,4-Dinitrophenol	µg/L	100 U	50 U	100 U	50 U	50 U	-	-	-	-	5.1 U	24 U	500 U	500 U	200 U	200 U
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	0.20 U	0.48 U	-	-	-	-
2-Methylphenol	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	1.0 U	11	100 U	100 U	40 U	40 U
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	19	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
3-Methylphenol	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4-Methylphenol	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	2.0 U	4.8 U	-	-	-	-
4-Nitrophenol	µg/L	100 U	50 U	100 U	50 U	50 U	-	-	-	-	5.1 U	24 U	500 U	500 U	200 U	200 U
Acenaphthene	µg/L	3.2 J	2.4 J	4.2 J	10 U	10 U	-	-	-	-	0.80	0.74	100 U	100 U	2.0 J	2.0 J
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	0.20 U	0.48 U	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Anthracene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	0.83 J	40 U
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	4.8 U	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	4.8 U	-	-	-	-
Benzo(a)anthracene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Benzo(a)pyrene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Benzo(b)fluoranthene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Benzo(b)pyridine (Quinoline)	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	-	-	100 U	100 U	40 U	40 U
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	0.20 U	0.48 U	-	-	-	-
Benzo(k)fluoranthene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	20 U	10 U	20 U	10 U	2.7 J	-	-	-	-	2.0 U	12 U	100 U	100 U	40 U	40 U
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	4.8 U	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	12 U	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.1 J	-	-	-	-
Chrysene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Dibenz(a,h)anthracene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Diethyl phthalate	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	1.0 U	12 U	100 U	100 U	40 U	40 U
Dimethyl phthalate	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	1.0 U	4.8 U	100 U	100 U	40 U	40 U
Di-n-butylphthalate (DBP)	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	1.0 U	12 U	100 U	100 U	40 U	40 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	4.8 U	-	-	-	-
Fluoranthene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Fluorene	µg/L	3.7 J	2.0 J	3.9 J	10 U	10 U	-	-	-	-	0.77	0.54	4.4 J	100 U	2.7 J	3.0 J
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	0.20 U	0.48 U	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	10 U	24 U	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	40 U	40 U
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Naphthalene	µg/L	49	37	69	10 U	10 U	-	-	-	-	0.20 U	0.48 U	180	130	130	140
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	1.0 U	2.4 U	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	5.1 U	24 U	-	-	-	-
Phenanthrene	µg/L	4.8 J	4.1 J	7.4 J	10 U	10 U	-	-	-	-	0.20 U	0.48 U	18 J	8.9 J	8.8 J	11 J
Phenol	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	1.0 U	30	100 U	11 J	7.0 J	40 U
Pyrene	µg/L	20 U	10 U	20 U	10 U	10 U	-	-	-	-	0.20 U	0.48 U	100 U	100 U	0.92 J	0.81 J
Pyridine	µg/L	40 U	20 U	40 U	20 U	20 U	-	-	-	-	-	-	200 U	200 U	80 U	80 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-9**	**MW-10**	**MW-10**	**MW-10**	**MW-10**
Sample ID:		**GW-060607-JO-14**	**GW-120507-SP-006**	**GW-120507-SP-007**	**GW-030608-KW-011**	**GW-030608-KW-012**	**GW-103008-KW-005**	**GW-080510-TW-10**	**GW-060311-JH-34**	**GW-060311-JH-35**	**GW-110311-JH-47**	**iW-31532-052418-JH-1**	**GW-032307-JO-022**	**GW-060507-JO-06**	**GW-120507-SP-008**	**GW-030608-KW-010**
Sample Date:		**6/6/2007**	**12/5/2007**	**12/5/2007**	**3/6/2008**	**3/6/2008**	**10/30/2008**	**8/5/2010**	**6/3/2011**	**6/3/2011**	**11/3/2011**	**5/24/2018**	**3/23/2007**	**6/5/2007**	**12/5/2007**	**3/6/2008**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
				(Duplicate)		**(Duplicate)**				**(Duplicate)**						
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	200 U	50 U	-	-	-	-
Antimony	µg/L	6.8 J	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	-	10 U	1.7 J	60.0 U	4.2 J	1.8 J	60.0 U
Arsenic	µg/L	8.0 J	8.1 J	8.9 J	10.0 U	3.8 J	-	27.7	-	-	10 U	8.0	10.0 U	6.6 J	5.4 J	10.0 U
Arsenic (dissolved)	µg/L	-	-	-	-	-	8.9 J	-	-	-	-	-	-	-	-	-
Barium	µg/L	39.0 J	55.1 J	56.6 J	13.3 J	13.6 J	-	-	-	-	200 U	50	76.1 J	105 J	110 J	13.1 J
Beryllium	µg/L	0.38 J	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	5.0 U	0.37 J	5.0 U	0.30 J	5.0 U	5.0 U
Cadmium	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	2.0 U	0.23 J	5.0 U	5.0 U	5.0 U	2.0 J
Calcium	µg/L	-	-	-	-	-	-	-	-	-	130000	180000	-	-	-	-
Chromium	µg/L	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	-	5.0 U	1.6 J	2.9 J	10.0 U	10.0 U	10.0 U
Cobalt	µg/L	1.8 J	50.0 U	50.0 U	50.0 U	50.0 U	-	-	-	-	7.0 U	0.34 J	50.0 U	1.4 J	50.0 U	2.0 J
Copper	µg/L	-	-	-	-	-	-	-	-	-	25 U	2.0 U	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	6700	6500	-	-	-	-
Lead	µg/L	2.6 J	4.1	4.4	3.0 U	3.0 U	-	-	-	-	3.0 U	3.3	3.0 U	2.0 J	2.7 J	276
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	5000 U	8000	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	750	2100	-	-	-	-
Mercury	µg/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
Nickel	µg/L	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	-	-	-	-	40 U	2.0 U	40.0 U	40.0 U	40.0 U	12.7 J
Potassium	µg/L	-	-	-	-	-	-	-	-	-	5000 U	1600	-	-	-	-
Selenium	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	5.0 U	5.0 U	5.0 U	4.2 J	5.0 U	5.0 U
Silver	µg/L	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	-	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	µg/L	-	-	-	-	-	-	-	-	-	5000 U	2000	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	10 U	1.0 U	-	-	-	-
Vanadium	µg/L	3.3 J	4.1 J	4.2 J	50.0 U	50.0 U	-	-	-	-	7.0 U	7.0	50.0 U	2.3 J	2.7 J	50.0 U
Zinc	µg/L	20.0 U	5.3 J	5.8 J	7.9 J	20.0 U	-	-	-	-	50 U	20 U	11.8 J	20.0 U	20.0 U	1030
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	0.52 U	0.095 U	-	-	-	-
Wet																
Cyanide (total)	µg/L	10 U	10 U	10 U	10 U	10 U	-	-	-	-	10 U	-	10 U	10 U	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10A	MW-10B	MW-10B	MW-10C	MW-10D	MW-12	MW-12	MW-12	MW-12
Sample ID:		GW-080510-TW-06	GW-060111-JH-14	GW-110311-JH-43	GW-110311-JH-45	W-31532-052318-JH-1	W-31532-052318-JH-1	GW-091611-JH-013	GW-091611-JH-014	GW-091611-JH-015	GW-091611-JH-016	GW-091611-JH-017	GW-032607-JO-023	GW-060607-JO-10	GW-060607-JO-11	GW-120707-SP-020
Sample Date:		8/5/2010	6/1/2011	11/3/2011	11/3/2011	5/23/2018	5/23/2018	9/16/2011	9/16/2011	9/16/2011	9/16/2011	9/16/2011	3/26/2007	6/6/2007	6/6/2007	12/7/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					(Duplicate)		(Duplicate)			(Duplicate)					(Duplicate)	
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
1,1-Dichloroethene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	57 U	57 U	40 U	40 U	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
1,2-Dichlorobenzene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
1,2-Dichloropropane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	10000 U	5000 U	2500 U	14000 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	290 U	290 U	200 U	200 U	-	-	-	-	-	500 U	250 U	120 U	710 U
2-Hexanone	µg/L	-	-	290 U	290 U	200 U	200 U	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	290 U	290 U	200 U	200 U	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	290 U	290 U	200 U	200 U	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	670	570	650	630	-	-	-	-	-	1800	1800 J	1200 J	2100
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Carbon tetrachloride	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Chloroethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Chloromethane (Methyl chloride)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	390	350	540	510	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	330	310	380	380	-	-	-	-	-	130	260 J	150 J	250
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	29	29 U	29	29	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	290 U	290 U	200 U	200 U	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	230	190	270	260	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	140 U	140 U	20 U	20 U	-	-	-	-	-	250 U	120 U	62 U	360 U
Methylene chloride	µg/L	-	-	29 U	29 U	100 U	100 U	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Tetrachloroethene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Toluene	µg/L	-	-	120	100	140	140	-	-	-	-	-	37 J	38	30	40 J
trans-1,2-Dichloroethene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	50 U	25 U	12 U	71 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	29 U	29 U	20 U	20 U	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	500	510	490	480	-	-	-	-	-	86 J	200	110	200
VOAs - BTEX																
Benzene	µg/L	800	770	-	-	-	-	51	680	690	890	130	-	-	-	-
Ethylbenzene	µg/L	420	480	-	-	-	-	320	770	770	960	330	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	71 U	140 U	140 U	170 U	140 U	-	-	-	-
Toluene	µg/L	140	160	-	-	-	-	42	220	220	310	51	-	-	-	-
Xylenes (total)	µg/L	710	880	-	-	-	-	610	1500	1500	2100	1800 J	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10A	MW-10B	MW-10B	MW-10C	MW-10D	MW-12	MW-12	MW-12	MW-12
Sample ID:		GW-080510-TW-06	GW-060111-JH-14	GW-110311-JH-43	GW-110311-JH-45	W-31532-052318-JH-1	W-31532-052318-JH-1	GW-091611-JH-013	GW-091611-JH-014	GW-091611-JH-015	GW-091611-JH-016	GW-091611-JH-017	GW-032607-JO-023	GW-060607-JO-10	GW-060607-JO-11	GW-120707-SP-020
Sample Date:		8/5/2010	6/1/2011	11/3/2011	11/3/2011	5/23/2018	5/23/2018	9/16/2011	9/16/2011	9/16/2011	9/16/2011	9/16/2011	3/26/2007	6/6/2007	6/6/2007	12/7/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					(Duplicate)		(Duplicate)			(Duplicate)					(Duplicate)	
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	13 U	10	6.3 J	7.3 J	-	-	-	-	-	40 U	100 U	100 U	200 U
2,4-Dinitrophenol	µg/L	-	-	34 U	26 U	38 U	38 U	-	-	-	-	-	200 U	500 U	500 U	1000 U
2,4-Dinitrotoluene	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	190	200	76	79	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	40 U	100 U	100 U	200 U
2-Nitroaniline	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
3-Nitroaniline	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
4-Nitroaniline	µg/L	-	-	13 U	10 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	34 U	26 U	38 U	38 U	-	-	-	-	-	200 U	500 U	500 U	1000 U
Acenaphthene	µg/L	-	-	2.5	2.2	2.2	2.4	-	-	-	-	-	2.3 J	100 U	100 U	200 U
Acenaphthylene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.61 J	-	-	-	-	-	40 U	100 U	100 U	200 U
Atrazine	µg/L	-	-	6.7 U	5.1 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	6.7 U	5.1 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Benzo(a)pyrene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Benzo(b)fluoranthene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	100 U	100 U	200 U
Benzo(g,h,i)perylene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	13 U	10 U	19 U	19 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Butyl benzylphthalate (BBP)	µg/L	-	-	6.7 U	5.1 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	34 U	26 U	19 U	19 U	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	44	47	49	51	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Dibenz(a,h)anthracene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Dibenzofuran	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	6.7 U	5.1 U	19 U	19 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Dimethyl phthalate	µg/L	-	-	6.7 U	5.1 U	7.6 U	7.6 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Di-n-butylphthalate (DBP)	µg/L	-	-	6.7 U	5.1 U	19 U	19 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	6.7 U	5.1 U	7.6 U	7.6 U	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Fluorene	µg/L	-	-	3.9	3.5	2.9	3.2	-	-	-	-	-	2.4 J	100 U	100 U	200 U
Hexachlorobenzene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	67 U	51 U	38 U	38 U	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Isophorone	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	130	130	88	90	-	-	-	-	-	52	310	250	660
Nitrobenzene	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	6.7 U	5.1 U	3.8 U	3.8 U	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	34 U	26 U	38 U	38 U	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	9.8	10	9.5	9.7	-	-	-	-	-	5.1 J	5.0 J	4.8 J	12 J
Phenol	µg/L	-	-	11	11	3.8 U	3.8 U	-	-	-	-	-	26 J	100 U	13 J	200 U
Pyrene	µg/L	-	-	1.3 U	1.0 U	0.76 U	0.76 U	-	-	-	-	-	40 U	100 U	100 U	200 U
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	80 U	200 U	200 U	400 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-10	MW-10	MW-10	MW-10	MW-10	MW-10	MW-10A	MW-10B	MW-10B	MW-10C	MW-10D	MW-12	MW-12	MW-12	MW-12
Sample ID:		GW-080510-TW-06	GW-060111-JH-14	GW-110311-JH-43	GW-110311-JH-45	W-31532-052318-JH-1	W-31532-052318-JH-1	GW-091611-JH-013	GW-091611-JH-014	GW-091611-JH-015	GW-091611-JH-016	GW-091611-JH-017	GW-032607-JO-023	GW-060607-JO-10	GW-060607-JO-11	GW-120707-SP-020
Sample Date:		8/5/2010	6/1/2011	11/3/2011	11/3/2011	5/23/2018	5/23/2018	9/16/2011	9/16/2011	9/16/2011	9/16/2011	9/16/2011	3/26/2007	6/6/2007	6/6/2007	12/7/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					(Duplicate)		(Duplicate)			(Duplicate)					(Duplicate)	
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	200 U	200 U	50 U	50 U	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	10 U	10 U	2.0 U	2.0 U	-	-	-	-	-	60.0 U	60.0 U	60.0 U	-
Arsenic	µg/L	10.0 U	-	10 U	10 U	6.9	7.2	-	-	-	-	-	20.0	31.7	29.6	22.5
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	200 U	200 U	96	97	-	-	-	-	-	246	240	222	221
Beryllium	µg/L	-	-	5.0 U	5.0 U	1.0 U	1.0 U	-	-	-	-	-	5.0 U	0.40 J	0.39 J	5.0 U
Cadmium	µg/L	-	-	2.0 U	2.0 U	1.0 U	1.0 U	-	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U
Calcium	µg/L	-	-	170000	170000	150000	150000	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	5.0 U	5.0 U	2.0 U	1.0 J	-	-	-	-	-	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	µg/L	-	-	7.0 U	7.0 U	0.22 J	0.22 J	-	-	-	-	-	1.4 J	50.0 U	50.0 U	50.0 U
Copper	µg/L	-	-	25 U	25 U	2.0 U	2.0 U	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	23000	24000	24000	25000	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	3.0 U	3.0 U	3.1	3.2	-	-	-	-	-	3.0 U	3.0 U	3.0 U	3.0 U
Magnesium	µg/L	-	-	19000	19000	15000	16000	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	1200	1300	1300	1400	-	-	-	-	-	-	-	-	-
Mercury	µg/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
Nickel	µg/L	-	-	40 U	40 U	2.0 U	2.0 U	-	-	-	-	-	40.0 U	40.0 U	40.0 U	40.0 U
Potassium	µg/L	-	-	5100	5700	4700	4900	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U
Silver	µg/L	-	-	5.0 U	5.0 U	1.0 U	1.0 U	-	-	-	-	-	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	µg/L	-	-	5000 U	5000 U	3100	3300	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	10 U	10 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	7.0 U	7.0 U	2.2 J	2.4 J	-	-	-	-	-	50.0 U	50.0 U	50.0 U	1.8 J
Zinc	µg/L	-	-	50 U	50 U	20 U	20 U	-	-	-	-	-	20.0 U	20.0 U	20.0 U	20.0 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	0.50 U	0.50 U	0.095 U	0.095 U	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	10 U	10 U	-	-	-	-	-	-	-	3.4 J	10 U	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13
Sample ID:		GW-030508-KW-006	GW-080410-LP-04	GW-060211-JH-22	GW-110211-JH-34	GW-110211-JH-36	W-31532-052318-JH-J	GW-032607-JO-024	GW-060607-JO-09	GW-120707-SP-021	GW-030508-KW-007	GW-103108-KW-011	GW-103108-KW-012	GW-080510-TW-05	GW-060211-JH-20	GW-110211-JH-32
Sample Date:		3/5/2008	8/4/2010	6/2/2011	11/2/2011	11/2/2011	5/23/2018	3/26/2007	6/6/2007	12/7/2007	3/5/2008	10/31/2008	10/31/2008	8/5/2010	6/2/2011	11/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)							(Duplicate)			
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,1,2-Trichloroethane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,1-Dichloroethane	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
1,1-Dichloroethene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,2,4-Trichlorobenzene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	50 U	57 U	20 U	-	-	-	-	-	-	-	-	20 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
1,2-Dichlorobenzene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,2-Dichloroethane	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
1,2-Dichloropropane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,3-Dichlorobenzene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,4-Dichlorobenzene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
1,4-Dioxane	µg/L	1600 U	-	-	-	-	-	2900 U	1300 U	3100 U	2900 U	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	80 U	-	-	250 U	290 U	100 U	14 J	3.6 J	150 U	140 U	-	-	-	-	100 U
2-Hexanone	µg/L	-	-	-	250 U	290 U	100 U	-	-	-	-	-	-	-	-	100 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	250 U	290 U	100 U	-	-	-	-	-	-	-	-	100 U
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	250 U	290 U	100 U	-	-	-	-	-	-	-	-	100 U
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	99	-	-	810	670	140	370	420	510	350	-	-	-	-	330
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Bromoform	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Bromomethane (Methyl bromide)	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Carbon disulfide	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Carbon tetrachloride	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Chlorobenzene	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Chloroethane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Chloroform (Trichloromethane)	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
cis-1,3-Dichloropropene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Cyclohexane	µg/L	-	-	-	310	260	320	-	-	-	-	-	-	-	-	160
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Ethylbenzene	µg/L	75	-	-	150	130	15	9.8 J	8.9	7.0 J	7.7 J	-	-	-	-	10 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	48	50	42	-	-	-	-	-	-	-	-	28
Methyl acetate	µg/L	-	-	-	250 U	290 U	100 U	-	-	-	-	-	-	-	-	100 U
Methyl cyclohexane	µg/L	-	-	-	280	220	300	-	-	-	-	-	-	-	-	150
Methyl tert butyl ether (MTBE)	µg/L	40 U	-	-	130 U	140 U	10 U	71 U	33 U	77 U	71 U	-	-	-	-	50 U
Methylene chloride	µg/L	-	-	-	25 U	29 U	50 U	-	-	-	-	-	-	-	-	10 U
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Tetrachloroethene	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Toluene	µg/L	9.9	-	-	30	29 U	6.3 J	15	16	19	14	-	-	-	-	16
trans-1,2-Dichloroethene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
trans-1,3-Dichloropropene	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Trichloroethene	µg/L	8.0 U	-	-	25 U	29 U	10 U	14 U	6.7 U	15 U	14 U	-	-	-	-	10 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Vinyl chloride	µg/L	-	-	-	25 U	29 U	10 U	-	-	-	-	-	-	-	-	10 U
Xylenes (total)	µg/L	100	-	-	100	90	23	29	35	39	34	-	-	-	-	41
VOAs - BTEX																
Benzene	µg/L	-	91	68	-	-	-	-	-	-	-	360	340	310	300	-
Ethylbenzene	µg/L	-	28	21	-	-	-	-	-	-	-	4.8 J	4.2 J	10 U	13 U	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	6.4	11 U	-	-	-	-	-	-	-	15	14	14	15	-
Xylenes (total)	µg/L	-	50	40	-	-	-	-	-	-	-	33	29	28	38	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13
Sample ID:		GW-030508-KW-006	GW-080410-LP-04	GW-060211-JH-22	GW-110211-JH-34	GW-110211-JH-36	W-31532-052318-JH-J	GW-032607-JO-024	GW-060607-JO-09	GW-120707-SP-021	GW-030508-KW-007	GW-103108-KW-011	GW-103108-KW-012	GW-080510-TW-05	GW-060211-JH-20	GW-110211-JH-32
Sample Date:		3/5/2008	8/4/2010	6/2/2011	11/2/2011	11/2/2011	5/23/2018	3/26/2007	6/6/2007	12/7/2007	3/5/2008	10/31/2008	10/31/2008	8/5/2010	6/2/2011	11/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)							(Duplicate)			
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	20 U	-	-	-	-	-	25 U	67 U	25 U	25 U	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	20 U	-	-	-	-	-	25 U	67 U	25 U	25 U	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	20 U	-	-	-	-	-	25 U	67 U	25 U	25 U	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
2,4,5-Trichlorophenol	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
2,4,6-Trichlorophenol	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
2,4-Dichlorophenol	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
2,4-Dimethylphenol	µg/L	20 U	-	-	38 U	38 U	13 U	1.5 J	67 U	25 U	25 U	-	-	-	-	7.9 U
2,4-Dinitrophenol	µg/L	100 U	-	-	96 U	96 U	63 U	120 U	330 U	120 U	120 U	-	-	-	-	20 U
2,4-Dinitrotoluene	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
2,6-Dinitrotoluene	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
2-Chloronaphthalene	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
2-Chlorophenol	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
2-Methylnaphthalene	µg/L	-	-	-	19	22	11	-	-	-	-	-	-	-	-	25
2-Methylphenol	µg/L	20 U	-	-	19 U	19 U	6.3 U	25 U	67 U	25 U	25 U	-	-	-	-	4.0 U
2-Nitroaniline	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
2-Nitrophenol	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
3&4-Methylphenol	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
3,3'-Dichlorobenzidine	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
3-Methylphenol	µg/L	20 U	-	-	-	-	-	1.3 J	67 U	25 U	25 U	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
4-Bromophenyl phenyl ether	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4-Chloro-3-methylphenol	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4-Chloroaniline	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4-Chlorophenyl phenyl ether	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4-Methylphenol	µg/L	20 U	-	-	-	-	-	25 U	67 U	25 U	25 U	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	38 U	38 U	13 U	-	-	-	-	-	-	-	-	7.9 U
4-Nitrophenol	µg/L	100 U	-	-	96 U	96 U	63 U	120 U	330 U	120 U	120 U	-	-	-	-	20 U
Acenaphthene	µg/L	2.0 J	-	-	3.8 U	3.8 U	2.0	7.1 J	4.7 J	6.1 J	5.7 J	-	-	-	-	4.6
Acenaphthylene	µg/L	-	-	-	3.8 U	3.8 U	1.3 U	-	-	-	-	-	-	-	-	0.79 U
Acetophenone	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Anthracene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	0.75 J	67 U	25 U	25 U	-	-	-	-	0.79 U
Atrazine	µg/L	-	-	-	19 U	19 U	13 U	-	-	-	-	-	-	-	-	4.0 U
Benzaldehyde	µg/L	-	-	-	19 U	19 U	13 U	-	-	-	-	-	-	-	-	4.0 U
Benzo(a)anthracene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Benzo(a)pyrene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Benzo(b)fluoranthene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Benzo(b)pyridine (Quinoline)	µg/L	20 U	-	-	-	-	-	25 U	67 U	25 U	25 U	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	3.8 U	3.8 U	1.3 U	-	-	-	-	-	-	-	-	0.79 U
Benzo(k)fluoranthene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
bis(2-Chloroethoxy)methane	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
bis(2-Chloroethyl)ether	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	20 U	-	-	38 U	38 U	32 U	25 U	67 U	25 U	25 U	-	-	-	-	7.9 U
Butyl benzylphthalate (BBP)	µg/L	-	-	-	19 U	19 U	13 U	-	-	-	-	-	-	-	-	4.0 U
Caprolactam	µg/L	-	-	-	96 U	96 U	32 U	-	-	-	-	-	-	-	-	20 U
Carbazole	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Chrysene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	0.66 J	67 U	25 U	25 U	-	-	-	-	0.79 U
Dibenz(a,h)anthracene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Dibenzofuran	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Diethyl phthalate	µg/L	20 U	-	-	19 U	19 U	32 U	25 U	67 U	25 U	25 U	-	-	-	-	4.0 U
Dimethyl phthalate	µg/L	20 U	-	-	19 U	19 U	13 U	25 U	67 U	25 U	25 U	-	-	-	-	4.0 U
Di-n-butylphthalate (DBP)	µg/L	20 U	-	-	19 U	19 U	32 U	25 U	67 U	25 U	25 U	-	-	-	-	4.0 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	19 U	19 U	13 U	-	-	-	-	-	-	-	-	4.0 U
Fluoranthene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Fluorene	µg/L	2.5 J	-	-	3.8 U	3.8 U	2.6	6.7 J	6.2 J	5.6 J	5.6 J	-	-	-	-	4.7
Hexachlorobenzene	µg/L	-	-	-	3.8 U	3.8 U	1.3 U	-	-	-	-	-	-	-	-	0.79 U
Hexachlorobutadiene	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Hexachlorocyclopentadiene	µg/L	-	-	-	190 U	190 U	63 U	-	-	-	-	-	-	-	-	40 U
Hexachloroethane	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Indeno(1,2,3-cd)pyrene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	25 U	67 U	25 U	25 U	-	-	-	-	0.79 U
Isophorone	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Naphthalene	µg/L	74	-	-	340	410	190	3.5 J	67 U	25 U	25 U	-	-	-	-	0.79 U
Nitrobenzene	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
N-Nitrosodi-n-propylamine	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
N-Nitrosodiphenylamine	µg/L	-	-	-	19 U	19 U	6.3 U	-	-	-	-	-	-	-	-	4.0 U
Pentachlorophenol	µg/L	-	-	-	96 U	96 U	63 U	-	-	-	-	-	-	-	-	20 U
Phenanthrene	µg/L	6.0 J	-	-	6.0	3.8 U	5.4	10 J	6.5 J	5.8 J	6.6 J	-	-	-	-	5.4
Phenol	µg/L	20 U	-	-	19 U	19 U	6.3 U	4.9 J	67 U	25 U	6.1 J	-	-	-	-	4.0 U
Pyrene	µg/L	20 U	-	-	3.8 U	3.8 U	1.3 U	1.0 J	67 U	25 U	25 U	-	-	-	-	0.79 U
Pyridine	µg/L	40 U	-	-	-	-	-	50 U	130 U	50 U	50 U	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13
Sample ID:		GW-030508-KW-006	GW-080410-LP-04	GW-060211-JH-22	GW-110211-JH-34	GW-110211-JH-36	W-31532-052318-JH-J	GW-032607-JO-024	GW-060607-JO-09	GW-120707-SP-021	GW-030508-KW-007	GW-103108-KW-011	GW-103108-KW-012	GW-080510-TW-05	GW-060211-JH-20	GW-110211-JH-32
Sample Date:		3/5/2008	8/4/2010	6/2/2011	11/2/2011	11/2/2011	5/23/2018	3/26/2007	6/6/2007	12/7/2007	3/5/2008	10/31/2008	10/31/2008	8/5/2010	6/2/2011	11/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)							(Duplicate)			
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	200 U	200 U	50 U	-	-	-	-	-	-	-	-	200 U
Antimony	µg/L	60.0 U	-	-	10 U	10 U	2.0 U	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	-	10 U
Arsenic	µg/L	41.9	52.5	-	43	46	42	10.0 U	10.0 U	10.0 U	10.0 U	-	-	10.0 U	-	10 U
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	3.3 J	10.0 U	-	-	-
Barium	µg/L	256	-	-	250	250	200	106 J	172 J	169 J	106 J	-	-	-	-	200 U
Beryllium	µg/L	5.0 U	-	-	5.0 U	5.0 U	1.0 U	5.0 U	0.36 J	5.0 U	5.0 U	-	-	-	-	5.0 U
Cadmium	µg/L	0.85 J	-	-	2.0 U	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	2.0 U
Calcium	µg/L	-	-	-	190000	180000	180000	-	-	-	-	-	-	-	-	140000
Chromium	µg/L	10.0 U	-	-	5.0 U	5.0 U	2.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	-	5.0 U
Cobalt	µg/L	50.0 U	-	-	7.0 U	7.0 U	0.29 J	2.0 J	1.7 J	50.0 U	50.0 U	-	-	-	-	7.0 U
Copper	µg/L	-	-	-	25 U	25 U	2.7	-	-	-	-	-	-	-	-	25 U
Iron	µg/L	-	-	-	20000	20000	19000	-	-	-	-	-	-	-	-	2900
Lead	µg/L	3.0 U	-	-	3.0 U	3.0 U	0.53 J	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-	-	3.0 U
Magnesium	µg/L	-	-	-	34000	34000	28000	-	-	-	-	-	-	-	-	10000
Manganese	µg/L	-	-	-	270	180	200	-	-	-	-	-	-	-	-	850
Mercury	µg/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
Nickel	µg/L	40.0 U	-	-	40 U	40 U	2.0 U	40.0 U	40.0 U	40.0 U	40.0 U	-	-	-	-	40 U
Potassium	µg/L	-	-	-	5000 U	5000 U	1700	-	-	-	-	-	-	-	-	6400
Selenium	µg/L	5.0 U	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	-	5.0 U
Silver	µg/L	10.0 U	-	-	5.0 U	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	-	5.0 U
Sodium	µg/L	-	-	-	17000	17000	8000	-	-	-	-	-	-	-	-	5000 U
Thallium	µg/L	-	-	-	10 U	10 U	1.0 U	-	-	-	-	-	-	-	-	10 U
Vanadium	µg/L	0.93 J	-	-	7.0 U	7.0 U	5.0 U	50.0 U	50.0 U	3.1 J	3.5 J	-	-	-	-	7.0 U
Zinc	µg/L	20.0 U	-	-	50 U	50 U	20 U	20.0 U	20.0 U	20.0 U	20.0 U	-	-	-	-	50 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	0.48 U	0.48 U	0.098 U	-	-	-	-	-	-	-	-	0.48 U
Wet																
Cyanide (total)	µg/L	8.5 J	-	-	13	17	-	10 U	10 U	10 U	10 U	-	-	-	-	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-13	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-15	MW-15	MW-15
Sample ID:		GW-31532-052218-JH-(	GW-032307-JO-026	GW-060507-JO-03	GW-120707-SP-017	GW-120707-SP-018	GW-030708-KW-019	GW-030708-KW-020	GW-103108-KW-013	GW-080510-TW-09	GW-060211-JH-23	GW-110211-JH-38	GW-31532-052218-JH-(	GW-032307-JO-027	GW-060507-JO-02	GW-120707-SP-019
Sample Date:		5/22/2018	3/23/2007	6/5/2007	12/7/2007	12/7/2007	3/7/2008	3/7/2008	10/31/2008	8/5/2010	6/2/2011	11/2/2011	5/22/2018	3/23/2007	6/5/2007	12/7/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)		(Duplicate)								
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,1,2-Trichloroethane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,1-Dichloroethane	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,2,4-Trichlorobenzene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	6.7 U	-	-	-	-	-	-	-	-	-	31 U	24 U	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,2-Dichloroethane	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,3-Dichlorobenzene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,4-Dichlorobenzene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
1,4-Dioxane	µg/L	-	2200 U	1600 U	2000 U	2000 U	1600 U	1600 U	-	-	-	-	-	200 U	200 U	200 U
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	4.6 J	110 U	7.8 J	100 U	100 U	80 U	80 U	-	-	-	150 U	120 U	10 U	10 U	10 U
2-Hexanone	µg/L	33 U	-	-	-	-	-	-	-	-	-	150 U	120 U	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	33 U	-	-	-	-	-	-	-	-	-	150 U	120 U	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	27 J	-	-	-	-	-	-	-	-	-	150 U	120 U	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	270	330	250	280	320	250	270	-	-	-	300	190	1.0 U	1.0 U	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Bromoform	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Bromomethane (Methyl bromide)	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Carbon disulfide	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Chlorobenzene	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Chloroform (Trichloromethane)	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
cis-1,3-Dichloropropene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Cyclohexane	µg/L	160	-	-	-	-	-	-	-	-	-	79	65	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Ethylbenzene	µg/L	2.6 J	270	140	210	230	170	190	-	-	-	260	170	1.0 U	1.0 U	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	32	-	-	-	-	-	-	-	-	-	18	14	-	-	-
Methyl acetate	µg/L	33 U	-	-	-	-	-	-	-	-	-	150 U	120 U	-	-	-
Methyl cyclohexane	µg/L	160	-	-	-	-	-	-	-	-	-	54	44	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	3.3 U	56 U	40 U	50 U	50 U	40 U	40 U	-	-	-	77 U	12 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	17 U	-	-	-	-	-	-	-	-	-	15 U	59 U	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	17	81	58	76	83	57	64	-	-	-	80	63	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
trans-1,3-Dichloropropene	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Trichloroethene	µg/L	3.3 U	11 U	8.0 U	10 U	10 U	8.0 U	8.0 U	-	-	-	15 U	12 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Vinyl chloride	µg/L	3.3 U	-	-	-	-	-	-	-	-	-	15 U	12 U	-	-	-
Xylenes (total)	µg/L	46	430	260	380	410	290	330	-	-	-	370	200	2.0 U	2.0 U	2.0 U
VOAs - BTEX																
Benzene	µg/L	-	-	-	-	-	-	-	190	240	250	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	160	220	240	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	53	60	65	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	280	330	360	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-13	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-15	MW-15	MW-15
Sample ID:		GW-31532-052218-JH-(	GW-032307-JO-026	GW-060507-JO-03	GW-120707-SP-017	GW-120707-SP-018	GW-030708-KW-019	GW-030708-KW-020	GW-103108-KW-013	GW-080510-TW-09	GW-060211-JH-23	GW-110211-JH-38	GW-31532-052218-JH-(	GW-032307-JO-027	GW-060507-JO-02	GW-120707-SP-019
Sample Date:		5/22/2018	3/23/2007	6/5/2007	12/7/2007	12/7/2007	3/7/2008	3/7/2008	10/31/2008	8/5/2010	6/2/2011	11/2/2011	5/22/2018	3/23/2007	6/5/2007	12/7/2007
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)		(Duplicate)								
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
1,3-Dichlorobenzene	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
1,4-Dichlorobenzene	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
2,4,5-Trichlorophenol	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
2,4,6-Trichlorophenol	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
2,4-Dichlorophenol	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
2,4-Dimethylphenol	µg/L	1.9 U	4.5 J	100 U	2.1 J	3.5 J	3.9 J	3.9 J	-	-	-	7.7 U	1.7 J	10 U	10 U	10 U
2,4-Dinitrophenol	µg/L	9.5 U	250 U	500 U	100 U	100 U	100 U	100 U	-	-	-	19 U	24 U	50 U	50 U	50 U
2,4-Dinitrotoluene	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
2,6-Dinitrotoluene	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
2-Chloronaphthalene	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
2-Chlorophenol	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
2-Methylnaphthalene	µg/L	20	-	-	-	-	-	-	-	-	-	110	97	-	-	-
2-Methylphenol	µg/L	0.95 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	3.8 U	2.4 U	10 U	10 U	10 U
2-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
2-Nitrophenol	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
3&4-Methylphenol	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
3,3'-Dichlorobenzidine	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
3-Methylphenol	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
3-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
4-Bromophenyl phenyl ether	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4-Chloro-3-methylphenol	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4-Chloroaniline	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4-Chlorophenyl phenyl ether	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4-Methylphenol	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
4-Nitroaniline	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	7.7 U	4.8 U	-	-	-
4-Nitrophenol	µg/L	9.5 U	250 U	500 U	100 U	100 U	100 U	100 U	-	-	-	19 U	24 U	50 U	50 U	50 U
Acenaphthene	µg/L	4.6	50 U	100 U	2.7 J	2.8 J	1.8 J	1.8 J	-	-	-	3.2	4.1	10 U	10 U	10 U
Acenaphthylene	µg/L	0.58	-	-	-	-	-	-	-	-	-	0.77 U	0.48 U	-	-	-
Acetophenone	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
Anthracene	µg/L	0.19 U	2.3 J	100 U	20 U	20 U	0.72 J	0.91 J	-	-	-	1.5	1.8	10 U	10 U	10 U
Atrazine	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	3.8 U	4.8 U	-	-	-
Benzaldehyde	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	3.8 U	4.8 U	-	-	-
Benzo(a)anthracene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Benzo(a)pyrene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Benzo(b)fluoranthene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Benzo(b)pyridine (Quinoline)	µg/L	-	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	-	-	10 U	10 U	10 U
Benzo(g,h,i)perylene	µg/L	0.19 U	-	-	-	-	-	-	-	-	-	0.77 U	0.48 U	-	-	-
Benzo(k)fluoranthene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Biphenyl (1,1-Biphenyl)	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
bis(2-Chloroethoxy)methane	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
bis(2-Chloroethyl)ether	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	4.8 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	7.7 U	12 U	10 U	10 U	10 U
Butyl benzylphthalate (BBP)	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	3.8 U	4.8 U	-	-	-
Caprolactam	µg/L	4.8 U	-	-	-	-	-	-	-	-	-	19 U	12 U	-	-	-
Carbazole	µg/L	3.1	-	-	-	-	-	-	-	-	-	77	96	-	-	-
Chrysene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	0.52 J	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Dibenzofuran	µg/L	2.3	-	-	-	-	-	-	-	-	-	3.8 U	3.7	-	-	-
Diethyl phthalate	µg/L	4.8 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	3.8 U	12 U	10 U	10 U	10 U
Dimethyl phthalate	µg/L	1.9 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	3.8 U	4.8 U	10 U	10 U	10 U
Di-n-butylphthalate (DBP)	µg/L	4.8 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	3.8 U	12 U	0.62 J	10 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	1.9 U	-	-	-	-	-	-	-	-	-	3.8 U	4.8 U	-	-	-
Fluoranthene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Fluorene	µg/L	4.9	9.1 J	6.9 J	4.6 J	4.3 J	3.1 J	2.9 J	-	-	-	6.3	7.4	10 U	10 U	10 U
Hexachlorobenzene	µg/L	0.19 U	-	-	-	-	-	-	-	-	-	0.77 U	0.48 U	-	-	-
Hexachlorobutadiene	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
Hexachlorocyclopentadiene	µg/L	9.5 U	-	-	-	-	-	-	-	-	-	38 U	24 U	-	-	-
Hexachloroethane	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.19 U	50 U	100 U	20 U	20 U	20 U	20 U	-	-	-	0.77 U	0.48 U	10 U	10 U	10 U
Isophorone	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
Naphthalene	µg/L	0.19 U	110	45 J	46	52	50	56	-	-	-	27	3.3	10 U	10 U	10 U
Nitrobenzene	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
N-Nitrosodi-n-propylamine	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
N-Nitrosodiphenylamine	µg/L	0.95 U	-	-	-	-	-	-	-	-	-	3.8 U	2.4 U	-	-	-
Pentachlorophenol	µg/L	9.5 U	-	-	-	-	-	-	-	-	-	19 U	24 U	-	-	-
Phenanthrene	µg/L	6.7	33 J	17 J	11 J	7.3 J	10 J	11 J	-	-	-	21	26	0.35 J	10 U	10 U
Phenol	µg/L	0.95 U	8.5 J	100 U	20 U	20 U	1.9 J	1.9 J	-	-	-	3.8 U	2.4 U	10 U	10 U	10 U
Pyrene	µg/L	0.47	2.1 J	100 U	20 U	20 U	0.90 J	0.99 J	-	-	-	0.77 U	0.82	10 U	10 U	10 U
Pyridine	µg/L	-	100 U	200 U	40 U	40 U	40 U	40 U	-	-	-	-	-	20 U	20 U	20 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-13**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-14**	**MW-15**	**MW-15**	**MW-15**
Sample ID:		**W-31532-052218-JH-(**	**GW-032307-JO-026**	**GW-060507-JO-03**	**GW-120707-SP-017**	**GW-120707-SP-018**	**GW-030708-KW-019**	**GW-030708-KW-020**	**GW-103108-KW-013**	**GW-080510-TW-09**	**GW-060211-JH-23**	**GW-110211-JH-38**	**W-31532-052218-JH-(**	**GW-032307-JO-027**	**GW-060507-JO-02**	**GW-120707-SP-019**
Sample Date:		**5/22/2018**	**3/23/2007**	**6/5/2007**	**12/7/2007**	**12/7/2007**	**3/7/2008**	**3/7/2008**	**10/31/2008**	**8/5/2010**	**6/2/2011**	**11/2/2011**	**5/22/2018**	**3/23/2007**	**6/5/2007**	**12/7/2007**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
						(Duplicate)		**(Duplicate)**								
Parameters	**Units**															
Metals																
Aluminum	µg/L	50 U	-	-	-	-	-	-	-	-	-	200 U	50	-	-	-
Antimony	µg/L	2.0 U	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	10 U	2.0 U	60.0 U	60.0 U	60.0 U
Arsenic	µg/L	4.2 J	10.9	8.7 J	5.1 J	5.4 J	4.5 J	10.0 U	-	18.3	-	17	1.1 J	22.6	16.6	20.5
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	14.8	-	-	-	-	-	-	-
Barium	µg/L	32	84.7 J	77.6 J	81.6 J	77.7 J	77.1 J	78.1 J	-	-	-	200 U	64	71.5 J	64.5 J	64.3 J
Beryllium	µg/L	0.37 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U
Cadmium	µg/L	0.30 J	0.44 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.6	5.0 U	5.0 U	5.0 U
Calcium	µg/L	75000	-	-	-	-	-	-	-	-	-	110000	64000	-	-	-
Chromium	µg/L	2.0 U	1.7 J	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.2 J	10.0 U	10.0 U	10.0 U
Cobalt	µg/L	0.37 J	1.6 J	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	-	-	-	7.0 U	1.3	1.3 J	50.0 U	50.0 U
Copper	µg/L	2.0 U	-	-	-	-	-	-	-	-	-	25 U	6.3	-	-	-
Iron	µg/L	5400	-	-	-	-	-	-	-	-	-	25000	2000	-	-	-
Lead	µg/L	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-	3.0 U	0.57 J	3.0 U	3.0 U	3.0 U
Magnesium	µg/L	15000	-	-	-	-	-	-	-	-	-	10000	11000	-	-	-
Manganese	µg/L	740	-	-	-	-	-	-	-	-	-	710	130	-	-	-
Mercury	µg/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
Nickel	µg/L	2.0 U	1.7 J	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	-	-	-	40 U	4.9	40.0 U	40.0 U	40.0 U
Potassium	µg/L	910 J	-	-	-	-	-	-	-	-	-	5000 U	5000	-	-	-
Selenium	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	4.8 J	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	µg/L	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	0.078 J	10.0 U	10.0 U	10.0 U
Sodium	µg/L	1200	-	-	-	-	-	-	-	-	-	5000 U	3600	-	-	-
Thallium	µg/L	1.0 U	-	-	-	-	-	-	-	-	-	10 U	1.0 U	-	-	-
Vanadium	µg/L	5.0 U	50.0 U	50.0 U	2.0 J	1.6 J	0.91 J	1.4 J	-	-	-	7.0 U	2.5 J	50.0 U	50.0 U	50.0 U
Zinc	µg/L	20 U	182	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	-	-	-	50 U	26	78.5	20.0 U	20.0 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	0.48 U	-	-	-	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-
Wet																
Cyanide (total)	µg/L	-	10 U	10 U	10 U	10 U	10 U	10 U	-	-	-	10 U	-	10 U	10 U	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-15	MW-15	MW-15	MW-15	MW-15	MW-15	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16
Sample ID:		GW-030608-KW-015	GW-103008-KW-010	GW-080510-TW-07	GW-060611-JH-50	GW-110311-JH-41	W-31532-052318-JH-(	GW-032307-JO-028	GW-060507-JO-01	GW-120607-SP-015	GW-030708-KW-018	GW-103008-KW-008	GW-080610-TW-17	GW-060611-JH-49	GW-110211-JH-31	W-31532-052218-JH-(
Sample Date:		3/6/2008	10/30/2008	8/5/2010	6/6/2011	11/3/2011	5/23/2018	3/23/2007	6/5/2007	12/6/2007	3/7/2008	10/30/2008	8/6/2010	6/6/2011	11/2/2011	5/22/2018
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,1-Dichloroethane	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	2.0 U	2.0 U	-	-	-	-	-	-	-	2.0 U	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,2-Dichloroethane	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
1,4-Dioxane	µg/L	200 U	-	-	-	-	-	4000 U	500 U	500 U	1000 U	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	10 U	-	-	-	10 U	10 U	200 U	25 U	25 U	50 U	-	-	-	10 U	10 U
2-Hexanone	µg/L	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	0.89 J	5.0 U	-	-	-	1.0 U	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Bromoform	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Carbon disulfide	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Carbon tetrachloride	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Chlorobenzene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Chloroethane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Cyclohexane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	2.2
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Ethylbenzene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	710	43	42	160	-	-	-	1.0 U	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	0.33 J
Methyl acetate	µg/L	-	-	-	-	10 U	10 U	-	-	-	-	-	-	-	10 U	10 U
Methyl cyclohexane	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	5.0 U	-	-	-	5.0 U	1.0 U	100 U	12 U	12 U	25 U	-	-	-	5.0 U	1.0 U
Methylene chloride	µg/L	-	-	-	-	1.0 U	7.2	-	-	-	-	-	-	-	1.0 U	5.0 U
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Tetrachloroethene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Toluene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	7.0 J	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Trichloroethene	µg/L	1.0 U	-	-	-	1.0 U	1.0 U	20 U	2.5 U	2.5 U	5.0 U	-	-	-	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Vinyl chloride	µg/L	-	-	-	-	1.0 U	1.0 U	-	-	-	-	-	-	-	1.0 U	1.0 U
Xylenes (total)	µg/L	2.0 U	-	-	-	2.0 U	2.0 U	150	12	19	33	-	-	-	4.1	0.69 J
VOAs - BTEX																
Benzene	µg/L	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-
Ethylbenzene	µg/L	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	1.2	1.0 U	3.5	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	1.0 U	1.0 U	1.0 U	-	-
Xylenes (total)	µg/L	-	2.0 U	2.0 U	2.0 U	-	-	-	-	-	-	0.92 J	2.0 U	15	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-15	MW-15	MW-15	MW-15	MW-15	MW-15	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16	MW-16
Sample ID:		GW-030608-KW-015	GW-103008-KW-010	GW-080510-TW-07	GW-060611-JH-50	GW-110311-JH-41	W-31532-052318-JH-(	GW-032307-JO-028	GW-060507-JO-01	GW-120607-SP-015	GW-030708-KW-018	GW-103008-KW-008	GW-080610-TW-17	GW-060611-JH-49	GW-110211-JH-31	W-31532-052218-JH-(
Sample Date:		3/6/2008	10/30/2008	8/5/2010	6/6/2011	11/3/2011	5/23/2018	3/23/2007	6/5/2007	12/6/2007	3/7/2008	10/30/2008	8/6/2010	6/6/2011	11/2/2011	5/22/2018
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	10 U	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	10 U	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	10 U	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
2,4,5-Trichlorophenol	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	5.0 U	4.8 U
2,4,6-Trichlorophenol	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	5.0 U	4.8 U
2,4-Dichlorophenol	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
2,4-Dimethylphenol	µg/L	10 U	-	-	-	2.0 U	1.9 U	100 U	10 U	10 U	10 U	-	-	-	2.0 U	1.9 U
2,4-Dinitrophenol	µg/L	50 U	-	-	-	5.0 U	9.6 U	500 U	50 U	50 U	50 U	-	-	-	5.0 U	9.5 U
2,4-Dinitrotoluene	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	5.0 U	4.8 U
2,6-Dinitrotoluene	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	5.0 U	4.8 U
2-Chloronaphthalene	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
2-Chlorophenol	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
2-Methylnaphthalene	µg/L	-	-	-	-	0.20 U	0.19 U	-	-	-	-	-	-	-	0.20 U	0.19 U
2-Methylphenol	µg/L	10 U	-	-	-	0.99 U	0.96 U	100 U	10 U	10 U	10 U	-	-	-	1.0 U	0.95 U
2-Nitroaniline	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
2-Nitrophenol	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
3&4-Methylphenol	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	R	4.8 U
3-Methylphenol	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	1.0 J	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	5.0 U	4.8 U	-	-	-	-	-	-	-	5.0 U	4.8 U
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4-Chloro-3-methylphenol	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4-Chloroaniline	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4-Methylphenol	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	1.0 J	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	2.0 U	1.9 U	-	-	-	-	-	-	-	2.0 U	1.9 U
4-Nitrophenol	µg/L	50 U	-	-	-	5.0 U	9.6 U	500 U	50 U	50 U	50 U	-	-	-	5.0 U	9.5 U
Acenaphthene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	0.79 J	-	-	-	0.20 U	0.19 U
Acenaphthylene	µg/L	-	-	-	-	0.20 U	0.19 U	-	-	-	-	-	-	-	0.20 U	0.19 U
Acetophenone	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Anthracene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Atrazine	µg/L	-	-	-	-	0.99 U	1.9 U	-	-	-	-	-	-	-	1.0 U	1.9 U
Benzaldehyde	µg/L	-	-	-	-	0.99 U	1.9 U	-	-	-	-	-	-	-	1.0 U	1.9 U
Benzo(a)anthracene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 UJ	0.19 U
Benzo(a)pyrene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 UJ	0.19 U
Benzo(b)fluoranthene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Benzo(b)pyridine (Quinoline)	µg/L	10 U	-	-	-	-	-	100 U	10 U	10 U	10 U	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.20 U	0.19 U	-	-	-	-	-	-	-	0.20 UJ	0.19 U
Benzo(k)fluoranthene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	10 U	-	-	-	2.0 U	4.8 U	100 U	10 U	10 U	2.6 J	-	-	-	2.0 UJ	4.8 U
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	0.99 U	1.9 U	-	-	-	-	-	-	-	1.0 U	1.9 U
Caprolactam	µg/L	-	-	-	-	5.0 U	0.23 J	-	-	-	-	-	-	-	5.0 UJ	4.8 U
Carbazole	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Chrysene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Dibenz(a,h)anthracene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 UJ	0.19 U
Dibenzofuran	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Diethyl phthalate	µg/L	10 U	-	-	-	0.99 U	4.8 U	100 U	10 U	10 U	10 U	-	-	-	1.0 U	4.8 U
Dimethyl phthalate	µg/L	10 U	-	-	-	0.99 U	1.9 U	100 U	10 U	10 U	10 U	-	-	-	1.0 U	1.9 U
Di-n-butylphthalate (DBP)	µg/L	10 U	-	-	-	0.99 U	4.8 U	100 U	10 U	10 U	10 U	-	-	-	1.0 U	4.8 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	0.99 U	1.9 U	-	-	-	-	-	-	-	1.0 UJ	1.9 U
Fluoranthene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Fluorene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	0.52 J	-	-	-	0.20 U	0.19 U
Hexachlorobenzene	µg/L	-	-	-	-	0.20 U	0.19 U	-	-	-	-	-	-	-	0.20 U	0.19 U
Hexachlorobutadiene	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Hexachlorocyclopentadiene	µg/L	-	-	-	-	9.9 U	9.6 U	-	-	-	-	-	-	-	10 U	9.5 U
Hexachloroethane	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Indeno(1,2,3-cd)pyrene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 UJ	0.19 U
Isophorone	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Naphthalene	µg/L	10 U	-	-	-	0.20 U	0.19 U	270	20	10 U	10 U	-	-	-	1.4	0.19 U
Nitrobenzene	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
N-Nitrosodiphenylamine	µg/L	-	-	-	-	0.99 U	0.96 U	-	-	-	-	-	-	-	1.0 U	0.95 U
Pentachlorophenol	µg/L	-	-	-	-	5.0 U	9.6 U	-	-	-	-	-	-	-	5.0 U	9.5 U
Phenanthrene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	10 U	-	-	-	0.20 U	0.19 U
Phenol	µg/L	10 U	-	-	-	0.99 U	0.96 U	100 U	10 U	10 U	10 U	-	-	-	1.0 U	0.95 U
Pyrene	µg/L	10 U	-	-	-	0.20 U	0.19 U	100 U	10 U	10 U	0.22 J	-	-	-	0.20 U	0.19 U
Pyridine	µg/L	20 U	-	-	-	-	-	200 U	20 U	20 U	20 U	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-15**	**MW-15**	**MW-15**	**MW-15**	**MW-15**	**MW-15**	**MW-16**	**MW-16**	**MW-16**	**MW-16**	**MW-16**	**MW-16**	**MW-16**	**MW-16**	**MW-16**
Sample ID:		**GW-030608-KW-015**	**GW-103008-KW-010**	**GW-080510-TW-07**	**GW-060611-JH-50**	**GW-110311-JH-41**	**W-31532-052318-JH-(**	**GW-032307-JO-028**	**GW-060507-JO-01**	**GW-120607-SP-015**	**GW-030708-KW-018**	**GW-103008-KW-008**	**GW-080610-TW-17**	**GW-060611-JH-49**	**GW-110211-JH-31**	**W-31532-052218-JH-(**
Sample Date:		**3/6/2008**	**10/30/2008**	**8/5/2010**	**6/6/2011**	**11/3/2011**	**5/23/2018**	**3/23/2007**	**6/5/2007**	**12/6/2007**	**3/7/2008**	**10/30/2008**	**8/6/2010**	**6/6/2011**	**11/2/2011**	**5/22/2018**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	200 U	50 U	-	-	-	-	-	-	-	200 U	170
Antimony	µg/L	60.0 U	-	-	-	10 U	2.0 U	60.0 U	60.0 U	60.0 U	60.0 U	-	-	-	10 U	2.0 U
Arsenic	µg/L	12.4	-	27.5	-	14	24	10.0 U	5.8 J	31.9	11.8	-	76.1	-	29	1.0 J
Arsenic (dissolved)	µg/L	-	21.5	-	-	-	-	-	-	-	-	101	-	-	-	-
Barium	µg/L	38.7 J	-	-	-	200 U	24	36.8 J	45.2 J	239	21.4 J	-	-	-	200 U	61
Beryllium	µg/L	5.0 U	-	-	-	5.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U
Cadmium	µg/L	5.0 U	-	-	-	2.0 U	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	0.82 J
Calcium	µg/L	-	-	-	-	56000	68000	-	-	-	-	-	-	-	88000	64000
Chromium	µg/L	10.0 U	-	-	-	5.0 U	2.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	0.98 J
Cobalt	µg/L	50.0 U	-	-	-	7.0 U	1.0 U	50.0 U	2.8 J	50.0 U	50.0 U	-	-	-	7.0 U	0.93 J
Copper	µg/L	-	-	-	-	25 U	3.9	-	-	-	-	-	-	-	25 U	4.7
Iron	µg/L	-	-	-	-	1200	6700	-	-	-	-	-	-	-	8500	730
Lead	µg/L	3.0 U	-	-	-	3.0 U	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-	3.0 U	1.0 U
Magnesium	µg/L	-	-	-	-	33000	22000	-	-	-	-	-	-	-	19000	11000
Manganese	µg/L	-	-	-	-	150	340	-	-	-	-	-	-	-	990	100
Mercury	µg/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
Nickel	µg/L	40.0 U	-	-	-	40 U	2.0 U	40.0 U	3.0 J	40.0 U	40.0 U	-	-	-	40 U	4.7
Potassium	µg/L	-	-	-	-	5000 U	2100	-	-	-	-	-	-	-	5000 U	5000
Selenium	µg/L	5.0 U	-	-	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U
Silver	µg/L	10.0 U	-	-	-	5.0 U	1.0 U	10.0 U	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U
Sodium	µg/L	-	-	-	-	5000 U	1200	-	-	-	-	-	-	-	5000 U	3800
Thallium	µg/L	-	-	-	-	10 U	1.0 U	-	-	-	-	-	-	-	10 U	1.0 U
Vanadium	µg/L	50.0 U	-	-	-	7.0 U	3.7 J	50.0 U	50.0 U	50.0 U	0.76 J	-	-	-	7.0 U	1.5 J
Zinc	µg/L	20.0 U	-	-	-	50 U	20 U	12.8 J	20.0 U	20.0 U	20.0 U	-	-	-	50 U	22
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.095 U
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	0.51 U	0.095 U	-	-	-	-	-	-	-	0.51 U	0.086 J
Wet																
Cyanide (total)	µg/L	10 U	-	-	-	10 U	-	10 U	10 U	10 U	10 U	-	-	-	10 U	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	PZ-1	PZ-1	PZ-2	PZ-3	PZ-3	PZ-4	PZ-4
Sample ID:		GW-032607-JO-029	GW-120607-SP-016	GW-030708-KW-021	GW-103008-KW-009	GW-080510-TW-08	GW-060311-JH-38	GW-110111-JH-20	iW-31532-052218-JH-(	GW-022306-NR-077	GW-022306-NR-078	GW-022306-NK-080	GW-022306-NR-068	GW-022306-NR-069	GW-022306-NR-083	GW-060111-JH-12
Sample Date:		3/26/2007	12/6/2007	3/7/2008	10/30/2008	8/5/2010	6/3/2011	11/1/2011	5/22/2018	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	6/1/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)			(Duplicate)		
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	5.0 U	2.0 U	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	200 U	400 U	200 U	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	0.83 J	20 U	10 U	-	-	-	25 U	1.9 J	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	25 U	10 U	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	25 U	10 U	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	25 U	11	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	1.2	13	20	-	-	-	2.5 U	0.68 J	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Carbon disulfide	µg/L	1.7	2.0 U	2.6 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Chlorobenzene	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	51	18	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Ethylbenzene	µg/L	0.67 J	0.55 J	0.49 J	-	-	-	2.5 U	0.21 J	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	52	30	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	25 U	10 U	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	7.1	1.0 U	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	5.0 U	10 U	5.0 U	-	-	-	13 U	1.0 U	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	2.5 U	5.0 U	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Toluene	µg/L	0.89 J	0.99 J	1.1	-	-	-	2.5 U	0.79 J	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Trichloroethene	µg/L	1.0 U	2.0 U	1.0 U	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	2.5 U	1.0 U	-	-	-	-	-	-	-
Xylenes (total)	µg/L	2.6	2.8 J	2.9	-	-	-	5.0 U	1.5 J	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	-	-	-	1.8	2.2	2.4	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	22	42
Ethylbenzene	µg/L	-	-	-	0.23 J	1.0 U	1.0 U	-	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.1	4.9
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	0.72 J	1.0 U	1.0 U	-	-	1.0 U	1.0 U	0.27 J	0.19 J	0.24 J	11	18
Xylenes (total)	µg/L	-	-	-	1.5 J	2.0 U	2.0 U	-	-	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	36	62

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	PZ-1	PZ-1	PZ-2	PZ-3	PZ-3	PZ-4	PZ-4
Sample ID:		GW-032607-JO-029	GW-120607-SP-016	GW-030708-KW-021	GW-103008-KW-009	GW-080510-TW-08	GW-060311-JH-38	GW-110111-JH-20	iW-31532-052218-JH-(	GW-022306-NR-077	GW-022306-NR-078	GW-022306-NK-080	GW-022306-NR-068	GW-022306-NR-069	GW-022306-NR-083	GW-060111-JH-12
Sample Date:		3/26/2007	12/6/2007	3/7/2008	10/30/2008	8/5/2010	6/3/2011	11/1/2011	5/22/2018	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	6/1/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)			(Duplicate)		
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	100 U	25 U	50 U	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	500 U	120 U	250 U	-	-	-	24 U	38 U	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
2-Methylphenol	µg/L	100 U	25 U	50 U	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
3-Methylphenol	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4-Methylphenol	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	9.6 U	7.6 U	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	500 U	120 U	250 U	-	-	-	24 U	38 U	-	-	-	-	-	-	-
Acenaphthene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Anthracene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	4.8 U	7.6 U	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	4.8 U	7.6 U	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	100 U	25 U	50 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	100 U	25 U	50 U	-	-	-	9.6 U	19 U	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	4.8 U	7.6 U	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	24 U	19 U	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Chrysene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	100 U	25 U	50 U	-	-	-	4.8 U	19 U	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	100 U	25 U	50 U	-	-	-	4.8 U	7.6 U	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	100 U	25 U	50 U	-	-	-	4.8 U	19 U	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	4.8 U	7.6 U	-	-	-	-	-	-	-
Fluoranthene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Fluorene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	48 U	38 U	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Naphthalene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	24 U	38 U	-	-	-	-	-	-	-
Phenanthrene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Phenol	µg/L	100 U	25 U	50 U	-	-	-	4.8 U	3.8 U	-	-	-	-	-	-	-
Pyrene	µg/L	100 U	25 U	50 U	-	-	-	0.96 U	0.76 U	-	-	-	-	-	-	-
Pyridine	µg/L	200 U	50 U	100 U	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**MW-17**	**MW-17**	**MW-17**	**MW-17**	**MW-17**	**MW-17**	**MW-17**	**MW-17**	**PZ-1**	**PZ-1**	**PZ-2**	**PZ-3**	**PZ-3**	**PZ-4**	**PZ-4**
Sample ID:		**GW-032607-JO-029**	**GW-120607-SP-016**	**GW-030708-KW-021**	**GW-103008-KW-009**	**GW-080510-TW-08**	**GW-060311-JH-38**	**GW-110111-JH-20**	**iW-31532-052218-JH-(**	**GW-022306-NR-077**	**GW-022306-NR-078**	**GW-022306-NK-080**	**GW-022306-NR-068**	**GW-022306-NR-069**	**GW-022306-NR-083**	**GW-060111-JH-12**
Sample Date:		**3/26/2007**	**12/6/2007**	**3/7/2008**	**10/30/2008**	**8/5/2010**	**6/3/2011**	**11/1/2011**	**5/22/2018**	**2/23/2006**	**2/23/2006**	**2/23/2006**	**2/23/2006**	**2/23/2006**	**2/23/2006**	**6/1/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
											(Duplicate)			**(Duplicate)**		
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	200 U	50 U	-	-	-	-	-	-	-
Antimony	µg/L	60.0 U	60.0 U	60.0 U	-	-	-	10 U	2.0 U	-	-	-	-	-	-	-
Arsenic	µg/L	10.0 U	10.0 U	6.3 J	-	10.0 U	-	10 U	18	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	3.3 J	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	81.5 J	63.7 J	159 J	-	-	-	200 U	75	-	-	-	-	-	-	-
Beryllium	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	5.0 U	1.0 U	-	-	-	-	-	-	-
Cadmium	µg/L	5.0 U	5.0 U	5.0 U	-	-	-	2.0 U	1.0 U	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	350000	120000	-	-	-	-	-	-	-
Chromium	µg/L	2.9 J	10.0 U	10.0 U	-	-	-	5.0 U	2.0 U	-	-	-	-	-	-	-
Cobalt	µg/L	50.0 U	50.0 U	50.0 U	-	-	-	7.0 U	0.30 J	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	25 U	2.0 U	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	1300	24000	-	-	-	-	-	-	-
Lead	µg/L	3.0 U	2.9 J	6.0	-	-	-	3.0 U	1.0 U	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	15000	9800	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	1100	990	-	-	-	-	-	-	-
Mercury	µg/L	0.20 U	0.20 U	0.20 U	-	-	-	0.20 U	0.20 U	-	-	-	-	-	-	-
Nickel	µg/L	4.3 J	40.0 U	40.0 U	-	-	-	40 U	2.0 U	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	5900	3000	-	-	-	-	-	-	-
Selenium	µg/L	2.5 J	5.0 U	5.0 U	-	-	-	5.0 U	5.0 U	-	-	-	-	-	-	-
Silver	µg/L	10.0 U	10.0 U	10.0 U	-	-	-	5.0 U	1.0 U	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	5000 U	1800	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	10 U	1.0 U	-	-	-	-	-	-	-
Vanadium	µg/L	16.0 J	12.0 J	1.9 J	-	-	-	11	1.3 J	-	-	-	-	-	-	-
Zinc	µg/L	20.0 U	20.0 U	11.5 J	-	-	-	50 U	20 U	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	0.48 U	0.095 U	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	10 U	10 U	21	-	-	-	10 U	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-5	PZ-6	PZ-6	PZ-C-D-3-4	PZ-F-5	PZ-H-4	PZ-H-4	PZ-I-4	PZ-I-4	PZ-I-5	PZ-I-5	PZ-I-5	PZ-I-6	PZ-I-6	PZ-I-6
Sample ID:		GW-022306-NR-075	GW-022306-NR-072	GW-060211-JH-25	GW-022306-NR-076	GW-022306-NR-074	GW-022306-NK-079	GW-060611-JH-40	GW-111910-GW-007	GW-060211-JH-24	GW-111910-GW-012	GW-060111-JH-08	GW-110111-JH-27	GW-022306-NR-073	GW-111910-GW-014	GW-060211-JH-33
Sample Date:		2/23/2006	2/23/2006	6/2/2011	2/23/2006	2/23/2006	2/23/2006	6/6/2011	11/19/2010	6/2/2011	11/19/2010	6/1/2011	11/1/2011	2/23/2006	11/19/2010	6/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	29 U	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	140 U	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	140 U	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	140 U	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	140 U	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	270	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	270	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	84	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	140 U	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	390	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	71 U	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	58	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	14 U	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	270	-	-	-
VOAs - BTEX																
Benzene	µg/L	1.0 U	270 J	210	1.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	420	200	-	21	62	35
Ethylbenzene	µg/L	1.0 U	88 J	22	4.5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	110	84	-	98	110	23
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1.0 U	33 J	25	2.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	81	59	-	5.3 J	5.2	3.3 U
Xylenes (total)	µg/L	2.0 U	20 J	18 U	29	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	220	260	-	720	140	33

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-5	PZ-6	PZ-6	PZ-C-D-3-4	PZ-F-5	PZ-H-4	PZ-H-4	PZ-I-4	PZ-I-4	PZ-I-5	PZ-I-5	PZ-I-5	PZ-I-6	PZ-I-6	PZ-I-6
Sample ID:		GW-022306-NR-075	GW-022306-NR-072	GW-060211-JH-25	GW-022306-NR-076	GW-022306-NR-074	GW-022306-NK-079	GW-060611-JH-40	GW-111910-GW-007	GW-060211-JH-24	GW-111910-GW-012	GW-060111-JH-08	GW-110111-JH-27	GW-022306-NR-073	GW-111910-GW-014	GW-060211-JH-33
Sample Date:		2/23/2006	2/23/2006	6/2/2011	2/23/2006	2/23/2006	2/23/2006	6/6/2011	11/19/2010	6/2/2011	11/19/2010	6/1/2011	11/1/2011	2/23/2006	11/19/2010	6/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	190	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.4	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	13 U	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	9.0	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	65 U	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	1.3 U	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	7.0	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	33 U	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	6.5 U	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.6	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**PZ-5**	**PZ-6**	**PZ-6**	**PZ-C-D-3-4**	**PZ-F-5**	**PZ-H-4**	**PZ-H-4**	**PZ-I-4**	**PZ-I-4**	**PZ-I-5**	**PZ-I-5**	**PZ-I-5**	**PZ-I-6**	**PZ-I-6**	**PZ-I-6**
Sample ID:		**GW-022306-NR-075**	**GW-022306-NR-072**	**GW-060211-JH-25**	**GW-022306-NR-076**	**GW-022306-NR-074**	**GW-022306-NK-079**	**GW-060611-JH-40**	**GW-111910-GW-007**	**GW-060211-JH-24**	**GW-111910-GW-012**	**GW-060111-JH-08**	**GW-110111-JH-27**	**GW-022306-NR-073**	**GW-111910-GW-014**	**GW-060211-JH-33**
Sample Date:		**2/23/2006**	**2/23/2006**	**6/2/2011**	**2/23/2006**	**2/23/2006**	**2/23/2006**	**6/6/2011**	**11/19/2010**	**6/2/2011**	**11/19/2010**	**6/1/2011**	**11/1/2011**	**2/23/2006**	**11/19/2010**	**6/2/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	200 U	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	230	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5.0 U	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.0 U	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	220000	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5.0 U	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	7.0 U	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	25 U	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	3000	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	3.0 U	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	18000	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	2400	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	0.20 U	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	40 U	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5000 U	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5.0 U	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	5.0 U	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	5000 U	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	10 U	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	7.0 U	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	50 U	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.5 U	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.5 U	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.5 U	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.5 U	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	2.5 U	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-J-3	PZ-J-3	PZ-J-4	PZ-J-4	PZ-J-5	PZ-J-5	PZ-J-5	PZ-J-7	PZ-J-7	PZ-J-7	PZ-J-7	PZ-K-3	PZ-K-3	PZ-K-3	PZ-K-3
Sample ID:		GW-111510-GW-001	GW-060611-JH-43	GW-111910-GW-006	GW-060211-JH-26	GW-111910-GW-013	GW-060111-JH-10	GW-110311-JH-44	GW-111910-GW-016	GW-060611-JH-45	GW-060611-JH-46	GW-110311-JH-46	GW-111510-GW-002	GW-060611-JH-41	GW-060611-JH-42	GW-110311-JH-48
Sample Date:		11/15/2010	6/6/2011	11/19/2010	6/2/2011	11/19/2010	6/1/2011	11/3/2011	11/19/2010	6/6/2011	6/6/2011	11/3/2011	11/15/2010	6/6/2011	6/6/2011	11/3/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)				(Duplicate)	
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	8.0 U	-	-	-	2.0 U	-	-	-	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	40 U	-	-	-	10 U	-	-	-	10 U
2-Hexanone	µg/L	-	-	-	-	-	-	40 U	-	-	-	10 U	-	-	-	10 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	40 U	-	-	-	10 U	-	-	-	10 U
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	40 U	-	-	-	10 U	-	-	-	10 U
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	5.9	-	-	-	5.7	-	-	-	1.0 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Bromoform	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Carbon disulfide	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Carbon tetrachloride	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Chlorobenzene	µg/L	-	-	-	-	-	-	6.6	-	-	-	1.0 U	-	-	-	1.0 U
Chloroethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Cyclohexane	µg/L	-	-	-	-	-	-	40	-	-	-	26	-	-	-	1.0 U
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Ethylbenzene	µg/L	-	-	-	-	-	-	4.6	-	-	-	1.0 U	-	-	-	1.0 U
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	7.4	-	-	-	2.1	-	-	-	1.0 U
Methyl acetate	µg/L	-	-	-	-	-	-	40 U	-	-	-	10 U	-	-	-	10 U
Methyl cyclohexane	µg/L	-	-	-	-	-	-	100	-	-	-	26	-	-	-	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	20 U	-	-	-	5.0 U	-	-	-	5.0 U
Methylene chloride	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Tetrachloroethene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Toluene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Trichloroethene	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Vinyl chloride	µg/L	-	-	-	-	-	-	4.0 U	-	-	-	1.0 U	-	-	-	1.0 U
Xylenes (total)	µg/L	-	-	-	-	-	-	15	-	-	-	2.0 U	-	-	-	2.0 U
VOAs - BTEX																
Benzene	µg/L	1 U	1.0 U	1.0 U	1.0 U	710	27	-	18	4.8	4.6	-	1 U	1.0 U	1.0 U	-
Ethylbenzene	µg/L	1 U	1.0 U	1.0 U	1.0 U	120	18	-	2.5 U	1.0 U	1.0 U	-	1 U	1.0 U	1.0 U	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1 U	1.0 U	1.0 U	1.0 U	73	8.6	-	3.1	1.1	1.0	-	0.93 J	1.0 U	1.0 U	-
Xylenes (total)	µg/L	2 U	2.0 U	2.0 U	2.0 U	220	53	-	5.0 U	2.0 U	2.0 U	-	1.3 J	2.0 U	2.0 U	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-J-3	PZ-J-3	PZ-J-4	PZ-J-4	PZ-J-5	PZ-J-5	PZ-J-5	PZ-J-7	PZ-J-7	PZ-J-7	PZ-J-7	PZ-K-3	PZ-K-3	PZ-K-3	PZ-K-3
Sample ID:		GW-111510-GW-001	GW-060611-JH-43	GW-111910-GW-006	GW-060211-JH-26	GW-111910-GW-013	GW-060111-JH-10	GW-110311-JH-44	GW-111910-GW-016	GW-060611-JH-45	GW-060611-JH-46	GW-110311-JH-46	GW-111510-GW-002	GW-060611-JH-41	GW-060611-JH-42	GW-110311-JH-48
Sample Date:		11/15/2010	6/6/2011	11/19/2010	6/2/2011	11/19/2010	6/1/2011	11/3/2011	11/19/2010	6/6/2011	6/6/2011	11/3/2011	11/15/2010	6/6/2011	6/6/2011	11/3/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											(Duplicate)				(Duplicate)	
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
2-Chlorophenol	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	9.3	-	-	-	6.2	-	-	-	2.6
2-Methylphenol	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
2-Nitroaniline	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
2-Nitrophenol	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
3&4-Methylphenol	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4-Chloroaniline	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
4-Nitrophenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
Acenaphthene	µg/L	-	-	-	-	-	-	1.1	-	-	-	0.19 U	-	-	-	0.98 U
Acenaphthylene	µg/L	-	-	-	-	-	-	0.19 U	-	-	-	0.19 U	-	-	-	0.98 U
Acetophenone	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Anthracene	µg/L	-	-	-	-	-	-	1.3	-	-	-	0.19 U	-	-	-	0.98 U
Atrazine	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Benzaldehyde	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	0.57	-	-	-	0.19 U	-	-	-	0.98 U
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	0.34	-	-	-	0.19 U	-	-	-	0.98 U
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	0.36	-	-	-	0.19 U	-	-	-	0.98 U
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	0.40	-	-	-	0.19 U	-	-	-	0.98 U
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	0.19 U	-	-	-	0.19 U	-	-	-	0.98 U
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	1.9 U	-	-	-	1.9 U	-	-	-	9.8 U
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Caprolactam	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
Carbazole	µg/L	-	-	-	-	-	-	12	-	-	-	0.95 U	-	-	-	4.9 U
Chrysene	µg/L	-	-	-	-	-	-	1.7	-	-	-	0.19 U	-	-	-	0.98 U
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	0.19 U	-	-	-	0.19 U	-	-	-	0.98 U
Dibenzofuran	µg/L	-	-	-	-	-	-	1.0	-	-	-	0.95 U	-	-	-	4.9 U
Diethyl phthalate	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Dimethyl phthalate	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Fluoranthene	µg/L	-	-	-	-	-	-	0.61	-	-	-	0.19 U	-	-	-	0.98 U
Fluorene	µg/L	-	-	-	-	-	-	2.6	-	-	-	0.19 U	-	-	-	0.98 U
Hexachlorobenzene	µg/L	-	-	-	-	-	-	0.19 U	-	-	-	0.19 U	-	-	-	0.98 U
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	9.5 U	-	-	-	9.5 U	-	-	-	49 U
Hexachloroethane	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	0.19 U	-	-	-	0.19 U	-	-	-	0.98 U
Isophorone	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Naphthalene	µg/L	-	-	-	-	-	-	2.1	-	-	-	0.19 U	-	-	-	1.8
Nitrobenzene	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Pentachlorophenol	µg/L	-	-	-	-	-	-	4.8 U	-	-	-	4.8 U	-	-	-	25 U
Phenanthrene	µg/L	-	-	-	-	-	-	6.0	-	-	-	0.19 U	-	-	-	0.98 U
Phenol	µg/L	-	-	-	-	-	-	0.95 U	-	-	-	0.95 U	-	-	-	4.9 U
Pyrene	µg/L	-	-	-	-	-	-	2.2	-	-	-	0.20	-	-	-	0.98 U
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**PZ-J-3**	**PZ-J-3**	**PZ-J-4**	**PZ-J-4**	**PZ-J-5**	**PZ-J-5**	**PZ-J-5**	**PZ-J-7**	**PZ-J-7**	**PZ-J-7**	**PZ-J-7**	**PZ-K-3**	**PZ-K-3**	**PZ-K-3**	**PZ-K-3**
Sample ID:		**GW-111510-GW-001**	**GW-060611-JH-43**	**GW-111910-GW-006**	**GW-060211-JH-26**	**GW-111910-GW-013**	**GW-060111-JH-10**	**GW-110311-JH-44**	**GW-111910-GW-016**	**GW-060611-JH-45**	**GW-060611-JH-46**	**GW-110311-JH-46**	**GW-111510-GW-002**	**GW-060611-JH-41**	**GW-060611-JH-42**	**GW-110311-JH-48**
Sample Date:		**11/15/2010**	**6/6/2011**	**11/19/2010**	**6/2/2011**	**11/19/2010**	**6/1/2011**	**11/3/2011**	**11/19/2010**	**6/6/2011**	**6/6/2011**	**11/3/2011**	**11/15/2010**	**6/6/2011**	**6/6/2011**	**11/3/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
											(Duplicate)				**(Duplicate)**	
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	700	-	-	-	200 U	-	-	-	200 U
Antimony	µg/L	-	-	-	-	-	-	10 U	-	-	-	10 U	-	-	-	10 U
Arsenic	µg/L	-	-	-	-	-	-	10 U	-	-	-	10 U	-	-	-	10 U
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	200 U	-	-	-	200 U	-	-	-	200 U
Beryllium	µg/L	-	-	-	-	-	-	5.0 U	-	-	-	5.0 U	-	-	-	5.0 U
Cadmium	µg/L	-	-	-	-	-	-	2.0 U	-	-	-	2.0 U	-	-	-	2.0 U
Calcium	µg/L	-	-	-	-	-	-	100000	-	-	-	100000	-	-	-	120000
Chromium	µg/L	-	-	-	-	-	-	5.0 U	-	-	-	5.0 U	-	-	-	5.0 U
Cobalt	µg/L	-	-	-	-	-	-	7.0 U	-	-	-	7.0 U	-	-	-	7.0 U
Copper	µg/L	-	-	-	-	-	-	25 U	-	-	-	25 U	-	-	-	25 U
Iron	µg/L	-	-	-	-	-	-	4200	-	-	-	13000	-	-	-	26000
Lead	µg/L	-	-	-	-	-	-	9.5	-	-	-	3.0 U	-	-	-	3.0 U
Magnesium	µg/L	-	-	-	-	-	-	7500	-	-	-	24000	-	-	-	7300
Manganese	µg/L	-	-	-	-	-	-	510	-	-	-	270	-	-	-	980
Mercury	µg/L	-	-	-	-	-	-	0.20 U	-	-	-	0.20 U	-	-	-	0.20 U
Nickel	µg/L	-	-	-	-	-	-	40 U	-	-	-	40 U	-	-	-	40 U
Potassium	µg/L	-	-	-	-	-	-	5000 U	-	-	-	5000 U	-	-	-	5000 U
Selenium	µg/L	-	-	-	-	-	-	5.0 U	-	-	-	5.0 U	-	-	-	5.0 U
Silver	µg/L	-	-	-	-	-	-	5.0 U	-	-	-	5.0 U	-	-	-	5.0 U
Sodium	µg/L	-	-	-	-	-	-	5000 U	-	-	-	5000 U	-	-	-	5000 U
Thallium	µg/L	-	-	-	-	-	-	10 U	-	-	-	10 U	-	-	-	10 U
Vanadium	µg/L	-	-	-	-	-	-	7.0 U	-	-	-	7.0 U	-	-	-	7.0 U
Zinc	µg/L	-	-	-	-	-	-	50 U	-	-	-	50 U	-	-	-	50 U
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	0.48 U	-	-	-	0.48 U	-	-	-	0.49 U
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	10 U	-	-	-	10 U	-	-	-	10 U

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-K-4	PZ-K-4	PZ-K-6	PZ-K-6	PZ-L-2	PZ-L-3	PZ-L-3	PZ-L-4	PZ-L-4	PZ-L-6	PZ-L-6B	PZ-L-6C	PZ-L-6D	PZ-L-6E	PZ-L-6E
Sample ID:		GW-111910-GW-009	GW-060211-JH-28	GW-111910-GW-015	GW-060211-JH-31	GW-091611-JH-018	GW-111510-GW-003	GW-053111-JH-04	GW-111910-GW-008	GW-060211-JH-30	GW-022306-NK-070	GW-060211-JH-21	GW-060111-JH-15	GW-060111-JH-13	GW-060211-JH-17	GW-060211-JH-19
Sample Date:		11/19/2010	6/2/2011	11/19/2010	6/2/2011	9/16/2011	11/15/2010	5/31/2011	11/19/2010	6/2/2011	2/23/2006	6/2/2011	6/1/2011	6/1/2011	6/2/2011	6/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
																(Duplicate)
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	2.8	2.1	2.1	2.8	54	1 U	1.0 U	1.0 U	1.0 U	25	7.3	140	1.0 U	50	64
Ethylbenzene	µg/L	1.7	1.0 U	1.3	1.0 U	40	1 U	1.0 U	1.0 U	1.0 U	13	1.0 U	220	1.0 U	50	57
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	13 U	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	6.4	3.7	3.7	1.3	14	0.64 J	1.0 U	1.0 U	1.0 U	6.7	1.0 U	34	1.0 U	9.8	11
Xylenes (total)	µg/L	46	21	7.6	4.4	190	1.2 J	2.0 U	2.0 U	2.0 U	120	2.0 U	230	2.0 U	33	37

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-K-4	PZ-K-4	PZ-K-6	PZ-K-6	PZ-L-2	PZ-L-3	PZ-L-3	PZ-L-4	PZ-L-4	PZ-L-6	PZ-L-6B	PZ-L-6C	PZ-L-6D	PZ-L-6E	PZ-L-6E
Sample ID:		GW-111910-GW-009	GW-060211-JH-28	GW-111910-GW-015	GW-060211-JH-31	GW-091611-JH-018	GW-111510-GW-003	GW-053111-JH-04	GW-111910-GW-008	GW-060211-JH-30	GW-022306-NK-070	GW-060211-JH-21	GW-060111-JH-15	GW-060111-JH-13	GW-060211-JH-17	GW-060211-JH-19
Sample Date:		11/19/2010	6/2/2011	11/19/2010	6/2/2011	9/16/2011	11/15/2010	5/31/2011	11/19/2010	6/2/2011	2/23/2006	6/2/2011	6/1/2011	6/1/2011	6/2/2011	6/2/2011
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
																(Duplicate)
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**PZ-K-4**	**PZ-K-4**	**PZ-K-6**	**PZ-K-6**	**PZ-L-2**	**PZ-L-3**	**PZ-L-3**	**PZ-L-4**	**PZ-L-4**	**PZ-L-6**	**PZ-L-6B**	**PZ-L-6C**	**PZ-L-6D**	**PZ-L-6E**	**PZ-L-6E**
Sample ID:		**GW-111910-GW-009**	**GW-060211-JH-28**	**GW-111910-GW-015**	**GW-060211-JH-31**	**GW-091611-JH-018**	**GW-111510-GW-003**	**GW-053111-JH-04**	**GW-111910-GW-008**	**GW-060211-JH-30**	**GW-022306-NK-070**	**GW-060211-JH-21**	**GW-060111-JH-15**	**GW-060111-JH-13**	**GW-060211-JH-17**	**GW-060211-JH-19**
Sample Date:		**11/19/2010**	**6/2/2011**	**11/19/2010**	**6/2/2011**	**9/16/2011**	**11/15/2010**	**5/31/2011**	**11/19/2010**	**6/2/2011**	**2/23/2006**	**6/2/2011**	**6/1/2011**	**6/1/2011**	**6/2/2011**	**6/2/2011**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
																(Duplicate)
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-M-2	PZ-M-2	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-4	PZ-M-4A	PZ-M-4A	PZ-M-4A	PZ-M-8-9	PZ-N-2	PZ-N-2	PZ-N-3
Sample ID:		GW-060111-JH-09	GW-110111-JH-22	GW-111510-GW-004	GW-053111-JH-02	GW-053111-JH-03	GW-110111-JH-24	GW-110111-JH-26	GW-022306-NK-081	GW-111910-GW-010	GW-060311-JH-32	GW-110111-JH-28	GW-022306-NR-071	GW-060111-JH-11	GW-110211-JH-30	GW-111510-GW-005
Sample Date:		6/1/2011	11/1/2011	11/15/2010	5/31/2011	5/31/2011	11/1/2011	11/1/2011	2/23/2006	11/19/2010	6/3/2011	11/1/2011	2/23/2006	6/1/2011	11/2/2011	11/15/2010
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)		(Duplicate)								
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,1,2,2-Tetrachloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,1,2-Trichloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,1-Dichloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,1-Dichloroethene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,2,4-Trichlorobenzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	25 UJ	-	-	-	130 U	180 U	-	-	-	2.0 U	-	-	2.0 U	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,2-Dichlorobenzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,2-Dichloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,2-Dichloropropane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,3-Dichlorobenzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,4-Dichlorobenzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	130 UJ	-	-	-	670 U	910 U	-	-	-	10 U	-	-	10 U	-
2-Hexanone	µg/L	-	130 UJ	-	-	-	670 U	910 U	-	-	-	10 U	-	-	10 U	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	130 UJ	-	-	-	670 U	910 U	-	-	-	10 U	-	-	10 U	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	130 UJ	-	-	-	670 U	910 U	-	-	-	10 U	-	-	10 U	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	65 J	-	-	-	180	170	-	-	-	1.0 U	-	-	1.0 U	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Bromoform	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Bromomethane (Methyl bromide)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Carbon disulfide	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Carbon tetrachloride	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Chlorobenzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Chloroethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Chloroform (Trichloromethane)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Chloromethane (Methyl chloride)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
cis-1,3-Dichloropropene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Cyclohexane	µg/L	-	21 J	-	-	-	420	450	-	-	-	1.0 U	-	-	1.0 U	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Ethylbenzene	µg/L	-	35 J	-	-	-	1000	910	-	-	-	1.0 U	-	-	1.0 U	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Methyl acetate	µg/L	-	130 UJ	-	-	-	670 U	910 U	-	-	-	10 U	-	-	10 U	-
Methyl cyclohexane	µg/L	-	15 J	-	-	-	210	230	-	-	-	1.0 U	-	-	1.0 U	-
Methyl tert butyl ether (MTBE)	µg/L	-	63 UJ	-	-	-	330 U	450 U	-	-	-	5.0 U	-	-	5.0 U	-
Methylene chloride	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Tetrachloroethene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Toluene	µg/L	-	150 J	-	-	-	390	370	-	-	-	1.0 U	-	-	1.0 U	-
trans-1,2-Dichloroethene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
trans-1,3-Dichloropropene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Trichloroethene	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Trichlorofluoromethane (CFC-11)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Vinyl chloride	µg/L	-	13 UJ	-	-	-	67 U	91 U	-	-	-	1.0 U	-	-	1.0 U	-
Xylenes (total)	µg/L	-	210 J	-	-	-	3900	3500	-	-	-	2.0 U	-	-	2.0 U	-
VOAs - BTEX																
Benzene	µg/L	80	-	520	190	170	-	-	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	-	1 U
Ethylbenzene	µg/L	53	-	1300	1200	1200	-	-	1.0 U	1.0 U	1.0 U	-	1.0 U	1.0 U	-	0.55 J
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	180	-	470	410	390	-	-	0.26 J	1.0 U	1.0 U	-	1.0 U	1.0 U	-	0.99 J
Xylenes (total)	µg/L	310	-	3200	4600	4600	-	-	2.0 U	2.0 U	2.0 U	-	0.47 J	2.0 U	-	2.1

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-M-2	PZ-M-2	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-4	PZ-M-4A	PZ-M-4A	PZ-M-4A	PZ-M-8-9	PZ-N-2	PZ-N-2	PZ-N-3
Sample ID:		GW-060111-JH-09	GW-110111-JH-22	GW-111510-GW-004	GW-053111-JH-02	GW-053111-JH-03	GW-110111-JH-24	GW-110111-JH-26	GW-022306-NK-081	GW-111910-GW-010	GW-060311-JH-32	GW-110111-JH-28	GW-022306-NR-071	GW-060111-JH-11	GW-110211-JH-30	GW-111510-GW-005
Sample Date:		6/1/2011	11/1/2011	11/15/2010	5/31/2011	5/31/2011	11/1/2011	11/1/2011	2/23/2006	11/19/2010	6/3/2011	11/1/2011	2/23/2006	6/1/2011	11/2/2011	11/15/2010
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)		(Duplicate)								
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
2,4,5-Trichlorophenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
2,4,6-Trichlorophenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
2,4-Dichlorophenol	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
2,4-Dimethylphenol	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
2,4-Dinitrophenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
2,4-Dinitrotoluene	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
2,6-Dinitrotoluene	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
2-Chloronaphthalene	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
2-Chlorophenol	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
2-Methylnaphthalene	µg/L	-	430	-	-	-	71	79	-	-	-	0.19 U	-	-	0.19 U	-
2-Methylphenol	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
2-Nitroaniline	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
2-Nitrophenol	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
3&4-Methylphenol	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
3,3'-Dichlorobenzidine	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4,6-Dinitro-2-methylphenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
4-Bromophenyl phenyl ether	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4-Chloro-3-methylphenol	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4-Chloroaniline	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4-Chlorophenyl phenyl ether	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9 U	-	-	1.9 U	-
4-Nitrophenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
Acenaphthene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Acenaphthylene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Acetophenone	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Anthracene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Atrazine	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Benzaldehyde	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Benzo(a)anthracene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Benzo(a)pyrene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Benzo(b)fluoranthene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Benzo(k)fluoranthene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Biphenyl (1,1-Biphenyl)	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
bis(2-Chloroethoxy)methane	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
bis(2-Chloroethyl)ether	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	24 U	-	-	-	19 U	19 U	-	-	-	1.9	-	-	1.9 U	-
Butyl benzylphthalate (BBP)	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Caprolactam	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
Carbazole	µg/L	-	12 U	-	-	-	25	26	-	-	-	0.95 U	-	-	0.96 U	-
Chrysene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Dibenz(a,h)anthracene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Dibenzofuran	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Diethyl phthalate	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Dimethyl phthalate	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Di-n-butylphthalate (DBP)	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Di-n-octyl phthalate (DnOP)	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Fluoranthene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Fluorene	µg/L	-	6.1	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Hexachlorobenzene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Hexachlorobutadiene	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Hexachlorocyclopentadiene	µg/L	-	120 U	-	-	-	97 U	97 U	-	-	-	9.5 U	-	-	9.6 U	-
Hexachloroethane	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Indeno(1,2,3-cd)pyrene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Isophorone	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Naphthalene	µg/L	-	330	-	-	-	240	300	-	-	-	0.19 U	-	-	0.19 U	-
Nitrobenzene	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
N-Nitrosodi-n-propylamine	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
N-Nitrosodiphenylamine	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Pentachlorophenol	µg/L	-	60 U	-	-	-	49 U	49 U	-	-	-	4.8 U	-	-	4.8 U	-
Phenanthrene	µg/L	-	12	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Phenol	µg/L	-	12 U	-	-	-	9.7 U	9.7 U	-	-	-	0.95 U	-	-	0.96 U	-
Pyrene	µg/L	-	2.4 U	-	-	-	1.9 U	1.9 U	-	-	-	0.19 U	-	-	0.19 U	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-M-2	PZ-M-2	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-3	PZ-M-4	PZ-M-4A	PZ-M-4A	PZ-M-4A	PZ-M-8-9	PZ-N-2	PZ-N-2	PZ-N-3
Sample ID:		GW-060111-JH-09	GW-110111-JH-22	GW-111510-GW-004	GW-053111-JH-02	GW-053111-JH-03	GW-110111-JH-24	GW-110111-JH-26	GW-022306-NK-081	GW-111910-GW-010	GW-060311-JH-32	GW-110111-JH-28	GW-022306-NR-071	GW-060111-JH-11	GW-110211-JH-30	GW-111510-GW-005
Sample Date:		6/1/2011	11/1/2011	11/15/2010	5/31/2011	5/31/2011	11/1/2011	11/1/2011	2/23/2006	11/19/2010	6/3/2011	11/1/2011	2/23/2006	6/1/2011	11/2/2011	11/15/2010
Sample Depth:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
						(Duplicate)		(Duplicate)								
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	200 U	-	-	-	200 U	200 U	-	-	-	200 U	-	-	400	-
Antimony	µg/L	-	10 U	-	-	-	10 U	10 U	-	-	-	10 U	-	-	10 U	-
Arsenic	µg/L	-	10 U	-	-	-	10 U	10 U	-	-	-	10 U	-	-	10 U	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	200 U	-	-	-	200 U	200 U	-	-	-	200 U	-	-	200 U	-
Beryllium	µg/L	-	5.0 U	-	-	-	5.0 U	5.0 U	-	-	-	5.0 U	-	-	5.0 U	-
Cadmium	µg/L	-	2.0 U	-	-	-	2.0 U	2.0 U	-	-	-	2.0 U	-	-	2.0 U	-
Calcium	µg/L	-	440000	-	-	-	170000	160000	-	-	-	69000	-	-	200000	-
Chromium	µg/L	-	5.0 U	-	-	-	5.0 U	5.0 U	-	-	-	5.0 U	-	-	5.0 U	-
Cobalt	µg/L	-	7.0 U	-	-	-	7.0 U	7.0 U	-	-	-	7.0 U	-	-	7.0 U	-
Copper	µg/L	-	25 U	-	-	-	25 U	25 U	-	-	-	25 U	-	-	25 U	-
Iron	µg/L	-	100 U	-	-	-	9300	8800	-	-	-	490	-	-	7200	-
Lead	µg/L	-	6.3	-	-	-	3.0 U	3.0 U	-	-	-	3.0 U	-	-	3.0 U	-
Magnesium	µg/L	-	30000	-	-	-	9400	9900	-	-	-	5700	-	-	18000	-
Manganese	µg/L	-	93	-	-	-	1700	1600	-	-	-	150	-	-	1500	-
Mercury	µg/L	-	0.20 U	-	-	-	0.20 U	0.20 U	-	-	-	0.20 U	-	-	0.20 U	-
Nickel	µg/L	-	40 U	-	-	-	40 U	40 U	-	-	-	40 U	-	-	40 U	-
Potassium	µg/L	-	7300	-	-	-	5000 U	5000 U	-	-	-	5000 U	-	-	5000 U	-
Selenium	µg/L	-	5.0 U	-	-	-	5.0 U	5.0 U	-	-	-	5.0 U	-	-	6.0	-
Silver	µg/L	-	5.0 U	-	-	-	5.0 U	5.0 U	-	-	-	5.0 U	-	-	5.0 U	-
Sodium	µg/L	-	16000	-	-	-	5000 U	5000 U	-	-	-	5000 U	-	-	6600	-
Thallium	µg/L	-	10 U	-	-	-	10 U	10 U	-	-	-	10 U	-	-	10 U	-
Vanadium	µg/L	-	7.0 U	-	-	-	7.0 U	7.0 U	-	-	-	7.0 U	-	-	7.0 U	-
Zinc	µg/L	-	50 U	-	-	-	50 U	50 U	-	-	-	50 U	-	-	50 U	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1221 (PCB-1221)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1232 (PCB-1232)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1242 (PCB-1242)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1248 (PCB-1248)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1254 (PCB-1254)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Aroclor-1260 (PCB-1260)	µg/L	-	0.48 U	-	-	-	2.4 U	2.4 U	-	-	-	0.48 U	-	-	0.48 U	-
Wet																
Cyanide (total)	µg/L	-	25	-	-	-	10 U	10 U	-	-	-	10 U	-	-	10 U	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-N-3	PZ-N-4	PZ-N-4	PZ-O-4-5	PZ-O-4-5	SB A-B 2-3	SB B-3	SB C-3	SB D-3	SB D-4	SB E-3	SB E-4	SB E-5	SB F 5-6	SB F-3
Sample ID:		GW-053111-JH-01	GW-111910-GW-011	GW-060311-JH-39	GW-022306-NK-082	GW-060311-JH-37	GW-022006-EV-001	GW-022006-NR-011	GW-022006-NR-012	GW-022006-NR-013	GW-022006-EV-003	GW-022006-NR-014	GW-022206-NR-028	GW-022206-NR-029	GW-022106-EV-006	GW-022006-NR-015
Sample Date:		5/31/2011	11/19/2010	6/3/2011	2/23/2006	6/3/2011	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/22/2006	2/22/2006	2/21/2006	2/20/2006
Sample Depth:		-	-	-	-	-	(4.5-) ft BGS	(5-) ft BGS	(4.5-) ft BGS	(3-) ft BGS	(5-) ft BGS	(4-) ft BGS	(2.3-) ft BGS	(3.5-) ft BGS	(5-) ft BGS	(4.5-) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	1.0 U	1.0 U	1.0 U	7.6	3.1	1.0 U	6.7 U	1.6 J	1.0 U	1.0 U	3.3 U	1.0 U	1.0 U	1.0 U	17 U
Ethylbenzene	µg/L	1.0 U	2.4	1.9	43	14	1.0 U	6.7 U	1.1 J	1.0 U	1.0 U	3.3 U	1.0 U	1.0 U	1.0 U	17 U
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1.0 U	1.0 U	1.0 U	8.3	2.9	0.35 J	6.7 U	0.92 J	0.60 J	0.24 J	1.4 J	0.57 J	1.0 U	0.17 J	4.2 J
Xylenes (total)	µg/L	2.0 U	4.2	2.0 U	25	4.6	2.0 U	12 J	4.1	2.0 U	2.0 U	6.7 U	0.56 J	2.0 U	2.0 U	9.4 J

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		PZ-N-3	PZ-N-4	PZ-N-4	PZ-O-4-5	PZ-O-4-5	SB A-B 2-3	SB B-3	SB C-3	SB D-3	SB D-4	SB E-3	SB E-4	SB E-5	SB F 5-6	SB F-3
Sample ID:		GW-053111-JH-01	GW-111910-GW-011	GW-060311-JH-39	GW-022306-NK-082	GW-060311-JH-37	GW-022006-EV-001	GW-022006-NR-011	GW-022006-NR-012	GW-022006-NR-013	GW-022006-EV-003	GW-022006-NR-014	GW-022206-NR-028	GW-022206-NR-029	GW-022106-EV-006	GW-022006-NR-015
Sample Date:		5/31/2011	11/19/2010	6/3/2011	2/23/2006	6/3/2011	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006	2/22/2006	2/22/2006	2/21/2006	2/20/2006
Sample Depth:		-	-	-	-	-	(4.5-) ft BGS	(5-) ft BGS	(4.5-) ft BGS	(3-) ft BGS	(5-) ft BGS	(4-) ft BGS	(2.3-) ft BGS	(3.5-) ft BGS	(5-) ft BGS	(4.5-) ft BGS
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**PZ-N-3**	**PZ-N-4**	**PZ-N-4**	**PZ-O-4-5**	**PZ-O-4-5**	**SB A-B 2-3**	**SB B-3**	**SB C-3**	**SB D-3**	**SB D-4**	**SB E-3**	**SB E-4**	**SB E-5**	**SB F 5-6**	**SB F-3**
Sample ID:		**GW-053111-JH-01**	**GW-111910-GW-011**	**GW-060311-JH-39**	**GW-022306-NK-082**	**GW-060311-JH-37**	**GW-022006-EV-001**	**GW-022006-NR-011**	**GW-022006-NR-012**	**GW-022006-NR-013**	**GW-022006-EV-003**	**GW-022006-NR-014**	**GW-022206-NR-028**	**GW-022206-NR-029**	**GW-022106-EV-006**	**GW-022006-NR-015**
Sample Date:		**5/31/2011**	**11/19/2010**	**6/3/2011**	**2/23/2006**	**6/3/2011**	**2/20/2006**	**2/20/2006**	**2/20/2006**	**2/20/2006**	**2/20/2006**	**2/20/2006**	**2/22/2006**	**2/22/2006**	**2/21/2006**	**2/20/2006**
Sample Depth:		**-**	**-**	**-**	**-**	**-**	**(4.5-) ft BGS**	**(5-) ft BGS**	**(4.5-) ft BGS**	**(3-) ft BGS**	**(5-) ft BGS**	**(4-) ft BGS**	**(2.3-) ft BGS**	**(3.5-) ft BGS**	**(5-) ft BGS**	**(4.5-) ft BGS**
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB F-4	SB G-3	SB G-4	SB G-5	SB G 5-6	SB H 5-6	SB H-3	SB H-5	SB I-3	SB I-3	SB I-4	SB I-5	SB I-7	SB J-3	SB J-4
Sample ID:		GW-022006-EV-004	GW-022106-NR-016	GW-022206-NR-027	GW-022206-NR-030	GW-022106-EV-007	GW-022106-EV-008	GW-022106-NR-017	GW-022206-NR-062	GW-022106-NR-018	GW-022106-NR-019	GW-022106-NR-024	GW-022306-EV-057	GW-022206-EV-045	GW-022206-NR-026	GW-022106-NR-023
Sample Date:		2/20/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006
Sample Depth:		(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(4.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS (Duplicate)	(2-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3-) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	2.0 U	6.7 U	0.49 J	1.0 U	1.0 U	1.0 U	10 U	1.0 U	10 U	10 U	1.0 U	260	96	1.0 U	1.0 U
Ethylbenzene	µg/L	2.0 U	7.4	1.0 U	1.0 U	1.0 U	1.0 U	10 U	1.0 U	10 U	10 U	1.0 U	270	450	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	0.64 J	6.7 U	0.94 J	0.22 J	0.20 J	1.0 U	10 U	0.32 J	10 U	10 U	0.35 J	97	16 J	0.30 J	1.0 U
Xylenes (total)	µg/L	4.0 U	71	2.0	2.0 U	2.0 U	2.0 U	23 U	2.0 U	20 U	20 U	2.0 U	350	59 U	2.0 U	2.0 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB F-4	SB G-3	SB G-4	SB G-5	SB G 5-6	SB H 5-6	SB H-3	SB H-5	SB I-3	SB I-3	SB I-4	SB I-5	SB I-7	SB J-3	SB J-4
Sample ID:		GW-022006-EV-004	GW-022106-NR-016	GW-022206-NR-027	GW-022206-NR-030	GW-022106-EV-007	GW-022106-EV-008	GW-022106-NR-017	GW-022206-NR-062	GW-022106-NR-018	GW-022106-NR-019	GW-022106-NR-024	GW-022306-EV-057	GW-022206-EV-045	GW-022206-NR-026	GW-022106-NR-023
Sample Date:		2/20/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006
Sample Depth:		(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(4.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS (Duplicate)	(2-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3-) ft BGS
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB F-4	SB G-3	SB G-4	SB G-5	SB G 5-6	SB H 5-6	SB H-3	SB H-5	SB I-3	SB I-3	SB I-4	SB I-5	SB I-7	SB J-3	SB J-4
Sample ID:		GW-022006-EV-004	GW-022106-NR-016	GW-022206-NR-027	GW-022206-NR-030	GW-022106-EV-007	GW-022106-EV-008	GW-022106-NR-017	GW-022206-NR-062	GW-022106-NR-018	GW-022106-NR-019	GW-022106-NR-024	GW-022306-EV-057	GW-022206-EV-045	GW-022206-NR-026	GW-022106-NR-023
Sample Date:		2/20/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006
Sample Depth:		(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(4.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS (Duplicate)	(2-) ft BGS	(5-) ft BGS	(5-) ft BGS	(3-) ft BGS	(3-) ft BGS
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB J-5	SB J-6	SB J-6	SB J-7	SB K 7-8	SB K-3	SB K-4	SB K-5	SB K-6	SB K-7	SB L-2	SB L-3	SB L-4	SB L-4	SB L-5
Sample ID:		GW-022306-EV-056	GW-022106-EV-010	GW-022106-EV-031	GW-022206-EV-044	GW-022206-EV-042	GW-022106-NR-020	GW-022106-NR-022	GW-022306-EV-055	GW-022106-EV-032	GW-022206-EV-043	GW-022306-EV-066	GW-022106-NR-021	GW-022306-EV-058	GW-022306-EV-059	GW-022306-EV-054
Sample Date:		2/23/2006	2/21/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/23/2006	2/21/2006	2/22/2006	2/23/2006	2/21/2006	2/23/2006	2/23/2006	2/23/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(4-) ft BGS	(4-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	590	840	770	4.3 J	1.0 U	10 U	4.0	350	250	160	5.0 U	10 U	9.6	7.1	860
Ethylbenzene	µg/L	330	950	800	4.0 J	1.0 U	10 U	9.9	150	150	97	3.7 J	10 U	32	26	290
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	120	210	190	6.7 U	0.19 J	10 U	6.9	86	11	6.0	1.4 J	10 U	6.5	4.9	63
Xylenes (total)	µg/L	930	2600	2600	18 U	2.0 U	20 U	41	320	250	90	13	20 U	51	40	200

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB J-5	SB J-6	SB J-6	SB J-7	SB K 7-8	SB K-3	SB K-4	SB K-5	SB K-6	SB K-7	SB L-2	SB L-3	SB L-4	SB L-4	SB L-5
Sample ID:		GW-022306-EV-056	GW-022106-EV-010	GW-022106-EV-031	GW-022206-EV-044	GW-022206-EV-042	GW-022106-NR-020	GW-022106-NR-022	GW-022306-EV-055	GW-022106-EV-032	GW-022206-EV-043	GW-022306-EV-066	GW-022106-NR-021	GW-022306-EV-058	GW-022306-EV-059	GW-022306-EV-054
Sample Date:		2/23/2006	2/21/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/23/2006	2/21/2006	2/22/2006	2/23/2006	2/21/2006	2/23/2006	2/23/2006	2/23/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(4-) ft BGS	(4-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB J-5	SB J-6	SB J-6	SB J-7	SB K 7-8	SB K-3	SB K-4	SB K-5	SB K-6	SB K-7	SB L-2	SB L-3	SB L-4	SB L-4	SB L-5
Sample ID:		GW-022306-EV-056	GW-022106-EV-010	GW-022106-EV-031	GW-022206-EV-044	GW-022206-EV-042	GW-022106-NR-020	GW-022106-NR-022	GW-022306-EV-055	GW-022106-EV-032	GW-022206-EV-043	GW-022306-EV-066	GW-022106-NR-021	GW-022306-EV-058	GW-022306-EV-059	GW-022306-EV-054
Sample Date:		2/23/2006	2/21/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/23/2006	2/21/2006	2/22/2006	2/23/2006	2/21/2006	2/23/2006	2/23/2006	2/23/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(3.5-) ft BGS	(3.5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(4-) ft BGS	(4-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB L-7	SB L-8	SB L-8	SB M-2	SB M-3	SB M-5	SB M-5	SB M-6	SB M-7	SB M-8	SB N-2	SB N-3	SB N-3	SB N-4	SB N 4-5
Sample ID:		GW-022106-EV-038	GW-022206-EV-040	GW-022206-EV-041	GW-022306-EV-065	GW-022306-EV-060	GW-022206-EV-051	GW-022206-EV-052	GW-022106-EV-034	GW-022106-EV-035	GW-022106-EV-036	GW-022306-EV-064	GW-022306-EV-061	GW-022206-NR-061	GW-022206-EV-047	GW-022206-EV-050
Sample Date:		2/21/2006	2/22/2006	2/22/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/22/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	-	(5-) ft BGS	(5-) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl acetate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl cyclohexane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	µg/L	1.2	1.4	1.5	1.5	110	330	280	380	3.1	0.87 J	1.1 J	3.1 J	1.0 U	1.0 U	1.2 J
Ethylbenzene	µg/L	0.29 J	1.0 U	1.0 U	4.2	690	21	17	370	21	9.1	14 J	87	1.0 U	1.4	64
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L	1.3	0.65 J	0.55 J	5.7	200	17	15	150	3.9	2.8	2.3 J	12	1.0 U	0.68 J	12
Xylenes (total)	µg/L	3.2	2.0 U	2.0 U	35	4100	73	65	870	52	36	63 J	450	2.0 U	3.7 U	32

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB L-7	SB L-8	SB L-8	SB M-2	SB M-3	SB M-5	SB M-5	SB M-6	SB M-7	SB M-8	SB N-2	SB N-3	SB N-3	SB N-4	SB N 4-5
Sample ID:		GW-022106-EV-038	GW-022206-EV-040	GW-022206-EV-041	GW-022306-EV-065	GW-022306-EV-060	GW-022206-EV-051	GW-022206-EV-052	GW-022106-EV-034	GW-022106-EV-035	GW-022106-EV-036	GW-022306-EV-064	GW-022306-EV-061	GW-022206-NR-061	GW-022206-EV-047	GW-022206-EV-050
Sample Date:		2/21/2006	2/22/2006	2/22/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/22/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	-	(5-) ft BGS	(5-) ft BGS
Parameters	**Units**															
SVOAs																
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetophenone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caprolactam	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB L-7	SB L-8	SB L-8	SB M-2	SB M-3	SB M-5	SB M-5	SB M-6	SB M-7	SB M-8	SB N-2	SB N-3	SB N-3	SB N-4	SB N 4-5
Sample ID:		GW-022106-EV-038	GW-022206-EV-040	GW-022206-EV-041	GW-022306-EV-065	GW-022306-EV-060	GW-022206-EV-051	GW-022206-EV-052	GW-022106-EV-034	GW-022106-EV-035	GW-022106-EV-036	GW-022306-EV-064	GW-022306-EV-061	GW-022206-NR-061	GW-022206-EV-047	GW-022206-EV-050
Sample Date:		2/21/2006	2/22/2006	2/22/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/22/2006
Sample Depth:		(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS (Duplicate)	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	(5-) ft BGS	-	(5-) ft BGS	(5-) ft BGS
Parameters	**Units**															
Metals																
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																
Aroclor-1016 (PCB-1016)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
Cyanide (total)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB O-2**	**SB O-3**	**SB O-4**
Sample ID:		**GW-022306-EV-063**	**GW-022306-EV-062**	**GW-022206-EV-048**
Sample Date:		**2/23/2006**	**2/23/2006**	**2/22/2006**
Sample Depth:		**(5-) ft BGS**	**(8-) ft BGS**	**(5-) ft BGS**
Parameters	**Units**			
VOAs				
1,1,1-Trichloroethane	µg/L	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-
1,1,2-Trichloroethane	µg/L	-	-	-
1,1-Dichloroethane	µg/L	-	-	-
1,1-Dichloroethene	µg/L	-	-	-
1,2,4-Trichlorobenzene	µg/L	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-
1,2-Dichloroethane	µg/L	-	-	-
1,2-Dichloropropane	µg/L	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-
1,4-Dioxane	µg/L	-	-	-
1-Methylnaphthalene	µg/L	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-
2-Hexanone	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acetone	µg/L	-	-	-
Anthracene	µg/L	-	-	-
Benzene	µg/L	-	-	-
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Bromodichloromethane	µg/L	-	-	-
Bromoform	µg/L	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-
Carbon disulfide	µg/L	-	-	-
Carbon tetrachloride	µg/L	-	-	-
Chlorobenzene	µg/L	-	-	-
Chloroethane	µg/L	-	-	-
Chloroform (Trichloromethane)	µg/L	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-
Chrysene	µg/L	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-
Cyclohexane	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Dibromochloromethane	µg/L	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-
Ethylbenzene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Isopropyl benzene	µg/L	-	-	-
Methyl acetate	µg/L	-	-	-
Methyl cyclohexane	µg/L	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-
Methylene chloride	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-
Styrene	µg/L	-	-	-
Tetrachloroethene	µg/L	-	-	-
Toluene	µg/L	-	-	-
trans-1,2-Dichloroethene	µg/L	-	-	-
trans-1,3-Dichloropropene	µg/L	-	-	-
Trichloroethene	µg/L	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-
Trifluorotrichloroethane (CFC-113)	µg/L	-	-	-
Vinyl chloride	µg/L	-	-	-
Xylenes (total)	µg/L	-	-	-
VOAs - BTEX				
Benzene	µg/L	0.99 J	1.1 J	140
Ethylbenzene	µg/L	14	16 J	33 U
Methyl tert butyl ether (MTBE)	µg/L	-	-	-
Toluene	µg/L	1.9	2.4 J	33 U
Xylenes (total)	µg/L	70	81 J	67 U

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB O-2**	**SB O-3**	**SB O-4**
Sample ID:		**GW-022306-EV-063**	**GW-022306-EV-062**	**GW-022206-EV-048**
Sample Date:		**2/23/2006**	**2/23/2006**	**2/22/2006**
Sample Depth:		**(5-) ft BGS**	**(8-) ft BGS**	**(5-) ft BGS**
Parameters	**Units**			
SVOAs				
1,2-Dichlorobenzene	µg/L	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-
2,4-Dichlorophenol	µg/L	-	-	-
2,4-Dimethylphenol	µg/L	-	-	-
2,4-Dinitrophenol	µg/L	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-
2,6-Dinitrotoluene	µg/L	-	-	-
2-Chloronaphthalene	µg/L	-	-	-
2-Chlorophenol	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
2-Methylphenol	µg/L	-	-	-
2-Nitroaniline	µg/L	-	-	-
2-Nitrophenol	µg/L	-	-	-
3&4-Methylphenol	µg/L	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-
3-Methylphenol	µg/L	-	-	-
3-Nitroaniline	µg/L	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-
4-Chloroaniline	µg/L	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-
4-Methylphenol	µg/L	-	-	-
4-Nitroaniline	µg/L	-	-	-
4-Nitrophenol	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acetophenone	µg/L	-	-	-
Anthracene	µg/L	-	-	-
Atrazine	µg/L	-	-	-
Benzaldehyde	µg/L	-	-	-
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Biphenyl (1,1-Biphenyl)	µg/L	-	-	-
bis(2-Chloroethoxy)methane	µg/L	-	-	-
bis(2-Chloroethyl)ether	µg/L	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-
Caprolactam	µg/L	-	-	-
Carbazole	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Dibenzofuran	µg/L	-	-	-
Diethyl phthalate	µg/L	-	-	-
Dimethyl phthalate	µg/L	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Hexachlorobenzene	µg/L	-	-	-
Hexachlorobutadiene	µg/L	-	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-
Hexachloroethane	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Isophorone	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Nitrobenzene	µg/L	-	-	-
N-Nitrosodi-n-propylamine	µg/L	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-
Pentachlorophenol	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Phenol	µg/L	-	-	-
Pyrene	µg/L	-	-	-
Pyridine	µg/L	-	-	-

Table H.1

Analytical Results Summary - Groundwater
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB O-2**	**SB O-3**	**SB O-4**
Sample ID:		**GW-022306-EV-063**	**GW-022306-EV-062**	**GW-022206-EV-048**
Sample Date:		**2/23/2006**	**2/23/2006**	**2/22/2006**
Sample Depth:		**(5-) ft BGS**	**(8-) ft BGS**	**(5-) ft BGS**
Parameters	**Units**			
Metals				
Aluminum	µg/L	-	-	-
Antimony	µg/L	-	-	-
Arsenic	µg/L	-	-	-
Arsenic (dissolved)	µg/L	-	-	-
Barium	µg/L	-	-	-
Beryllium	µg/L	-	-	-
Cadmium	µg/L	-	-	-
Calcium	µg/L	-	-	-
Chromium	µg/L	-	-	-
Cobalt	µg/L	-	-	-
Copper	µg/L	-	-	-
Iron	µg/L	-	-	-
Lead	µg/L	-	-	-
Magnesium	µg/L	-	-	-
Manganese	µg/L	-	-	-
Mercury	µg/L	-	-	-
Nickel	µg/L	-	-	-
Potassium	µg/L	-	-	-
Selenium	µg/L	-	-	-
Silver	µg/L	-	-	-
Sodium	µg/L	-	-	-
Thallium	µg/L	-	-	-
Vanadium	µg/L	-	-	-
Zinc	µg/L	-	-	-
PCBs				
Aroclor-1016 (PCB-1016)	µg/L	-	-	-
Aroclor-1221 (PCB-1221)	µg/L	-	-	-
Aroclor-1232 (PCB-1232)	µg/L	-	-	-
Aroclor-1242 (PCB-1242)	µg/L	-	-	-
Aroclor-1248 (PCB-1248)	µg/L	-	-	-
Aroclor-1254 (PCB-1254)	µg/L	-	-	-
Aroclor-1260 (PCB-1260)	µg/L	-	-	-
Wet				
Cyanide (total)	µg/L	-	-	-

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		CITGO-MW3-1	CITGO-SB1-1	CITGO-SB6-1	CITGO-SB12-1	CITGO-SB13-1	GP-1	GP-2	GP-3	GP-4	GP-5	GP-6	GP-7	GP-8	GP-9	GP-10
Sample ID:		CITGO-MW3-1	CITGO-SB1-1	CITGO-SB6-1	CITGO-SB12-1	CITGO-SB13-1	S-032007-SP-003	S-032007-SP-002	S-032007-SP-001	S-032007-SP-004	S-032007-SP-005	S-032007-SP-006	S-032107-SP-007	S-032107-SP-008	S-032107-SP-009	S-032107-SP-010
Sample Date:		12/5/1996	12/3/1996	12/3/1996	12/4/1996	12/4/1996	3/20/2007	3/20/2007	3/20/2007	3/20/2007	3/20/2007	3/20/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007
Sample Depth:		(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
1,1-Dichloroethane	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
1,2-Dichloroethane	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
1,4-Dioxane	mg/kg	-	-	-	-	-	0.55 U	0.65 U	480 U	270 U	190 U	25 U	31 U	1800 U	55 U	0.59 U
1-Methylnaphthalene	mg/kg	25	0.18	33	58	44	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	0.022 U	0.026 U	19 U	11 U	7.7 U	1 U	1.3 U	73 U	2.2 U	0.024 U
2-Methylnaphthalene	mg/kg	25	0.094	62	95	92	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	3.7	0.06 U	3.5	5.2	4.3	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	3.9	0.06 U	4.1	8	6.3	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.24	0.022 U	0.4	0.28	0.23	-	-	-	-	-	-	-	-	-	-
Benzene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	0.77 J	2.7 U	1.9 U	0.091 J	0.31 U	2.5 J	0.55 U	0.00038 J
Benzo(a)anthracene	mg/kg	0.16	0.006	0.06	0.07	0.062	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.26	0.0008 U	0.008 U	0.024	0.021	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.29	0.0006 U	0.006 U	0.028	0.031	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.23	0.003 U	0.03 U	0.07	0.058	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.043	0.0006 U	0.006 U	0.006 U	0.007	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.021 J	0.31 U	18 U	0.55 U	0.0059 U
Chlorobenzene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
Chrysene	mg/kg	0.49	0.006	0.26	0.13	0.13	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.063	0.001 U	0.01 U	0.011	0.012	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	3.4 J	1.4 J	1.9 U	0.18 J	0.31 U	18 U	0.55 U	0.0059 U
Fluoranthene	mg/kg	0.14	0.007 U	0.07 U	0.19	0.15	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	1.3	0.0021 U	1.3	1.8	1.5	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.085	0.001 U	0.01 U	0.018	0.01 U	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	0.022 U	0.026 U	19 U	11 U	7.7 U	1 U	1.3 U	73 U	2.2 U	0.024 U
Naphthalene	mg/kg	11	0.06 U	16	25	17	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	1.7	0.021 U	1.5	1.9	1.6	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	0.22	0.009 U	0.09 U	0.09 U	0.09 U	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.25 U	0.31 U	18 U	0.55 U	0.0059 U
Tetrachloroethene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.17 J	0.31 U	18 U	0.55 U	0.0059 U
Toluene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	0.68 J	0.17 J	1.9 U	0.19 J	0.31 U	1.3 J	0.55 U	0.00037 J
Trichloroethene	mg/kg	-	-	-	-	-	0.0055 U	0.0065 U	4.8 U	2.7 U	1.9 U	0.045 J	0.31 U	18 U	0.55 U	0.0059 U
Xylenes (total)	mg/kg	-	-	-	-	-	0.011 U	0.013 U	16	1.6 J	0.29 J	0.94	0.63 U	10 J	0.091 J	0.012 U
VOAs - BTEX																
Benzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	77 U	9.1 U	91 U	37 U	38 U	170 U	38 U	140 U	18 U	1.8 U
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
3-Methylphenol	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
4-Methylphenol	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
4-Nitrophenol	mg/kg	-	-	-	-	-	77 U	9.1 U	91 U	37 U	38 U	170 U	38 U	140 U	18 U	1.8 U
Acenaphthene	mg/kg	-	-	-	-	-	1.5 J	0.046 J	18 J	0.68 J	0.51 J	2.4 J	1.1 J	23 J	3.8 U	0.016 J
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	2.1 J	0.53 J	4.2 J	0.54 J	0.3 J	3.3 J	7.9 U	7.8 J	3.8 U	0.043 J
Benzo(a)anthracene	mg/kg	-	-	-	-	-	11 J	1.9	3.1 J	0.95 J	0.7 J	10 J	0.61 J	28 J	0.09 J	0.51
Benzo(a)pyrene	mg/kg	-	-	-	-	-	9.5 J	2	3.5 J	0.76 J	0.55 J	8.1 J	0.37 J	14 J	3.8 U	0.48
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	6.9 J	1.8 J	3.8 J	0.75 J	0.44 J	6.3 J	0.41 J	15 J	0.098 J	0.71
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	1.9 J	0.51 J	1.6 J	0.17 J	7.9 U	1.7 J	7.9 U	3.8 J	3.8 U	0.34 J
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.17 J
Chrysene	mg/kg	-	-	-	-	-	27	3.9	8.7 J	2.3 J	1.5 J	24 J	0.84 J	63	0.21 J	0.97
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	5 J	1 J	1.6 J	0.35 J	7.9 U	2.1 J	7.9 U	5.9 J	3.8 U	0.16 J
Diethyl phthalate	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
Dimethyl phthalate	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U
Fluoranthene	mg/kg	-	-	-	-	-	6.8 J	1.2 J	5.2 J	0.84 J	0.62 J	5.3 J	0.74 J	23 J	0.1 J	1
Fluorene	mg/kg	-	-	-	-	-	2.3 J	0.15 J	15 J	7.7 U	0.65 J	3.4 J	0.35 J	22 J	3.8 U	0.016 J
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	4.2 J	1.1 J	2.2 J	0.53 J	0.27 J	2.9 J	0.16 J	5.5 J	3.8 U	0.33 J
Naphthalene	mg/kg	-	-	-	-	-	5.5 J	0.54 J	33	0.96 J	1.6 J	3.4 J	4.3 J	29 U	3.8 U	0.017 J
Phenanthrene	mg/kg	-	-	-	-	-	49	5.6	60	5.6 J	3.3 J	18 J	0.59 J	110	0.1 J	0.53
Phenol	mg/kg	-	-	-	-	-	16 U	1.9 U	19 U	7.7 U	7.9 U	36 U	7.9 U	29 U	3.8 U	0.37 U

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**CITGO-MW3-1**	**CITGO-SB1-1**	**CITGO-SB6-1**	**CITGO-SB12-1**	**CITGO-SB13-1**	**GP-1**	**GP-2**	**GP-3**	**GP-4**	**GP-5**	**GP-6**	**GP-7**	**GP-8**	**GP-9**	**GP-10**
Sample ID:		**CITGO-MW3-1**	**CITGO-SB1-1**	**CITGO-SB6-1**	**CITGO-SB12-1**	**CITGO-SB13-1**	**S-032007-SP-003**	**S-032007-SP-002**	**S-032007-SP-001**	**S-032007-SP-004**	**S-032007-SP-005**	**S-032007-SP-006**	**S-032107-SP-007**	**S-032107-SP-008**	**S-032107-SP-009**	**S-032107-SP-010**
Sample Date:		**12/5/1996**	**12/3/1996**	**12/3/1996**	**12/4/1996**	**12/4/1996**	**3/20/2007**	**3/20/2007**	**3/20/2007**	**3/20/2007**	**3/20/2007**	**3/20/2007**	**3/21/2007**	**3/21/2007**	**3/21/2007**	**3/21/2007**
Sample Depth:		**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**	**(0-2) ft BGS**
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	25	3.4	8.8 J	3 J	1.9 J	22 J	2.6 J	87	0.19 J	0.88
Pyridine	mg/kg	-	-	-	-	-	32 U	3.8 U	37 U	15 U	16 U	72 U	16 U	58 U	7.6 U	0.74 U
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	7.3 U	0.66 J	12.4	1.3 J	7.2 U	6.5 U	7.2 U	1.0 J	6.9 U	1.2 J
Arsenic	mg/kg	-	-	-	-	-	1.1 J	5.6	4.5	2.4	1.0 J	11.0	0.94 J	2.2	4.1	11.0
Barium	mg/kg	-	-	-	-	-	8.4 J	29.3	42.5	11.6 J	11.7 J	194	66.6	45.2	38.9	142
Beryllium	mg/kg	-	-	-	-	-	0.60 U	0.71 U	0.57 U	0.58 U	0.60 U	2.8	0.64	0.20 J	0.13 J	0.70
Cadmium	mg/kg	-	-	-	-	-	0.60 U	0.57 J	0.30 J	0.25 J	0.60 U	2.2	0.13 J	0.29 J	0.58 U	0.38 J
Chromium	mg/kg	-	-	-	-	-	2.6	9.2	8.0	6.7	2.6	13.1	3.1	3.5	5.6	68.5
Cobalt	mg/kg	-	-	-	-	-	1.3 J	3.3 J	2.5 J	2.6 J	1.8 J	3.7 J	1.6 J	2.0 J	2.1 J	2.9 J
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	23.8	60.5	87.8	25.3	13.7	86.5	23.7	36.7	14.9	167
Mercury	mg/kg	-	-	-	-	-	0.098 J	0.12 J	0.14	0.87	1.7	0.96	0.21	8.2	0.066 J	0.56
Nickel	mg/kg	-	-	-	-	-	11.1	13.0	5.7	11.5	3.3 J	29.6	2.9 J	5.5	4.4 J	41.9
Selenium	mg/kg	-	-	-	-	-	0.60 U	0.71 U	0.57 U	0.58 U	0.60 U	0.54 U	1.1	0.69	0.80	0.91
Silver	mg/kg	-	-	-	-	-	1.2 U	1.4 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U
Vanadium	mg/kg	-	-	-	-	-	40.4	28.3	5.7	4.9 J	4.6 J	18.3	4.8 J	7.8	11.2	219
Zinc	mg/kg	-	-	-	-	-	34.3	158	145	90.9	31.2	320	38.4	90.0	77.2	191
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	0.60 U	0.71 U	0.57 U	0.58 U	0.60 U	0.29 J	0.26 J	1.1	0.84	0.87
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	-	-	-	-	-	82.7	70.3	88.4	85.5	83.5	92.1	83.2	84.8	86.9	88.8

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		GP-11	GP-12	GP-12	PZ-C-D-3-4	PZ-F-5	PZ-H-4	PZ-I-6	PZ-L-6	PZ-M-4	PZ-M-8-9	PZ-O-4-5	SB A-B 2-3	SB B-3	SB C-3	SB D-3
Sample ID:		S-032107-SP-011	S-032107-SP-012	S-032107-SP-013	S-022006-EV-002	S-022006-EV-005	S-022106-NR-025	S-022106-EV-009	S-022106-EV-033	S-022206-EV-046	S-022106-EV-037	S-022206-EV-049	S-022006-EV-001	S-022006-NR-011	S-022006-NR-012	S-022006-NR-013
Sample Date:		3/21/2007	3/21/2007	3/21/2007	2/20/2006	2/20/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/21/2006	2/22/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006
Sample Depth:		(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS (Duplicate)	(2-2.5) ft BGS	(3-3.4) ft BGS	(1.1-1.6) ft BGS	(2.8-3.2) ft BGS	(2.8-3.2) ft BGS	(2.9-3.3) ft BGS	(2.9-3.3) ft BGS	(2.5-4) ft BGS	(3-3.5) ft BGS	(2.5-3) ft BGS	(0.5-1) ft BGS	(0.8-1.3) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	300 U	300 U	190 U	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	12 U	12 U	7.7 U	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	mg/kg	3 U	0.81 J	0.86 J	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	1.7 J	3.7	3.6	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	12 U	12 U	7.7 U	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	3 U	0.62 J	0.53 J	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	3 U	3 U	1.9 U	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	0.74 J	15	15	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	-	-	-	0.0063 U	0.0058 U	0.0057 U	1.9 U	0.0059 U	0.0059 U	0.0067 U	5.3 U	0.00092 J	0.0054 U	0.0057 U	0.0061 U
Ethylbenzene	mg/kg	-	-	-	0.0063 U	0.0058 U	0.0057 U	0.97 J	0.0059 U	0.0059 U	0.0067 U	5.3 U	0.0066 U	0.0054 U	0.0057 U	0.0061 U
Toluene	mg/kg	-	-	-	0.0063 U	0.0058 U	0.00075 J	1.9 U	0.0007 J	0.0059 U	0.0067 U	5.3 U	0.0015 J	0.0054 U	0.0057 U	0.0061 U
Xylenes (total)	mg/kg	-	-	-	0.013 U	0.012 U	0.011 U	6.8	0.012 U	0.012 U	0.013 U	0.75 J	0.013 U	0.011 U	0.011 U	0.012 U
SVOAs																
1,2-Dichlorobenzene	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	7 J	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	100 U	77 U	49 U	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	100 U	77 U	49 U	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	23	9.4 J	5.7 J	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	6.2 J	6.3 J	3.8 J	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	6.3 J	13 J	10	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	4.4 J	9 J	5.9 J	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	5.1 J	11 J	8 J	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.3 J	3.4 J	1.8 J	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	20 J	35	22	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	2.3 J	2.8 J	1.8 J	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	8.2 J	17	12	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	32	11 J	6.2 J	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	3.3 J	4.3 J	2.5 J	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	5.9 J	6.5 J	3.2 J	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	74	54	30	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	21 U	16 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		GP-11	GP-12	GP-12	PZ-C-D-3-4	PZ-F-5	PZ-H-4	PZ-I-6	PZ-L-6	PZ-M-4	PZ-M-8-9	PZ-O-4-5	SB A-B 2-3	SB B-3	SB C-3	SB D-3
Sample ID:		S-032107-SP-011	S-032107-SP-012	S-032107-SP-013	S-022006-EV-002	S-022006-EV-005	S-022106-NR-025	S-022106-EV-009	S-022106-EV-033	S-022206-EV-046	S-022106-EV-037	S-022206-EV-049	S-022006-EV-001	S-022006-NR-011	S-022006-NR-012	S-022006-NR-013
Sample Date:		3/21/2007	3/21/2007	3/21/2007	2/20/2006	2/20/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/21/2006	2/22/2006	2/20/2006	2/20/2006	2/20/2006	2/20/2006
Sample Depth:		(0-2) ft BGS	(0-2) ft BGS	(0-2) ft BGS (Duplicate)	(2-2.5) ft BGS	(3-3.4) ft BGS	(1.1-1.6) ft BGS	(2.8-3.2) ft BGS	(2.8-3.2) ft BGS	(2.9-3.3) ft BGS	(2.9-3.3) ft BGS	(2.5-4) ft BGS	(3-3.5) ft BGS	(2.5-3) ft BGS	(0.5-1) ft BGS	(0.8-1.3) ft BGS
Parameters	**Units**															
Pyrene	mg/kg	33	49	34	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	43 U	32 U	20 U	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	33.4	1.2 J	0.43 J	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	13.4	3.3	2.3	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	201	37.7	36.2	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	0.53 J	0.65	0.42 J	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	1.4	0.52 J	0.27 J	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	10.9	5.0	5.2	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	4.1 J	2.3 J	2.3 J	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	553	190	123	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	2.2	0.47	0.40	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	12.8	5.7	5.2	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	1.4	0.60 J	0.61 U	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	1.3 U	1.3 U	1.2 U	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	13.2	8.7	6.8	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	576	121	79.9	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	5.2	0.16 J	0.61 U	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	77.4	78.0	82.0	82.4	84.8	85.5	93.6	87.2	82.1	80.8	90.1	82.3	91.0	88.9	87.1

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB D-4	SB E-3	SB E-5	SB F 5-6	SB F-4	SB G-3	SB G-4	SB G-5	SB G 5-6	SB H 5-6	SB H-3	SB H-5	SB I-5	SB I-7	SB J-5
Sample ID:		S-022006-EV-003	S-022006-NR-014	S-022206-NR-029	S-022106-EV-006	S-022006-EV-004	S-022106-NR-016	S-022206-NR-027	S-022206-NR-030	S-022106-EV-007	S-022106-EV-008	S-022106-NR-017	S-022206-NR-062	S-022306-EV-057	S-022206-EV-045	S-022306-EV-056
Sample Date:		2/20/2006	2/20/2006	2/22/2006	2/21/2006	2/20/2006	2/21/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/22/2006	2/23/2006	2/22/2006	2/23/2006
Sample Depth:		(3-3.4) ft BGS	(1-1.5) ft BGS	(0.7-1.2) ft BGS	(2.2-2.6) ft BGS	(3-3.5) ft BGS	(0.5-1) ft BGS	(1.1-1.6) ft BGS	(1.1-1.6) ft BGS	(2.5-3) ft BGS	(2.6-3.1) ft BGS	(1.2-1.7) ft BGS	(1.6-2.1) ft BGS	(2.9-3.3) ft BGS	(2.9-3.3) ft BGS	(2.4-2.8) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	0.0067 U	0.0066 U	0.0063 U	0.0063 U	0.0062 U	0.0061 U	0.028 J	0.0063 U	0.0058 U	0.006 U	0.31 U	0.006 U	0.25 J	0.27 J	0.27 J
Ethylbenzene	mg/kg	0.0067 U	0.0066 U	0.0063 U	0.0063 U	0.0062 U	0.0061 U	0.044 J	0.0063 U	0.0058 U	0.006 U	0.31 U	0.006 U	5 J	3.7	1.3 J
Toluene	mg/kg	0.0067 U	0.0066 U	0.0063 U	0.0063 U	0.00036 J	0.0061 U	0.12 J	0.0063 U	0.0058 U	0.006 U	0.31 U	0.006 U	0.82 J	0.26 J	0.33 J
Xylenes (total)	mg/kg	0.013 U	0.013 U	0.013 U	0.013 U	0.012 U	0.012 U	0.34 J	0.013 U	0.012 U	0.012 U	0.63 U	0.012 U	8 J	1.9 J	3.1 J
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB D-4**	**SB E-3**	**SB E-5**	**SB F 5-6**	**SB F-4**	**SB G-3**	**SB G-4**	**SB G-5**	**SB G 5-6**	**SB H 5-6**	**SB H-3**	**SB H-5**	**SB I-5**	**SB I-7**	**SB J-5**
Sample ID:		**S-022006-EV-003**	**S-022006-NR-014**	**S-022206-NR-029**	**S-022106-EV-006**	**S-022006-EV-004**	**S-022106-NR-016**	**S-022206-NR-027**	**S-022206-NR-030**	**S-022106-EV-007**	**S-022106-EV-008**	**S-022106-NR-017**	**S-022206-NR-062**	**S-022306-EV-057**	**S-022206-EV-045**	**S-022306-EV-056**
Sample Date:		**2/20/2006**	**2/20/2006**	**2/22/2006**	**2/21/2006**	**2/20/2006**	**2/21/2006**	**2/22/2006**	**2/22/2006**	**2/21/2006**	**2/21/2006**	**2/21/2006**	**2/22/2006**	**2/23/2006**	**2/22/2006**	**2/23/2006**
Sample Depth:		**(3-3.4) ft BGS**	**(1-1.5) ft BGS**	**(0.7-1.2) ft BGS**	**(2.2-2.6) ft BGS**	**(3-3.5) ft BGS**	**(0.5-1) ft BGS**	**(1.1-1.6) ft BGS**	**(1.1-1.6) ft BGS**	**(2.5-3) ft BGS**	**(2.6-3.1) ft BGS**	**(1.2-1.7) ft BGS**	**(1.6-2.1) ft BGS**	**(2.9-3.3) ft BGS**	**(2.9-3.3) ft BGS**	**(2.4-2.8) ft BGS**
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	84.1	82.8	90.8	85.4	87.0	83.4	86.7	86.1	84.8	85.6	82.6	90.0	82.2	91.0	83.3

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB J-6	SB J-6	SB J-7	SB K 7-8	SB K-5	SB K-6	SB K-7	SB L-2	SB L-4	SB L-4	SB L-5	SB L-7	SB L-8	SB L-8	SB M-2
Sample ID:		S-022106-EV-010	S-022106-EV-031	S-022206-EV-044	S-022206-EV-042	S-022306-EV-055	S-022106-EV-032	S-022206-EV-043	S-022306-EV-066	S-022306-EV-058	S-022306-EV-059	S-022306-EV-054	S-022106-EV-038	S-022206-EV-040	S-022206-EV-041	S-022306-EV-065
Sample Date:		2/21/2006	2/21/2006	2/22/2006	2/22/2006	2/23/2006	2/21/2006	2/22/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/21/2006	2/22/2006	2/22/2006	2/23/2006
Sample Depth:		(3-3.5) ft BGS	(3-3.5) ft BGS (Duplicate)	(3-3.4) ft BGS	(2.8-3.2) ft BGS	(2.5-3) ft BGS	(2.8-3.2) ft BGS	(2.9-3.3) ft BGS	(0.6-0.9) ft BGS	(2.8-3.2) ft BGS	(2.8-3.2) ft BGS (Duplicate)	(2.6-3) ft BGS	(2.4-2.8) ft BGS	(2.5-3) ft BGS	(2.5-3) ft BGS (Duplicate)	(2.2-3) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	0.006 U	0.0057 U	0.025 J	0.58 U	1.2 UJ	1.6 J	0.076 J	0.8 UJ	0.0063 UJ	0.0061 UJ	0.36 J	0.0056 U	0.0059 U	0.0063 U	0.3 UJ
Ethylbenzene	mg/kg	0.006 U	0.0057 U	0.033 J	0.58 U	0.17 J	7.1	1.3	0.8 UJ	0.0063 UJ	0.0061 UJ	0.91 J	0.0056 U	0.0059 U	0.0063 U	0.3 UJ
Toluene	mg/kg	0.006 U	0.0057 U	0.036 J	0.58 U	0.17 J	0.42 J	0.044 J	0.078 J	0.0063 UJ	0.0061 UJ	0.18 J	0.0056 U	0.0059 U	0.00046 J	0.03 J
Xylenes (total)	mg/kg	0.012 U	0.0019 J	0.58 J	1.2 U	3.3 J	16	2.4	1.6 UJ	0.013 UJ	0.012 UJ	2.7 J	0.011 U	0.012 U	0.013 U	0.019 J
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB J-6	SB J-6	SB J-7	SB K 7-8	SB K-5	SB K-6	SB K-7	SB L-2	SB L-4	SB L-4	SB L-5	SB L-7	SB L-8	SB L-8	SB M-2
Sample ID:		S-022106-EV-010	S-022106-EV-031	S-022206-EV-044	S-022206-EV-042	S-022306-EV-055	S-022106-EV-032	S-022206-EV-043	S-022306-EV-066	S-022306-EV-058	S-022306-EV-059	S-022306-EV-054	S-022106-EV-038	S-022206-EV-040	S-022206-EV-041	S-022306-EV-065
Sample Date:		2/21/2006	2/21/2006	2/22/2006	2/22/2006	2/23/2006	2/21/2006	2/22/2006	2/23/2006	2/23/2006	2/23/2006	2/23/2006	2/21/2006	2/22/2006	2/22/2006	2/23/2006
Sample Depth:		(3-3.5) ft BGS	(3-3.5) ft BGS (Duplicate)	(3-3.4) ft BGS	(2.8-3.2) ft BGS	(2.5-3) ft BGS	(2.8-3.2) ft BGS	(2.9-3.3) ft BGS	(0.6-0.9) ft BGS	(2.8-3.2) ft BGS	(2.8-3.2) ft BGS (Duplicate)	(2.6-3) ft BGS	(2.4-2.8) ft BGS	(2.5-3) ft BGS	(2.5-3) ft BGS (Duplicate)	(2.2-3) ft BGS
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	87.1	86.3	89.6	87.3	85.4	91.7	85.7	73.0	80.1	78.0	84.2	91.5	85.3	83.9	82.9

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		SB M-3	SB M-5	SB M-5	SB M-6	SB M-7	SB M-8	SB N-2	SB N-3	SB N-4	SB N 4-5	SB O-2	SB O-3	SB O-4	SB-1	SB-2
Sample ID:		S-022306-EV-060	S-022206-EV-051	S-022206-EV-052	S-022106-EV-034	S-022106-EV-035	S-022106-EV-036	S-022306-EV-064	S-022306-EV-061	S-022206-EV-047	S-022206-EV-050	S-022306-EV-063	S-022306-EV-062	S-022206-EV-048	S-072408-JL-001	S-072408-JL-002
Sample Date:		2/23/2006	2/22/2006	2/22/2006	2/21/2006	2/21/2006	2/21/2006	2/23/2006	2/23/2006	2/22/2006	2/22/2006	2/23/2006	2/23/2006	2/22/2006	7/24/2008	7/24/2008
Sample Depth:		(3.2-3.6) ft BGS	(2.8-3.2) ft BGS	(2.8-3.2) ft BGS (Duplicate)	(3.2-3.6) ft BGS	(2.2-2.6) ft BGS	(2.3-2.9) ft BGS	(2.7-3) ft BGS	(2.9-3.3) ft BGS	(3-3.4) ft BGS	(3.1-3.5) ft BGS	(3.4-3.8) ft BGS	(3.6-4) ft BGS	(3.2-3.6) ft BGS	(2-4) ft BGS	(2-4) ft BGS
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	0.18 J	2.5 J	2 J	0.27 J	0.006 U	0.0059 U	0.006 UJ	1 UJ	0.0059 U	0.0061 U	0.0059 UJ	0.33 UJ	1 U	-	-
Ethylbenzene	mg/kg	2.3 J	1.6 J	1.6 J	4.1	0.006 U	0.0059 U	0.006 UJ	1 UJ	0.0059 U	0.0061 U	0.0059 UJ	0.33 UJ	1 U	-	-
Toluene	mg/kg	0.95 J	1.2 J	1.3 J	0.5 J	0.006 U	0.0059 U	0.006 UJ	0.082 J	0.0059 U	0.0061 U	0.00036 J	0.024 J	1 U	-	-
Xylenes (total)	mg/kg	44 J	6.8 J	6.9	10	0.012 U	0.012 U	0.012 UJ	2.1 UJ	0.012 U	0.012 U	0.012 UJ	0.66 UJ	0.15 J	-	-
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB M-3**	**SB M-5**	**SB M-5**	**SB M-6**	**SB M-7**	**SB M-8**	**SB N-2**	**SB N-3**	**SB N-4**	**SB N 4-5**	**SB O-2**	**SB O-3**	**SB O-4**	**SB-1**	**SB-2**
Sample ID:		**S-022306-EV-060**	**S-022206-EV-051**	**S-022206-EV-052**	**S-022106-EV-034**	**S-022106-EV-035**	**S-022106-EV-036**	**S-022306-EV-064**	**S-022306-EV-061**	**S-022206-EV-047**	**S-022206-EV-050**	**S-022306-EV-063**	**S-022306-EV-062**	**S-022206-EV-048**	**S-072408-JL-001**	**S-072408-JL-002**
Sample Date:		**2/23/2006**	**2/22/2006**	**2/22/2006**	**2/21/2006**	**2/21/2006**	**2/21/2006**	**2/23/2006**	**2/23/2006**	**2/22/2006**	**2/22/2006**	**2/23/2006**	**2/23/2006**	**2/22/2006**	**7/24/2008**	**7/24/2008**
Sample Depth:		**(3.2-3.6) ft BGS**	**(2.8-3.2) ft BGS**	**(2.8-3.2) ft BGS (Duplicate)**	**(3.2-3.6) ft BGS**	**(2.2-2.6) ft BGS**	**(2.3-2.9) ft BGS**	**(2.7-3) ft BGS**	**(2.9-3.3) ft BGS**	**(3-3.4) ft BGS**	**(3.1-3.5) ft BGS**	**(3.4-3.8) ft BGS**	**(3.6-4) ft BGS**	**(3.2-3.6) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	2100	11000
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	86.2	85.3	86.9	85.4	82.9	87.2	79.4	79.5	81.5	79.7	81.3	93.0	92.9	78.2	83.1

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB-3**	**SB-4**	**SB-5**	**SB-6**	**SB-7**	**SB-8**	**SB-9**	**SB-10**	**SB-11**	**SB-12**	**SB-13**	**SB-14**	**SB-15**	**SB-16**	**SB-17**
Sample ID:		**S-072408-JL-003**	**S-072408-JL-004**	**S-072408-JL-005**	**S-072408-JL-006**	**S-072408-JL-007**	**S-072408-JL-008**	**S-072408-JL-009**	**S-072408-JL-010**	**S-072408-JL-011**	**S-072408-JL-012**	**S-072408-JL-013**	**S-072408-JL-014**	**S-072408-JL-015**	**S-072408-JL-016**	**S-072408-JL-017**
Sample Date:		**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**
Sample Depth:		**(0-1) ft BGS**	**(1-4) ft BGS**	**(1-2) ft BGS**	**(0.6-2) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(1-2) ft BGS**	**(2-3) ft BGS**	**(2-4) ft BGS**	**(2.5-4) ft BGS**	**(2-4) ft BGS**	**(0.6-2) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(2-4) ft BGS**
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB-3**	**SB-4**	**SB-5**	**SB-6**	**SB-7**	**SB-8**	**SB-9**	**SB-10**	**SB-11**	**SB-12**	**SB-13**	**SB-14**	**SB-15**	**SB-16**	**SB-17**
Sample ID:		**S-072408-JL-003**	**S-072408-JL-004**	**S-072408-JL-005**	**S-072408-JL-006**	**S-072408-JL-007**	**S-072408-JL-008**	**S-072408-JL-009**	**S-072408-JL-010**	**S-072408-JL-011**	**S-072408-JL-012**	**S-072408-JL-013**	**S-072408-JL-014**	**S-072408-JL-015**	**S-072408-JL-016**	**S-072408-JL-017**
Sample Date:		**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**	**7/24/2008**
Sample Depth:		**(0-1) ft BGS**	**(1-4) ft BGS**	**(1-2) ft BGS**	**(0.6-2) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(1-2) ft BGS**	**(2-3) ft BGS**	**(2-4) ft BGS**	**(2.5-4) ft BGS**	**(2-4) ft BGS**	**(0.6-2) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(2-4) ft BGS**
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	6800	3900	19000	27000	2700	9900	9200	12000	51000	5700	15000	58000	27000	20000	15000
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	86.5	84.9	83.5	92.8	86.6	83.1	87.4	85.0	90.5	83.3	86.8	92.9	89.8	90.8	84.1

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB-18**	**SB-19**	**SB-20**	**SB-21**	**SB-22**	**SB-23**	**SB-24**	**SB-25**	**SB-26**	**SB-27**	**SB-28**	**SB-29**	**SB-30**	**SB-31**	**SB-32**
Sample ID:		**S-072408-JL-018**	**S-072508-JL-020**	**S-072508-JL-021**	**S-072508-JL-022**	**S-072508-JL-023**	**S-072508-JL-024**	**S-072508-JL-025**	**S-072508-JL-026**	**S-072508-JL-027**	**S-072508-JL-028**	**S-072508-JL-029**	**S-072508-JL-030**	**S-072508-JL-031**	**S-072508-JL-032**	**S-072508-JL-033**
Sample Date:		**7/24/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**
Sample Depth:		**(2-4) ft BGS**	**(1-2) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(1-2) ft BGS**	**(0-2) ft BGS**	**(2-4) ft BGS**
Parameters	**Units**															
VOAs																
1,1,1-Trichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dioxane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VOAs - BTEX																
Benzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs																
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-butylphthalate (DBP)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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East Chicago, Indiana

Sample Location:		**SB-18**	**SB-19**	**SB-20**	**SB-21**	**SB-22**	**SB-23**	**SB-24**	**SB-25**	**SB-26**	**SB-27**	**SB-28**	**SB-29**	**SB-30**	**SB-31**	**SB-32**
Sample ID:		**S-072408-JL-018**	**S-072508-JL-020**	**S-072508-JL-021**	**S-072508-JL-022**	**S-072508-JL-023**	**S-072508-JL-024**	**S-072508-JL-025**	**S-072508-JL-026**	**S-072508-JL-027**	**S-072508-JL-028**	**S-072508-JL-029**	**S-072508-JL-030**	**S-072508-JL-031**	**S-072508-JL-032**	**S-072508-JL-033**
Sample Date:		**7/24/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**	**7/25/2008**
Sample Depth:		**(2-4) ft BGS**	**(1-2) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(2-4) ft BGS**	**(1-2) ft BGS**	**(1-2) ft BGS**	**(0-2) ft BGS**	**(2-4) ft BGS**
Parameters	**Units**															
Pyrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOAs - TCLP																
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3&4-Methylphenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyridine	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Antimony	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals - TCLP																
Arsenic	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc																
Ash	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petrl Prod																
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	4800	32 J	15	14	3500	5.0 J	7200	17000	5400	6900	4500	15000	7000	8100	6300
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wet																
British thermal units (BTU)	BTU/lb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percent solids, vol.	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific gravity	sg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total solids	%	84.9	84.5	83.6	83.1	86.7	82.7	86.4	83.2	86.4	85.6	85.5	91.8	88.3	93.4	87.2

Footnotes:

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

Table H.2

Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB-33**
Sample ID:		**S-072508-JL-034**
Sample Date:		**7/25/2008**
Sample Depth:		**(1-2) ft BGS**
Parameters	**Units**	
VOAs		
1,1,1-Trichloroethane	mg/kg	-
1,1-Dichloroethane	mg/kg	-
1,2-Dibromoethane (Ethylene dibromide)	mg/kg	-
1,2-Dichloroethane	mg/kg	-
1,4-Dioxane	mg/kg	-
1-Methylnaphthalene	mg/kg	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/kg	-
2-Methylnaphthalene	mg/kg	-
Acenaphthene	mg/kg	-
Acenaphthylene	mg/kg	-
Anthracene	mg/kg	-
Benzene	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	-
Carbon disulfide	mg/kg	-
Chlorobenzene	mg/kg	-
Chloroform (Trichloromethane)	mg/kg	-
Chrysene	mg/kg	-
Dibenz(a,h)anthracene	mg/kg	-
Ethylbenzene	mg/kg	-
Fluoranthene	mg/kg	-
Fluorene	mg/kg	-
Indeno(1,2,3-cd)pyrene	mg/kg	-
Methyl tert butyl ether (MTBE)	mg/kg	-
Naphthalene	mg/kg	-
Phenanthrene	mg/kg	-
Pyrene	mg/kg	-
Styrene	mg/kg	-
Tetrachloroethene	mg/kg	-
Toluene	mg/kg	-
Trichloroethene	mg/kg	-
Xylenes (total)	mg/kg	-
VOAs - BTEX		
Benzene	mg/kg	-
Ethylbenzene	mg/kg	-
Toluene	mg/kg	-
Xylenes (total)	mg/kg	-
SVOAs		
1,2-Dichlorobenzene	mg/kg	-
1,3-Dichlorobenzene	mg/kg	-
1,4-Dichlorobenzene	mg/kg	-
2,4-Dimethylphenol	mg/kg	-
2,4-Dinitrophenol	mg/kg	-
2-Methylnaphthalene	mg/kg	-
2-Methylphenol	mg/kg	-
3-Methylphenol	mg/kg	-
4-Methylphenol	mg/kg	-
4-Nitrophenol	mg/kg	-
Acenaphthene	mg/kg	-
Acenaphthylene	mg/kg	-
Anthracene	mg/kg	-
Benzo(a)anthracene	mg/kg	-
Benzo(a)pyrene	mg/kg	-
Benzo(b)fluoranthene	mg/kg	-
Benzo(b)pyridine (Quinoline)	mg/kg	-
Benzo(g,h,i)perylene	mg/kg	-
Benzo(k)fluoranthene	mg/kg	-
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	-
Chrysene	mg/kg	-
Dibenz(a,h)anthracene	mg/kg	-
Diethyl phthalate	mg/kg	-
Dimethyl phthalate	mg/kg	-
Di-n-butylphthalate (DBP)	mg/kg	-
Fluoranthene	mg/kg	-
Fluorene	mg/kg	-
Indeno(1,2,3-cd)pyrene	mg/kg	-
Naphthalene	mg/kg	-
Phenanthrene	mg/kg	-
Phenol	mg/kg	-

Table H.2

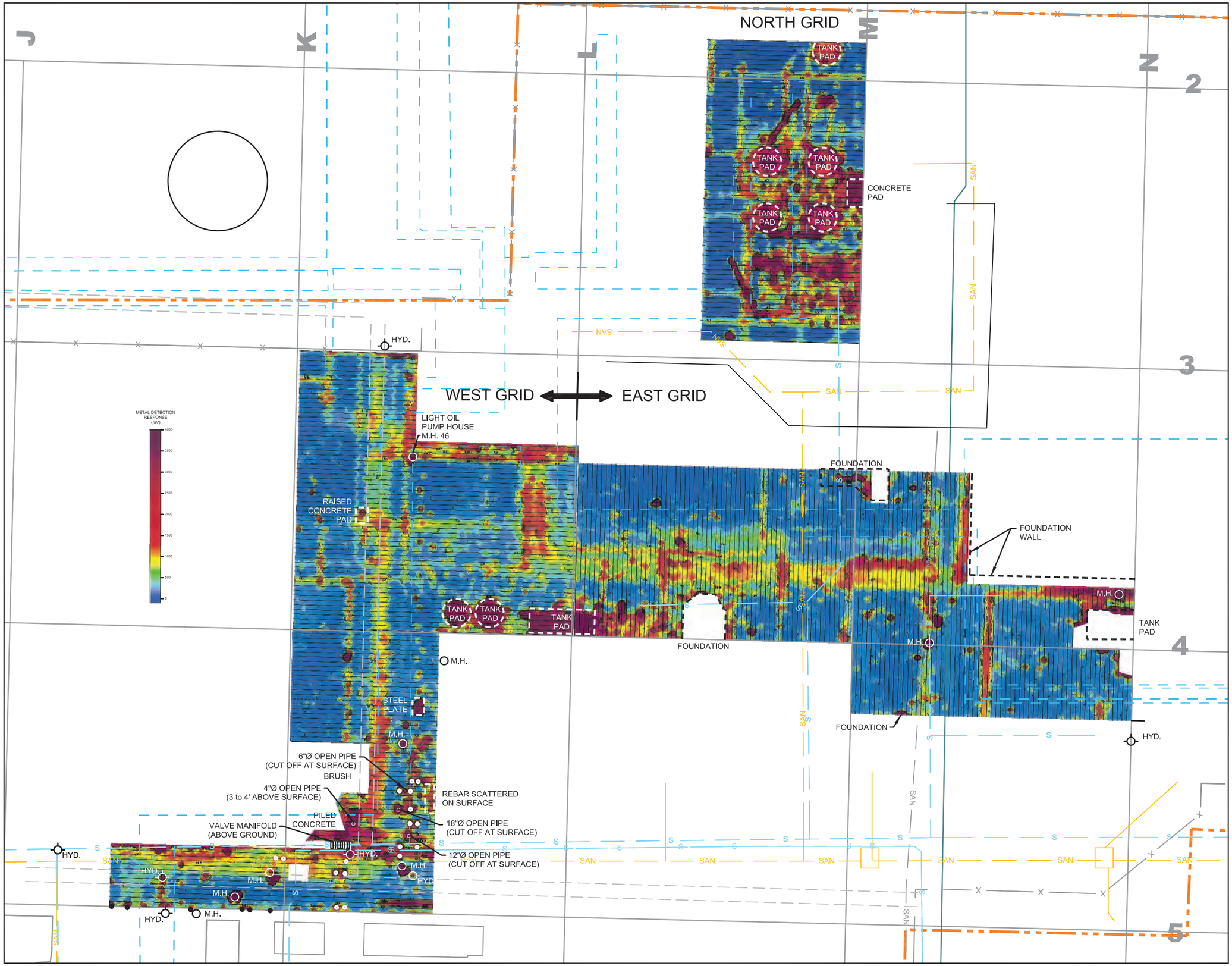
Analytical Results Summary - Soil
Former Cities Refinery and CITGO Terminal
East Chicago, Indiana

Sample Location:		**SB-33**
Sample ID:		**S-072508-JL-034**
Sample Date:		**7/25/2008**
Sample Depth:		**(1-2) ft BGS**
Parameters	**Units**	
Pyrene	mg/kg	-
Pyridine	mg/kg	-
SVOAs - TCLP		
1,4-Dichlorobenzene	mg/L	-
2,4,5-Trichlorophenol	mg/L	-
2,4,6-Trichlorophenol	mg/L	-
2,4-Dinitrotoluene	mg/L	-
2-Methylphenol	mg/L	-
3&4-Methylphenol	mg/L	-
Hexachlorobenzene	mg/L	-
Hexachlorobutadiene	mg/L	-
Hexachloroethane	mg/L	-
Nitrobenzene	mg/L	-
Pentachlorophenol	mg/L	-
Pyridine	mg/L	-
Metals		
Antimony	mg/kg	-
Arsenic	mg/kg	-
Barium	mg/kg	-
Beryllium	mg/kg	-
Cadmium	mg/kg	-
Chromium	mg/kg	-
Cobalt	mg/kg	-
Cyanide (total)	mg/kg	-
Lead	mg/kg	-
Mercury	mg/kg	-
Nickel	mg/kg	-
Selenium	mg/kg	-
Silver	mg/kg	-
Vanadium	mg/kg	-
Zinc	mg/kg	-
Metals - TCLP		
Arsenic	mg/L	-
Barium	mg/L	-
Cadmium	mg/L	-
Chromium	mg/L	-
Lead	mg/L	-
Mercury	mg/L	-
Selenium	mg/L	-
Silver	mg/L	-
Misc		
Ash	%	-
Petrl Prod		
Total Petroleum Hydrocarbons - Extractable (DRO)	mg/kg	15000
Total Petroleum Hydrocarbons - Purgeable (GRO)	mg/kg	-
Total Petroleum Hydrocarbons (C10-C32) Fuel	mg/kg	-
Total Petroleum Hydrocarbons (C6-C10) GRO	mg/kg	-
Wet		
British thermal units (BTU)	BTU/lb	-
Cyanide (total)	mg/kg	-
Moisture	%	-
Percent solids, vol.	%	-
Specific gravity	sg	-
Total organic carbon (TOC)	%	-
Total solids	%	92.3

Footnotes:

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

Appendix I
Historical Electromagnetic Survey



Nº	Revision	Date	Initial

0 20 50ft

LEGEND

- EXISTING PROPERTY BOUNDARY
- SEWER MANHOLE LOCATION
- COMBINED SEWER LINE
- RELIEF SEWER LINE
- SAN — OFF-SITE SANITARY SEWER LINE
- STORM SEWER FORCE MAIN
- S — CLEAR WATER SEWER SYSTEM
- SAN — ON-SITE SANITARY SEWER SYSTEM
- CRA GRID LINE
- M.H. — MANHOLE
- HYD. — FIRE HYDRANT
- CONCRETE FOOTING
- CONCRETE FOUNDATION/PAD
- OPEN PIPE (CUT OFF AT SURFACE)

SCALE VERIFICATION

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

Approved

DRAFT FOR REVIEW

DRAWING STATUS

Status	Date	Initial

EAST CHICAGO SITE
EAST CHICAGO, INDIANA

EAST CHICAGO SITE

EM61 METAL DETECTION SURVEY RESULTS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:
P. HARVEY	J. ROTHFISCHER	DECEMBER 2007

Scale:	Project Nº:	Report Nº:	Drawing Nº:
as shown	31532-99911	005	figure 4.18

31532-99911(005)GN-CO023 JUL 14/2008

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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