# Corrective Action Plan
# Pat's Grocery
# Odenville, St.Clair County, Alabama

Facility I.D. No. 17720-115-012336
Incident No. UST 97-08-04

June 2024

**Certification Page**

I certify under penalty of law that this Corrective Action Plan and all plans, specifications, and technical data submitted within were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiring of the person or persons who directly gathered the enclosed information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.

Signature

BRUCE A. BRADLEY

Name of Alabama Registered Professional Engineer

23837

Registration Number

7-18-2024

Date

## Table of Contents

## Section 1.0 - UST Release Fact Sheet and Site Classification System Checklist

### UST RELEASE FACT SHEET

GENERAL INFORMATION:

SITE NAME: Pat's Grocery
ADDRESS: 20303, U.S. Highway 411, Odenville, St, Clair Co., AL
FACILITY I.D. NO.: 17720-115-012336
UST INCIDENT NO.: UST 97-08-04

RESULTS OF EXPOSURE ASSESSMENT:

| | |
|---|---|
| How many private drinking water wells are located within 1,000 ft. of site? | -0- |
| How many public water supply wells are located within 1 mile of the site? | -0- |
| Have any drinking water supply wells been impacted by contamination from this release? | None |
| Is there an imminent threat of contamination to any drinking water wells? | { } Yes {X} No |
| Have vapors or contaminated groundwater posed a threat to the public? | { } Yes {X} No |
| Are any underground utilities impacted or imminently threatened by the release? | { } Yes {X} No |
| Have surface waters been impacted by the release? | { } Yes {X} No |
| Is there an imminent threat of contamination to surface waters? | { } Yes {X} No |
| What is the type of surrounding population? | |

CONTAMINATION DESCRIPTION:

Type of contamination at site: {X} Gasoline, { } Diesel, { } Waste Oil
{ } Kerosene, { } Other _____

Free product present in wells? { } Yes {X} No Maximum thickness measured: NA

Maximum BTEX concentrations measured in soil: 23.43 mg/kg (SB-17 2/22/2024)

Maximum BTEX or PAH concentrations measured in groundwater from recent data (2/22/2024): 13.49 mg/L (MW-1)

ADEM UST Form - 001 (04/22/93)

# ADEM GROUNDWATER BRANCH
# UST SITE CLASSIFICATION SYSTEM
# CHECKLIST

Please read all of the following statements and mark either yes or no if the statement applies to your site. If you have conducted a Preliminary or Secondary Investigation, all questions should be answered. Closure site assessment reports may not provide you with all the necessary information but answer the statements with the knowledge obtained during the closure site assessment.

| | |
|---|---|
| SITE NAME: | Pat's Grocery |
| SITE ADDRESS: | 20303 U.S. Highway 411 |
| | Odenville, St. Clair County, Alabama |
| FACILITY I.D. NO.: | 17720-115-012336 |
| UST INCIDENT NO.: | UST97-08-04 |
| OWNER NAME: | Ms. Patricia Case |
| OWNER ADDRESS: | 80 Hollock Drive |
| | Ashville, Alabama 35953 |
| NAME & ADDRESS OF PERSON COMPLETING THIS FORM: | Brian Dinnell |
| | Poly, Inc./Spectrum Environmental, Inc. |
| | 85 Spectrum Cove |
| | Alabaster, Alabama 35007 |

| *CLASSIFICATION* | *DESCRIPTION* | *YES* | *NO* |
|---|---|---|---|
| CLASS A | IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR | | |
| A.1 | Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building. | ☐ | ☒ |
| | | | |
| A.2 | Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted. | ☐ | ☒ |
| CLASS B | IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR | | |
| B.1 | An active public water supply well, public water supply line, or public surface water intake is impacted or immediately threatened. | ☐ | ☒ |
| | | | |
| B.2 | An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened. | ☐ | ☒ |
| | | | |
| B.3 | The release is located within a designated Wellhead Protection Area I. | ☐ | ☒ |
| CLASS C | IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR | | |
| C.1 | Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint. | ☐ | ☒ |
| | | | |
| C.2 | Free product is present on the groundwater, at ground surface, on surface water bodies, in utilities other than water supply lines, or in surface water runoff. | ☐ | ☒ |

| *CLASSIFICATION* | *DESCRIPTION* | *YES* | *NO* |
|---|---|---|---|
| CLASS D | SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| D.1 | There is a potential for explosive levels, or concentrations of vapors that could cause acute effects, to accumulate in a residence or other building. | ☐ | ☒ |
| | | | |
| D.2 | A non-potable water supply well is impacted or immediately threatened. | ☐ | ☒ |
| | | | |
| D.3 | Shallow contaminated surface soils are open to public access, and dwellings, parks, playgrounds, day care centers, schools or similar use facilities are within 500 feet of those soils. | ☐ | ☒ |
| CLASS E | SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| E.1 | A sensitive habitat or sensitive resources (sport fish, economically important species, threatened and endangered species, etc.) are impacted and affected. | ☐ | ☒ |
| CLASS F | SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| F.1 | Groundwater is impacted and a public well is located within 1 mile of the site. | ☐ | ☒ |
| | | | |
| F.2 | Groundwater is impacted and a domestic well is located within 1,000 feet of the site. | ☒ | ☐ |
| | | | |
| F.3 | Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III). | ☐ | ☒ |
| CLASS G | SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| G.1 | Contaminated soils and/or groundwater are located within areas vulnerable to contamination from surface sources. | ☒ | ☐ |
| GLASS H | SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| H.1 | Impacted surface water, stormwater or groundwater discharges within 500 feet of a surface water body used for human drinking water, whole body water-contact sports, or habitat to a protected or listed endangered plant and animal species. | ☐ | ☒ |
| CLASS I | LONG TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS | | |
| I.1. | Site has contaminated soils and/or groundwater but does not meet any of the above-mentioned criteria. | ☐ | ☒ |

**Complete the classification evaluation questions listed above. Upon completion, determine the highest rank of the site (A.1 is the highest rank) based on the statements answered with a yes.**

| | |
|---|---|
| Enter the determined classification ranking: | G.1 |

ADEM GROUNDWATER BRANCH
SITE CLASSIFICATION CHECKLIST (5/8/95)

## Section 2.0 - Introduction

### 2.1 Executive Summary

This Corrective Action Plan (CAP) has been developed by Poly, Inc./Spectrum Environmental Services, Inc (Poly/Spectrum) in response to remediation progress regarding a previous release of petroleum hydrocarbons at the former Pat's Grocery site located at 20303 U.S. Highway 411 in Odenville, St. Clair County, Alabama. During the closure of the two gasoline USTs at the subject site on July 9, 1997, soil concentrations of total petroleum hydrocarbons (TPH) were generally reported to be less than the ADEM corrective action limits (CALs) for TPH. However, two soil samples (one collected from the West Side of the tank pit and one collected from the base of the piping trench) were reported to be well above the ADEM CAL (303 mg/Kg and 346 mg/Kg, respectively). During these and subsequent investigations, Benzene, Toluene, Ethylbenzene and Xylene, and Methyl-tertiary-butyl ether (BETX/MtBE) concentrations within the boundaries of the subject site have been reported to be in excess of established Initial Screening Levels (ISLs). Natural Attenuation Monitoring with occasional Mobile Enhanced Multiphase Extraction (MEME) events have been conducted at the site over the last 27 years. The most recent data collected from the site on January 23, 2023 shows the highest BTEX concentration at 13.49 mg/L in RW-1. As such, Poly/Spectrum is proposing the implementation of Cool-Ox (developed by DeepEarth Technologies, Inc.) as an in-situ bioremediation method for this site.

The ADEM Facility Identification Number for this site is 17720-115-012336. The ADEM UST Incident Number is UST97-08-04.

### 2.1 Site Location and Setting

The Pat's Grocery site is located at 20303 U.S. Highway 411 in Odenville (St. Clair County), Alabama. The subject site is further described as being located in the Southwest ¼ of Section 9, Township 15 South, Range 3 East, latitude 33.73426 longitude -86.34182.

## 2.2 Purpose of the Plan

This Corrective Action Plan will summarize historic site cleanup actions, data gathered at the site (including soil, groundwater, and high-resolution characterization) in order to better characterize the state of contamination in the subsurface and summarize the proposed method of remediation.

## 2.3 Surrounding Area Wells

There are private drinking water wells located within 1,000ft of the site. However, no public supply wells are located within a mile. Currently there are seventeen monitoring wells active at this facility.

## 2.4 Surrounding Surface Water

The nearest running body of water to the subject site is Beaver Creek which is approximately 0.6 miles to the northwest. Ephemeral ponds occur immediately northwest and northeast of the subject site. The general trend of surface water movement in the area appears to be to the west-southwest. Elevations greatly increase immediately east and southeast of the subject site. St. Clair County lies almost entirely within the Tennessee section of the Valley and Ridge province.

## 2.4 Underground Utilities

The site is vacant with no activities utilities in use. UST tanks and piping have bene removed. Overhead electricity and city water are available in the area.

## Section 3.0 - Summary of Site Geology and Previously Conducted Site Activities

### 3.1 Discussion of Site Geology

*3.1.1 Physiographic Setting*

The subject site is located in north-central St. Clair County and is situated in the Birmingham-Big Canoe Valley District of the Alabama Valley and Ridge Physiographic section (Plannert and Pritchett, 1989). The general topography surrounding the site is typified by broad, relatively flat, uplands dissected by well-defined stream valleys. The subject site is situated in an area where surface gradients are generally to the Northeast. The terrain of the Birmingham-Big Canoe District slopes gradually from 600 feet above sea level in St. Clair County to 500 feet in Jefferson County (Plannert and Pritchett, 1989).

According to the Geologic Map of Alabama (Osbourne, et. al., 1989), sedimentary deposits of the Alabama Valley and Ridge Physiographic province underlie the subject site and general site area. Sedimentary deposits occupying the valleys consist of clays, sands, silts, and gravel's originating from fluvial deposition or from the weathering of the carbonate bedrock. Northeast-southwest trending ridges that are predominantly composed of Ordovician through Mississippian age Sandstones and Shales divide these valleys.

The bedrock underlying the site is classified as belonging to the Ordovician Age Newalla and Longview Limestones, undifferentiated (Osbourne, et.al., 1989). The Newalla and Longview, undifferentiated consist of light to dark gray, thick-bedded limestone and dolomite, cherty in part.

*3.1.2 Regional Hydrogeology*

The site lies in the recharge zone of the Valley and Ridge Aquifers in an area that is designated as susceptible to contamination. This aquifer is approximately 10,000 feet thick and is composed of Limestone and dolomite. Based on a potentiometric surface

map of the Valley and Ridge Aquifers prepared in 1989 by Planert and Pritchett the depth to water is approximately 305 feet below surface elevation and the general gradient is to the southwest. The springs associated with the Valley and Ridge Aquifers have been developed as the primary source of water for the City of Odenville.

### *3.1.2 Local Geology/Hydrology*

The site geology is consistent with the general outline of the regional geology described above. The deepest monitoring wells on the site were installed to approximately 33 feet below lands surface (bls). Clays with chert were observed to approximately 10 feet bls. Dense clay was present from 10 to 25 feet bls. A thin sandy clay was present prior to limestone which was observed from 26 to 33 feet. Groundwater generally flows east-southeast. However, direction may var over time due to precipitation and season changes.

## 3.2 Historical Site Chronology

According to the St.Clair County Parcel Viewer database, the subject site is currently owned by the Phillip & Robin Dollar. The site is currently abandoned but was formerly used as a convenience store and filling station. A brief chronology of the environmental history at the site is described below.

| Date | Activities | Comments |
|---|---|---|
| December 1997 | CP1 | Preliminary UST Investigation |
| January 30, 1998 | CP2 | Soil Management Plan/Solid Waste Profile |
| March 4, 1998 | CP3 | Groundwater Sampling Event |
| December 16, 1998 – April 30, 1999 | CP4, CP5 | Secondary Groundwater Sampling Event<br>Soil Sampling |
| May 29, 2000 – August 4, 2003 | CP6 - CP10 | Groundwater Monitoring |
| September 24, 2003 | CP11 | ARBCA Data Acquisition |
| September 2004 | CP12 | CAP RNA |
| June 2005 – August 2012 | CP13 -CP28 | NAMRs |
| February 22, 2012 | CP29 | Property Owner Compliance Visit |
| August 26, 2013 | CP30 | Monitoring Well Installation |

| Date | Activities | Comments |
|---|---|---|
| September 20, 2013 – September 29, 2021 | CP31- CP47 | NAMRs |
| October 17, 2023 - | CP51 – CP53 | NAMR |
| October 24-27, 2023 | CP54 | HRSC Report |

## 3.3 Summary of Significant Previous Site Investigations

*3.3.1 Groundwater Elevation*

Groundwater Elevation data has been collected at the site since March 4, 1998. The widely fluctuating groundwater elevation between monitoring events is most likely attributed to precipitation trends and near surface aquifer usage. The dominant groundwater flow direction is toward the northwest at a variable gradient averaging about 0.1116 vertical feet per horizontal foot. Please note this is a change from the historical flow direction. The location of groundwater monitoring wells and the most recently published groundwater elevation data for this site is provided in Appendix A – Figure 2.

*3.3.2 Benzene and Total BTEX Concentrations*

Benzene data has been collected from the site since March 4, 1998. During the most recent event, benzene concentrations ranged from below detection limit (BDL) to 5.38 mg/L (MW-1). Since the implementation of HVE events as part of the RNA CAP, monitoring wells have generally shown decreasing benzene concentrations. The overall trend for the chemicals of concern indicates a decreasing trend in most wells, but some wells have fluctuating or increasing trends.

*3.3.3 MtBE Concentrations*

MtBE data has been collected at the site since March 4, 1998. MtBE follows the same concentration pattern as BTEX. The wells sampled for MtBE, Ethylbenzene and Total Xylene concentrations ranged from below SSTL to 0.337 mg/L.

*3.3.4 Naphthalene Concentrations*

Naphthalene data has been collected at the site since January 22, 2014. During the most recent event, Naphthalene concentrations ranged from below detection limit (BDL) to 0.641 mg/L (MW-1).

## 4.1 Summary of High Resolution Characterization Study

Poly/Spectrum retained Walker Hill Drilling and Eagle Synergistic to conduct a High Resolution Characterization Study (HRCS) at the subject site from October 24th through October 27th, 2023. The HRCS study was conducted using Optical Image Profiling (OIP), Hydraulic Profiling Tool (HPT), Electric Conductivity (EC), and soil/groundwater collection. 18 borings were advanced during this assessment. Boring placement was determined based on previous data showing plume size and direction. It was determined groundwater was flowing towards the northwest at the site. Each boring depth ranged from 8.35 to 27.75 ft below land surface (bls) using direct push GeoProbe techniques.

## 4.2 *Methodology*

The OIP, HPT, and EC tools were attached to a GeoProbe and read continuous data as the GeoProbe advanced down each boring. The live data provided by the OIP tool consisted of fluorescence imagining, allowing for the visual identification of soil significantly impacted by petroleum in the subsurface. The HPT tool provided live pressure data, correlating to how compact subsurface materials are. The HPT tool in conjunction with EC (which correlates to grainsizes measurements), allow for the determination of preferential pathways for contaminant/ groundwater migration.

Soil samples were then collected on October 24th and October 27th, 2023, at areas of interest identified by the OIP, HPT, and EC results. These samples were collected using direct push GeoProbe Methods and placed into laboratory prepared containers for analysis. A total of 4 soil sample collection borings were extended to intervals of suspect contamination, one sample was collected from each boring. One soil samples was collected from each boring at a depth consistent with the highest contamination observed in the probing data. Groundwater was not encountered in any of the borings sampled.

## 4.2 *High Resolution Characterization Study Results*

### *4.2.1 OIP*

Five (5) OIP borings were performed. These OIP borings were placed in and around the suspected source area in an attempt to locate any free product that may be present. The highest detection occurred at OIP-04 with a detections of 1.1% at 26.8' bgs. The remaining four OIP boring did not exhibit signatures above 1% fluorescence. This would indicate little to no free product remaining from the source area.

### *4.2.2 HPT*

The goal of the investigation was to delineate the free product around the source area (MW-1) and to find the extent of the dissolved phase plume. The OIP tool confirmed that there was little to no free product left around the source area. The most significant petroleum signatures were identified at MIP-06 which was the closest to the source area. As the investigation stepped out from the source area, MIP signatures generally decreased. MIP-17 and MIP-18 which are to the north northwest of the source area did see moderate impacts indicating that there is likely a migratory pathway following the gradient of the groundwater to the northwest. HPT data suggested a series of permeable and impermeable zones across most of the borings. At MIP-07, where HPT pressure was maxed out, it is likely that the HPT screen became clogged with fine material somewhere during the transition from the silty zone to the underlying clay.

### *4.2.3 EC*

The data suggests a gradual increase in EC starting at about 4' bgs to about 15' bgs indicating a smooth transition from sand to silt to clay. The clay unit from about 15' bgs was mostly prominent to the termination of the boring with occasional silt seems interbedded in the clay.

### *4.3.4 Soil and Groundwater Sample Results*

The results of the HRCS study compared soil samples and one groundwater sample to the Site Specific Target Levels at the Point of Exposure based on the location of the plume.

Below is a table of the SSTL values set for the subject site. A complete table of all the HRCS sample results is provided in Appendix B.

Table 1 – Soil Results

| Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Soil Sampling | | | | | | | |
| Sample ID | Depth | Analyte (in ppm) | | | | | |
| | | Benzene | Toluene | Ethylbenzene | Xylenes, Total | MTBE | Napthalene |
| OIP-01 | 22' | **34.00** | 9.47 | 109.00 | 412.00 | BDL | 71.20 |
| OIP-04 | 25' | **13.60** | **135.00** | 38.50 | 210.00 | BDL | 22.90 |
| MIP-06 | 21' | **10.20** | 6.03 | 53.80 | 259.00 | BDL | 30.70 |
| MIP-12 | 13' | BDL | BDL | BDL | BDL | BDL | BDL |
| Soil Tier II Target | | 0.611 | 11.9 | 440 | 178 | 1110 | NL |
| Soil POE Limit | | **0.362** | **156** | **158** | **1740** | **0.365** | NL |

All samples were collected on 10/26/23
Samples reported in mg/Kg (ppm)
Sampled highlighted yellow exceed Soil Tier II Target Level
Samples bolded exceed the Soil Concentration at Source Protective of Groundwater
BDL = Below detection limit
NL = Not Listed

Based on our review of the area, contamination appeared to be present across the subject property as well as the neighboring property to the north. The area of highest contamination is concentrated to approximately a 13,000 sq. foot area centered on the previous convenience store building and at depths of 4 to 27.5 feet below land surface.

Benzene concentrations exceeded SSTL for soil concentrations protective of Groundwater Resource Protection Source Soil Protective of Point of Exposure (POE) at OIP-01, OIP-04, and MIP-06. Toluene concentrations exceeded SSTL for soil concentrations protective of POE at OIP-04. Additionally, Xylene concentrations exceeded SSTL for soil concentrations POE from OIP-01, OIP-04, and MIP-06..

## 5.1 Site Characterization

Site characterization is critical in implementing Cool-Ox Injection technology. Based on data from historic investigations, geologic data, and particularly the HRCS investigation, the subject property soils are generally made of compacted soils or clays. However, in areas where grainsize increased (EC measurements) and hydraulic pressure measurements decreased, "pockets" of hydrocarbons were identified. These points have been identified as key Cool-Ox injection points. Based on all data collected, historic and recent, the plume does not appear to be migrating, however, it appears that contaminants are "stuck" to subsurface materials.

DeepEarth Technologies has proposed an injection area of 6,200 sq ft over a total of 127 injection points in 10 days. A proposed volume of 4,200-gallons will be injected with an average of 109-gallons per injection point. A copy of the Cost Proposal for Cool-Ox Injection Provided by DeepEarth Technologies, Inc. is provided in Appendix C. A Map depicting the proposed injection area is provided in Appendix A – Figure 5.

## 5.3 Comparison of Site Remedial Goals to Estimated RNA Performance

Evaluating the stage(s) that Natural Attenuation is occurring at the site can be extremely useful in evaluating the remedial approach. However, the natural attenuation data collected at this site during groundwater monitoring events proved that Natural Attenuation and EFR Events alone was not effective in remediating the hotspot of the plume, particularly near MW-1. This is likely due to the nature of the sediments and soils underlying the site.

Based on the data collected during the HRCS study, key points of injection have been identified which may allow for the most impacted soils to be directly remediated.

## 5.4 Cool-Ox Well Injection

### *5.4.1 Cool-Ox Process*

The Cool-Ox® process is a hydrogen peroxide based technology designed to address a wide variety of remediation challenges presented by organic contaminants in various types of soils and groundwater. Although other hydrogen peroxide technologies may sound similar, only Cool-Ox® is based on a unique chemistry that truly delivers results.

Unlike Fenton chemistry where liquid hydrogen peroxide is used as the source of the oxidizing radicals, the Cool-Ox® technology uses an aqueous suspension of solid peroxygen compounds. These compounds hydrolyze to generate hydrogen peroxide in the proximity of the contaminants. A key to the success of the technology is that the relative insolubility of these compounds allows the oxidizers to be produced over an extended period of time (up to three months). This long term production of oxidizer greatly enhances the probability of the oxidizing compounds contacting the contaminants as well as providing an ongoing source of molecular oxygen for the enhancement of aerobic microbial proliferation.

### *5.4.2 Concerns with Injection*

Concerns with injection of the Cool-Ox fluid would be subsurface pressure increase and generation of heat due to the chemical reactions. To address these concerns, the following steps would be made:

1. Poly/Spectrum would request an Alabama 811 Line Locate to the site prior to mobilization. Additionally, a private line locate using GPRS services would be contracted in order to identify any additional subsurface structures to avoid. Prior to the advancement of any boring, a thin rod will be inserted into the ground to feel for any pipes.
2. 10 days of work which would include a mid-job check in to ensure that materials and techniques are being used effectively. This would allow for changes in injection points should obstacles arise.

3. The radius of influence for Cool-Ox technology has generally been observed to be 3 ft. Therefore, a minimum distance of 3 ft would separate any given injection point and underground utility.
4. Cool-Ox can provide previous application data with data showing that their technology would not increase heat/ corrosion.

Additional documentation regarding the chemistry process and corrosion inhibiting characteristics of Cool-Ox has been provided in Appendix C.

### *5.4.3 Cost associated with Cool-Ox*

Upon approval of this Corrective Action Plan a detailed Cost Proposal will be prepared and submitted to the Department; however, a Deep Earth Quote is provided as Appendix C. After numerous conversations with the company, they believe we can complete the necessary work with one injection round that will take place over 10 days. This cost estimate is for $179,320. Please note that this proposal assumes a cluster approach targeting those areas of concern. A separate proposal was provided for a full scale injection at $272,293; however, we believe that targeting the areas of concern is a more cost efficient approach. Additional cost associated with this treatment methodology will be office time associated with preparation of a UIC permit application, a UIC permit fee, geologist oversight during injection and geologist reporting, and subsequent monitoring events. All of these items will be charged at the standard Alabama Tank Trust Fund rates.

## 6.1 UIC Permit Application

The first step of the proposed Corrective Action Plan will be to obtain an Underground Injection Control Permit through ADEM for the injection of the Cool-Ox reagent.

## 6.2 Injection of Cool Ox & Subsequent Review

Based on the High Resolution Characterization Study, and discussions with ADEM and DeepEarth Technologies the following Corrective Action Plan is proposed below:

*Scope of Work*

1. Poly/Spectrum shall request an Alabama 811 Line Locate to the site prior to mobilization. Additionally, a private line locate using GPRS services would be contracted in order to identify any additional subsurface structures to avoid;
2. Spectrum shall arrange for a suitable on-site water source and secure permits necessary for the legal commencement of injection;
3. Prior to the advancement of any boring, a thin rod will be inserted into the ground to feel for any pipes;
4. Over a course of ten (10) days, DeepEarth and Poly/Spectrum will coordinate and oversee the implementation of the Cool-Ox injection via direct push methodology;
5. Approximately 127injections will be conducted with an estimated 109-gallons of Cool-Ox per injection point. A preliminary map of Cool-Ox injection points is provided in Appendix A – Figure 5.
6. Injections shall occur between 20 to 30 feet bls;
7. Mid- job check-ins will be conducted to adjust injection points and resource utilization;

8. Following the Cool-Ox Pilot Injection, a Corrective Action Report will be prepared summarizing the injection process and the 30-day post injection monitoring (groundwater only);
9. A second Corrective Action Report will be prepared to summarize the 60 (groundwater only) and 90-day post injection monitoring (groundwater and soil).

# APPENDIX A

# FIGURES

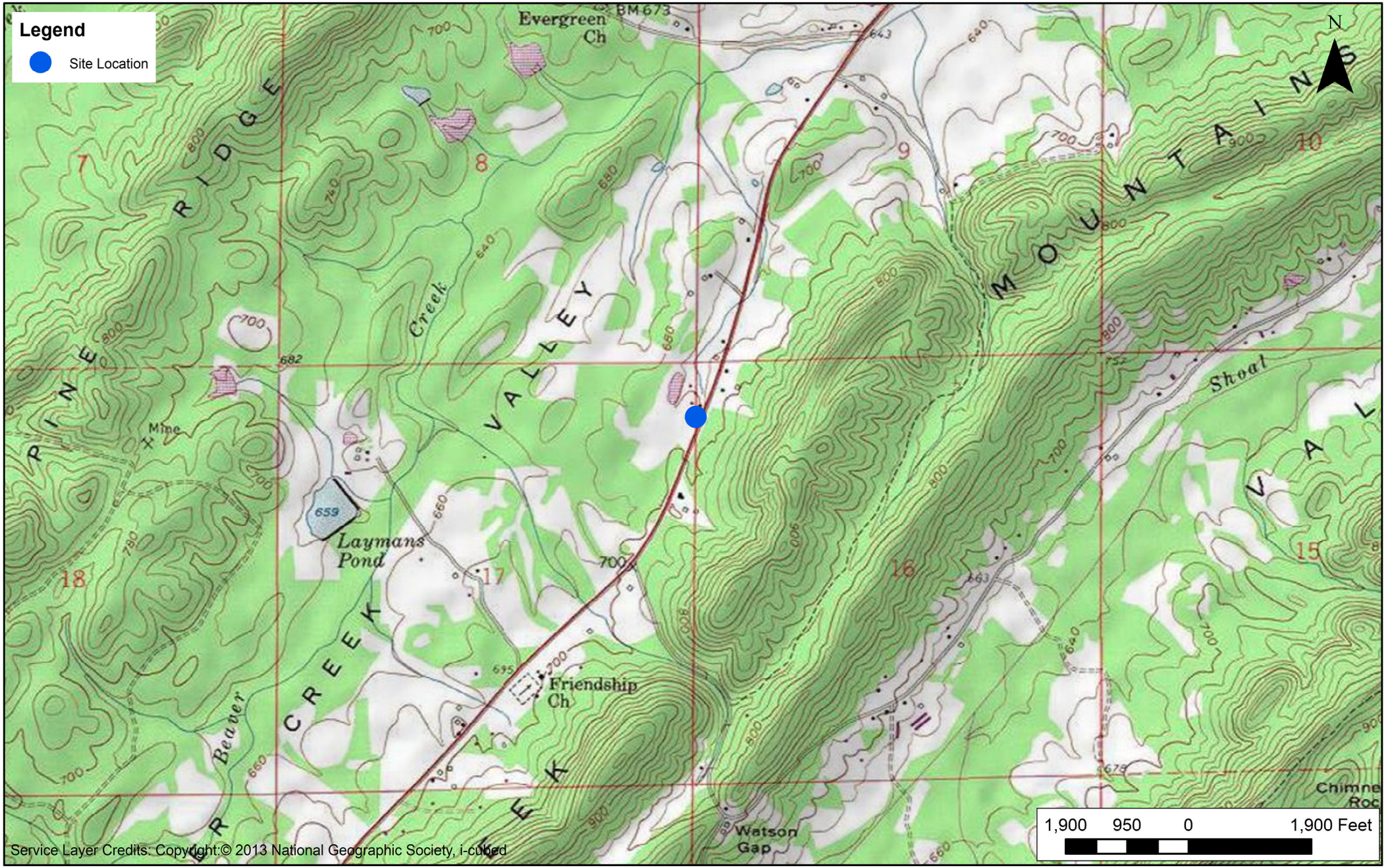



Figure 1 — Site Location Map

Odenville, Alabama

Pat's Grocery CP 55

Project Number: 0979-017-55

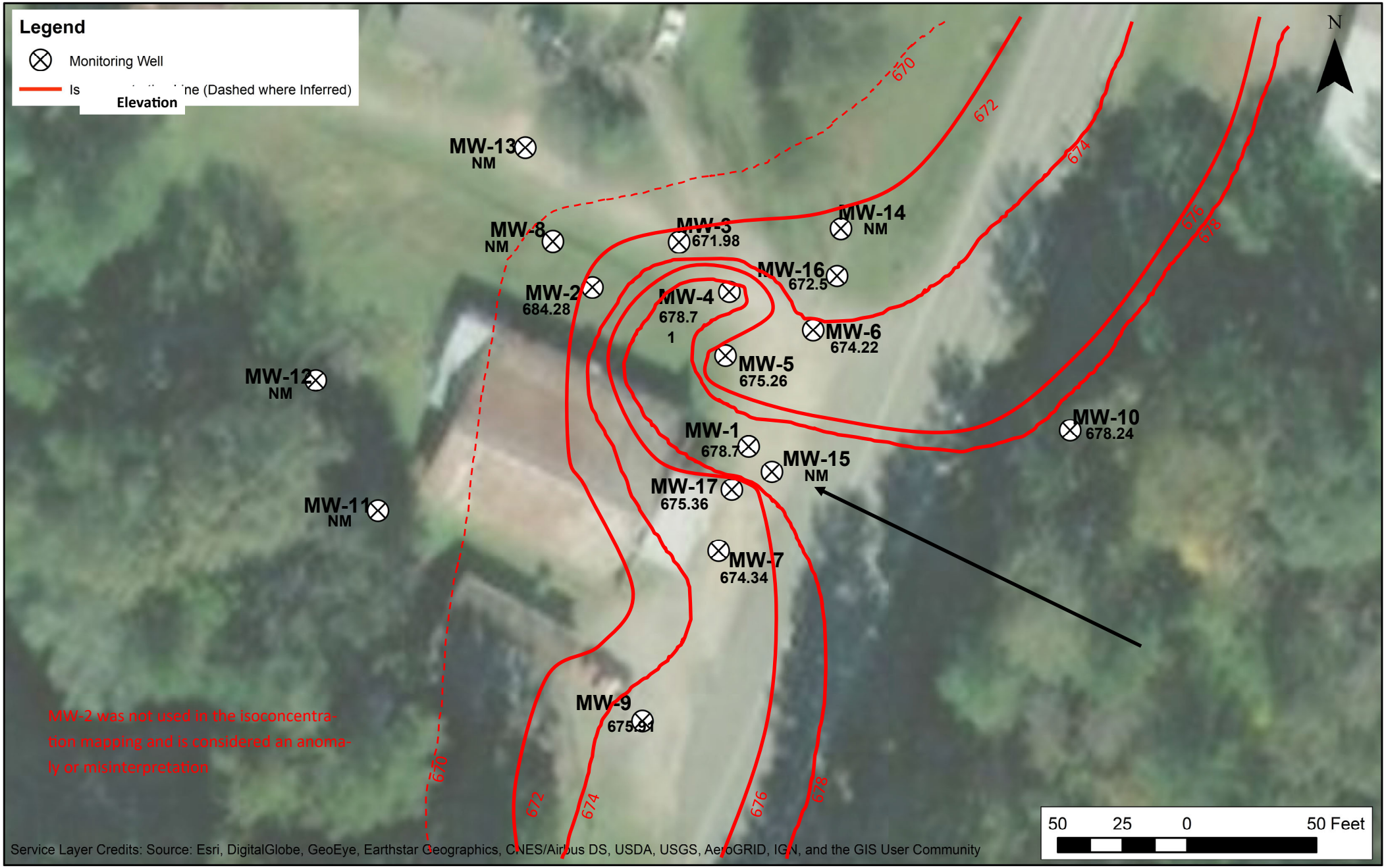
Project Manager: Jamie Cox

Date: July 28, 2024

POLY

SPECTRUM

Solutions to Your Environmental Challenges




Figure—2 Site Aerial & Well Locations

Odenville, Alabama

Pat's Grocery CP 55

Project Number: 0979-017-55

Project Manager: Jamie Cox

Date: July 28, 2024

POLY

SPECTRUM

Solutions to Your Environmental Challenges

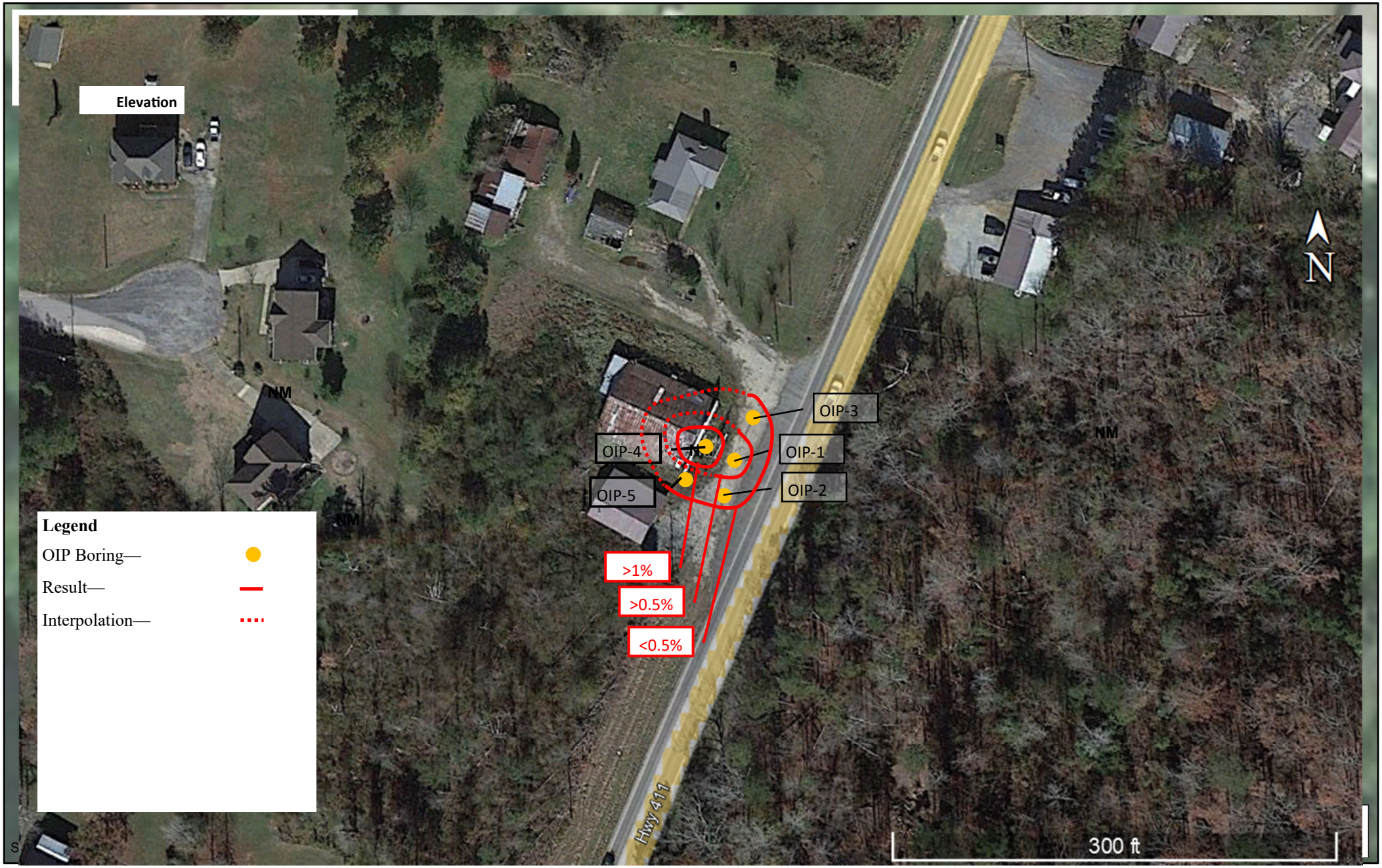



Figure 3 — OIP Results (% Fluorescence)

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 12/20/23

POLY

SPECTRUM

Solutions to Your Environmental Challenges

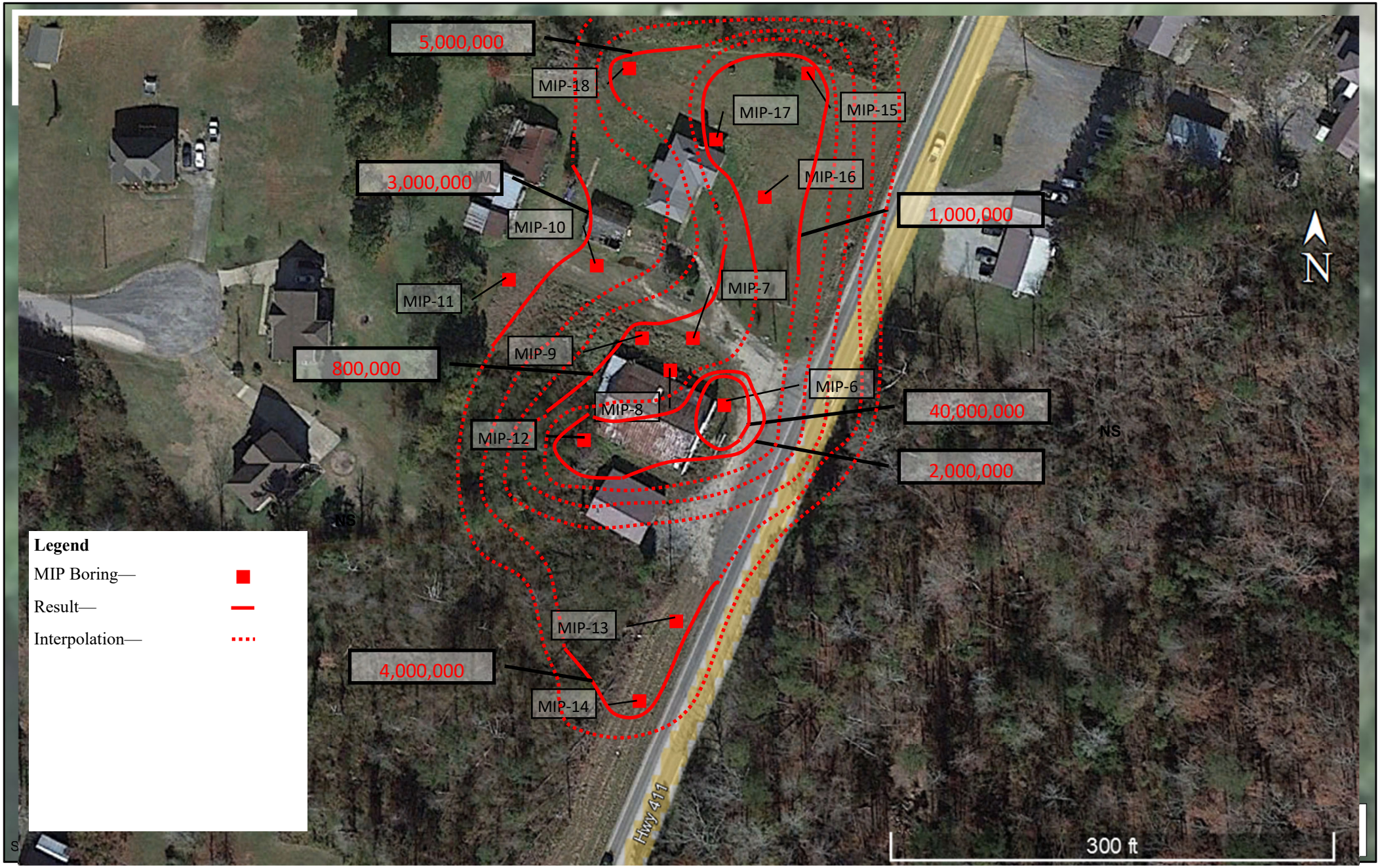



Figure 4 — MIP (PID-uV)

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

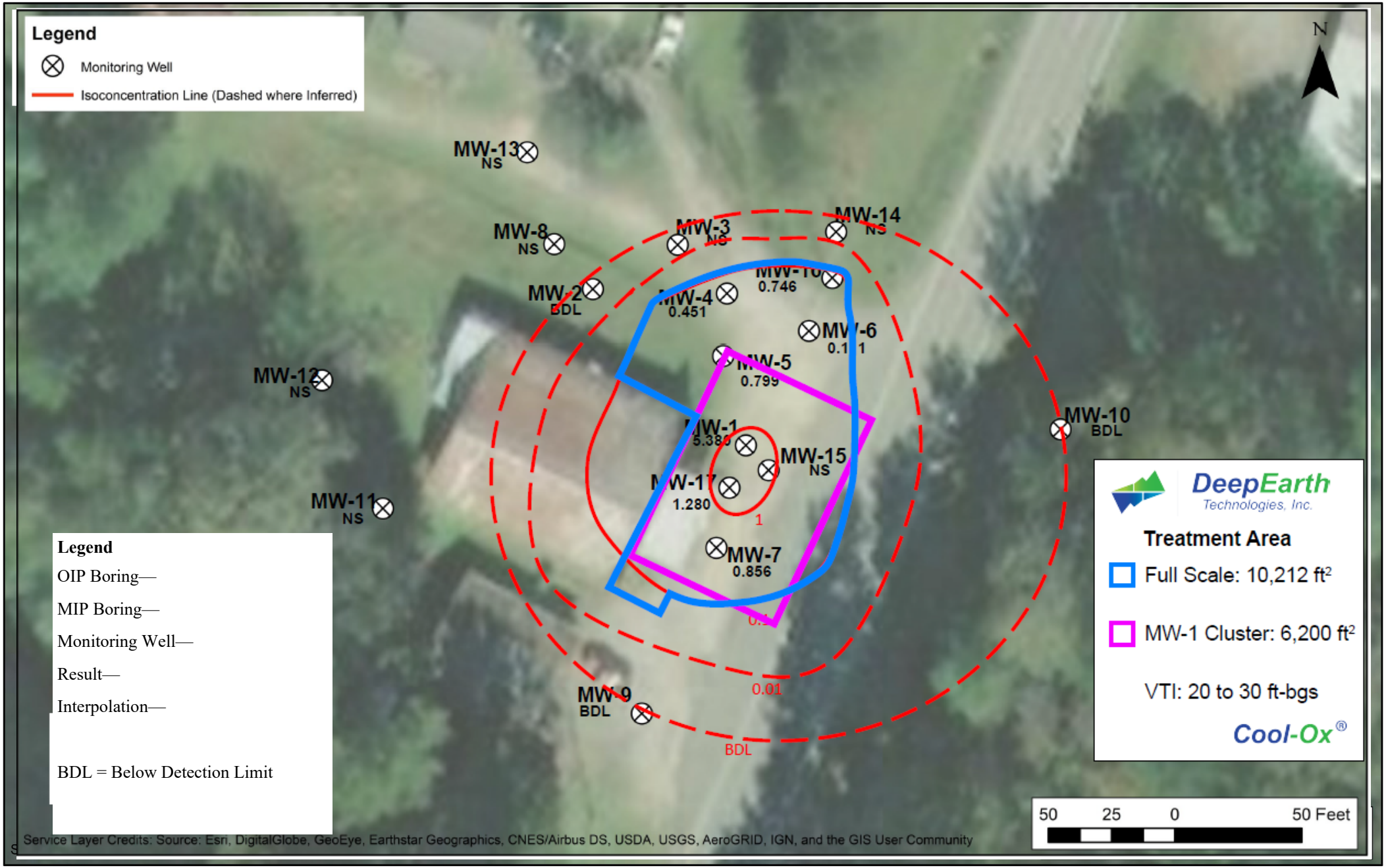



Figure 5 — Proposed Treatment Map
Odenville, Alabama
Pat's Grocery CP 51
Project Number: 0979-017-51
Project Manager: Jamie Cox
Date: 10/17/2023

POLY

SPECTRUM
Solutions to Your Environmental Challenges

# APPENDIX B

## HIGH RESOLUTION CHARACTERIZATION STUDY
## SAMPLE ANALYTICAL DATA

May 5, 2022

The Alabama Department of Environmental Management
J.J Houston
P.O. Box 301463
Montgomery, AL 36130-1463

ATTENTION: Mr. J.J. Houston
UST Corrective Action Unit

SUBJECT: High Resolution Site Characterization Report for Cost Proposal #54
Pat's Grocery
20303 US Highway 411
Facility I.D. No. 17720-115-012336
Incident No. UST 97-08-04
Adem File Code: UST970804/CP54

Dear Mr. Houston:

On behalf of our client, Ms. Patricia Case, Poly, Inc./Spectrum Environmental, Inc. (Poly/Spectrum) has completed the High Resolution Site Characterization event for CP #54 at the above-referenced site, and is pleased to submit this report detailing our site activities and findings.

Should your review require additional information, please contact Jamie Cox at (205) 664-2000.

Sincerely,
**POLY, INC./SPECTRUM ENVIRONMENTAL, INC**

Jamie D. Cox, P.G.
Project Manager
Spectrum Environmental, Inc.

Ryan Cothern, G.I.T
Senior Staff Geologist
Spectrum Environmental, Inc.

## Section 1 - Introduction

A High Resolution Site Characterization (HRSC) event has been completed by Spectrum Environmental Services, Inc. (Spectrum) in accordance with the ADEM approved Cost Proposal #54 dated November 7, 2023, in reference to the site:

FACILITY NAME: Pat's Grocery

FACILITY ADDRESS: 20303 US Hwy 411, Springville, St. Clair County, Alabama

FACILITY I.D. NO.: 17720-115-012336

UST OR AST INCIDENT NO.: UST97-08-04

### 1.1 Description of Current and Past Site Usage

Pat's Grocery (or previous gasoline station) was operated as a gasoline station for approximately 57 years. In July 1997, fueling operations at the site ceased and the USTs were permanently closed. The retail store formerly referred to as Pat's Grocery has historically been used as a small convenience store. However, the store is no longer being used. A site locator map is provided in Appendix A - Figure 1.

### 1.2 Summary of Site History

During the closure of the two gasoline USTs at the subject site on July 9, 1997, soil concentrations of total petroleum hydrocarbons (TPH) were generally reported to be less than the ADEM corrective action limits (CALs) for TPH. However, two soil samples (one collected from the West Side of the tank pit and one collected from the base of the piping trench) were reported to be well above the ADEM CAL (303 mg/Kg and 346 mg/Kg, respectively). During these and subsequent investigations, Benzene, Toluene, Ethylbenzene and Xylene, and Methyl-tertiary-butyl ether (BETX/MtBE) concentrations within the boundaries of the subject site have been reported to be in excess of established Initial Screening Levels (ISLs). As part of previous site assessment activities, 15 monitoring wells were installed at the site. Not all of the wells are currently available for sampling. Two of the wells were historically dry and two new monitoring wells were installed (MW-16 and MW-17) to replace these wells. For the locations of monitoring wells and the site layout, refer the attached site maps in Appendix A.

Subsequent to an Alabama Risk Based Corrective Action (ARBCA) Assessment of the subject site, Benzene concentrations exceeded the Tier II Site Specific Target Level (SSTL) for the Indoor Inhalation of Vapors from Groundwater and Ingestion of Groundwater for Off-site Resident Child and Off-site Resident Adult receptors. Currently, groundwater sampling occurs under an approved Remediation by Natural Attenuation (RNA) Corrective Action Plan (CAP). As part of the RNA CAP the monitoring wells exhibiting the highest chemical of concern concentrations and wells that have exceeded and continue to exceed the SSTLs developed for the site are being monitored. Poly/Spectrum has also calculated Site Specific Target Levels (SSTLs) for each groundwater monitoring well at the site.

### 1.3 Drinking Well & Monitoring Well Status

There are private drinking water wells located within 1,000ft of the site. However, no public supply wells are located within a mile. Currently there are seventeen monitoring wells active at this facility.

### 1.4 Scope of Work & Purpose

In order to provide a better understanding of the extent of the plume to remediate, Spectrum contracted Eagle Synergistic Optimizing Technologies (Eagle) and Walker Hill Drilling (WHD) to perform a High Resolution Site Characterization (HRSC) study. The objectives of this study are to evaluate the horizontal and vertical extents of the plume, identify hot spots, and identify the best remediation method to eliminate the remaining petroleum in groundwater. All sampling locations are provided on Appendix A – Figures 2 through 8.

## 2.1 OIHPT Overview

Spectrum, Eagle, and WHD mobilized to the site between October 24th, and October 27th, 2023, for the field work. WHD advanced 18 borings on the site in order to delineate the plume of contamination. Boring placement was determined based on previous data showing plume size and direction. It was determined groundwater was flowing towards the northwest at the site. Each boring depth ranged from 8.35 to 27.75 ft below land surface (bls) using direct push GeoProbe techniques.

While the GeoProbe advanced, the OIHPT tool connected to Eagle's monitoring ran continuously. The OIHPT tool consists of the Optical Image Profiler (OIP), a Hydraulic Profiling Tool (HPT) and an electric conductivity (EC) dipole to evaluate the presence of Light Non Aqueous Phase Liquids (LNAPL) in the subsurface. The OIP, HPT, and EC tools combine to make the OIHPT tool. The OIP tool emits fluorescence causing petroleum products to be captured by the camera and monitor allowing for the visual identification of contaminated intervals of material. The HPT portion of the tool measures the pressure required to flow water through the matrix, which corelates to how compacted the material is. The EC tool is used to determine relative grain size, higher EC values (given in mS/m) corelate to smaller grain sizes. These measurements can be used to determine areas of soil compaction and preferential flow pathways. This data is recorded in the form of depth logs allowing for the isolation of intervals where contamination is contained. Each boring was filled in with bentonite plug material and sealed with concrete.

## 2.2 OIP Results

Five (5) OIP borings were performed. These OIP borings were placed in and around the suspected source area in an attempt to locate any free product that may be present. The highest detection occurred at OIP-04 with a detections of 1.1% at 26.8' bgs. The remaining four OIP boring did not exhibit signatures above 1% fluorescence. This would indicate little to no free product remaining from the source area.

## 2.3 MIP Results

Thirteen (13) MIP borings were performed. Of the thirteen borings, MIP-06 exhibited the largest PIF/FID signatures. MIP-06 had two distinct zones in which these large signatures were observed, the first being at 5.5 to 8.3' bgs and the second at 19.5 to 26.9' bgs (refusal). MIP-07 and MIP-12 displayed the second largest signatures from 4.5 to 20.0' bgs.

A copy of the OIHPT report logs from Eagle Synergistic Technologies INC is provided in Appendix B.

## 2.5 Soil Sampling

On October 26, 2023, Spectrum performed soil sampling based on information observed in the OIP and MIP probing. Spectrum selected four locations (OIP-01, OIP-04, MIP-06, and MIP-12) for sampling. These samples were collected by extending the GeoProbe down to intervals of suspect contamination using direct push techniques and collecting soil into liners. Once collected, the soils were described and characterized with any signs of staining or odors. One soil samples was collected from each boring at a depth consistent with the highest contamination observed in the probing data. Groundwater was not encountered in any of the borings sampled.

All samples were placed into laboratory prepared containers and put on ice inside of a cooler. The samples were sent to Eurofins Environmental Testing in Pensacola, Florida for analysis on October 26, 2023. The laboratory analytical results and a chain of custody for this assessment is available in Appendix C, and summary of the results are provided in Table 1 below.

Table 1 - Soil Results

| Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Soil Sampling | | | | | | | |
| Sample ID | Depth | Analyte (in ppm) | | | | | |
| | | Benzene | Toluene | Ethylbenzene | Xylenes, Total | MTBE | Napthalene |
| OIP-01 | 22' | **34.00** | 9.47 | 109.00 | 412.00 | BDL | 71.20 |
| OIP-04 | 25' | **13.60** | **135.00** | 38.50 | 210.00 | BDL | 22.90 |
| MIP-06 | 21' | **10.20** | 6.03 | 53.80 | 259.00 | BDL | 30.70 |
| MIP-12 | 13' | BDL | BDL | BDL | BDL | BDL | BDL |
| Soil Tier II Target | | 0.611 | 11.9 | 440 | 178 | 1110 | NL |
| Soil POE Limit | | **0.362** | **156** | **158** | **1740** | **0.365** | NL |

Please Note

All samples were collected on 10/26/23
Samples reported in mg/Kg (ppm)
Sampled highlighted yellow exceed Soil Tier II Target Level
Samples bolded exceed the Soil Concentration at Source Protective of Groundwater
BDL = Below detection limit
NL = Not Listed

The highlighted results correspond to values exceeding the SSTLs set for this specific site. MTBE was not detected in any of the samples. Concentration maps of the analytical results are provided in Appendix A.

## Section 3 Conclusions and Recommendations

A HRSC Study was conducted on the target property October 24th to October 27nd. This study provided OIP, MIP, HPT, EC and soil analytical results across the site at Pats's Grocery in Springville, Alabama.

Based on our review of the area, contamination appeared to be present across the subject property as well as the neighboring property to the north. The area of highest contamination is concentrated to approximately a 13,000 sq. foot area centered on the previous convenience store building and at depths of 4 to 27.5 feet below land surface.

Benzene concentrations exceeded SSTL for soil concentrations protective of Groundwater Resource Protection Source Soil Protective of Point of Exposure (POE) at OIP-01, OIP-04, and MIP-06. Toluene concentrations exceeded SSTL for soil concentrations protective of POE at OIP-04. Additionally, Xylene concentrations exceeded SSTL for soil concentrations POE from OIP-01, OIP-04, and MIP-06.

Based on the results of the sampling events, it is Poly/Spectrum's opinion that the least disruptive way to eliminate the remaining petroleum contaminants is to inject a chemical that would destroy the source and continue to remediate the groundwater. We have conducted a review of Cool-Ox technology and believe it would be useful in remediation for this site. This area includes the smear zone and upper section of groundwater 30 ft bls. If ADEM agrees with this recommendation, we can prepare a cost proposal for a UIC Permit, Cool-Ox Injection, and subsequent monitoring events.

Should you have any questions or comments, please contact us at 205-664-2000.

# APPENDIX A

# FIGURES

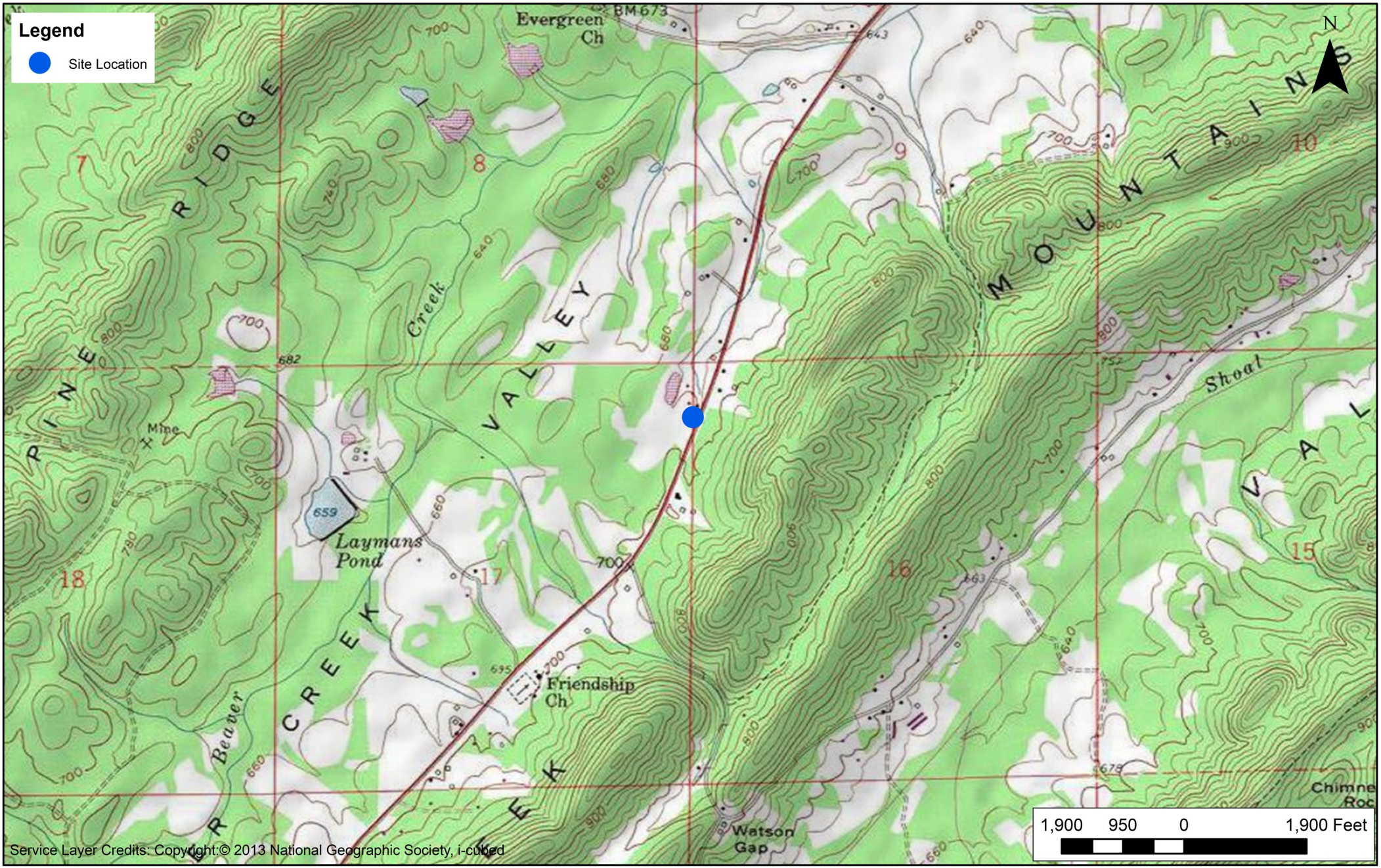



Figure 1 — Site Location Map

Odenville, Alabama

Pat's Grocery CP 54

Project Number: 0979-017-54

Project Manager: Jamie Cox

Date: 12/20/23

POLY

SPECTRUM

Solutions to Your Environmental Challenges


Figure—2 Boring Locations

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

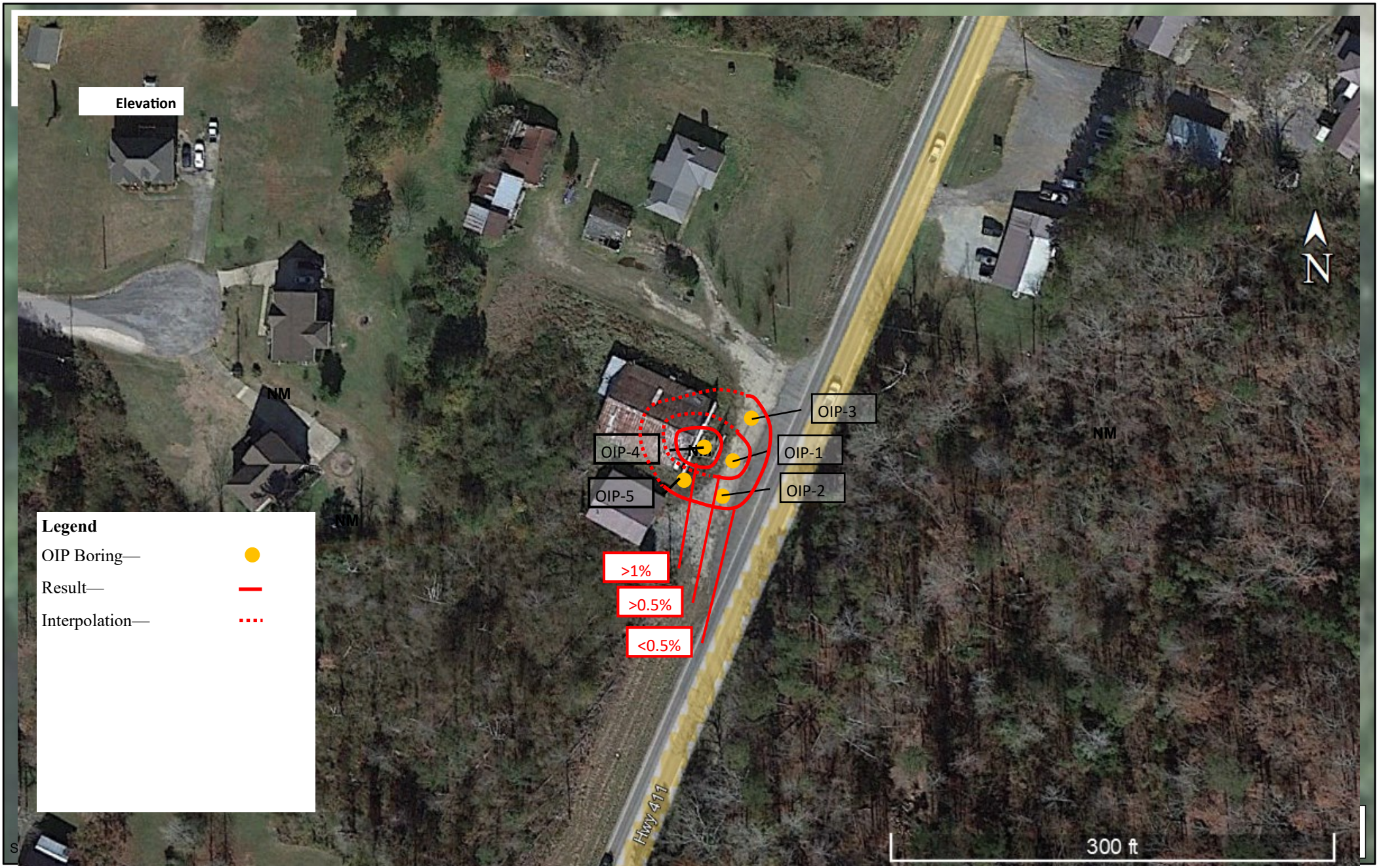



Figure 3 — OIP Results (% Fluorescence)

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 12/20/23

POLY

SPECTRUM

Solutions to Your Environmental Challenges

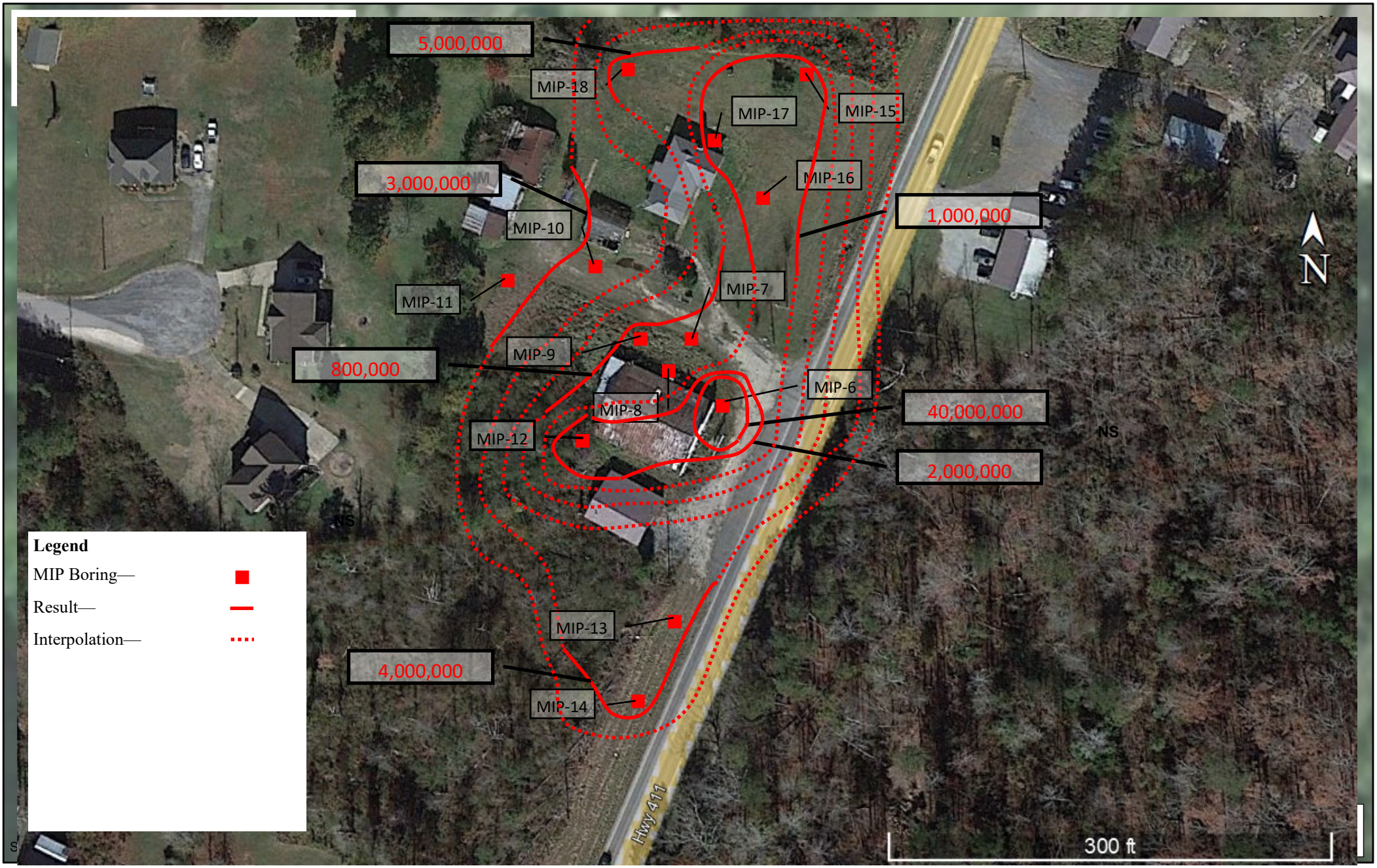



Figure 4 — MIP (PID-uV)

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

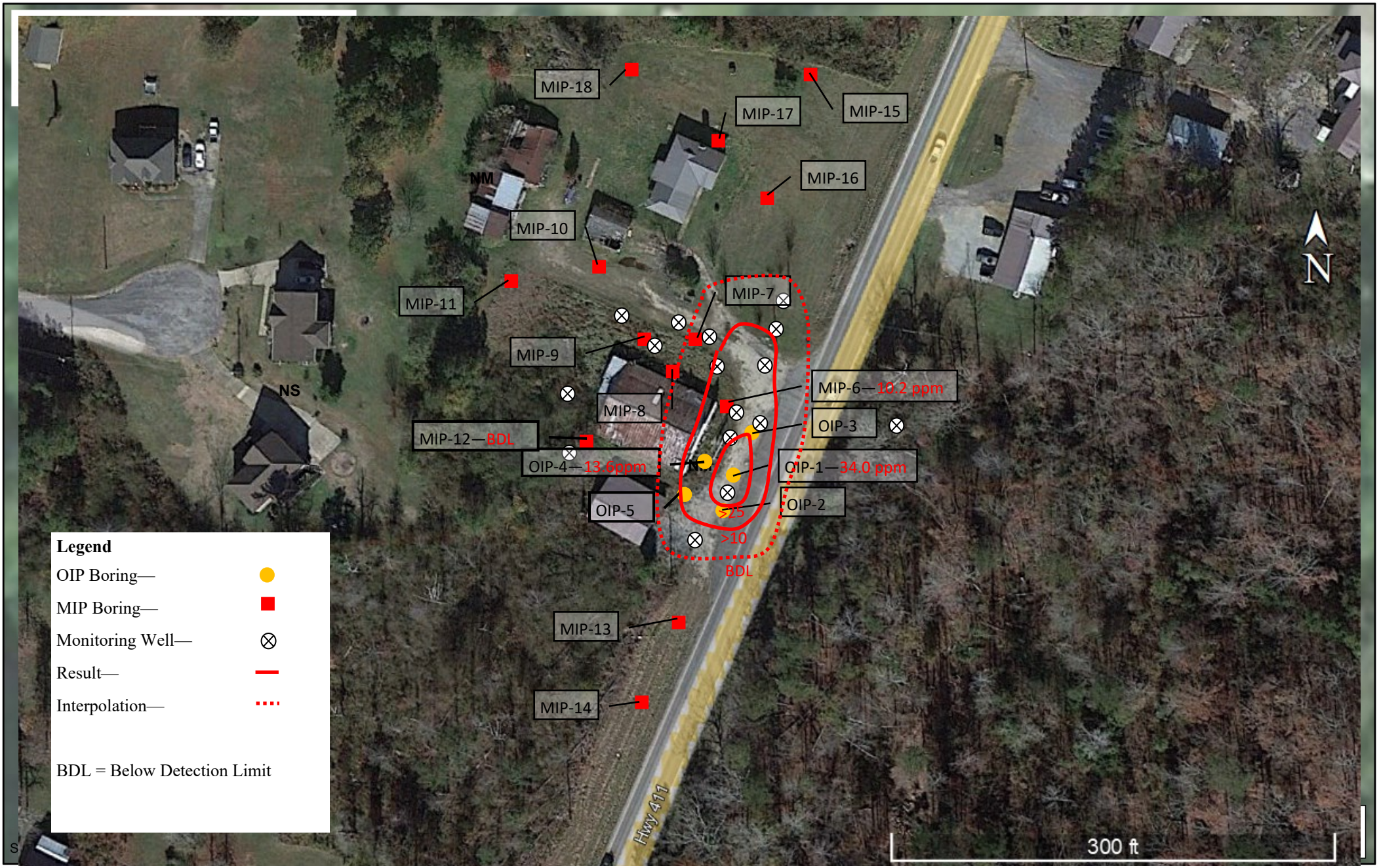



Figure 5 — Benzene Isoconcentration Map

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

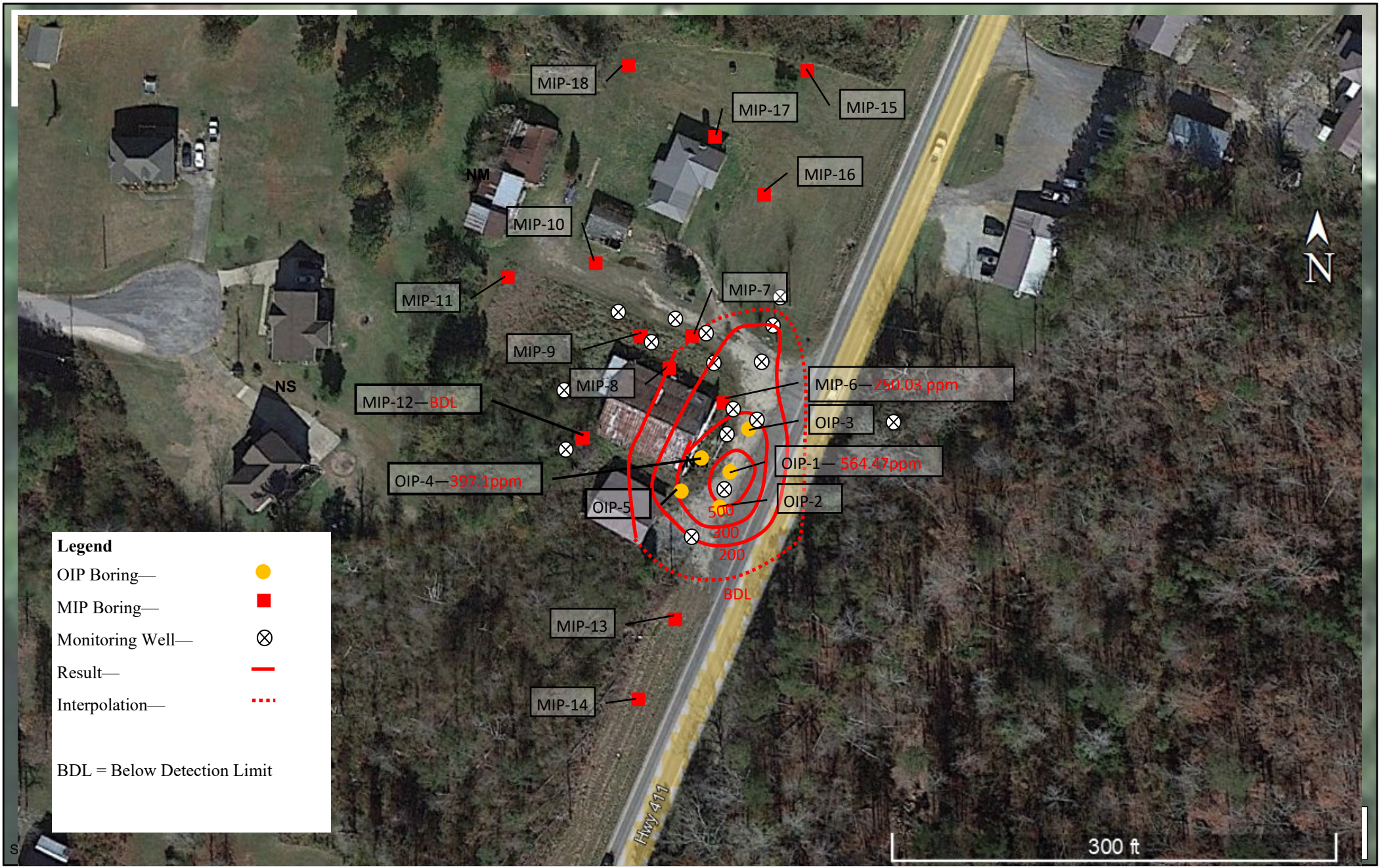



Figure 6 —BTEX Isoconcentration Map

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

# APPENDIX B

# OIHPT RESULTS

# Eagle Synergistic
# Optimizing Technologies, LLC

***Specializing* in High Resolution Site Characterization Technology**

Jamie Cox
Spectrum Environmental
jcox@specenviro.com
205-612-9298

RE:
Pat's Grocery
20303 U.S. Highway 411
Springville, AL
Project # 23.218

Jamie,

Below is a comprehensive report detailing the HRSC investigative services conducted at your site at Pat's Grocery. It includes an overview of logistics, individual logs, cross-sections of data, as well as a data synopsis.

Please let us know if you have any questions or requests and feel free to contact us anytime.

We strive to ensure that our client's expectations are met and exceeded in all aspects. We look forward to working with you again in the future.

Thank you,

Janet L Castle, PG, President
jcastle@EagleSynergistic.com
**Eagle Synergistic**
751 Pine Ridge Rd #100
Golden, CO 80403
**Direct: 720-475-0022**
**Office: 303-305-7783**
**www.EagleSynergistic.com**
Locations Nationwide: CO, TX, CA, GA, PA
WOSB

# Project #23.218
# COMPREHENSIVE REPORT
# 11/7/23

## Pat's Grocery

## 20303 U.S. Highway 411

## Springville, AL

# Table of Contents

# PROJECT OVERVIEW

## Project Summary - Logistics

Between Tuesday, October 24th, 2023, and Friday, October 27th, 2023, Eagle Synergistic worked with Client Company Name to complete an HRSC investigation of Pat's Grocery. DPT Services were provided by Walker Hill. This Investigation included advancing 13 Membrane Interface Probe and 5 Optical Image Profiler (OIP) borings to depths ranging from 8.35 to 27.75 feet below ground surface. Both tools were run in conjunction with the electrical conductivity dipole (EC) and the Hydraulic Profiling Tool (HPT). The objective of the investigation was to identify and delineate any free-phase LNAPL and dissolved-phase petroleum impacts.

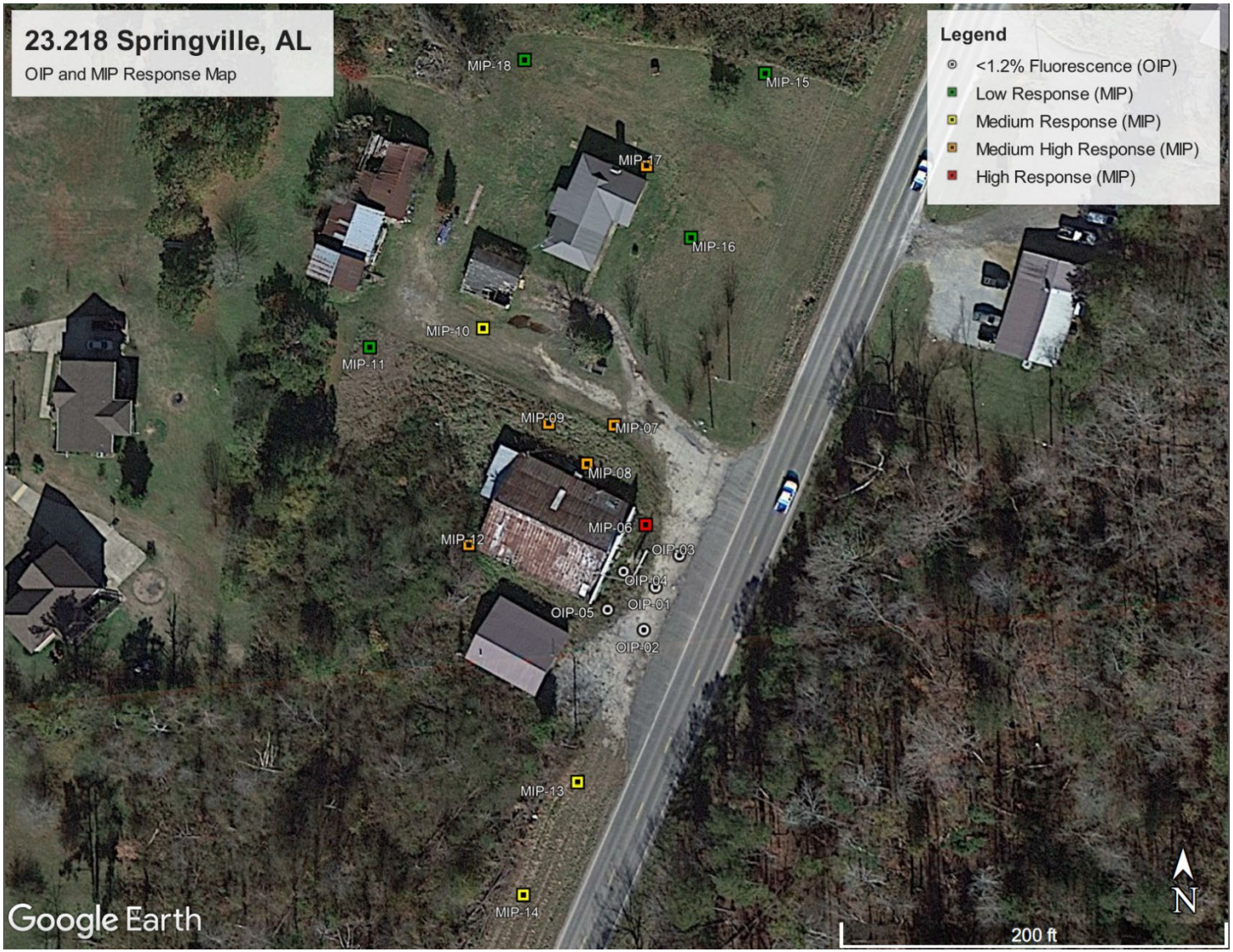
**Personnel:**
Eagle Synergistic – Logan Cayon

Spectrum - Ryan

Cory, Cecil – Walker Hill

**Site Access:**
Some portions of the site south and west of the buildings were wooded, preventing us from delineating the plume fully in that direction.

## HRSC BORING LOCATIONS



## DETECTOR INTERPRETATION

Typical standard MIP configurations use 3 gas phase detectors: a photo-ionization detector (PID), flame-ionization (FID) and a halogen specific detector (XSD). The PID responds to compounds which have an ionization potential of 10.6eV or less. These compounds include both chlorinated and non-chlorinated hydrocarbons. The FID will respond when organic compounds (anything containing carbon) are present in the carrier gas stream in high enough concentration burn up in the flame which increases the flames ionization voltage. The XSD responds only to halogenated compounds which are made up of chlorinated (most typical halogen environmental contaminant), brominated and fluorinated compounds. Based upon which detector or detector series a contaminant responds on, we can determine if the contaminants are halogenated, or petroleum based.

Petroleum hydrocarbons will respond on the PID and FID but not on the XSD. Fresh gasoline primarily contains aromatic hydrocarbons such as benzene, toluene, ethyl benzene and xylenes, which respond strongly on a photo-ionization detector (PID) and not so well on the FID. As gasoline breaks down or weathers the molecular structure changes from primarily aromatic to mainly straight chain hydrocarbons (single bonded hydrocarbons). Straight chain hydrocarbons typically do not show up on the PID do having a higher ionization potential but will respond on a flame ionization detector (FID). Weathered petroleum will still have a noticeable signal on the PID but may show a stronger FID signal.

Standard MIP systems can identify compound families and determine general compound classes. The only sure way of determining contaminant concentration from MIP responses is to take confirmation soil and/or groundwater samples for laboratory analysis. After obtaining the results the actual concentrations can be compared to the MIP detector responses and concentrations may be estimated across the site.

The OIP-UV probe is designed with UV and visible light sources which are directed out a sapphire window. As the probe is advanced into the subsurface, the UV light source will induce fluorescence of the fuel polycyclic aromatic hydrocarbons (PAHs). This fluorescence is captured by an onboard camera which operates at 30 images per second. Images are saved throughout the advancement of the log and still photos are taken using UV and visible light sources each rod addition as well as at operator chosen depths.

In general, higher HPT pressure values indicate more compact soil. Likewise, higher EC values indicate smaller grain size, increased pore-fluid conductivity, or higher compaction. HPT is simply measuring the pressure required to maintain a set flow of water into the side-wall soil. The EC is measuring how readily an electrical current can pass through the soil. A tighter, more compact soil will display higher values than a looser, less compact soil.

Normally, EC values and HPT pressure should trend together. When the EC reads a lower value (coarser-grained material e.g., sand or gravel) the HPT pressure tends to generally read lower in that interval as the sand/gravel will accept the injected water with ease. When the EC reads a higher value (finer-grained material, i.e., silts and clays) the HPT pressure tends to read higher. In tight, impermeable clays the HPT pressure can often reach 110 pounds per square

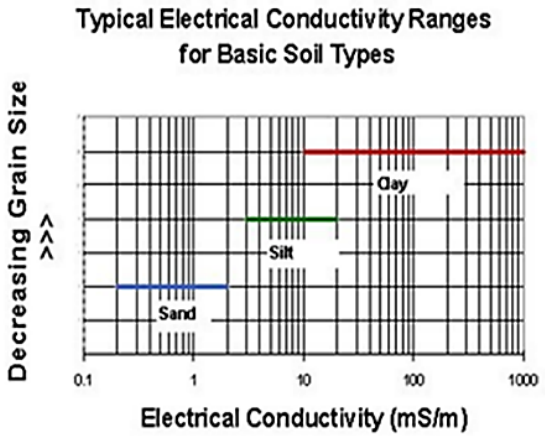
inch (PSI), the system maximum pressure, while EC values may range from 100-400 milli Siemens per meter (mS/m).

This report, and the information contained herein, consists solely of qualitative information provided to the recipient for its own independent use. Eagle Synergistic will not provide to the recipient or owner(s) of the subject property any recommendations related to this report or any information contained herein, and Eagle Synergistic hereby disclaims all responsibility related to the same.

# UNDERSTANDING EC AND HPT DATA

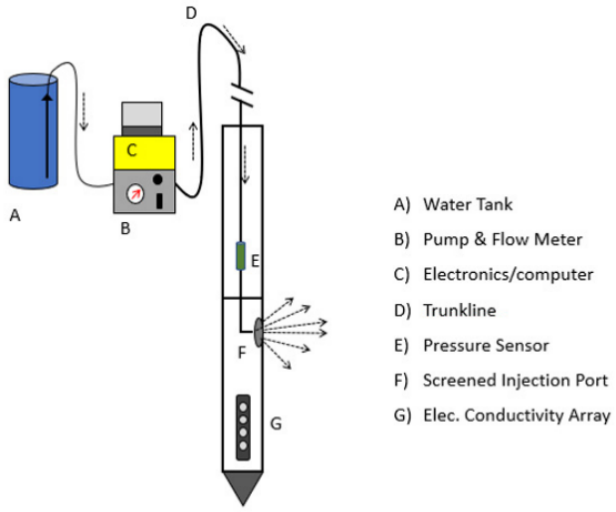
## EC (Electrical Conductivity):

- Lowest relative detector on probe, located approximately 1 inch from the probe tip.
- Soil conductivity, in general, varies with grain size.
- Fine-grained soils, such as silt or clay, tend to produce higher EC signals than coarse-grained sands and gravels.
- The EC can also detect salts, metals, etc.



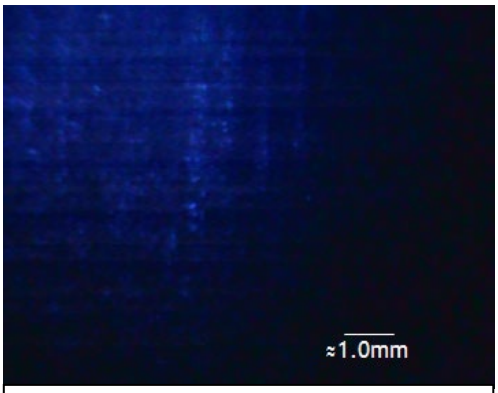

## HPT Pressure

As shown in the figure below, water from a supply tank (A) is pumped by a pump (B) housed within the HPT controller at a set flow rate through the trunkline (D) and into the formation after passing through the injection screen (F). HPT system injection pressure measurements are made using a downhole pressure transducer (E). 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.

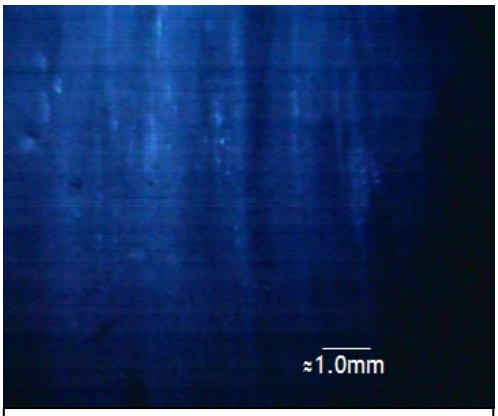


## UNDERSTANDING OIP DATA

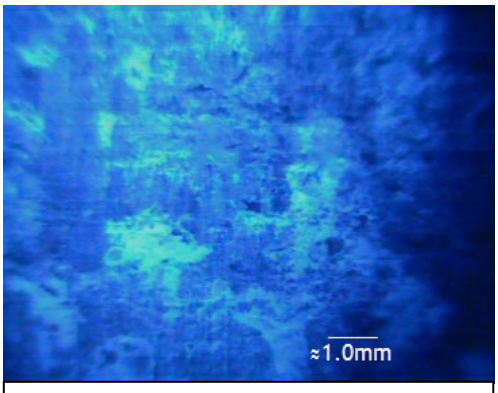
OIP Fluorescence (%) is expressed as the percentage of the OIP camera view occupied by fluorescence, essentially indicating the degree of light non-aqueous phase liquid (LNAPL) saturation within the soil matrix. Site-specific variables such as the degree of LNAPL weathering, soil texture and LNAPL composition can affect the fluorescence intensity and appearance on the log. The images below are examples only and were not collected during on-site operations.




21%Fluorescence




50%Fluorescence



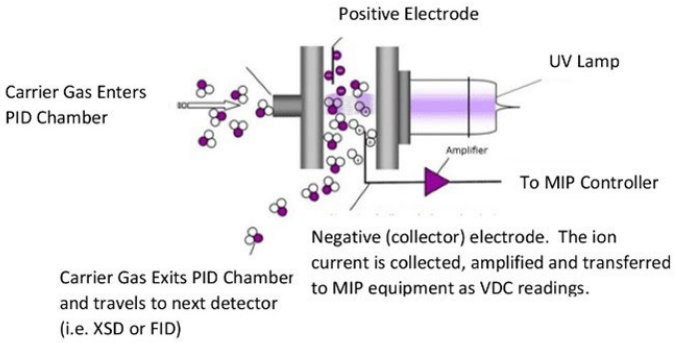

93%Fluorescence

# UNDERSTANDING MIP DETECTORS

During normal MIHPT operation, the general detection limit of most compounds is around 1ppm. For ppb concentrations, the Low -Level MIHPT configuration is recommended. Contact Eagle Synergistic for further details.

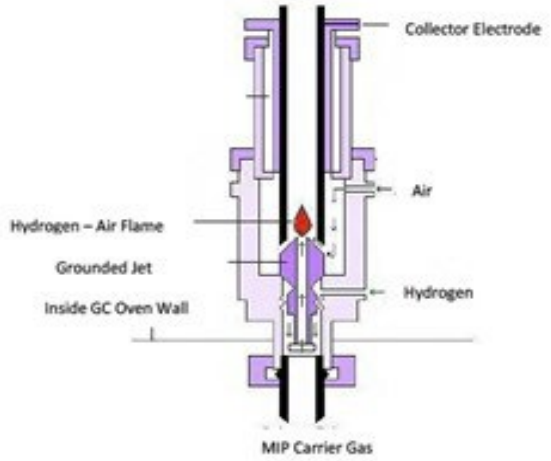
## Photo Ionization Detector (PID)

The PID uses ultraviolet radiation to ionize molecules in the effluent of the MIP carrier gas stream for analyte detection. The PID is a non-destructive detector and can therefore be used in series with other detector types. For a compound to be detected by a PID the chemical must have an ionization potential below the electron voltage of the PID lamp. The most common PID lamp used with the MIP is 10.6eV. The PID is generally used for detection of aromatic hydrocarbons such as benzene and toluene and double bonded chlorinated compounds such as trichloroethylene and perchloroethylene.




## Flame Ionization Detector (FID)

The FID uses a hydrogen/air flame to produce ions and electrons that can conduct electricity through the flame. A potential is applied across the burner tip and the collector electrode. The resulting current is then amplified and recorded. The FID will respond to any organic compound at a large enough concentration. The FID has a lower sensitivity to common VOC analytes compared to the PID or XSD, and typically serves as a confirmation detector run in tandem with the PID and XSD. It is, however, the primary detector for mapping methane impacts since methane does not show up on the other detectors.



# HRSC DATA OVERVIEW

## Detectors:

The investigation started by utilizing the OIP tool around the suspected source area to delineate any free product that may be present. All detections on the OIP data were relatively minor, with OIP-04 displaying the highest detection of 1.1% at 26.8' bgs. All other OIP borings' signatures did not exceed 1% fluorescence, indicating little to no free product remaining from the source area. Once the operator was confident in the relative lack of free product in the area, they switched over to the MIP probe to delineate the dissolved phase contamination. Out of the 13 MIP borings logged, the boring with the largest PIF/FID signatures was MIP-06, which was closest to the suspected source area. MIP-06 had 2 distinct zones of large PID/FID signatures, the first being from ~5.5-8.3' bgs and the second being from ~19.5-26.9' bgs (refusal). Stepping out from the source area we saw a large drop off in signature magnitude, but still found significantly impacted intervals. MIP-07 and MIP-12, to the west-northwest of the source area, displayed the second largest impact interval of the investigation, from ~4.5-20.0' bgs. Further to the north, MIP-17 and MIP-18 saw moderate signatures from ~3.0-16.5' bgs. These borings were the furthest offset borings that showed moderate signatures indicating there could be a migratory pathway leading to the north-northwest portion of the site.

## Lithology:

Lithological data displayed general trends throughout the site. The data suggests a gradual increase in EC starting at about 4' bgs to about 15' bgs indicating a smooth transition from sand to silt to clay. The clay unit from about 15' bgs was mostly prominent to the termination of the boring with occasional silt seems interbedded in the clay. HPT data suggested a series of permeable and impermeable zones across most of the borings. At MIP-07, where HPT pressure was maxed out, it is likely that the HPT screen became clogged with fine material somewhere during the transition from the silty zone to the underlying clay.

## Interpretation

The goal of the investigation was to delineate the free product around the source area (MW-1) and to find the extent of the dissolved phase plume. The OIP tool confirmed that there was little to no free product left around the source area. The most significant petroleum signatures were identified at MIP-06 which was the closest to the source area. As the investigation stepped out from the source area, MIP signatures generally decreased. MIP-17 and MIP-18 which are to the north northwest of the source area did see moderate impacts indicating that there is likely a migratory pathway following the gradient of the groundwater to the northwest.

## QUALITY ASSURANCE

All probes contain an electrical conductivity dipole, which is tested for performance prior to the tooling being advanced. The dipole is tested using a low-value resistor and a high-value resistor, and the results for this test are presented with each boring log.

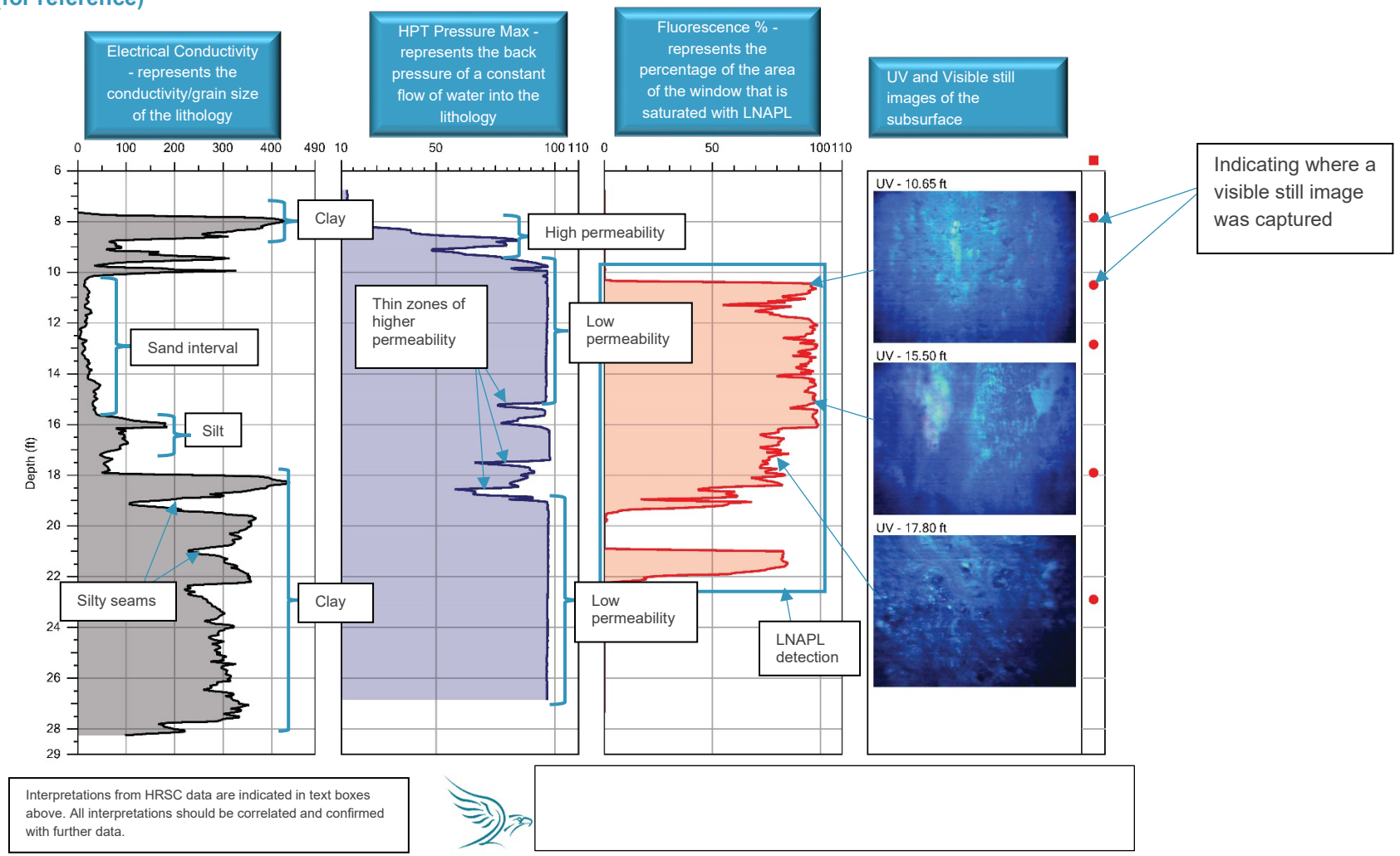
HPT ports and transducers are tested for performance prior to advancement using a reference tube, which allows the static pressure of a 6-in water column to be measured. We ensure that the transducer reads this value within a reasonable margin of error. This test is performed at the beginning and end of each boring, and the results are included.

Membrane Interface Probes and the necessary gas chromatograph detectors are tested simultaneously using site-specific chemical standards of known concentrations. These standards are determined and mixed before work begins. Testing involves heating the MIP probe while it is at the surface and placing the standard directly onto the membrane. The contaminant then passes through the membrane and is carried into the chromatograph, where it is picked up by the various detectors, (PID, FID, XSD). For this site, Eagle Synergistic's field specialists used standards of 1, 10, and 25 ppm Benzene. The response from each detector is recorded to ensure they are within the operating range. Additionally, the "trip time" (the time it takes for the contaminant to travel from the membrane to the gas chromatograph) is also recorded.

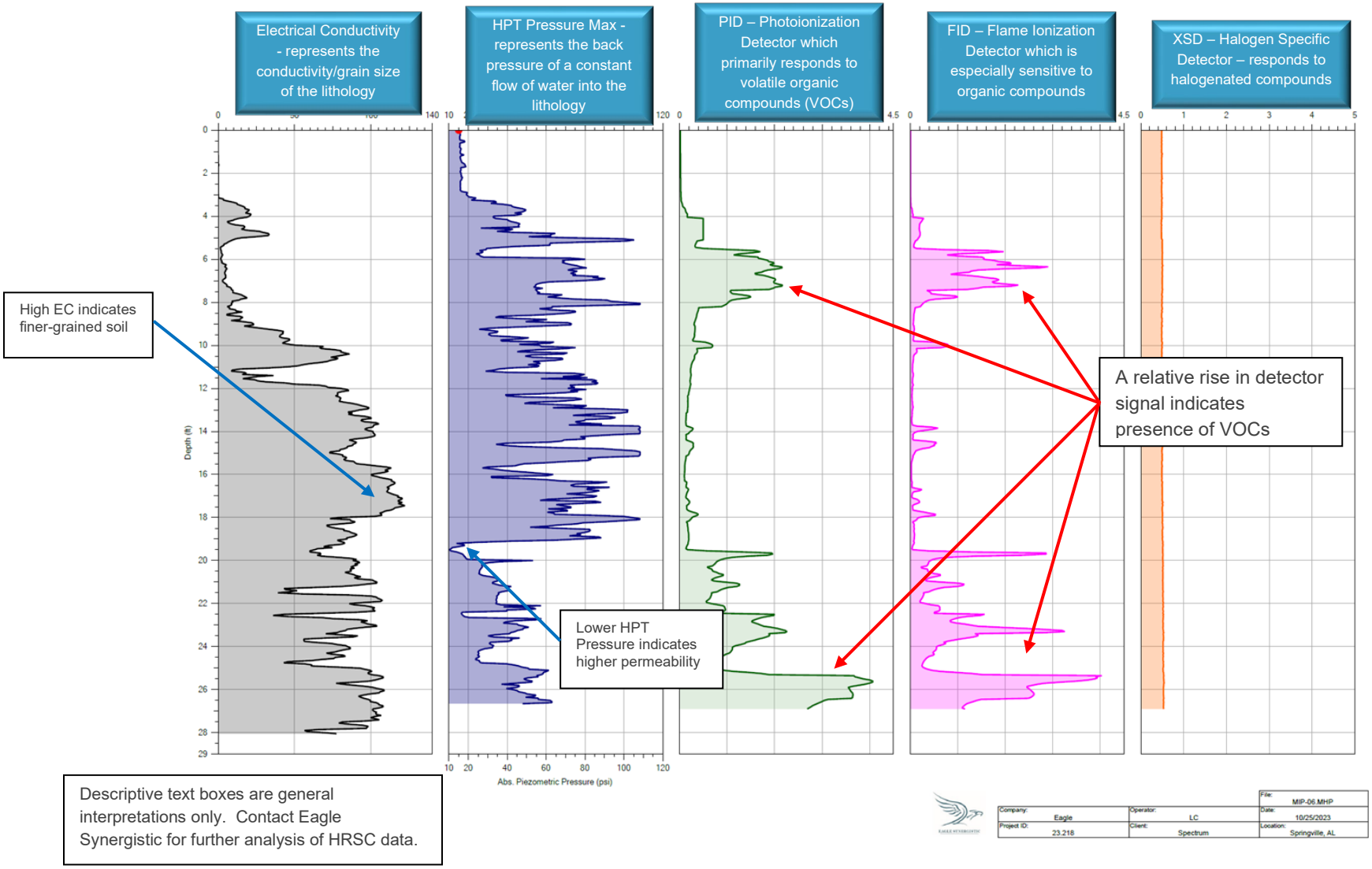
Optical Image Profiler are tested in several ways. A visual target is held against the sapphire window to test the functionality of the visible light source. 4 mL quartz containers of Diesel fuel and motor are each held against the window to measure the effectiveness of the ultraviolet light within the probe. A blank black box is also held against the window to ensure that there are no false positives being recorded. These three tests are performed at the beginning and end of each boring and the results are recorded with each log.

These QA/Response tests are completed before and after each individual boring to ensure that the system is functioning correctly and responding well to the site-specific contaminant of concern. All QA/response logs are automatically compiled by the software and are available at client's request.

## Example Log (for reference)



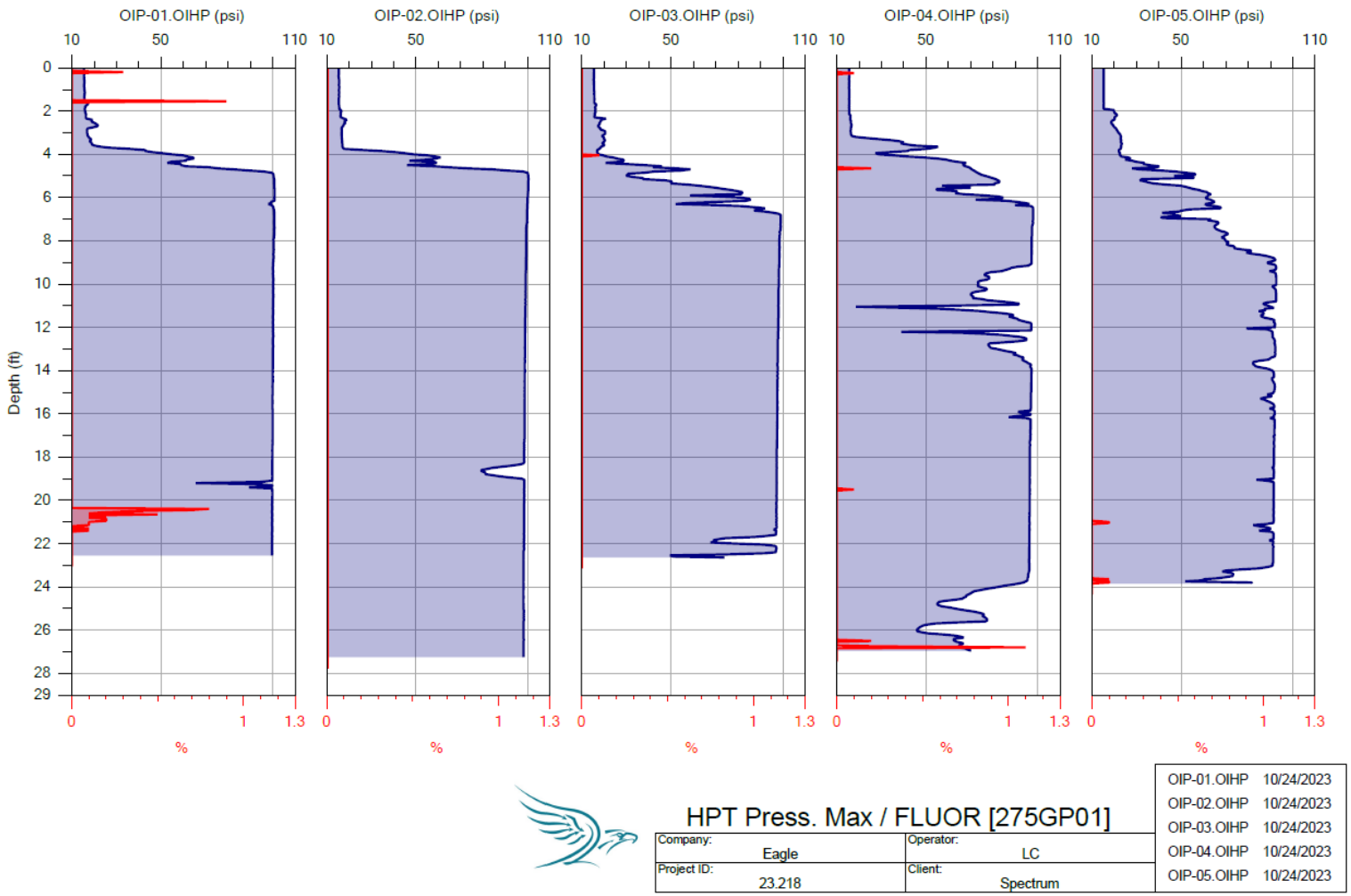
## Example Log (for reference)



# OIP OVERLAYS

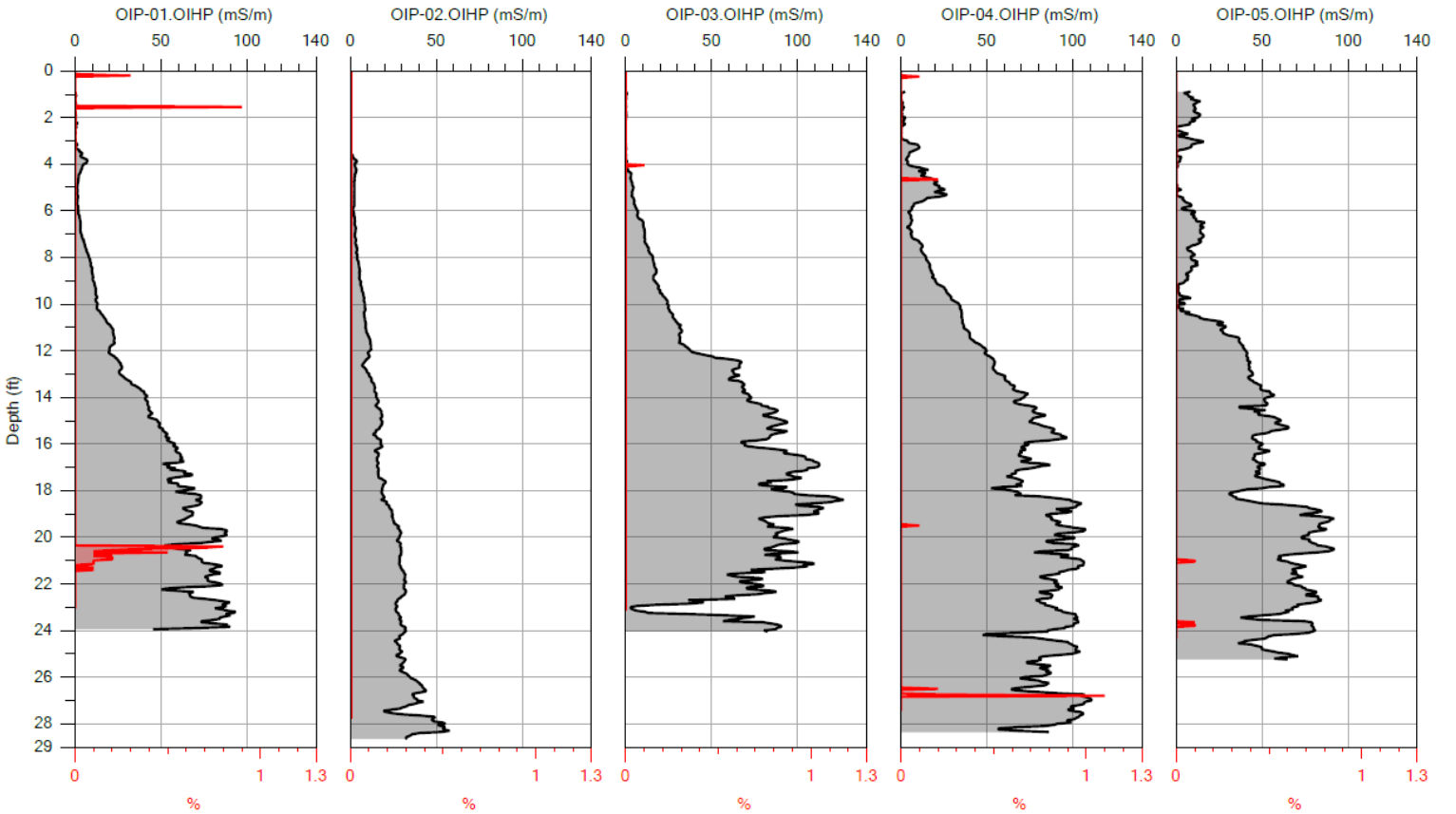
## Fluorescence (%) and HPT Pressure (psi)

(Pg 1 of 1)



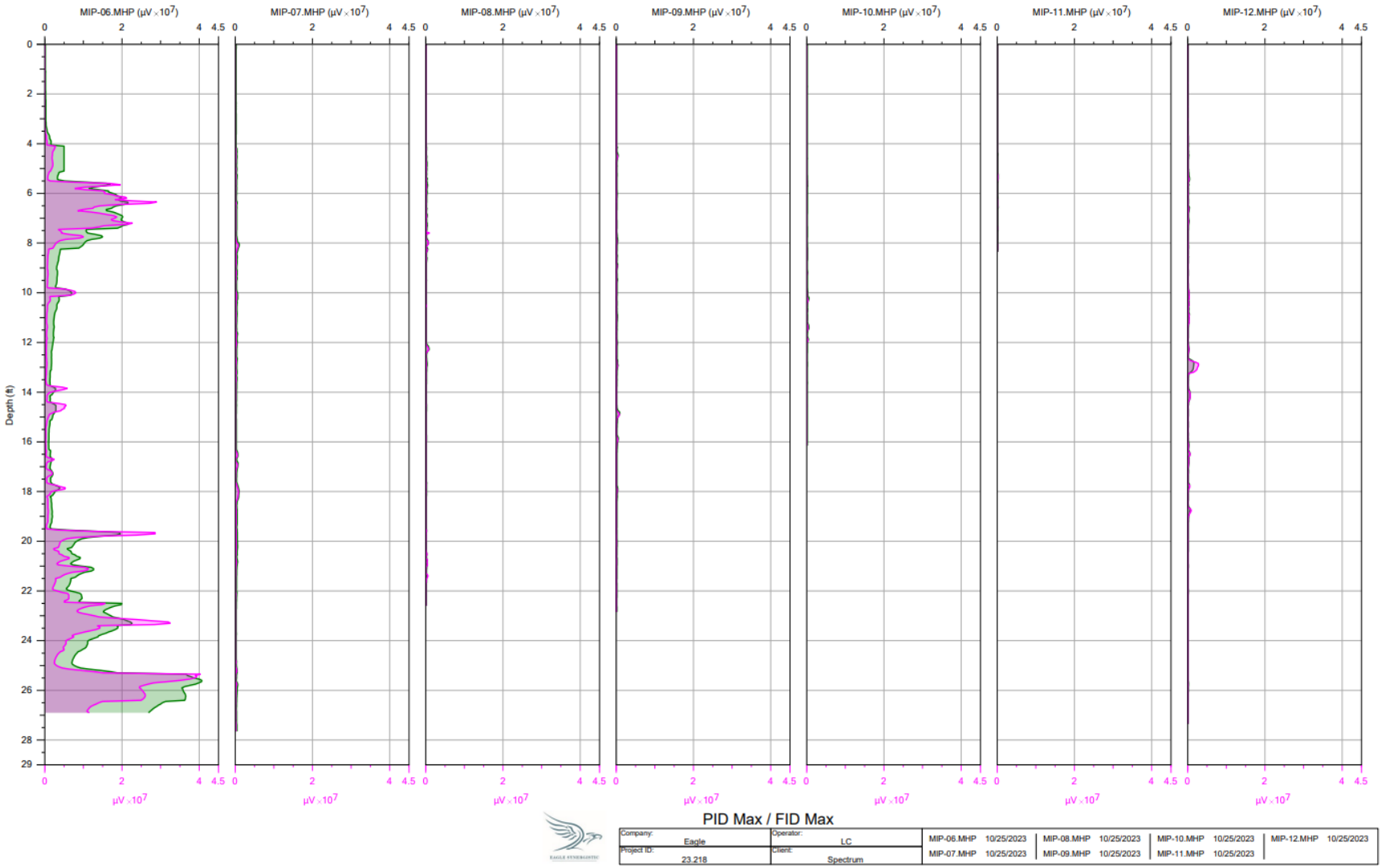
## Fluorescence (%) anD EC (mS/m)

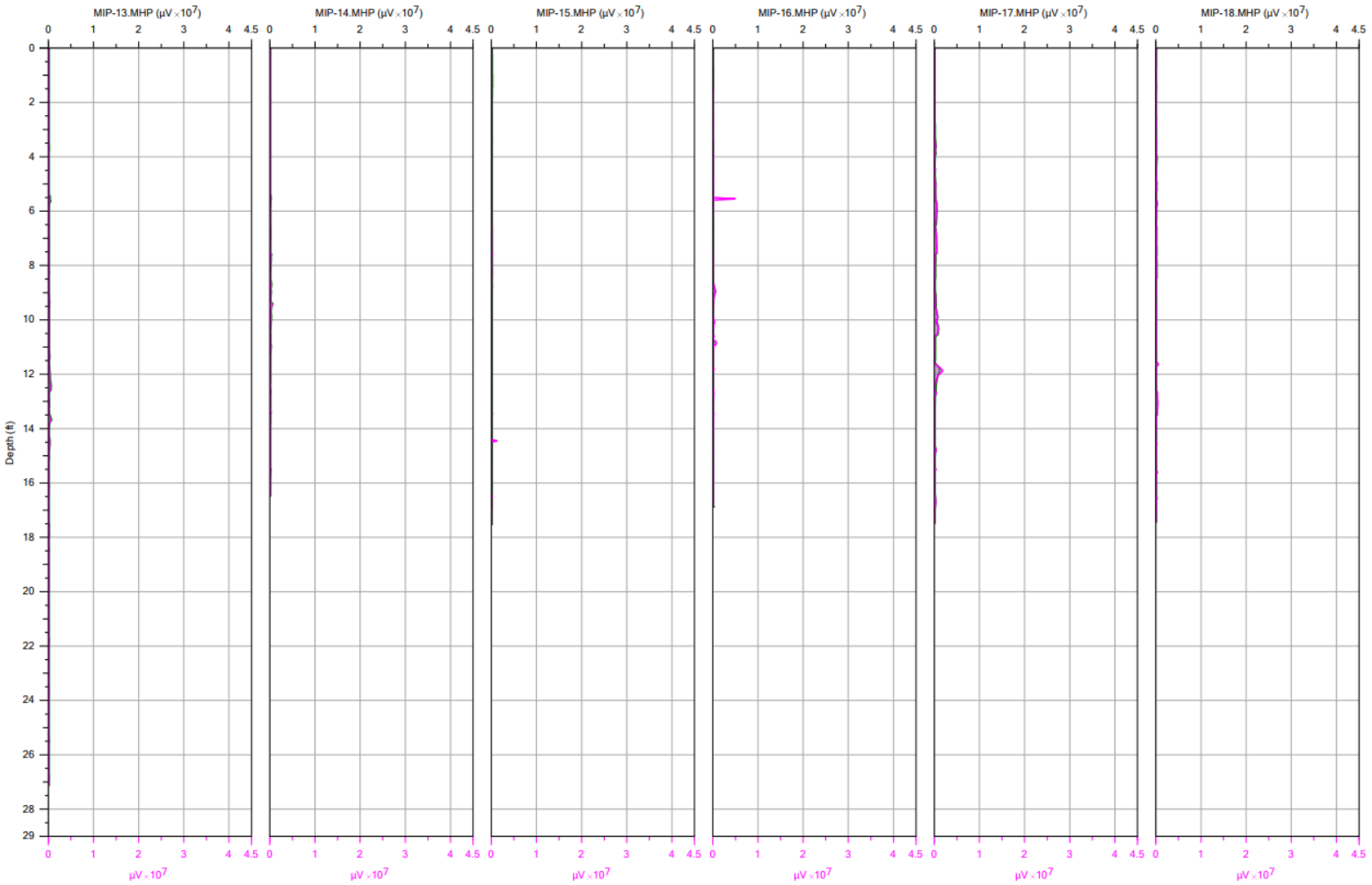
Pg (1 of 1)



# MIP Overlays
# PID (µV) AND XSD (µV) (COMMON SCALE)

(Pg 1 of 2)



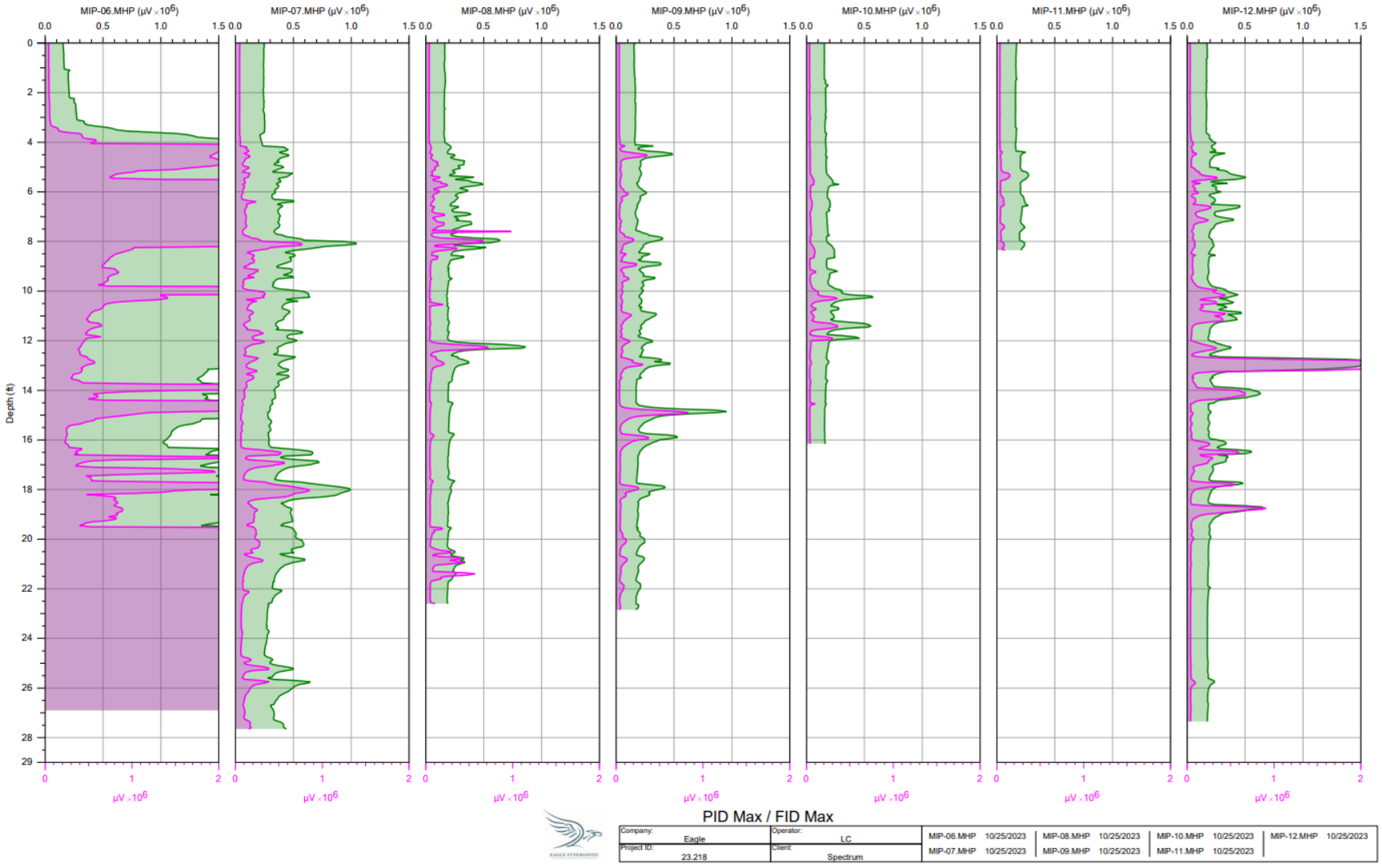


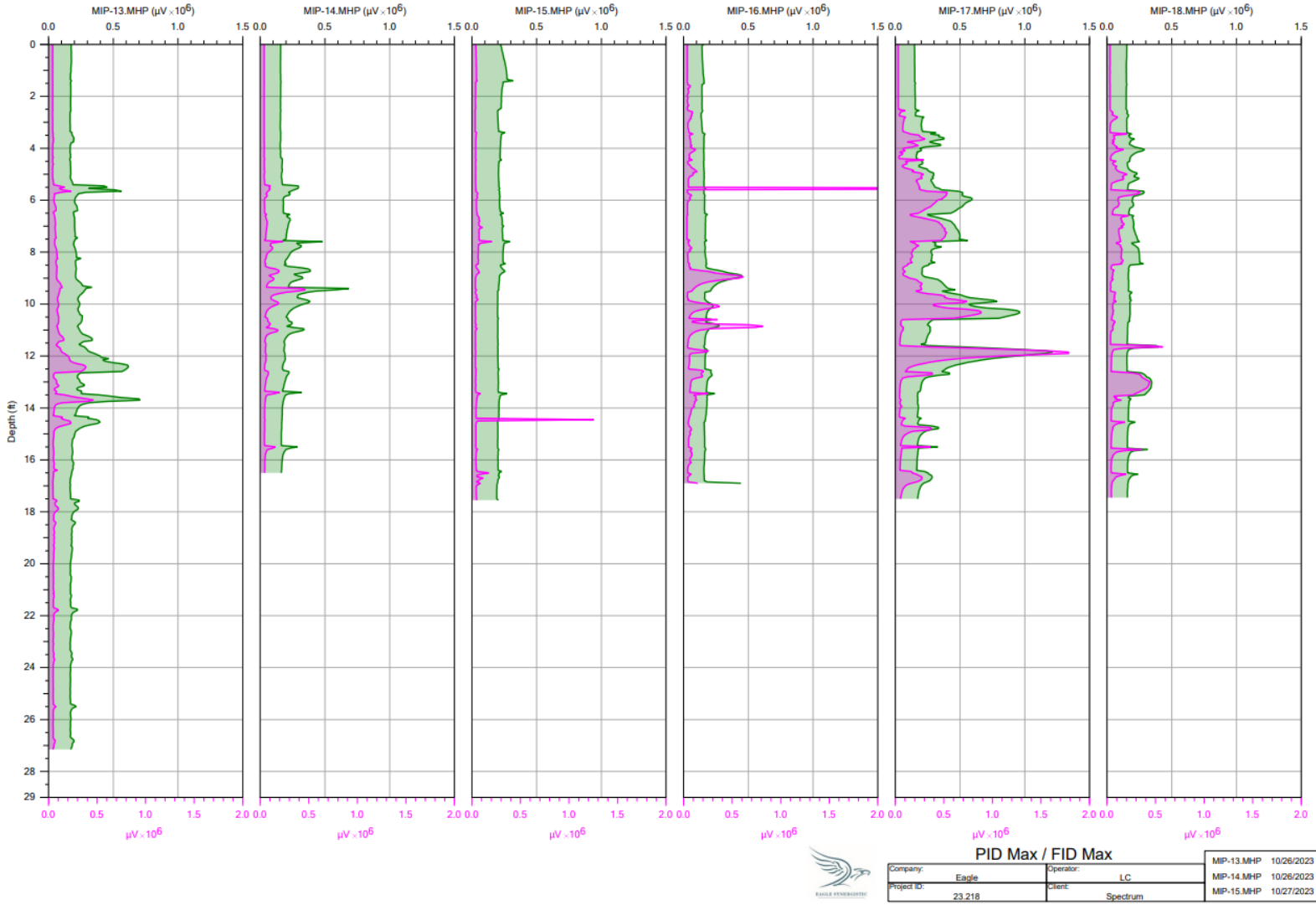

PID Max / FID Max

| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | MIP-13.MHP | 10/26/2023 |
| Project ID: 23.218 | Client: Spectrum | MIP-14.MHP | 10/26/2023 |
| | | MIP-15.MHP | 10/27/2023 |
| | | MIP-16.MHP | 10/27/2023 |
| | | MIP-17.MHP | 10/27/2023 |
| | | MIP-18.MHP | 10/27/2023 |

## PID (µV) and XSD (µV) (Zoomed scale)

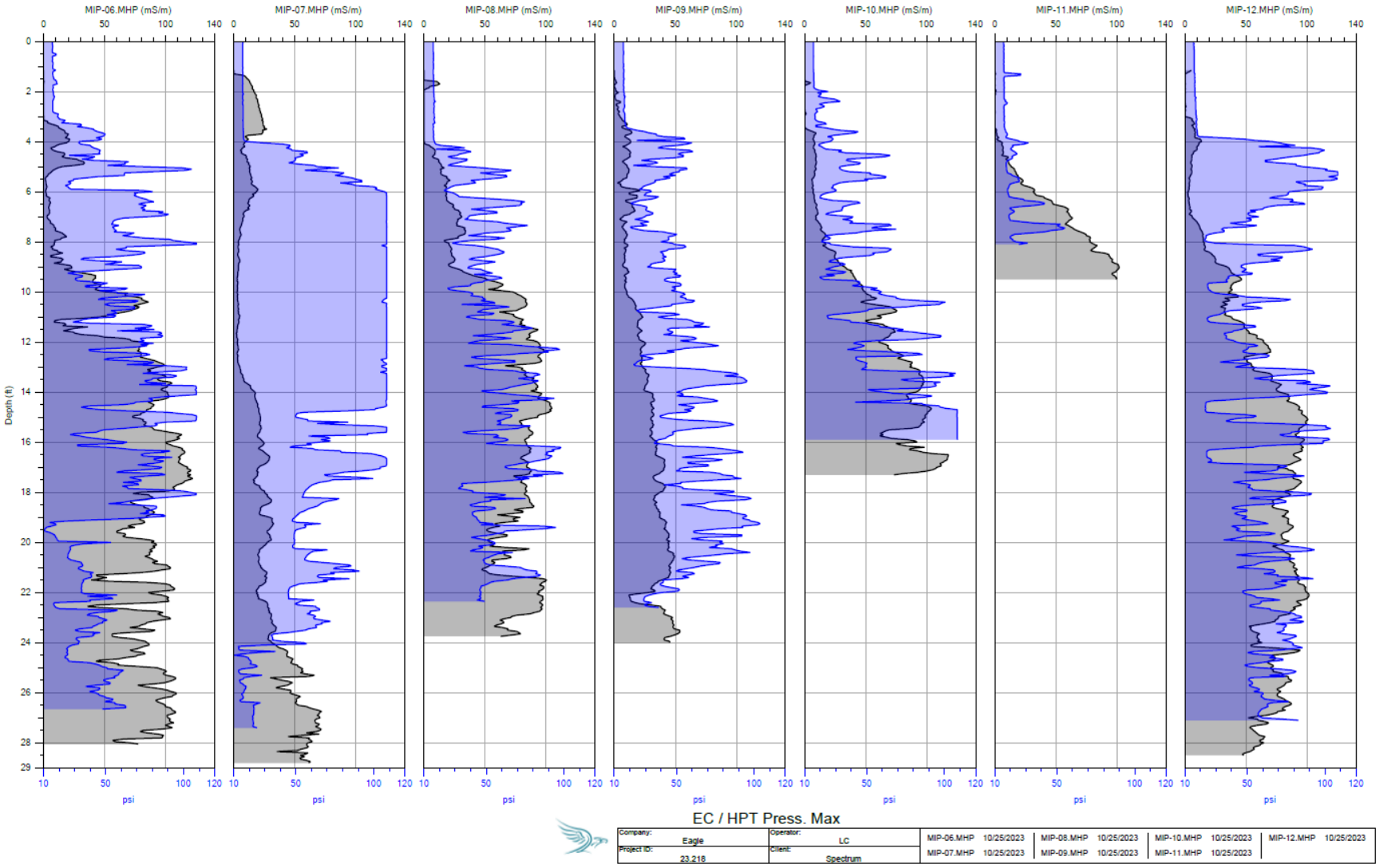
Pg (1 of 2)

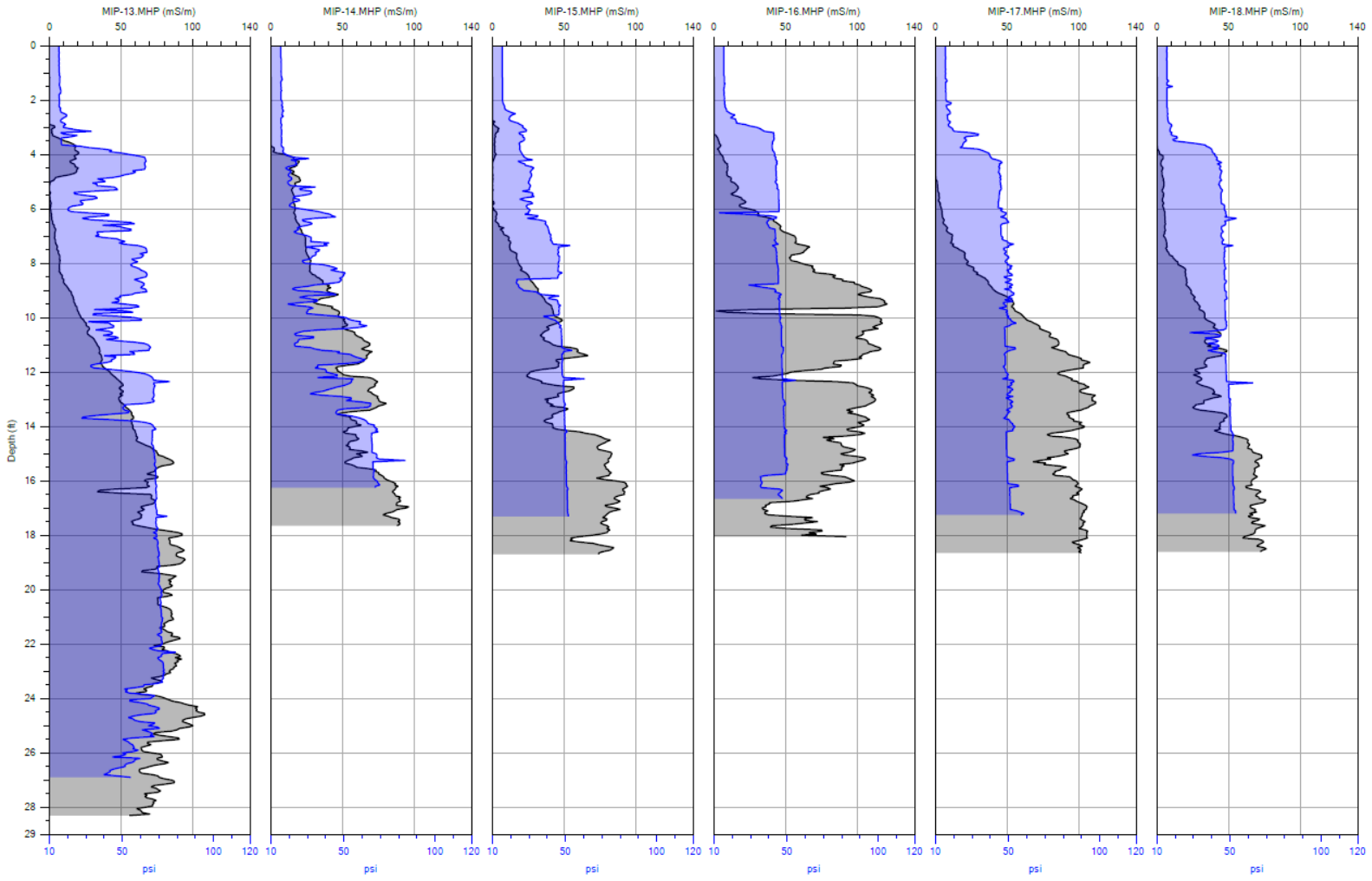



MIP-13.MHP (µV ×10^6)
MIP-14.MHP (µV ×10^6)
MIP-15.MHP (µV ×10^6)
MIP-16.MHP (µV ×10^6)
MIP-17.MHP (µV ×10^6)
MIP-18.MHP (µV ×10^6)
Depth (ft)
PID Max / FID Max
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
MIP-13.MHP 10/26/2023
MIP-14.MHP 10/26/2023
MIP-15.MHP 10/27/2023
MIP-16.MHP 10/27/2023
MIP-17.MHP 10/27/2023
MIP-18.MHP 10/27/2023

## EC (mS/m) and HPT Pressure (psi)

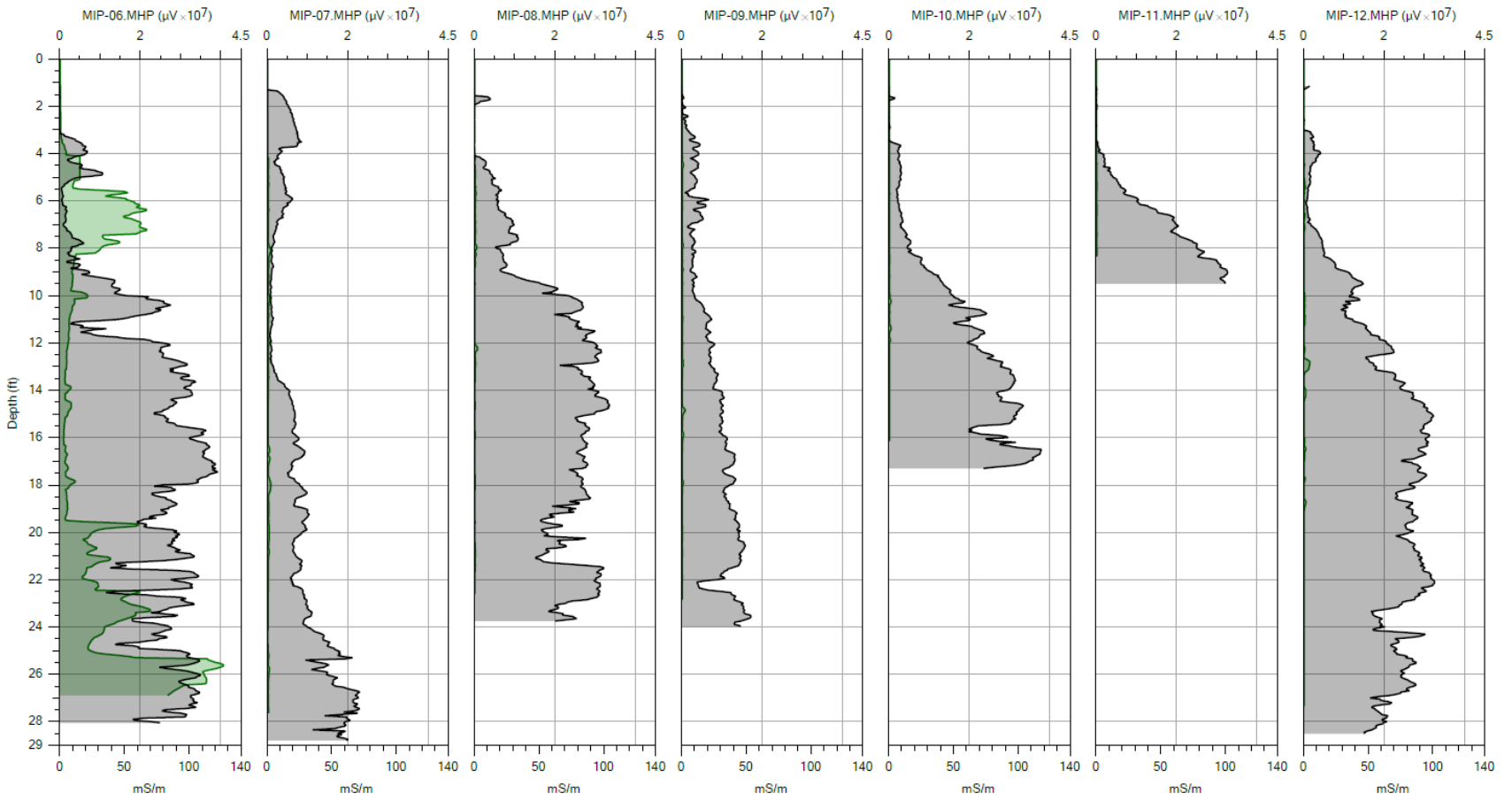
Pg (1 of 2)

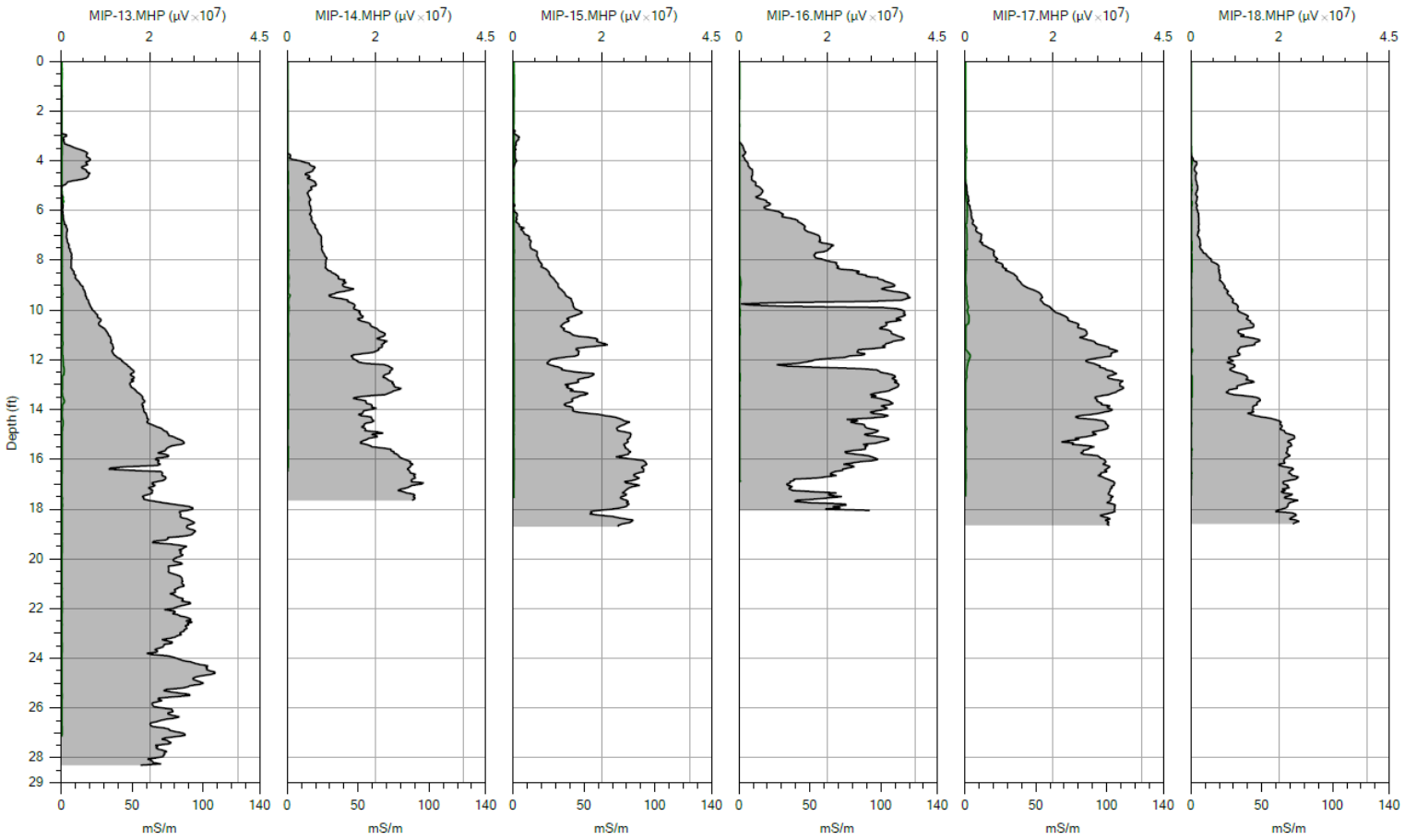



MIP-13.MHP (mS/m)
MIP-14.MHP (mS/m)
MIP-15.MHP (mS/m)
MIP-16.MHP (mS/m)
MIP-17.MHP (mS/m)
MIP-18.MHP (mS/m)
0 50 100 140
Depth (ft)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 29
10 50 100 120
psi
EC / HPT Press. Max
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
MIP-13.MHP 10/26/2023
MIP-14.MHP 10/26/2023
MIP-15.MHP 10/27/2023
MIP-16.MHP 10/27/2023
MIP-17.MHP 10/27/2023
MIP-18.MHP 10/27/2023

## PID (µV) and EC (mS/m)

Pg (1 of 2)





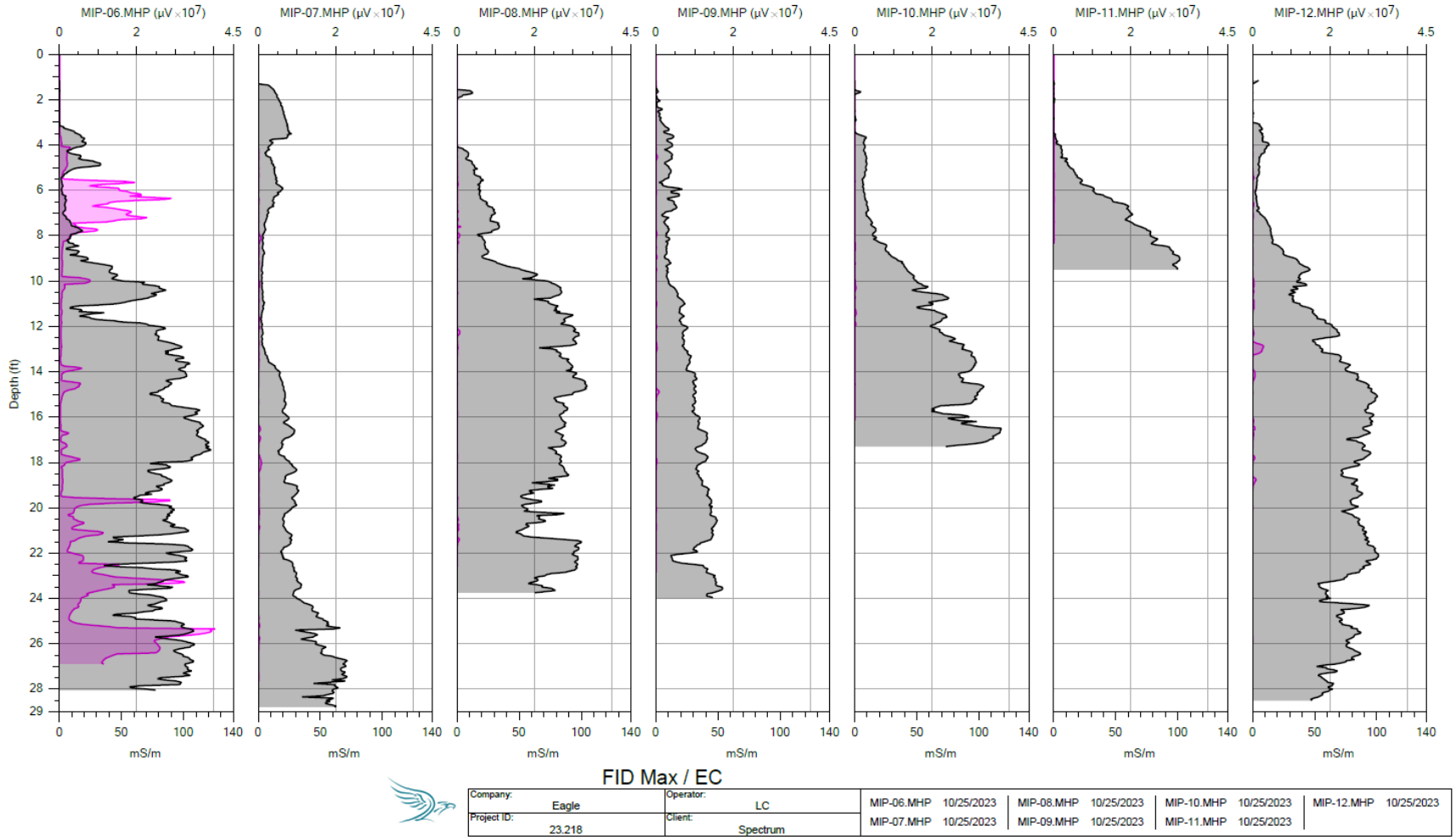

PID Max / EC

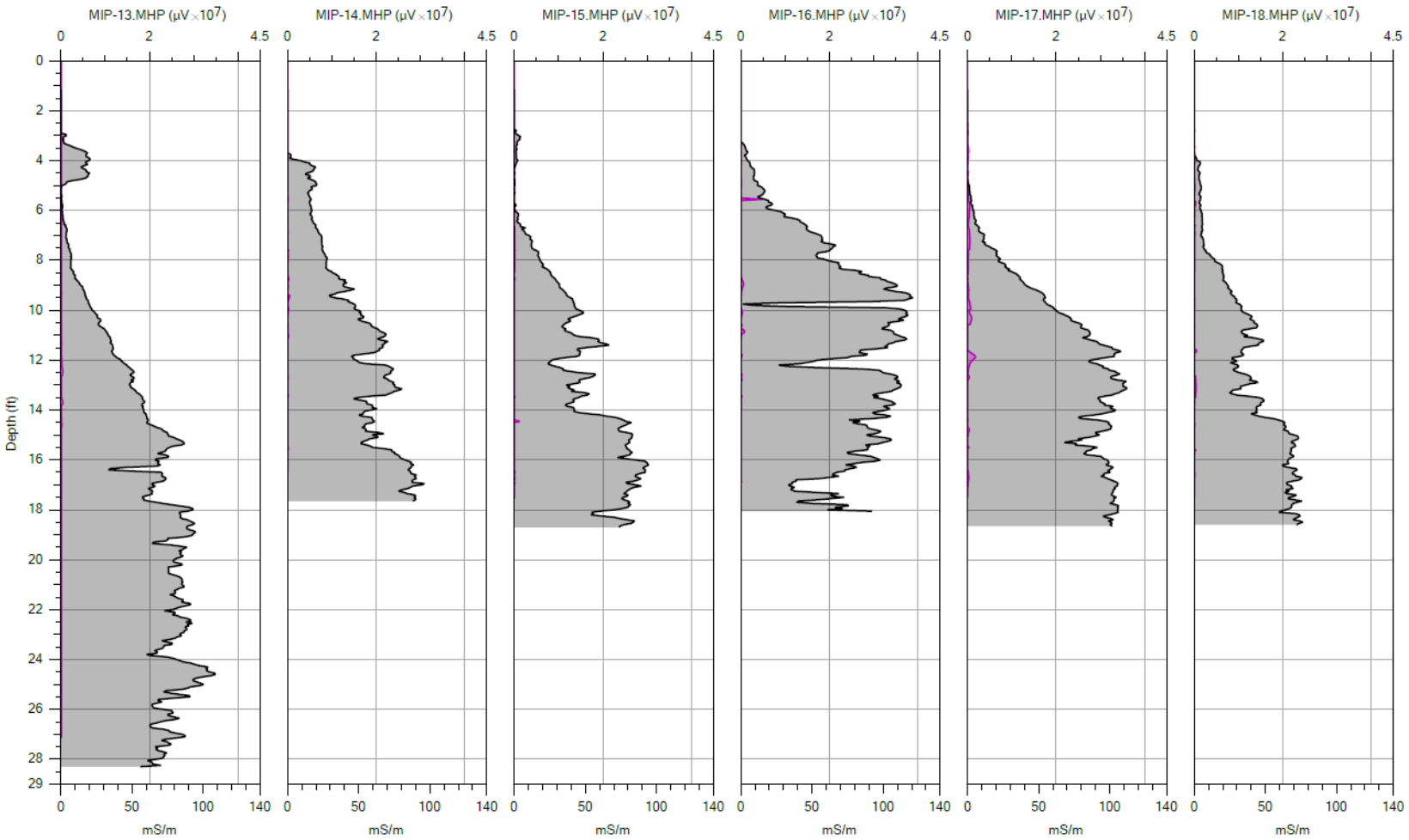
| | |
|---|---|
| Company: Eagle | Operator: LC |
| Project ID: 23.218 | Client: Spectrum |

| | | | |
|---|---|---|---|
| MIP-13.MHP | 10/26/2023 | MIP-16.MHP | 10/27/2023 |
| MIP-14.MHP | 10/26/2023 | MIP-17.MHP | 10/27/2023 |
| MIP-15.MHP | 10/27/2023 | MIP-18.MHP | 10/27/2023 |

## FID (µV) and EC (mS/m)

Pg (1 of 2)





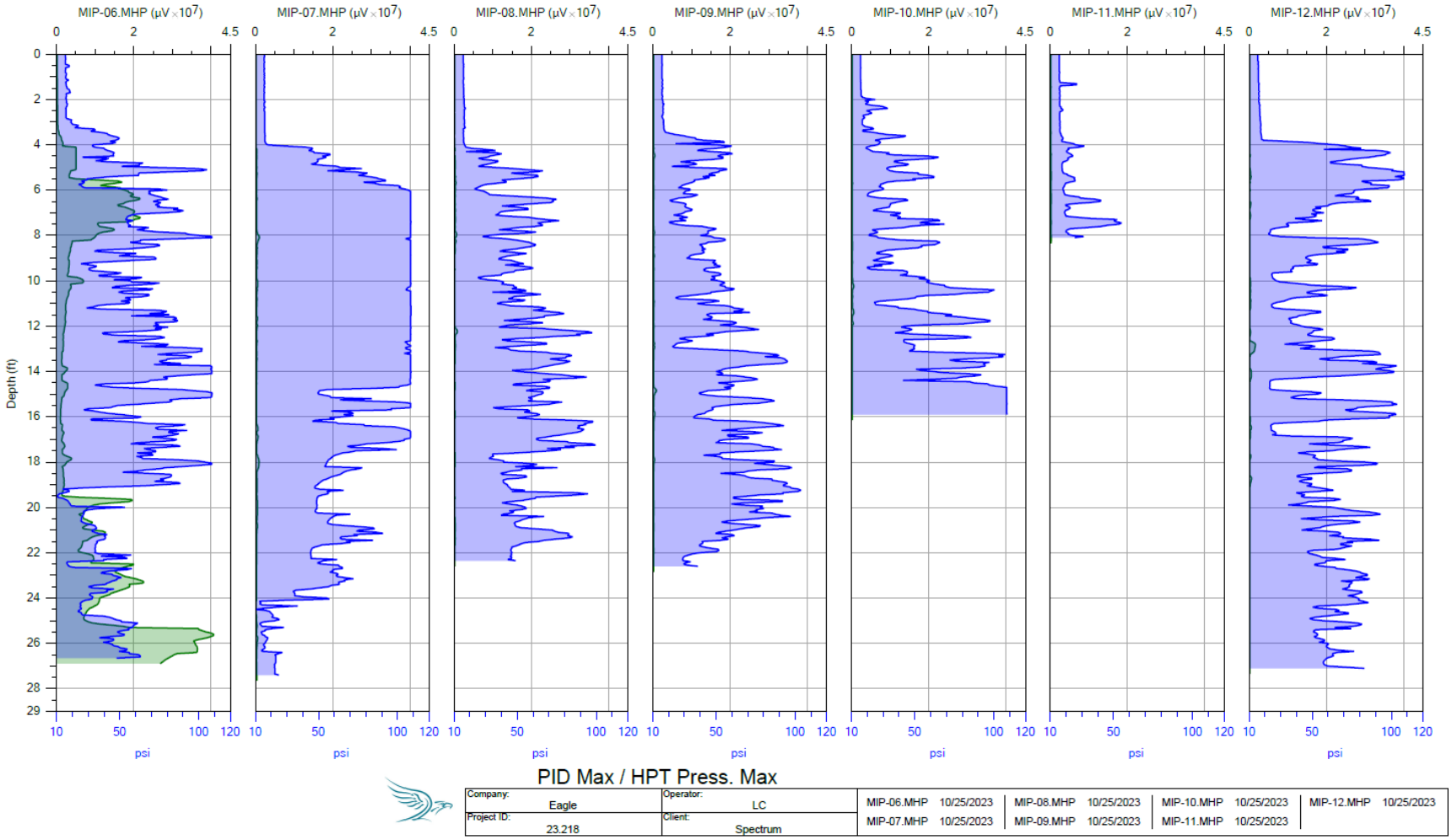

## FID Max / EC

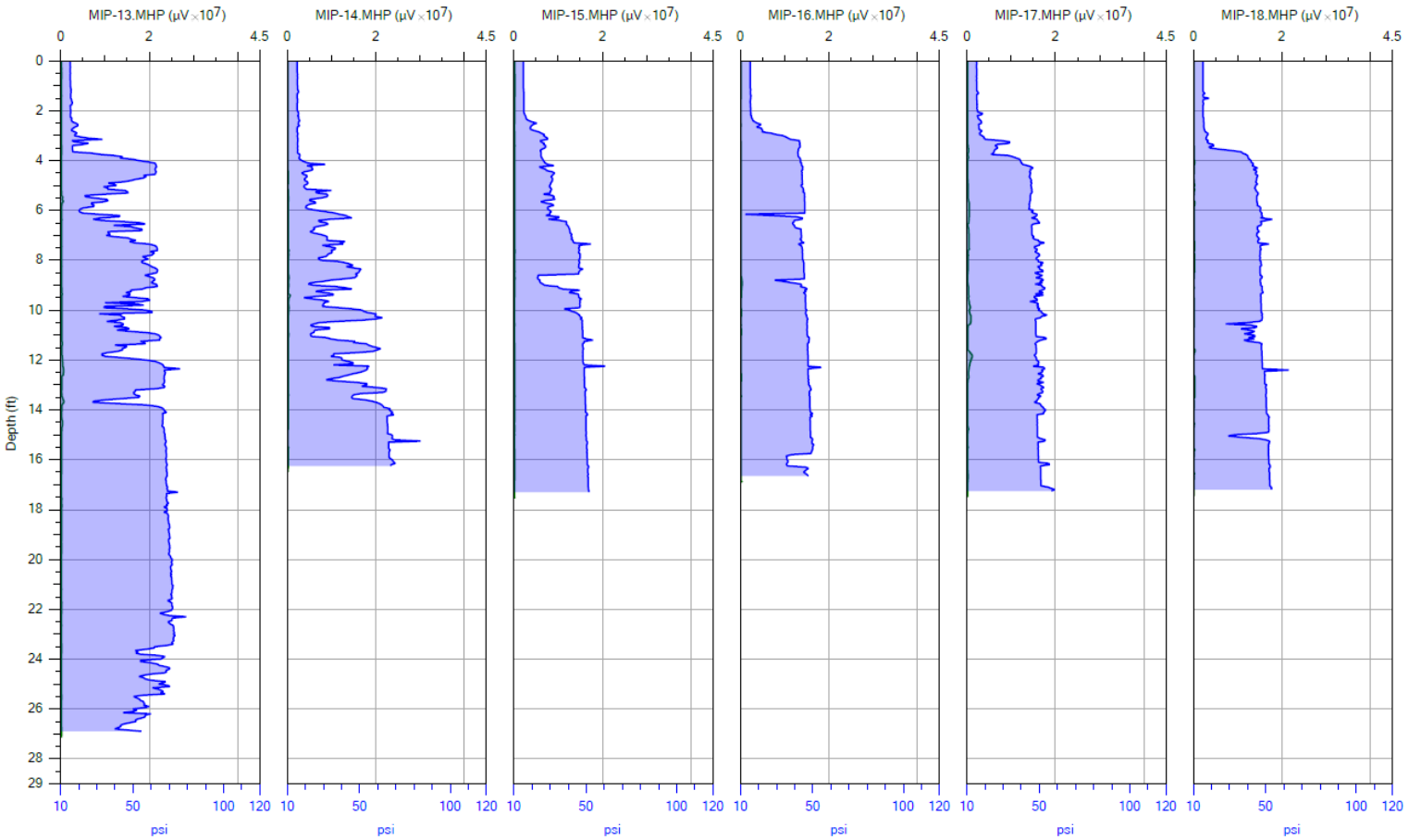
| | |
|---|---|
| Company: Eagle | Operator: LC |
| Project ID: 23.218 | Client: Spectrum |

| | | | |
|---|---|---|---|
| MIP-13.MHP | 10/26/2023 | MIP-16.MHP | 10/27/2023 |
| MIP-14.MHP | 10/26/2023 | MIP-17.MHP | 10/27/2023 |
| MIP-15.MHP | 10/27/2023 | MIP-18.MHP | 10/27/2023 |

## PID (µV) and HPT Pressure (psi)

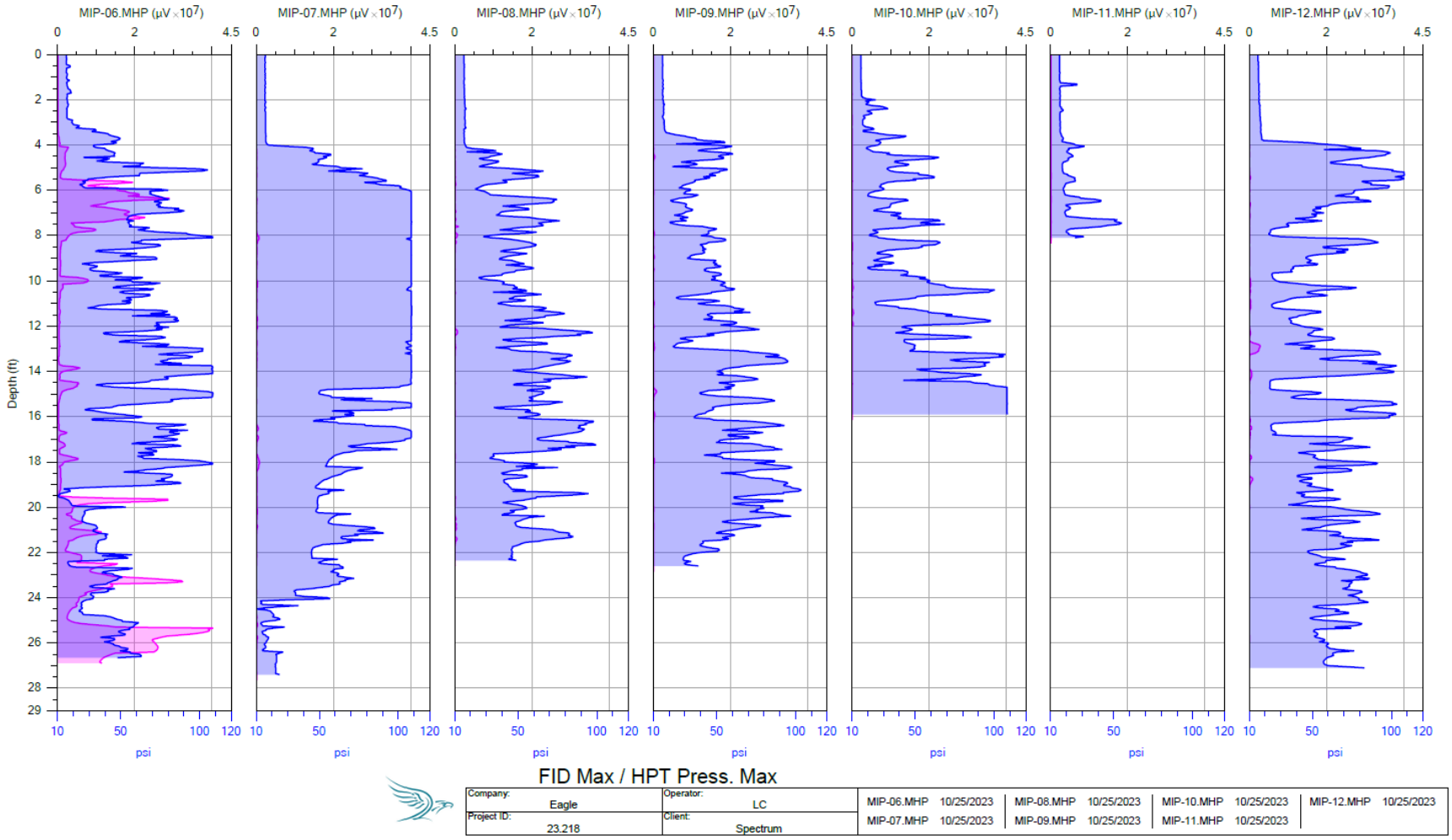
Pg (1 of 2)

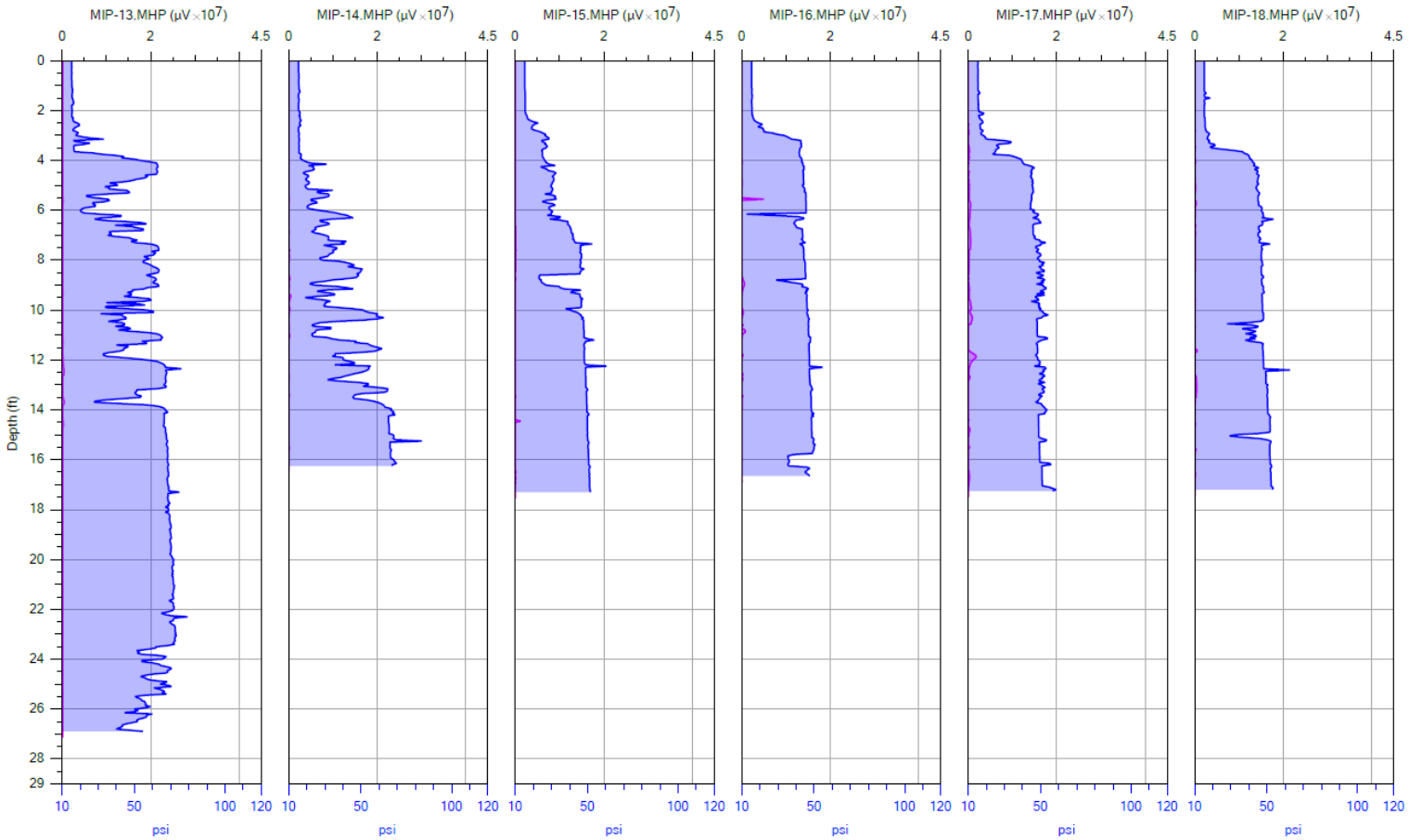



MIP-13.MHP (μV x 10^7)
MIP-14.MHP (μV x 10^7)
MIP-15.MHP (μV x 10^7)
MIP-16.MHP (μV x 10^7)
MIP-17.MHP (μV x 10^7)
MIP-18.MHP (μV x 10^7)
Depth (ft)
psi
PID Max / HPT Press. Max
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
MIP-13.MHP 10/26/2023
MIP-14.MHP 10/26/2023
MIP-15.MHP 10/27/2023
MIP-16.MHP 10/27/2023
MIP-17.MHP 10/27/2023
MIP-18.MHP 10/27/2023

## FID (µV) and HPT Pressure (psi)

Pg (1 of 2)



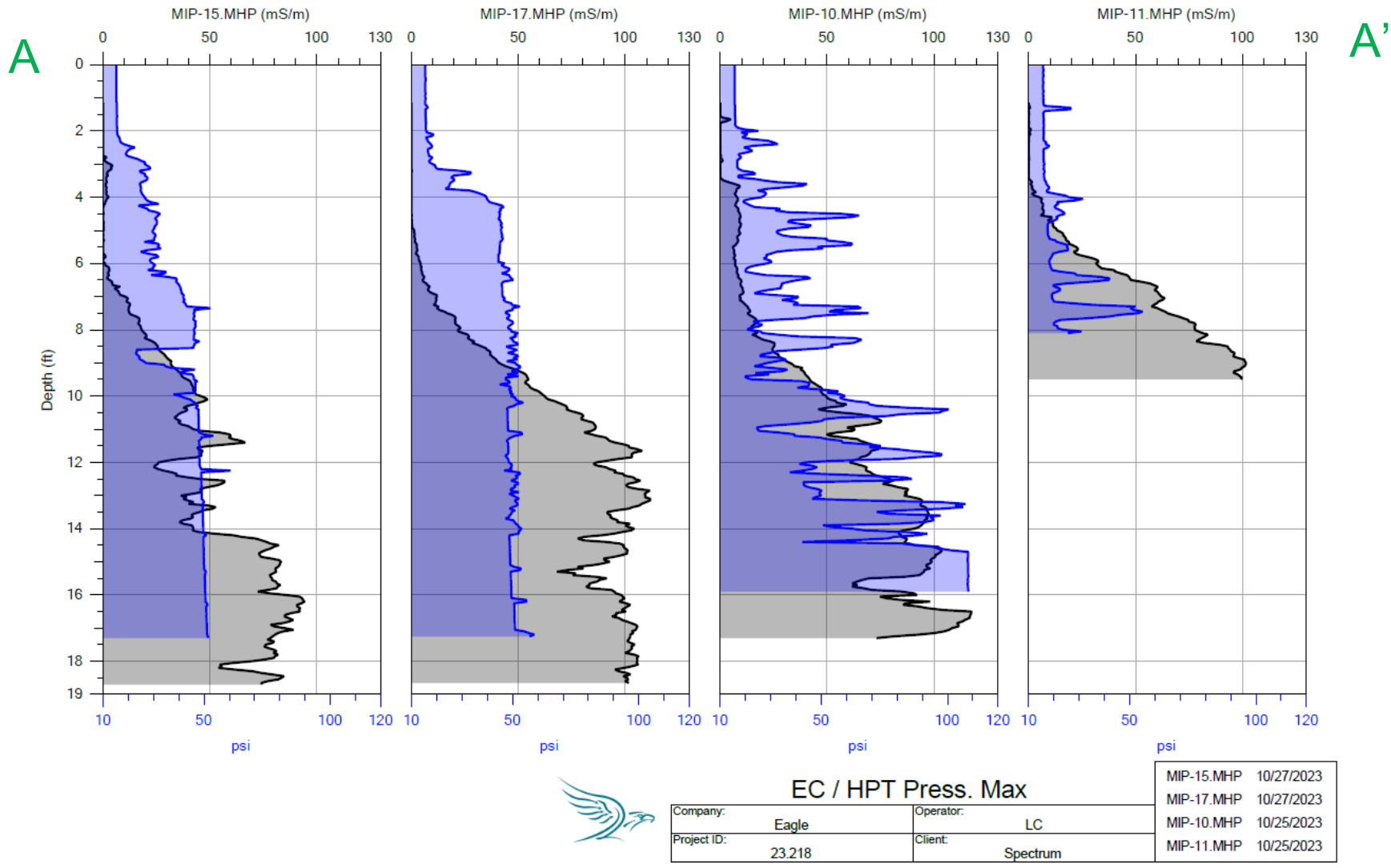

MIP-13.MHP (µV×10^7)
MIP-14.MHP (µV×10^7)
MIP-15.MHP (µV×10^7)
MIP-16.MHP (µV×10^7)
MIP-17.MHP (µV×10^7)
MIP-18.MHP (µV×10^7)
Depth (ft)
psi
FID Max / HPT Press. Max
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
MIP-13.MHP 10/26/2023
MIP-14.MHP 10/26/2023
MIP-15.MHP 10/27/2023
MIP-16.MHP 10/27/2023
MIP-17.MHP 10/27/2023
MIP-18.MHP 10/27/2023

## MIP CROSS SECTION MAP


(Boring locations are based on estimated field measurements and are subject to change pending collection of GPS locations)

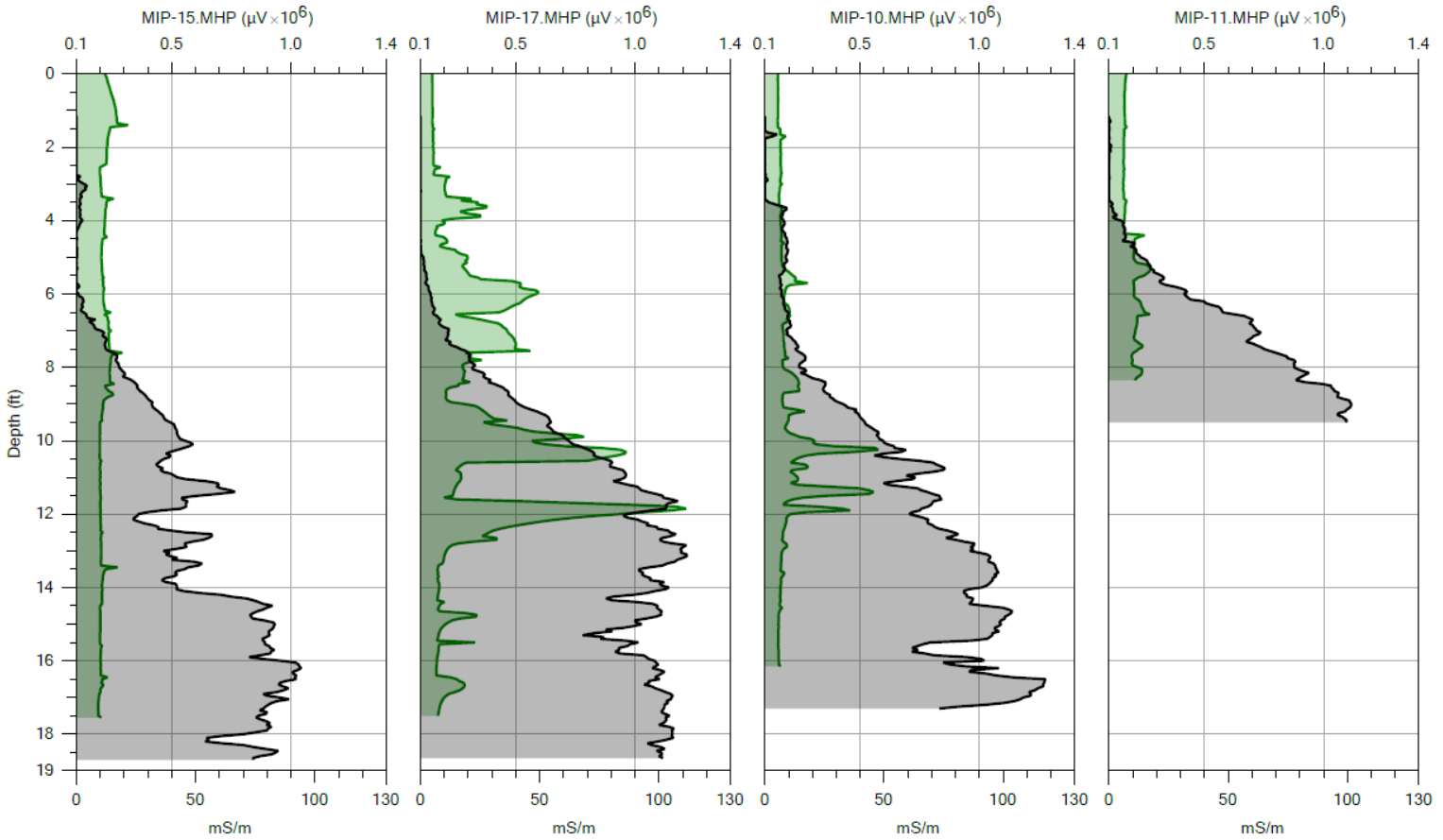
# MIP CROSS SECTIONS A-A’

## EC (mS/m) With HPT Pressure Max (psi)



## PID (µV) With EC (mS/m)

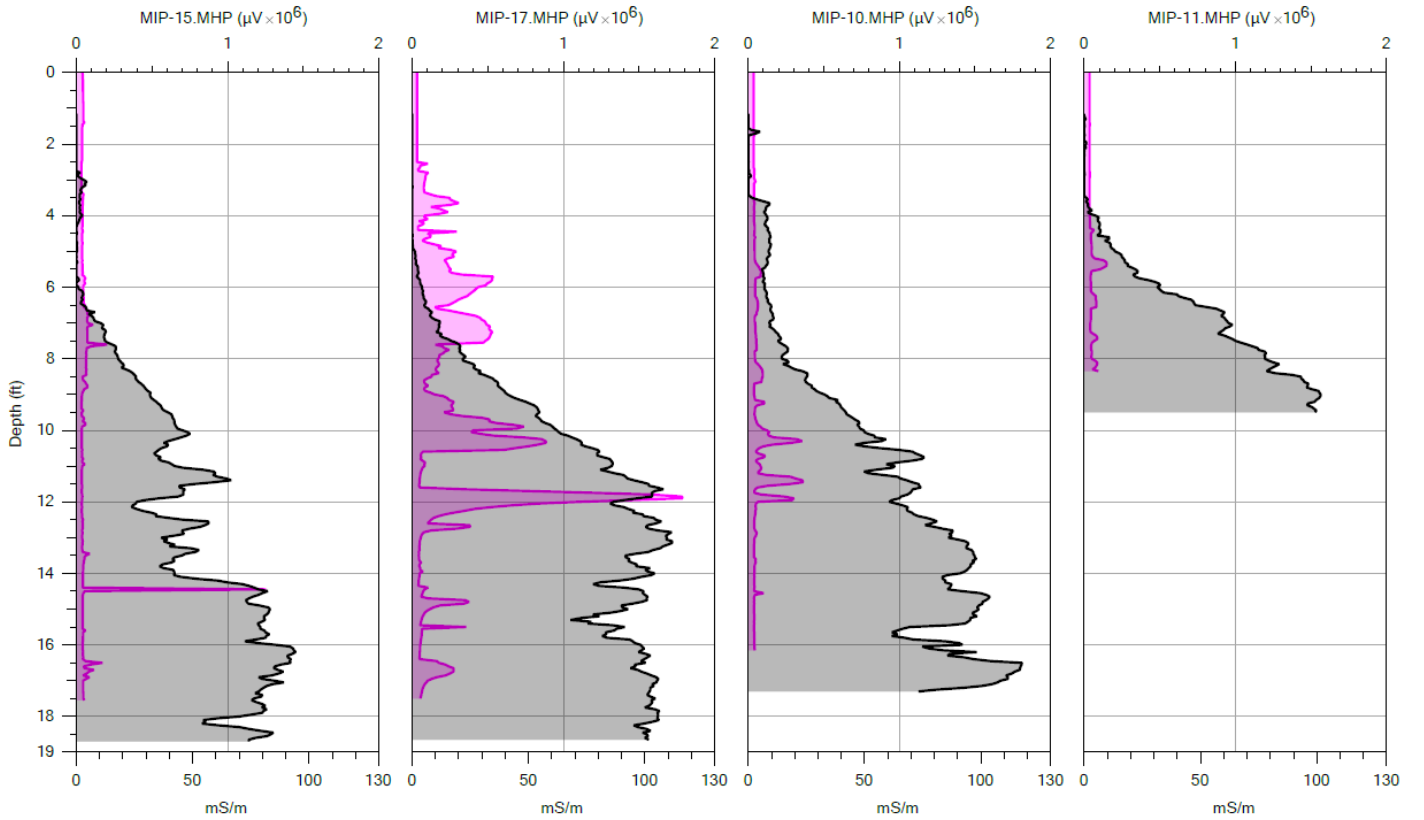
A




A’

## FID (µV) With EC (mS/m)

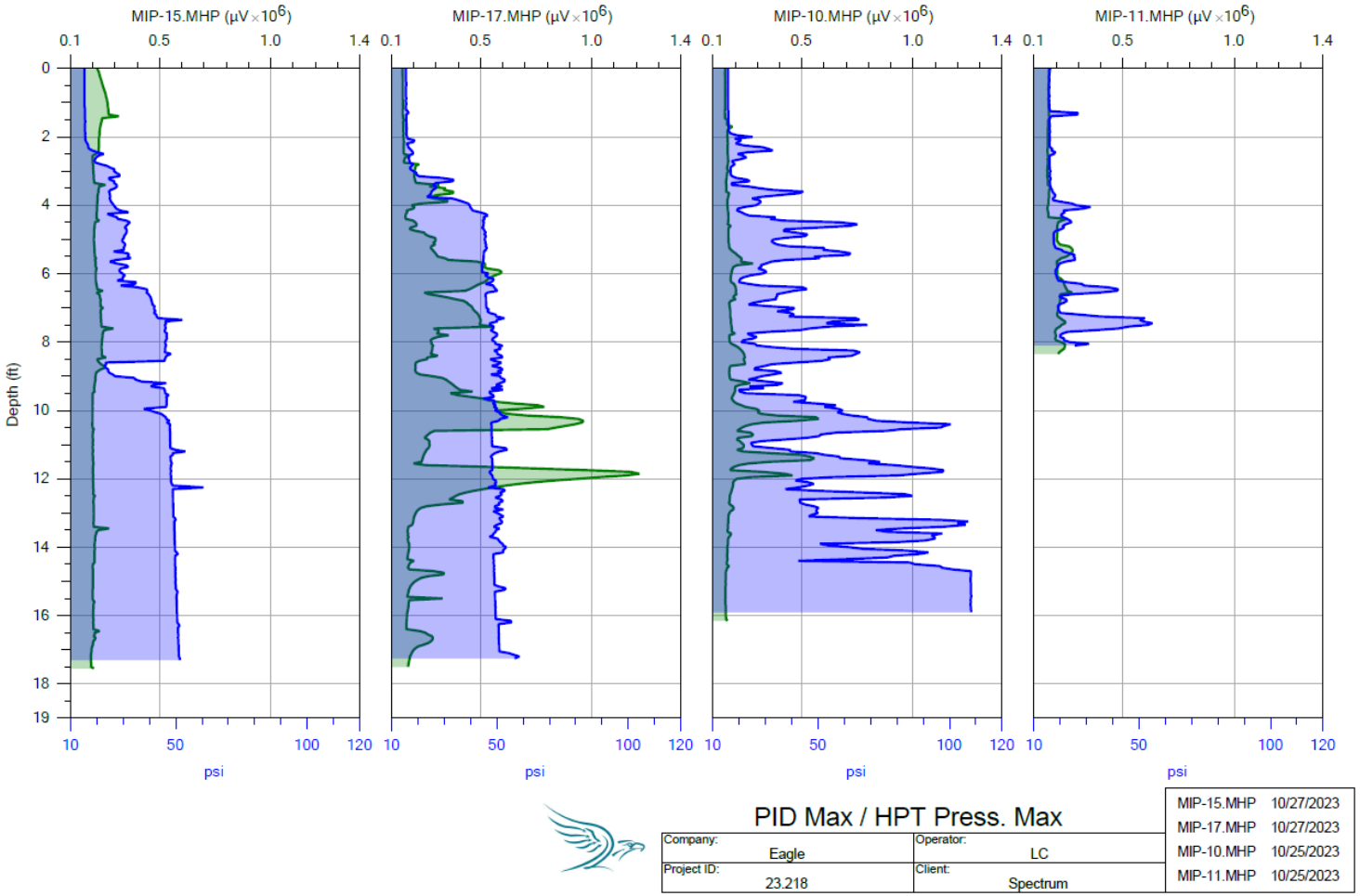
A




A’

## PID (µV) With HPT Pressure Max (psi)

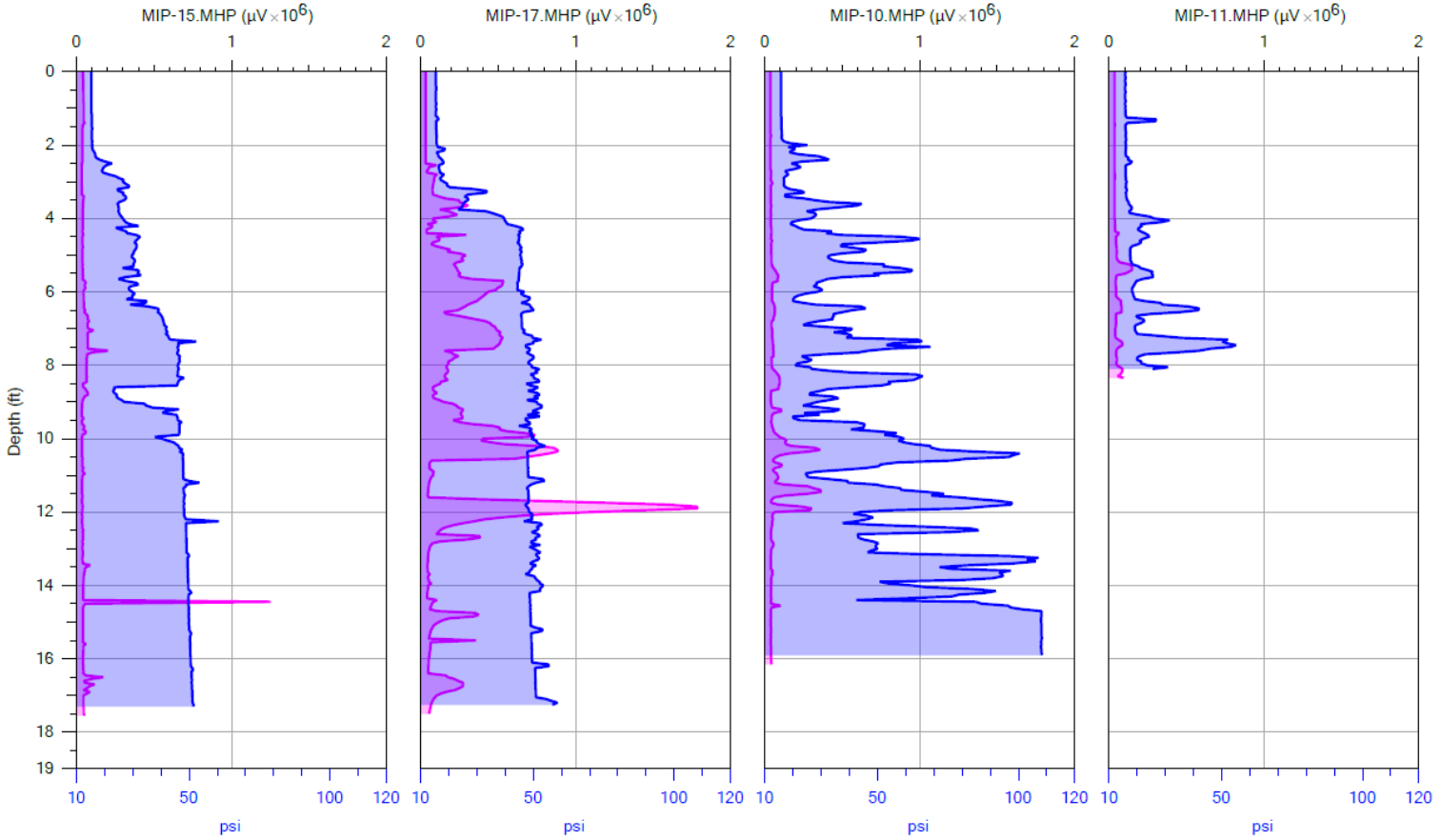
A




A’

## FID (µV) With HPT Pressure Max (psi)

A

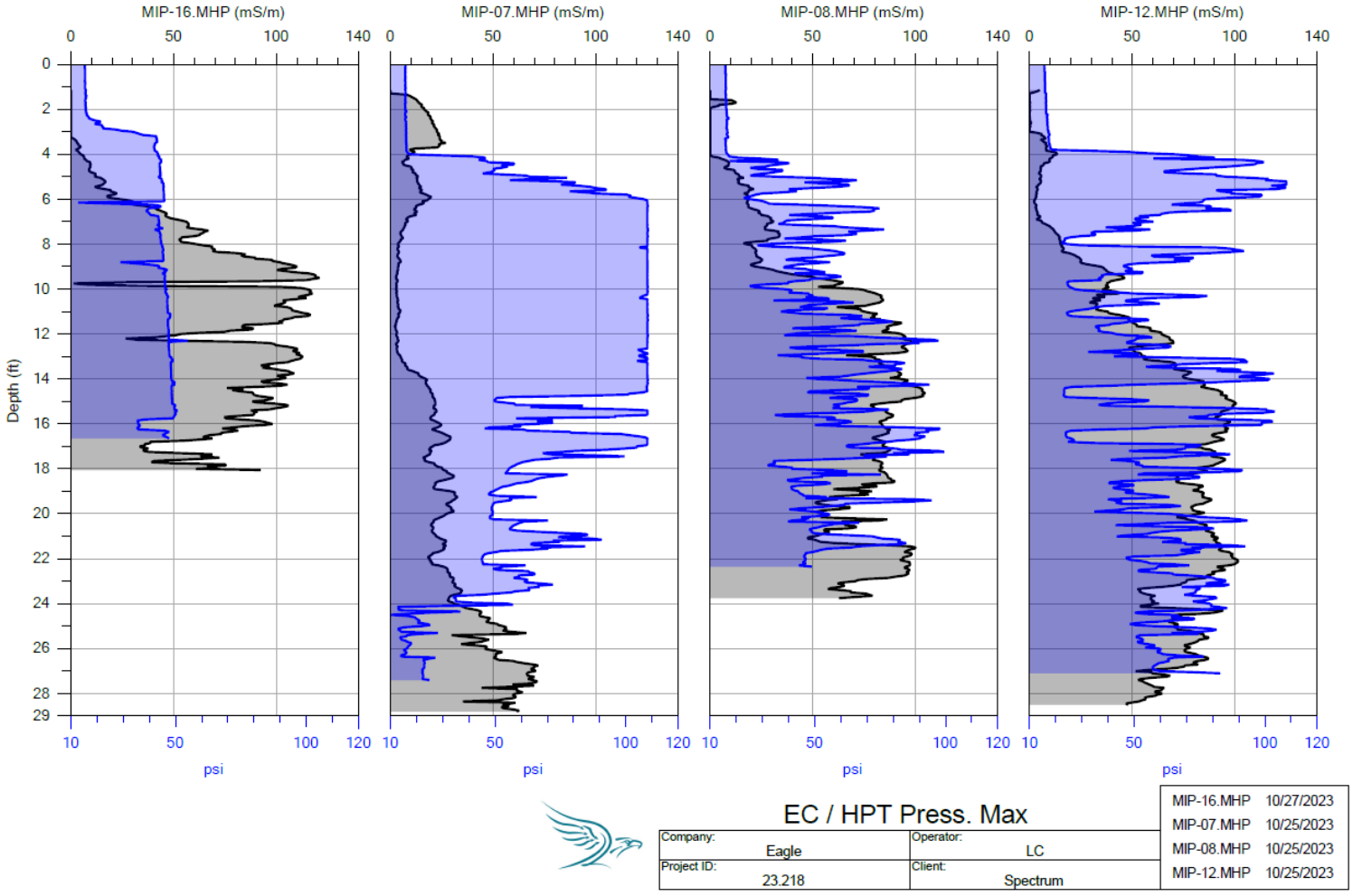



A’

# MIP CROSS SECTIONS B-B’

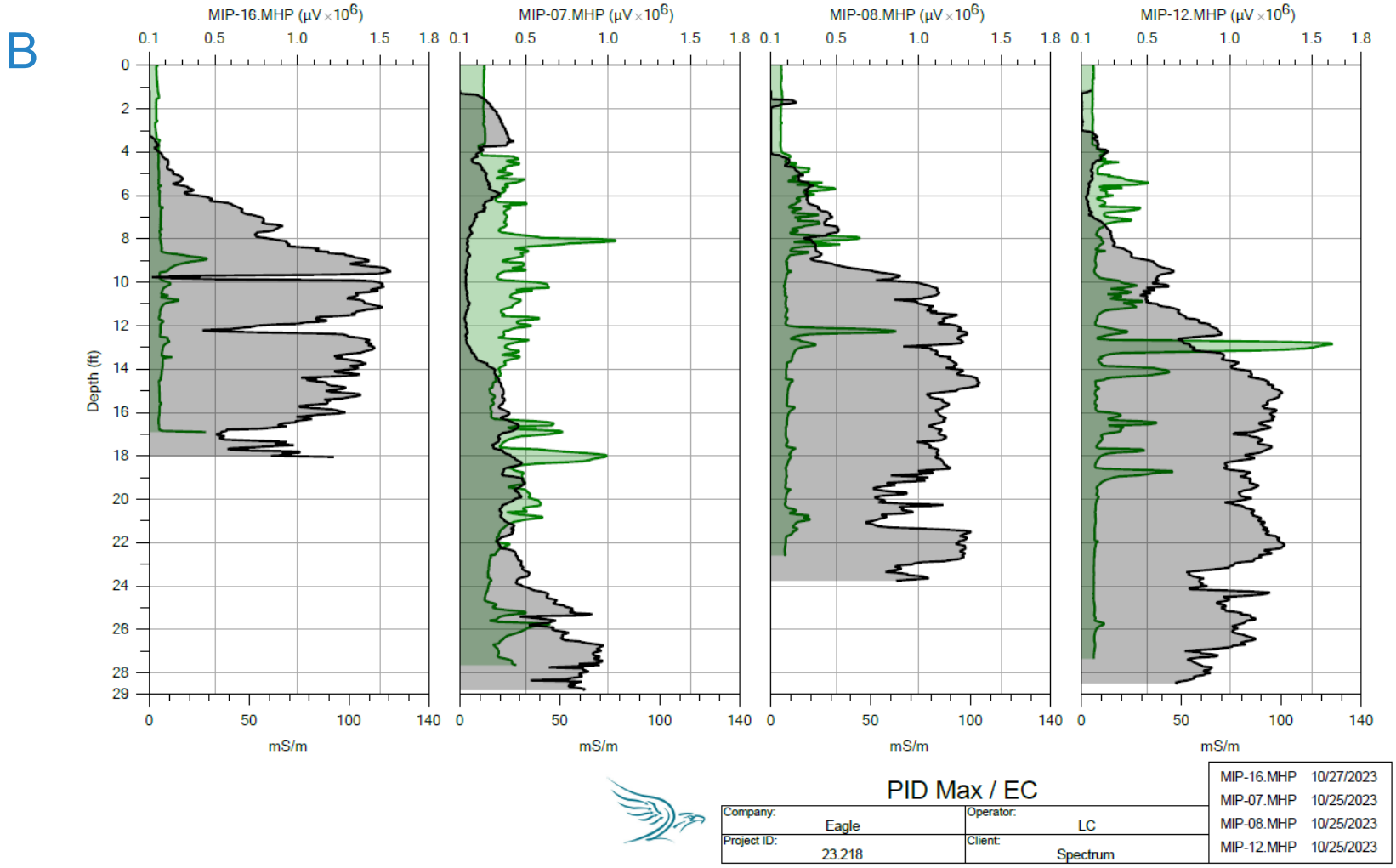
## EC (mS/m) With HPT Pressure Max (psi)

B



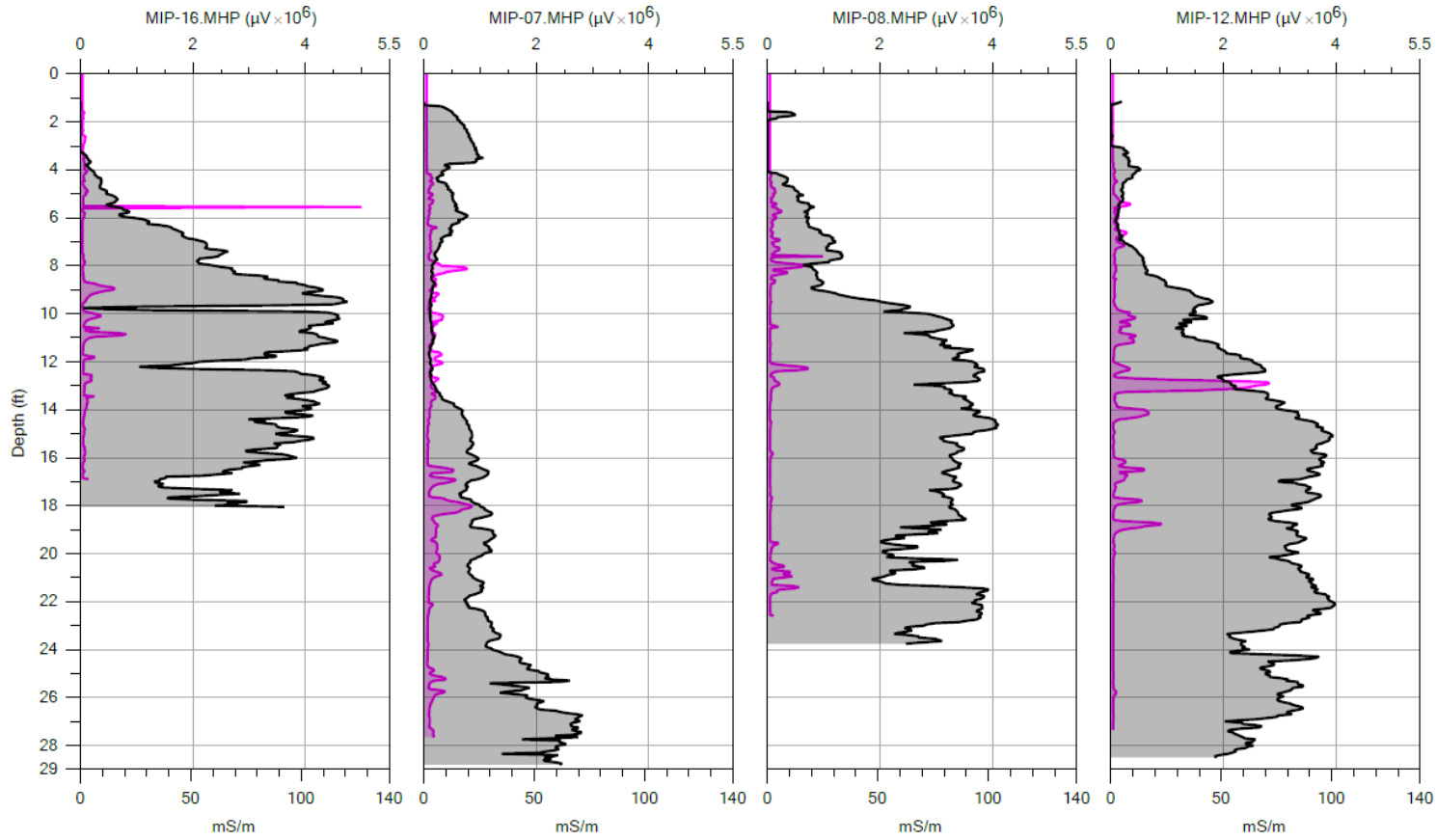

B’

## PID (µV) With EC (mS/m)



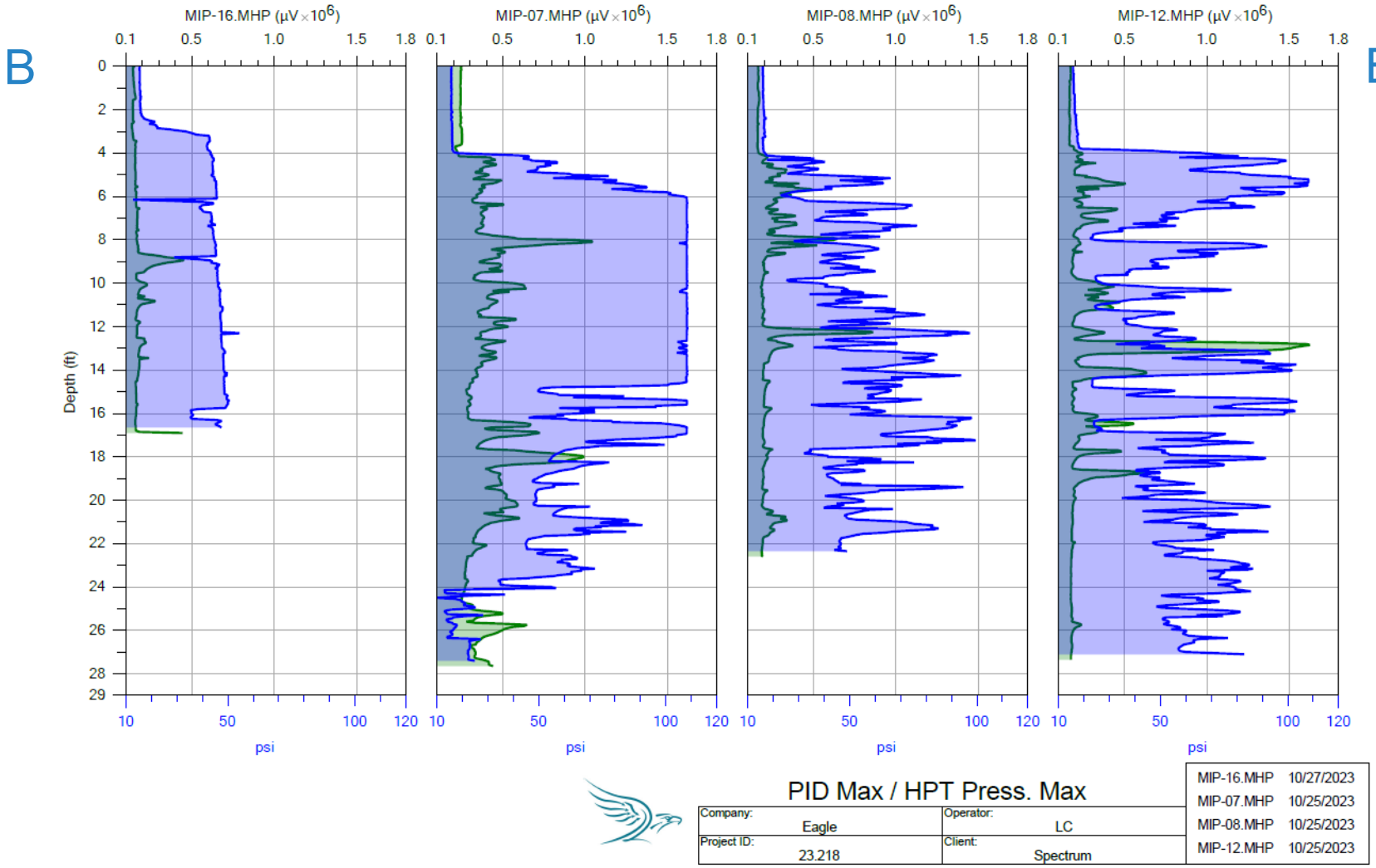
## FID (µV) With EC (mS/m)

B



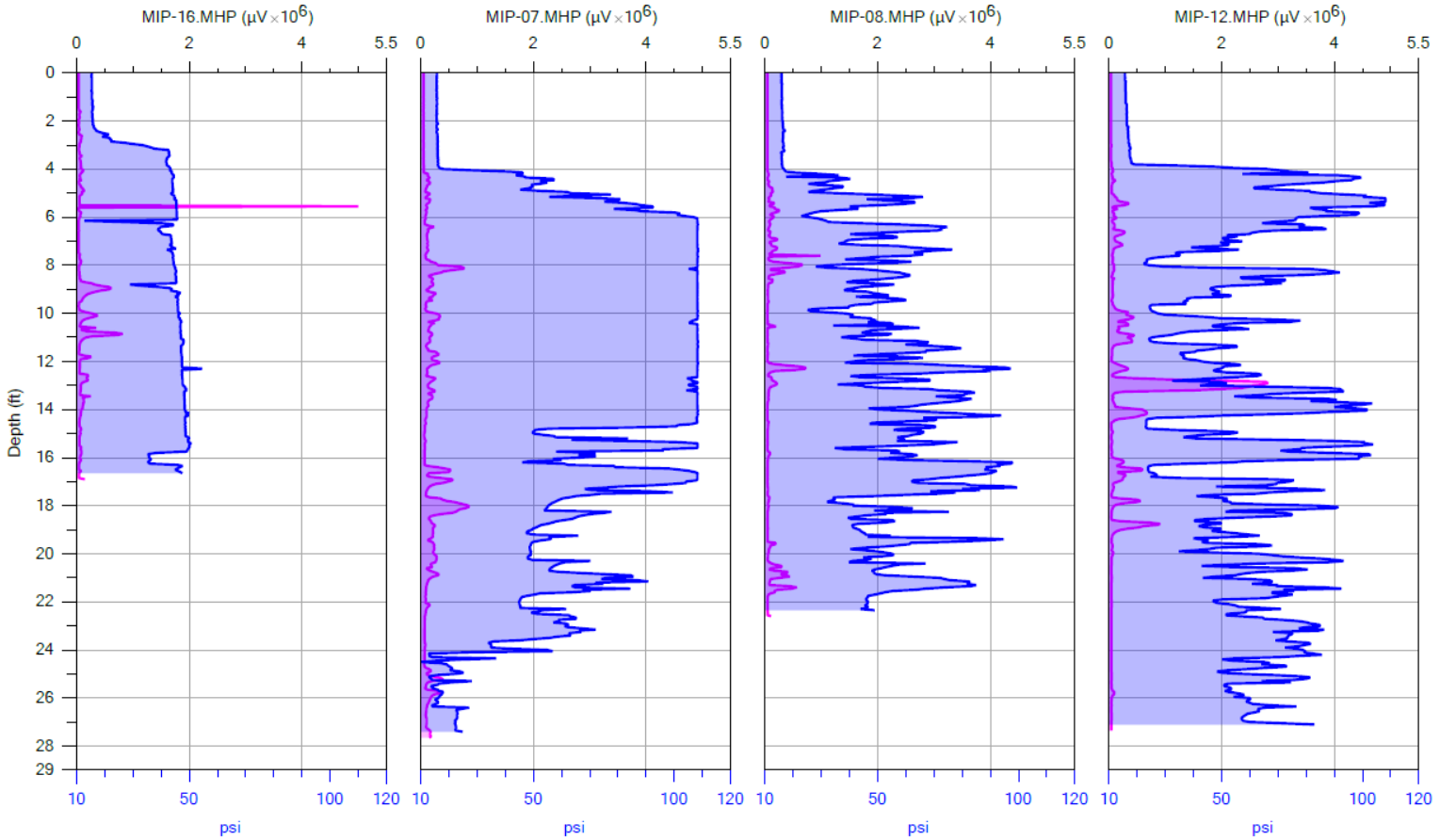

B’

## PID (µV) With HPT Pressure Max (psi)



## FID (µV) With HPT Pressure Max (psi)

B

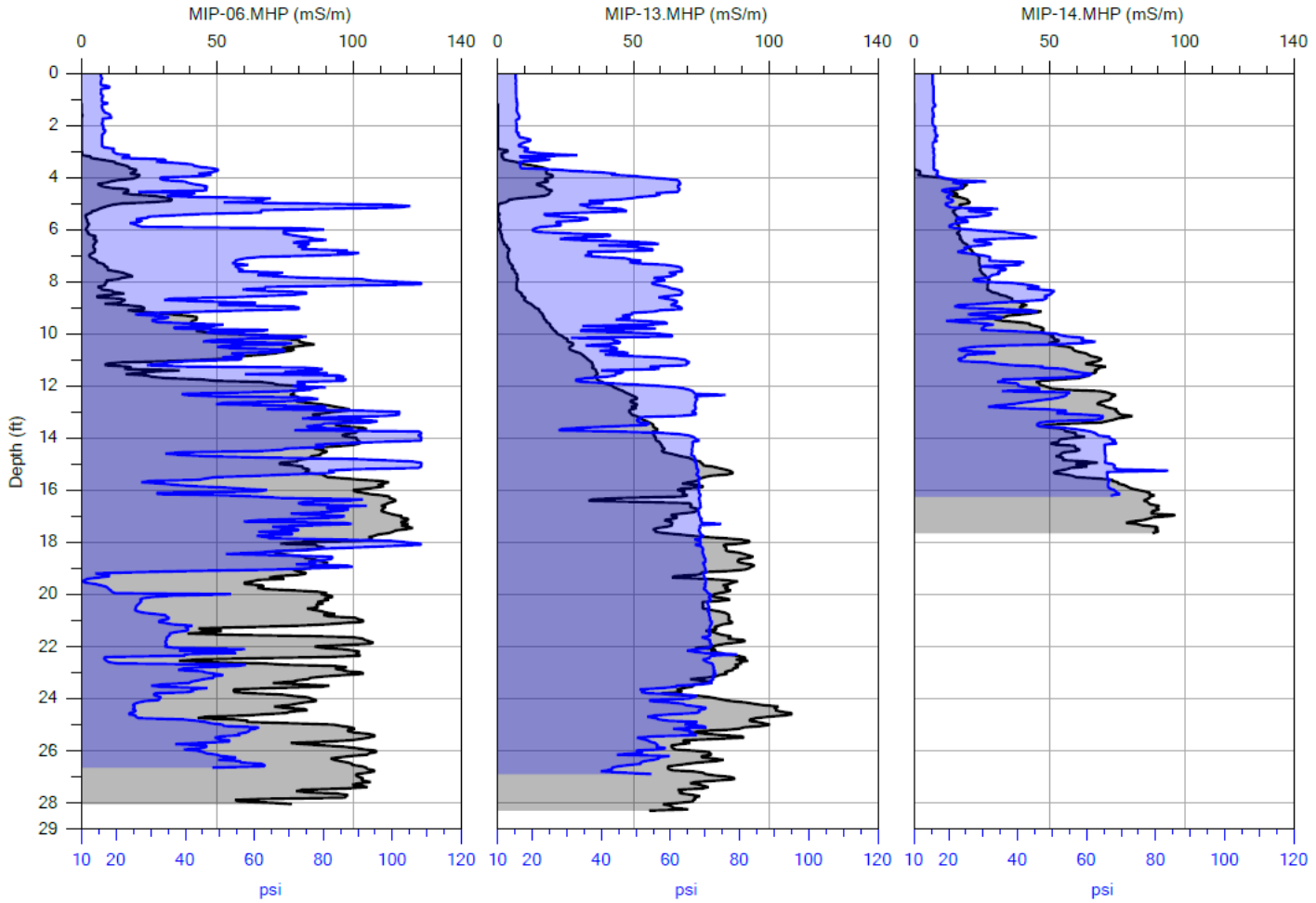



B’

# MIP CROSS SECTIONS C-C'

## EC (mS/m) With HPT Pressure Max (psi)

C



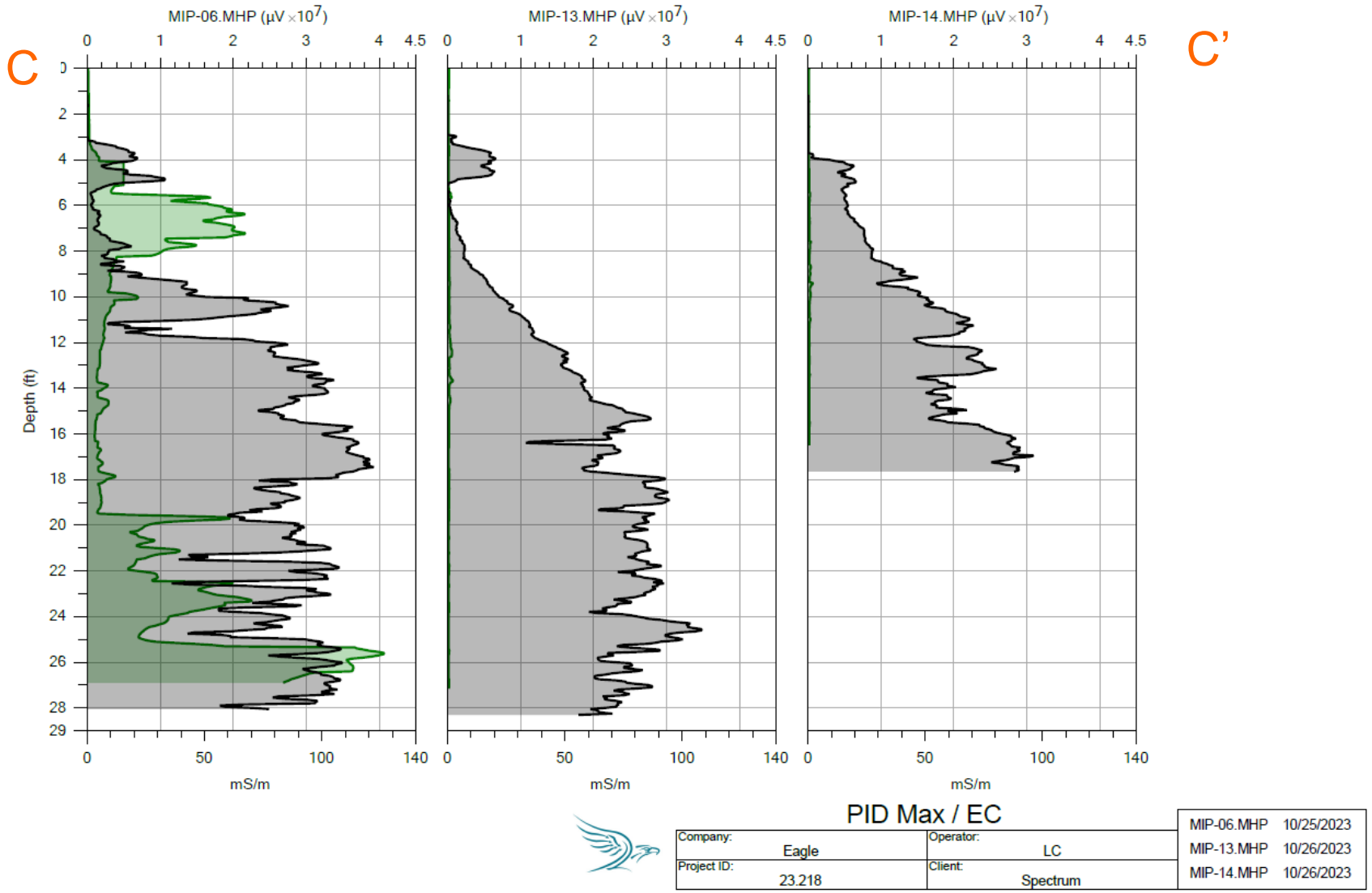

C'

EC / HPT Press. Max

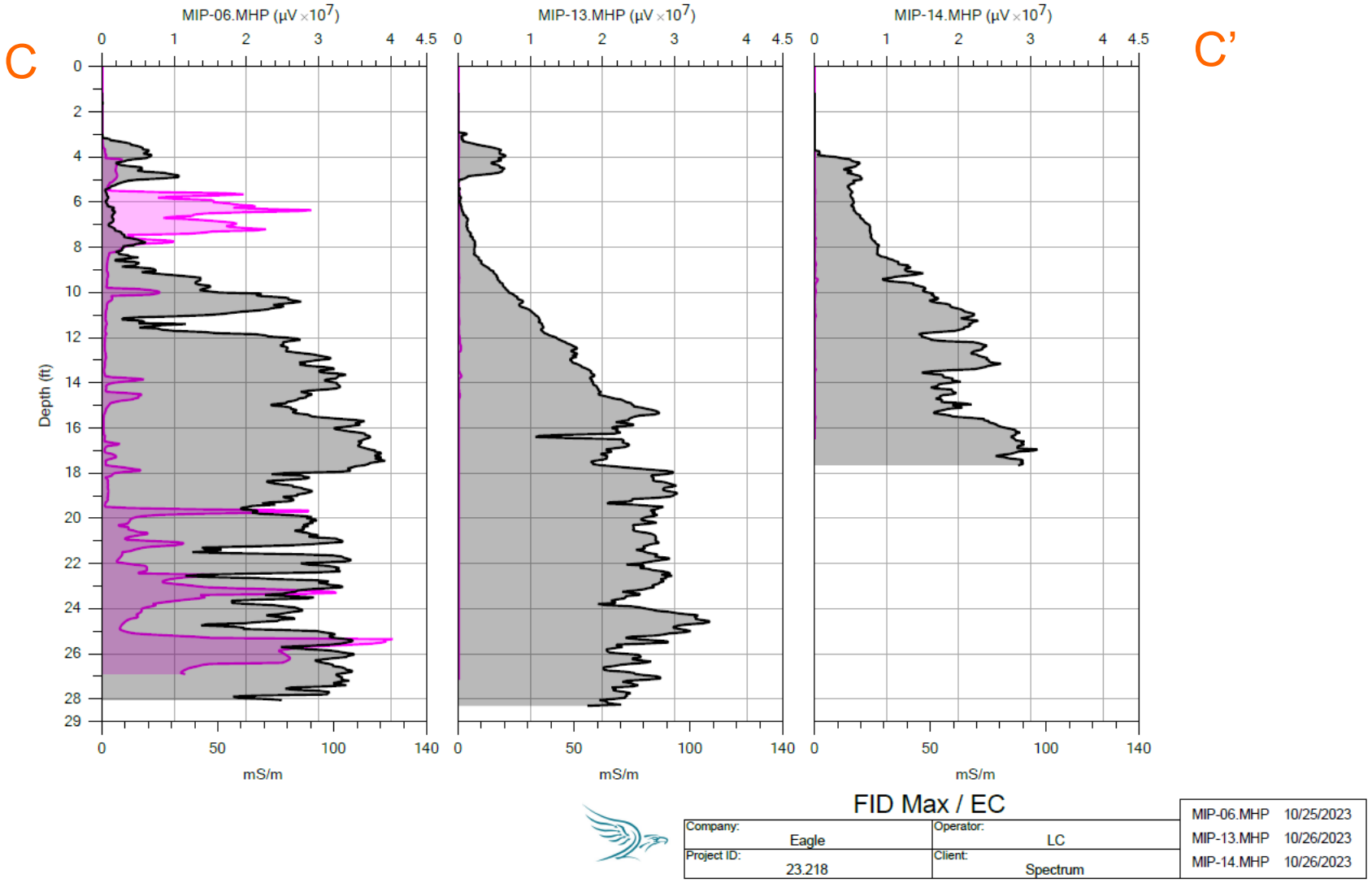
| | |
|---|---|
| Company: Eagle | Operator: LC |
| Project ID: 23.218 | Client: Spectrum |

| | |
|---|---|
| MIP-06.MHP | 10/25/2023 |
| MIP-13.MHP | 10/26/2023 |
| MIP-14.MHP | 10/26/2023 |

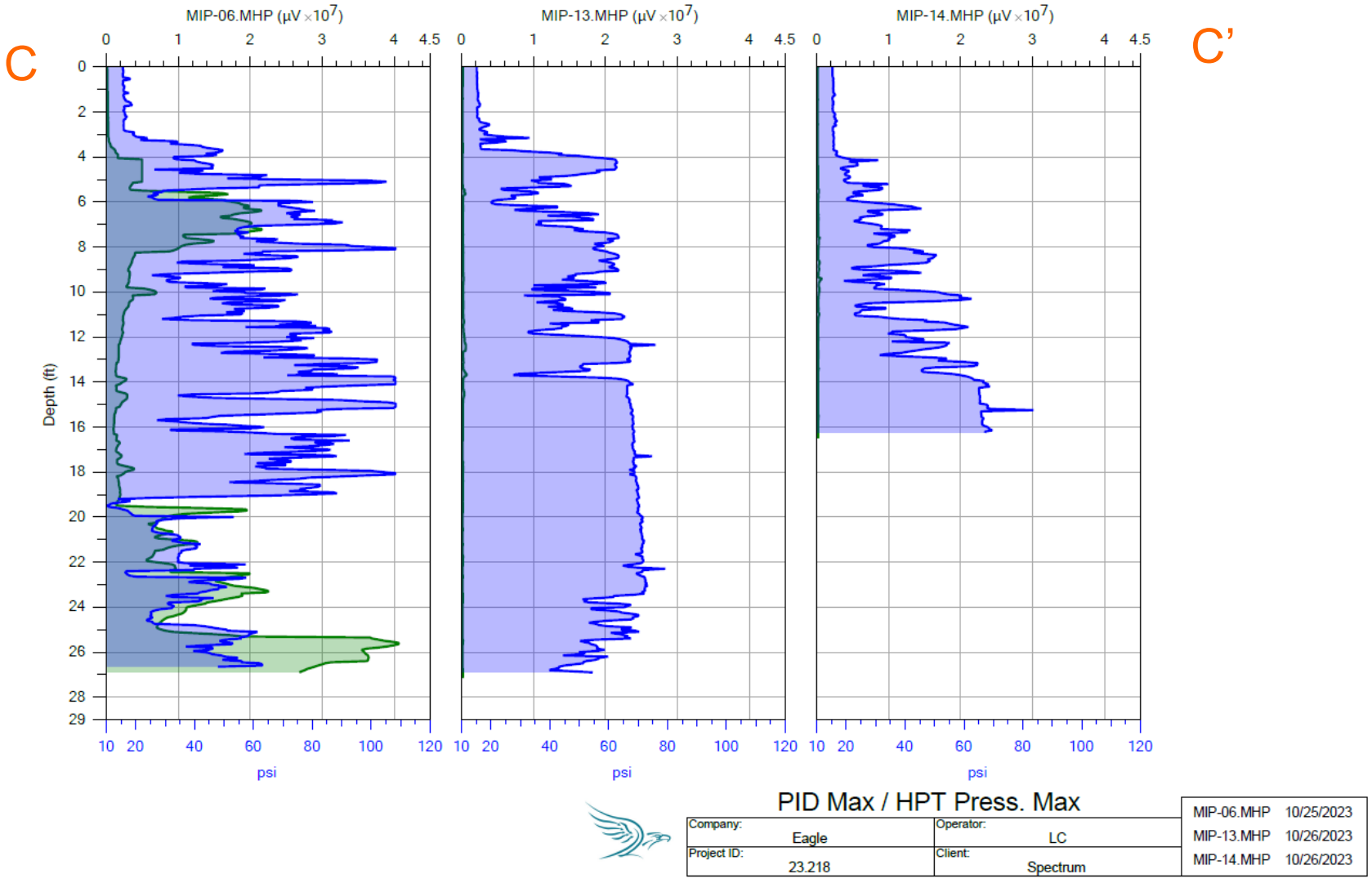
## PID (µV) With EC (mS/m)



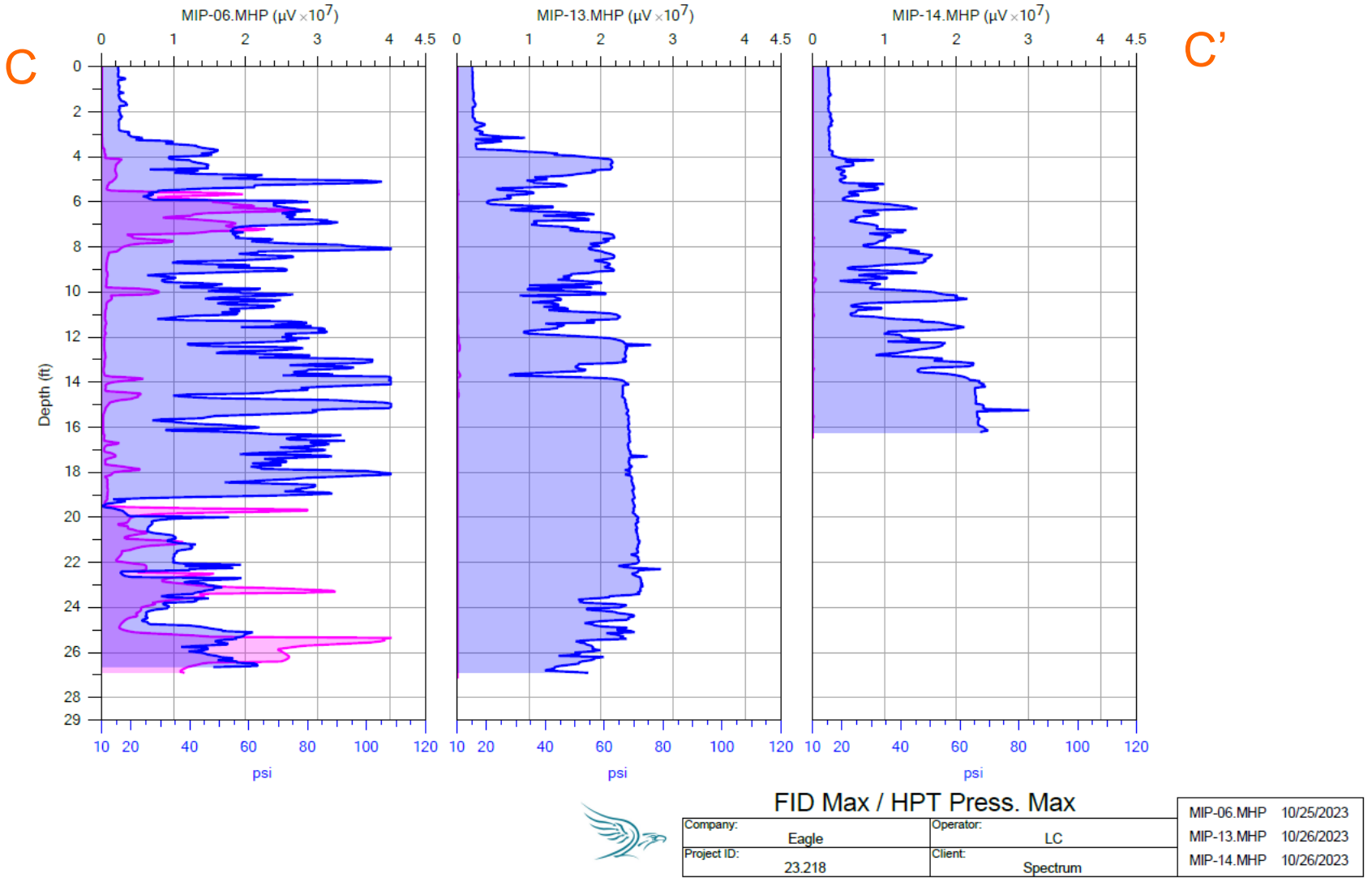
## FID (µV) With EC (µV)



## PID (µV) With HPT Pressure Max (psi)

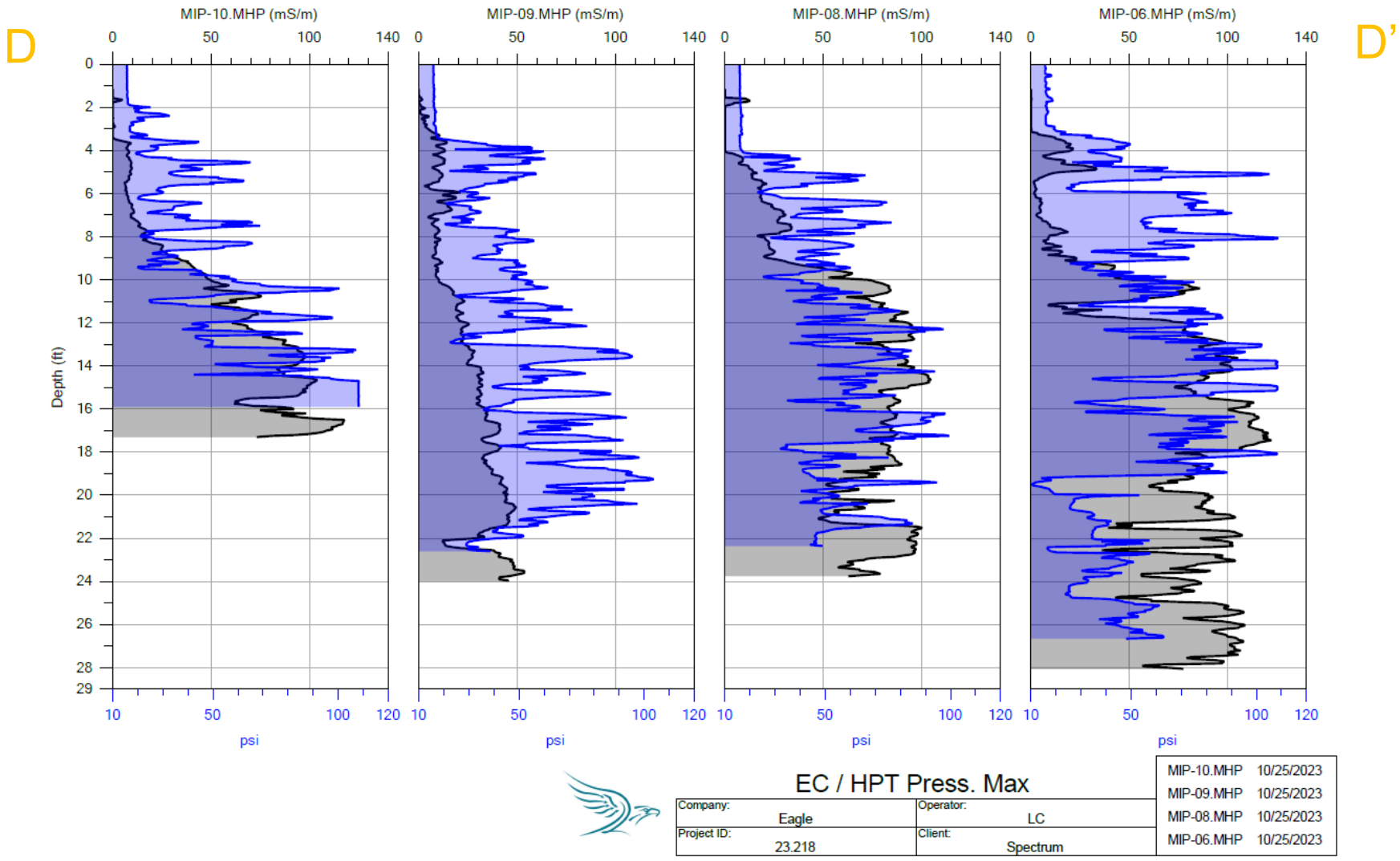


## FID (µV) With HPT Pressure Max (psi)

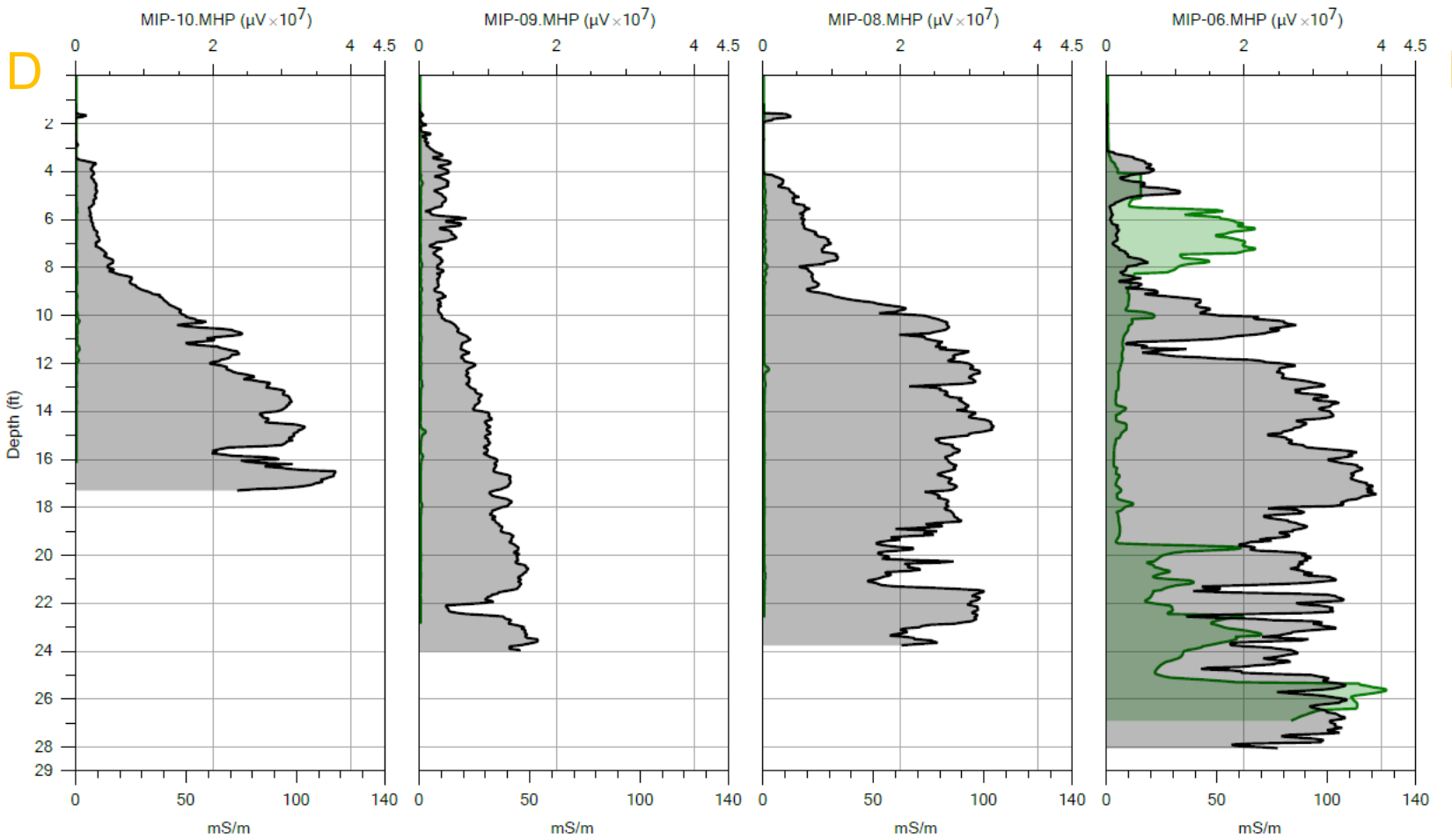


# MIP CROSS SECTIONS D-D'

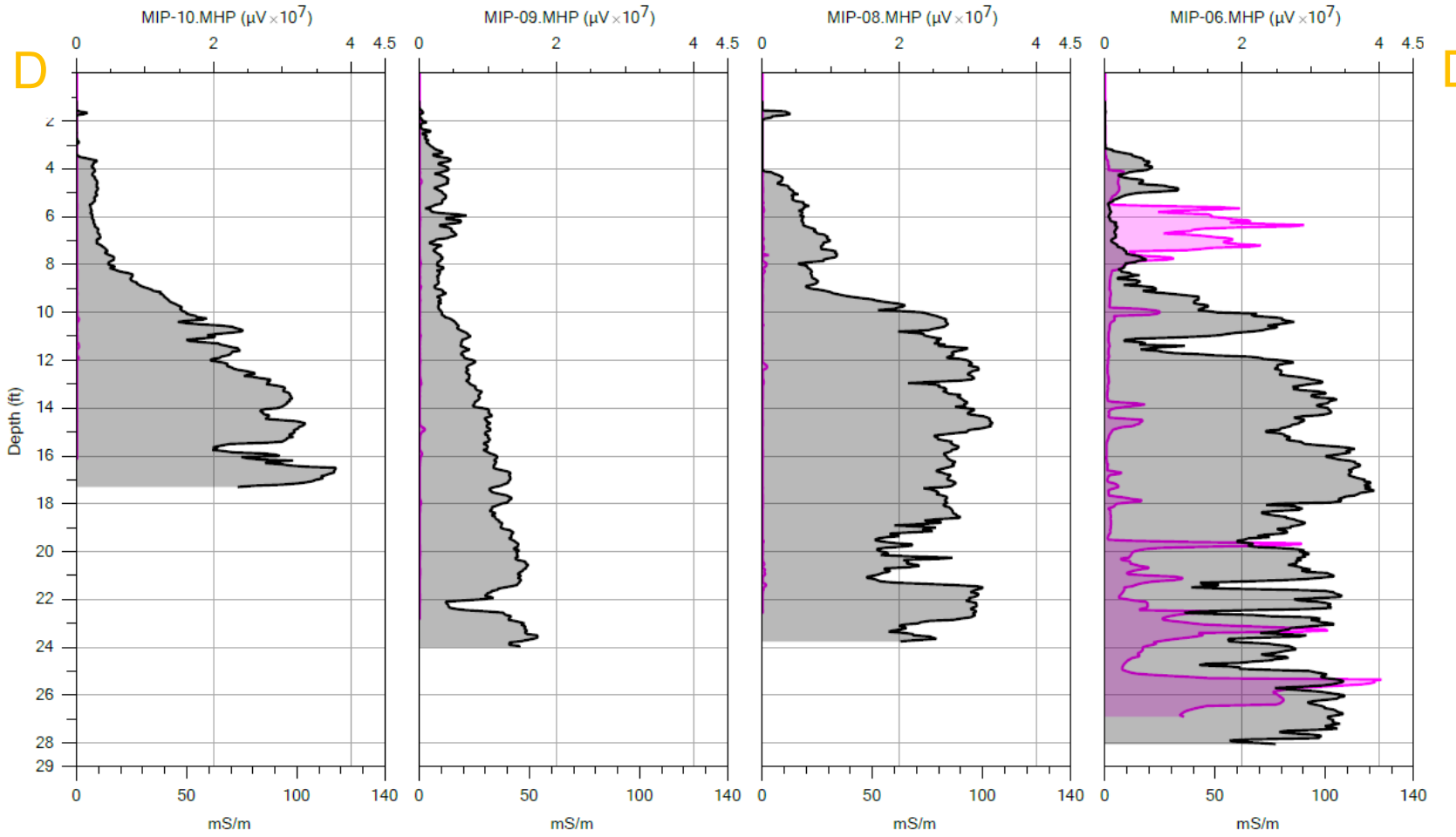
## EC (mS/m) With HPT Pressure Max (psi)



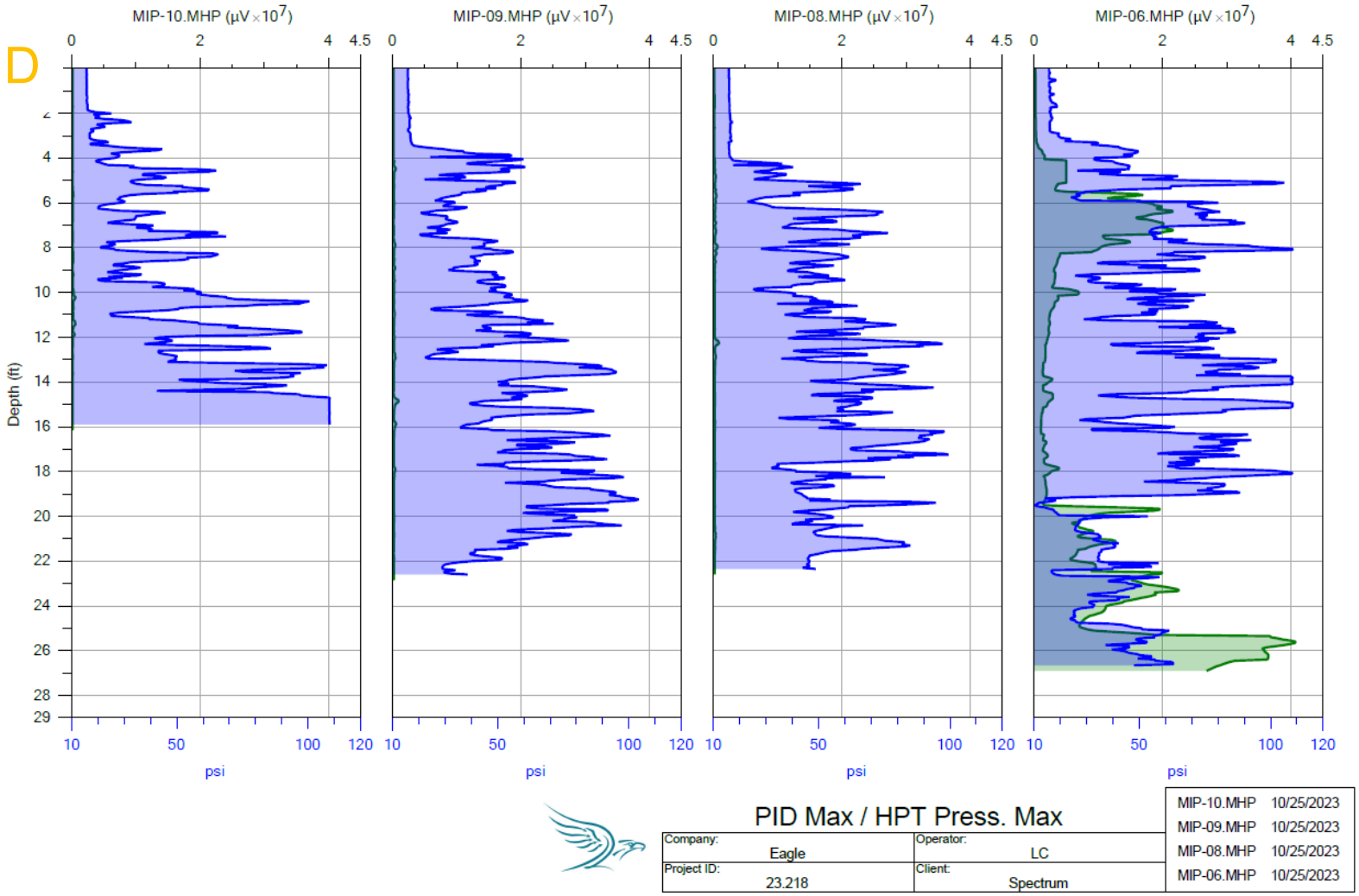
## PID (µV) With EC (mS/m)



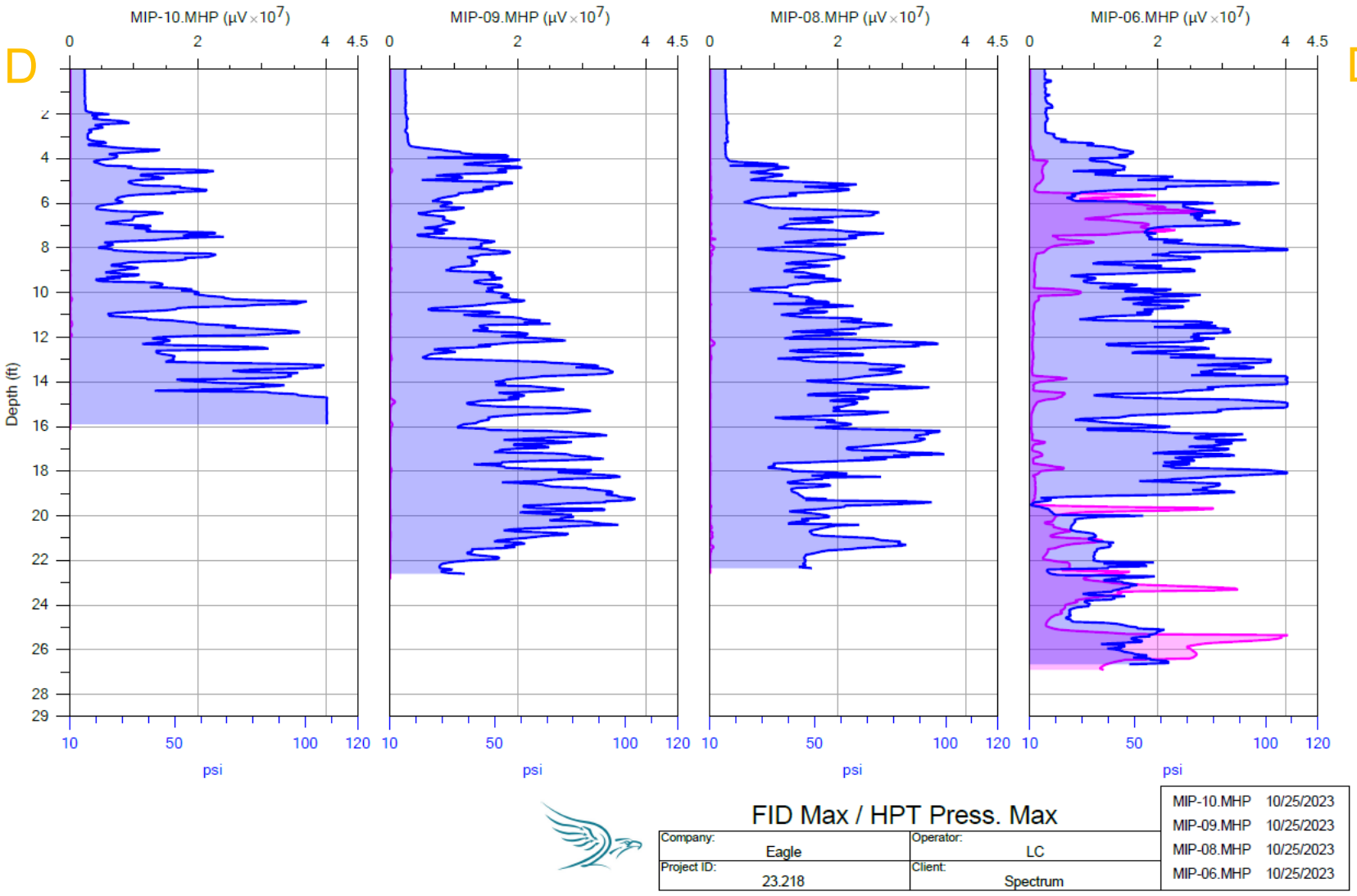
## FID (µV) With EC (mS/m)



## PID (µV) With HPT Pressure Max (psi)



## FID (µV) With HPT Pressure Max (psi)



## NEXT STEPS

For further data please refer to the individual logs, daily reports, and overlays. For additional explanations on your project, we would like to present via webinar or in person.

Eagle Synergistic specializes in 3D visualizations, we are happy to complete 3D models to help visualize lithology, hydrogeologic and contaminant properties.

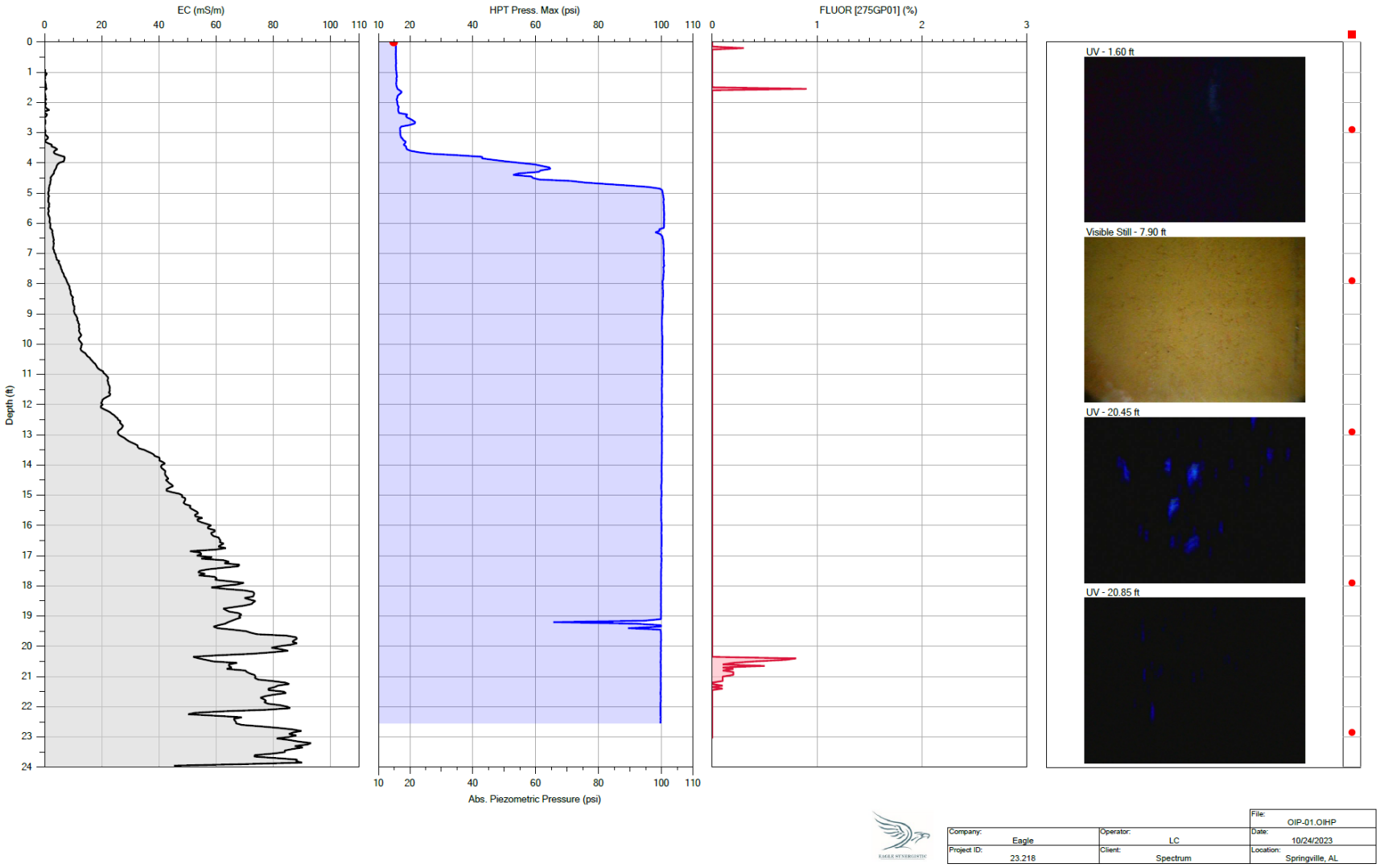
For the next step please send additional soil and/or groundwater samples and we will correlate with the MIP data completed on site. We are happy to include correlation sampling data within the presentation.

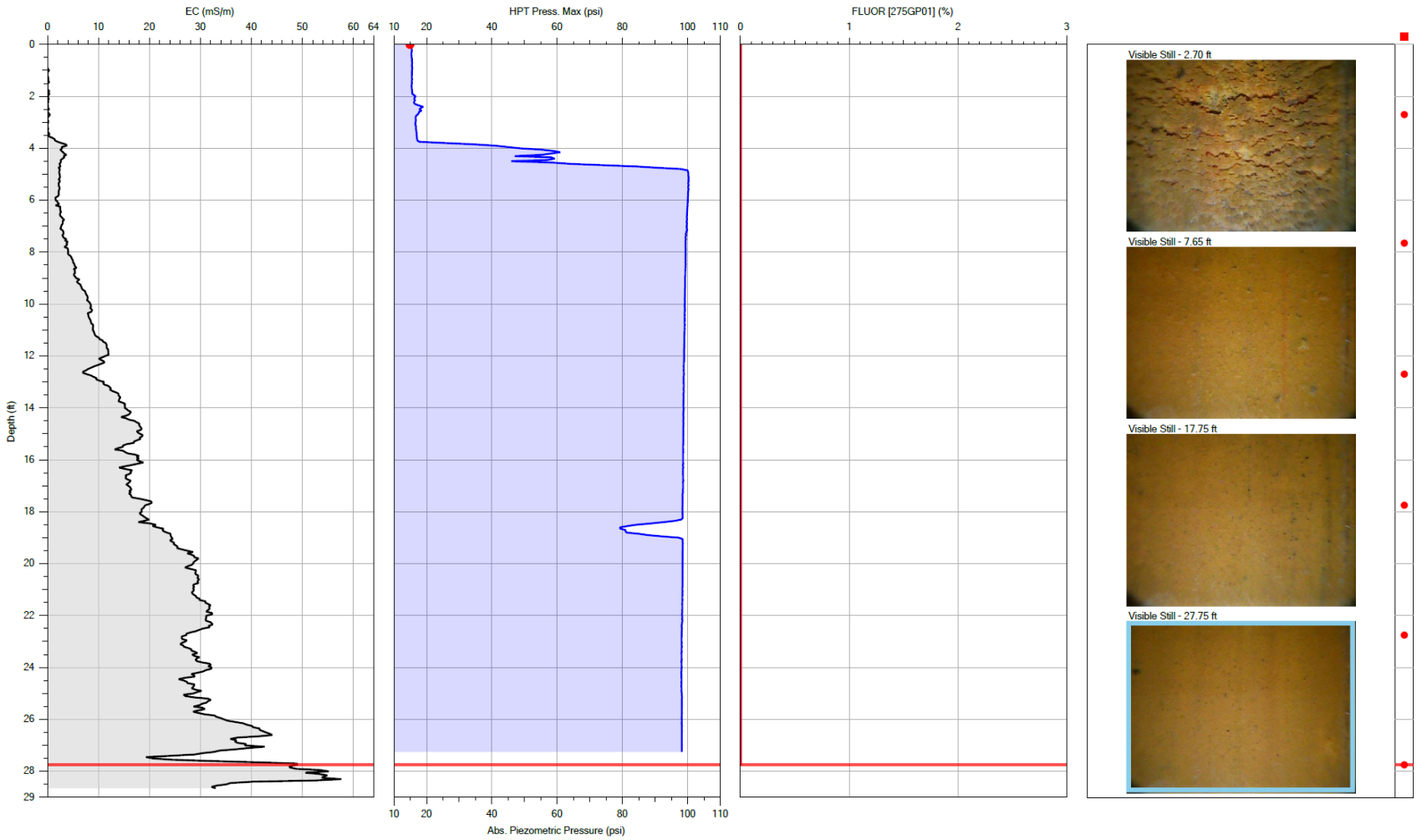
From all of us at Eagle Synergistic, we look forward to working with you again!

Eagle Synergistic
Optimizing Technologies, LLC

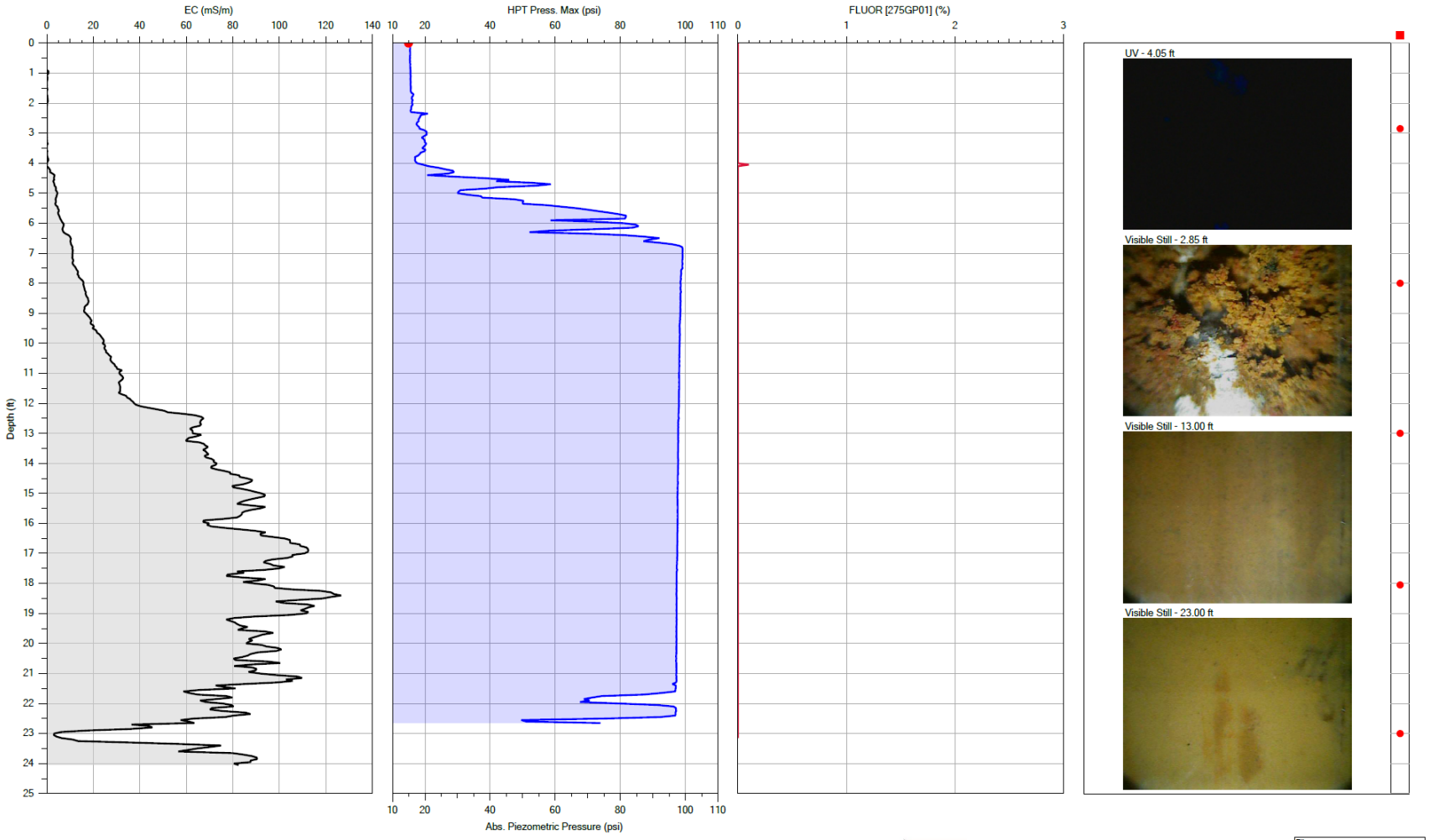
*Specializing* in High Resolution Site Characterization Technology

# INDIVIDUAL LOGS (INDIVIDUAL SCALE)

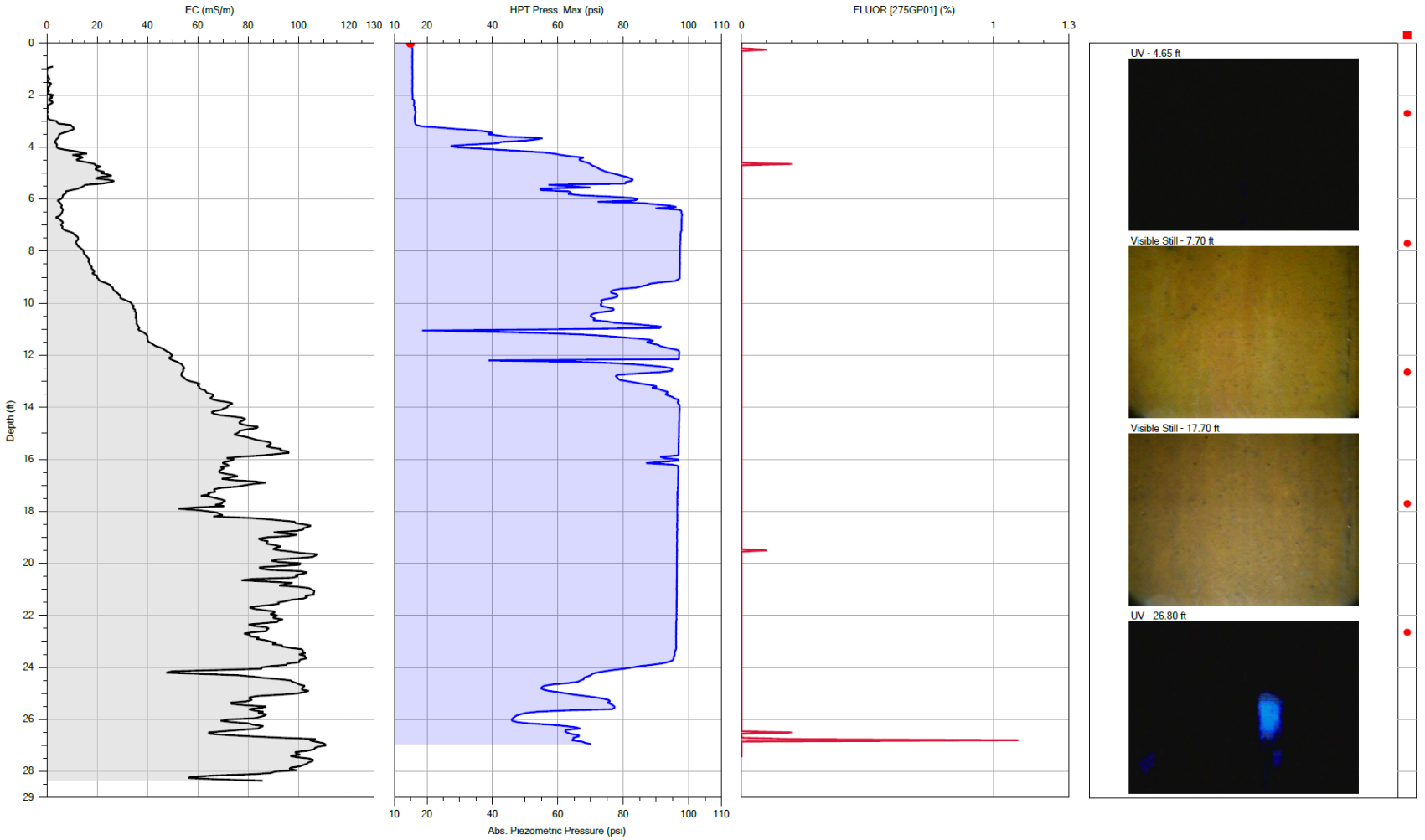




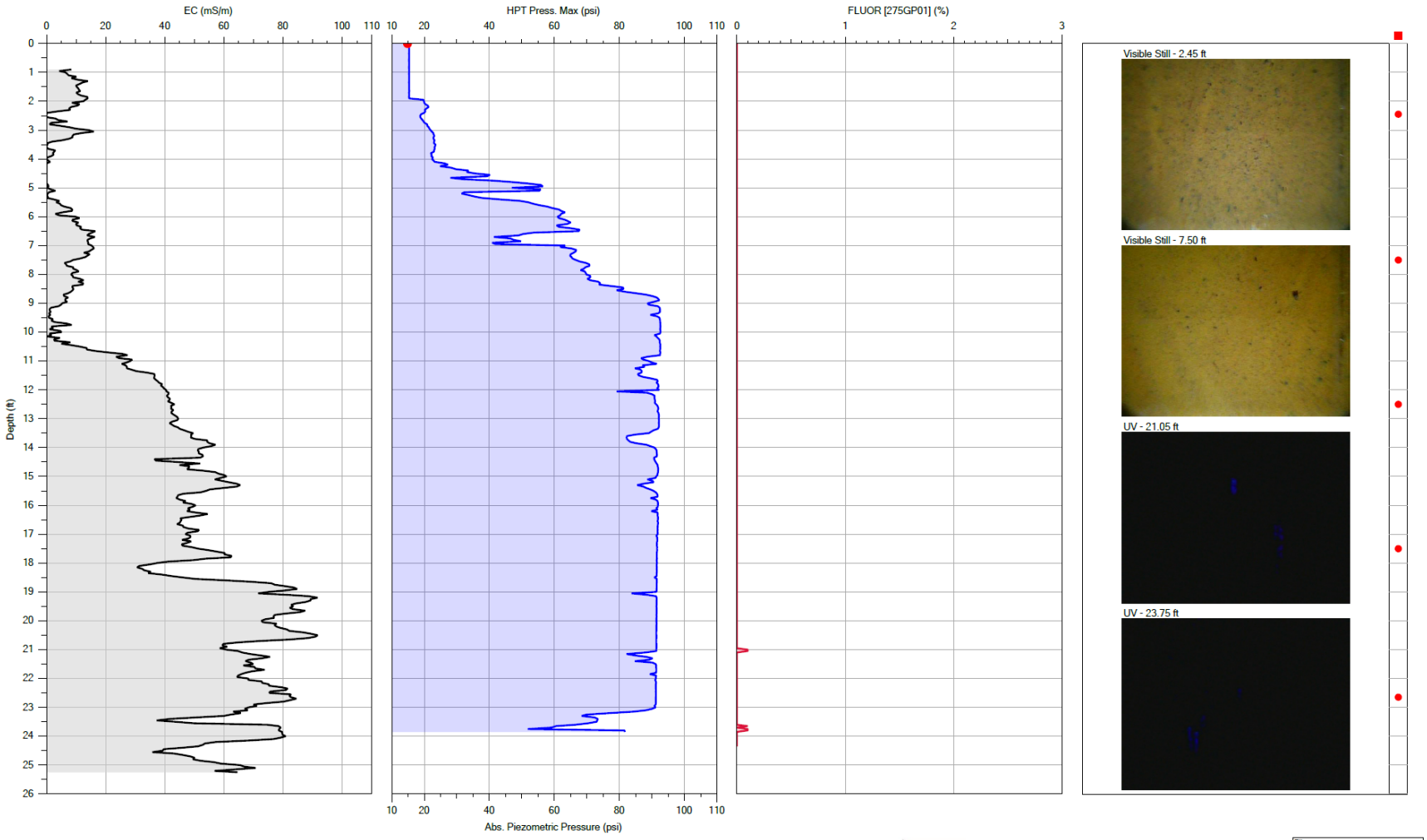

| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | File: OIP-02.OIHP | |
| Project ID: 23.218 | Client: Spectrum | Date: 10/24/2023 | |
| | | Location: Springville, AL | |



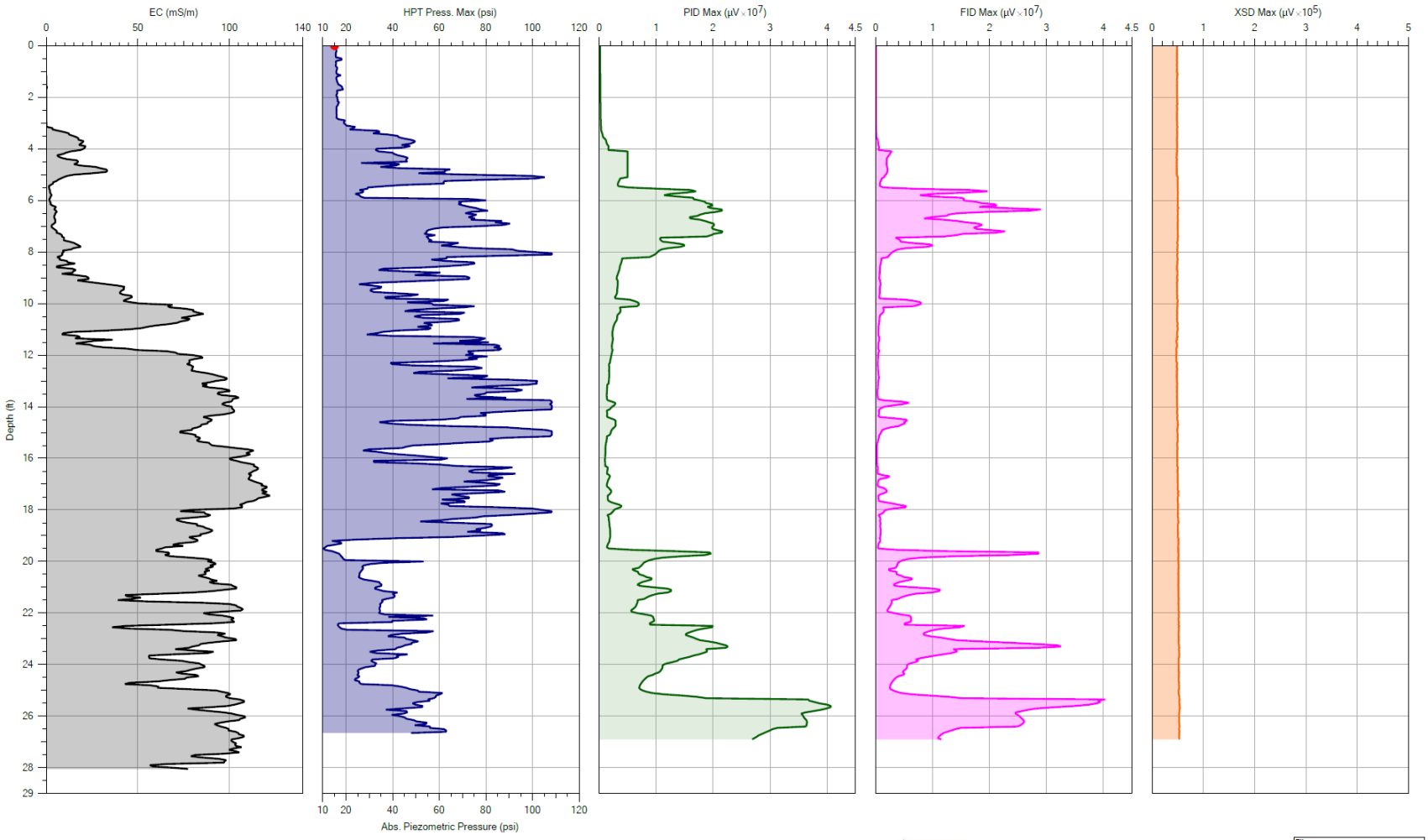

| | | |
|---|---|---|
| | | File: OIP-03.OIHP |
| Company: Eagle | Operator: LC | Date: 10/24/2023 |
| Project ID: 23.218 | Client: Spectrum | Location: Springville, AL |

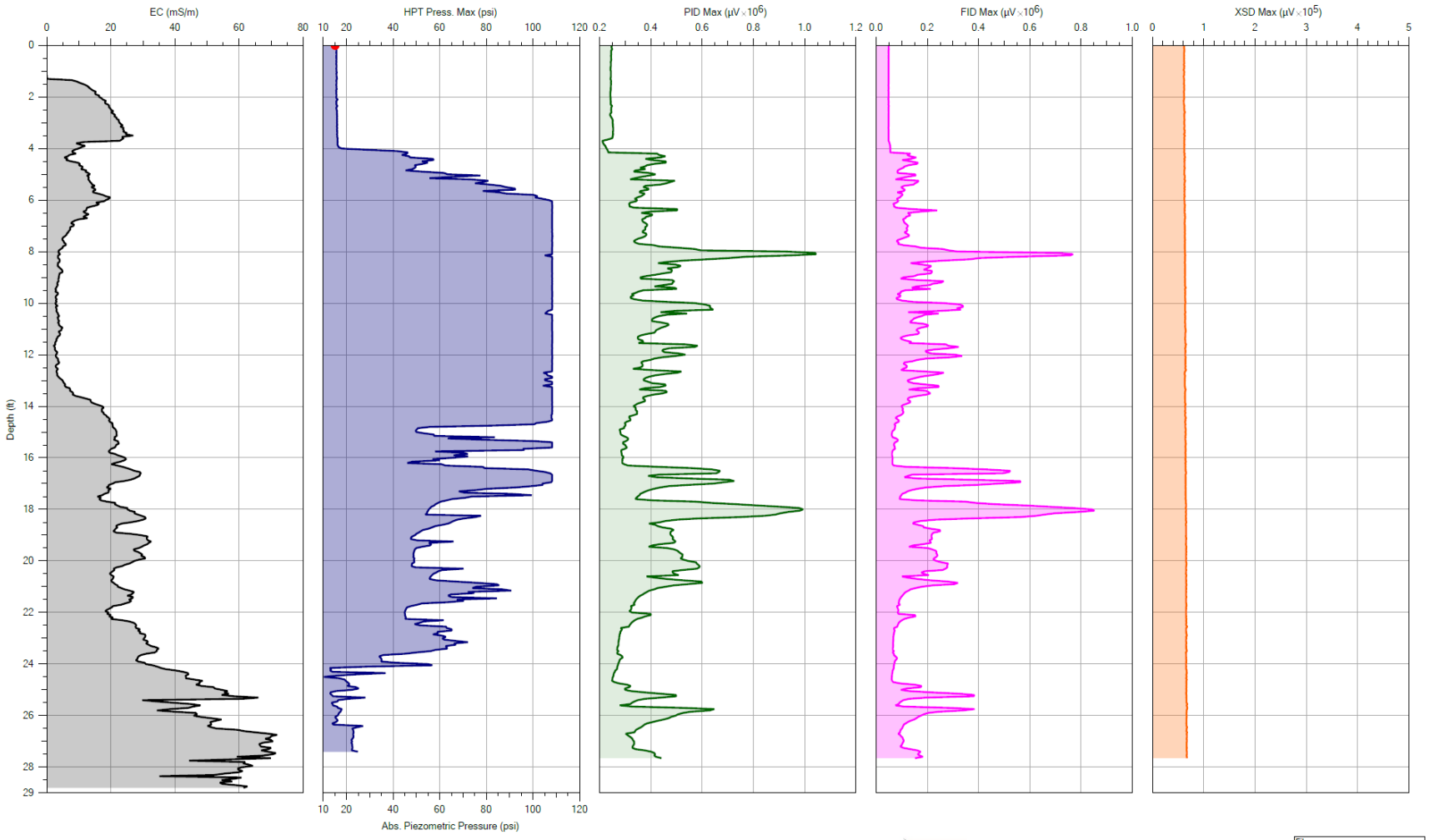



| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | | File: OIP-04.OIHP |
| Project ID: 23.218 | Client: Spectrum | | Date: 10/24/2023 |
| | | | Location: Springville, AL |

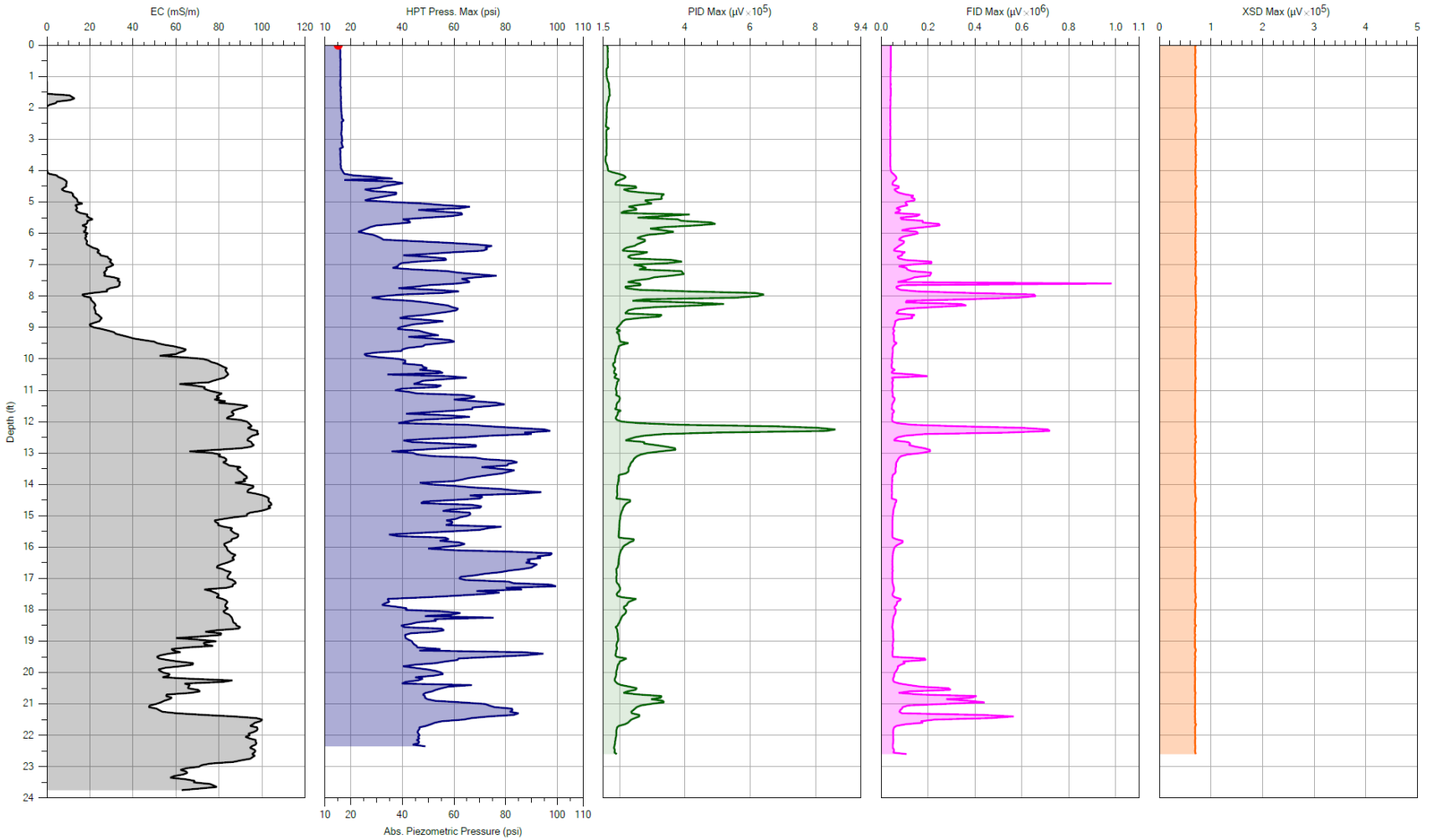



| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | | File: OIP-05.OIHP |
| Project ID: 23.218 | Client: Spectrum | | Date: 10/24/2023 |
| | | | Location: Springville, AL |

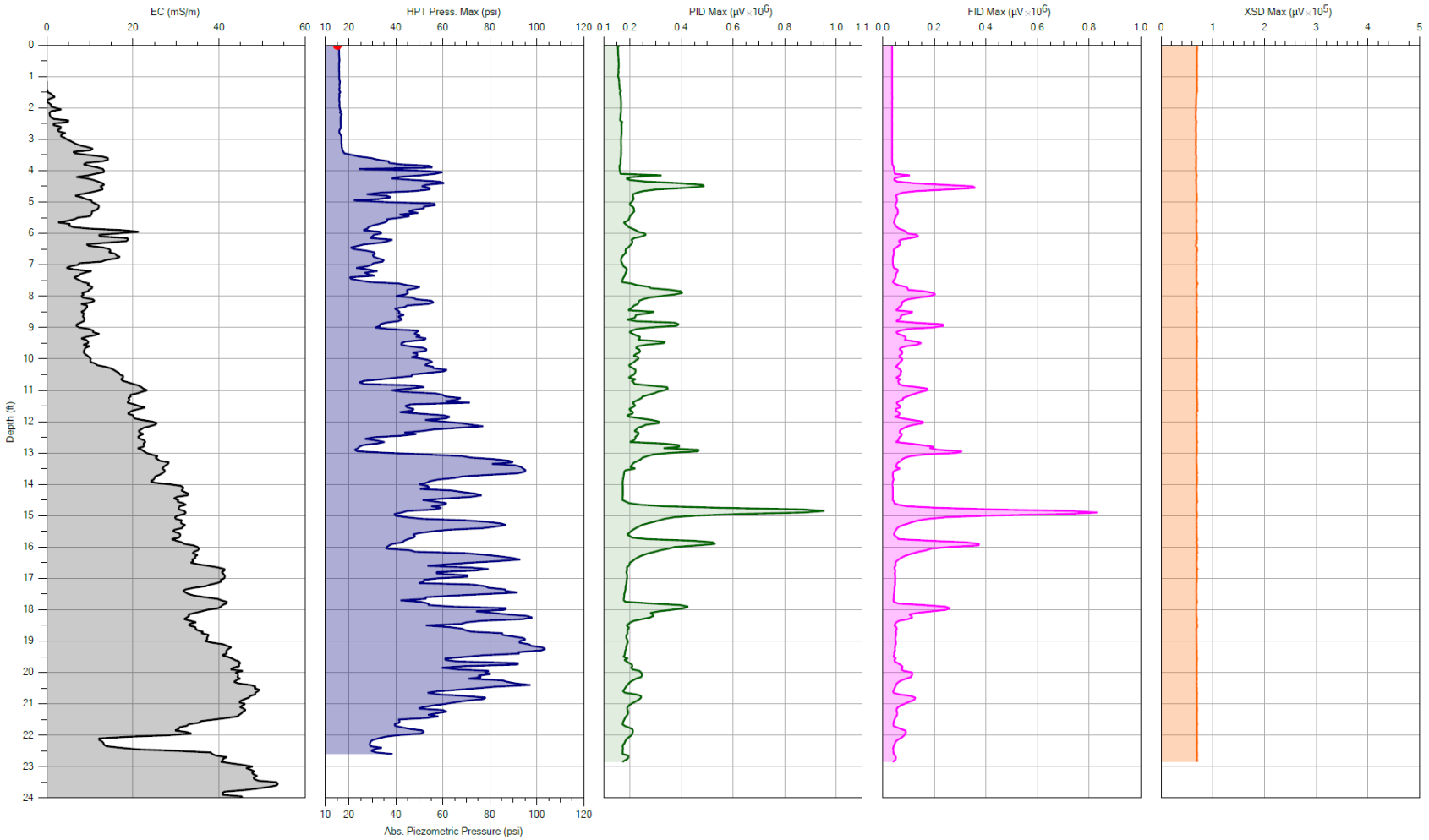

EC (mS/m)
HPT Press. Max (psi)
PID Max (µV×10^7)
FID Max (µV×10^7)
XSD Max (µV×10^5)
Depth (ft)
Abs. Piezometric Pressure (psi)
File: MIP-06.MHP
Company: Eagle
Operator: LC
Date: 10/25/2023
Project ID: 23.218
Client: Spectrum
Location: Springville, AL



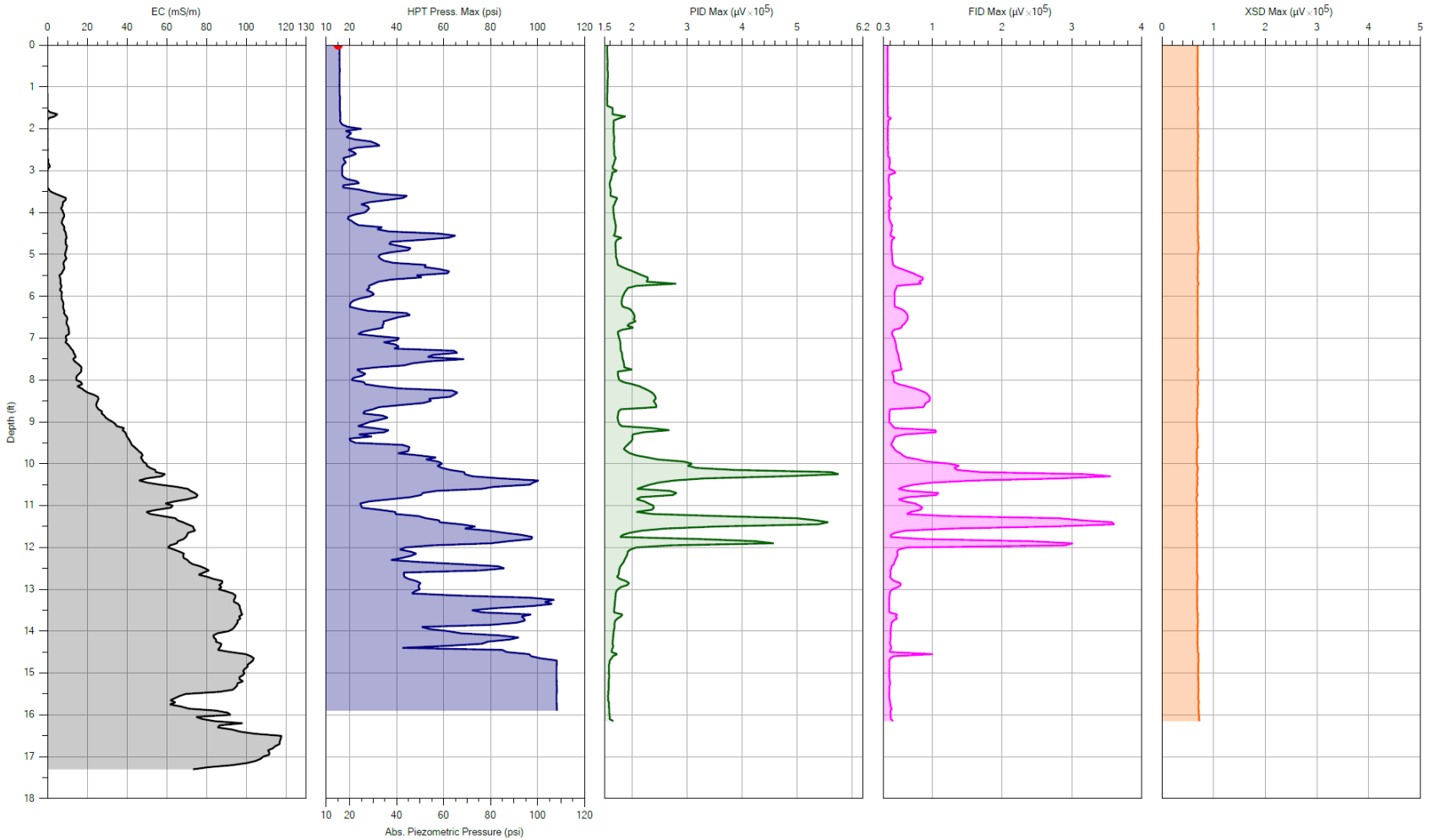

| | | | |
|---|---|---|---|
| | | | File: MIP-07.MHP |
| Company: Eagle | | Operator: LC | Date: 10/25/2023 |
| Project ID: 23.218 | | Client: Spectrum | Location: Springville, AL |



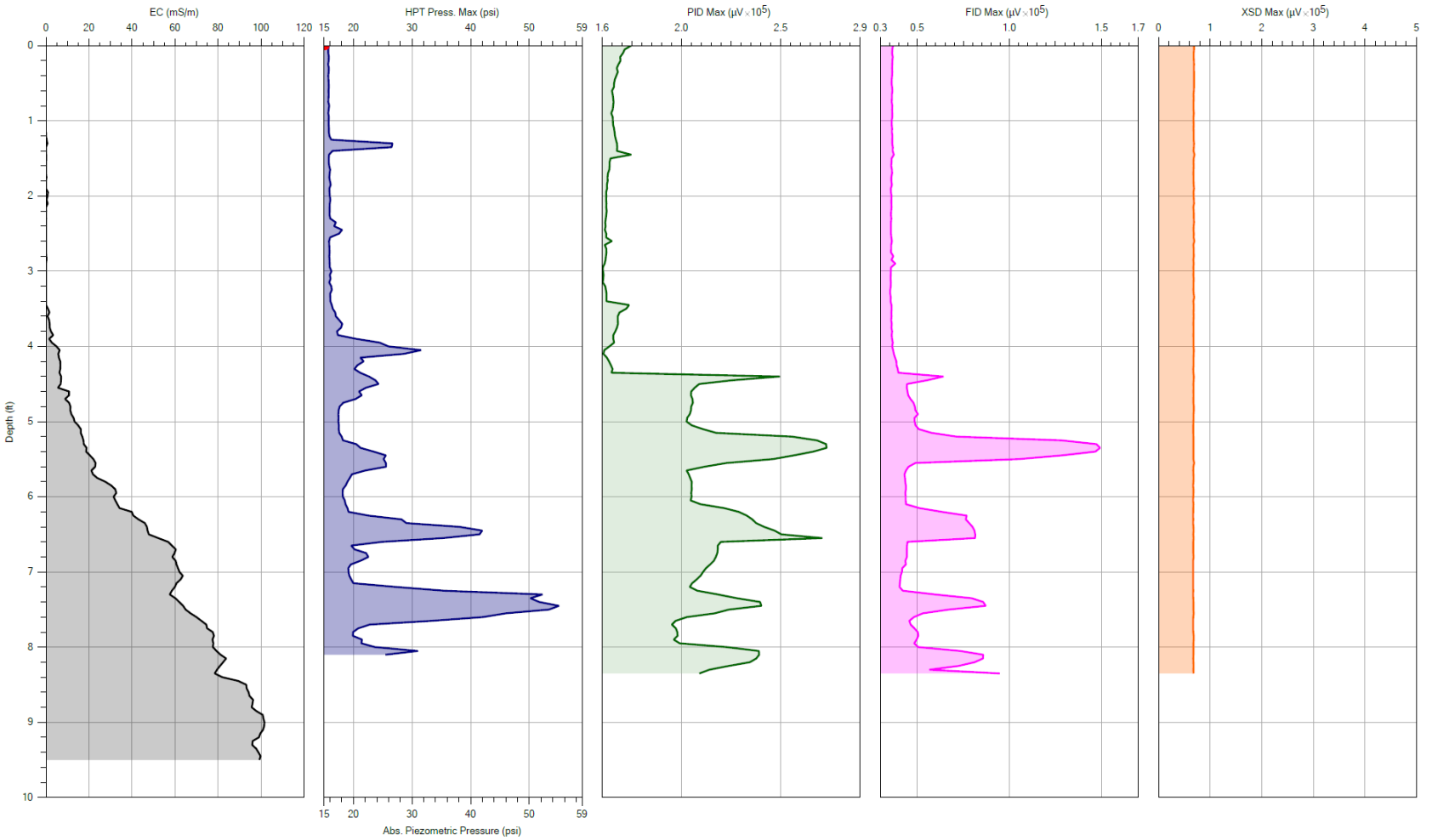

| | | | |
|---|---|---|---|
| | | | File: MIP-08.MHP |
| Company: Eagle | Operator: LC | | Date: 10/25/2023 |
| Project ID: 23.218 | Client: Spectrum | | Location: Springville, AL |



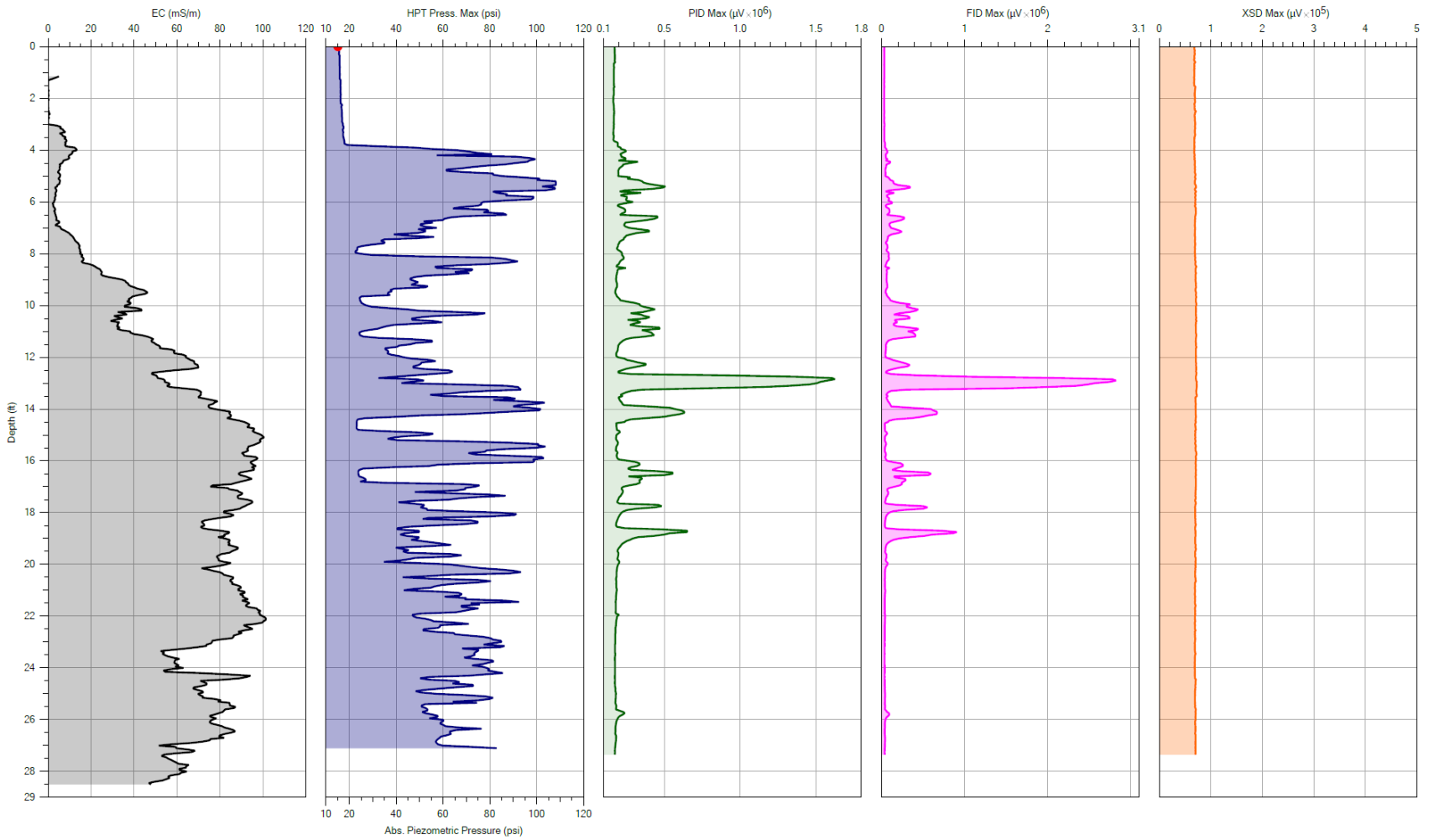

| | | | |
|---|---|---|---|
| | | | File: MIP-09.MHP |
| Company: Eagle | Operator: LC | | Date: 10/25/2023 |
| Project ID: 23.218 | Client: Spectrum | | Location: Springville, AL |

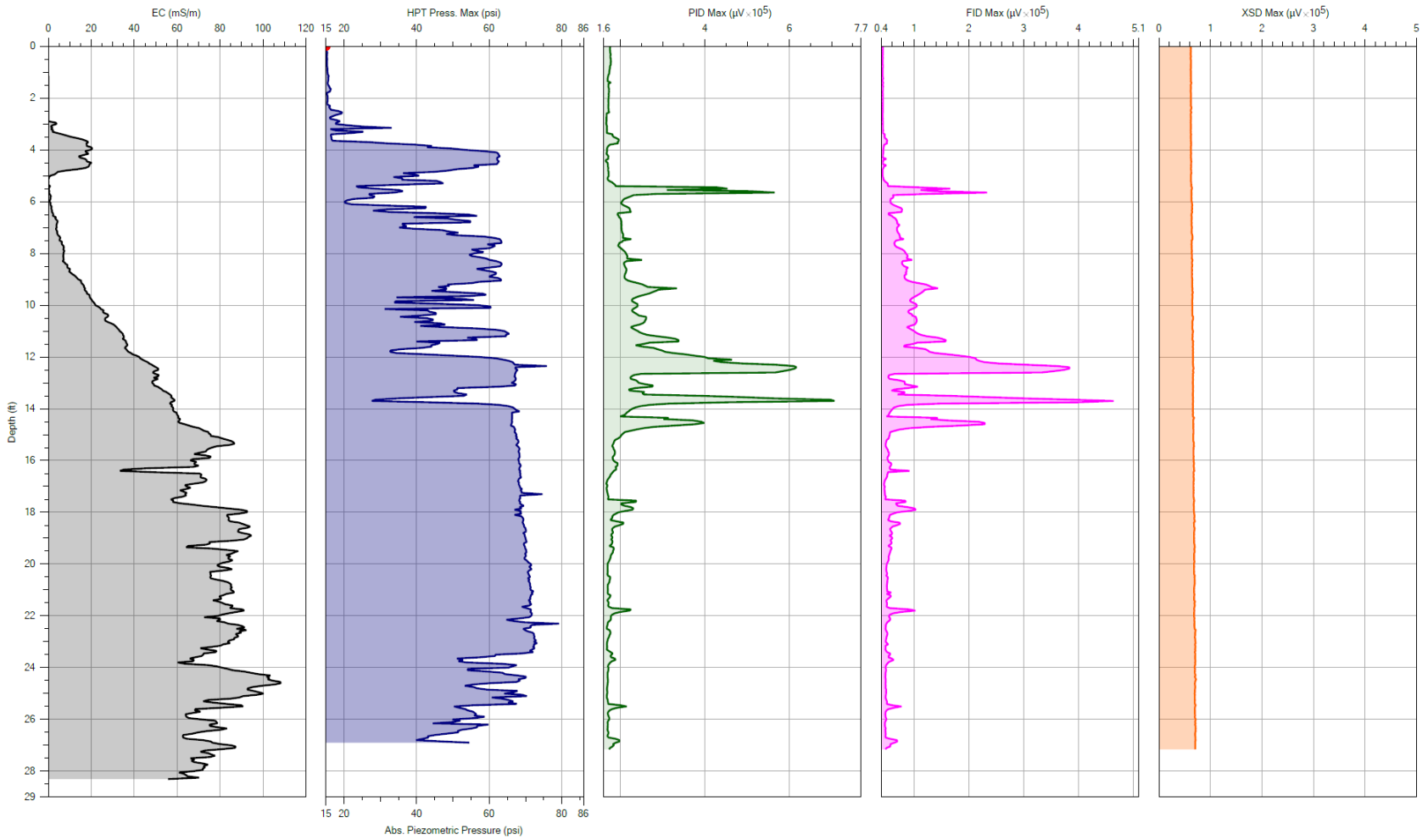


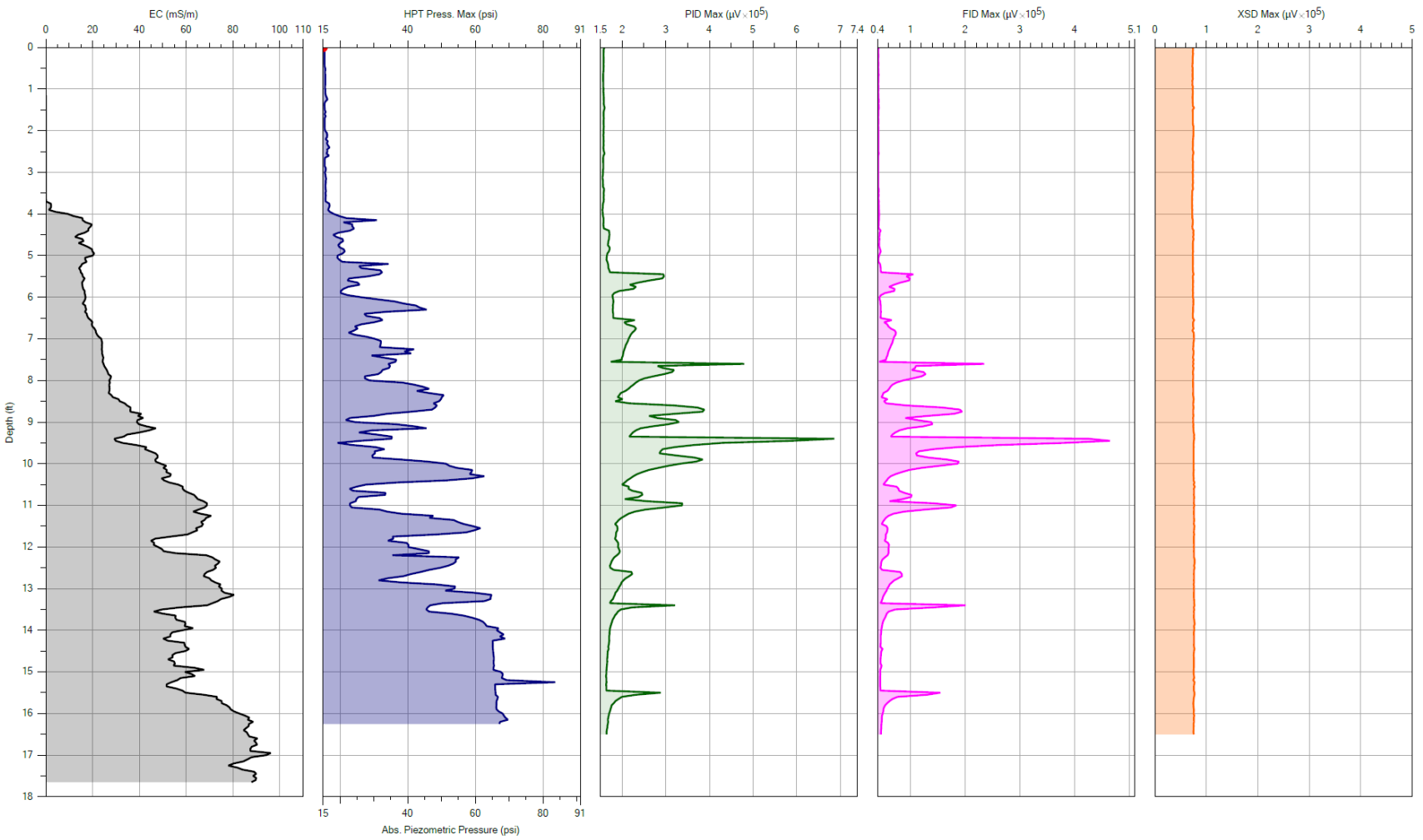

| | | | |
|---|---|---|---|
| | | | File: MIP-10.MHP |
| Company: Eagle | | Operator: LC | Date: 10/25/2023 |
| Project ID: 23.218 | | Client: Spectrum | Location: Springville, AL |

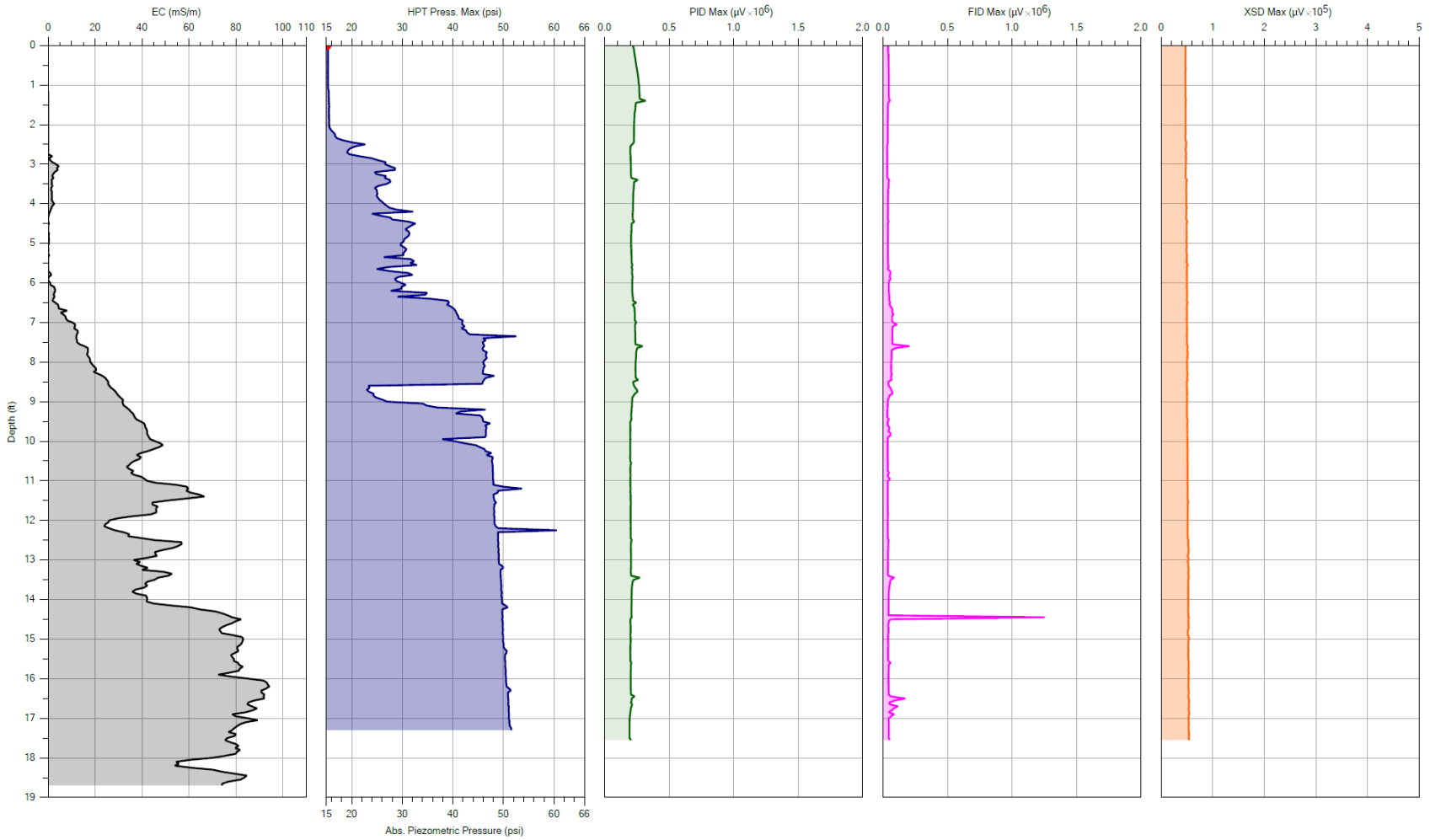



| | | | |
|---|---|---|---|
| | | | File: MIP-11.MHP |
| Company: Eagle | | Operator: LC | Date: 10/25/2023 |
| Project ID: 23.218 | | Client: Spectrum | Location: Springville, AL |

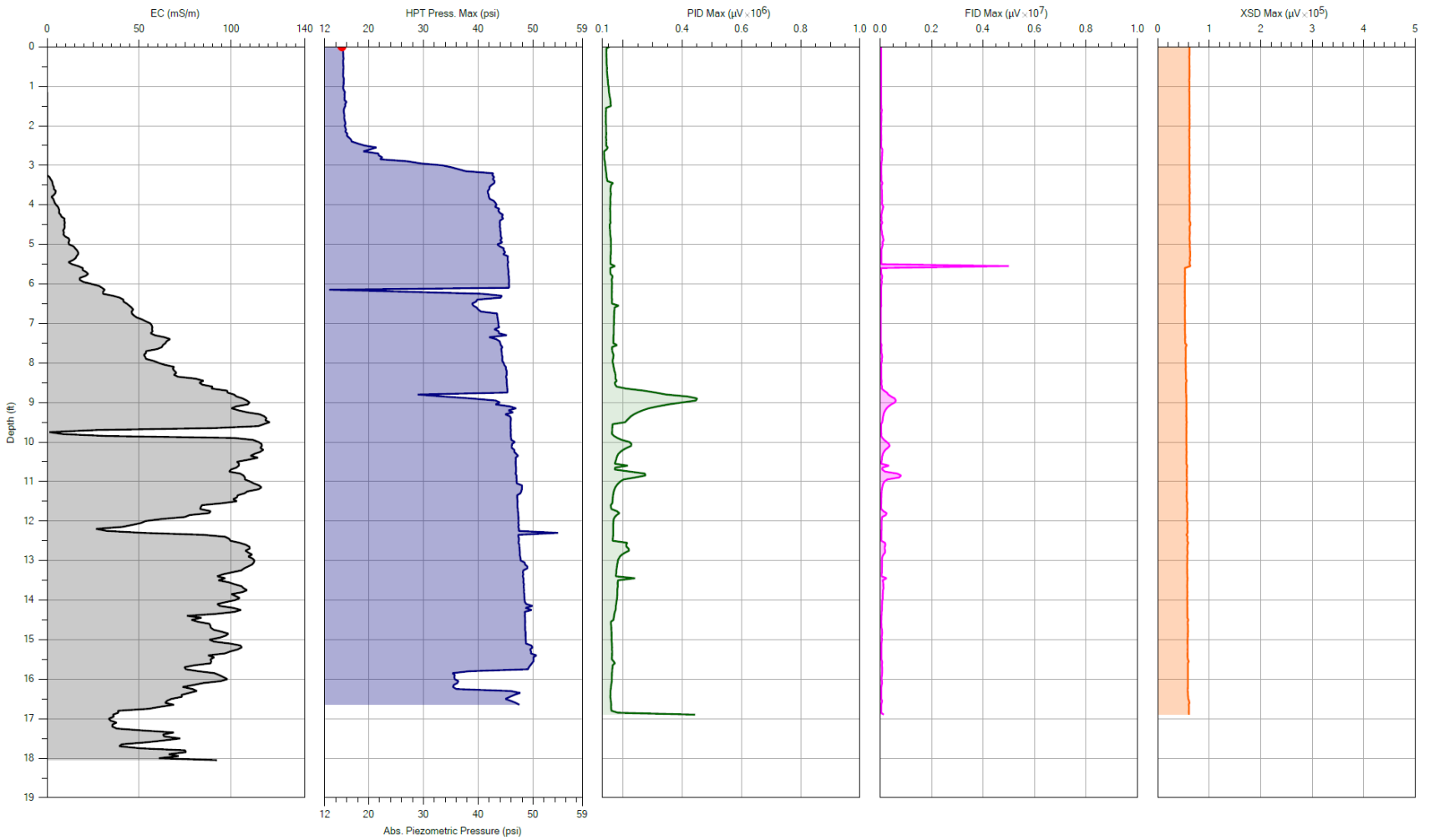

EC (mS/m)
HPT Press. Max (psi)
PID Max (µV×10^6)
FID Max (µV×10^6)
XSD Max (µV×10^5)
Depth (ft)
Abs. Piezometric Pressure (psi)
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
File: MIP-12.MHP
Date: 10/25/2023
Location: Springville, AL


EC (mS/m)
HPT Press. Max (psi)
PID Max (µV×10^5)
FID Max (µV×10^5)
XSD Max (µV×10^5)
Depth (ft)
Abs. Piezometric Pressure (psi)
File: MIP-13.MHP
Company: Eagle
Operator: LC
Date: 10/26/2023
Project ID: 23.218
Client: Spectrum
Location: Springville, AL

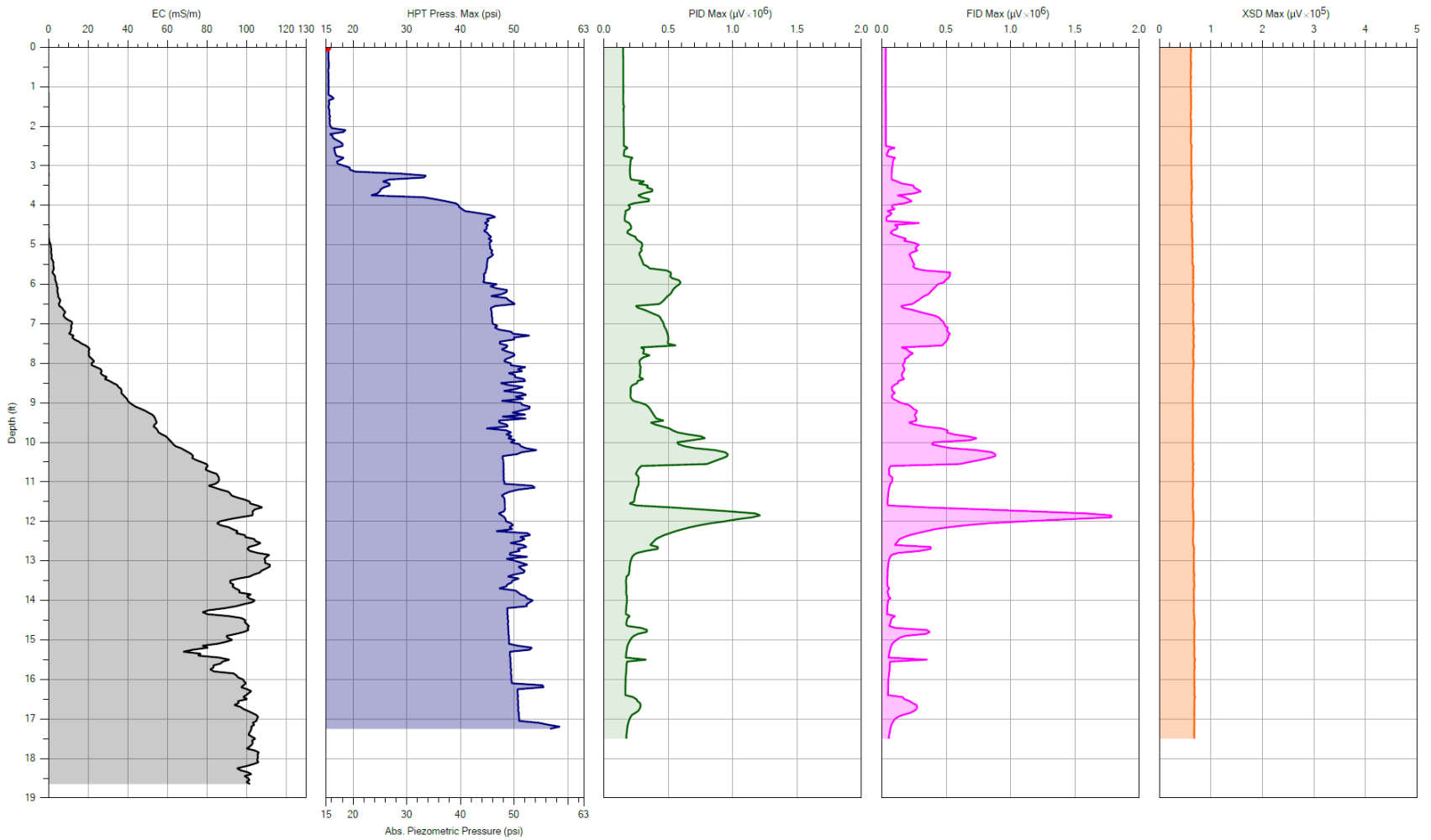

EC (mS/m)
HPT Press. Max (psi)
PID Max (µV x 10^5)
FID Max (µV x 10^5)
XSD Max (µV x 10^5)
Depth (ft)
Abs. Piezometric Pressure (psi)
Company: Eagle
Operator: LC
File: MIP-14.MHP
Project ID: 23.218
Client: Spectrum
Date: 10/26/2023
Location: Springville, AL

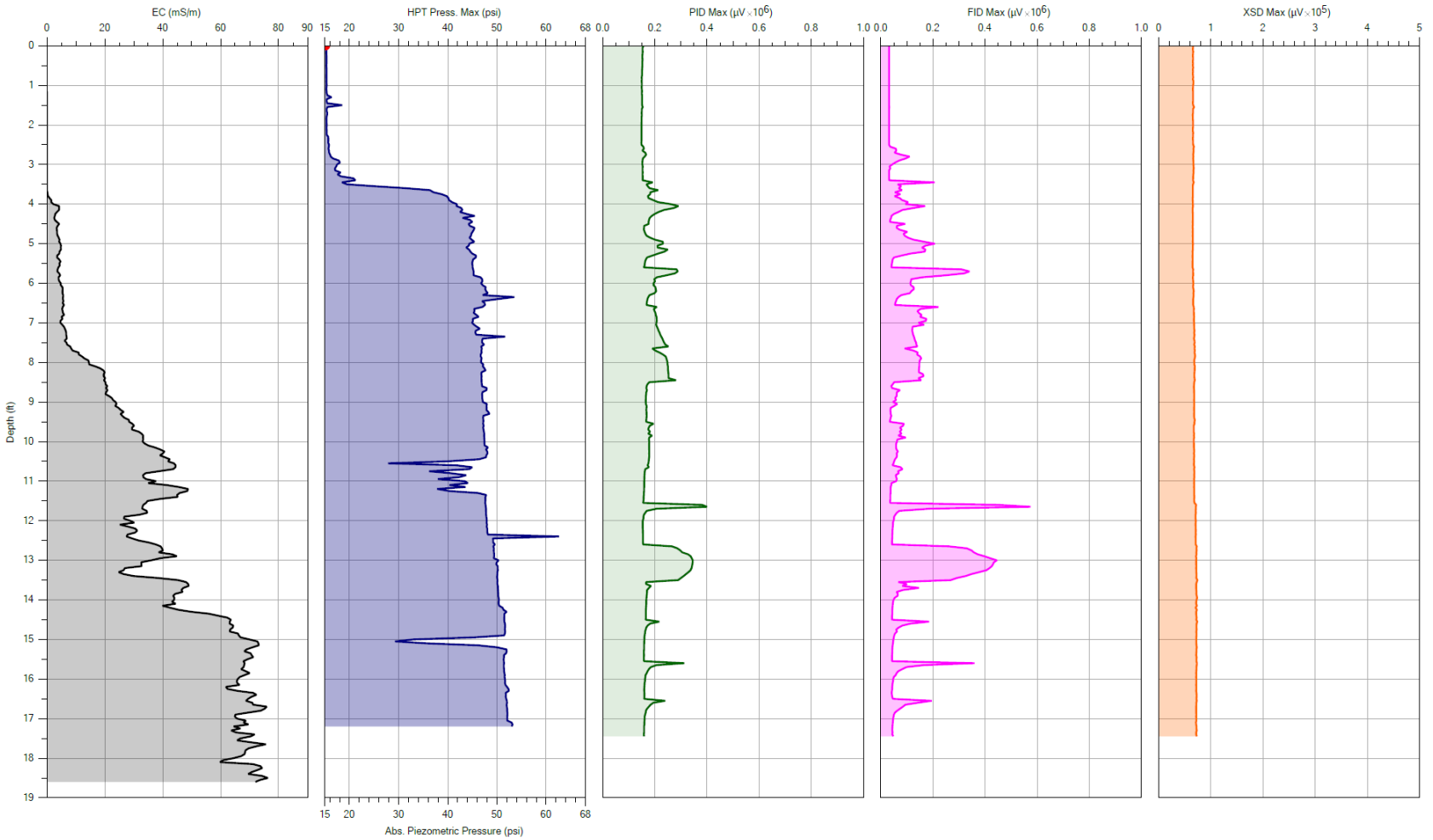



| | | | |
|---|---|---|---|
| | | | File: MIP-15.MHP |
| Company: Eagle | Operator: LC | | Date: 10/27/2023 |
| Project ID: 23.218 | Client: Spectrum | | Location: Springville, AL |




| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | | File: MIP-16.MHP |
| Project ID: 23.218 | Client: Spectrum | | Date: 10/27/2023 |
| | | | Location: Springville, AL |


EC (mS/m)
HPT Press. Max (psi)
PID Max (µV×10^6)
FID Max (µV×10^6)
XSD Max (µV×10^5)
Depth (ft)
Abs. Piezometric Pressure (psi)
Company: Eagle
Operator: LC
Project ID: 23.218
Client: Spectrum
Location: Springville, AL
File: MIP-17.MHP
Date: 10/27/2023




| | | | |
|---|---|---|---|
| Company: Eagle | Operator: LC | File: MIP-18.MHP | |
| Project ID: 23.218 | Client: Spectrum | Date: 10/27/2023 | Location: Springville, AL |

# APPENDIX C

## LABORATORY DOCUMENTATION

eurofins | Environment Testing



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Jamie Cox
Spectrum Environmental Inc
85 Spectrum Cove
Alabaster, Alabama 35007

Generated 12/29/2023 3:46:20 PM Revision 1

## JOB DESCRIPTION

Pat's Grocery

## JOB NUMBER

400-245713-1

Eurofins Pensacola
3355 McLemore Drive
Pensacola FL 32514

See page two for job notes and contact information.

## Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Southeast, LLC Project Manager.

## Authorization

Generated
12/29/2023 3:46:20 PM
Revision 1

Authorized for release by
Mark Swafford, Project Manager II
Mark.Swafford@et.eurofinsus.com
(850)471-6207

# Table of Contents

**Job Narrative**
**400-245713-1**

**Receipt**

The samples were received on 10/27/2023 9:17 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.6°C

**GC/MS VOA**

Method 8260D: The following sample was diluted to bring the concentration of target analytes within the calibration range: MIP-6 (400-245713-2). Elevated reporting limits (RLs) are provided.

Method 8260D: Samples OIP-1 (400-245713-1), MIP-12 (400-245713-3) and OIP-4 (400-245713-4) were overdiluted on the initial analysis. Reanalysis was performed outside of holding time. The initial analysis is reported as primary and the reanalysis is reported as secondary.

Method 8260D: The result for Xylenes, Total exceeded the linear range of the instrument for sample: MIP-6 (400-245713-2). Reanalysis was performed outside of holding time. The initial analysis is reported as primary and the reanalysis is reported as secondary for Xylenes, Total.

Method 8260D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 400-649406 and analytical batch 400-649355 were outside control limits for one or more analytes. See QC Sample Results for detail. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery is within acceptance limits.

Method 8260D: Reanalysis of the following sample was performed outside of the analytical holding time due to overdilution on the initial analysis: MIP-12 (400-245713-3). The sample was loaded on the instrument on the final day of holding time but acquired slightly after it's midnight hold time expiration.

Method 8260D: The following samples were diluted to bring the concentration of target analytes within the calibration range: OIP-1 (400-245713-1) and OIP-4 (400-245713-4). Elevated reporting limits (RLs) are provided.

Method 8260D: Reanalysis of the following samples were performed outside of the analytical holding time due to overdilution on the initial analysis: OIP-1 (400-245713-1) and OIP-4 (400-245713-4).

Method 8260D: Reanalysis of the following sample was performed outside of the analytical holding time due to a result for Xylenes, Total being over the linear range on the initial analysis: MIP-6 (400-245713-2).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

**General Chemistry**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

# Detection Summary

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: OIP-1 — Lab Sample ID: 400-245713-1

| Analyte | Result | Qualifier | RL | | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ethylbenzene | 139 | | 76.6 | | mg/Kg | 10000 | ☼ | 8260D | Total/NA |
| Xylenes, Total | 528 | | 153 | | mg/Kg | 10000 | ☼ | 8260D | Total/NA |
| Benzene - RERA | 34.0 | H | 7.66 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |
| Ethylbenzene - RERA | 109 | H | 7.66 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |
| Naphthalene - RERA | 71.2 | H | 7.66 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |
| Toluene - RERA | 9.47 | H | 7.66 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |
| Xylenes, Total - RERA | 412 | H | 15.3 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |

## Client Sample ID: MIP-6 — Lab Sample ID: 400-245713-2

| Analyte | Result | Qualifier | RL | | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | 10.2 | | 2.87 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Ethylbenzene | 53.8 | | 2.87 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Naphthalene | 30.7 | | 2.87 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Toluene | 6.03 | | 2.87 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Xylenes, Total | 259 | E | 5.73 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Xylenes, Total - RERA | 180 | H | 11.5 | | mg/Kg | 1000 | ☼ | 8260D | Total/NA |

## Client Sample ID: MIP-12 — Lab Sample ID: 400-245713-3

No Detections.

## Client Sample ID: OIP-4 — Lab Sample ID: 400-245713-4

| Analyte | Result | Qualifier | RL | | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Toluene | 150 | | 135 | | mg/Kg | 20000 | ☼ | 8260D | Total/NA |
| Benzene - RERA | 13.6 | H | 3.37 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Ethylbenzene - RERA | 38.5 | H | 3.37 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Naphthalene - RERA | 22.9 | H | 3.37 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Toluene - RERA | 135 | H | 3.37 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |
| Xylenes, Total - RERA | 210 | H | 6.74 | | mg/Kg | 500 | ☼ | 8260D | Total/NA |

This Detection Summary does not include radiochemical test results.

# Sample Summary

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 400-245713-1 | OIP-1 | Solid | 10/26/23 08:55 | 10/27/23 09:17 |
| 400-245713-2 | MIP-6 | Solid | 10/26/23 10:05 | 10/27/23 09:17 |
| 400-245713-3 | MIP-12 | Solid | 10/26/23 13:30 | 10/27/23 09:17 |
| 400-245713-4 | OIP-4 | Solid | 10/26/23 15:45 | 10/27/23 09:17 |

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: OIP-1
**Date Collected: 10/26/23 08:55**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-1
**Matrix: Solid**
**Percent Solids: 69.5**

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <76.6 | | 76.6 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |
| **Ethylbenzene** | **139** | | 76.6 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |
| Methyl tert-butyl ether | <76.6 | | 76.6 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |
| Naphthalene | <76.6 | | 76.6 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |
| Toluene | <76.6 | | 76.6 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |
| **Xylenes, Total** | **528** | | 153 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:36 | 10000 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *99* | | *67 - 130* | *11/09/23 06:35* | *11/09/23 13:36* | *10000* |
| *Dibromofluoromethane* | *84* | | *77 - 127* | *11/09/23 06:35* | *11/09/23 13:36* | *10000* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* | *11/09/23 06:35* | *11/09/23 13:36* | *10000* |

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS - RERA

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Benzene** | **34.0** | **H** | 7.66 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |
| **Ethylbenzene** | **109** | **H** | 7.66 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |
| Methyl tert-butyl ether | <7.66 | H | 7.66 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |
| **Naphthalene** | **71.2** | **H** | 7.66 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |
| **Toluene** | **9.47** | **H** | 7.66 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |
| **Xylenes, Total** | **412** | **H** | 15.3 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:28 | 1000 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *105* | | *67 - 130* | *11/16/23 11:00* | *11/16/23 19:28* | *1000* |
| *Dibromofluoromethane* | *81* | | *77 - 127* | *11/16/23 11:00* | *11/16/23 19:28* | *1000* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* | *11/16/23 11:00* | *11/16/23 19:28* | *1000* |

### General Chemistry

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Percent Moisture (EPA Moisture)** | **30.5** | | 0.01 | | % | | | 11/01/23 15:14 | 1 |

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: MIP-6
**Date Collected: 10/26/23 10:05**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-2
**Matrix: Solid**
**Percent Solids: 77.4**

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Benzene** | **10.2** | | 2.87 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |
| **Ethylbenzene** | **53.8** | | 2.87 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |
| Methyl tert-butyl ether | <2.87 | | 2.87 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |
| **Naphthalene** | **30.7** | | 2.87 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |
| **Toluene** | **6.03** | | 2.87 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |
| **Xylenes, Total** | **259** | **E** | 5.73 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:59 | 500 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *107* | | *67 - 130* | *11/09/23 06:35* | *11/09/23 12:59* | *500* |
| *Dibromofluoromethane* | *80* | | *77 - 127* | *11/09/23 06:35* | *11/09/23 12:59* | *500* |
| *Toluene-d8 (Surr)* | *103* | | *76 - 127* | *11/09/23 06:35* | *11/09/23 12:59* | *500* |

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS - RERA

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Xylenes, Total** | **180** | **H** | 11.5 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:46 | 1000 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *109* | | *67 - 130* | *11/16/23 11:00* | *11/16/23 19:46* | *1000* |
| *Dibromofluoromethane* | *95* | | *77 - 127* | *11/16/23 11:00* | *11/16/23 19:46* | *1000* |
| *Toluene-d8 (Surr)* | *99* | | *76 - 127* | *11/16/23 11:00* | *11/16/23 19:46* | *1000* |

### General Chemistry

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Percent Moisture (EPA Moisture)** | **22.6** | | 0.01 | | % | | | 11/01/23 15:14 | 1 |

# Client Sample Results

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: MIP-12

**Date Collected: 10/26/23 13:30**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-3

**Matrix: Solid**
**Percent Solids: 86.3**

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.209 | | 0.209 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |
| Ethylbenzene | <0.209 | | 0.209 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |
| Methyl tert-butyl ether | <0.209 | | 0.209 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |
| Naphthalene | <0.209 | | 0.209 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |
| Toluene | <0.209 | | 0.209 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |
| Xylenes, Total | <0.419 | | 0.419 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 12:40 | 50 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *96* | | *67 - 130* | *11/09/23 06:35* | *11/09/23 12:40* | *50* |
| *Dibromofluoromethane* | *88* | | *77 - 127* | *11/09/23 06:35* | *11/09/23 12:40* | *50* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* | *11/09/23 06:35* | *11/09/23 12:40* | *50* |

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS - RERA

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00375 | H | 0.00375 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |
| Ethylbenzene | <0.00375 | H | 0.00375 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |
| Methyl tert-butyl ether | <0.00375 | H | 0.00375 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |
| Naphthalene | <0.00375 | H | 0.00375 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |
| Toluene | <0.00375 | H | 0.00375 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |
| Xylenes, Total | <0.00750 | H | 0.00750 | | mg/Kg | ☼ | 11/09/23 05:00 | 11/10/23 00:51 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *106* | | *67 - 130* | *11/09/23 05:00* | *11/10/23 00:51* | *1* |
| *Dibromofluoromethane* | *89* | | *77 - 127* | *11/09/23 05:00* | *11/10/23 00:51* | *1* |
| *Toluene-d8 (Surr)* | *105* | | *76 - 127* | *11/09/23 05:00* | *11/10/23 00:51* | *1* |

### General Chemistry

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Percent Moisture (EPA Moisture) | 13.7 | | 0.01 | | % | | | 11/01/23 15:14 | 1 |

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: OIP-4
**Date Collected: 10/26/23 15:45**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-4
**Matrix: Solid**
**Percent Solids: 71.1**

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <135 | | 135 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |
| Ethylbenzene | <135 | | 135 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |
| Methyl tert-butyl ether | <135 | | 135 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |
| Naphthalene | <135 | | 135 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |
| **Toluene** | **150** | | 135 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |
| Xylenes, Total | <270 | | 270 | | mg/Kg | ☼ | 11/09/23 06:35 | 11/09/23 13:54 | 20000 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *100* | | *67 - 130* | *11/09/23 06:35* | *11/09/23 13:54* | *20000* |
| *Dibromofluoromethane* | *89* | | *77 - 127* | *11/09/23 06:35* | *11/09/23 13:54* | *20000* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* | *11/09/23 06:35* | *11/09/23 13:54* | *20000* |

### Method: SW846 8260D - Volatile Organic Compounds by GC/MS - RERA

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Benzene** | **13.6** | **H** | 3.37 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |
| **Ethylbenzene** | **38.5** | **H** | 3.37 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |
| Methyl tert-butyl ether | <3.37 | H | 3.37 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |
| **Naphthalene** | **22.9** | **H** | 3.37 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |
| **Toluene** | **135** | **H** | 3.37 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |
| **Xylenes, Total** | **210** | **H** | 6.74 | | mg/Kg | ☼ | 11/16/23 11:00 | 11/16/23 19:09 | 500 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *108* | | *67 - 130* | *11/16/23 11:00* | *11/16/23 19:09* | *500* |
| *Dibromofluoromethane* | *89* | | *77 - 127* | *11/16/23 11:00* | *11/16/23 19:09* | *500* |
| *Toluene-d8 (Surr)* | *97* | | *76 - 127* | *11/16/23 11:00* | *11/16/23 19:09* | *500* |

### General Chemistry

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Percent Moisture (EPA Moisture)** | **28.9** | | 0.01 | | % | | | 11/01/23 15:14 | 1 |

# Definitions/Glossary

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Qualifiers

### GC/MS VOA

| Qualifier | Qualifier Description |
|---|---|
| E | Result exceeded calibration range. |
| H | Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CFU | Colony Forming Unit |
| CNF | Contains No Free Liquid |
| DER | Duplicate Error Ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL | Detection Limit (DoD/DOE) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision Level Concentration (Radiochemistry) |
| EDL | Estimated Detection Limit (Dioxin) |
| LOD | Limit of Detection (DoD/DOE) |
| LOQ | Limit of Quantitation (DoD/DOE) |
| MCL | EPA recommended "Maximum Contaminant Level" |
| MDA | Minimum Detectable Activity (Radiochemistry) |
| MDC | Minimum Detectable Concentration (Radiochemistry) |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| MPN | Most Probable Number |
| MQL | Method Quantitation Limit |
| NC | Not Calculated |
| ND | Not Detected at the reporting limit (or MDL or EDL if shown) |
| NEG | Negative / Absent |
| POS | Positive / Present |
| PQL | Practical Quantitation Limit |
| PRES | Presumptive |
| QC | Quality Control |
| RER | Relative Error Ratio (Radiochemistry) |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |
| TNTC | Too Numerous To Count |

## GC/MS VOA

### Analysis Batch: 649355

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-1 | OIP-1 | Total/NA | Solid | 8260D | 649406 |
| 400-245713-2 | MIP-6 | Total/NA | Solid | 8260D | 649406 |
| 400-245713-3 | MIP-12 | Total/NA | Solid | 8260D | 649406 |
| 400-245713-4 | OIP-4 | Total/NA | Solid | 8260D | 649406 |
| MB 400-649406/1-A | Method Blank | Total/NA | Solid | 8260D | 649406 |
| LCS 400-649406/2-A | Lab Control Sample | Total/NA | Solid | 8260D | 649406 |
| 400-245962-A-1-A MS | Matrix Spike | Total/NA | Solid | 8260D | 649406 |
| 400-245962-A-1-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 8260D | 649406 |

### Prep Batch: 649406

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-1 | OIP-1 | Total/NA | Solid | 5035 | |
| 400-245713-2 | MIP-6 | Total/NA | Solid | 5035 | |
| 400-245713-3 | MIP-12 | Total/NA | Solid | 5035 | |
| 400-245713-4 | OIP-4 | Total/NA | Solid | 5035 | |
| MB 400-649406/1-A | Method Blank | Total/NA | Solid | 5035 | |
| LCS 400-649406/2-A | Lab Control Sample | Total/NA | Solid | 5035 | |
| 400-245962-A-1-A MS | Matrix Spike | Total/NA | Solid | 5035 | |
| 400-245962-A-1-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 5035 | |

### Analysis Batch: 649476

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-3 - RERA | MIP-12 | Total/NA | Solid | 8260D | 649570 |
| MB 400-649570/5-A | Method Blank | Total/NA | Solid | 8260D | 649570 |
| LCS 400-649570/6-A | Lab Control Sample | Total/NA | Solid | 8260D | 649570 |
| 400-245962-A-5-B MS | Matrix Spike | Total/NA | Solid | 8260D | 649570 |
| 400-245962-A-5-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 8260D | 649570 |

### Prep Batch: 649570

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-3 - RERA | MIP-12 | Total/NA | Solid | 5035 | |
| MB 400-649570/5-A | Method Blank | Total/NA | Solid | 5035 | |
| LCS 400-649570/6-A | Lab Control Sample | Total/NA | Solid | 5035 | |
| 400-245962-A-5-B MS | Matrix Spike | Total/NA | Solid | 5035 | |
| 400-245962-A-5-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 5035 | |

### Analysis Batch: 650564

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-1 - RERA | OIP-1 | Total/NA | Solid | 8260D | 650676 |
| 400-245713-2 - RERA | MIP-6 | Total/NA | Solid | 8260D | 650676 |
| 400-245713-4 - RERA | OIP-4 | Total/NA | Solid | 8260D | 650676 |
| MB 400-650676/2-A | Method Blank | Total/NA | Solid | 8260D | 650676 |
| LCS 400-650676/1-A | Lab Control Sample | Total/NA | Solid | 8260D | 650676 |
| 400-246159-A-28-B MS | Matrix Spike | Total/NA | Solid | 8260D | 650676 |
| 400-246159-A-28-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 8260D | 650676 |

### Prep Batch: 650676

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-1 - RERA | OIP-1 | Total/NA | Solid | 5035 | |
| 400-245713-2 - RERA | MIP-6 | Total/NA | Solid | 5035 | |
| 400-245713-4 - RERA | OIP-4 | Total/NA | Solid | 5035 | |

## GC/MS VOA (Continued)

### Prep Batch: 650676 (Continued)

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| MB 400-650676/2-A | Method Blank | Total/NA | Solid | 5035 | |
| LCS 400-650676/1-A | Lab Control Sample | Total/NA | Solid | 5035 | |
| 400-246159-A-28-B MS | Matrix Spike | Total/NA | Solid | 5035 | |
| 400-246159-A-28-C MSD | Matrix Spike Duplicate | Total/NA | Solid | 5035 | |

## General Chemistry

### Analysis Batch: 648258

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 400-245713-1 | OIP-1 | Total/NA | Solid | Moisture | |
| 400-245713-2 | MIP-6 | Total/NA | Solid | Moisture | |
| 400-245713-3 | MIP-12 | Total/NA | Solid | Moisture | |
| 400-245713-4 | OIP-4 | Total/NA | Solid | Moisture | |
| 400-245695-A-7 MS | Matrix Spike | Total/NA | Solid | Moisture | |
| 400-245695-A-7 MSD | Matrix Spike Duplicate | Total/NA | Solid | Moisture | |
| 400-245695-A-1 DU | Duplicate | Total/NA | Solid | Moisture | |

## Method: 8260D - Volatile Organic Compounds by GC/MS

**Lab Sample ID: MB 400-649406/1-A**
**Matrix: Solid**
**Analysis Batch: 649355**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 649406**

| Analyte | MB Result | MB Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |
| Ethylbenzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |
| Methyl tert-butyl ether | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |
| Naphthalene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |
| Toluene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |
| Xylenes, Total | <0.0100 | | 0.0100 | | mg/Kg | | 11/09/23 06:35 | 11/09/23 07:36 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *99* | | *67 - 130* | *11/09/23 06:35* | *11/09/23 07:36* | *1* |
| *Dibromofluoromethane* | *90* | | *77 - 127* | *11/09/23 06:35* | *11/09/23 07:36* | *1* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* | *11/09/23 06:35* | *11/09/23 07:36* | *1* |

**Lab Sample ID: LCS 400-649406/2-A**
**Matrix: Solid**
**Analysis Batch: 649355**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 649406**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | | | 0.200 | 0.1373 | | mg/Kg | | 69 | 48 - 160 | | |
| Benzene | | | 0.0500 | 0.04738 | | mg/Kg | | 95 | 65 - 130 | | |
| Ethylbenzene | | | 0.0500 | 0.04991 | | mg/Kg | | 100 | 70 - 130 | | |
| Naphthalene | | | 0.0500 | 0.04636 | | mg/Kg | | 93 | 45 - 144 | | |
| Toluene | | | 0.0500 | 0.04793 | | mg/Kg | | 96 | 70 - 130 | | |
| Xylenes, Total | | | 0.100 | 0.09599 | | mg/Kg | | 96 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *99* | | *67 - 130* |
| *Dibromofluoromethane* | *86* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* |

**Lab Sample ID: 400-245962-A-1-A MS**
**Matrix: Solid**
**Analysis Batch: 649355**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 649406**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | <0.0285 | | 0.228 | 0.2304 | | mg/Kg | ☼ | 94 | 10 - 150 | | |
| Benzene | <0.00569 | | 0.0569 | 0.05619 | | mg/Kg | ☼ | 99 | 38 - 131 | | |
| Ethylbenzene | <0.00569 | | 0.0569 | 0.05891 | | mg/Kg | ☼ | 104 | 35 - 130 | | |
| Naphthalene | <0.00569 | | 0.0569 | 0.05665 | | mg/Kg | ☼ | 100 | 10 - 150 | | |
| Toluene | <0.00569 | | 0.0569 | 0.06063 | | mg/Kg | ☼ | 107 | 42 - 130 | | |
| Xylenes, Total | <0.0114 | | 0.114 | 0.1118 | | mg/Kg | ☼ | 98 | 35 - 130 | | |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *107* | | *67 - 130* |
| *Dibromofluoromethane* | *87* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *105* | | *76 - 127* |

## Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: 400-245962-A-1-C MSD**
**Matrix: Solid**
**Analysis Batch: 649355**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: Total/NA**
**Prep Batch: 649406**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | <0.0285 | | 0.229 | 0.2406 | | mg/Kg | ☼ | 97 | 10 - 150 | 4 | 30 |
| Benzene | <0.00569 | | 0.0572 | 0.05599 | | mg/Kg | ☼ | 98 | 38 - 131 | 0 | 30 |
| Ethylbenzene | <0.00569 | | 0.0572 | 0.05850 | | mg/Kg | ☼ | 102 | 35 - 130 | 1 | 30 |
| Naphthalene | <0.00569 | | 0.0572 | 0.05997 | | mg/Kg | ☼ | 105 | 10 - 150 | 6 | 30 |
| Toluene | <0.00569 | | 0.0572 | 0.06117 | | mg/Kg | ☼ | 107 | 42 - 130 | 1 | 30 |
| Xylenes, Total | <0.0114 | | 0.114 | 0.1108 | | mg/Kg | ☼ | 97 | 35 - 130 | 1 | 30 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *112* | | *67 - 130* |
| *Dibromofluoromethane* | *88* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *105* | | *76 - 127* |

**Lab Sample ID: MB 400-649570/5-A**
**Matrix: Solid**
**Analysis Batch: 649476**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 649570**

| Analyte | MB Result | MB Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |
| Ethylbenzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |
| Methyl tert-butyl ether | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |
| Naphthalene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |
| Toluene | <0.00500 | | 0.00500 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |
| Xylenes, Total | <0.0100 | | 0.0100 | | mg/Kg | | 11/09/23 05:00 | 11/09/23 17:35 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *100* | | *67 - 130* | *11/09/23 05:00* | *11/09/23 17:35* | *1* |
| *Dibromofluoromethane* | *89* | | *77 - 127* | *11/09/23 05:00* | *11/09/23 17:35* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *76 - 127* | *11/09/23 05:00* | *11/09/23 17:35* | *1* |

**Lab Sample ID: LCS 400-649570/6-A**
**Matrix: Solid**
**Analysis Batch: 649476**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 649570**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | | | 0.0500 | 0.04533 | | mg/Kg | | 91 | 65 - 130 | | |
| Ethylbenzene | | | 0.0500 | 0.04807 | | mg/Kg | | 96 | 70 - 130 | | |
| Methylcyclohexane | | | 0.0500 | 0.04359 | | mg/Kg | | 87 | 64 - 130 | | |
| Naphthalene | | | 0.0500 | 0.05144 | | mg/Kg | | 103 | 45 - 144 | | |
| Toluene | | | 0.0500 | 0.04661 | | mg/Kg | | 93 | 70 - 130 | | |
| Xylenes, Total | | | 0.100 | 0.09240 | | mg/Kg | | 92 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *103* | | *67 - 130* |
| *Dibromofluoromethane* | *85* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *100* | | *76 - 127* |

## Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: 400-245962-A-5-B MS**
**Matrix: Solid**
**Analysis Batch: 649476**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 649570**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00567 | | 0.0567 | 0.05369 | | mg/Kg | ☼ | 95 | 38 - 131 |
| Ethylbenzene | <0.00567 | | 0.0567 | 0.05410 | | mg/Kg | ☼ | 95 | 35 - 130 |
| Methylcyclohexane | <0.00567 | | 0.0567 | 0.05146 | | mg/Kg | ☼ | 91 | 29 - 138 |
| Naphthalene | <0.00567 | | 0.0567 | 0.05710 | | mg/Kg | ☼ | 101 | 10 - 150 |
| Toluene | <0.00567 | | 0.0567 | 0.05636 | | mg/Kg | ☼ | 99 | 42 - 130 |
| Xylenes, Total | <0.0113 | | 0.113 | 0.1025 | | mg/Kg | ☼ | 90 | 35 - 130 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *108* | | *67 - 130* |
| *Dibromofluoromethane* | *87* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *104* | | *76 - 127* |

**Lab Sample ID: 400-245962-A-5-C MSD**
**Matrix: Solid**
**Analysis Batch: 649476**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: Total/NA**
**Prep Batch: 649570**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00567 | | 0.0567 | 0.05028 | | mg/Kg | ☼ | 89 | 38 - 131 | 7 | 30 |
| Ethylbenzene | <0.00567 | | 0.0567 | 0.05120 | | mg/Kg | ☼ | 90 | 35 - 130 | 6 | 30 |
| Methylcyclohexane | <0.00567 | | 0.0567 | 0.04890 | | mg/Kg | ☼ | 86 | 29 - 138 | 5 | 30 |
| Naphthalene | <0.00567 | | 0.0567 | 0.05511 | | mg/Kg | ☼ | 97 | 10 - 150 | 4 | 30 |
| Toluene | <0.00567 | | 0.0567 | 0.05483 | | mg/Kg | ☼ | 97 | 42 - 130 | 3 | 30 |
| Xylenes, Total | <0.0113 | | 0.113 | 0.09638 | | mg/Kg | ☼ | 85 | 35 - 130 | 6 | 30 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *113* | | *67 - 130* |
| *Dibromofluoromethane* | *88* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *109* | | *76 - 127* |

**Lab Sample ID: MB 400-650676/2-A**
**Matrix: Solid**
**Analysis Batch: 650564**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 650676**

| Analyte | MB Result | MB Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |
| Ethylbenzene | <0.00500 | | 0.00500 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |
| Methyl tert-butyl ether | <0.00500 | | 0.00500 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |
| Naphthalene | <0.00500 | | 0.00500 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |
| Toluene | <0.00500 | | 0.00500 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |
| Xylenes, Total | <0.0100 | | 0.0100 | | mg/Kg | | 11/16/23 11:00 | 11/16/23 12:27 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene* | *96* | | *67 - 130* | *11/16/23 11:00* | *11/16/23 12:27* | *1* |
| *Dibromofluoromethane* | *91* | | *77 - 127* | *11/16/23 11:00* | *11/16/23 12:27* | *1* |
| *Toluene-d8 (Surr)* | *98* | | *76 - 127* | *11/16/23 11:00* | *11/16/23 12:27* | *1* |

## Method: 8260D - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: LCS 400-650676/1-A**
**Matrix: Solid**
**Analysis Batch: 650564**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 650676**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | | | 0.200 | 0.1706 | | mg/Kg | | 85 | 48 - 160 | | |
| Benzene | | | 0.0500 | 0.04633 | | mg/Kg | | 93 | 65 - 130 | | |
| Ethylbenzene | | | 0.0500 | 0.04803 | | mg/Kg | | 96 | 70 - 130 | | |
| Naphthalene | | | 0.0500 | 0.04559 | | mg/Kg | | 91 | 45 - 144 | | |
| Toluene | | | 0.0500 | 0.04630 | | mg/Kg | | 93 | 70 - 130 | | |
| Xylenes, Total | | | 0.100 | 0.09180 | | mg/Kg | | 92 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *100* | | *67 - 130* |
| *Dibromofluoromethane* | *85* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *99* | | *76 - 127* |

**Lab Sample ID: 400-246159-A-28-B MS**
**Matrix: Solid**
**Analysis Batch: 650564**

**Client Sample ID: Matrix Spike**
**Prep Type: Total/NA**
**Prep Batch: 650676**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | <0.0286 | | 0.229 | 0.1877 | | mg/Kg | ☼ | 82 | 10 - 150 | | |
| Benzene | <0.00572 | | 0.0573 | 0.06618 | | mg/Kg | ☼ | 115 | 38 - 131 | | |
| Ethylbenzene | <0.00572 | | 0.0573 | 0.06878 | | mg/Kg | ☼ | 120 | 35 - 130 | | |
| Naphthalene | <0.00572 | | 0.0573 | 0.06408 | | mg/Kg | ☼ | 112 | 10 - 150 | | |
| Toluene | <0.00572 | | 0.0573 | 0.06587 | | mg/Kg | ☼ | 115 | 42 - 130 | | |
| Xylenes, Total | <0.0114 | | 0.115 | 0.1314 | | mg/Kg | ☼ | 115 | 35 - 130 | | |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *99* | | *67 - 130* |
| *Dibromofluoromethane* | *85* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *100* | | *76 - 127* |

**Lab Sample ID: 400-246159-A-28-C MSD**
**Matrix: Solid**
**Analysis Batch: 650564**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: Total/NA**
**Prep Batch: 650676**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | <0.0286 | | 0.228 | 0.1616 | | mg/Kg | ☼ | 71 | 10 - 150 | 15 | 30 |
| Benzene | <0.00572 | | 0.0571 | 0.05662 | | mg/Kg | ☼ | 99 | 38 - 131 | 16 | 30 |
| Ethylbenzene | <0.00572 | | 0.0571 | 0.05773 | | mg/Kg | ☼ | 101 | 35 - 130 | 17 | 30 |
| Naphthalene | <0.00572 | | 0.0571 | 0.05932 | | mg/Kg | ☼ | 104 | 10 - 150 | 8 | 30 |
| Toluene | <0.00572 | | 0.0571 | 0.05646 | | mg/Kg | ☼ | 99 | 42 - 130 | 15 | 30 |
| Xylenes, Total | <0.0114 | | 0.114 | 0.1099 | | mg/Kg | ☼ | 96 | 35 - 130 | 18 | 30 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene* | *100* | | *67 - 130* |
| *Dibromofluoromethane* | *86* | | *77 - 127* |
| *Toluene-d8 (Surr)* | *101* | | *76 - 127* |

# QC Sample Results

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Method: Moisture - Percent Moisture

**Lab Sample ID: 400-245695-A-1 DU**
**Matrix: Solid**
**Analysis Batch: 648258**

**Client Sample ID: Duplicate**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent Moisture | 17.5 | | | 15.8 | | % | | | | 10 | |

# Lab Chronicle

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: OIP-1
**Date Collected: 10/26/23 08:55**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-1**
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: OIP-1
**Date Collected: 10/26/23 08:55**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-1**
**Matrix: Solid**
**Percent Solids: 69.5**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 6.583 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 10000 | 5 mL | 5 mL | 649355 | 11/09/23 13:36 | WPD | EET PEN |
| Total/NA | Prep | 5035 | RERA | | 6.583 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | RERA | 1000 | 5 mL | 5 mL | 650564 | 11/16/23 19:28 | CAR | EET PEN |

## Client Sample ID: MIP-6
**Date Collected: 10/26/23 10:05**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-2**
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: MIP-6
**Date Collected: 10/26/23 10:05**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-2**
**Matrix: Solid**
**Percent Solids: 77.4**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 7.563 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 500 | 5 mL | 5 mL | 649355 | 11/09/23 12:59 | WPD | EET PEN |
| Total/NA | Prep | 5035 | RERA | | 7.563 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | RERA | 1000 | 5 mL | 5 mL | 650564 | 11/16/23 19:46 | CAR | EET PEN |

## Client Sample ID: MIP-12
**Date Collected: 10/26/23 13:30**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-3**
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: MIP-12
**Date Collected: 10/26/23 13:30**
**Date Received: 10/27/23 09:17**

**Lab Sample ID: 400-245713-3**
**Matrix: Solid**
**Percent Solids: 86.3**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 8.534 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 50 | 5 mL | 5 mL | 649355 | 11/09/23 12:40 | WPD | EET PEN |
| Total/NA | Prep | 5035 | RERA | | 7.726 g | 5.00 g | 649570 | 11/09/23 05:00 | CH | EET PEN |
| Total/NA | Analysis | 8260D | RERA | 1 | 5 mL | 5 mL | 649476 | 11/10/23 00:51 | WPD | EET PEN |

# Lab Chronicle

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: OIP-4
**Date Collected: 10/26/23 15:45**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-4
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: OIP-4
**Date Collected: 10/26/23 15:45**
**Date Received: 10/27/23 09:17**

## Lab Sample ID: 400-245713-4
**Matrix: Solid**
**Percent Solids: 71.1**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 7.473 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 20000 | 5 mL | 5 mL | 649355 | 11/09/23 13:54 | WPD | EET PEN |
| Total/NA | Prep | 5035 | RERA | | 7.473 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | RERA | 500 | 5 mL | 5 mL | 650564 | 11/16/23 19:09 | CAR | EET PEN |

## Client Sample ID: Method Blank
**Date Collected: N/A**
**Date Received: N/A**

## Lab Sample ID: MB 400-649406/1-A
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649355 | 11/09/23 07:36 | WPD | EET PEN |

## Client Sample ID: Method Blank
**Date Collected: N/A**
**Date Received: N/A**

## Lab Sample ID: MB 400-649570/5-A
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 649570 | 11/09/23 05:00 | CH | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649476 | 11/09/23 17:35 | WPD | EET PEN |

## Client Sample ID: Method Blank
**Date Collected: N/A**
**Date Received: N/A**

## Lab Sample ID: MB 400-650676/2-A
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 650564 | 11/16/23 12:27 | CAR | EET PEN |

## Client Sample ID: Lab Control Sample
**Date Collected: N/A**
**Date Received: N/A**

## Lab Sample ID: LCS 400-649406/2-A
**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649355 | 11/09/23 06:41 | WPD | EET PEN |

# Lab Chronicle

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: Lab Control Sample
**Lab Sample ID: LCS 400-649570/6-A**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 649570 | 11/09/23 05:00 | CH | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649476 | 11/09/23 16:31 | WPD | EET PEN |

## Client Sample ID: Lab Control Sample
**Lab Sample ID: LCS 400-650676/1-A**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.00 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 650564 | 11/16/23 11:04 | CAR | EET PEN |

## Client Sample ID: Matrix Spike
**Lab Sample ID: 400-245695-A-7 MS**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: Matrix Spike Duplicate
**Lab Sample ID: 400-245695-A-7 MSD**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

## Client Sample ID: Matrix Spike
**Lab Sample ID: 400-245962-A-1-A MS**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 80.9**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.43 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649355 | 11/09/23 14:13 | WPD | EET PEN |

## Client Sample ID: Matrix Spike Duplicate
**Lab Sample ID: 400-245962-A-1-C MSD**
**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 80.9**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.40 g | 5.00 g | 649406 | 11/09/23 06:35 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649355 | 11/09/23 14:31 | WPD | EET PEN |

# Lab Chronicle

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Client Sample ID: Matrix Spike
**Lab Sample ID: 400-245962-A-5-B MS**

**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 81.2**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.43 g | 5.00 g | 649570 | 11/09/23 05:00 | CH | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649476 | 11/09/23 20:14 | WPD | EET PEN |

## Client Sample ID: Matrix Spike Duplicate
**Lab Sample ID: 400-245962-A-5-C MSD**

**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 81.2**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.43 g | 5.00 g | 649570 | 11/09/23 05:00 | CH | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 649476 | 11/09/23 20:32 | WPD | EET PEN |

## Client Sample ID: Matrix Spike
**Lab Sample ID: 400-246159-A-28-B MS**

**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 80.2**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.44 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 650564 | 11/16/23 13:15 | CAR | EET PEN |

## Client Sample ID: Matrix Spike Duplicate
**Lab Sample ID: 400-246159-A-28-C MSD**

**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**
**Percent Solids: 80.2**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 5035 | | | 5.46 g | 5.00 g | 650676 | 11/16/23 11:00 | KG | EET PEN |
| Total/NA | Analysis | 8260D | | 1 | 5 mL | 5 mL | 650564 | 11/16/23 13:33 | CAR | EET PEN |

## Client Sample ID: Duplicate
**Lab Sample ID: 400-245695-A-1 DU**

**Date Collected: N/A**
**Matrix: Solid**
**Date Received: N/A**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | Moisture | | 1 | | | 648258 | 11/01/23 15:14 | TMP | EET PEN |

**Laboratory References:**

EET PEN = Eurofins Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

# Method Summary

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8260D | Volatile Organic Compounds by GC/MS | SW846 | EET PEN |
| Moisture | Percent Moisture | EPA | EET PEN |
| 5035 | Closed System Purge and Trap | SW846 | EET PEN |

**Protocol References:**

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

EET PEN = Eurofins Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

# Accreditation/Certification Summary

Client: Spectrum Environmental Inc
Project/Site: Pat's Grocery

Job ID: 400-245713-1

## Laboratory: Eurofins Pensacola

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority | Program | Identification Number | Expiration Date |
|---|---|---|---|
| Alabama | State | 40150 | 06-30-24 |
| ANAB | ISO/IEC 17025 | L2471 | 02-22-26 |
| Arkansas DEQ | State | 88-00689 | 08-01-24 |
| California | State | 2510 | 06-30-24 |
| Florida | NELAP | E81010 | 06-30-24 |
| Georgia | State | E81010(FL) | 06-30-24 |
| Illinois | NELAP | 200041 | 10-09-24 |
| Kansas | NELAP | E-10253 | 10-31-24 |
| Kentucky (UST) | State | 53 | 06-30-24 |
| Louisiana (All) | NELAP | 30976 | 06-30-24 |
| Louisiana (DW) | State | LA017 | 12-31-23 |
| North Carolina (WW/SW) | State | 314 | 12-31-23 |
| Oklahoma | NELAP | 9810 | 08-31-24 |
| Pennsylvania | NELAP | 68-00467 | 01-31-24 |
| South Carolina | State | 96026 | 06-30-24 |
| Tennessee | State | TN02907 | 06-30-24 |
| Texas | NELAP | T104704286 | 09-30-24 |
| US Fish & Wildlife | US Federal Programs | A22340 | 06-30-24 |
| USDA | US Federal Programs | P330-21-00056 | 05-17-24 |
| USDA | US Federal Programs | FLGNV23001 | 01-08-26 |
| Virginia | NELAP | 460166 | 06-14-24 |
| West Virginia DEP | State | 136 | 03-31-24 |
| West Virginia DEP | State | 136 | 03-31-24 |

**Eurofins Pensacola**
3355 McLemore Drive
Pensacola, FL 32514
Phone: 850-474-1001 Fax: 850-478-2671

# Chain of Custody Record

eurofins | Environment Testing

400-245713 COC

AL

| Client Information | Sampler: Ryan Cothern | Lab PM: Swafford, Mark H | Carrier: | COC No: 400-123783-42399.1 |
|---|---|---|---|---|
| Client Contact: Jamie Cox | Phone: | E-Mail: Mark.Swafford@et.eurofinsus.com | State of: AL | Page: Page 1 of 2 |
| Company: Spectrum Environmental Inc | PWSID: | | | Job #: |
| Address: 85 Spectrum Cove | Due Date Requested: | | | |
| City: Alabaster | TAT Requested (days): Standard | | | |
| State, Zip: AL, 35007 | Compliance Project: Δ Yes Δ No | | | |
| Phone: 205-612-9298(Tel) | PO #: 16500 | | | |
| Email: jcox@specenviro.com | WO #: 0979-017-54 | | | |
| Project Name: Pat's Grocery TRUST FUND | Project #: 40012686 | | | |
| Site: | SSOW#: | | | |

**Analysis Requested**

**Preservation Codes:**

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)

Other:

| Sample Identification | Sample Date | Sample Time | Sample Type (C=Comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | 8260D - TCL Volatiles | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code: | | | | N | | |
| OIP-1 | 10/26/23 | 8:55 | G | Solid | | | ✓ | | |
| MIP-6 | 10/26/23 | 10:05 | G | Solid | | | ✓ | | |
| MIP-12 | 10/26/23 | 13:30 | G | Solid | | | ✓ | | |
| OIP-4 | 10/26/23 | 15:45 | G | Solid | | | ✓ | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |
| | | | | Solid | | | | | |

**Possible Hazard Identification**
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

**Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)**
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested. I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

| Empty Kit Relinquished by: | Date: | Time: | Method of Shipment: |
|---|---|---|---|

| Relinquished by | Date/Time | Company | Received by | Date/Time | Company |
|---|---|---|---|---|---|
| Ryan Cothern | 10/26/23 | | BP | 10/27/23 917 | |
| Relinquished by: | Date/Time | Company | Received by: | Date/Time: | Company |
| Relinquished by: | Date/Time | Company | Received by: | Date/Time | Company |

| Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks | 4.6°C IR8 |
|---|---|---|---|

Ver: 06/08/2021

# Login Sample Receipt Checklist

Client: Spectrum Environmental Inc

Job Number: 400-245713-1

**Login Number: 245713**
**List Number: 1**
**Creator: Roberts, Alexis J**

**List Source: Eurofins Pensacola**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | N/A | |
| Sample custody seals, if present, are intact. | N/A | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 4.6°C IR8 |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

# APPENDIX C

# COOL-OX DOCUMENTATION

# Chemistry - Oxidation

Cool-Ox®

(Search to control Fenton reaction)

**Oxidation of Hydrocarbons:**

*(Produce Hydrogen Peroxide In-Situ)*

$$CaO_2 + H_2O \rightarrow H_2O_2 + OH^{-1} + O_2 + Ca^{+2}$$

*(Chelates Activate Intrinsic Catalysts – Produces Radicals)*

$$H_2O_2 + Fe^{+2} \rightarrow [OH]^\bullet + OH^{-1} + Fe^{+3}$$

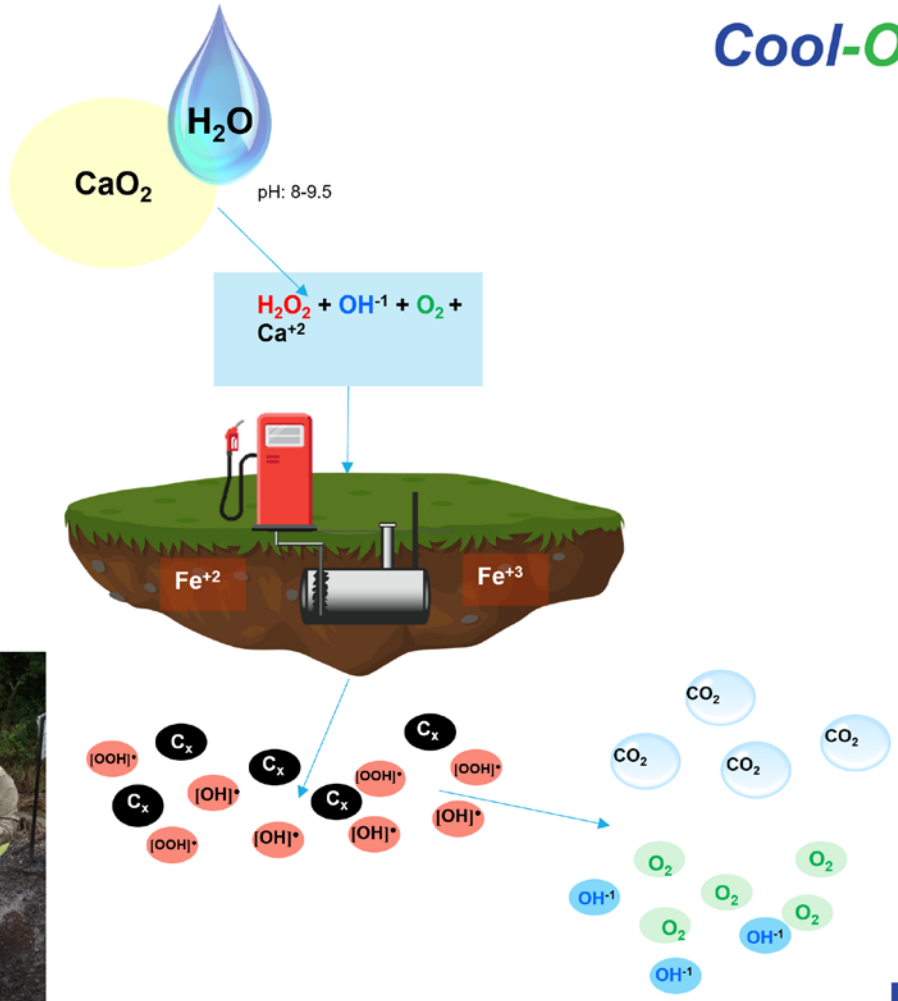
$$H_2O_2 + Fe^{+3} \rightarrow [OOH]^\bullet + OH^{-1} + Fe^{+2}$$

*(Radicals React with Hydrocarbons – Oxidation By-products)*

$$[OH]^\bullet \text{ \& } [OOH]^\bullet + C_x \rightarrow C_x(OH)_y + CO_2$$

*(Biodegradable By-products Used by Microbes)*

$$C_x(OH)_y + O_2 \rightarrow CO_2$$



DeepEarth Technologies, Inc.

Cool-Ox®
"Where Science & Technology Meet"

(708) 396-0100 - tech@cool-ox.com

# ©Corrosion Inhibiting Characteristics of *Cool-Ox*®

It is widely understood that ferrous metals and in particular, steel pipe can suffer catastrophic corrosion under acidic chemical oxidation conditions. In extreme cases, corrosive dissolution of iron can cause failure in the structural integrity of iron pipe culminating in the release of product to the environment. Thus, it came as no surprise that, FMC the producer and vendor of persulfate chemical oxidation products, cautioned against the employment of persulfate reagents in their "*Corrosion and Material Compatibility - Technical Bulletin*" (attached), where contact with ferrous metals was possible. The warning was in line with the general chemistry tenant that where corrosion is concerned, "*acid and iron are a bad combination*." Because of this concern, DTI launched a thorough investigation to determine what affect if any, *Cool-Ox*® would have on iron pipe if the metal were encountered during remedial projects.

During this investigation it was found that the majority of iron pipe failures were from either metal fatigue due to vibration, electrolytic impacts, or chemical corrosion due to contact with acidic compounds or environments. However, *Cool-Ox*® chemical reactions that promote the destruction of hydrocarbons as well as halogenated compounds occur under basic or alkaline conditions. So where does *Cool-Ox*® rank in the corrosion spectrum?

The scientific basis is found in understanding the chemistry concept of pH (the numerical scale used to define the acidity of aqueous (water) chemistry). Simply stated, any solution falling in a pH range of 7 or less (pH<7) is an acid. Whereas, any solution exhibiting a pH greater than 7, (pH>7), is a base. Although volumes have been written concerning the theory and practice of acid/base chemistry, it is important to understand where *Cool-Ox*® fits into the discussion of corrosion chemistry.

Textbooks point out that the inhibition (*stopping*) of the corrosion of iron in alkaline solutions (*this means basic pH>7)* is due to the anodic formation of a film of iron compounds on iron pipe. This film is often a buildup of iron hydroxides or carbonates (*the hardwater scale found in iron pipes*). These iron compounds subsequently harden and in effect, protect the pipe from corrosion. This all happens in a solution with a pH greater than seven (pH>7). But, what about *Cool-Ox*®?

To eliminate the generation of heat and boisterous reactions associated with Fenton chemistry, *Cool-Ox*® produces hydrogen peroxide in-situ by the reaction of calcium peroxide with water. In this reaction, calcium ions ($Ca^{+2}$) and hydroxide ions ($OH^{-}$) are produced as byproducts. Once the hydrogen peroxide is formed, it reacts with iron ions ($Fe^{+2}$) released from the soil matrix by the chelating activities of the *Cool-Ox*® formulation. This reaction produces the hydroxyl radicals [OH°] necessary for the destruction of hydrocarbons. It also produces additional hydroxide ions ($OH^{-}$), again as byproducts of this secondary reaction. Thus, we have two reactions producing hydroxide ions thereby, buffering the pH of the reagent upward to a level of pH 8-9.5 (the alkaline optimum level necessary for hydroxyl radical oxidation as well as reductive halide reactions).

(708) 396-0100 - tech@cool-ox.com

Of additional importance is the fact that the oxidative mineralization of hydrocarbons, produce carbon dioxide as a reaction byproduct. In aqueous solution carbon dioxide associates with water to produce a carbonate ion ($CO_2^-$), that along with hydroxide ion, readily react with the iron ions freed from the soil matrix. These iron salts readily adhere to iron piping forming the hard water scale referred to above and further depositing a protective layer on the pipeline. It can therefore, be concluded that the alkalinity producing characteristics of *Cool-Ox*® will not cause corrosion of iron. And, will in fact, actually inhibit corrosion of iron products.

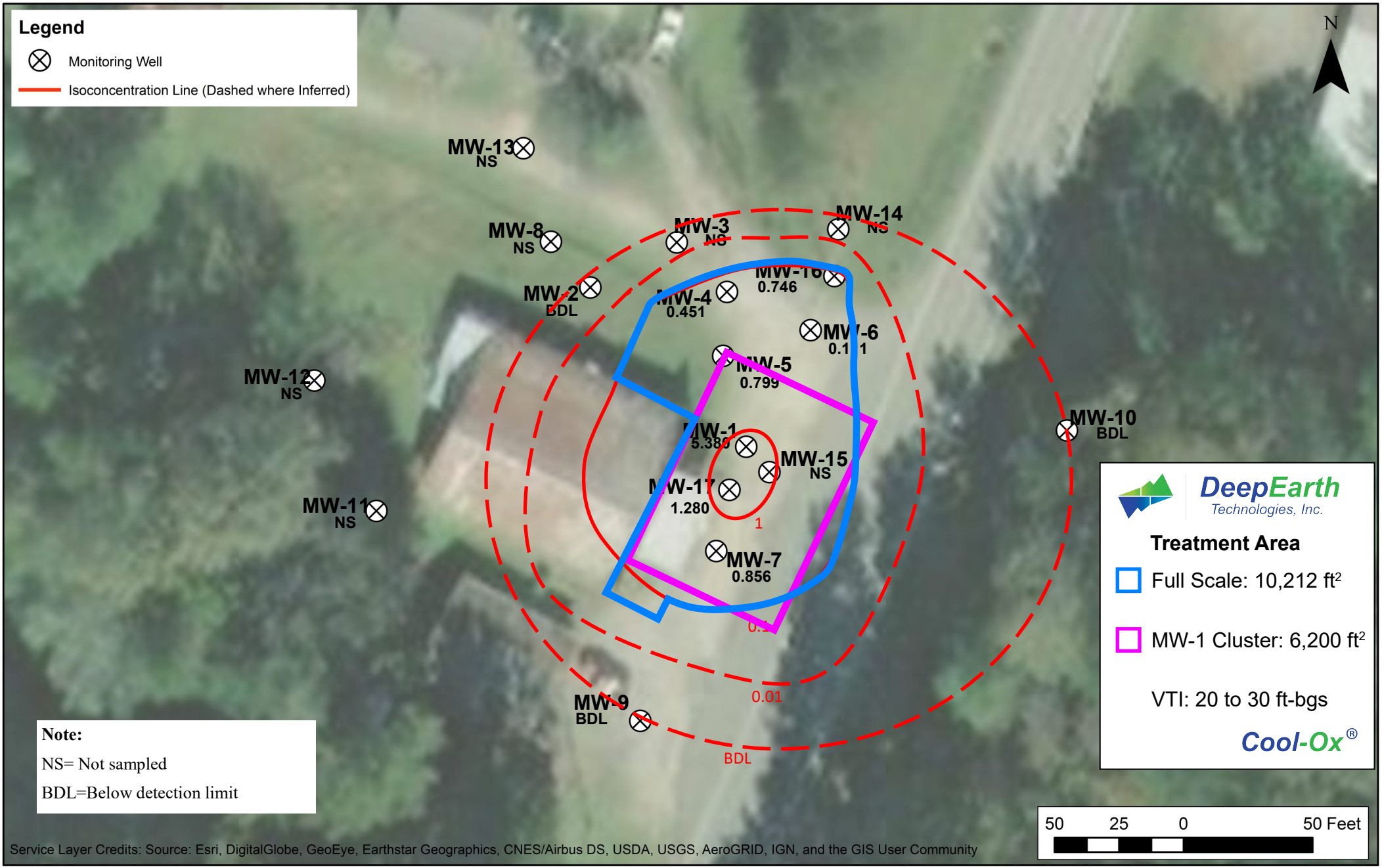



Figure 3 — Benzene Isoconcentration Map

Odenville, Alabama

Pat's Grocery CP 51

Project Number: 0979-017-51

Project Manager: Jamie Cox

Date: 10/17/2023

POLY

SPECTRUM

Solutions to Your Environmental Challenges

DeepEarth Technologies, Inc.

Cool-Ox®

(708) 396-0100 - tech@cool-ox.com

## *DTI Field Services Group - Summary Sheet for Cool-Ox® Application*

Spectrum Environmental, Inc.
85 Spectrum Cove
Alabaster, AL 35007

Site: Pat's Grocery
20303 US Hwy 411
Odenville, AL

5/10/2024

DTI Job #: 2838
Full Scale

Attention: Jamie D. Cox, PG

Phone: 205-612-9298

jcox@specenviro.com

DeepEarth Technologies, Inc., is pleased to submit this proposal for *Cool-Ox®* remediation of subject site:

| | | | |
|---|---|---|---|
| Contaminants: | BTEX, MTBE and Naph | Depth to Groundwater (feet bgl): | 25 |
| Media Treated: | Soil & GW | Vertical Extent (feet bgl): | 20 to 30 |
| Area (square feet): | 10,212 | Proposed Injection Point Spacing (feet): | 7 |
| Cubic Yards: | 3,782 | Reagent Per Cubic Yard (gal): | 6 |
| Number of Points: | 208 | Est. On-Site Days to Complete: | 15 |
| Estimated Total Gals: | 22,693 | Equivalent $: $/CY: | $ 71.99 |
| Gals Per Point: | 109 | | |
| Lump Sum Price: | $ 272,293 | | |

Conditions of Quote:

1) All quotes shall remain in effect for a period of sixty (60) days only. Expired quotes must be renegotiated.

2) The Client shall:
   a) Arrange for a suitable water source at the site.
   b) Arrange for the locating and marking of all underground utilities and structures including GPR. DTI shall not be liable for any damage to such utilities or structures not clearly identified and revealed to DTI.
   c) Secure all permits necessary for the legal commencement of work and right of entry to the site.
   d) If necessary, arrange for coring of paved surfaces prior to the commencement of work.
   e) Pay DTI for all work completed within 30 days of receipt of DTI invoice. For projects in excess of $200,000 a minimum deposit in the amount of 1/3 of the quoted price will be required prior to the commencement of work to cover a portion of the materials and mobilization costs.
   If payment is not received within 30 days of receipt of DTI invoice, a late payment fee of 1.5% per month will be charged.
   f) Notify DTI if any additional on site health and safety training classes are required 30 days prior to job start.
   g) Provide copies of all analytical data derived from samples collected prior to (to establish baseline data), during, and for three years after the completion of the remedial application. This data shall be considered confidential and used to evaluate and improve the *Cool-Ox®* technology.

3) Assumptions:
   a) No work shall be conducted in inclement weather such as lightning storms, freezing conditions, excessive rain or snow. The Stand-by daily rate, if applicable, shall be that rate stated in the work order.
   b) All quotes are based upon an eight (8) hour work day.
   c) In offering this quote, DTI does not warrant or imply that the site shall be remediated to closure standards by a single application of the *Cool-Ox®* technology.
   d) The Estimated Total Gallons states the maximum amount that could be applied at the above mentioned site. If the amount of reagent applied is less than the Estimated Total Gallons, a discount in the Lump Sum Price will not be provided.

4) Site Specific Provisions:

a) This estimate includes all costs for material, labor and equipment for injections. Changes to the scope may be made in the field by DTI to account for unknowns or changes in the site conditions.

b) If a larger treatment area or additional reagent is required to adequately treat the site, a change order shall be be executed by the client prior to the initiation of additional work.

5) Ownership of Documents, Patents, and Copyrights:

Client understands and agrees that the primary reason Client is contracting with DTI is to secure the services and knowledge of DTI to provide Client with in-situ or ex-situ remediation of contaminants employing technology and application methods developed and provided by DTI. Client further understands and agrees that in the broadest definition of the term, the "craft" of DTI is providing, developing and improving the technology for the exclusive commercial or other use of DTI and that all intellectual property developed in the performance of any and all Work performed by DTI for Client or its clients, including, without limitation, all drawings, specifications, reports, summaries, samples, photographs, memoranda, notes, calculations, and other documents collected or prepared by DTI, shall be deemed the exclusive property of DTI.

We at DTI wish to thank you for your consideration of our company as your in-situ chemical oxidation and reduction remedial contractor. If you have any questions regarding the technology or the information contained in this proposal, please contact us immediately. If you are in agreement with the proposal and wish to proceed with the project by reserving a work schedule date, please sign below and return this form to us.

Sincerely,

*William L. Lundy, Sr. V. P.*

DeepEarth Technologies, Inc.

**Accepted:**

Name and Title:_____

Order Number:_____ Date:_____

DeepEarth Technologies, Inc.

Cool-Ox®

(708) 396-0100 - tech@cool-ox.com

## *DTI Field Services Group - Summary Sheet for Cool-Ox® Application*

Spectrum Environmental, Inc.
85 Spectrum Cove
Alabaster, AL 35007

Site: Pat's Grocery
20303 US Hwy 411
Odenville, AL

5/10/2024

DTI Job #: 2838

Attention: Jamie D. Cox, PG  Phone: 205-612-9298  jcox@specenviro.com

DeepEarth Technologies, Inc., is pleased to submit this proposal for *Cool-Ox®* remediation of subject site:

| | | | |
|---|---|---|---|
| Contaminants: | BTEX, MTBE and Naph | Depth to Groundwater (feet bgl): | 25 |
| Media Treated: | Soil & GW | Vertical Extent (feet bgl): | 20 to 30 |
| Area (square feet): | 6,200 | Proposed Injection Point Spacing (feet): | 7 |
| Cubic Yards: | 2,296 | Reagent Per Cubic Yard (gal): | 6 |
| Number of Points: | 127 | Est. On-Site Days to Complete: | 10 |
| Estimated Total Gals: | 13,778 | Equivalent $: $/CY: | $ 78.09 |
| Gals Per Point: | 109 | | |
| Lump Sum Price: | $ 179,320 | | |

Conditions of Quote:

1) All quotes shall remain in effect for a period of sixty (60) days only. Expired quotes must be renegotiated.

2) The Client shall:
   a) Arrange for a suitable water source at the site.
   b) Arrange for the locating and marking of all underground utilities and structures including GPR. DTI shall not be liable for any damage to such utilities or structures not clearly identified and revealed to DTI.
   c) Secure all permits necessary for the legal commencement of work and right of entry to the site.
   d) If necessary, arrange for coring of paved surfaces prior to the commencement of work.
   e) Pay DTI for all work completed within 30 days of receipt of DTI invoice. For projects in excess of $200,000 a minimum deposit in the amount of 1/3 of the quoted price will be required prior to the commencement of work to cover a portion of the materials and mobilization costs.
   If payment is not received within 30 days of receipt of DTI invoice, a late payment fee of 1.5% per month will be charged.
   f) Notify DTI if any additional on site health and safety training classes are required 30 days prior to job start.
   g) Provide copies of all analytical data derived from samples collected prior to (to establish baseline data), during, and for three years after the completion of the remedial application. This data shall be considered confidential and used to evaluate and improve the *Cool-Ox®* technology.

3) Assumptions:
   a) No work shall be conducted in inclement weather such as lightning storms, freezing conditions, excessive rain or snow. The Stand-by daily rate, if applicable, shall be that rate stated in the work order.
   b) All quotes are based upon an eight (8) hour work day.
   c) In offering this quote, DTI does not warrant or imply that the site shall be remediated to closure standards by a single application of the *Cool-Ox®* technology.
   d) The Estimated Total Gallons states the maximum amount that could be applied at the above mentioned site. If the amount of reagent applied is less than the Estimated Total Gallons, a discount in the Lump Sum Price will not be provided.

4) Site Specific Provisions:

a) This estimate includes all costs for material, labor and equipment for injections. Changes to the scope may be made in the field by DTI to account for unknowns or changes in the site conditions.

b) If a larger treatment area or additional reagent is required to adequately treat the site, a change order shall be be executed by the client prior to the initiation of additional work.

5) Ownership of Documents, Patents, and Copyrights:

Client understands and agrees that the primary reason Client is contracting with DTI is to secure the services and knowledge of DTI to provide Client with in-situ or ex-situ remediation of contaminants employing technology and application methods developed and provided by DTI. Client further understands and agrees that in the broadest definition of the term, the "craft" of DTI is providing, developing and improving the technology for the exclusive commercial or other use of DTI and that all intellectual property developed in the performance of any and all Work performed by DTI for Client or its clients, including, without limitation, all drawings, specifications, reports, summaries, samples, photographs, memoranda, notes, calculations, and other documents collected or prepared by DTI, shall be deemed the exclusive property of DTI.

We at DTI wish to thank you for your consideration of our company as your in-situ chemical oxidation and reduction remedial contractor. If you have any questions regarding the technology or the information contained in this proposal, please contact us immediately. If you are in agreement with the proposal and wish to proceed with the project by reserving a work schedule date, please sign below and return this form to us.

Sincerely,

*William L. Lundy, Sr. V. P.*

DeepEarth Technologies, Inc.

**Accepted:**

Name and Title:_____

Order Number:_____ Date:_____