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April 15, 2019

Division of Environmental Remediation
Remedial Bureau E, 12th Floor
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-7016

Attention: Mr. Kyle Forster, Project Manager

Subject: **Data Gap Investigation Report**
Former Bearoff Metallurgical; Site Number 401069
MACTEC Engineering and Consulting, P.C. Project No. 3611171207

Dear Mr. Forster:

This Data Gap Investigation report has been prepared by MACTEC Engineering and Consulting, P.C. (MACTEC) in response to Work Assignment No. D007619-41 from the New York State Department of Environmental Conservation (NYSDEC) for the Former Bearoff Metallurgical site (Site) in Colonie, Albany County, New York. On behalf of the NYSDEC under the state superfund program, MACTEC conducted a Data Gap Investigation to evaluate the following data gap identified during the Remedial Investigation (RI) (MACTEC, 2018a):

- Further evaluation of shallow bedrock groundwater in the northern and eastern portions of the Site as a contributing factor to the seeps and the Site Constituents of Concern (COC) that are observed there was determined to be required.

This data gap was based on:

- Groundwater across the northern and eastern portions of the Site typically has not been encountered in the overburden during investigations conducted to date. However, samples of water from seeps which have been observed on the northern and eastern slopes of the Site contain concentrations of metals and polychlorinated biphenyls (PCBs) exceeding Class GA groundwater standards.

MACTEC Engineering and Consulting, P.C.
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- Water level monitoring conducted during the RI indicated that monitoring wells were nonresponsive to precipitation events largely due to the impermeable clayey till unit underlying the waste/fill materials. This suggested that precipitation across the site preferentially results in overland flow or shallow subsurface migration along the top of the till/clay surface and was potentially the source of the seeps on the Site slopes.

SITE LOCATION

The Site is located at 152 Spring Street Road, in the Town of Colonie, Albany County, New York (Figure 1). It is approximately 10.6 acres and is currently vacant with no buildings or paved roads. The AL Tech Specialty Steel property is located adjacent to the Site to the north (the Waste Management Area) and south (the Main Plant Area). A small unnamed tributary to the Kromma Kill flows from west to east along the north side of the Site, originating in the AL Tech Specialty Steel Waste Management Area. A residential property abuts the Site to the southeast. A portion of a 150-foot long driveway for this residence appears to be located on the Bearoff property according to a 2017 Site survey (MACTEC, 2018a). The Niagara Mohawk Power Corporation (National Grid) has an easement for power lines that run along the eastern edge of the Site on AL Tech property.

INVESTIGATION OBJECTIVES

The objectives for this investigation included evaluation of:

1) bedrock structure compared to seep locations to determine if seeps located on the northern and eastern slopes are the result of bedrock groundwater discharge or precipitation leaching through the waste and flowing along the till/clay surface,
2) water chemistry in the bedrock groundwater and the seeps to identify if seeps on the northern and eastern slopes represent bedrock groundwater, and
3) site groundwater for emerging contaminant 1,4-dioxane.

To meet the objectives, two open borehole bedrock borings were installed at the site following the MACTEC 2011 Quality Assurance Program Plan (QAPP) and the methodologies described in the Field Activities Plans developed for this Site (listed below). Groundwater and seep water samples were also collected. Figure 2 shows the data gap sample locations.

FIELD OPERATIONS

MACTEC conducted field investigations from September 24 through October 17, 2018 in accordance with the specifications presented in the documents below:

- MACTEC's Program QAPP (MACTEC, 2011a),
- Health and Safety Plan (HASP) (MACTEC, 2011b),
- Site Specific HASP (MACTEC, 2017a),
- Field Activities Plan (FAP) Former Bearoff Metallurgical (MACTEC, 2017b), and
- Data Gap Investigation FAP (MACTEC, 2018b).

Subcontractors chosen to support the field activities include:

- Bedrock drilling - North Star Drilling, Homer, New York;
- Site survey - Shumaker Consulting Engineering, Albany, New York;
- Borehole geophysics - Northeast Geophysical, Hampden, Maine;
- Groundwater analysis - Test America Laboratories, Buffalo, New York.

HEALTH AND SAFETY

Primary hazards at this Site include physicals hazards associated with steep slopes and debris (e.g. drums, metal debris, concrete, tires, etc.). Field investigations were conducted in Level D or Modified Level D personal protective equipment. There were no safety incidents during field activities.

ACCESS AND CLEARANCE

Investigation activities occurred on the Site property (Figure 2). MACTEC coordinated access with the NYSDEC prior to mobilization. To clear exploration locations, MACTEC and its drilling subcontractor marked locations in the field and coordinated utility clearance with Dig Safely, New York.

DOCUMENTATION

Investigation documentation was conducted as described in the Site FAPs, and the field data records are included in Attachment 1.

GROUNDWATER DATA GAP INVESTIGATION

The data gap investigation included the following:

- Installation and geophysical logging of two open bedrock boreholes.
- Synoptic groundwater measurements for both new and existing wells on and in the vicinity of the Site.
- Groundwater and Seep Sampling
    - Groundwater samples were collected from the newly installed open borehole wells for PCBs, target analyte list (TAL) metals, hexavalent chromium, chloride, sulfate and alkalinity using low-flow sampling techniques.
    - Grab samples were collected from one seep on the northern slope (PP-2) and one seep on the eastern slope (PP-3) for comparison to data from the new bedrock wells. Seeps were sampled for PCBs, TAL metals, hexavalent chromium, chloride, sulfate and alkalinity.
    - Groundwater sampling for 1,4- dioxane from MW-04 and BR-202.
- Location survey of groundwater and seep samples (horizontal to 0.1 feet and vertical to 0.01 feet).

Bedrock Well Installation

Two open bedrock boreholes (BR-201 and BR-202) were advanced using hollow stem augers through the waste/fill and clayey and silty overburden to the top of bedrock. A steel casing was grouted in place to seal off the overburden materials. The boreholes were then advanced into the shale bedrock using rock coring methods.

The terminal depths of the boreholes were designed to capture shallow bedrock groundwater to an elevation comparable to and below that which the seeps are observed on the downgradient slope. Borehole BR-201 was advanced 26 feet (ft) to the top of bedrock and 44.4 ft into shale bedrock for a total depth of 70.4 ft below ground surface (bgs). Borehole BR-202 was advanced 37 ft to the top of bedrock and 29.1 ft into the shale bedrock for a total depth of 66.1 ft bgs. Soil boring and rock coring logs are included in Attachment 1.

The boreholes were developed by over pumping in accordance with procedures outlined in the FAPs.

Bedrock Geophysical Evaluation

Geophysical logging was conducted by Northeast Geophysical Services of Hampden, Maine on the open boreholes for each of the newly installed bedrock wells. The following data were collected:

- Acoustic and optical televiewer data to determine the location, degree of weathering, and attitude of fractures exposed in the bedrock borehole.
- Caliper (3-arm type) data to measure the diameter of the borehole. Deviations in borehole diameter indicate the presence of fractures leaving breakouts in the borehole wall. Caliper data could also be used to locate packer intervals for a proper seal; if packer sampling is deemed necessary in the future.
- Fluid temperature and fluid resistivity log data to evaluate the presence of hydraulically active fractures and highly conductive groundwater.
- Electrical logs (Single Point Resistance/ Spontaneous Potential/ Current) to evaluate the presence of hydraulically active fractures and possible changes in lithology.
- Natural gamma data to evaluate bedrock lithology (particularly shale/non shaley units).
- Heat pulse flowmeter and pressure transducer logging completed under non-pumping (ambient) and pumping conditions. The log data was used to determine the location of water bearing fractures under non-stressed and stressed conditions.

A summary report of the geophysical findings is presented in Attachment 2.

Synoptic Groundwater Monitoring

A synoptic round of water levels from Site and nearby monitoring wells located at the AL Tech Waste Management Area was collected prior to groundwater and seep sampling. The groundwater elevation measurements are presented in Table 1. Water level measurements were not collected from the downgradient wells in the area of the AL Tech Leachate building or from the historically dry piezometers. The overburden groundwater potentiometric surface is presented on Figure 3. The interpreted bedrock groundwater flow direction is presented on Figure 4.

Groundwater/Seep Sampling

Due to low recharge rates, newly installed open borehole bedrock well BR-201 and existing well MW-4 were purged dry and allowed to recover prior to sampling the groundwater recharge. Open borehole bedrock well BR-202 was sampled using low-flow sampling procedures as described in the FAP (MACTEC, 2017b). In addition, grab samples were collected from two previously sampled seep locations (PP-02 and PP-03). PP-02 was sampled on the embankment in a visibly saturated area approximately 20 ft upslope of the unnamed tributary. The sample was collected using a push point sampler inserted 0.25 ft bgs. Water quality readings were collected before and after sampling at PP-02.

PP-03 was sampled below rubble along a saturated area leading to phragmites. Unsuccessful attempts were made to sample PP-03 with a push point sampler. The sampler was pushed into the ground at varying depths and angles and then removed slowly while pumping to find a water source. Each attempt yielded small amounts of turbid water that was insufficient for sampling. Off-setting horizontally throughout the saturated area yielded similar results. PP-03 was ultimately collected by digging a shallow hole and sampling the accumulated water. Water quality parameter readings were collected prior to sampling the seep.

The groundwater and seep sampling field data records are provided in Attachment 1. Purge water from the groundwater and seep sampling did not exhibit visual or olfactory evidence of contamination and was released to the ground surface in the immediate area of the sampling location in accordance with the FAP (MACTEC, 2017b).

Groundwater and seep samples were analyzed for PCBs, TAL Metals, hexavalent chromium, chloride, sulfate, alkalinity and 1,4-dioxane (BR-202 and MW-4 only). Due to elevated turbidity at PP-03 a field filtered sample for dissolved TAL metals was also collected.

Elevation Survey

Shumaker Consulting Engineering of Albany, New York completed a survey of the newly installed boring locations. Horizontal locations were tied to the New York State Plane Coordinate System using North American Datum of 1983.

Vertical elevations of groundwater wells were tied to mean sea level (msl), using North American Vertical Datum of 1988, and measured to an accuracy of 0.01 ft; horizontally the well was measured to an accuracy of 0.1 ft. The elevation survey is presented in Attachment 3.

RESULTS AND DISCUSSION

Site Geology and Hydrology

Geology

Overburden in the area consists of steel manufacturing waste fill (where present) and clayey till. The fill is variable in nature and is comprised of debris such as slag, metal fragments, brick, fire brick, and concrete, as well as sand and gravel. Fill thickness varies across the extent of the Site. Fill is generally underlain by competent clayey till deposits of varying plasticity which are underlain by bedrock. Bedrock encountered consists of dark gray shale, which is consistent with area bedrock maps. According to published maps, the bedrock in the area of the Site consists of the Middle Ordovician Normanskill Shale (Fisher et al, 1970) also referred to as the Snake Hill Shale (United States Geological Survey, 2014). The Snake Hill Shale is characteristically medium to dark gray, silty, micaceous, and pyritic with occasional thin interbeds of siltstone and fine grained calcareous mudstone. The Snake Hill Shale is intensely folded and well cleaved.

Site features observed during the drilling of BR-201 and BR-202 were consistent with those observed during the RI and Site Characterization (SC) investigations (MACTEC, 2018a and MACTEC, 2015). An updated bedrock surface map is presented as Figure 5. Cross sections for the Site are presented as Attachment 4.

BR-201 encountered approximately 17.5 ft of mixed fill consisting of fire brick, slag, metal, ceramic rollers, and other waste debris followed by 8.5 ft of moist, plastic clay and silt before encountering shale bedrock at 26 ft bgs (162.2 ft msl) (Attachment 4 - Figures A4.2 and A4.3).

BR-202 did not encounter fill material. The boring encountered thicker than expected (37 ft) of plastic clay and silt overlying deeper than expected shale bedrock (present at 150.7 ft msl) (Attachment 4 - Figures A4.2 and A4.3). The localized bedrock trough and associated thicker overburden deposits is consistent with other trough structures inferred at the nearby AL Tech Main

Plant area and Waste Management area sites (MACTEC, 2017c). The bedrock knob observed at TP-07 and TP-08 has been narrowed from the RI interpretation as a result of the localized trough structure observed at BR-202.

Hydrology

Groundwater flow directions did not deviate significantly from those observed in the RI. In general, over the course of the Site investigations groundwater has not been observed in the overburden monitoring wells, piezometers, and soil borings across the northern and eastern portion of the Site (Figure 3). Monitoring wells installed at the Site indicate that groundwater is greater than 25 ft bgs across the west-central portion of the Site.

Data collected from pressure transducers during the RI indicated a gradual lowering of both bedrock and overburden groundwater over the month of September 2017 (MACTEC, 2018a). Rainfall that was recorded early in the month of September at Albany airport did not appear to influence the recorded groundwater levels. Piezometers PZ-01 and PZ-03 (Figure 2), located along the southern embankment of the unnamed tributary, and installed on top of bedrock, did not contain water during the entire month of September 2017. This implies that groundwater that is contributing to the flow of the unnamed tributary is from the discharge of bedrock groundwater. Seeps that occur along the unnamed tributary's southern embankment and from the Site's eastern slopes are inferred to be due to surface water runoff (i.e., precipitation) traveling along the surface of the underlying clay.

Where overburden groundwater is present, hydraulic gradients are relatively flat across the site with a slight 0.05 ft/ft slope to the east, which mimics the general topography. The vertical hydraulic gradient between the overburden/bedrock monitoring well pair MW-04/MW-101 does not suggest a vertical flow component between the two formations on the Site. Previous water levels at the MW-21/MW-21B (overburden/bedrock) well pair downgradient of the Site indicate a more regional downward vertical gradient between the overburden and bedrock (MACTEC 2018a).

The geophysical logs for BR-201 identified possible water bearing fractures due to apparent rust staining located from 35.5 to 40.1 ft bgs (152.6 to 148 ft msl). Although these fractures were identified as above the water table in the geophysical logging report, the water level had risen to an elevation above this zone by the time groundwater sampling occurred. Flowmeter measurements taken under ambient and pumping conditions indicated no flow in the borehole. However, these tests

were conducted in the water column below these potentially transmissive fractures. These potentially transmissive fractures dip from the horizontal at an average of 40 degrees (°) to the southeast (129° azimuth) with a strike to the northeast (39° azimuth).

Geophysical results for BR-202 indicate likely transmissive fractures at 47.2 ft bgs (140.5 ft msl) and 50.9 ft bgs (136.8 ft msl). Flow measurements under ambient conditions indicated no flow, however under pumping conditions upflow was observed from the fractures at 47.2 and 50.9 ft bgs at 0.18 gpm. Deviations in the caliper log and median fluid conductivity also suggest that these fractures are transmissive. These likely transmissive fractures at BR-202 dip at approximately 20° from the horizontal to the east-northeast (96° and 31° azimuth) with a strike to the north-northwest (6° and 329° azimuth).

The azimuthal directions and dip angles of these potentially water bearing fractures are consistent with the interpreted overall groundwater flow in bedrock toward the steep slopes to the east-northeast of the Site. A component of groundwater flow may also be attributed to the strike of these features, largely identified to the north towards the unnamed tributary. The relative elevations and attitudes of these features suggest that water bearing fractures in bedrock have limited potential to be discharging as seeps on the steep slopes of the Site.

The groundwater elevation at BR-202 was measured as 150.27 ft msl and the top of bedrock is at 150.7 ft msl. The measured groundwater elevation at BR-202 was significantly lower than those observed in nearby bedrock wells BR-201 and MW-101 (159.38 and 162.51 ft msl, respectively). Groundwater in this well, BR-202, is likely not well connected to the overburden groundwater due to the overlying clays and silts acting as a hydraulic barrier. Groundwater in BR-201 was observed just below the bedrock surface which is consistent with the lack of overburden groundwater observed at nearby well MW-02. Water levels at MW-101 were measured above the top of bedrock and may be the result of coarse grained material and less fine material in the overburden immediately overlying bedrock in this area, allowing connection of groundwater between the overburden and fractured bedrock. In other areas of the Site, where there is a lack of permeable material, the presence of relatively impermeable clays and silt overlying bedrock likely act as an aquitard. This heterogeneity in overburden material at the bedrock interface is evident in the relative specific capacity of the overburden wells. The specific capacity at monitoring well MW-4 is 0.04 gpm/ft and

at MW-1 is <0.008gpm/ft. This indicates that overburden at MW-4 where coarser material is observed, is more transmissive than at MW-1, where coarser material is not observed.

The more highly fractured bedrock at BR-202 may represent an area of localized preferential groundwater flow in bedrock acting as a hydraulic sink, as reflected in the difference of water elevations between BR-201, BR-202, and MW-101. However, even with this localized hydraulic sink the overall flow of bedrock groundwater is expected to be to the east-northeast across the Site in the direction of the identified fracture dips. There is some potential for groundwater to migrate along the strike of the fractures towards the steep slopes and the unnamed tributary to the north which is consistent with bedrock groundwater acting as a contributing source to the tributary. This northward flow potential might be limited based on the competence of the rock observed at BR-201.

Groundwater and Seep Sample Results

Groundwater and seep sampling results are presented in Table 2. Concentrations of contaminants were compared to Class GA Groundwater Quality Standards and Guidance Values (New York State [NYS], 2006). A Data Usability Summary Report was prepared in accordance with the NYSDEC's Guidance for the Development of Data Usability Summary Reports (NYSDEC, 2010) and is provided as Attachment 5. Data results were determined usable for the objectives of the Data Gap Investigation.

The groundwater and seep sampling results were consistent with those observed during the RI.

- Metals – Site COC metals (barium and hexavalent chromium) were only observed above Class GA standards in the seep samples. Nickel was detected above Class GA standards at PP-3. However, turbidity values were elevated at this location and the concentrations of nickel in the dissolved metals analysis were below Class GA standards. Detections of Site related COCs in the bedrock groundwater samples, when present, were typically one to two orders of magnitude lower in concentration in comparison to the seep sample results.
- PCBs - PCBs were detected above Class GA standards at seep location, PP-2. PCBs were not detected in the other samples. Due to the elevated turbidity of the sample collected at PP-3, reporting limits for PCBs were elevated and subsequently non-detect. PCBs were previously detected during the SC and RI at seep locations PP-3 and PP-4. PCBs have consistently not been detected in groundwater at the Site.
- Emerging contaminant 1,4-dioxane was not detected in the groundwater samples collected and is therefore not considered a Site COC.

Seep and Bedrock Geochemistry Comparison

Geochemistry data collected from the bedrock wells was compared to that from seeps identified on the steep downgradient slopes of the Site. Cations (calcium, magnesium, sodium, and potassium) and anions (bicarbonate alkalinity, sulfate, and chloride) were selected for comparison purposes as they are naturally occurring in soils, bedrock, and precipitation in the region. The concentrations of these constituents are not expected to be affected by the presence or absence of Site COCs.

The concentrations of the cations and anions selected are presented in Table 2. The anion/cation total concentrations were normalized to percent concentrations by converting to milliequivalents per liter (meg/L). Stiff plots were generated using these percent concentrations to compare the bedrock groundwater and seep sample results and are presented in Attachment 6.

The stiff plots indicate that the seeps are geochemically different than bedrock groundwater, particularly in the disparity in relative sulfate concentrations, where bedrock groundwater was higher in sulfate concentrations (magnitude and total anion percentage) than in the seep water. Shale bedrock typically contains sulfur bearing minerals that will leach sulfate into groundwater resulting in high sulfate concentrations. Water derived from meteoric precipitation is typically much lower in sulfate concentrations. The sampling results indicate that the source water for the seeps is from infiltrating precipitation that is migrating through the shallow subsurface along the surface of the impermeable clay and silt rather than from bedrock groundwater.

REVISED CONCEPTUAL SITE MODEL

Based on the results of the data gap investigation, the conceptual site model (CSM) has been updated from that presented in the RI report (MACTEC, 2018a). The entire updated CSM is presented below for continuity purposes.

Site History

The known history of Bearoff Metallurgical operations is vague. Activities at the Site appear to have occurred between 1952 and 1978 based on available aerial photographs (MACTEC, 2018a). It is

believed that the Site was used for waste disposal for the AL Tech Specialty Steel property prior to waste regulation (NYSDEC, 2017). Historical documentation, previously collected data, and data collected for the RI indicate that metals and PCBs were released to Site soils as a result of previous Site activities.

Contaminants of Concern

Contaminants of concern at the site include:

- Metals (primarily chromium [hexavalent and trivalent], nickel, copper, and barium) and
- PCBs.

These contaminants are typically associated with industrial waste materials including waste from steel mill operations.

Source Areas and Points of Entry

Contaminants detected on-site are associated with waste materials/fill which was apparently deposited on the ground surface and used to fill low areas throughout the Site. The fill is variable in content, presumably depending on the type of waste accepted at the time of deposition. Some fill areas consist primarily of fire brick and ash and other areas consist of slag, metal fragments, and fire brick, while other areas additionally include concrete construction debris. Metals contamination was typically associated with the waste/fill materials throughout the Site. However, concentrations in several soil samples were detected above soil cleanup objectives in areas beyond the visual extent of the waste. PCB contamination in shallow surface soil samples is present at the highest concentrations in the north and central portions of the Site, with decreasing concentrations along the site road to the site entrance, which may be due to tracking by vehicles.

Contaminant Fate and Transport

Metals and PCBs are typically very persistent in the environment, remaining long after their use discontinues. Once released into the environment metals may be soluble in water depending on the geochemistry of the Site soils and their physical state upon their release. Although metals as elements do not break down, they are often present in various ionic states or complexed with other metals

depending on factors such as the surrounding chemistry, which may change their chemical properties and their behavior in the environment.

PCBs are hydrophobic and readily sorb to soil particles. PCBs are chemically stable and strongly resistant to degradation. PCBs can be broken down by the effect of sunlight (such as in shallow surface water) or by microorganisms in soil and sediment. The rate of breakdown by microorganisms depends on the PCB congener present, the type of microorganisms present, available nutrients, and temperature.

Processes including infiltration, percolation, and erosion can cause migration from one environmental medium to another and/or one area of the Site to another. Mobility of PCBs in the environment is generally low; metals may be more mobile depending on the ionic state of the metal and the Site geochemistry.

Migration Pathways

Contaminants detected on-site are typically associated with the waste materials/fill. Site related contaminants including metals and PCBs are present in soil, groundwater, surface water, and sediment. Migration pathways for the contaminants from soil into the other media include erosion/overland flow and leaching.

Erosion/Overland Flow

The presence of metals contamination beyond the visual extent of the fill/waste suggests that erosion and overland flow of soils is a migration pathway at the Site. PCBs in surface soils can migrate by erosional processes, with precipitation, or by tracking as people and/or vehicles move through the area. Elevated concentrations of metals and PCBs in surface water in the unnamed tributary were also present, although less frequent, suggesting that erosion of soil down the steep embankment and into nearby surface water bodies is a migration pathway at the Site. Metals and PCB contamination of surface soils and waste materials adjacent to the unnamed tributary may be contributing to contamination detected in sediments.

Infiltration/Leaching

Metals and PCBs have the potential to impact groundwater by leaching with infiltrating precipitation. Contaminants may then migrate with groundwater and discharge directly to adjacent surface water bodies or as seeps on the steep embankment adjacent to the Site. Migration of PCBs through leaching with precipitation into the groundwater is expected to be minimal since 1) PCBs are hydrophobic and tend to adsorb to soil particles, and 2) concentrations in soil are observed to be decreasing with depth. Review of the analytical data for perched groundwater indicates that detections for PCBs and metals were less frequent and at lower concentrations than in soil. PCBs were not detected in groundwater samples collected from the groundwater monitoring wells and are limited to water samples collected with shallow push point samplers from perched water located above the water table. Toxicity Characteristic Leaching Procedure results also indicate that concentrations of metals in soil potentially mobilized by rainfall from Site soils are low in comparison to regulatory criteria. This data together suggests that although contaminants in soil are leaching to perched water with rainwater, this migration pathway to underlying groundwater may be limited for this Site.

Water discharging at the seeps along the steep slopes of the Site is interpreted to be the result of rainwater migrating down to, and then along the surface of the impermeable clay underlying the Site based on:

- the geochemical data,
- the infrequent detections of Site COCs in monitoring wells,
- the general horizontal or slightly downwards hydraulic gradients, and
- the relative difference in potentiometric groundwater elevations.

Metals and PCB detections in the seeps may be contributing to contamination detected in surface water in the unnamed tributary and surface soils on the eastern slope of the Site. As such, the seeps are considered part of the contaminant migration pathway identified for the Site; however, the seeps are not considered to be related to bedrock groundwater migration.

Complete Exposure Pathways

Site related contaminants including metals and PCBs are present in soil, groundwater, surface water, and sediment. Potentially complete exposure pathways were identified for direct contact with soil,

groundwater, surface water, and sediment. Under the current use conditions human exposure to these media is limited. Potential future human exposure is possible if the Site is re-developed.

CONCLUSIONS AND RECOMMENDATIONS

The objectives of the data gap investigation have been met.

1) The bedrock structure from the geophysical logging indicates that even though there are transmissive fractures dipping to the east-northeast in the direction of the steep Site slopes and seeps, the relative elevations and dip angles of the fractures suggest that bedrock groundwater is not a likely source for the seeps.
2) Comparison of the cation/anion geochemistry results from bedrock groundwater and the seep samples suggests that the seeps are the result of infiltrating precipitation migrating along the shallow impermeable clay/silt surface and are not the result of daylighting bedrock groundwater.
3) Emerging contaminant 1,4-dioxane was not observed and is not considered a COC for the Site.

Based on the sampling results to date, perched groundwater may be impacted by Site COCs; however, deeper, non-perched groundwater does not appear to be impacted by downward percolation/infiltration of Site COCs. Under current Site conditions the monitoring wells present a potential pathway for Site COCs to penetrate the impermeable clays and silt underlying the waste/fill materials and into the water table. As such MACTEC recommends that the Site monitoring wells be decommissioned in the future.

If you have questions or concerns, please contact us at 207-828-3200.

Sincerely,

MACTEC Engineering and Consulting, P.C.

Jean Firth, PG
Project Manager

Charles Staples, PG
Technical Reviewer

Enclosures:

Figures

Tables

Attachment 1: Field Data Records

Attachment 2: Borehole Geophysical Logging Report

Attachment 3: Site Survey

Attachment 4: Site Cross Sections

Attachment 5: Data Usability Summary Report

Attachment 6: Geochemistry Stiff Plots

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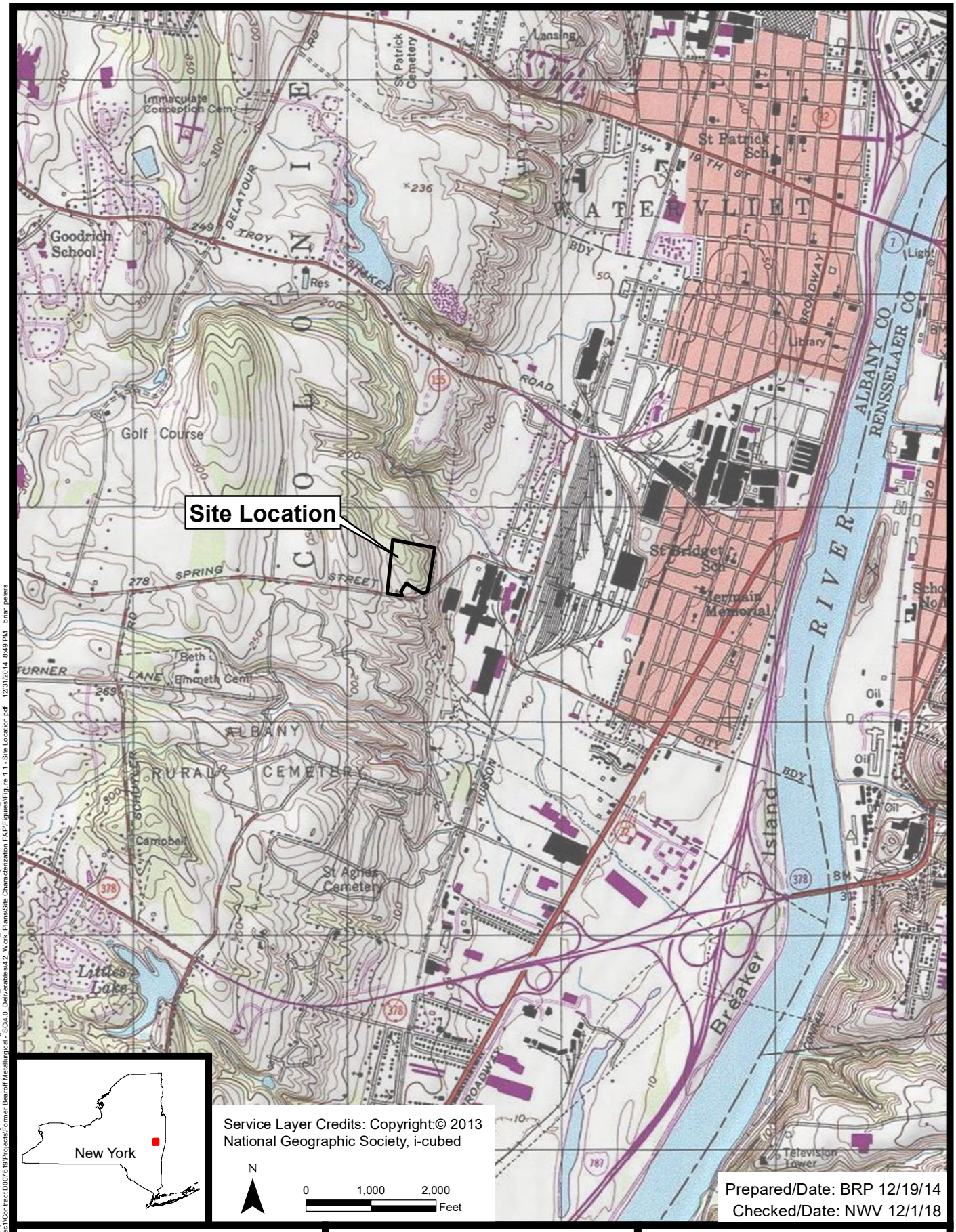
LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
COC	constituent of concern
CSM	conceptual site model
°	degree
FAP	Field Activities Plan
ft	feet
HASP	Health and Safety Plan
MACTEC	MACTEC Engineering & Consulting, P.C.
meg/L	milliequivalents per liter
msl	mean sea level
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
PCBs	polychlorinated biphenyls
QAPP	Quality Assurance Program Plan
RI	Remedial Investigation
Site	Former Bearoff Metallurgical
SC	Site Characterization
TAL	target analyte list

FIGURES



NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

Site Location

Project 3611171207 Figure 1

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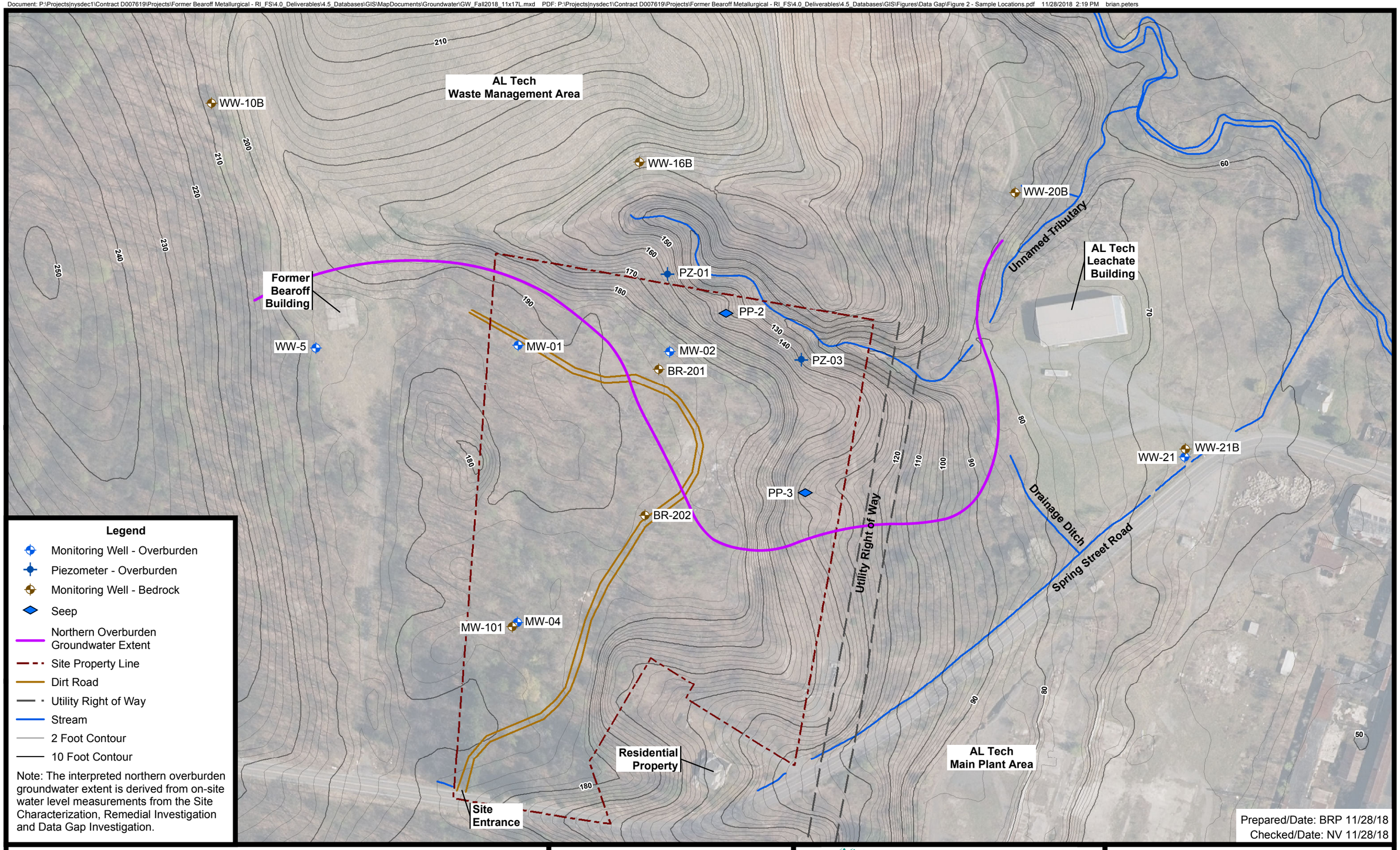


Legend

- Monitoring Well - Overburden
- Piezometer - Overburden
- Monitoring Well - Bedrock
- Seep
- Northern Overburden Groundwater Extent
- Site Property Line
- Dirt Road
- Utility Right of Way
- Stream
- 2 Foot Contour
- 10 Foot Contour

Note: The interpreted northern overburden groundwater extent is derived from on-site water level measurements from the Site Characterization, Remedial Investigation and Data Gap Investigation.

Prepared/Date: BRP 11/28/18
Checked/Date: NV 11/28/18

N

0 70 140 Feet

Albany County color digital orthoimagery (2014) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

Data Gap Investigation
Sample Locations
Project 3611171207 Figure 2

AL Tech
Waste Management Area

WW-10B
WW-16B
WW-20B
WW-21
WW-21B

Former
Bearoff
Building

AL Tech
Leachate
Building

Unnamed Tributary

PZ-01
PP-2
138.15
PZ-03

WW-5
178.79

MW-01
164.07

MW-02
<156.55

BR-201

BR-202

PP-3
134.98

MW-101

MW-04
162.58

Utility Right of Way

Drainage Ditch

Spring Street Road

Residential
Property

AL Tech
Main Plant Area

Site
Entrance

210 200 210 220 230 240 250 170 160 150 160 170 180 190 180 180 120 110 100 90 80 70 60 90 80 50

Legend

- Interpreted Potentiometric Surface - Overburden
- Northern Overburden Groundwater Extent
- Monitoring Well - Overburden
- Piezometer - Overburden
- Monitoring Well - Bedrock
- Seep
- Site Property Line
- Dirt Road
- Utility Right of Way
- Stream
- 2 Foot Contour
- 10 Foot Contour

Note: The interpreted northern overburden groundwater extent is derived from on-site water level measurements from the Site Characterization, Remedial Investigation and Data Gap Investigation.

Prepared/Date: BRP 11/28/18
Checked/Date: NV 11/28/18

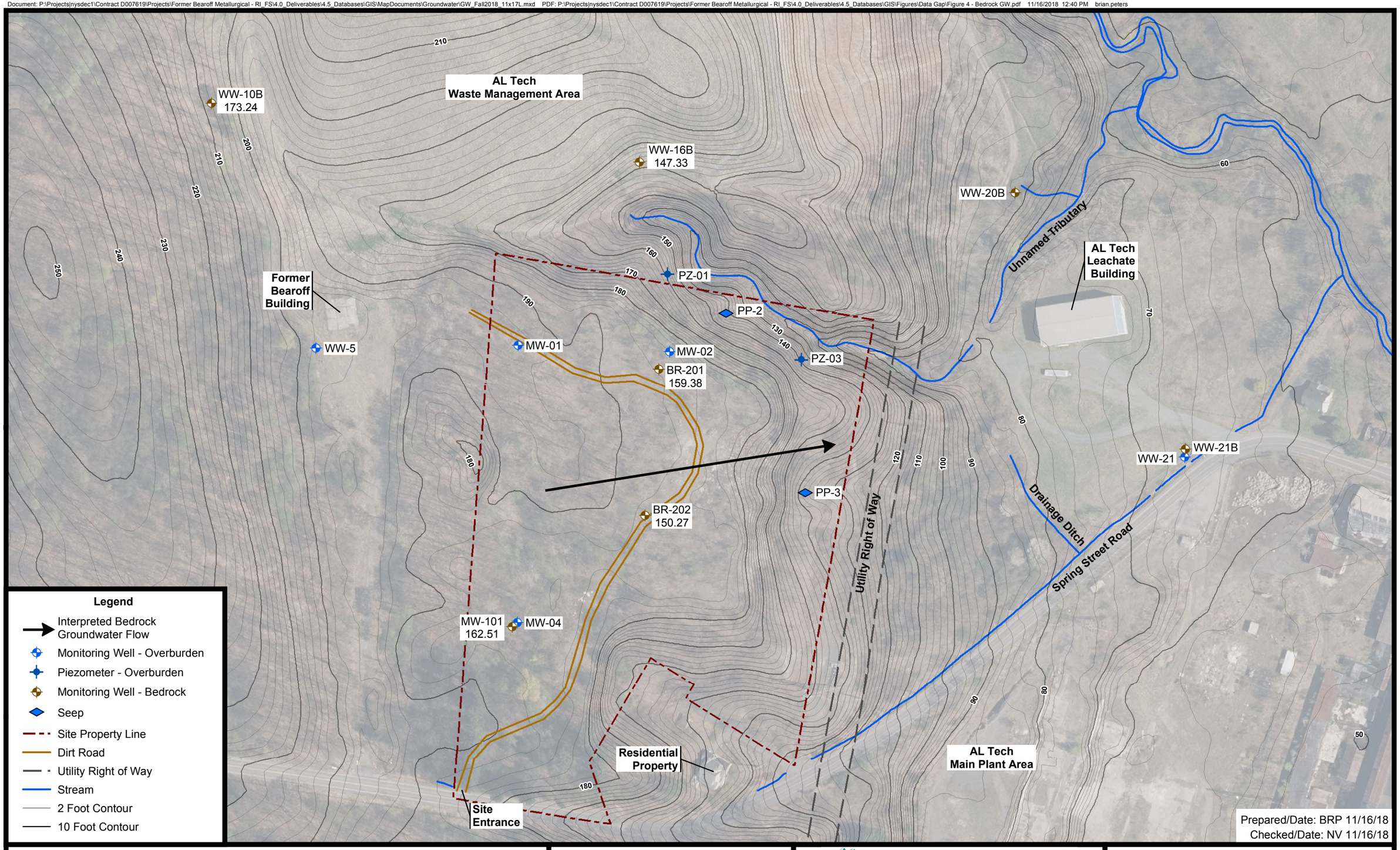
N
0 70 140
Feet

Albany County color digital orthoimagery (2014) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

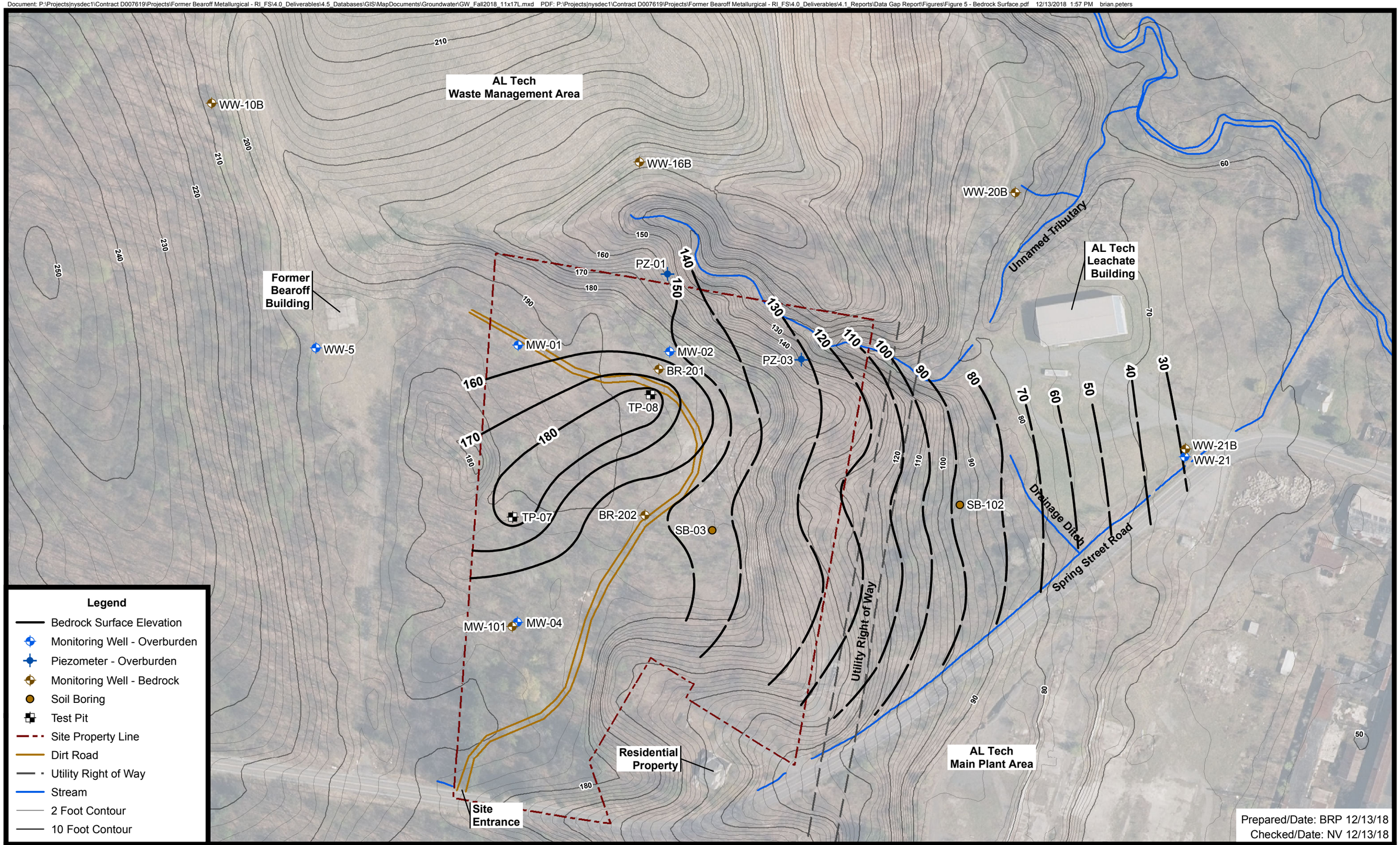
Interpreted Overburden
Potentiometric Surface
Project 3611171207 Figure 3



NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

Interpreted Bedrock
Groundwater Flow
Project 3611171207 Figure 4



Albany County color digital orthoimagery (2014) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

Interpreted Bedrock
Surface Elevations
Project 3611171207 Figure 5

TABLES

Table 1 - Groundwater Elevation Measurements

Location I.D	Well Site	Measuring Point Elevation (ft msl)	Groundwater Elevation (ft msl)	Water level (ft btor)	Comments
Monitoring Wells					
BR-201	Bearoff	189.84	159.38	30.46	Top of Rock 162.2 ft msl
BR-202	Bearoff	190.12	150.27	39.85	Top of Rock 150.7 ft msl
MW-01	Bearoff	196.60	164.07	32.53	
MW-02	Bearoff	189.69	<156.55	33.14 (Sump)	Top of Rock 156.9 ft msl
MW-04	Bearoff	190.88	162.58	28.3	
MW-101	Bearoff	190.86	162.51	28.35	Top of Rock 156.1 ft msl
WW-5	AL Tech - WMA	200.72	178.79	21.93	
WW-10B	AL Tech - WMA	212.59	173.24	39.35	
WW-16	AL Tech - WMA	162.15	141.05	21.1	
WW-16B	AL Tech - WMA	163.48	147.33	16.15	
Seeps					
PP-02	Bearoff	NA	138.15	NA	
PP-03	Bearoff	NA	134.98	NA	

Notes:
ft msl - ft above mean sea level
ft btor - feet below top of riser
WMA - Waste Management Area

Table 2 - Groundwater and Seep Sample Results

			Location	BR-201		BR-202		BR-202		MW-4		PP-2		PP-3	
			Sample Date	10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018	
			Sample ID	BR-201-680		BR-202-550		BR-202D-550		MW-04-284		PP-02		PP-03	
			Qc Code	FS		FS		FD		FS		FS		FS	
Parameter	**NY-GA**	**NY-GV**		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Dioxane (µg/L)															
1,4-Dioxane	1*	NS		NA		0.2	U	NA		0.2	U	NA		NA	
Polychlorinated biphenyls (µg/L)															
Aroclor-1016	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1221	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1232	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1242	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1248	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1254	0.09	NS		0.5	U	0.5	U	0.5	U	NA		**1.5**		5	U
Aroclor-1260	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1262	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
Aroclor-1268	0.09	NS		0.5	U	0.5	U	0.5	U	NA		0.5	U	5	U
PCB (total)	0.09	NS		0.5	U	0.5	U	0.5	U	NA		**1.5**		5	U
Total Metals (mg/L)															
Aluminum	NS	NS		**0.18**	J	0.2	U	0.2	U	NA		**0.15**	J	**5.7**	
Antimony	0.003	NS		0.02	U	0.02	U	0.02	U	NA		0.02	U	0.02	U
Arsenic	0.025	NS		0.015	U	0.015	U	0.015	U	NA		0.015	U	0.015	U
Barium	1	NS		**0.034**		**0.023**		**0.022**		NA		**2**		**3.9**	
Beryllium	NS	0.003		0.002	U	0.002	U	0.002	U	NA		0.002	U	**0.00038**	J
Cadmium	0.005	NS		0.002	U	**0.00062**	J	**0.0006**	J	NA		**0.00066**	J	**0.00055**	J
Calcium	NS	NS		**125**		**106**		**103**		NA		**37.9**		**51.9**	
Chromium	0.05	NS		**0.0018**	J	0.004	U	0.004	U	NA		**3.6**		**1.3**	
Chromium, Hexavalent	0.05	NS		0.0055	U	0.0055	U	0.0055	U	NA		**3.8**		**0.78**	
Cobalt	NS	NS		**0.00081**	J	0.004	U	0.004	U	NA		**0.0071**		**0.017**	
Copper	0.2	NS		**0.055**		**0.08**	J	0.01	UJ	NA		**0.0045**	J	**0.021**	
Iron	0.3	NS		**0.59**		**0.96**		**0.88**		NA		**0.12**		**8.5**	
Lead	0.025	NS		0.01	U	**0.0058**	J	0.01	U	NA		0.01	U	**0.018**	
Magnesium	NS	35		**35.7**		**94.5**		**92.1**		NA		**151**		**74.2**	
Manganese	0.3	NS		**0.27**		**0.59**		**0.58**		NA		**0.011**		**1**	
Mercury	0.0007	NS		0.0002	U	0.0002	U	0.0002	U	NA		0.0002	U	0.0002	U
Nickel	0.1	NS		**0.0032**	J	**0.0019**	J	0.01	U	NA		**0.026**		**0.24**	
Potassium	NS	NS		**13**		**19.4**		**18.5**		NA		**16.8**		**25.6**	

		Location	BR-201		BR-202		BR-202		MW-4		PP-2		PP-3	
		Sample Date	10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018	
		Sample ID	BR-201-680		BR-202-550		BR-202D-550		MW-04-284		PP-02		PP-03	
		Qc Code	FS		FS		FD		FS		FS		FS	
Parameter	**NY-GA**	**NY-GV**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Selenium	0.01	NS	0.025	U	0.025	U	0.025	U	NA		**0.16**		**0.13**	
Silver	0.05	NS	0.006	U	0.006	U	0.006	U	NA		0.006	U	0.006	U
Sodium	20	NS	**68.8**		**42.2**		**40.5**		NA		**14.5**		**13.2**	
Thallium	NS	0.0005	0.02	U	0.02	U	0.02	U	NA		0.02	U	0.02	U
Vanadium	NS	NS	0.005	U	0.005	U	0.005	U	NA		**0.0075**		**0.025**	
Zinc	NS	2	**0.031**		**0.052**	J	0.01	UJ	NA		0.01	U	**0.027**	
Dissolved Metals (mg/L)														
Aluminum	NS	NS	NA		NA		NA		NA		NA		0.2	U
Antimony	0.003	NS	NA		NA		NA		NA		NA		0.02	U
Arsenic	0.025	NS	NA		NA		NA		NA		NA		0.015	U
Barium	1	NS	NA		NA		NA		NA		NA		**1.5**	
Beryllium	NS	0.003	NA		NA		NA		NA		NA		0.002	U
Cadmium	0.005	NS	NA		NA		NA		NA		NA		0.002	U
Calcium	NS	NS	NA		NA		NA		NA		NA		**29.6**	
Chromium	0.05	NS	NA		NA		NA		NA		NA		**0.87**	
Cobalt	NS	NS	NA		NA		NA		NA		NA		0.004	U
Copper	0.2	NS	NA		NA		NA		NA		NA		0.01	U
Iron	0.3	NS	NA		NA		NA		NA		NA		**0.056**	
Lead	0.025	NS	NA		NA		NA		NA		NA		0.01	U
Magnesium	NS	35	NA		NA		NA		NA		NA		**71.2**	
Manganese	0.3	NS	NA		NA		NA		NA		NA		**0.049**	
Mercury	0.0007	NS	NA		NA		NA		NA		NA		0.0002	U
Nickel	0.1	NS	NA		NA		NA		NA		NA		**0.0016**	J
Potassium	NS	NS	NA		NA		NA		NA		NA		**24.3**	
Selenium	0.01	NS	NA		NA		NA		NA		NA		**0.12**	
Silver	0.05	NS	NA		NA		NA		NA		NA		0.006	U
Sodium	20	NS	NA		NA		NA		NA		NA		**13.3**	
Thallium	NS	0.0005	NA		NA		NA		NA		NA		0.02	U
Vanadium	NS	NS	NA		NA		NA		NA		NA		**0.0046**	J
Zinc	NS	2	NA		NA		NA		NA		NA		0.01	U

			Location	BR-201		BR-202		BR-202		MW-4		PP-2		PP-3	
			Sample Date	10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018	
			Sample ID	BR-201-680		BR-202-550		BR-202D-550		MW-04-284		PP-02		PP-03	
			Qc Code	FS		FS		FD		FS		FS		FS	
Parameter	**NY-GA**	**NY-GV**		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Anions (mg/L)															
Chloride	250	NS		**13.1**		**12.2**		NA		NA		**13.9**		**9.3**	
Sulfate	250	NS		**293**		**391**		NA		NA		**40.4**		**27.6**	
Alkalinity (mg/L)															
Bicarbonate Alkalinity, as CaCO3	NS	NS		**347**		**328**		NA		NA		**665**		**327**	
Total Alkalinity, as CaCO3	NS	NS		**347**		**328**		NA		NA		**680**		**359**	F1

Note:

Bold cells indicate a positively detected resul
Highlighted cells indicate an exceedance of either the GA or GV
NY-GA = New York State Class GA Groundwater Standards
NY-GV = New York State Guidance Values
NS = No Standard
NA = Not analyzed for
µg/L = micrograms per liter
mg/L = milligrams per liter

F1 = MS and/or MSD Recovery was outside acceptable limits
FS = Field Sample
FD = Field Duplicate
J = estimated value
PCB = Polychloinrated biphenyls
U = not detected
*- New York State Recommended Maximum Contaminant Leve

ATTACHMENT 1

FIELD DATA RECORDS

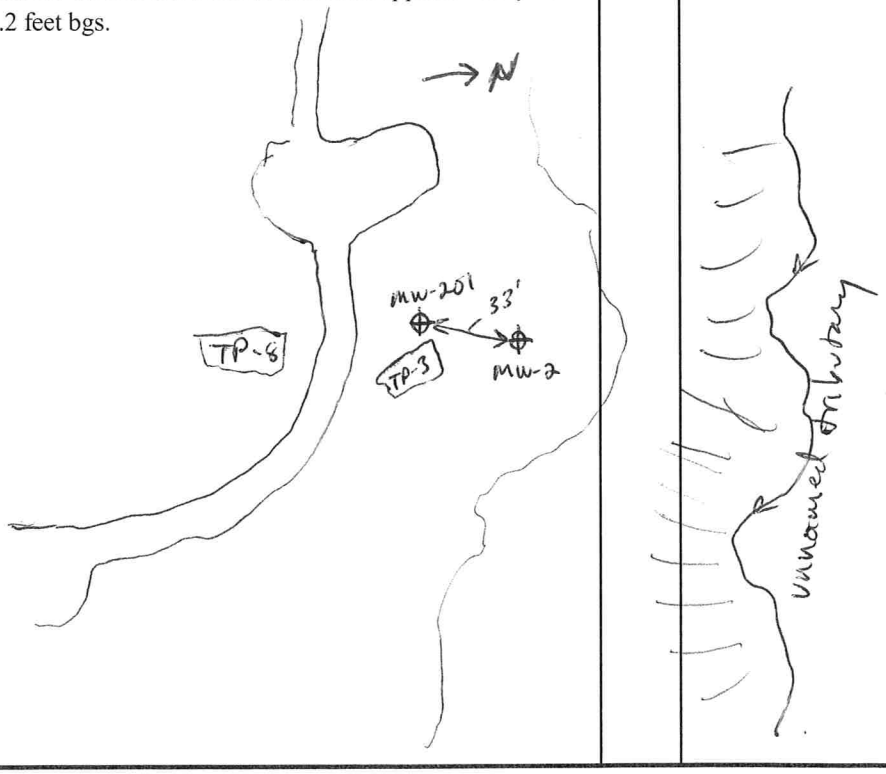
SOIL BORING LOG

MACTEC

511 Congress Street, Portland Maine 04101

Project Name: **Former Bearoff Metallurgical - RI**		Boring ID: **BR-201**
Project Location: **Colonie, N.Y.**		Page No. 1
Project No.: 36111171207.05	Client: NYSDEC	of: 4
Boring Location: 33 feet South of MW-2	Refusal Depth: NA	Total Depth: 70.4 feet	Bore Hole ID/OD: OB 10"/BR 4"
Weather: Cloudy, 70° F, light breeze	Soil Drilled: 26 feet	Method: HSA/Core	Casing Size:'6 1/4" H S A
Subcontractor: North Star Drilling		Protection Level: D	Sampler: NA
Driller: Steve Laramie	Date Started: 9/26/2018	Date Completed: 9/27/2018	Sampler ID/OD: NA
Rig Type/Model: CME-55 Truck	Logged By: J. Rawcliffe	Checked By: NW 10/9/18	
Reference Elevation:	Water Level:	Time:	

Sample Information				Monitoring	Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)		NA			
0.0	NA	NA			0 - 17.5' bgs Very dark brown to gray waste fill material with fire brick, slag, metal, brick, ceramic rollers and other waste debris. Very difficult drilling.		PID = 0 ppm
					17.5 - 26' bgs Brown clay and silt. Very moist, plastic.		PID = 0.2 ppm
					26' bgs = Top of bedrock.		PID = 0 ppm
					Used Tri-cone to drill rock socket from approximately 26 to 29.2 feet bgs.		



NOTES:

ROCK CORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: Former Bearoff Metallurgical			Boring ID: BR-201
Project Location: Colonie, NY			Page No. 2
Project No.: 3611171207.05	Client: NYSDEC		of: 4
Boring Location: MW-2/TP-3 Area (North)	Refusal Depth: NA	Total Depth:	Bore Hole ID/OD: BR=4=
Weather: Sunny, 55-65°F, clear	Soil Drilled: 26'	Method: 6¼ HSA/Core HQ	Casing Size:
Subcontractor: Northstar Drilling	P.I.D (eV): 10.6	Protection Level: Mod D	Bit Type: Diamond
Driller: Steve Laramie	Date Started: 9/26/18	Date Completed: 9/27/18	Bit Size: HQ
Rig Type/Model: CME-55 Truck	Logged By: JKR	Checked By: NW 10/9/18	Bit Use: —
Reference Elevation:	Water Level:	Time:	Core Interval: 29.2 - 70.4' bgs

Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)	Natural Core Breaks: Type/Dip	Natural Core Breaks: Surface Condition	Weathered Condition	Rock Quality: Total 4" Core	Rock Quality: RQD (%)	Rock Quality: Rock Quality Description	Drill Rate (min/ft)	Color	Rock Description and Comments on Drilling	Graphic Log	Additional Remarks
29													
30	R1	1.6/1.5				4"		Poor	—	-	R1 - 29-30.6 Very dark gray fine to medium grained shale with some calcite veins. Minor iron staining at top fracture. Most breaks/fractures clean.		Start coring 9/27/18 1035 PID=0
31	R2	5.0/5.1				4" 4" 6" 11" 17" 17"	100	Excellent	7 to 8 min/ft		R2 30.6 - 35.6' BGS Very dark gray fine grained shale. No weathering, all fractures/breaks appear to be fresh mechanical. generally jagged and irregular Breaks generally dipping 30-40°. One 45° Calcite stringers.		1120 PID=0 PID=0 See Photos PID=0 PID=0 1155
36	R3	5.0/4.9				15" 6" 7" 13" 7" 7"	43% 92	Excellent	10		R3 35.6 - 40.6' BGS Very dark gray shale - fine grained Breaks/fractures tend to be steeper 45° Calcite stringers also ~45° No weathered fractures/breaks		1205 PID=0 PID=0 PID=0 1250
41	R4	5.0/5.0				7" 10" 14" 8" 9"	80%	Good	5		R4 40.6-45.6' BGS Similar rock with possible fracture zone 44 - 45.6' More broken up with some vertical breaks. No iron staining or other obvious weathering High angle/vertical breaks fractures		1340 PID=0 PID=0 1405

NOTES: See Photos of core

FIGURE 4.5
ROCK CORING LOG
NYSDEC QUALITY ASSURANCE PROGRAM PLAN

ROCK CORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: Former Bearoff Metallurgical			Boring ID: BR-201
Project Location: Colonie, NY			Page No. 3
Project No.: 3611171207.05	Client: NYSDEC		of: 4
Boring Location:	Refusal Depth: NA	Total Depth:	Bore Hole ID/OD: BR-4"
Weather: Sunny 65°/light breeze	Soil Drilled: 26	Method: HSA/Core	Casing Size: 6¼ HSA/4" steel
Subcontractor: Northstar Drilling	P.I.D (eV):	Protection Level: Mod D	Bit Type: Diamd
Driller: Steve Laramie	Date Started: 9/26/18	Date Completed: 9/27/18	Bit Size: HQ
Rig Type/Model: CME-55 Truck	Logged By: JKR	Checked By: MW 10/09/18	Bit Use: —
Reference Elevation:	Water Level:	Time:	Core Interval: 29.2 - 70.4' bgs

Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)	Natural Core Breaks: Type/Dip	Natural Core Breaks: Surface Condition	Weathered Condition	Rock Quality: Total 4" Core	Rock Quality: RQD (%)	Rock Quality: Rock Quality Description	Drill Rate (min/ft)	Color	Rock Description and Comments on Drilling	Graphic Log	Additional Remarks
45	R4												
46	R5	5.0/5.0				8" 5" 6" 10"	88%	Good (G)	6.8		R5 45.6 - 50.6 Dark grey shale - fine grained some thin calcite stringers No obvious weathering Most breaks, calcite stringers dipping at 30-40°.	0° 70° 30-40°	1416 PID=0 PID=0
47													
48													
49						7" 9"							
50						8"						0°	PID=0 1450
51	R6	5.0/5.1				6" 18"					R6 50.6 - 55.6		1510
52											No change in rock type a little more calcite.	Calcite	Drilling rate Increased.
53						13"	95%	Excellent (E)	3.4		No obvious weathering along fractures/breaks.		PID=0
54						4"					Most breaks 40-45°	Calcite band	PID=0
55						11" 6"					Calcite stringers 60-70° Occasional one ≈ 30°		1527
56	R7	5.0/5.0				8"					R7 55.6 - 60.6' BGS No change in rock type. Numerous thin calcite stringers No weathering along fractures/breaks		1537
57													
58						17"	100%	Excellent (E)	4.2				PID=0
59													
60						14" 14"							PID=0
61						7"							1558

NOTES: See Photos of core

FIGURE 4.5
ROCK CORING LOG
NYSDEC QUALITY ASSURANCE PROGRAM PLAN

ROCK CORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

	Project Name: Former Bearoff Metallurgical	Boring ID: BR-201
	Project Location: Colonie, NY	Page No. 4
	Project No.: 3611171207.05 Client: NYSDEC	of: 4
Boring Location:	Refusal Depth: NA Total Depth:	Bore Hole ID/OD: BR=4"
Weather: Sunny 60°F, light breeze	Soil Drilled: 26' Method: HSA/Core	Casing Size: 6¼ HSA/4" Steel
Subcontractor: Northstar Drilling	P.I.D (eV): Protection Level: Mod D	Bit Type: Diamond
Driller: Steve Laramie	Date Started: 9/26/18 Date Completed: 9/27	Bit Size: HQ
Rig Type/Model: CME-55 Truck	Logged By: JKR Checked By: NW 10/9/18	Bit Use: –
Reference Elevation:	Water Level: Time:	Core Interval: 29.2 - 70.4' bgs

Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)	Natural Core Breaks: Type/Dip	Natural Core Breaks: Surface Condition	Weathered Condition	Rock Quality: Total 4" Core	Rock Quality: RQD (%)	Rock Quality Description	Drill Rate (min/ft)	Color	Rock Description and Comments on Drilling	Graphic Log	Additional Remarks
60	R7												1609
61	R8	5.0 / 5.0				10"					R8 60.6-65.6' Calcite		
						10"					Dark grey shale fine grained with lenses of calcite stringers		PID=0
62						10"		Excellent (2)	5.4		No obvious weathering		
63						7"	97%				Break/fractures generally rough jagged with some smooth faces		PID=0
64						18"					dipping at 40-50°		
						11"					Some traces of steep fractures 70-80°		PID=0
65													1636
66	R9	5.0 / 5.1				7"					R9 65.6-70.6' No change in rock type		~~1636~~ 1651
67						5"					65.6-67.8 lots of connected vertical breaks/fractures.		PID=0
68						4"	64%	Fair (2)	5.6		68.8-70 lots of calcite stringers		PID=0
69						9"					Most breaks 40-50° dip		
						5"					No obvious weathering on break/fracture faces.		PID=0
70						9"							1719
71											Bottom of boring = 70.4' BGS		
72											9/27/18 1752		
73									WL =		8.40 BGS		
74													
75													
76													

NOTES: See Photos of core

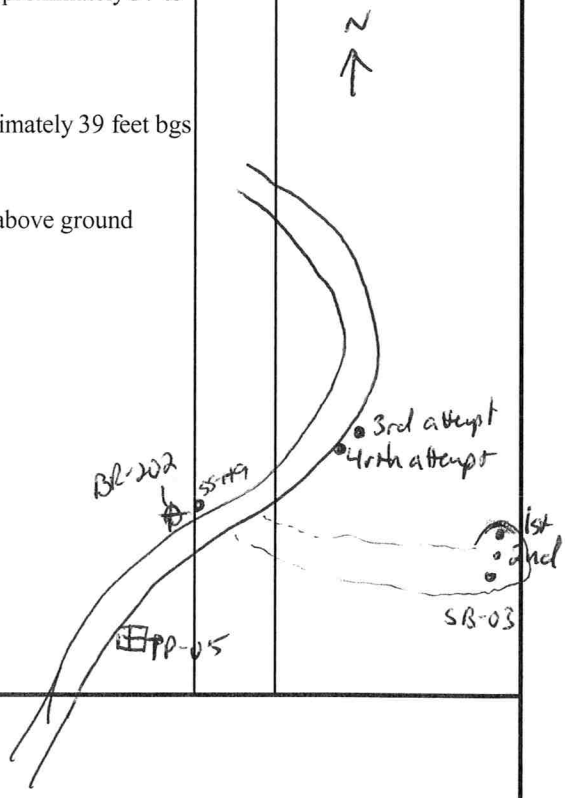
FIGURE 4.5
ROCK CORING LOG
NYSDEC QUALITY ASSURANCE PROGRAM PLAN

SOIL BORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: **Former Bearoff Metallurgical - RI**		Boring ID: **BR-202**
Project Location: **Colonie, N.Y.**		Page No. 1
Project No.: 36111171207.05	Client: NYSDEC	of: 3
Boring Location: 8 feet South of SS-H9	Refusal Depth: NA	Total Depth: 66.1 feet bgs	Bore Hole ID/OD: OB 10"/BR 4"
Weather: Cloudy, 70° F, light breeze	Soil Drilled: 37 feet	Method: HSA/Core	Casing Size:'6 1/4" H S A
Subcontractor: North Star Drilling		Protection Level: D	Sampler: NA
Driller: Steve Laramie	Date Started: 9/26/2018	Date Completed: 10/2/2018	Sampler ID/OD: NA
Rig Type/Model: CME-55 Truck	Logged By: J. Rawcliffe	Checked By: NW 10/9/18	
Reference Elevation:	Water Level: 37.5' bgs	Time: 10/3/2018 0720	

Sample Information				Monitoring	Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)		NA			
0.0	NA	NA			This is the 5th attempt to advance SB-202 to bedrock.		
					0 - 0.5' bgs Very dark brown organic topsoil and organic debris.		
					0.5 - 29' bgs Brown clay and silt. Very moist to wet, plastic.		No elevated PID readings
					29 - 37' bgs Gray clay and silt, wet, plastic.		PID = 0.2 ppm
					37' bgs = Top of bedrock.		
					Used Tri-cone to drill rock socket from approximately 37 to 39 feet bgs.		
					Installed 4" ID flush joint casingto approximately 39 feet bgs and grouted in place.		
					Stickup on casing approximately 2.4 feet above ground surface.		



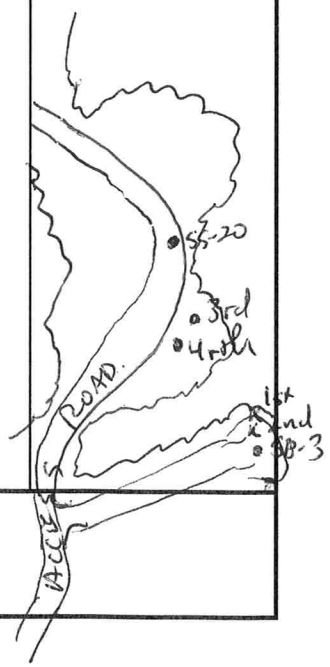
NOTES:

SOIL BORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: **Former Bearoff Metallurgical - RI**		Boring ID: BR-202
Project Location: **Colonie, N.Y.**		Page No. 1
Project No.: 36111171207.05	Client: NYSDEC	of: 1
Boring Location:	Refusal Depth: 18	Total Depth: 18	Bore Hole ID/OD: OB 10"/~~BR 4"~~
Weather: 9/24 Sunny, 9/25 Rain 55°F	Soil Drilled: 18	Method: HSA/~~Core~~ (2nd)	Casing Size:'6 1/4" H S A
Subcontractor: North Star Drilling		Protection Level: D	Sampler: NA
Driller: Steve Laramie	Date Started: 9/24/18	Date Completed: 9/25/18	Sampler ID/OD: NA
Rig Type/Model: CME-55 Truck	Logged By: J. Rawcliffe	Checked By: NW 10/9/18	
Reference Elevation:	Water Level: NA	Time: NA	

Sample Information				Monitoring	Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)		NA			
0.0	NA	NA	13/5		1st Attempt - Refusal with augers at 3.5' BGS. 2nd Attempt 0-5.5 Brown to olive brown fine to coarse sand and gravel with st/t. FILL with chunks of metal, pieces of stainless steel, large chunks of slag, firebrick 5.5-6.5 Chunks of gray metallic slag. Advanced augers to 14.5' thru slag cobbles, pieces of metal. Extremely tough drilling. 9/24/18 9/25/18 Used roller bit to advance to 18' BGS. Augers stuck at 14.5' bgs. Cannot advance boring. Going to move WNW ≈60' and try again. Refusal at 18' bgs. Pulled augers and abandoned boring.		



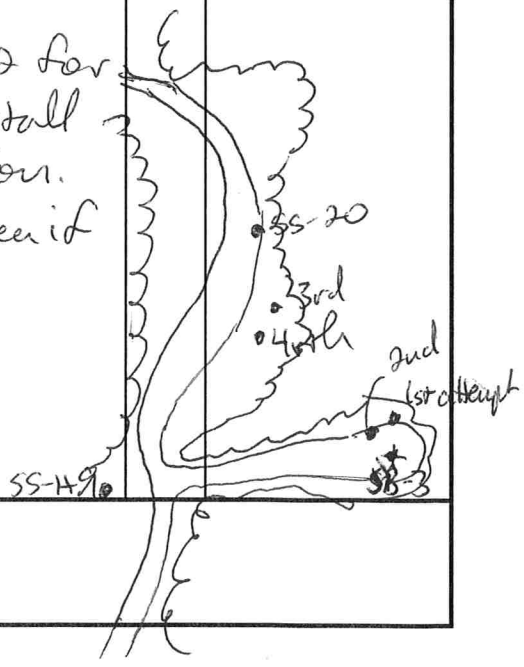
NOTES: Located approximately 25' South of SS-20

SOIL BORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: **Former Bearoff Metallurgical - RI**		Boring ID: BR-202
Project Location: **Colonie, N.Y.**		Page No. 1
Project No.: 36111171207.05	Client: NYSDEC	of: 1
Boring Location:	Refusal Depth: 12'	Total Depth: 12' BGS
Weather: 9/25/18 Rain 50°F.	Soil Drilled: 12'	Method: HSA/~~Core~~
Subcontractor: North Star Drilling		Protection Level: D
Driller: Steve Laramie	Date Started: 9/25/18	Date Completed: 9/25/18
Rig Type/Model: CME-55 Truck	Logged By: J. Rawcliffe	Checked By: MW 10/9/18
Reference Elevation:	Water Level: —	Time: —

Sample Information				Monitoring	Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)		NA			
0.0	NA	NA			3rd attempt Refusal at 4' BGS in waste material. Moving ahead about 4'. 4rth Attempt. Gray rubble waste FILL with large chunks of slag, fire brick, metal. 10.5-12' Very difficult drilling. - Appear to be encountering large pieces of slag. Broke right angle drive - done for the day. Going to abandon BR-202 for now and attempt to install well at BR-201 location. Will return to BR-202 even if BR-201 is successfull.		



NOTES:

ROCK CORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: Former Bearoff Metallurgical		Boring ID: BR-202
Project Location: Colonie, NY		Page No. 2
Project No.: 3611171207.05	Client: NYSDEC	of: 3
Boring Location: 8' South SS-H9	Refusal Depth: NA / Total Depth: 66.1' BGS	Bore Hole ID/OD: 10" OB/4" BR
Weather: Overcast, 50-55°, chance rain	Soil Drilled: 37.5' / Method: HSA/Core	Casing Size: 6 1/4 HSA/4" Casing
Subcontractor: Northstar Drilling	P.I.D (eV): 10.6eV / Protection Level: Mod D	Bit Type: Diamond
Driller: Steve Laramie	Date Started: 9/26/18 / Date Completed: 10/2/18	Bit Size: HQ
Rig Type/Model: CME 55 Truck	Logged By: JKR / Checked By: NW 10/9/18	Bit Use: —
Reference Elevation:	Water Level: 37.5' BGS / Time: 10/3/18 0720	Core Interval: 39-66' BGS

Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)	Natural Core Breaks: Type/Dip	Natural Core Breaks: Surface Condition	Weathered Condition	Rock Quality: Total 4" Core	Rock Quality: RQD (%)	Rock Quality: Rock Quality Description	Drill Rate (min/ft)	Color	Rock Description and Comments on Drilling	Graphic Log	Additional Remarks
39													
40	R1	1.5/1.4				6"	67%	Fair (W)			Very dark gray fine grained shale. Occational calcite stringers. Weathered fracture faces with high angle fracture 50-70° (Fe staining).		PID=0
41						6"							PID=0 0843
42	R2	3.5/3.5					17%	very Poor (W)	8.2		R2 40.2-45.2 Same rock type. Fracture zone with weathered faces		0916 PID=0
43						7"					calcite stringers		PID=0.1
44											competant Broken up		0945 Casing Blocked
45	45.2'	1.5/1.5				7"	72%	Fair (W)			Becomes more competant no weathering. some high & breaks (45°) Significant calcite		1003
46	R3	5.0/5.0				6" 16"			5 min/ft		R3 45.2-50.2 Same rock type		1015 PID=0
47						9"	73%				Calcite stringers Broken up high angle breaks/fractures (40-50°)		PID=0
48						6"					Calcite 1 high angle fracture/break (45-50°)		PID=0.1
49						5" 4"		Fair (W)			No weathered faces.		
50						4"							PID=0 1035
51	R4	5.0/5.0				10"					R4 50.2-55.2 Dark grey shale Minor calcite stringers		1045 PID=0.1
52						7"	47%	Poor (W)	6		Numerous breaks 30-50° Some higher angle No weathered faces.		PID=0
53						5"							
54						6"							PID=0.1
55													1115

NOTES:

FIGURE 4.5
ROCK CORING LOG
NYSDEC QUALITY ASSURANCE PROGRAM PLAN

ROCK CORING LOG

MACTEC
511 Congress Street, Portland Maine 04101

Project Name: Former Bearoff Metallurgical		Boring ID: BR-202
Project Location: Colonie, NY		Page No. 3
Project No.: 3611171207.05	Client: NYSDEC	of: 3
Boring Location: 6' South of SS-H9	Refusal Depth: NA	Total Depth: 66.1' BGS
Weather: Overcast 50-55 light rain	Soil Drilled: 37'	Method: HSA/Core
Subcontractor: Northstar Drilling	P.I.D (eV): 10.6	Protection Level: Mod D
Driller: Steve Laramie	Date Started: 9/26/18	Date Completed: 10/2/18
Rig Type/Model: CME-55 Truck	Logged By: JKR	Checked By: MW 10/9/18
Reference Elevation:	Water Level: 37.5' BGS	Time: 10/3/18 0720
Bore Hole ID/OD: 10"OB/4"OR		
Casing Size: 6¼" HSA/4" casing		
Bit Type: Diamond		
Bit Size: 1+Q		
Bit Use: —		
Core Interval: 39-66' BGS		

Depth (feet bgs)	Sample Number	Penetration/ Recovery (feet)	Natural Core Breaks: Type/Dip	Natural Core Breaks: Surface Condition	Weathered Condition	Rock Quality: Total 4" Core	Rock Quality: RQD (%)	Rock Quality: Rock Quality Description	Drill Rate (min/ft)	Color	Rock Description and Comments on Drilling	Graphic Log	Additional Remarks
55													
56	R5	5.0 / 4.6				10" 5" 6" 6" 4" 4" 7"	76% (N)	Good	5.4		R5 55.2 – 60.2 Numerous clean fractures/breaks dipping at ± 40-50°? No obvious weathering. Very little calcite. Dark gray fine grained shale.		1125 PID = 0 PID = 0 PID = 0.1 PID = 0.1 1152
57													
58													
59													
60													
61	R6	5.0 / 4.6				11" 5" 4" 10"	55% (N)	Fair	11.6		R6 60.2 – 65.0' BGS Numerous high angle breaks/fractures and some apparent fracture zones (very broken up) Very few calcite stringers fractures and gunnell foliation ≈ 50-55°		1213 PID = 0 Out of water Water run PID = 0 PID = 0 1311
62													
63													
64													
65													
66	R7	1.0 / 1.4				7"	58% (N)	Fair			R7 – 65 – 66' BGS redrilled Same rock type. Top was recored, possible infilled fracture at bottom Bottom of boring ≈ 66' BGS		1423
67													
68													
69													
70													

NOTES:

FIGURE 4.5
ROCK CORING LOG
NYSDEC QUALITY ASSURANCE PROGRAM PLAN

MACTEC

Groundwater Measurements Field Data Record

Field Staff: JL/JR
Date: 10/15/18

Location ID	MP Elevation (ft msl)	August 2017 Depth to Water (ft MP)	2017 Groundwater Elevation (ft msl)	October 2018 Depth to Water (ft MP)	2018 Groundwater Elevation (ft msl)
MW-01*	196.6	31.51	165.09	32.53	
MW-02*	189.69	33.08	< 156.61	33.14	
MW-04*	190.88	28.03	162.85	28.30	
MW-101*	190.86	28.02	162.84	28.35	
PP-02**	NA	NA	NA	AREA SATURATED W/ SM. PUDDLES ~6 15'	
PP-03**	NA	NA	NA	AREA SATURATED W/ SM. PUDDLES DEEP	
BR-201*	NA	NA	NA	30.46	
BR-202*	NA	NA	NA	~~23.85~~ 39.85	

MP = measuring point
*- MP = top of riser
** -MP = ground surface
ft = feet
msl = mean sea level
MW = monitoring well
PP = push point
NA = not applicable

WW-5 21.93' bTOR
MW-10B 39.35' bTOR
WW-16 21.10 bTOR
WW-16B 16.51 bTOR

CHECKED BY: TNG
DATE: 11/1/18

LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME		LOCATION ID	DATE
Former Bearoff Metallurgical		BR-201	10/15/18
PROJECT NUMBER		**START TIME**	**END TIME**
3611171207		1430	10/16/18 1315
SAMPLE ID	**SAMPLE TIME**	**SITE NAME/NUMBER**	**PAGE**
BR-201-680	1230	819018	1 OF 1

WELL DIAMETER (INCHES) 4

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☑ 1/2 ☐ 5/8 ☐ OTHER

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☑ TOP OF CASING (TOC) ☐ OTHER

WELL INTEGRITY

	YES	NO	N/A
CAP		✓	
CASING	✓		
LOCKED		✓	
COLLAR	✓		

INITIAL DTW (BMP)	30.46 FT	**FINAL DTW (BMP)**	0 FT	**PROT. CASING STICKUP (AGS)**	1.60 FT	**TOC/TOR DIFFERENCE**	NA FT
WELL DEPTH (BMP)	72.60 FT	**SCREEN LENGTH**	NA FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	42.14 FT	**DRAWDOWN VOLUME** (initial DTW- final DTW X well diam. squared X 0.041)	19.98 GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	27.64 GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	25 GAL	**DRAWDOWN/ TOTAL PURGED**	0.80	**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA (AS LISTED IN THE QAPP)

TIME 3-5 Minutes	DTW (FT) 0.0-0.33 ft Drawdown	PURGE RATE (mL/min)	TEMP. (°C) (+/- 3 degrees)	SP. CONDUCTANCE (mS/cm) (+/- 3%)	pH (units) (+/- 0.1 units)	DISS. O_2 (mg/L) (+/- 10%)	TURBIDITY (ntu) (+/- 10% <10 ntu)	REDOX (mv) (+/- 10 mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1430	**BEGIN PURGING**									
1435	-	see notes	10.99	1.180	7.45	8.00	-	82.1	70	purge rate: 1L/12 sec
1442	44		11.17	1.180	7.45	5.38	65.9	99.7		
1450	55.5		11.22	1.179	7.44	4.35	37.7	98.0		
1456	66		11.39	1.173	7.49	3.68	185	82.6		
1500	70		11.64	1.141	7.71	4.41	303	60.5		Detach flow cell, well dry
1230	-		11.64	1.189	8.36	10.62	7.77	142.6		10/16 - Collect grab sample
1233	-		11.10	1.187	8.21	9.72	9.36	146.8		
1236	58.82		11.18	1.187	8.24	7.64	24.7	146.1		
FINAL STABILIZED FIELD PARAMETERS (to appropriate significant figures[SF])			11	1.19	8.2	7.6	24.7	150		

TEMP.: nearest degree (ex. 10.1 = 10)
COND.: 3 SF max (ex. 3333 = 3330, 0.696 = 0.696)
pH: nearest tenth (ex. 5.53 = 5.5)
DO: nearest tenth (ex. 3.51 = 3.5)
TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101)
ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	DECON FLUIDS USED	TUBING/PUMP/BLADDER MATERIALS		EQUIPMENT USED
☐ PERISTALTIC	☐ LIQUINOX	✓ SILICON TUBING	✓ S. STEEL PUMP MATERIAL	✓ WL METER M200-76
☐ SUBMERSIBLE	✓ DEIONIZED WATER	☐ TEFLON TUBING	☐ PVC PUMP MATERIAL	☐ PID
☐ BLADDER	☐ POTABLE WATER	☐ TEFLON LINED TUBING	☐ GEOPROBE SCREEN	✓ WQ METER M015-09
☐ WATTERA	☐ NITRIC ACID	✓ HDPE TUBING	☐ TEFLON BLADDER	✓ TURB. METER M024-31
✓ OTHER Tornado	☐ HEXANE	☐ LDPE TUBING	☐ OTHER	✓ PUMP tornado
☐ OTHER	☐ METHANOL	☐ OTHER	☐ OTHER	☐ OTHER
	✓ OTHER Alconox	☐ OTHER	☐ OTHER	☐ FILTERS NO. TYPE

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
✓	PCBs	8082	No	4C	2x250mL	Yes	No	
✓	TAL Metals	6010	No	4C, HNO3	1x250mL	Yes	No	
✓	Hex Cr	7199	No	4C	1x500mL	Yes	No	
✓	Anions	300	No	4C	1x60mL	Yes	No	
✓	Alkalinity	2320B	No	4C	1x250mL	Yes	No	

PURGE OBSERVATIONS

	YES	NO
PURGE WATER CONTAINERIZED	✓	
NO-PURGE METHOD UTILIZED		✓

NUMBER OF GALLONS GENERATED ~25

If yes, purged approximately 1 standing volume prior to sampling or _____mL for this sample location.

SKETCH/NOTES

Purge well dry on 10/15. Sample on 10/16. Purge rate was 1L / 12 seconds

Sampler Signature: JPallozzi Print Name: Julie Pallozzi

Checked By: Date: 11/1/2018

MACTEC
511 Congress Street, Portland Maine 04101

LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME		LOCATION ID	DATE
Former Bearoff Metallurgical		BR-202	10/16/18
PROJECT NUMBER		**START TIME**	**END TIME**
3611171207		0835	1130
SAMPLE ID	**SAMPLE TIME**	**SITE NAME/NUMBER**	**PAGE**
BR-202-550	1105	401069	1 OF 1

WELL DIAMETER (INCHES) 4

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☑ 1/2 ☐ 5/8 ☐ OTHER

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☑ TOP OF CASING (TOC) ☐ OTHER

WELL INTEGRITY

	YES	NO	N/A
CAP		✓	
CASING	✓		
LOCKED	✓		
COLLAR	✓		

INITIAL DTW (BMP)	39.90 FT	**FINAL DTW (BMP)**	0 FT	**PROT. CASING STICKUP (AGS)**	2.39 FT	**TOC/TOR DIFFERENCE**	NA FT
WELL DEPTH (BMP)	68.4 FT	**SCREEN LENGTH**	NA FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	28.50 FT	**DRAWDOWN VOLUME** (initial DTW- final DTW X well diam. squared X 0.041)	26.17 GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	18.70 GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	10 GAL	**DRAWDOWN/ TOTAL PURGED**	2.62	**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA (AS LISTED IN THE QAPP)

TIME 3-5 Minutes	DTW (FT) 0.0-0.33 ft Drawdown	PURGE RATE (mL/min)	TEMP. (°C) (+/- 3 degrees)	SP. CONDUCTANCE (mS/cm) (+/- 3%)	pH (units) (+/- 0.1 units)	DISS. O_2 (mg/L) (+/- 10%)	TURBIDITY (ntu) (+/- 10% <10 ntu)	REDOX (mv) (+/- 10 mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
0905	**BEGIN PURGING**									
0915	40.52	200	10.66	1.281	9.20	6.99	35.0	156.8	55.0	Air bubbles in cell
0955	40.52	200	11.21	1.303	8.78	1.81	36.2	83.5	55	
1012	40.40	200	11.28	1.305	8.67	1.61	40.9	-7.4	55	
1021	40.60	200	11.46	1.303	8.61	1.32	9.51	-11.4	55	
1038	40.68	250	11.61	1.304	8.50	1.16	9.50	-27.2	55	
1043	40.68	250	11.53	1.305	8.47	1.16	8.08	-28.0	55	
1048	40.70	250	11.64	1.308	8.45	1.18	6.08	-29.5	55	
1055	40.70	200	11.55	1.305	8.39	1.16	7.03	-27.0	55	
1100	40.70	200	11.62	1.304	8.39	1.16	8.47	-30.5	55	
1105										collect sample

FINAL STABILIZED FIELD PARAMETERS (to appropriate significant figures[SF])

12	1.30	8.4	1.2	8.5	-31	

TEMP.: nearest degree (ex. 10.1 = 10)
COND.: 3 SF max (ex. 3333 = 3330, 0.696 = 0.696)
pH: nearest tenth (ex. 5.53 = 5.5)
DO: nearest tenth (ex. 3.51 = 3.5)
TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101)
ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- ☐ PERISTALTIC
- ✓ SUBMERSIBLE
- ☐ BLADDER
- ☐ WATTERA
- ☐ OTHER
- ☐ OTHER

DECON FLUIDS USED
- ☐ LIQUINOX
- ✓ DEIONIZED WATER
- ☐ POTABLE WATER
- ☐ NITRIC ACID
- ☐ HEXANE
- ☐ METHANOL
- ✓ OTHER Alconox

TUBING/PUMP/BLADDER MATERIALS
- ✓ SILICON TUBING
- ☐ TEFLON TUBING
- ☐ TEFLON LINED TUBING
- ✓ HDPE TUBING
- ☐ LDPE TUBING
- ☐ OTHER
- ☐ OTHER

- ✓ S. STEEL PUMP MATERIAL
- ☐ PVC PUMP MATERIAL
- ☐ GEOPROBE SCREEN
- ☐ TEFLON BLADDER
- ☐ OTHER
- ☐ OTHER
- ☐ OTHER

EQUIPMENT USED
- ✓ WL METER M200-76
- ☐ PID
- ✓ WQ METER MO15-09
- ✓ TURB. METER MO24-31
- ✓ PUMP SS Mega Monsoon Pro
- ☐ OTHER
- ☐ FILTERS NO. ___ TYPE ___

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
✓	PCBs	8082	No	4C	2x250mL	yes	D MS MD	
✓	Hex Chrom	7199	No	4C	250 mL	yes	D MS MD	
✓	TAL Metals w/ Hg	6010,7471	No	4C, HNO3	250 mL	yes	D MS MD	
✓	Chloride/Sulfate	4500Cl, 300	No	4C	60 mL	yes	No	
✓	Alkalinity	2320B	No	4C	250 mL	yes	No	
✓	1,4-dioxane	8270SIM	No	4C	2x1L	yes	No	

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES ✓ NO ☐
NO-PURGE METHOD UTILIZED: YES ☐ NO ✓

NUMBER OF GALLONS GENERATED: ~ 10

If yes, purged approximately 1 standing volume prior to sampling or _____mL for this sample location.

SKETCH/NOTES

Sampler Signature: JPallozzi Print Name: Julie Pallozzi

Checked By: Date: 11/1/2018

MACTEC
511 Congress Street, Portland Maine 04101

LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME		LOCATION ID	DATE
Former Bearoff Metallurgical		MW-04	10/15/18
PROJECT NUMBER		**START TIME**	**END TIME**
3611171207		10/15/18 1540	10/16/18 0950
SAMPLE ID	**SAMPLE TIME**	**SITE NAME/NUMBER**	**PAGE**
MW-04	0945	401069	1 OF 1

WELL DIAMETER (INCHES) 2

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☑ 1/2 ☐ 5/8 ☐ OTHER

MEASUREMENT POINT (MP) ☑ TOP OF RISER (TOR) ☐ TOP OF CASING (TOC) ☐ OTHER

WELL INTEGRITY

	YES	NO	N/A
CAP	✓		
CASING	✓		
LOCKED	✓		
COLLAR	✓		

INITIAL DTW (BMP)	28.30 FT	**FINAL DTW (BMP)**	0 FT	**PROT. CASING STICKUP (AGS)**	2.75 FT	**TOC/TOR DIFFERENCE**	0.26 FT
WELL DEPTH (BMP)	36.5 FT	**SCREEN LENGTH**	10 FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	8.20 FT	**DRAWDOWN VOLUME** (initial DTW- final DTW X well diam. squared X 0.041)	4.64 GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	1.34 GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	5 GAL	**DRAWDOWN/ TOTAL PURGED**	0.93	**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA (AS LISTED IN THE QAPP)

TIME 3-5 Minutes	DTW (FT) 0.0-0.33 ft Drawdown	PURGE RATE (mL/min)	TEMP. (°C) (+/- 3 degrees)	SP. CONDUCTANCE (mS/cm) (+/- 3%)	pH (units) (+/- 0.1 units)	DISS. O_2 (mg/L) (+/- 10%)	TURBIDITY (ntu) (+/- 10% <10 ntu)	REDOX (mv) (+/- 10 mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1605	**BEGIN PURGING**									
1610	~30	See note	10.51	1.642	7.23	10.13	> 800	111.5	36	~1 L/ 12 sec
1615	dry	-	-	-	-	-	-	-	-	Well dry
0940	28.39	-	-	-	-	-	-	-	NA	Bail well for sample
0945	-	-	-	-	-	-	99.2	-	NA	Collect sample

FINAL STABILIZED FIELD PARAMETERS (to appropriate significant figures[SF])

TEMP.: nearest degree (ex. 10.1 = 10)
COND.: 3 SF max (ex. 3333 = 3330, 0.696 = 0.696)
pH: nearest tenth (ex. 5.53 = 5.5)
DO: nearest tenth (ex. 3.51 = 3.5)
TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101)
ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- ☐ PERISTALTIC
- ☑ SUBMERSIBLE
- ☐ BLADDER
- ☐ WATTERA
- ☐ OTHER
- ☐ OTHER

DECON FLUIDS USED
- ☐ LIQUINOX
- ☑ DEIONIZED WATER
- ☐ POTABLE WATER
- ☐ NITRIC ACID
- ☐ HEXANE
- ☐ METHANOL
- ☑ OTHER Alconox

TUBING/PUMP/BLADDER MATERIALS
- ☑ SILICON TUBING
- ☐ TEFLON TUBING
- ☐ TEFLON LINED TUBING
- ☑ HDPE TUBING
- ☐ LDPE TUBING
- ☐ OTHER
- ☐ OTHER

- ☑ S. STEEL PUMP MATERIAL
- ☐ PVC PUMP MATERIAL
- ☐ GEOPROBE SCREEN
- ☐ TEFLON BLADDER
- ☐ OTHER
- ☐ OTHER
- ☐ OTHER

EQUIPMENT USED
- ☑ WL METER M200-76
- ☐ PID
- ☑ WQ METER MO15-09
- ☑ TURB. METER MO24-31
- ☑ PUMP tornado
- ☐ OTHER
- ☐ FILTERS NO. ___ TYPE

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
✓	1,4-dioxane	8270 SIM	No	4C	(2) 1L	Yes	No	

PURGE OBSERVATIONS

	YES	NO
PURGE WATER CONTAINERIZED	☑	☐
NO-PURGE METHOD UTILIZED	☐	☑

NUMBER OF GALLONS GENERATED: ~ 5

If yes, purged approximately 1 standing volume prior to sampling or _____mL for this sample location.

SKETCH/NOTES

Purge well dry on 10/15/18. Sample recharge with bailer on 10/16/18

Sampler Signature: JPallozzi Print Name: Julie Pallozzi

Checked By: Date: 11/1/2018

MACTEC
511 Congress Street, Portland Maine 04101

GROUNDWATER/ PORE WATER GRAB SAMPLING RECORD

MACTEC
511 Congress Street, Portland Maine 04101

PROJECT NAME Former Bearoff Metallurgical	
PROJECT NUMBER 3611171207	
SAMPLE ID PP-02	**SAMPLE TIME** 1340

SAMPLE LOCATION PP-02	**DATE** 10/16/18
START TIME 1330	**END TIME** 1430
SITE NAME/NUMBER Former 401069	**PAGE** 1 OF 1

SAMPLE TYPE ☑ GRAB ☐ WELL/PIEZOMETER ☐ GEOPROBE ☑ PORE WATER ☐ OUTFALL ☐ OTHER

WELL DIAMETER (INCHES) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ 8 ☐ OTHER NA

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☐ 1/2 ☐ 5/8 ☐ OTHER NA

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☐ TOP OF CASING (TOC) ☐ OTHER NA

WELL INTEGRITY

	YES	NO	N/A
CAP			✓
CASING			✓
LOCKED			✓
COLLAR			✓

INITIAL DTW (BMP)	NA FT	**FINAL DTW (BMP)**	NA FT	**PROT. CASING STICKUP (AGS)**	NA FT	**TOC/TOR DIFFERENCE**	NA FT
WELL DEPTH (BMP)	NA FT	**SCREEN LENGTH**	NA FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	NA FT	**DRAWDOWN VOLUME** (initial DTW- final DTW X well diam. squared X 0.041)	NA GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	NA GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	0.9 GAL	**DRAWDOWN/ TOTAL PURGED**	NA	**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS

TIME	DTW (FT)	PURGE RATE (mL/min)	TEMP. (°C)	SP. CONDUCTANCE (mS/cm)	pH (units)	DISS. O_2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1335	**BEGIN PURGING**									
1338	See notes	100	11.55	1.259	9.01	9.14	6.82	111.9	0.25	
1340		150	11.64	1.252	8.98	8.08	18.6	105.7		collect sample
1355		150	11.36	1.213	8.68	8.07	5.53	106.6		
1400	-	150	11.27	1.282	9.11	9.45	-	105.5		Adjacent puddle

SAMPLE OBSERVATIONS: CLEAR Yes COLORED No CLOUDY No TURBID No ODOR None OTHER (see notes)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- ☑ PERISTALTIC
- ☐ SUBMERSIBLE
- ☐ BLADDER
- ☐ WATTERA
- ☐ Geopump
- ☐ OTHER

DECON FLUIDS USED
- ☐ LIQUINOX
- ☐ DEIONIZED WATER
- ☐ POTABLE WATER
- ☐ NITRIC ACID
- ☐ HEXANE
- ☐ METHANOL
- ☑ OTHER dedicated

TUBING/PUMP/BLADDER MATERIALS
- ☑ SILICON TUBING
- ☐ TEFLON TUBING
- ☐ TEFLON LINED TUBING
- ☐ HDPE TUBING
- ☐ LDPE TUBING
- ☐ OTHER
- ☐ OTHER

- ☐ S. STEEL PUMP MATERIAL
- ☐ PVC PUMP MATERIAL
- ☐ GEOPROBE SCREEN
- ☐ TEFLON BLADDER
- ☐ OTHER
- ☐ OTHER
- ☐ OTHER

EQUIPMENT USED
- ☐ WATER LEVEL METER
- ☐ PID
- ☑ WQ METER MO15-09
- ☑ TURB. METER MO24-31
- ☑ PUMP
- ☐ OTHER
- ☐ FILTERS NO. TYPE

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
✓	PCBs	8082	4C	2x250mL	Yes	No	
✓	TAL Metals	6010	4C HNO3	1x250mL	Yes	No	
✓	Hex Cr	7199	4C	1x250mL	Yes	No	
✓	Anions	4500Cl, 300	4C	1x60mL	Yes	No	
✓	Alkalinity	2320B	4C	1x250mL	Yes	No	

NOTES

DO reading 10.05 mg/L and 93.4 % in flow cell in ambient air (no water).
Depth of nearby puddles 0.15 ft.
Dissolved metals not collected because turbidity < 50 NTU.

SKETCH

no sketch

PURGE OBSERVATIONS

	YES	NO
PURGE WATER CONTAINERIZED		X
NO-PURGE METHOD UTILIZED		X

NUMBER OF GALLONS GENERATED: NA

If yes, purged approximately 1 standing volume prior to sampling or _____mL for this sample location.

Sampler Signature: JPallozzi Print Name: Julie Pallozzi

Checked By: Date: 11/1/2018

GROUNDWATER/ PORE WATER GRAB SAMPLING RECORD

GROUNDWATER/ PORE WATER GRAB SAMPLING RECORD

MACTEC
511 Congress Street, Portland Maine 04101

PROJECT NAME Former Bearoff Metallurgical	
PROJECT NUMBER 3611171207	
SAMPLE ID PP-03	**SAMPLE TIME** 1500

SAMPLE LOCATION PP-03	**DATE** 10/16/18
START TIME 1440	**END TIME** 1645
SITE NAME/NUMBER Former 401069	**PAGE** 1 OF 1

SAMPLE TYPE ☑ GRAB ☐ WELL/PIEZOMETER ☐ GEOPROBE ☑ PORE WATER ☐ OUTFALL ☐ OTHER

WELL DIAMETER (INCHES) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ 8 ☐ OTHER NA

TUBING ID (INCHES) ☐ 1/8 ☐ 1/4 ☐ 3/8 ☐ 1/2 ☐ 5/8 ☐ OTHER NA

MEASUREMENT POINT (MP) ☐ TOP OF RISER (TOR) ☐ TOP OF CASING (TOC) ☐ OTHER NA

WELL INTEGRITY

	YES	NO	N/A
CAP			✓
CASING			✓
LOCKED			✓
COLLAR			✓

INITIAL DTW (BMP)	NA FT	**FINAL DTW (BMP)**	NA FT	**PROT. CASING STICKUP (AGS)**	NA FT	**TOC/TOR DIFFERENCE**	NA FT
WELL DEPTH (BMP)	NA FT	**SCREEN LENGTH**	NA FT	**PID AMBIENT AIR**	NA PPM	**REFILL TIMER SETTING**	NA SEC
WATER COLUMN	NA FT	**DRAWDOWN VOLUME** (initial DTW- final DTW X well diam. squared X 0.041)	NA GAL	**PID WELL MOUTH**	NA PPM	**DISCHARGE TIMER SETTING**	NA SEC
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	NA GAL	**TOTAL VOL. PURGED** (mL per minute X total minutes X 0.00026 gal/mL)	NA GAL	**DRAWDOWN/ TOTAL PURGED**	NA	**PRESSURE TO PUMP**	NA PSI

FIELD PARAMETERS

TIME	DTW (FT)	PURGE RATE (mL/min)	TEMP. (°C)	SP. CONDUCTANCE (mS/cm)	pH (units)	DISS. O_2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
1600	**BEGIN PURGING**									
1600	See notes	~ 50	10.54	0.767	9.39	7.83	156	126.0	1 in	pump intake = below water
										surface

SAMPLE OBSERVATIONS: CLEAR ☐ COLORED Yes CLOUDY Yes TURBID Yes ODOR no OTHER (see notes)

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	DECON FLUIDS USED	TUBING/PUMP/BLADDER MATERIALS		EQUIPMENT USED
✓ PERISTALTIC	LIQUINOX	✓ SILICON TUBING	S. STEEL PUMP MATERIAL	WATER LEVEL METER
SUBMERSIBLE	DEIONIZED WATER	TEFLON TUBING	PVC PUMP MATERIAL	PID
BLADDER	POTABLE WATER	TEFLON LINED TUBING	GEOPROBE SCREEN	✓ WQ METER MO15-09
	NITRIC ACID	HDPE TUBING	✓ TEFLON BLADDER	✓ TURB. METER MO24-31
WATTERA	HEXANE	LDPE TUBING	OTHER	✓ PUMP
Geopump	METHANOL	OTHER	OTHER	OTHER
OTHER	✓ OTHER Dedicated	OTHER	OTHER	✓ FILTERS NO. TYPE 0.45 um

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
✓	PCBs	8082	4C	2x250mL	Yes	No	
✓	TAL Metals (total & dissolved)	6010	4C HNO3	2x250mL	Yes	No	
✓	Hex Cr	7199	4C	1x250mL	Yes	No	
✓	Anions	4500Cl, 300	4C	1x60mL	Yes	No	
✓	Alkalinity	2320B	4C	1x250mL	Yes	No	

NOTES

A dissolved metals sample was collected because the turbidity was > 50 NTU. The dissolved metals samples was field filtered.

The sample time is listed as 1500 because the bottles were labeled prior to collection and sample crew did not remember to adjust time to 1600 until after samples and COCs were custody sealed in coolers.

SKETCH

Seep area is saturated with some puddles. Soil appears to be mostly silt and clay. Push point sampler was unable to produce sufficient water supply for sampling and parameters. Multiple attempts were made along seep at varying depths and angles to find water source. After discussion with N.Vogan the decision was made to dig a hole and sample the recharge water. The hole was dug just below/downslope of large debris and within saturated area.

PURGE OBSERVATIONS

	YES	NO
PURGE WATER CONTAINERIZED		X
NO-PURGE METHOD UTILIZED		x

NUMBER OF GALLONS GENERATED: 0

If yes, purged approximately 1 standing volume prior to sampling or _____mL for this sample location.

Sampler Signature: JPallozzi Print Name: Julie Pallozzi

Checked By: Date: 11/1/2018

GROUNDWATER/ PORE WATER GRAB SAMPLING RECORD

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME: Former Bearoff Metallurgical - RI
PROJECT NUMBER: 36111171207
PROJECT LOCATION: Colonie, N.Y.
WEATHER CONDITIONS (AM): 48°F / mostly sunny
WEATHER CONDITIONS (PM):
TASK NO: .05 DATE: 10/16/18
MACTEC CREW: JL/SR
SAMPLER NAME: J. Lorenzi
SAMPLER SIGNATURE:
CHECKED BY: TNG DATE: 11/1/18

MULTI-PARAMETER WATER QUALITY METER

METER TYPE YSI
MODEL NO. 556
UNIT ID NO. MO1509

AM CALIBRATION Start Time 1557 /End Time 0815

POST CALIBRATION CHECK Start Time 1845 /End Time 1900

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)
pH (4)	SU	4.0	3.99	+/- 0.1 pH Units			
pH (7)	SU	7.0	7.00	+/- 0.1 pH Units	7.0	6.804	+/- 0.3 pH Units
pH (10)	SU	10.0	—	+/- 0.1 pH Units			
Redox	+/- mV	240	240.0	+/- 10 mV	240	247.0	+/- 10 mV
Conductivity	mS/cm	1.413	1.413	+/- 0.5 % of standard	1.413	0.976 (1.430)	+/- 5% of standard
DO (saturated)	%	100	100.9	+/- 2% of standard			
DO (saturated)	mg/L [1] (see Chart 1)		—	+/- 0.2 mg/L	10.67	9.96 (10.08)	+/- 0.5 mg/L of standard
DO (<0.1)	mg/L	<0.1	—	< 0.5 mg/L			
Temperature	°C		18.29			11.55	
Baro. Press.	mmHg		746.8			755.7	

out low

TURBIDITY METER

METER TYPE Hach
MODEL NO. 2100Q
UNIT ID NO. M0724-31

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
10 Standard	NTU	10	10.6	10	9.97	+/- 5% of standard
20 Standard	NTU	20	19.1	20	19.0	+/- 5% of standard
100 Standard	NTU	100	101	100	100	+/- 5% of standard
800 Standard	NTU	800	802	800	803	+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE NA
MODEL NO.
UNIT ID NO.

Background	ppmv	<0.1		<0.1		within 5 ppmv of BG
Span Gas	ppmv	100		100		+/- 10% of standard

O_2-LEL 4 GAS METER

METER TYPE NA
MODEL NO.
UNIT ID NO.

Methane	%	50		50		+/- 10% of standard
O_2	%	20.9		20.9		+/- 10% of standard
H_2S	ppmv	25		25		+/- 10% of standard
CO	ppmv	50		50		+/- 10% of standard

OTHER METER NA

METER TYPE
MODEL NO.
UNIT ID NO.

See Notes Below for Additional Information

☒ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
☐ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: Portland FOS
Lot#/Date Produced:
Trip Blank Source:
Sample Preservatives Source:
Disposable Filter Type: 0.45µm cellulose
Calibration Fluids / Standard Source:
- DO Calibration Fluid (<0.1 mg/L) Portland FOS
- Other
- Other
- Other

	Cal. Standard Lot Number	Exp. Date
pH (4)	76J052	10/19
pH (7)	76J0198	10/19
pH (10)	—	
ORP	2390	12/22
Conductivity	76J198	10/19
10 Turb. Stan.	A8235	10/19
20 Turb. Stan.	A8239	10/19
100 Turb. Stan.	A8234	10/19
800 Turb. Stan.	A8234	10/19
PID Span Gas		
O_2-LEL Span Gas		
Other		

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.
** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.
1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

MACTEC
511 Congress Street, Portland Maine 04101

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME: Bearoff Metallurgic
PROJECT NUMBER: 3612112282.04 xxxx
PROJECT LOCATION: 200 Spring St, Colonie NY
WEATHER CONDITIONS (AM): 52°F / overcast / slight rain
WEATHER CONDITIONS (PM): 55°F, overcast

TASK NO: 05 DATE: 10/15/18
FIELD CREW: JL/JR
SAMPLER NAME: JL
SAMPLER SIGNATURE:
CHECKED BY: TNG DATE: 11/1/18

MULTI-PARAMETER WATER QUALITY METER
METER TYPE YSI
MODEL NO. 556
UNIT ID NO. M015'04

AM CALIBRATION — Start Time: End Time:
PM CALIBRATION CHECK (Cal Lot) — Start Time: End Time:

	Units	Standard Value (AM)	Meter Value (AM)	*Acceptance Criteria (AM)	Standard Value (PM)	Meter Value (PM)	*Acceptance Criteria (PM)
pH (4)	SU	4.0	4.00	+/- 0.1 pH Units	4.0 - 4.12 (JL)	~~4.0~~	
pH (7)	SU	7.0	7.00	+/- 0.1 pH Units	7.0	7.08	+/- 0.3 pH Units
pH (10)	SU	10.0	—	+/- 0.1 pH Units			
Redox	+/- mV	240	~~240~~ 240	+/- 10 mV	240	243	+/- 10 mV
Sp. Conductivity	µS/cm	1413	1.413	+/- 3% of standard	1413	1.456	+/- 5% of standard
DO (saturated)	%	100	100.2	+/- 2% of standard		98.3	%
DO (saturated)	mg/L[1] (see Chart 1)		—	+/- 0.2 mg/L		—	+/- 0.5 mg/L of sat. value
DO (<0.1)	mg/L	<0.1	—	< 0.5 mg/L	DO (<0.1)	—	< 0.5 mg/L
Temperature	°C		17.90			16.56	°C
Baro. Press.	mmHg		762 762			762	mmHg

TURBIDITY METER
METER TYPE Hach
MODEL NO. 2100Q
UNIT ID NO. M024-31

	Units	Standard Value	Meter Value	Standard Value (PM)	Meter Value (PM)	*Acceptance Criteria (PM)
Standard	NTU	10	9.89	10 (+/-5%)	10.4	+/- 5% of standard
Standard	NTU	20	19.18	20	20.8 (JL)	
Standard	NTU	100	96.7	100	103 (JL)	
Standard	NTU	800	798	800	811	

PHOTOIONIZATION DETECTOR NA
METER TYPE
MODEL NO.
UNIT ID NO.

	Units	Standard Value	Meter Value	Standard Value (PM)	Meter Value (PM)	*Acceptance Criteria (PM)
Background	ppmv	<0.1		<0.1		within 5 ppmv of BG
Span Gas	ppmv	100		100		+/- 10% of standard

O_2-LEL 4 GAS METER NA
METER TYPE
MODEL NO.
UNIT ID NO.

	Units	Standard Value	Meter Value	Standard Value (PM)	Meter Value (PM)	*Acceptance Criteria (PM)
Methane	%	50		50		+/- 10% of standard
O_2	%	20.9		20.9		
H_2S	ppmv	25		25		
CO	ppmv	50		50		

OTHER METER NA
METER TYPE
MODEL NO.
UNIT ID NO.

See Notes Below for Additional Information

[X] Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
[ ] Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source:
Lot#/Date Produced:
Trip Blank Source: Lab
Sample Preservatives Source: Lab
Disposable Filter Type: 0.45µm
Calibration Fluids / Standard Source:
- DO Calibration Fluid (<0.1 mg/L)
- Other
- Other
- Other

	Cal. Standard Lot Number	Exp. Date
pH (4)	7GJ052	10/19
pH (7)	7GJ0798	10/19
pH (10)	—	
ORP	2340	12/22
Conductivity	7GJ798	10/18
10 Turb. Stan.	A8232	11/19
20 Turb. Stan.	A8234	11/19
100 Turb. Stan.	A8234	11/19
800 Turb. Stan.	A8236	11/19
PID Span Gas	NA	
O_2-LEL Span Gas	NA	
DO	NA	

NOTES:

wood.

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-Field Calibration) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.
** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.
1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-Field Calibration), dated 1/19/2010.

ATTACHMENT 2

BOREHOLE GEOPHYSICAL LOGGING REPORT

BOREHOLE GEOPHYSICAL LOGGING OF BOREHOLES BR-201 AND BR-202 AT THE FORMER BEAROFF PROPERTY COLONIE, NEW YORK

Northeast Geophysical Services
4 Union Street, Suite 3
Bangor, Maine 04401
November 2018

BOREHOLE GEOPHYSICAL LOGGING
OF BOREHOLES BR-201 AND BR-202
AT THE FORMER BEAROFF PROPERTY
COLONIE, NEW YORK

Introduction

At the request of Wood., two bedrock boreholes, designated as BR-201 and BR-202, located at the former Bearoff property in Colonie, New York were geophysically logged by Rudy Rawcliffe of Northeast Geophysical Services (NGS). The boreholes were logged on October 4, 2018. The purpose of the geophysical logging was to identify water-bearing fractures. Caliper, temperature, fluid conductivity, natural gamma and heat-pulse flowmeter measurements were collected from each of the boreholes. In addition, acoustic televiewer (ATV) and optical televiewer (OTV) images were generated for each borehole.

Geophysical Methods and Instrumentation

The boreholes were logged with a Mount Sopris Matrix digital logger. The boreholes were logged with a caliper tool, fluid temperature/fluid conductivity tool, natural gamma tool and the OTV and ATV tools. The final log on each borehole was the flowmeter measurements. Following is a brief description of each parameter that was measured and how that information is used to locate possible bedrock fractures.

Temperature (in degrees Centigrade [ºC]) is measured with the probe going down each hole. Generally, temperature rises smoothly with depth at a rate of about 1.0º C per 100 feet due to the local geothermal gradient. Areas where water may be entering or exiting the borehole are sometimes revealed on the temperature log as abrupt temperature changes or sometimes as temperature gradient changes. Other factors that can affect the temperature log besides transmissive fractures include variations in the thermal resistivity of the rock with depth along the borehole, surface climatic changes, thermal effects of drilling activity, and localized heat sources such as radionuclides in the rock or cement setting outside the casing.

Fluid conductivity measures the conductivity (in micro Siemens) of the water in the borehole. Fluid conductivity can be useful in identifying transmissive fractures because water entering the borehole through fractures sometimes has a different conductivity than the water that is already in the borehole.

Caliper measures the borehole diameter. Fractures are often revealed on the caliper log as abrupt widenings of the borehole.

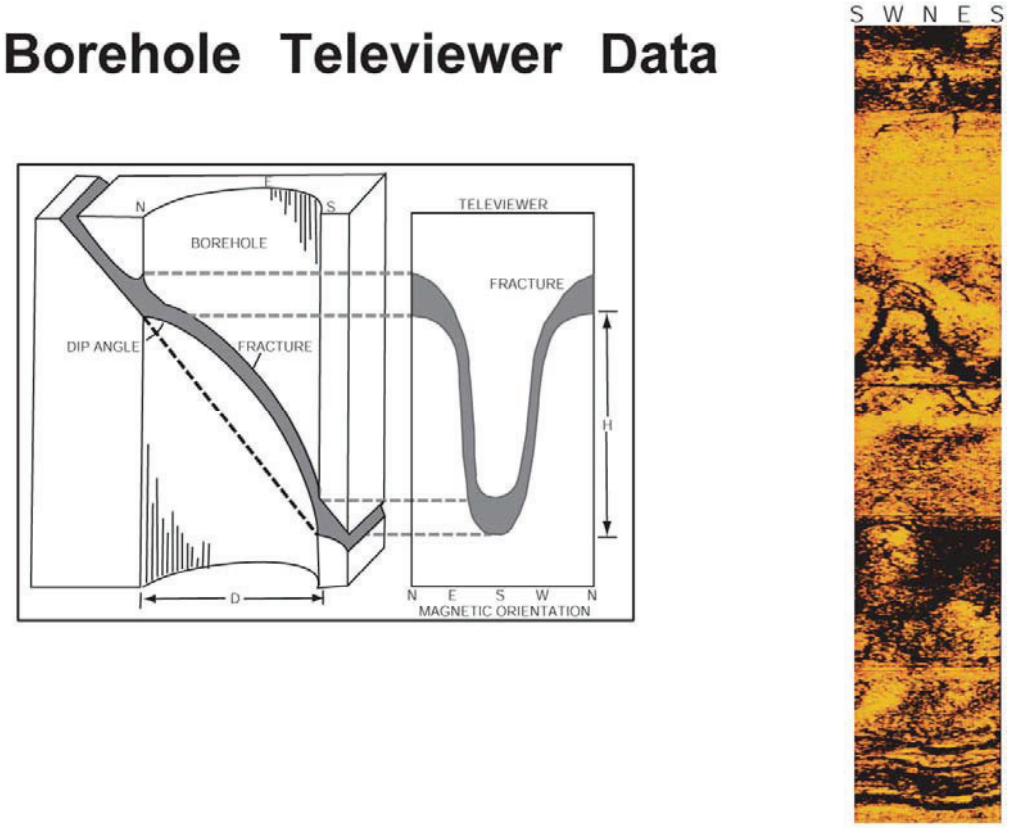
Natural gamma measures the gamma radiation in counts per second (cps) that is being emitted from the materials located next to the probe. Natural gamma is generally used as a way to distinguish between different lithologies or soil types. This is because different materials often have different percentages of radioactive elements (mainly potassium-40 and to a lesser extent uranium-238 and thorium-232). For example, granites or pegmatites, because of their higher feldspar content, are usually higher in radioactivity than mafic rocks such as gabbros. Bedrock fractures or fracture zones are sometimes distinguished by the gamma log because fractures often contain weathered clay minerals which can have higher amounts of potassium or uranium than the unfractured rock.

The optical televiewer (OTV) log provides a digital optical image of the borehole walls. The OTV can identify planar features such as fractures, bedding surfaces, and joints and the strike, dip direction and dip angle.

The acoustical televiewer (ATV) log provides an acoustical image of the borehole walls. The ATV works by scanning the borehole wall with an acoustic beam that is produced by a rapidly rotating piezoelectric source. Similar to the optical televiewer, planar features such as fractures, bedding surfaces and joints can be identified with the ATV tool and the strike, dip direction and dip angle of these features can often be determined.

The optical (OTV) and acoustical (ATV) televiewer logs are somewhat duplicative in that they both can provide similar information. However, there are advantages and disadvantages to both tools. The ATV requires the borehole to be water filled and will not provide information above the water level. The OTV can work in air or water but is not effective in cloudy, turbid water whereas the ATV will work fine in cloudy water. The ATV can be better at discerning voids, cracks and fractures whereas the OTV can be better at discerning lithology. Also, sometimes water-bearing fractures are rust stained, which can be seen by the OTV.

The ATV (and OTV) data are presented as "unwrapped" images of the borehole wall that are oriented to magnetic north. The dip angle and dip direction of any planar feature that intersects the borehole can be measured from this image. The following figure illustrates this.



Each identified feature was digitized using WellCad software which then calculates the dip and

dip direction of the features taking into account the borehole tilt and orientation.

The temperature, caliper, fluid conductivity, ATV and OTV logs were examined and possible bedrock fractures were identified. This information was used to select measurement locations for the flowmeter instrument. Generally, flowmeter measurements were taken in the zone above and below locations where potential fractures might exist in the boreholes.

Flowmeter Measurements

Flowmeter measurements of the vertical water flow were made in the boreholes using a Mount Sopris Heat Pulse Flowmeter. This instrument is capable of measuring flow direction in a borehole (up or down) and has a calibrated measurement range of 1.0 to 0.03 gallons per minute (gpm).

Vertical flow in a borehole is caused when two or more transmissive fractures in the borehole are at hydraulic disequilibrium with one another. When this occurs there is a hydraulic gradient developed and water will flow toward the fracture with the lower hydraulic head. When no vertical flow is measured it can mean that there are less than two transmissive fractures in the borehole or that all the fractures in the borehole are at equilibrium with each other.

Flowmeter measurements are made under ambient (unstressed) conditions and then repeated while stressing the borehole by pumping using a small pump situated near the top of the borehole. The effect of pumping is to cause inflow into the borehole from any transmissive fractures which can be identified by the flowmeter measurements.

Borehole Geophysical Results

The first plot for each borehole, Plate 1, is a composite log plot containing the caliper log, heat pulse flowmeter, fluid conductivity, temperature logs and a tadpole plot of the dip and dip direction of the interpreted planar features interpreted from the televiewer logs. The blue colored tadpoles represent possible (light blue) and likely (dark blue) transmissive fractures. The number adjacent to each blue tadpole reference tabulated data for the borehole that provide the strike, dip direction and dip amount of each identified planar feature in the borehole.

One or a combination of anomalous geophysical responses identified physical discontinuities that may represent possible transmissive fractures. These included abrupt widenings in the caliper log, changes in the fluid conductivity log, deflections or gradient changes in the temperature log and the heat pulse flowmeter measurements. The flowmeter log and the temperature and fluid conductivity logs were mainly used to identify transmissive fractures.

Plate 2 is a rose plot of the strike and dip angle of all the interpreted planar features in each borehole.

Plate 3 is an upper hemisphere polar plot of the dip direction and dip amount of planar features in each borehole.

Plate 4 is the televiewer image log plots, caliper log and interpreted structure for each borehole.

Table 1 provides the depth and calculated strike and dip of the planar features in each borehole that have been interpreted from the televiewer logs. These planar features may be fractures or may represent cleavage, joints or bedding planes. The results in Table 1 have been categorized and also have been color-coded on the logs to provide an interpretative range of the likelihood that the associated feature signifies a transmissive fracture as follows:

- Dark blue symbol (category 107) - multiple distinct borehole geophysical logging responses indicating borehole enlargement (caliper and acoustic signal), or evident change in the borehole fluid characteristic (temperature, fluid conductivity, discoloration on the optical log or quantified vertical flow) that provides the strongest data that the indicated bedrock feature represents a likely transmissive water-bearing fracture.
- Light blue symbol (category 108) - less amount of corroborating geophysical data to support that the indicated feature will transmit groundwater compared to the dark blue symbol. However, the televiewer logs show a fairly distinct acoustic signal or optical image that perhaps under a higher stress condition (e.g. pumping rate), vertical flow could be induced in the borehole. Less degree of confidence that the feature represents a transmissive feature.
- Black symbol (category 101) - bedrock feature with aperture greater than 1 mm. Less likely to transmit water; more likely to represent planes of foliation, bedding planes or healed or filled fractures that parallel the bedding/foliation.
- Gray symbol (category 100) - bedrock feature with aperture less than 1 mm. Not interpreted to transmit water; more likely to represent planes of foliation, bedding planes or healed or filled fractures that parallel the bedding/foliation.

It is possible that there are other transmissive fractures in the boreholes but the ones indicated on the logs and tables are considered the most likely based on the geophysical measurements.

Following are summaries of the two boreholes:

BR-201:

Total Depth (from top of casing):	72.10 feet
Casing Depth:	30.5 feet
Water Level:	44.0 feet

The geophysical logs for BR-201 are shown in the attachments on Plates A-1 and A-4.

The caliper log for BR-201 shows a median diameter of 3.80 inches. The borehole walls of BR-201 were generally very smooth with no large deflections that would indicate a fracture..

BR-201 had a median temperature below the casing of 10.82º C ranging from 10.70º to 12.40º C. In general the temperature decreases starting from just below the casing at 30.5 feet to the bottom of the borehole at 72.10 feet. There is a subtle temperature deflection at about 47 feet that could indicate a transmissive zone in this area although more likely this temperature variation is a near surface effect.

BR-201 had a median fluid conductivity (adjusted to 25º C) of 940 uS/cm ranging from 913 to 949 uS/cm. There is a change in gradient at about 47 feet similar to the temperature log, however this may be a near surface effect.

BR-201 had a median gamma count rate of 155 counts per second (cps) ranging from 99 to 221 cps. The count rate was fairly constant in the borehole with no obvious high or low zones.

Flowmeter measurements taken under ambient conditions in BR-201 show no measurable flow in the borehole. Flowmeter measurements were then taken while pumping the well from the top at about 0.28 gpm. Measurements that were taken under pumping conditions also show no flow in the borehole. This means that the transmissivity in this borehole is very low and that there are no obvious transmissive fractures in this borehole.

Although the flowmeter measurements did not detect any transmissive fractures in BR-201 the optical televiewer shows a couple of fractures located above the water table that show some possible rust staining. These fractures are shown on plate A-1 and in the table as possibly transmissive fractures.

The televiewer images for BR-201 are shown on Plate A-4. The strike and dip of the planar features including the possible transmissive fractures for BR-201 are shown on the composite log (Plate A-1) and tabulated in the appendix (Table A-1).

BR-202:

Total Depth (from top of casing):	68.0 feet
Casing Depth:	41.7 feet
Water Level:	39.88 feet

The geophysical logs for BR-202 are shown in the attachments on Plates B-1 and B-4.

The caliper log for BR-202 shows a median diameter of 3.83 inches. There are some deflections (widenings) in the caliper log from 42 to 45 feet and at 49.5 and 53 feet that may represent bedrock fractures.

BR-202 had a median temperature below the casing of 10.79º C ranging from 10.65º to 11.42º C. In general the temperature decreases starting from just below the casing at 41.7 feet to the bottom of the borehole at 68 feet with no obvious deflections or gradient changes in the temperature log

BR-202 had a median fluid conductivity (adjusted to 25º C) of 897 uS/cm ranging from 838 to 907 uS/cm. There are some subtle deflections in conductivity near to the caliper anomalies at 43, 50 and 52.5 feet that may indicate transmissive zones in these areas.

BR-202 had a median gamma count rate of 151 counts per second (cps) ranging from 90 to 202 cps. The count rate was fairly constant in the borehole with no obvious high or low zones.

Flowmeter measurements taken under ambient conditions in BR-202 show no measurable flow in the borehole. Flowmeter measurements were then taken while pumping the well from the top at about 0.36 gpm. Measurements that were taken under pumping conditions also show no flow in the bottom of the borehole until 51.8 feet where an upflow of 0.11 gpm was measured. At 49 feet upflow increased to 0.18 gpm. This indicates that the fractures located at 53.3 and 49.6 feet are likely to be transmissive.

The televiewer images for BR-202 are shown on Plate B-4. The strike and dip of the planar features including the likely and possible transmissive fractures for BR-202 are shown on the composite log (Plate B-1) and tabulated in the appendix (Table B-1).

ATTACHMENT A

BOREHOLE GEOPHYSICAL LOGS

BR-201

FORMER BEAROFF PROPERTY

Northeast Geophysical Services

PLATE A-1
Borehole Geophysical Log
BR-201 - Bearoff Site
Colonie, New York

Date logged: 10/04/18

Flowmeter Measurements (in gpm)

Caliper (inches)

Temperature (C)

Natural Gamma (cps)

Dip and Dip Direction of planar features interpreted from Acoustic and Optical Televiewers

Dip in Degrees

flowmeter ambient

flowmeter pumping @ 0.28 gpm

All of the water appears to be coming out of storage.

end of casing

NF

NF

NF

NF

NF

NF

Depth in feet below top of casing

Fluid Conductivity (uS/cm)

= Likely transmissive zone

= Possible transmissive zone

Tadpole tail indicates dip direction.
The solid tadpoles with a feature number are the ones interpreted to be likely or possibly transmissive.

Northeast Geophysical Services

BR-201
Bearoff Site
Colonie, NY

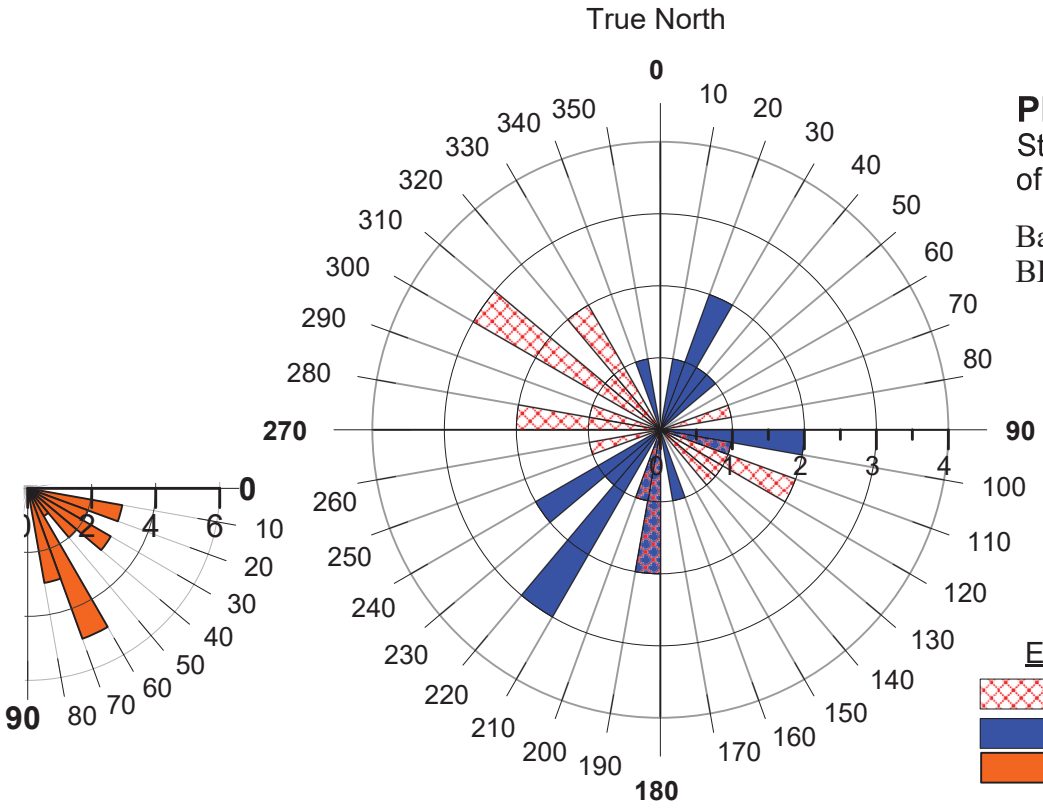


PLATE A-2

Strike and Dip Direction of all features

Based on 19 measurements in BR-201 borehole

Explanation

- Dip direction of feature
- Strike of feature
- Dip Amount (Tilt)

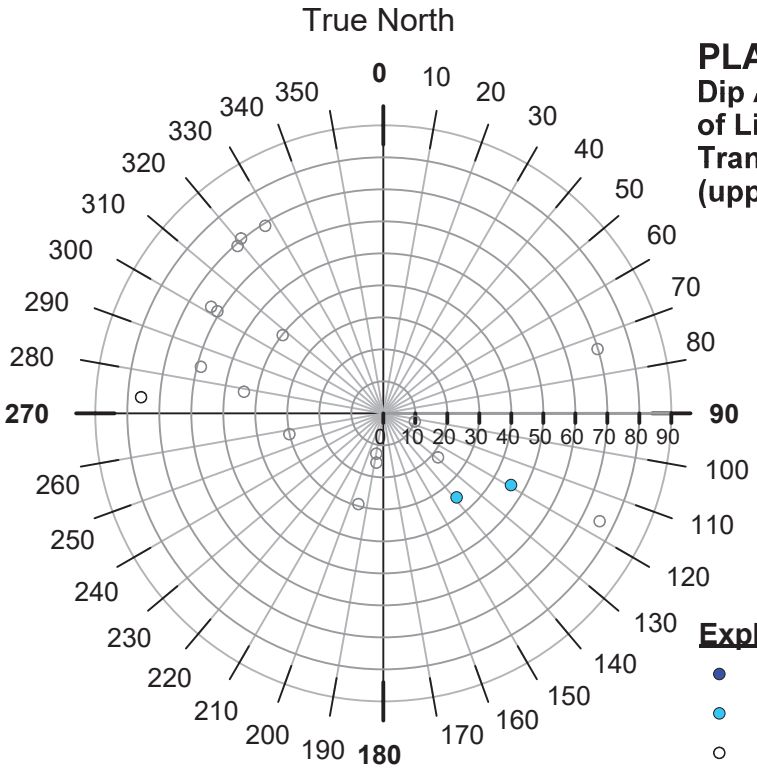


PLATE A-3

Dip Amount and Dip Azimuth of Likely and Possibly Transmissive Fractures (upper hemisphere plot)

Explanation -

- Likely transmissive
- Possibly transmissive
- Aperture > 1 mm
- Aperture < 1 mm

Declination: 13.5 degrees west

Northeast Geophysical Services
4 Union Street Bangor, Maine 04401
Tel. 207-942-2700
email: ngsinc@negeophysical.com

Log: Plate A-4 Televiewer & Caliper Logs

Well: BR-201

Site: Bearoff

Date: 10/04/2018

Location: Colonie, NY

Casing Depth: 30.5 ft.

For: Wood.

Casing Type: 4 in steel

Logged by: R Rawcliffe

Boring Depth: 72.10 ft

Orientation: magnetic

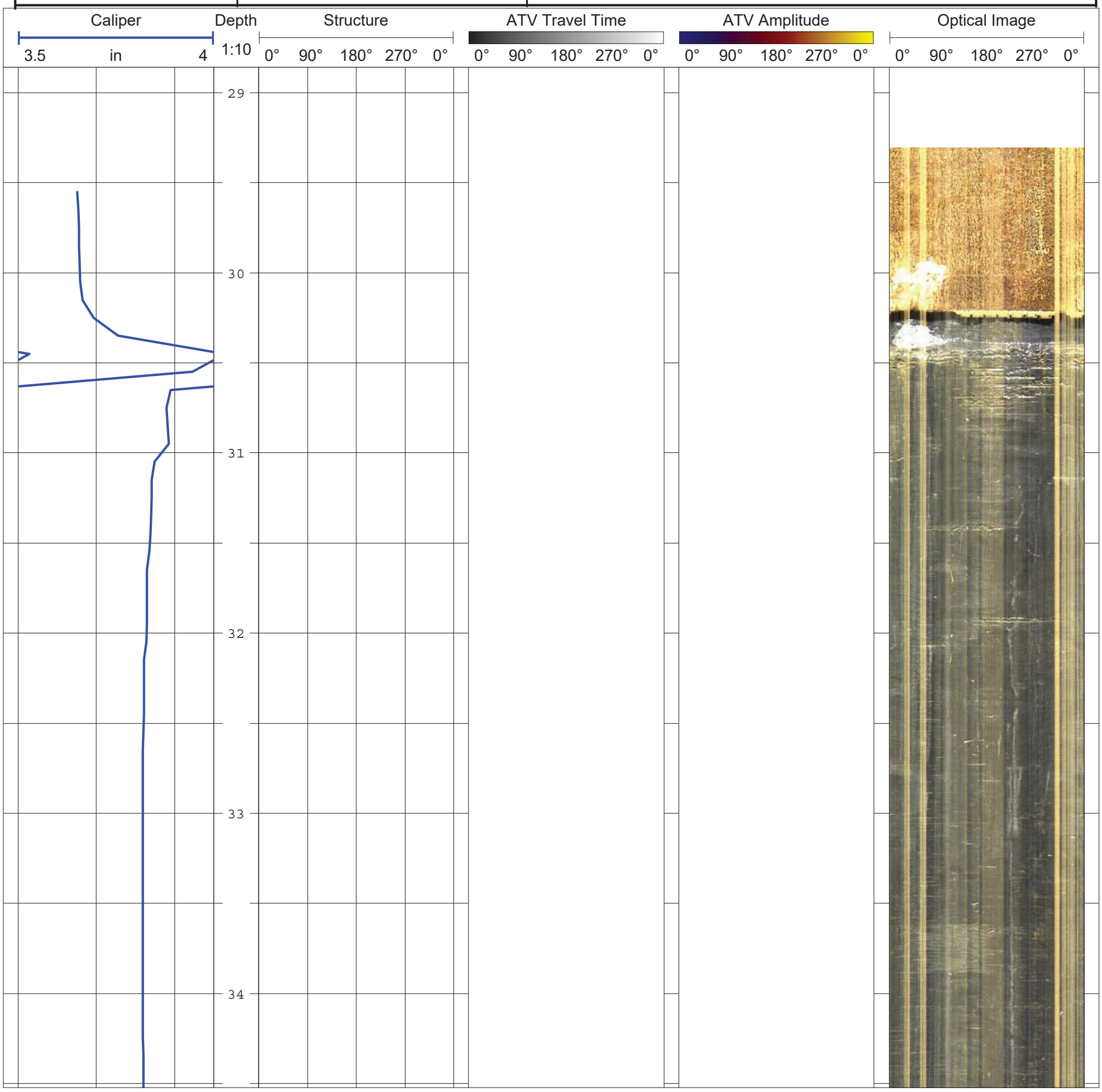
Meas. From: top of casing

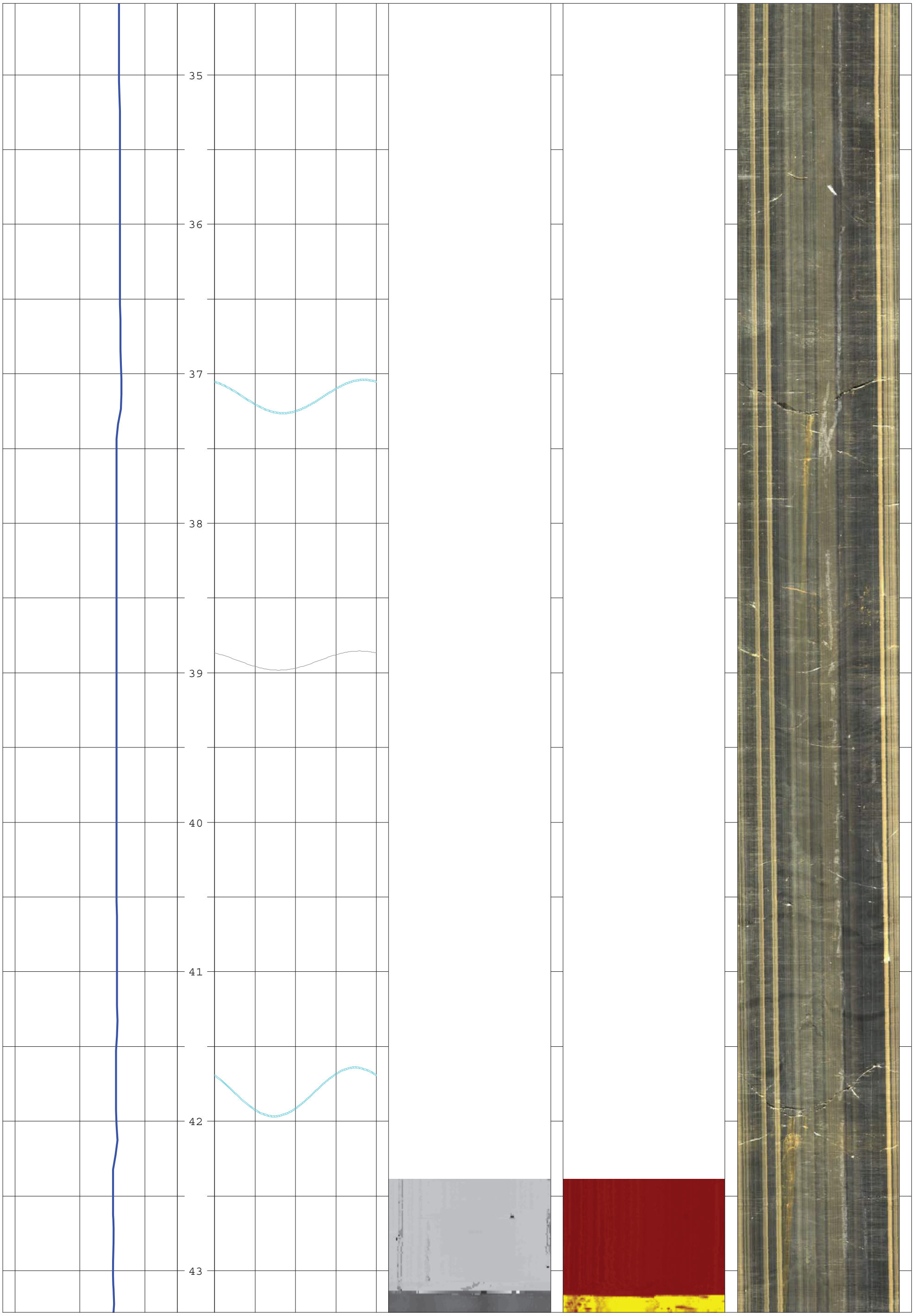
Stickup: 1.60 ft.

Water Level: 44.01 ft.

Structure Plots:

black = planar features (faults, foliation, bedding, joints, etc)
light blue = possibly transmissive fracture
dark blue = likely transmissive fracture

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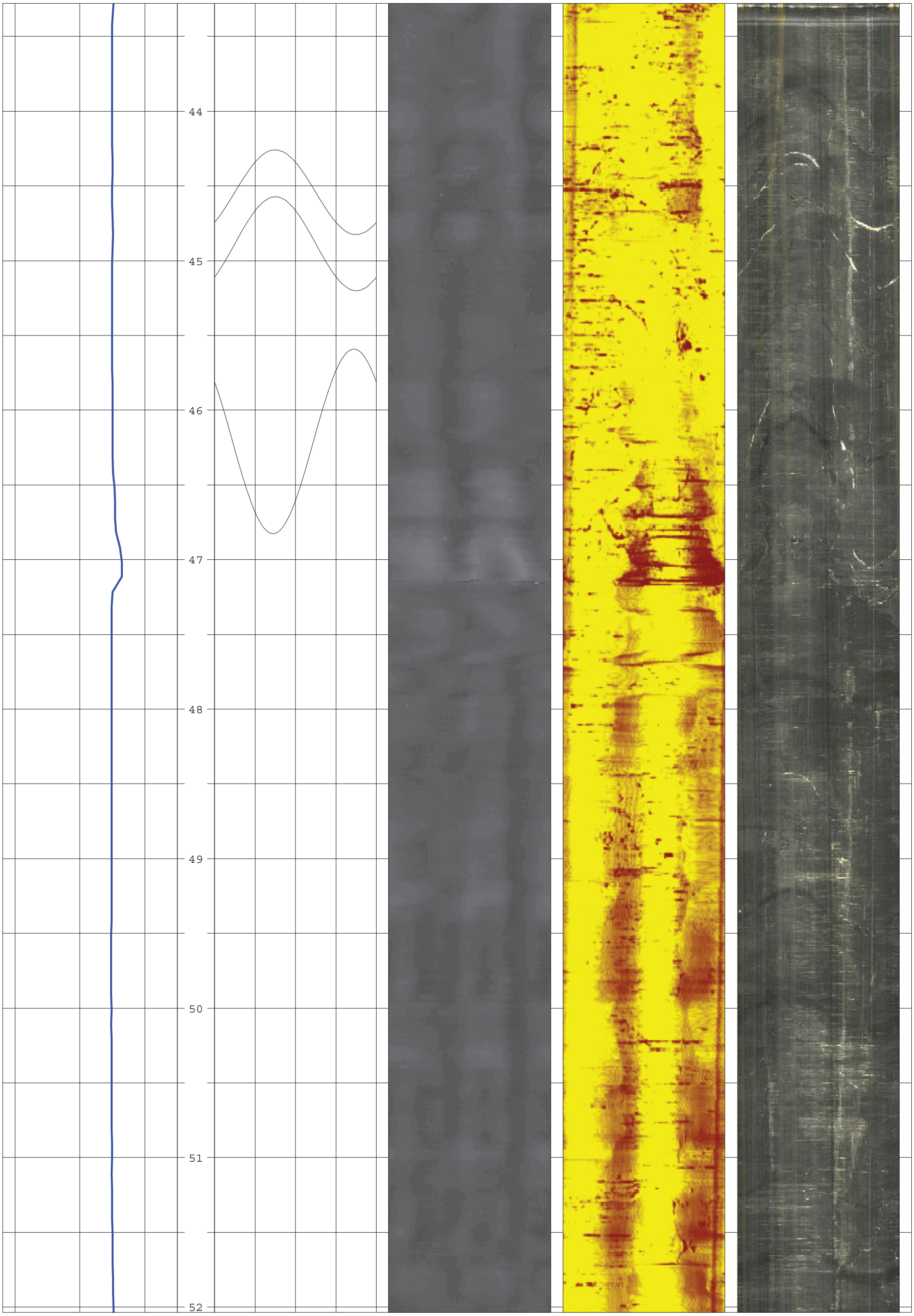
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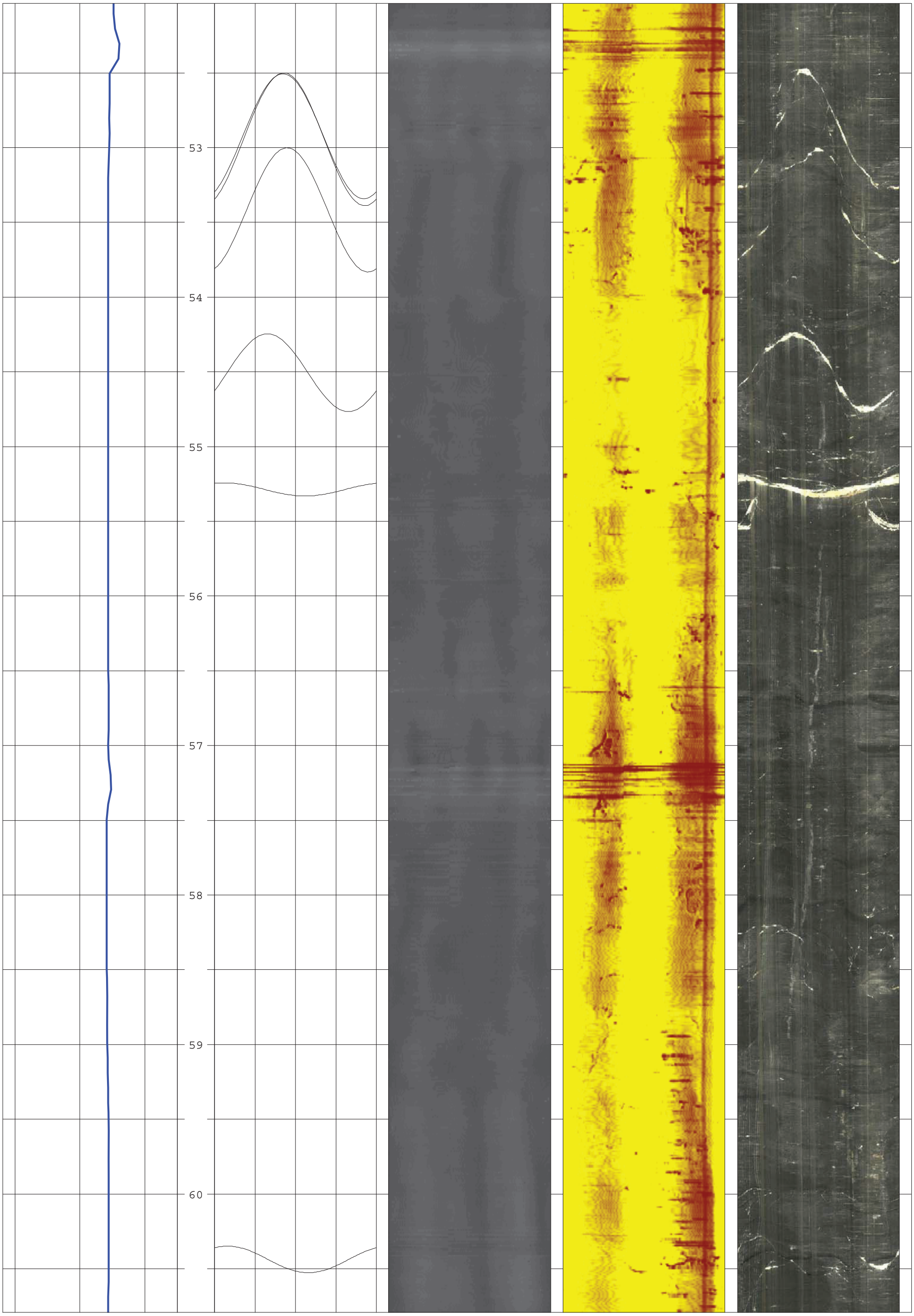
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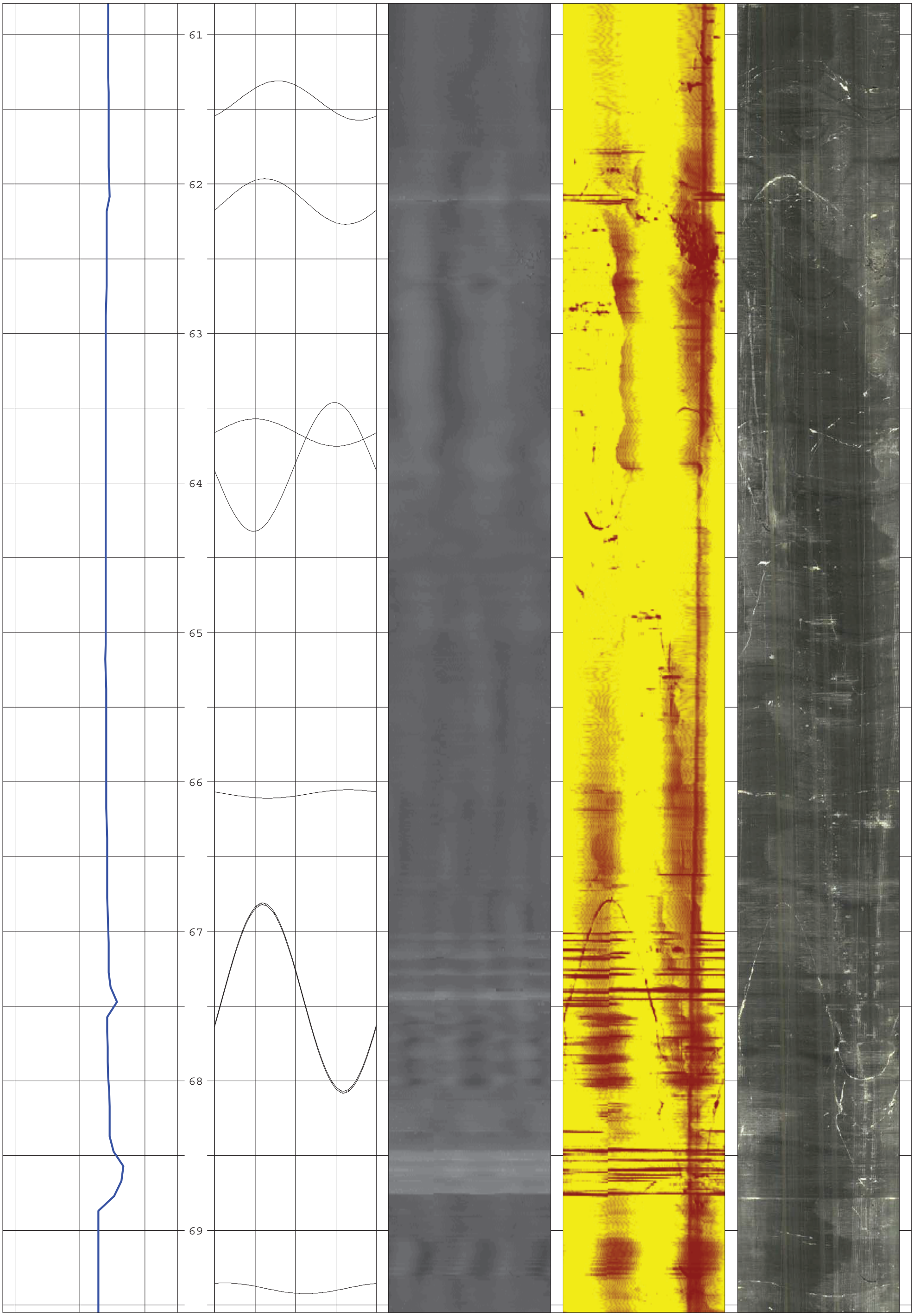
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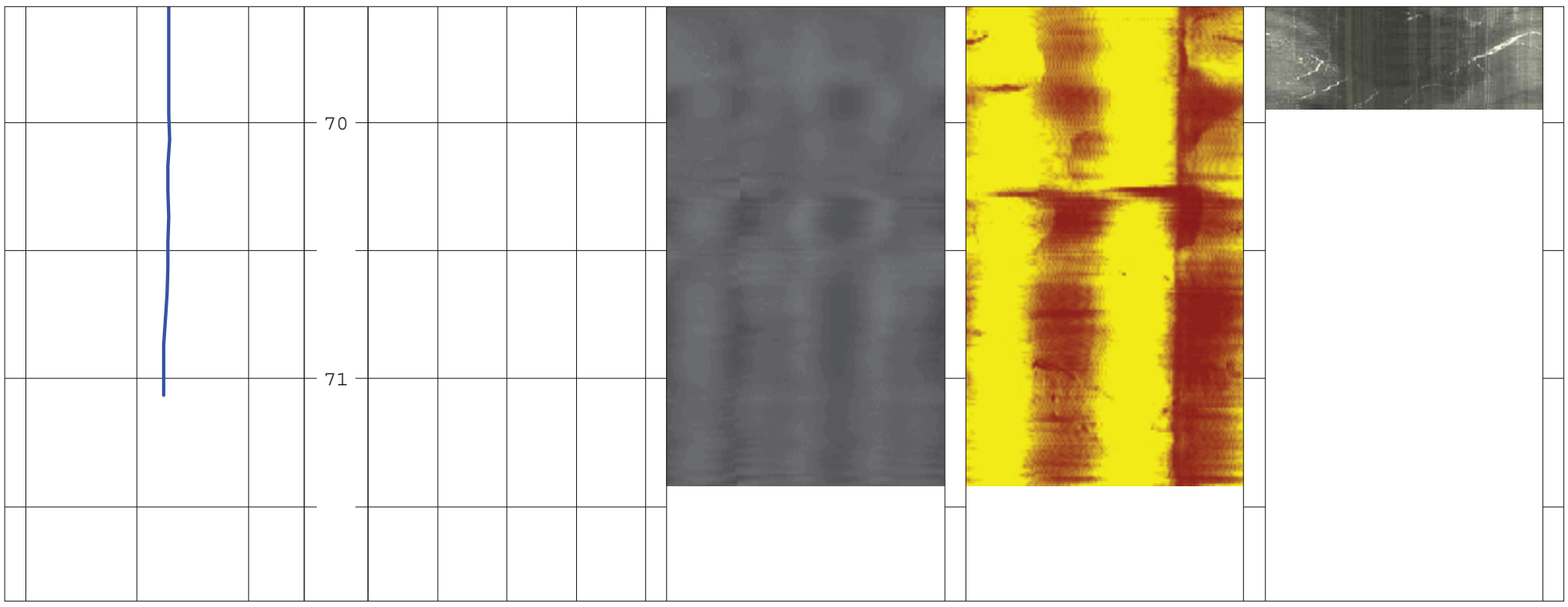
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TABLE A-1 Planar features interpreted from acoustical and optical televiewers
BR-201 - Bearoff Site - Colonie, New York **October, 2018**

Declination: 13.5 degrees west

Borehole	Feature # Number	Feature depth Feet	Dip Degrees	Dip Azimuth magnetic	Strike magnetic	Dip Azimuth True	Strike True	Aperture mm	Category Type
Bearoff BR-201	1	37.2	35	152	62	139	49	2	108
Bearoff BR-201	2	38.9	22	142	52	129	39	<1 mm	100
Bearoff BR-201	3	41.8	46	133	43	119	29	2	108
Bearoff BR-201	4	44.5	61	315	225	302	212	<1 mm	100
Bearoff BR-201	5	44.9	63	315	225	302	212	<1 mm	100
Bearoff BR-201	6	46.2	76	130	40	117	27	<1 mm	100
Bearoff BR-201	7	52.9	69	332	242	319	229	<1 mm	100
Bearoff BR-201	8	53.0	70	334	244	321	231	<1 mm	100
Bearoff BR-201	9	53.4	69	341	251	328	238	<1 mm	100
Bearoff BR-201	10	54.5	59	298	208	284	194	<1 mm	100
Bearoff BR-201	11	55.3	16	201	111	188	98	<1 mm	100
Bearoff BR-201	12	60.4	29	209	119	195	105	<1 mm	100
Bearoff BR-201	13	61.4	40	321	231	308	218	<1 mm	100
Bearoff BR-201	14	62.1	44	292	202	279	189	<1 mm	100
Bearoff BR-201	15	63.7	30	271	181	257	167	<1 mm	100
Bearoff BR-201	16	63.9	70	87	357	73	343	<1 mm	100
Bearoff BR-201	17	66.1	10	118	28	105	15	<1 mm	100
Bearoff BR-201	18	67.5	76	287	197	274	184	1	101
Bearoff BR-201	19	69.4	13	203	113	190	100	<1 mm	100

Explanation:

	Category 100 = planar feature (possible fracture, joint, foliation, bedding, etc.) aperture < 1 mm
	Category 101 = planar feature (possible fracture, joint, foliation, bedding, etc.) aperture > 1 mm
	Category 107 = Likely water bearing feature
	Category 108 = Possible water bearing fracture

ATTACHMENT B

BOREHOLE GEOPHYSICAL LOGS

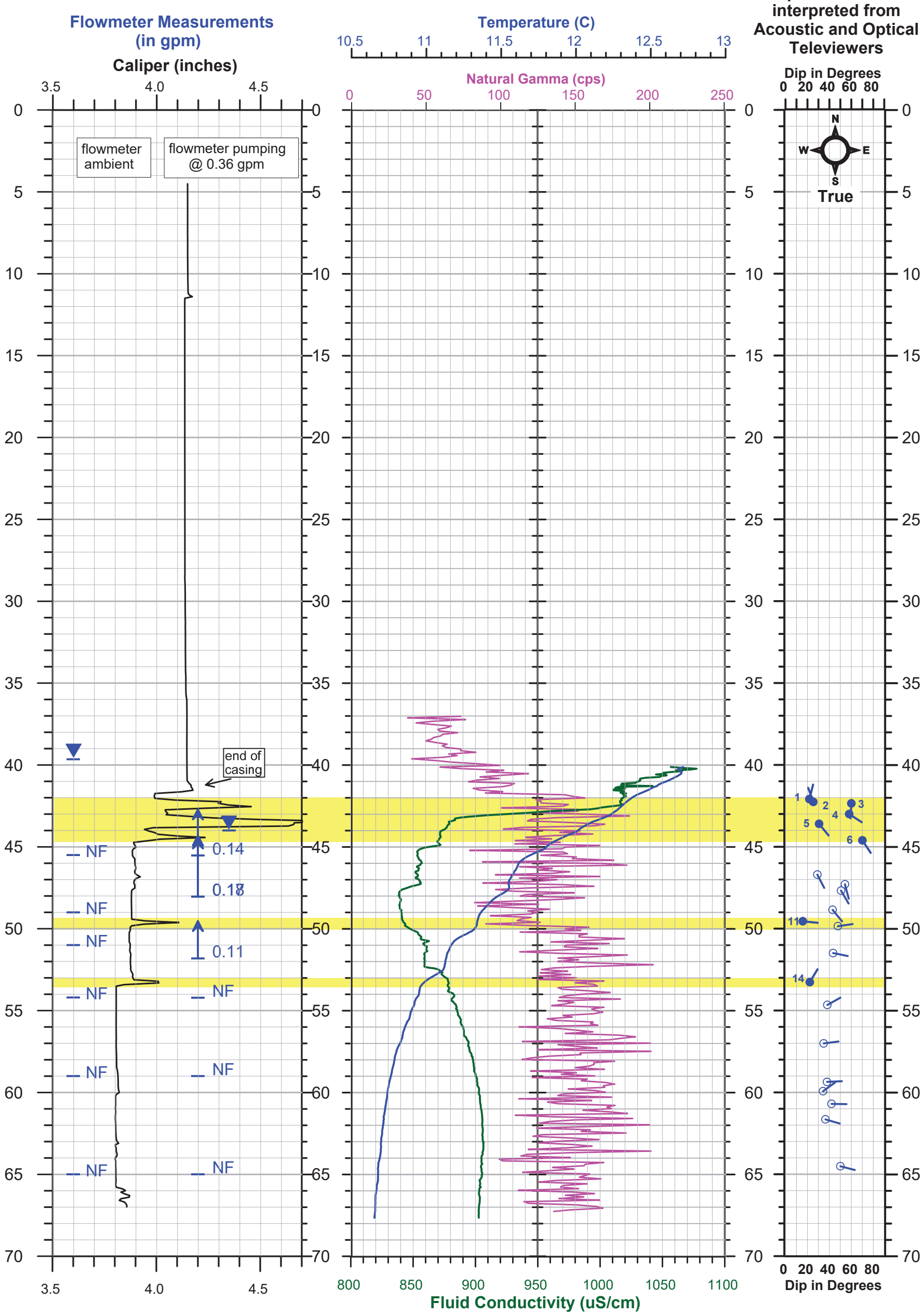
BR-202

FORMER BEAROFF PROPERTY

Northeast Geophysical Services

PLATE B-1
Borehole Geophysical Log
BR-202 - Bearoff Site
Colonie, New York

Date logged: 10/04/18



= Likely transmissive zone

= Possible transmissive zone

PLATE B-1
Borehole Geophysical Log
BR-202 - Bearoff Site
Colonie, New York

Tadpole tail indicates dip direction.
The solid tadpoles with a feature number are the ones interpreted to be likely or possibly transmissive.

Northeast Geophysical Services

BR-202
Bearoff Site
Colonie, NY

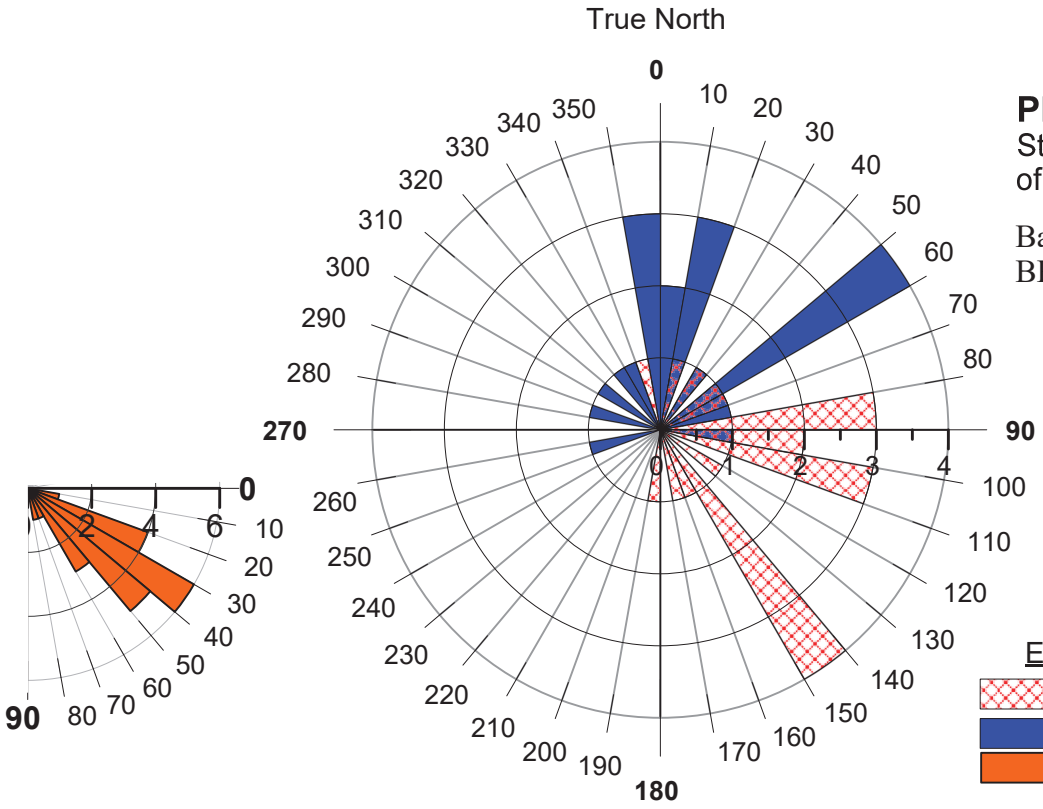


PLATE B-2

Strike and Dip Direction of all features

Based on 21 measurements in BR-202 borehole

Explanation

- Dip direction of feature
- Strike of feature
- Dip Amount (Tilt)

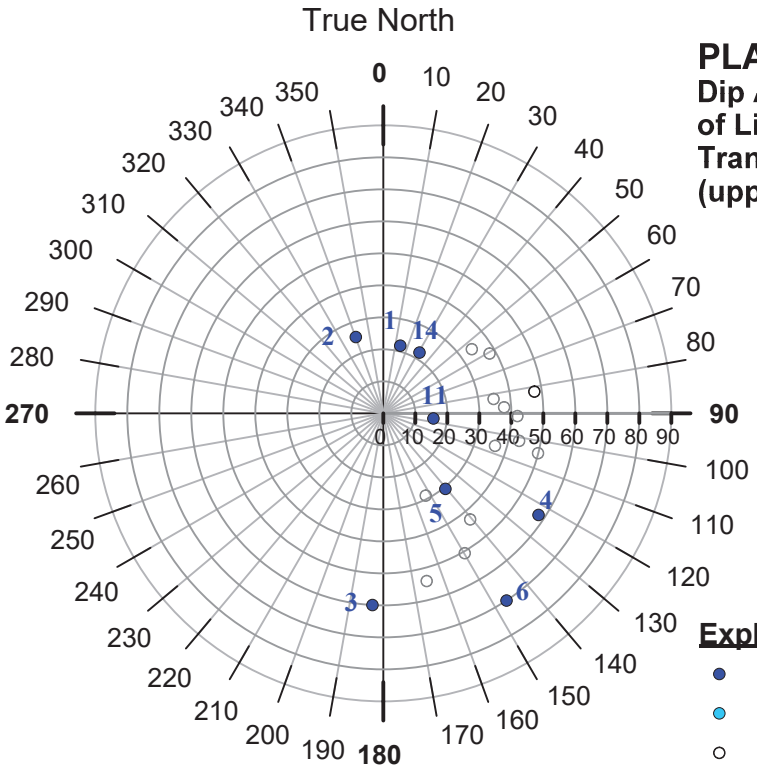


PLATE B-3

Dip Amount and Dip Azimuth of Likely and Possibly Transmissive Fractures (upper hemisphere plot)

Explanation -

- Likely transmissive
- Possibly transmissive
- Aperture > 1 mm
- Aperture < 1 mm

Declination: 13.5 degrees west

Northeast Geophysical Services
4 Union Street Bangor, Maine 04401
Tel. 207-942-2700
email: ngsinc@negeophysical.com

Log: Plate B-4 Televiewer & Caliper

Well: BR-202

Site: Bearoff

Date: 10/04/2018

Location: Colonie, NY

Casing Depth: 41.7 ft.

For: Wood.

Casing Type: 4 in steel

Logged by: R Rawcliffe

Boring Depth: 68.0 ft.

Orientation: magnetic

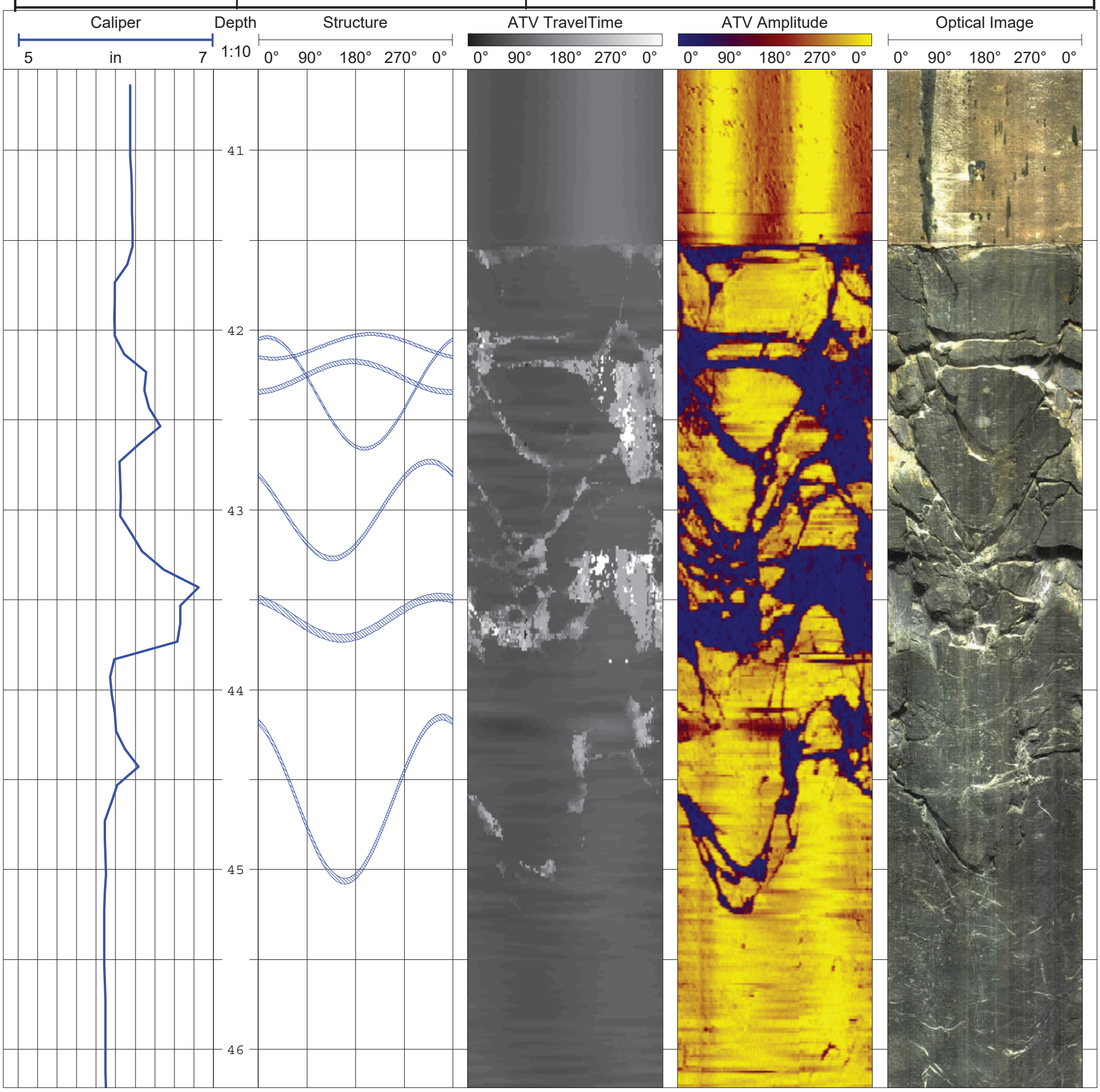
Meas. From: top of casing

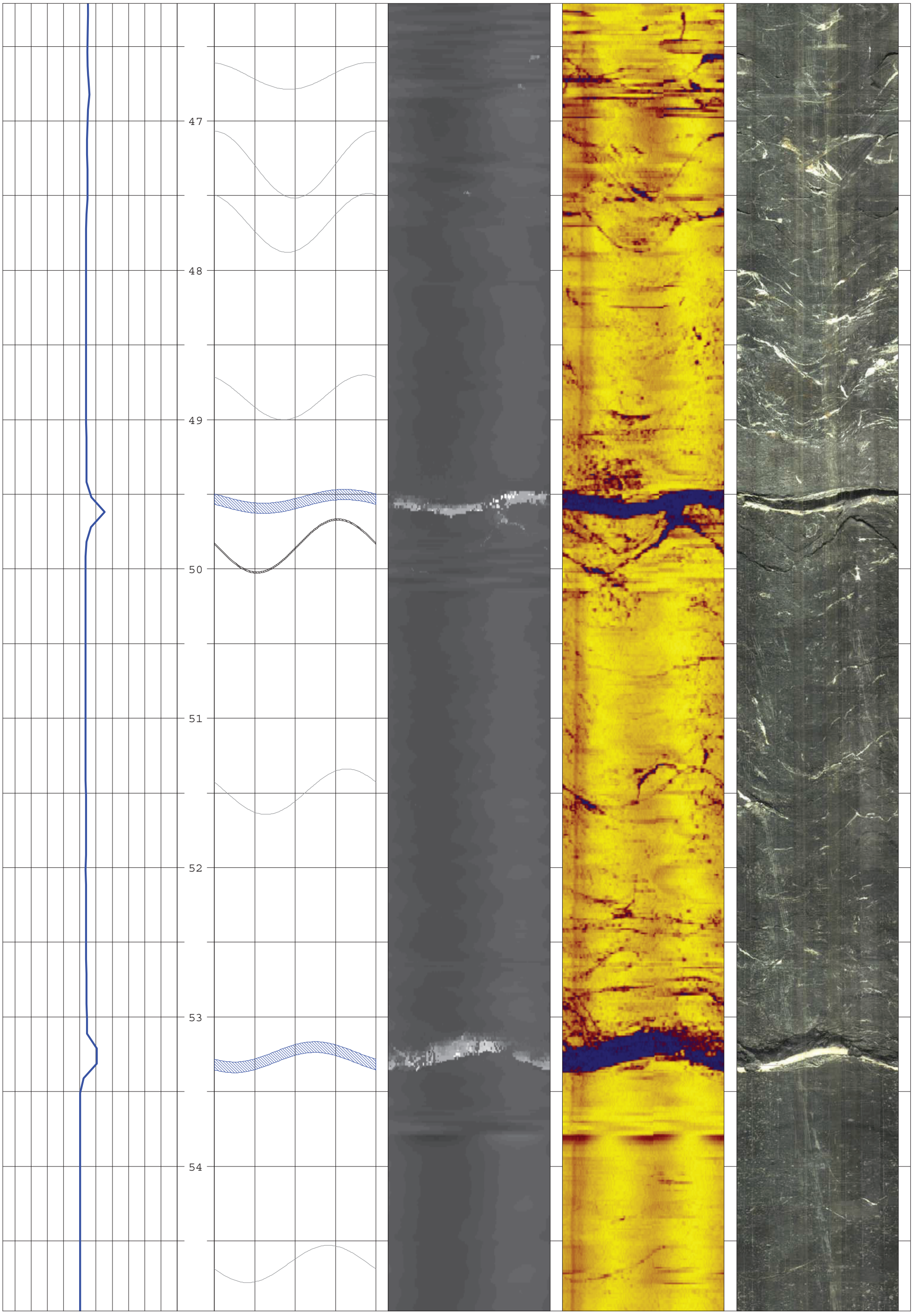
Stickup: 2.45 ft.

Water Level: 39.88 ft.

Structure Plots:

black = planar features (faults, foliation, bedding, joints, etc)
light blue = possibly transmissive fracture
dark blue = likely transmissive fracture

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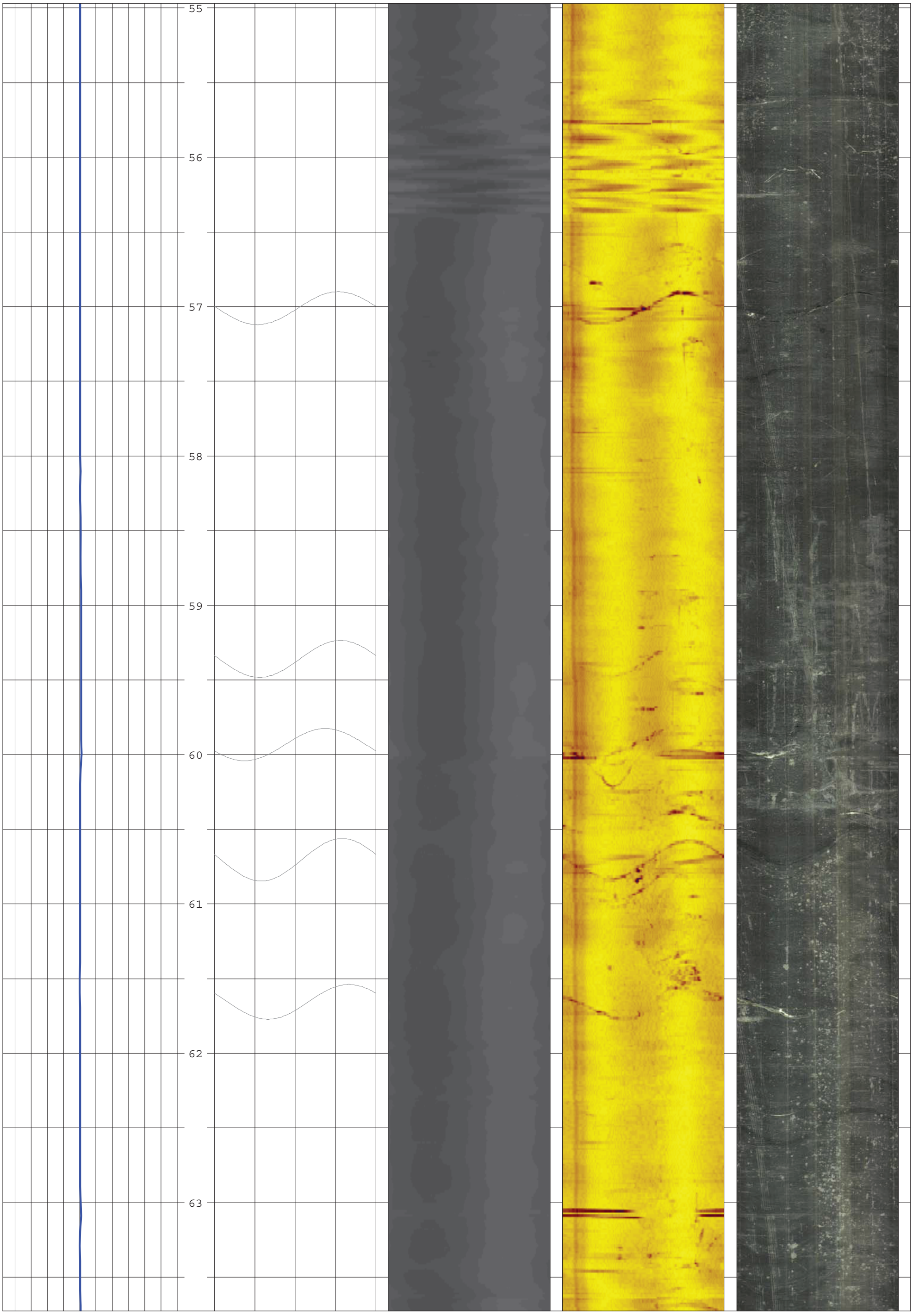
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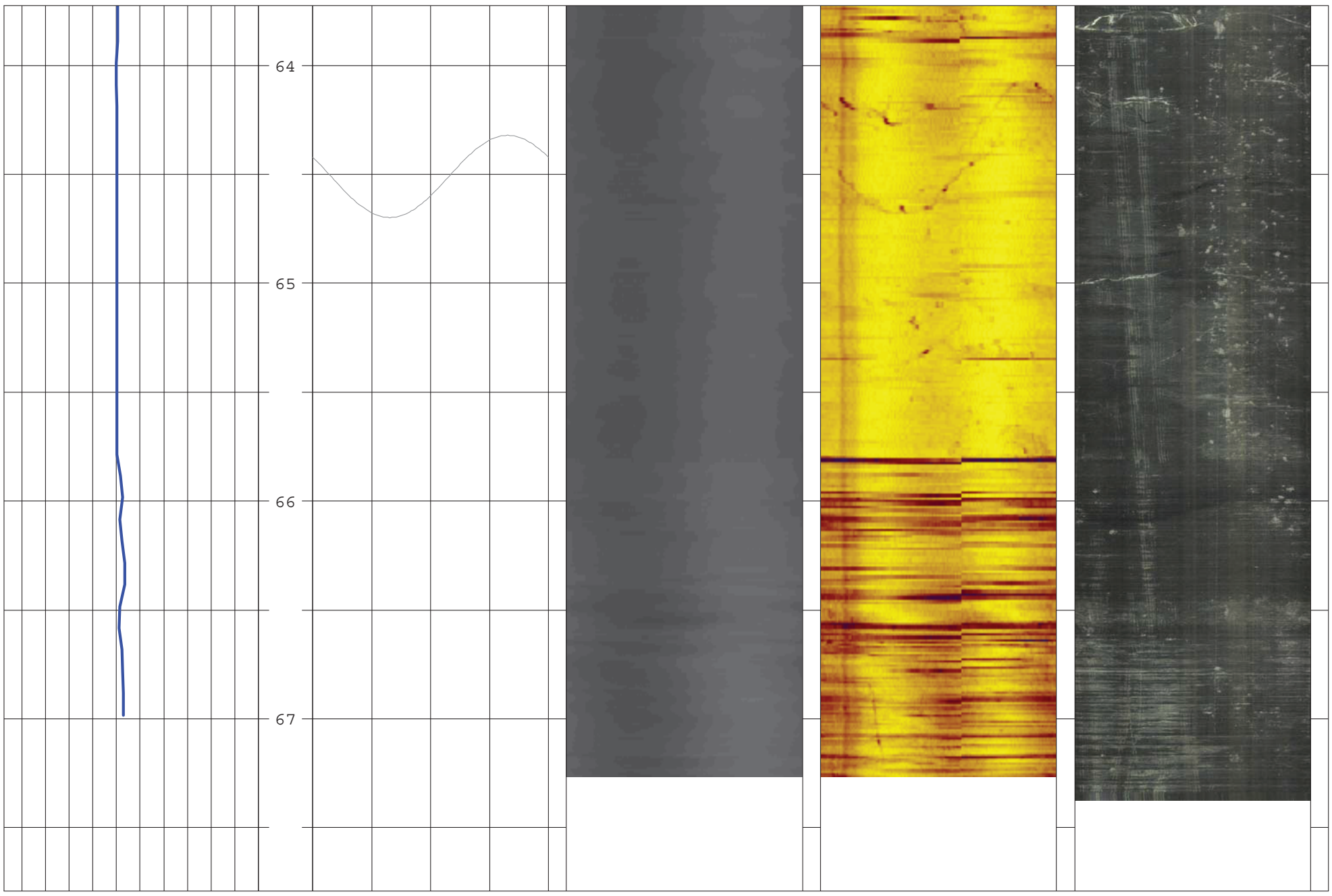
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TABLE B-1 Planar features interpreted from acoustical and optical televiewers
BR-202 - Bearoff Site - Colonie, New York **October, 2018**
Declination: 13.5 degrees west

Borehole	Feature # Number	Feature depth Feet	Dip Degrees	Dip Azimuth magnetic	Strike magnetic	Dip Azimuth True	Strike True	Aperture mm	Category Type
Bearoff BR-202	1	42.1	22	28	298	14	284	5	107
Bearoff BR-202	2	42.3	25	354	264	340	250	7	107
Bearoff BR-202	3	42.4	60	197	107	183	93	3	107
Bearoff BR-202	4	43.0	58	137	47	123	33	4	107
Bearoff BR-202	5	43.6	31	154	64	141	51	11	107
Bearoff BR-202	6	44.6	70	160	70	147	57	3	107
Bearoff BR-202	7	46.7	29	166	76	153	63	<1 mm	100
Bearoff BR-202	8	47.3	54	179	89	166	76	<1 mm	100
Bearoff BR-202	9	47.7	51	163	73	150	60	<1 mm	100
Bearoff BR-202	10	48.9	43	154	64	141	51	<1 mm	100
Bearoff BR-202	11	49.6	16	110	20	96	6	20	107
Bearoff BR-202	12	49.9	48	95	5	82	352	2	101
Bearoff BR-202	13	51.5	43	115	25	101	11	<1 mm	100
Bearoff BR-202	14	53.3	22	44	314	31	301	21	107
Bearoff BR-202	15	54.7	38	74	344	61	331	<1 mm	100
Bearoff BR-202	16	57.0	35	96	6	83	353	<1 mm	100
Bearoff BR-202	17	59.4	38	101	11	87	357	<1 mm	100
Bearoff BR-202	18	59.9	34	68	338	54	324	<1 mm	100
Bearoff BR-202	19	60.7	42	105	15	91	1	<1 mm	100
Bearoff BR-202	20	61.7	36	120	30	106	16	<1 mm	100
Bearoff BR-202	21	64.5	50	118	28	104	14	<1 mm	100

Explanation:

	Category 100 = planar feature (possible fracture, joint, foliation, bedding, etc.) aperture < 1 mm
	Category 101 = planar feature (possible fracture, joint, foliation, bedding, etc.) aperture > 1 mm
	Category 107 = Likely water bearing feature
	Category 108 = Possible water bearing fracture

ATTACHMENT 3

SITE SURVEY

NOTES

1. HORIZONTAL DATUM IS REFERENCED TO THE NEW YORK STATE PLANE COORDINATE SYSTEM NAD 83 EAST ZONE.
2. VERTICAL DATUM IS REFERENCED TO NAVD88.

120 0 60 120

SCALE: 1"=60'

SHUMAKER

Consulting Engineering & Land Surveying, D.P.C.
143 Court St. Binghamton, NY 13901

SCE PROJECT NO. 15152.03

FORMER BEAROFF SITE

SAMPLING LOCATION SURVEY

TOWN OF COLONIE ALBANY CO., NY

DRAWN BY	DATE	DRAWING NO.
SLS	OCT. 2018	1515203_map_sur_3dh.dwg
CHECKED BY	SCALE	
SEG	As Shown	

Attachment 3 - Site Survey

15152.03

SOIL SAMPLES
BEAROFF METALLURGICAL SITE

Soil Samples	Latitude	Longitude	Elevation at Ground
SS-G6	42.715418260	73.726109281	189.81
SS-N8	42.715169648	73.724907963	136.44
SS-L9	42.714974102	73.725166750	145.05
SS-L8	42.715105570	73.725097910	140.61
SS-L3	42.715784739	73.725278833	134.84
SS-K2	42.715944977	73.725495724	136.44
SS-J7	42.715276167	73.725588737	184.27
SS-J5	42.715546640	73.725599700	184.66
SS-J3	42.715766646	73.725573558	154.36
SS-I9	42.714941067	73.725719052	186.54
SS-I7B	42.715235267	73.725801838	188.27
SS-I7A	42.715295952	73.725690266	185.72
SS-I6	42.715410681	73.725743020	186.91
SS-I5	42.715523115	73.725805405	187.73
SS-I4	42.715656083	73.725787936	186.62
SS-I3	42.715818845	73.725769502	164.08
SS-H9	42.714979643	73.725986312	187.50
SS-H6	42.715404804	73.725937230	188.95
SS-H5	42.715557470	73.725898753	188.44
SS-H4	42.715666541	73.725971152	188.08
SS-H3	42.715807395	73.725963298	182.93
SS-H2	42.715914519	73.725885570	166.84
SS-H17	42.713888924	73.725915175	169.78
SS-H16	42.713995954	73.725921063	161.02
SS-G8	42.715102853	73.726185540	190.39
SS-G3	42.715841479	73.726150537	188.26
SS-G2	42.715941922	73.726143968	179.70
SS-G17	42.713897426	73.726149984	177.73
SS-G16	42.714015920	73.726127980	167.53
SS-F6	42.715372988	73.726552706	192.33
SS-F4	42.715752272	73.726292979	190.70
SS-E8	42.715106119	73.726465930	191.61
SS-D9	42.714927292	73.726783299	187.78
SS-E11	42.714760941	73.726461286	187.81
SB-102	42.714995483	73.724162244	94.06
SS-F16	42.714016843	73.72634210	181.75
SS-H7	42.715318346	73.72596559	189.53
SS-K8	42.715136282	73.72534766	168.49
SS-L7	42.715247277	73.72525876	170.80
SS-K7	42.715241133	73.72541096	176.93
SS-E3	42.715821681	73.72648510	188.97
SS-E4	42.715712895	73.72654294	191.10
SS-U11	42.714712633	73.72355700	74.79
SS-Q14	42.714276676	73.72426836	96.91
SS-T9	42.715031871	73.72378335	80.23
SS-Q10	42.714943994	73.72406315	89.34

*HORIZ. DATUM: GEOGRAPHIC NAD83

*VERT. DATUM: NAVD 88

MONITORING WELLS
BEAROFF METALLURGICAL SITE

Well	Latitude	Longitude	Top of Casing Elevation	round Ele
MW-4	42.714507709	73.726760376	190.88	188.08
MW-101	42.714489379	73.726788884	190.86	188.05
SW-201	42.716122513	73.725698149	125.47	
SW-202	42.715973591	73.725543522	122.28	
SW-203	42.715786023	73.725071060	109.59	
SD-204	42.715620200	73.724544075	84.94	
SW-205	42.715554622	73.724236811	79.34	
BR-201	42.715593342	73.725916979	189.84	188.15
BR-202	42.714964959	73.726005974	190.12	187.67

GEOGRAPHIC NAD83
*VERT. DATUM: NAVD 88

PIEZOMETER
BEAROFF METALLURGICAL SITE

Piezometer	Latitude	Longitude	Elevation
PZ01	42.716004192	73.725860825	160.00
PZ03	42.715630103	73.725082787	140.94

*HORIZ. DATUM: GEOGRAPHIC NAD83
*VERT. DATUM: NAVD 88

SEEP SAMPLING LOCATION
BEAROFF METALLURGICAL SITE

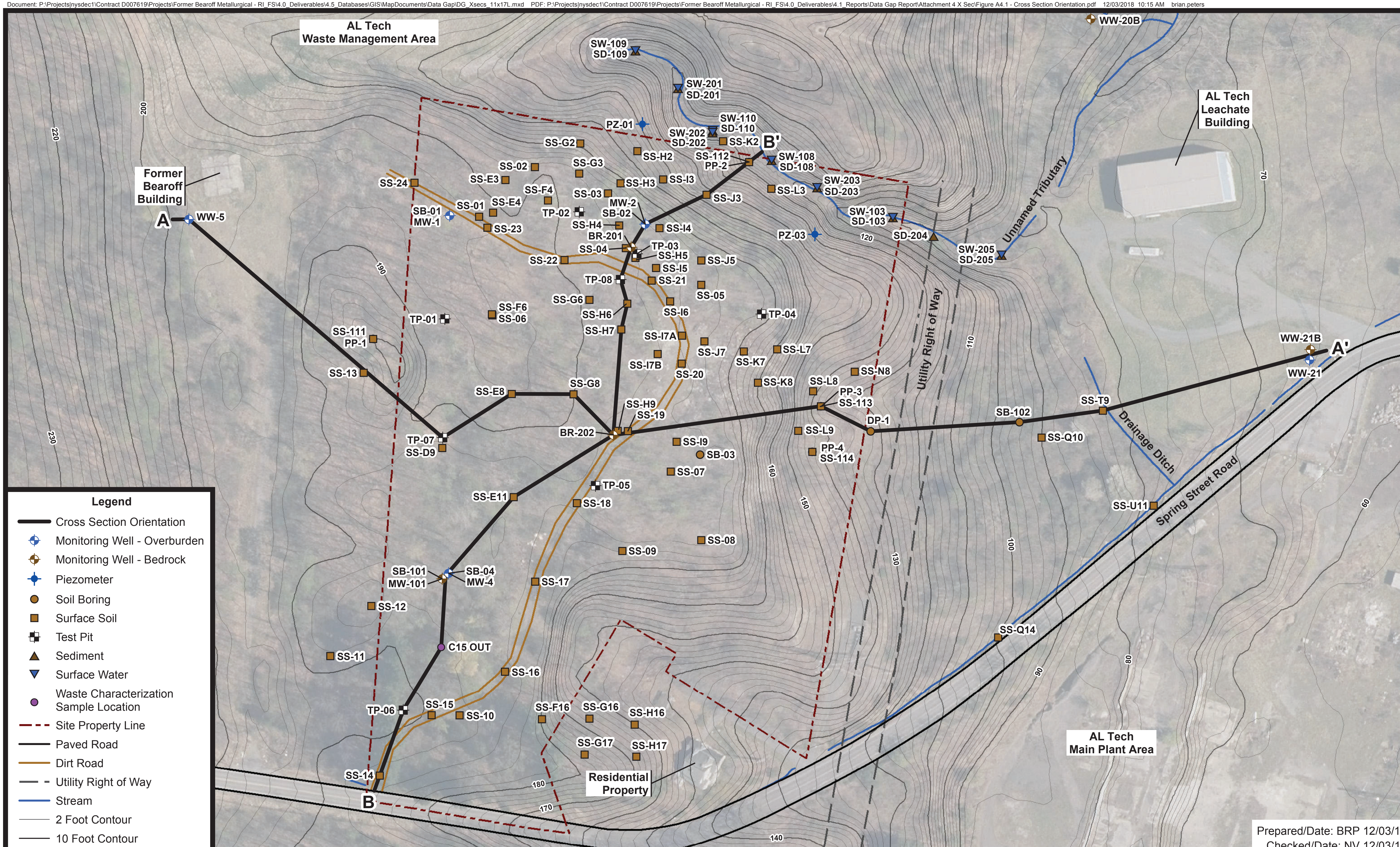
Seep Location	Latitude	Longitude	Elevation
PP-2	42.715832501	73.725521455	138.15
PP-3	42.715054387	73.725067228	134.98

*HORIZ. DATUM: GEOGRAPHIC NAD83
*VERT. DATUM: NAVD 88

ATTACHMENT 4

SITE CROSS SECTIONS

Document: P:\Projects\nysdec1\Contract D007619\Projects\Former Bearoff Metallurgical - RI_FS\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\Data Gap\DG_Xsecs_11x17L.mxd PDF: P:\Projects\nysdec1\Contract D007619\Projects\Former Bearoff Metallurgical - RI_FS\4.0_Deliverables\4.1_Reports\Data Gap Report\Attachment 4 X Sec\Figure A4.1 - Cross Section Orientation.pdf 12/03/2018 10:15 AM brian.peters



AL Tech
Waste Management Area
AL Tech
Leachate
Building
Former
Bearoff
Building
AL Tech
Main Plant Area
Residential
Property
Unnamed Tributary
Drainage Ditch
Utility Right of Way
Spring Street Road
A
A'
B
B'
WW-5
WW-20B
WW-21B
WW-21
SW-109
SD-109
SW-201
SD-201
SW-110
SD-110
SW-202
SD-202
SW-108
SD-108
SW-203
SD-203
SW-103
SD-103
SD-204
SW-205
SD-205
PZ-01
PZ-03
SS-G2
SS-K2
SS-H2
SS-112
PP-2
SS-02
SS-G3
SS-E3
SS-H3
SS-I3
SS-L3
SS-24
SS-F4
SS-03
SS-J3
SS-01
SS-E4
MW-2
SB-02
SB-01
MW-1
TP-02
SS-H4
SS-I4
SS-23
BR-201
TP-03
SS-04
SS-H5
SS-22
SS-J5
SS-I5
TP-08
SS-21
SS-05
SS-G6
SS-F6
SS-06
SS-I6
SS-H6
TP-01
TP-04
SS-111
PP-1
SS-H7
SS-I7A
SS-J7
SS-L7
SS-I7B
SS-K7
SS-13
SS-20
SS-N8
SS-E8
SS-G8
SS-K8
SS-L8
PP-3
SS-113
SS-H9
SS-19
SS-T9
SB-102
DP-1
BR-202
TP-07
SS-D9
SS-L9
SS-Q10
SS-I9
SB-03
PP-4
SS-114
SS-07
TP-05
SS-E11
SS-18
SS-U11
SS-08
SS-09
SB-101
MW-101
SB-04
MW-4
SS-17
SS-12
SS-Q14
C15 OUT
SS-11
SS-16
SS-15
TP-06
SS-10
SS-F16
SS-G16
SS-H16
SS-G17
SS-H17
SS-14
220
200
230
190
120
110
160
150
130
100
70
60
90
80
180
170
140
Legend
Cross Section Orientation
Monitoring Well - Overburden
Monitoring Well - Bedrock
Piezometer
Soil Boring
Surface Soil
Test Pit
Sediment
Surface Water
Waste Characterization Sample Location
Site Property Line
Paved Road
Dirt Road
Utility Right of Way
Stream
2 Foot Contour
10 Foot Contour
Prepared/Date: BRP 12/03/18
Checked/Date: NV 12/03/18

N

0 55 110 Feet

Albany County color digital orthoimagery (2014) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

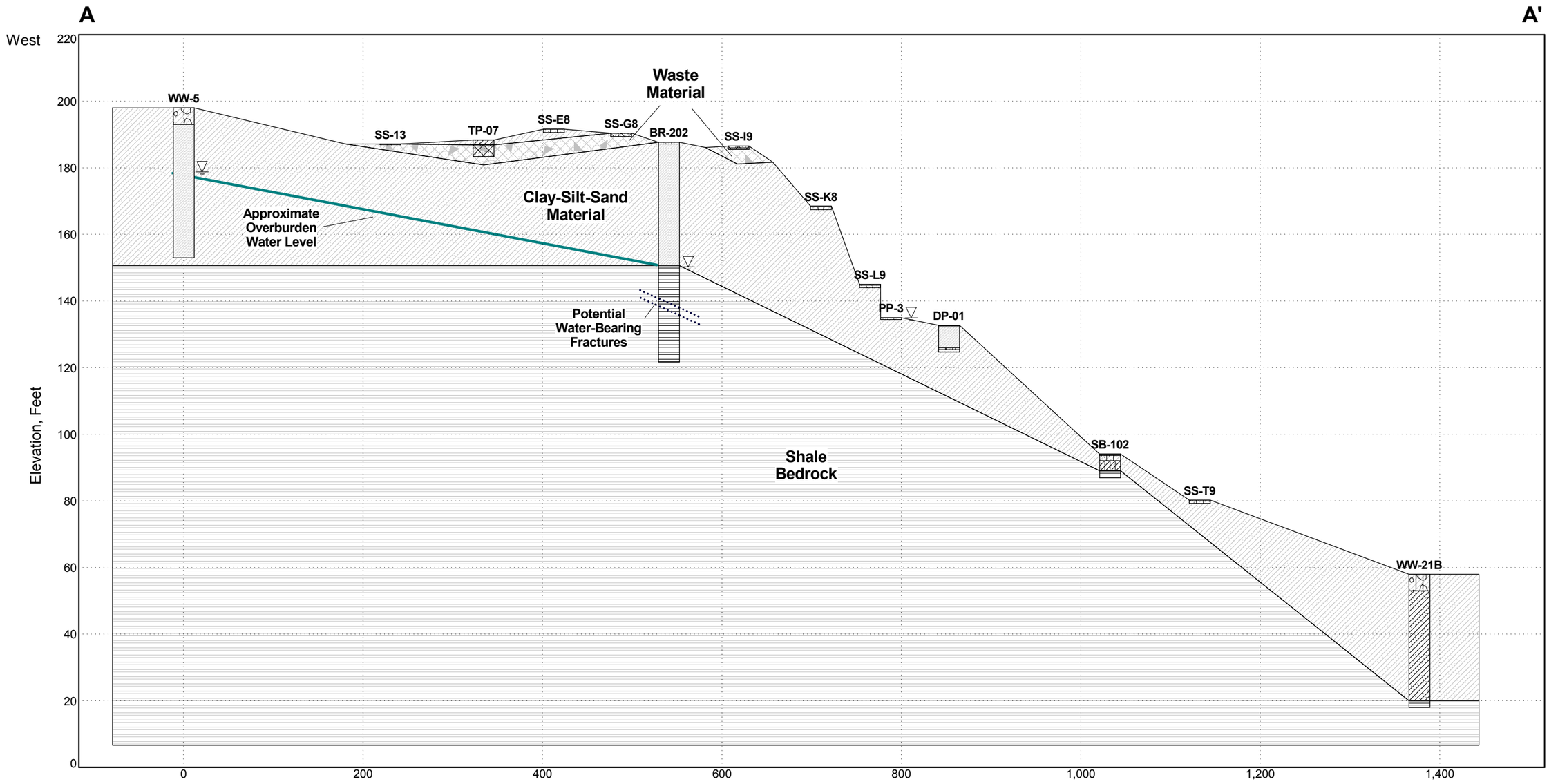
NYSDEC Site # 401069
Former Bearoff Metallurgical
Colonie, New York

MACTEC

Cross Section Orientation

Project 3611171207

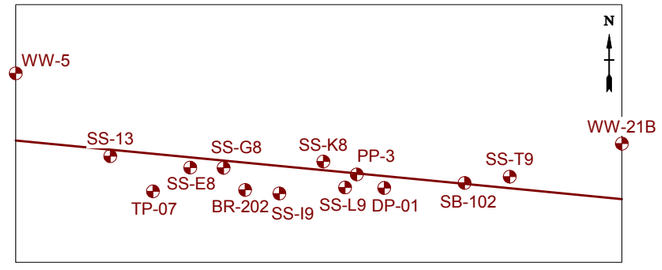
Figure A4.1



LEGEND:

- **CL** CLAY OR CLAY-LIKE MATERIAL, SILTY CLAY OR SANDY CLAY
- **SM** SAND, SILTY SAND, SAND-SILT MIXTURES
- **GM** GRAVEL, SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
- **BR** SHALE BEDROCK
- **WF** WASTE FILL

SITE MAP:



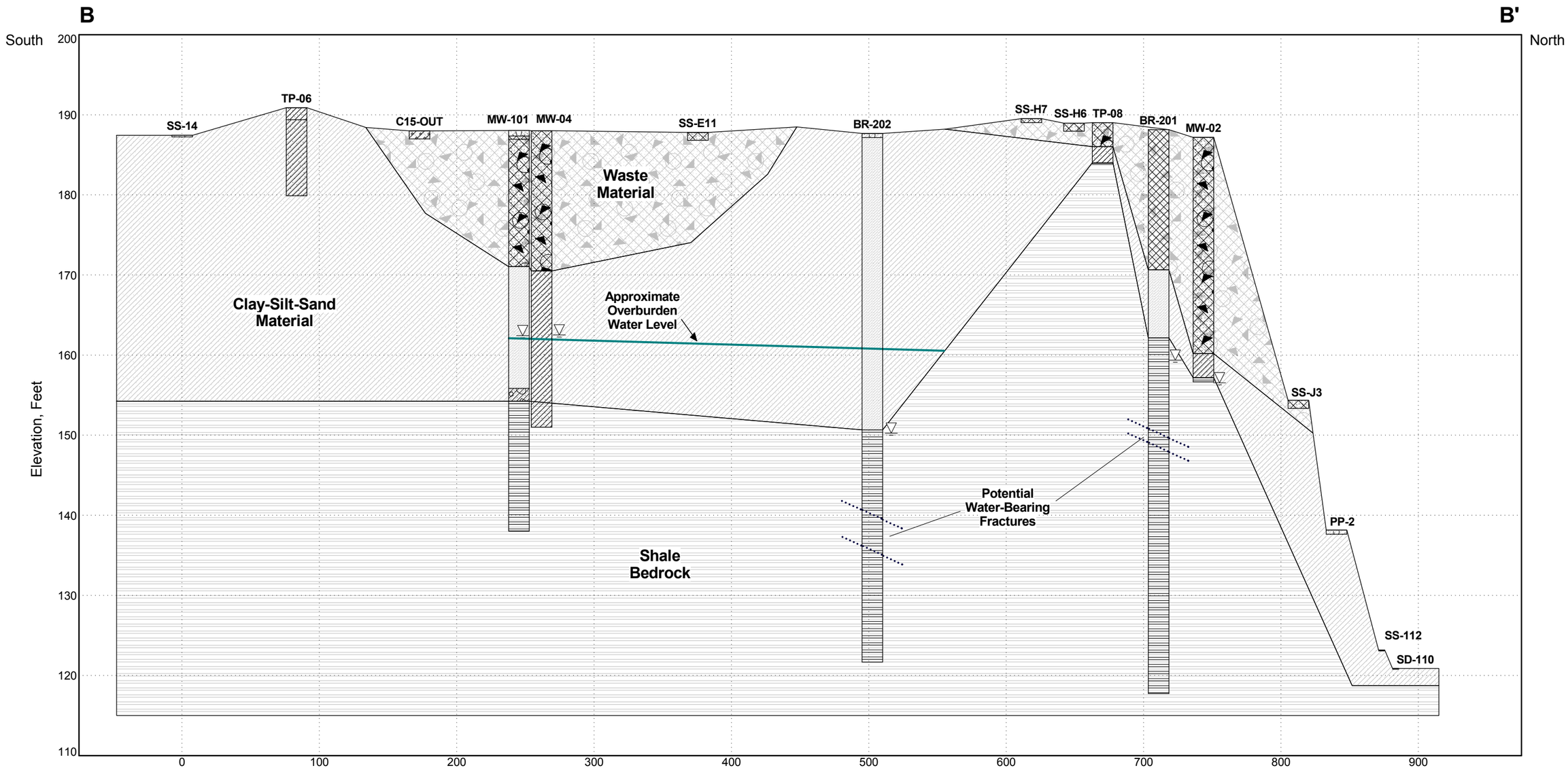
THIS PROFILE IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATIONS. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Prepared By: KSavage
Checked By: NVogan

SUBSURFACE PROFILE

PROJECT: Former Bearoff RIFS
PROJECT No.: 3611171207
SECTION: A - A'
FIGURE: A4.2

MACTEC Engineering & Consulting, Inc.

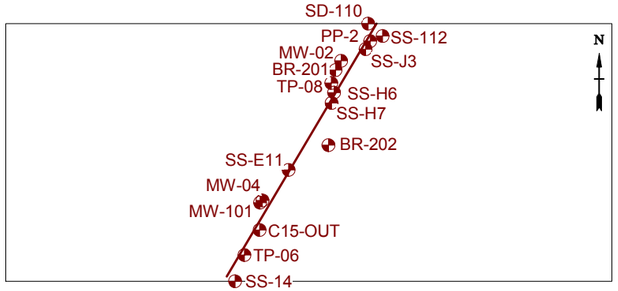


Distance Along Horizontal Baseline, Feet

LEGEND:

- **CL** CLAY OR CLAY-LIKE MATERIAL, SILTY CLAY OR SANDY CLAY
- **SM** SAND, SILTY SAND, SAND-SILT MIXTURES
- **GM** GRAVEL, SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
- **BR** SHALE BEDROCK
- **WF** WASTE FILL

SITE MAP:



THIS PROFILE IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATIONS. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Prepared By: KSavage
Checked By: NVogan

SUBSURFACE PROFILE

PROJECT: Former Bearoff RIFS
PROJECT No.: 3611171207
SECTION: B - B'
FIGURE: A4.3

MACTEC Engineering & Consulting, Inc.

ATTACHMENT 5

DATA USABILITY SUMMARY REPORT

DATA USABILITY SUMMARY REPORT
OCTOBER 2018 GROUNDWATER SAMPLING
FORMER BEAROFF METALLURGICAL SITE
COLONIE, NEW YORK

1.0 INTRODUCTION

Groundwater samples were collected at the Former Bearoff Metallurgical Site in October 2018 and submitted to TestAmerica Laboratories, Inc., located in Amherst, New York, and SGS Laboratory located in Dayton, New Jersey, for analysis. Samples included in this review were analyzed by one or more of the following methods:

- 1,4-Dioxane by Method 8270D Selected Ion Monitoring (SIM)
- Polychlorinated Biphenyls (PCBs) by Method 8082A
- Metals by Methods 6010C and 7470A
- Hexavalent Chromium by Method 7199

Results were reported in the following sample delivery groups (SDGs):

- 480-143817-1
- JC76020

A Data Usability Summary Report (DUSR) review was completed based on the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation guidance (NYSDEC, 2010). Sample event information included in this DUSR is presented in the following Tables:

- Table 1 – Summary of Samples and Analytical Methods
- Table 2 – Summary of Analytical Results
- Table 3 – Summary of Qualification Actions

Laboratory deliverables included:

- Category B deliverables as defined in the NYSDEC Analytical Services Protocols (NYSDEC, 2005).

The DUSR review included the following evaluations. A table of the project control limits is presented in Attachment A. Applicable laboratory QC summary forms are included in Attachment B to document QC outliers associated with qualification actions.

- Lab Report Narrative Review
- Data Package Completeness and COC Records (Table 1 verification)
- Sample Preservation and Holding Times
- Instrument Calibration (report narrative/lab-qualifier evaluation)
- QC Blanks
- Laboratory Control Samples (LCS)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Surrogate Spikes (if applicable)
- Field Duplicates
- Target Analyte Identification and Quantitation

- Raw Data (chromatograms), Calculation Checks and Transcription Verifications
- Reporting Limits
- Electronic Data Qualification and Verification

Data qualification actions are applied when necessary based on general procedures in USEPA validation guidelines (USEPA, 2006a; USEPA, 2006b) and the judgment of the project chemist. The following laboratory or data review qualifiers are used in the final data presentation:

U = target analyte is not detected above the reported detection limit
J = concentration is estimated

Results are interpreted to be usable as reported by the laboratory or as qualified in the following sections.

2.0 POTENTIAL DATA LIMITATIONS

Based on the DUSR review the data meet the data quality objectives; however, the following potential limitations were identified:

Metals

- Low concentration detections of zinc in a subset of groundwater samples were qualified non-detect (U) based on contamination in the associated method blank. Qualified results are summarized in Table 3 with reason code BL1.
- MS/MSD analyses were performed using sample BR-202-550. Low recoveries were reported for copper (58, 59) and zinc (69, 72). Positive and non-detect results for copper and zinc in sample BR-202-550 and field duplicate BR-202D-550 were qualified estimated (J/UJ). Qualified results are summarized in Table 3 with reason code MS-L.
- A field duplicate (BR-202D-550) was collected for sample BR-202-550. Results for a subset of target analytes in sample BR-202-550 and field duplicate BR-202D-550 were qualified estimated (J) based on inconsistent results between the sample and field duplicate. Copper and zinc were reported at concentrations greater than the reporting limits in sample BR-202-550, but were not detected (or were less than the reporting limit and qualified non-detect due to blank contamination) in the field duplicate BR-202D-550. Qualified results are summarized in Table 3 and were assigned reason code FD.

3.0 ADDITIONAL QC EXCEEDANCES AND OBSERVATIONS

There were no additional observations or quality control exceedances not specifically addressed above (Section 2.0) or included in Table 3. Unless presented in Table 3, sample results are usable as reported by the laboratory.

Reference:

New York State Department of Environmental Conservation (NYSDEC), 2005. "Analytical Services Protocols"; June 2005.

New York State Department of Environmental Conservation (NYSDEC), 2010. "Technical Guidance for Site Investigation and Remediation-Appendix 2B"; DER-10; Division of Environmental Remediation; May 2010.

U.S. Environmental Protection Agency (USEPA), 2006a. "Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILM05.3 (SOP Revision 13)"; SOP # HW-2, Revision 3, Hazardous Waste Support Branch; September 2006.

U.S. Environmental Protection Agency (USEPA), 2006b. "Validating PCB Compounds PCBS by Gas Chromatography SW-846 Method 8082A"; USEPA Region II Hazardous Waste Support Branch; HW-45; Revision 1.0; October 2006.

Data Validator: Julie Ricardi

Julie Ricardi

November 16, 2018

Reviewed by Chris Ricardi, NRCC-EAC

Chris Ricardi

November 19, 2018

Table 1 - Summary of Samples and Analytical Methods
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

				SDG	480-143817-1	480-143817-1	480-143817-1	480-143817-1	480-143817-1
				Method Class	PCBs	Dioxane	Metals	Metals	Metals
				Analysis Method	SW8082A	SW8270D-SIM	SW6010C	SW6010C	SW7470A
				Fraction	N	N	T	D	T
Location	**Sample ID**	**Sample Date**	**Media**	**Qc Code**	Param_Count	Param_Count	Param_Count	Param_Count	Param_Count
BR-201	BR-201-680	10/16/2018	GW	FS	10		22		1
BR-202	BR-202-550	10/16/2018	GW	FS	10	1	22		1
BR-202	BR-202D-550	10/16/2018	GW	FD	10		22		1
MW-4	MW-04-284	10/16/2018	GW	FS		1			
PP-2	PP-02	10/16/2018	GW	FS	10		22		1
PP-3	PP-03	10/16/2018	GW	FS	10		22	22	1

FS = field sample
FD = field duplicate
GW = groundwater
Param_Count = number of target analytes reported
N, T = total
D = dissolved

Table 1 - Summary of Samples and Analytical Methods
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

				SDG	480-143817-1	JC76020
				Method Class	Metals	Hex Chrome
				Analysis Method	SW7470A	SW846 7199
				Fraction	D	T
Location	**Sample ID**	**Sample Date**	**Media**	**Qc Code**	Param_Count	Param_Count
BR-201	BR-201-680	10/16/2018	GW	FS		1
BR-202	BR-202-550	10/16/2018	GW	FS		1
BR-202	BR-202D-550	10/16/2018	GW	FD		1
MW-4	MW-04-284	10/16/2018	GW	FS		
PP-2	PP-02	10/16/2018	GW	FS		1
PP-3	PP-03	10/16/2018	GW	FS	1	1

FS = field sample
FD = field duplicate
GW = groundwater
Param_Count = number of target analytes reported
N, T = total
D = dissolved

Prepared by: KMS 11/10/18
Checked by: JAR 11/16/18

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	480-143817-1		480-143817-1		480-143817-1	
			Location	BR-201		BR-202		BR-202	
			Sample Date	10/16/2018		10/16/2018		10/16/2018	
			Sample ID	BR-201-680		BR-202-550		BR-202D-550	
			Qc Code	FS		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8270D-S	N	1,4-Dioxane	ug/l			0.2	U		
SW8270D-S	N	1,4-Dioxane	ug/l			0.2	U		
SW8082A	N	Aroclor-1016	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1221	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1232	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1242	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1248	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1254	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1260	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1262	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	Aroclor-1268	ug/l	0.5	U	0.5	U	0.5	U
SW8082A	N	PCB (total)	ug/l	0.5	U	0.5	U	0.5	U
SW6010C	T	Aluminum	mg/l	0.18	J	0.2	U	0.2	U
SW6010C	T	Antimony	mg/l	0.02	U	0.02	U	0.02	U
SW6010C	T	Arsenic	mg/l	0.015	U	0.015	U	0.015	U
SW6010C	T	Barium	mg/l	0.034		0.023		0.022	
SW6010C	T	Beryllium	mg/l	0.002	U	0.002	U	0.002	U
SW6010C	T	Cadmium	mg/l	0.002	U	0.00062	J	0.0006	J
SW6010C	T	Calcium	mg/l	125		106		103	
SW6010C	T	Chromium	mg/l	0.0018	J	0.004	U	0.004	U
SW6010C	T	Cobalt	mg/l	0.00081	J	0.004	U	0.004	U
SW6010C	T	Copper	mg/l	0.055		0.08	J	0.01	UJ
SW6010C	T	Iron	mg/l	0.59		0.96		0.88	
SW6010C	T	Lead	mg/l	0.01	U	0.0058	J	0.01	U
SW6010C	T	Magnesium	mg/l	35.7		94.5		92.1	
SW6010C	T	Manganese	mg/l	0.27		0.59		0.58	
SW6010C	T	Nickel	mg/l	0.0032	J	0.0019	J	0.01	U
SW6010C	T	Potassium	mg/l	13		19.4		18.5	
SW6010C	T	Selenium	mg/l	0.025	U	0.025	U	0.025	U
SW6010C	T	Silver	mg/l	0.006	U	0.006	U	0.006	U
SW6010C	T	Sodium	mg/l	68.8		42.2		40.5	
SW6010C	T	Thallium	mg/l	0.02	U	0.02	U	0.02	U
SW6010C	T	Vanadium	mg/l	0.005	U	0.005	U	0.005	U
SW6010C	T	Zinc	mg/l	0.031		0.052	J	0.01	UJ
SW7470A	T	Mercury	mg/l	0.0002	U	0.0002	U	0.0002	U
SW6010C	D	Aluminum	mg/l						
SW6010C	D	Antimony	mg/l						
SW6010C	D	Arsenic	mg/l						
SW6010C	D	Barium	mg/l						
SW6010C	D	Beryllium	mg/l						
SW6010C	D	Cadmium	mg/l						
SW6010C	D	Calcium	mg/l						
SW6010C	D	Chromium	mg/l						
SW6010C	D	Cobalt	mg/l						
SW6010C	D	Copper	mg/l						
SW6010C	D	Iron	mg/l						
SW6010C	D	Lead	mg/l						
SW6010C	D	Magnesium	mg/l						
SW6010C	D	Manganese	mg/l						

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	480-143817-1		480-143817-1		480-143817-1	
			Location	BR-201		BR-202		BR-202	
			Sample Date	10/16/2018		10/16/2018		10/16/2018	
			Sample ID	BR-201-680		BR-202-550		BR-202D-550	
			Qc Code	FS		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010C	D	Nickel	mg/l						
SW6010C	D	Potassium	mg/l						
SW6010C	D	Selenium	mg/l						
SW6010C	D	Silver	mg/l						
SW6010C	D	Sodium	mg/l						
SW6010C	D	Thallium	mg/l						
SW6010C	D	Vanadium	mg/l						
SW6010C	D	Zinc	mg/l						
SW7470A	D	Mercury	mg/l						

ug/l = microgram per liter
mg/l = milligram per liter
U = not detected
J = estimated value
T = total, N = normal, D = dissolved

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	480-143817-1		480-143817-1		480-143817-1	
			Location	MW-4		PP-2		PP-3	
			Sample Date	10/16/2018		10/16/2018		10/16/2018	
			Sample ID	MW-04-284		PP-02		PP-03	
			Qc Code	FS		FS		FS	
Class	Fraction	Parameter	Units	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW8270D-S	N	1,4-Dioxane	ug/l	0.2	U				
SW8270D-S	N	1,4-Dioxane	ug/l	0.2	U				
SW8082A	N	Aroclor-1016	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1221	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1232	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1242	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1248	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1254	ug/l			1.5		5	U
SW8082A	N	Aroclor-1260	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1262	ug/l			0.5	U	5	U
SW8082A	N	Aroclor-1268	ug/l			0.5	U	5	U
SW8082A	N	PCB (total)	ug/l			1.5		5	U
SW6010C	T	Aluminum	mg/l			0.15	J	5.7	
SW6010C	T	Antimony	mg/l			0.02	U	0.02	U
SW6010C	T	Arsenic	mg/l			0.015	U	0.015	U
SW6010C	T	Barium	mg/l			2		3.9	
SW6010C	T	Beryllium	mg/l			0.002	U	0.00038	J
SW6010C	T	Cadmium	mg/l			0.00066	J	0.00055	J
SW6010C	T	Calcium	mg/l			37.9		51.9	
SW6010C	T	Chromium	mg/l			3.6		1.3	
SW6010C	T	Cobalt	mg/l			0.0071		0.017	
SW6010C	T	Copper	mg/l			0.0045	J	0.021	
SW6010C	T	Iron	mg/l			0.12		8.5	
SW6010C	T	Lead	mg/l			0.01	U	0.018	
SW6010C	T	Magnesium	mg/l			151		74.2	
SW6010C	T	Manganese	mg/l			0.011		1	
SW6010C	T	Nickel	mg/l			0.026		0.24	
SW6010C	T	Potassium	mg/l			16.8		25.6	
SW6010C	T	Selenium	mg/l			0.16		0.13	
SW6010C	T	Silver	mg/l			0.006	U	0.006	U
SW6010C	T	Sodium	mg/l			14.5		13.2	
SW6010C	T	Thallium	mg/l			0.02	U	0.02	U
SW6010C	T	Vanadium	mg/l			0.0075		0.025	
SW6010C	T	Zinc	mg/l			0.01	U	0.027	
SW7470A	T	Mercury	mg/l			0.0002	U	0.0002	U
SW6010C	D	Aluminum	mg/l					0.2	U
SW6010C	D	Antimony	mg/l					0.02	U
SW6010C	D	Arsenic	mg/l					0.015	U
SW6010C	D	Barium	mg/l					1.5	
SW6010C	D	Beryllium	mg/l					0.002	U
SW6010C	D	Cadmium	mg/l					0.002	U
SW6010C	D	Calcium	mg/l					29.6	
SW6010C	D	Chromium	mg/l					0.87	
SW6010C	D	Cobalt	mg/l					0.004	U
SW6010C	D	Copper	mg/l					0.01	U
SW6010C	D	Iron	mg/l					0.056	
SW6010C	D	Lead	mg/l					0.01	U
SW6010C	D	Magnesium	mg/l					71.2	
SW6010C	D	Manganese	mg/l					0.049	

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	480-143817-1		480-143817-1		480-143817-1	
			Location	MW-4		PP-2		PP-3	
			Sample Date	10/16/2018		10/16/2018		10/16/2018	
			Sample ID	MW-04-284		PP-02		PP-03	
			Qc Code	FS		FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010C	D	Nickel	mg/l					0.0016	J
SW6010C	D	Potassium	mg/l					24.3	
SW6010C	D	Selenium	mg/l					0.12	
SW6010C	D	Silver	mg/l					0.006	U
SW6010C	D	Sodium	mg/l					13.3	
SW6010C	D	Thallium	mg/l					0.02	U
SW6010C	D	Vanadium	mg/l					0.0046	J
SW6010C	D	Zinc	mg/l					0.01	U
SW7470A	D	Mercury	mg/l					0.0002	U

ug/l = microgram per liter
mg/l = milligram per liter
U = not detected
J = estimated value
T = total, N = normal, D = dissolved

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	JC76020		JC76020		JC76020	
			Location	BR-201		BR-202		BR-202	
			Sample Date	10/16/2018		10/16/2018		10/16/2018	
			Sample ID	BR-201-680		BR-202-550		BR-202D-550	
			Qc Code	FS		FS		FD	
Class	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW846 7199	T	Chromium, Hexavalent	mg/l	0.0055	U	0.0055	U	0.0055	U

mg/l = milligram per liter
U = not detected
J = estimated value
T = total

Table 2 - Summary of Analytical Results
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

			SDG	JC76020		JC76020	
			Location	PP-2		PP-3	
			Sample Date	10/16/2018		10/16/2018	
			Sample ID	PP-02		PP-03	
			Qc Code	FS		FS	
Class	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier
SW846 7199	T	Chromium, Hexavalent	mg/l	3.8		0.78	

mg/l = milligram per liter
U = not detected
J = estimated value
T = total

Table 3 - Summary of Qualification Actions
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

Lab SDG	Method	Location	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Unit	Lab ID
480-143817-1	SW6010C	BR-202	480-143817-2	BR-202-550	Copper	0.08	F1	0.08	J	MS-L, FD	mg/l	TALBFLO
480-143817-1	SW6010C	BR-202	480-143817-2	BR-202-550	Zinc	0.052	B F1	0.052	J	MS-L, FD	mg/l	TALBFLO
480-143817-1	SW6010C	BR-202	480-143817-3	BR-202D-550	Copper	0.01	U	0.01	UJ	MS-L, FD	mg/l	TALBFLO
480-143817-1	SW6010C	BR-202	480-143817-3	BR-202D-550	Zinc	0.0039	J B	0.01	UJ	BL1, MS-L, FD	mg/l	TALBFLO
480-143817-1	SW6010C	PP-2	480-143817-5	PP-02	Zinc	0.004	J B	0.01	U	BL1	mg/l	TALBFLO
480-143817-1	SW6010C	PP-3	480-143817-6	PP-03	Zinc	0.0036	J B	0.01	U	BL1	mg/l	TALBFLO

Notes:
SDG = Sample Delivery Group
J = concentration is estimated
U = target analyte is not detected above the reported detection limit
UJ = the target compound was not detected and the reporting limit is considered to be estimated

Val Reason Code:
BL1 = Method blank qualifier
FD = Field duplicate limit exceeded
MS-L = MS and/or MSD Recovery low

Prepared by: KMS 11/16/18
Checked by: JAR 11/16/18

Table 3 - Summary of Qualification Actions
Data Usability Summary Report
October 2018 Groundwater Sampling
Former Bearoff Metallurgical Site
Colonie, New York

ATTACHMENT A - SUMMARY OF QC LIMITS
DATA USABILITY SUMMARY REPORT
JULY-SEPTEMBER 2017 SOIL, SEDIMENT, SURFACE WATER, AND GROUNDWATER SAMPLING
FORMER BEAROFF METALLURGICAL SITE
COLONIE, NEW YORK

PARAMETER	QC TEST	ANALYTE	WATER (%R)	Water (RPD)
PCBs	Surrogate	All Surrogate Compounds	30 - 150	
	LCS	All Target Analytes	50 - 150	
	MS/MSD[1]	All Target Analytes	29 - 135	20
	Field Duplicate	All Target Analytes		50
1,4-Dioxane	Surrogate	All Surrogate Compounds	Lab Limits	
	LCS	All Target Compounds	Lab Limits	
	MS/MSD	All Target Compounds	Lab Limits	Lab Limits
	Field Duplicate	All Target Compounds		50
Inorganics-Metals	LCS	All Target Analytes	80 - 120	
	MS/MSD	All Target Analytes	75 -125	20
	Lab Duplicate[2]	All Target Analytes		20
	Field Duplicate[2]	All Target Analytes		20

Notes:
LCS - Laboratory Control Sample
MS/MSD - Matrix spike/ Matrix Spike Duplicate
RPD = Relative percent difference
%R = percent recovery
QC Limits are based on USEPA Region II Data Validation Guidelines and Project QA/QC Objectives
1. RPD limit for Aroclcor 1016 = 15.
2. See additional duplicate criteria in USEPA Region II guideline.

DATA USABILITY SUMMARY REPORT
OCTOBER 2018 GROUNDWATER SAMPLING
FORMER BEAROFF METALLURGICAL SITE
COLONIE, NEW YORK

ATTACHMENT B

No Quals

SVOC

NYSDEC DUSR PROJECT CHEMIST REVIEW RECORD
Project: Former Bearoff
Method: 8270D - SIM 1,4-Dioxane
Laboratory: TAL Buffalo **SDG(s):** 480-143817-1
Date: 11/13/18
Reviewer: Julie Ricardi

Review Level [X] NYSDEC DUSR USEPA Region II Guideline

1. [☑] **Case Narrative Review and Data Package Completeness** COMMENTS
   Were problems noted? No
   Were all the samples on the COC analyzed for the requested analyses? (YES) NO (circle one)
   Are Field Sample IDs and Locations assigned correctly? (YES) NO (circle one)

2. [☑] **Holding time and Sample Collection**
   Soil: 14 days from collection to extraction; 40 days from extraction to analysis
   Water: 7 days from collection to extraction; 40 days from extraction to analysis
   Hold time met for all samples? (YES) NO (circle one)

3. [☑] **QC Blanks**
   Are method blanks free of contamination? (YES) NO (circle one)
   Are Rinse blanks free of contamination? YES NO (NA) (circle one)

4. [☑] **Instrument Tuning – Data Package Narrative Review**
   Did the laboratory narrative identify any results that were not within method criteria? YES (NO) (circle one)
   If yes, use professional judgment to evaluate data and qualify results if needed

5. [☑] **Internal Standards – Data Package Narrative Review**
   (Area Limits = -50% to +100%, RTs within 30 seconds of daily CCAL standard (or ICAL mid-point if samples follow ICAL))
   Did the laboratory narrative identify any sample internal standards that were not within criteria? YES (NO) (circle one)

   Did the laboratory qualify results based on internal standard exceedances? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed

6. [☑] **Instrument Calibration – Data Package Narrative Review**
   Did the laboratory narrative identify compounds that were not within criteria in the initial and/or continuing calibration standards? YES (NO) (circle one)

   Control Limits (Region II HW-22): Initial Calibration %RSD = 15%, Continuing Calibration %D = 20%
   Average RRF should be ≥ 0.05 (or reject NDs, J detects or use professional judgment to J/UJ)

   Did the laboratory qualify results based on initial or continuing calibration exceedances? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed

7. [☑] **Surrogate Recovery** (water and soil limits: Base/Neutral 50-140%, Acid 30-140%) Lab limits
   Were all results within limits? (YES) NO (circle one)
   Were any recoveries < 10%? (Reject fraction compounds if recoveries are < 10%)

8. [☑] **Matrix Spike** (water & soil limits: Base/Neutral 50-140%, Acid 30-140%) (RPD soil=35,water=20)
   Were MS/MSDs submitted/analyzed? YES (NO)

   Were all results within limits? YES NO (NA) (circle one)

9. ☑ **Duplicates** (RPD limits = water:50, soil:100)
Were Field Duplicates submitted/analyzed? YES (NO)

Were RPDs within criteria? YES NO(NA)(circle one)

10. ☑ **Laboratory Control Sample Results** (water&soil limits: Base/Neutral 50-140%, Acid 30-140%)
Were all results within limits? (YES) NO (circle one)

11. ☑ **Raw Data Review and Calculation Checks**
See attached

12. ☑ **Electronic Data Review and Edits**
Does the EDD match the Form Is? (YES) NO (circle one)

13. ☑ **Tables and TIC Review**
Table 1 (Samples and Analytical Methods)
Table 2 (Analytical Results)
Table 3 (Qualification Actions)
Were all tables produced and reviewed? (YES) NO (circle one)

Table 4 (TICs) Did lab report TICs? YES (NO) (circle one)

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Buffalo Job No.: 480-143817-1 Analy Batch No.: 437915

SDG No.:

Instrument ID: HP5973U GC Column: RXI-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 10/05/2018 13:16 Calibration End Date: 10/05/2018 15:13 Calibration ID: 35015

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 480-437915/3	U3312052.D
Level 2	ICIS 480-437915/5	U3312054.D
Level 3	IC 480-437915/6	U3312055.D
Level 4	IC 480-437915/7	U3312056.D
Level 5	IC 480-437915/8	U3312057.D
Level 6	IC 480-437915/4	U3312053.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
1,4-Dioxane	0.9713 1.0439	1.0753	1.0815	1.1079	1.0948	L2ID	-0.031	1.1264			0.0100				1.0000		0.9900
1,4-Dioxane-d8	0.4886 0.4931	0.4712	0.5087	0.5033	0.5008	Ave		0.4943	✓		0.0100	2.7 ✓		20.0			

11/16/18

ICAL calc

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

 Sample Calc

TestAmerica Buffalo
Target Compound Quantitation Report

ND

Data File: \\ChromNA\Buffalo\ChromData\HP5973U\20181023-75775.b\U3312526.D
Lims ID: 480-143817-C-2-C
Client ID: BR-202-550
Sample Type: Client
Inject. Date: 23-Oct-2018 22:26:30 ALS Bottle#: 23 Worklist Smp#: 22
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: 480-0075775-022
Operator ID: MKP Instrument ID: HP5973U

Method: \\ChromNA\Buffalo\ChromData\HP5973U\20181023-75775.b\1,4_Dx_SIM_HP5973U.m
Limit Group: MB - 8270D SIM ID ICAL
Last Update: 24-Oct-2018 12:28:05 Calib Date: 05-Oct-2018 15:13:30
Integrator: Picker ID Type: RT Order ID
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Buffalo\ChromData\HP5973U\20181005-75235.b\U3312057.D

Column 1 : Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: richardsd Date: 24-Oct-2018 12:21:52

	Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ng/ul	%Rec	Flags
D	1 1,4-Dioxane-d8	96	2.895	2.801	0.094	62	456367	4.38	43.8	a
	3 1,4-Dioxane	88		2.842				ND		U
*	2 1,4-Dichlorobenzene-d4	152	5.967	5.963	0.004	97	842481	4.00		

QC Flag Legend

Review Flags
U - Marked Undetected
a - User Assigned ID

Reagents:

MB_LLIS_WRK_00156 Amount Added: 20.00 Units: uL Run Reagent

$$\text{Conc}_{\text{Surr}} = \frac{456367}{842481} \times \frac{4}{.4943} = 4.38 \quad \text{OK}$$

$$\%\text{Rec} = \frac{4.38}{10}$$

$$= 44\% \quad \text{OK}$$

JR 11/16/18

No Quals

PCBs

NYSDEC DUSR PROJECT CHEMIST REVIEW RECORD
Project: Former Bearoff
Method: 8082A
Laboratory: TAL Buffalo **SDG(s):** 480-143817-1
Date: 11/13/18
Reviewer: Julie Ricardi

Review Level [X] NYSDEC DUSR USEPA Region II Guideline

1. **Case Narrative Review and Data Package Completeness** COMMENTS
   Were problems noted? No impact
   Are Field Sample IDs and Locations assigned correctly? (YES) NO (circle one)
   Were all the samples on the COC analyzed for the requested analyses? (YES) NO (circle one)

2. **Holding time and Sample Collection**

   Soil: 14 days from collection to extraction; 40 days from extraction to analysis
   Water: 7 days from collection to extraction; 40 days from extraction to analysis
   Hold time met for all samples? (YES) NO (circle one)

3. **QC Blanks**

   Are method blanks free of contamination? (YES) NO (circle one)

   Are Rinse blanks free of contamination? YES NO (NA) (circle one)

4. **Second Column Confirmation – Data Package Narrative Review**
   Did the laboratory narrative identify sample results for which the percent difference between columns was ≥ 25 (Region II criteria) for PCBs? YES (NO) NA (circle one)

   Did the laboratory qualify results based on the percent difference between columns? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed

5. **Instrument Calibration – Data Package Narrative Review**
   Did the laboratory narrative identify compounds that were not within criteria in the initial and/or continuing calibration standards? YES (NO) (circle one)

   Aroclors ICAL %RSD criteria = 20
   Aroclors Continuing Calibration %D criteria = 15

   Did the laboratory qualify results based on initial or continuing calibration exceedances? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed

6. **Surrogate Recovery**

   Were all percent recoveries within limits? (30-150 project limits) (YES) NO (circle one)

7. **Matrix Spike**

   Were MS/MSDs submitted/analyzed? (YES) NO BR-202-550 MS/MSD: OK

   Were all percent recoveries and RPDs within limits? (soil and water project limit 29-135, RPD<20) (YES) NO NA (circle one)

8. **Duplicates**

BR-202-550 / BR-202D-550 OK (ND)

Were Field Duplicates submitted/analyzed? (YES) NO

Were all results within Region II limits? (soil RPD<100, water RPD<50) Yes

9. **Laboratory Control Sample Results**

Were all results within limits? (50-150 project limits) (YES) NO (circle one)

10. **Raw Data Review and Calculation Checks**

See attached

11. **Electronic Data Review and Edits**

Does the EDD match the Form Is? (YES) NO (circle one)

12. **Tables Review**

Table 1 (Samples and Analytical Methods)
Table 2 (Analytical Results)
Table 3 (Qualification Actions)
Were all tables produced and reviewed? (YES) NO (circle one)

Comments
No additional comments.

Receipt
The samples were received on 10/18/2018 1:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7° C.

GC/MS Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

HPLC/IC
Method(s) 300.0: The following sample was diluted to bring the concentration of target analytes within the calibration range: BR-201-680 (480-143817-1). Elevated reporting limits (RLs) are provided.

Method(s) 300.0: The following samples were reported with elevated reporting limits for all analytes: PP-02 (480-143817-5) and PP-03 (480-143817-6). The sample was analyzed at a dilution based on screening results.

Method(s) 300.0: The following sample was diluted to bring the concentration of target analytes within the calibration range: BR-202-550 (480-143817-2). Elevated reporting limits (RLs) are provided.

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

GC Semi VOA
Method(s) 8082A: The following samples are associated with a continuing calibration verification (CCV 480-441644/32) that had recoveries for the surrogate Decachlorobiphenyl that were above acceptance limits: BR-202D-550 (480-143817-3), PP-02 (480-143817-5) and PP-03 (480-143817-6). The secondary surrogate Tetrachloro-m-xylene is within limits. Therefore, the data has been reported. OK

Method(s) 8082A: The following sample was diluted due to the nature of the sample matrix: PP-03 (480-143817-6). Elevated reporting limits (RLs) are provided.

Elevated RLs

Method(s) 8082A: The following sample was diluted due to the nature of the sample matrix: PP-03 (480-143817-6). As such, surrogate recoveries are estimated and not representative, and elevated reporting limits (RLs) are provided

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

Metals
Method(s) 6010C: The low level continuing calibration verification (CCVL 480-441309/31) recovered above the upper control limit for Dissolved Aluminum. The samples associated with this CCVL were either less than the reporting limit (RL) for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCVL; therefore, re-analysis of samples PP-03 (480-143817-6), (LCS 480-440821/2-A) and (MB 480-440821/1-A) was not performed. OK; no impact

Method(s) 6010C: The serial dilution (480-143817-E-2-B SD ^5) associated with batch 480-442289, exhibited a result outside the quality control limits for Total Copper. However, the post digestion spike (PDS) was compliant, therefore no corrective action was necessary.

Method(s) 6010C: The recovery of post spike, (480-143817-E-2-B PDS), associated with batch 480-442289, exhibited a result outside quality control limits for Total Magnesium. However, the serial dilution (SD) of this sample was compliant, therefore no corrective action was necessary.

Outside scope

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

General Chemistry
Method(s) SM 2320B: The following sample(s) was received with headspace in the sample container. This sample container was received with headspace. BR-201-680 (480-143817-1).

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

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

JR
11/13/18

Sample Summary

Client: Wood E&I Solutions Inc
Project/Site: NYSDEC:Former Bearoff Metallurgical Site

TestAmerica Job ID: 480-143817-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-143817-1	BR-201-680	Water	10/16/18 12:30	10/18/18 01:00
480-143817-2	BR-202-550	Water	10/16/18 11:05	10/18/18 01:00
480-143817-3	BR-202D-550	Water	10/16/18 11:05	10/18/18 01:00
480-143817-4	MW-04-284	Water	10/16/18 09:45	10/18/18 01:00
480-143817-5	PP-02	Water	10/16/18 13:40	10/18/18 01:00
480-143817-6	PP-03	Water	10/16/18 15:00	10/18/18 01:00

FORM VI
PCBS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Buffalo Job No.: 480-143817-1 Analy Batch No.: 413004

SDG No.:

Instrument ID: HP6890-7 GC Column: ZB-35 ID: 0.53(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2018 17:37 Calibration End Date: 05/07/2018 18:09 Calibration ID: 33766

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 480-413004/18	7_13-140.D
Level 2	IC 480-413004/17	7_13-139.D
Level 3	IC 480-413004/16	7_13-138.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1	LVL 2	LVL 3				B	M1	M2								
PCB-1221 Peak 1	0.0265	0.0084	0.0064			Lin1	0.0004	0.0064							0.9910		0.9900
PCB-1221 Peak 2	0.0207	0.0133	0.0113			Lin1	0.0002	0.0115							0.9960		0.9900
PCB-1221 Peak 3	0.0518	0.0071	0.0068			Lin1	0.0009	0.0061							0.9950		0.9900
PCB-1221 Peak 4	0.1511	0.0263	0.0244			Lin1	0.0025	0.0228							0.9990		0.9900
PCB-1254 Peak 1	0.0529	0.0422	0.0346			Lin1	0.0004	0.0358							0.9940		0.9900
PCB-1254 Peak 2	0.0845	0.0692	0.0576			Ave		0.0704				19.1		20.0			
PCB-1254 Peak 3	0.0849	0.0693 ✓	0.0579			Ave		0.0707 ✓				19.1 ✓		20.0			
PCB-1254 Peak 4	0.0475	0.0404	0.0334			Ave		0.0404				17.5		20.0			
PCB-1254 Peak 5	0.0842	0.0540	0.0475			Lin1	0.0008	0.0481							0.9980		0.9900

% RSD = .01355 / .0707 = 19.17 OK

[initials] 11/16/18

IRAL Calc

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

 Sample calc

TestAmerica Buffalo
Target Compound Quantitation Report

Data File:	\\ChromNA\Buffalo\ChromData\HP6890-07\20181025-75848.b\7_29-168.D				
Lims ID:	480-143817-A-5-A				
Client ID:	PP-02				
Sample Type:	Client				
Inject. Date:	25-Oct-2018 19:16:11	ALS Bottle#:	0	Worklist Smp#:	42
Injection Vol:	1.0 ul	Dil. Factor:	1.0000		
Sample Info:					
Operator ID:	BufTCHROM	Instrument ID:	HP6890-7		
Method:	\\ChromNA\Buffalo\ChromData\HP6890-07\20181025-75848.b\7-IS PCB.m				
Limit Group:	GC - 8082A PCB IS ICAL				
Last Update:	26-Oct-2018 11:09:19	Calib Date:	17-Sep-2018 16:57:59		
Integrator:	Falcon				
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Buffalo\ChromData\HP6890-07\20180917-74716.b\7_26-062.D				
Column 1 :			Det: Ch-A-7A136		
Column 2 :			Det: Ch-B-7b136		
Process Host:	XAWRK003				

First Level Reviewer: thongjanw Date: 26-Oct-2018 11:09:36

Col	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Response	OnCol Amt ng/uL	Flags
* 1 1-Bromo-2-nitrobenzene						
1	1.079	1.081	-0.002	12507579	0.5000	
2	0.918	0.919	-0.001	32562538	0.5000	
				RPD = 0.00		
$ 6 Tetrachloro-m-xylene						
1	1.959	1.958	0.001	502637	0.0165	
2	1.444	1.443	0.001	933901	0.0118	
				RPD = 33.03		
11 PCB-1254						
1	3.841	3.842	-0.001	525556	0.3753	
1	4.062	4.062	0.000	273141	0.2579	
1	4.141	4.142	-0.001	526049	0.2731	
1	4.339	4.340	-0.001	203436	0.1056	
1	4.742	4.743	-0.001	131768	0.0730	
		Average of Peak Amounts =			0.2170	
2	3.252	3.253	0.000	882396	0.3670	
2	3.621	3.621	0.000	1292598	0.2819	
2	3.763	3.761	0.001	567757	0.1233	
2	4.055	4.055	0.000	245586	0.0933	
2	4.181	4.183	-0.001	345021	0.0937	
		Average of Peak Amounts =			0.1918	
				RPD = 12.30		

✓ Conc = $\frac{567757}{32562538} \times \frac{.5}{.0707}$ (Peak 3)

= 0.1233 OK

Conc Sample = $\frac{0.1918\ ng/uL \times 2000\ uL}{250000\ uL}$ = .001534 ng/uL

OK

= .001534 $\frac{ng}{mL} \times \frac{1000\ mL}{1\ L}$ = 1.534 ng/L

11/16/18

PCBS BATCH WORKSHEET

Lab Name: TestAmerica Buffalo Job No.: 480-143817-1

SDG No.:

Batch Number: 441373 Batch Start Date: 10/24/18 10:03 Batch Analyst: Pulera, Andrew A

Batch Method: 3510C Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	ReceivedpH	O_608PCBSpike 00016	O_PCBLLsurr 00051	
MB 480-441373/1		3510C, 8082A		250 mL	2 mL	7 SU		1 mL	
LCS 480-441373/2		3510C, 8082A		250 mL	2 mL	7 SU	1 mL	1 mL	
480-143817-B-2 MS	BR-202-550	3510C, 8082A	T	250 mL	2 mL	7 SU	1 mL	1 mL	
480-143817-B-2 MSD	BR-202-550	3510C, 8082A	T	250 mL	2 mL	7 SU	1 mL	1 mL	
480-143817-A-2	BR-202-550	3510C, 8082A	T	250 mL	2 mL	7 SU		1 mL	
480-143817-B-1	BR-201-680	3510C, 8082A	T	250 mL	2 mL	7 SU		1 mL	
480-143817-B-3	BR-202D-550	3510C, 8082A	T	250 mL	2 mL	7 SU		1 mL	
480-143817-A-5	PP-02	3510C, 8082A	T	250 mL	2 mL	7 SU		1 mL	
480-143817-A-6	PP-03	3510C, 8082A	T	250 mL	2 mL	7 SU		1 mL	

Batch Notes	
Acid used for Clean Up ID	Sulfuric: 4921000
Analyst ID - Concentration	AP
Exchange Solvent ID	4924789
Analyst ID - Extraction	AP
Glass Wool ID	244155999
Method/Fraction	3510C_LVI_1YR/8082A
Na2SO4 ID	4895627
Prep Solvent ID	4951258
Prep Solvent Volume Used	60 mL
Analyst ID - Spike Analyst	AP
Analyst ID - Spike Witness Analyst	AP
Sufficient Volume for Batch QC	Yes
Vial Lot Number	1609411071

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

METALS

NYSDEC DUSR PROJECT CHEMIST REVIEW RECORD

Project: Former Bearoff
Method(s): 6010C / 7470A
Laboratory: TAL Buffalo
SDG(s): 480-143817-1
Date: 11/13/18
Reviewer: Julie Ricardi

Review Level [X] NYSDEC DUSR USEPA Region II Guideline

1. ☑ **Case Narrative Review and Data Package Completeness** COMMENTS
   Were problems noted? No impact on result
   Were all the samples on the COC analyzed for the requested analyses? (YES) NO (circle one)

   Are Field Sample IDs and Locations assigned correctly? (YES) NO (circle one)

2. ☑ **Holding time and Sample Collection**
   Were all samples were all prepped and analyzed with the holding time (6 month) (YES) NO

3. ☑ **QC Blanks**
   Are method blanks clean? YES (NO) (circle one) See attached for (quals)

   Are Initial and continuing calibration blanks clean? YES (OK) NO (circle one) no problems noted in narrative

4. ☑ **Instrument Calibration – Data Package Narrative Review**
   Did the laboratory narrative identify any results that were not within criteria in the initial and/or continuing calibration standards? (YES) NO (circle one)
   no impact; no quals
   Initial calibration criteria based on method guidance and continuing calibration standards recovery 90-110% (80-120% Hg)

   Did the laboratory qualify results based on initial or continuing calibration exceedances? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed

5. ☑ **Laboratory Control Sample Results**
   Were all results were within 80-120% limits? (YES) NO (circle one)

6. ☑ **Matrix Spike**
   Were MS/MSDs submitted/analyzed? (YES) NO BR-202-550 MS/MSD; See attached for (quals) to sample + dup
   Were all results were within 75-125% limits? YES (NO) NA (circle one)

7. ☑ **Duplicates**
   Were Field Duplicates submitted/analyzed? (YES) NO BR-202-550 / BR-202D-550; See attached for (quals) to sample & dup
   Aqueous RPD within limit? (20%) YES (NO) NA (circle one)
   Soil RPD within limit? (35%) YES NO (NA) (circle one)
   Lab Dup RPD <20% for water, 35% for soil values > 5X the CRQL (or ± CRQL) YES NO (NA)

8. ☑ Were both **Total and Dissolved** metals reported? (YES) NO NA (circle one) PP-03 only
   If the dissolved concentration is > 20% of the total concentration then estimate (J) both results using professional judgment All OK

9. ☑ **Percent solids** < 50% for any soil/sediment sample? YES NO (NA) (circle one)
   If yes, estimate all results using professional judgment

10. ☑ **Raw Data Review and Calculation Checks**

See attached

11. ☑ **Electronic Data Review and Edits**

Does the EDD match the Form Is? (YES) NO (circle one)

12. ☑ **DUSR Tables Review**

Table 1 (Samples and Analytical Methods)
Table 2 (Analytical Results)
Table 3 (Qualification Actions)

Were all tables produced and reviewed? (YES) NO (circle one)

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 480-441215/1-A
Matrix: Water
Analysis Batch: 442289

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 441215

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0040	0.0010	mg/L		10/24/18 08:27	10/27/18 13:27	1
Cobalt	ND		0.0040	0.00063	mg/L		10/24/18 08:27	10/27/18 13:27	1
Copper	ND		0.010	0.0016	mg/L		10/24/18 08:27	10/27/18 13:27	1
Iron	ND		0.050	0.019	mg/L		10/24/18 08:27	10/27/18 13:27	1
Lead	ND		0.010	0.0030	mg/L		10/24/18 08:27	10/27/18 13:27	1
Magnesium	ND		0.20	0.043	mg/L		10/24/18 08:27	10/27/18 13:27	1
Manganese	0.000560	J	0.0030	0.00040	mg/L		10/24/18 08:27	10/27/18 13:27	1
Nickel	ND		0.010	0.0013	mg/L		10/24/18 08:27	10/27/18 13:27	1
Potassium	ND		0.50	0.10	mg/L		10/24/18 08:27	10/27/18 13:27	1
Selenium	ND		0.025	0.0087	mg/L		10/24/18 08:27	10/27/18 13:27	1
Silver	ND		0.0060	0.0017	mg/L		10/24/18 08:27	10/27/18 13:27	1
Sodium	ND		1.0	0.32	mg/L		10/24/18 08:27	10/27/18 13:27	1
Thallium	ND		0.020	0.010	mg/L		10/24/18 08:27	10/27/18 13:27	1
Vanadium	ND		0.0050	0.0015	mg/L		10/24/18 08:27	10/27/18 13:27	1
Zinc	0.00206	J	0.010	0.0015	mg/L		10/24/18 08:27	10/27/18 13:27	1

T T D
(U) - 3, 5, 6

Lab Sample ID: LCS 480-441215/2-A
Matrix: Water
Analysis Batch: 442289

11/13/18

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 441215

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	8.85		mg/L		89	80 - 120
Antimony	0.200	0.187		mg/L		94	80 - 120
Arsenic	0.200	0.192		mg/L		96	80 - 120
Barium	0.200	0.179		mg/L		90	80 - 120
Beryllium	0.200	0.193		mg/L		96	80 - 120
Cadmium	0.200	0.191		mg/L		96	80 - 120
Calcium	10.0	9.17		mg/L		92	80 - 120
Chromium	0.200	0.190		mg/L		95	80 - 120
Cobalt	0.200	0.183		mg/L		92	80 - 120
Copper	0.200	0.181		mg/L		90	80 - 120
Iron	10.0	9.34		mg/L		93	80 - 120
Lead	0.200	0.184		mg/L		92	80 - 120
Magnesium	10.0	9.17		mg/L		92	80 - 120
Manganese	0.200	0.190		mg/L		95	80 - 120
Nickel	0.200	0.192		mg/L		96	80 - 120
Potassium	10.0	8.90		mg/L		89	80 - 120
Selenium	0.200	0.187		mg/L		94	80 - 120
Silver	0.0500	0.0449		mg/L		90	80 - 120
Sodium	10.0	8.71		mg/L		87	80 - 120
Thallium	0.200	0.186		mg/L		93	80 - 120
Vanadium	0.200	0.188		mg/L		94	80 - 120
Zinc	0.200	0.194		mg/L		97	80 - 120

All OK

field_sample_id	qc_code	lab_sample_id	analysis_m	param_name	final_result	final_qualif	RPD	VAL QUAL	result_uom	detection_	SQL_text	run_id	dilution_fa
BR-202-550	FS	480-143817-2	SW6010C	Aluminum	0.20	U	0.0		mg/l	0.06	0.2	1	1
BR-202-550	FS	480-143817-2	SW6010C	Antimony	0.020	U	0.0		mg/l	0.0068	0.02	1	1
BR-202-550	FS	480-143817-2	SW6010C	Arsenic	0.015	U	0.0		mg/l	0.0056	0.015	1	1
BR-202-550	FS	480-143817-2	SW6010C	Barium	0.023		4.4		mg/l	0.0007	0.002	1	1
BR-202-550	FS	480-143817-2	SW6010C	Beryllium	0.0020	U	0.0		mg/l	0.0003	0.002	1	1
BR-202-550	FS	480-143817-2	SW6010C	Cadmium	0.00062	J	3.3		mg/l	0.0005	0.002	1	1
BR-202-550	FS	480-143817-2	SW6010C	Calcium	106		2.9		mg/l	0.1	0.5	1	1
BR-202-550	FS	480-143817-2	SW6010C	Chromium	0.0040	U	0.0		mg/l	0.001	0.004	1	1
BR-202-550	FS	480-143817-2	SW6010C	Cobalt	0.0040	U	0.0		mg/l	0.00063	0.004	1	1
BR-202-550	FS	480-143817-2	SW6010C	Copper	0.080	F1	155.6	J/UJ QUAL	mg/l	0.0016	0.01	1	1
BR-202-550	FS	480-143817-2	SW6010C	Iron	0.96		8.7		mg/l	0.019	0.05	1	1
BR-202-550	FS	480-143817-2	SW6010C	Lead	0.0058	J	53.2	OK, <RL	mg/l	0.003	0.01	1	1
BR-202-550	FS	480-143817-2	SW6010C	Magnesium	94.5		2.6		mg/l	0.043	0.2	1	1
BR-202-550	FS	480-143817-2	SW6010C	Manganese	0.59		1.7		mg/l	0.0004	0.003	1	1
BR-202-550	FS	480-143817-2	SW6010C	Nickel	0.0019	J	136.1	OK, <RL	mg/l	0.0013	0.01	1	1
BR-202-550	FS	480-143817-2	SW6010C	Potassium	19.4		4.7		mg/l	0.1	0.5	1	1
BR-202-550	FS	480-143817-2	SW6010C	Selenium	0.025	U	0.0		mg/l	0.0087	0.025	1	1
BR-202-550	FS	480-143817-2	SW6010C	Silver	0.0060	U	0.0		mg/l	0.0017	0.006	1	1
BR-202-550	FS	480-143817-2	SW6010C	Sodium	42.2		4.1		mg/l	0.32	1	1	1
BR-202-550	FS	480-143817-2	SW6010C	Thallium	0.020	U	0.0		mg/l	0.01	0.02	1	1
BR-202-550	FS	480-143817-2	SW6010C	Vanadium	0.0050	U	0.0		mg/l	0.0015	0.005	1	1
BR-202-550	FS	480-143817-2	SW6010C	Zinc	0.052		135.5	J/UJ QUAL	mg/l	0.0015	0.01	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Aluminum	0.20	U			mg/l	0.06	0.2	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Antimony	0.020	U			mg/l	0.0068	0.02	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Arsenic	0.015	U			mg/l	0.0056	0.015	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Barium	0.022				mg/l	0.0007	0.002	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Beryllium	0.0020	U			mg/l	0.0003	0.002	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Cadmium	0.00060	J			mg/l	0.0005	0.002	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Calcium	103				mg/l	0.1	0.5	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Chromium	0.0040	U			mg/l	0.001	0.004	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Cobalt	0.0040	U			mg/l	0.00063	0.004	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Copper	0.010	U			mg/l	0.0016	0.01	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Iron	0.88				mg/l	0.019	0.05	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Lead	0.010	U			mg/l	0.003	0.01	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Magnesium	92.1				mg/l	0.043	0.2	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Manganese	0.58				mg/l	0.0004	0.003	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Nickel	0.010	U			mg/l	0.0013	0.01	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Potassium	18.5				mg/l	0.1	0.5	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Selenium	0.025	U			mg/l	0.0087	0.025	1	1

field_sample_id	qc_code	lab_sample_id	analysis_m	param_name	final_result	final_qualif	RPD	VAL	QUAL	result_uom	detection_	SQL_text	run_id	dilution_fa
BR-202D-550	FD	480-143817-3	SW6010C	Silver	0.0060	U				mg/l	0.0017	0.006	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Sodium	40.5					mg/l	0.32	1	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Thallium	0.020	U				mg/l	0.01	0.02	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Vanadium	0.0050	U				mg/l	0.0015	0.005	1	1
BR-202D-550	FD	480-143817-3	SW6010C	Zinc	0.01	U			BL1	mg/l	0.0015	0.01	1	1
BR-202-550	FS	480-143817-2	SW7470A	Mercury	0.00020	U		0.0		mg/l	0.00012	0.0002	1	1
BR-202D-550	FD	480-143817-3	SW7470A	Mercury	0.00020	U				mg/l	0.00012	0.0002	1	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 480-143817-2 MS
Matrix: Water
Analysis Batch: 442289

Client Sample ID: BR-202-550
Prep Type: Total/NA
Prep Batch: 441215

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	ND		10.0	9.53		mg/L		95	75 - 125
Antimony	ND		0.200	0.195		mg/L		97	75 - 125
Arsenic	ND		0.200	0.204		mg/L		102	75 - 125
Barium	0.023		0.200	0.218		mg/L		98	75 - 125
Beryllium	ND		0.200	0.196		mg/L		98	75 - 125
Cadmium	0.00062	J	0.200	0.199		mg/L		99	75 - 125
Calcium	106		10.0	114.4	4	mg/L	OK	88	75 - 125
Chromium	ND		0.200	0.189		mg/L		94	75 - 125
Cobalt	ND		0.200	0.187		mg/L		94	75 - 125
Copper (J)(UJ) sample + dup	0.080	F1	0.200	0.196	F1	mg/L		58	75 - 125
Iron	0.96		10.0	10.24		mg/L		93	75 - 125
Lead	0.0058	J	0.200	0.192		mg/L		93	75 - 125
Magnesium	94.5		10.0	105.3	4	mg/L	OK	109	75 - 125
Manganese	0.59	B	0.200	0.781		mg/L		95	75 - 125
Nickel	0.0019	J	0.200	0.195		mg/L		97	75 - 125
Potassium	19.4		10.0	28.42		mg/L		90	75 - 125
Selenium	ND		0.200	0.197		mg/L		99	75 - 125
Silver	ND		0.0500	0.0486		mg/L		97	75 - 125
Sodium	42.2		10.0	51.86	4	mg/L	OK	96	75 - 125
Thallium	ND		0.200	0.195		mg/L		97	75 - 125
Vanadium	ND		0.200	0.191		mg/L		95	75 - 125
Zinc (J)(UJ) sample + dup	0.052	B F1	0.200	0.190	F1	mg/L		69	75 - 125

Lab Sample ID: 480-143817-2 MSD
Matrix: Water
Analysis Batch: 442289

Client Sample ID: BR-202-550
Prep Type: Total/NA
Prep Batch: 441215

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	ND		10.0	9.39		mg/L		94	75 - 125	2	20
Antimony	ND		0.200	0.193		mg/L		97	75 - 125	1	20
Arsenic	ND		0.200	0.200		mg/L		100	75 - 125	2	20
Barium	0.023		0.200	0.215		mg/L		96	75 - 125	1	20
Beryllium	ND		0.200	0.195		mg/L		98	75 - 125	0	20
Cadmium	0.00062	J	0.200	0.199		mg/L		99	75 - 125	0	20
Calcium	106		10.0	111.5	4	mg/L	OK	59	75 - 125	3	20
Chromium	ND		0.200	0.189		mg/L		95	75 - 125	0	20
Cobalt	ND		0.200	0.187		mg/L		94	75 - 125	0	20
Copper (J)(UJ) sample + dup	0.080	F1	0.200	0.198	F1	mg/L		59	75 - 125	1	20
Iron	0.96		10.0	10.27		mg/L		93	75 - 125	0	20
Lead	0.0058	J	0.200	0.193		mg/L		93	75 - 125	1	20
Magnesium	94.5		10.0	104.4	4	mg/L	OK	100	75 - 125	1	20
Manganese	0.59	B	0.200	0.781		mg/L		95	75 - 125	0	20
Nickel	0.0019	J	0.200	0.196		mg/L		97	75 - 125	0	20
Potassium	19.4		10.0	27.60		mg/L		82	75 - 125	3	20
Selenium	ND		0.200	0.198		mg/L		99	75 - 125	0	20
Silver	ND		0.0500	0.0494		mg/L		99	75 - 125	2	20
Sodium	42.2		10.0	49.99	4	mg/L	OK	78	75 - 125	4	20
Thallium	ND		0.200	0.196		mg/L		98	75 - 125	1	20

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 480-143817-2 MSD
Matrix: Water
Analysis Batch: 442289

Client Sample ID: BR-202-550
Prep Type: Total/NA
Prep Batch: 441215

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Vanadium	ND		0.200	0.194		mg/L		97	75 - 125	2	20
Zinc	0.052	B F1	0.200	0.196	F1	mg/L		72	75 - 125	3	20

(J/UJ sample + dup)

Lab Sample ID: MB 480-440821/1-A
Matrix: Water
Analysis Batch: 441309

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 440821

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND	^	0.20	0.060	mg/L		10/22/18 09:47	10/23/18 14:32	1
Antimony	ND		0.020	0.0068	mg/L		10/22/18 09:47	10/23/18 14:32	1
Arsenic	ND		0.015	0.0056	mg/L		10/22/18 09:47	10/23/18 14:32	1
Barium	ND		0.0020	0.00070	mg/L		10/22/18 09:47	10/23/18 14:32	1
Beryllium	ND		0.0020	0.00030	mg/L		10/22/18 09:47	10/23/18 14:32	1
Cadmium	ND		0.0020	0.00050	mg/L		10/22/18 09:47	10/23/18 14:32	1
Calcium	ND		0.50	0.10	mg/L		10/22/18 09:47	10/23/18 14:32	1
Chromium	ND		0.0040	0.0010	mg/L		10/22/18 09:47	10/23/18 14:32	1
Cobalt	ND		0.0040	0.00063	mg/L		10/22/18 09:47	10/23/18 14:32	1
Copper	ND		0.010	0.0016	mg/L		10/22/18 09:47	10/23/18 14:32	1
Iron	ND		0.050	0.019	mg/L		10/22/18 09:47	10/23/18 14:32	1
Lead	ND		0.010	0.0030	mg/L		10/22/18 09:47	10/23/18 14:32	1
Magnesium	ND		0.20	0.043	mg/L		10/22/18 09:47	10/23/18 14:32	1
Manganese	ND		0.0030	0.00040	mg/L		10/22/18 09:47	10/23/18 14:32	1
Nickel	ND		0.010	0.0013	mg/L		10/22/18 09:47	10/23/18 14:32	1
Potassium	ND		0.50	0.10	mg/L		10/22/18 09:47	10/23/18 14:32	1
Selenium	ND		0.025	0.0087	mg/L		10/22/18 09:47	10/23/18 14:32	1
Silver	ND		0.0060	0.0017	mg/L		10/22/18 09:47	10/23/18 14:32	1
Sodium	ND		1.0	0.32	mg/L		10/22/18 09:47	10/23/18 14:32	1
Thallium	ND		0.020	0.010	mg/L		10/22/18 09:47	10/23/18 14:32	1
Vanadium	ND		0.0050	0.0015	mg/L		10/22/18 09:47	10/23/18 14:32	1
Zinc	0.00184	J	0.010	0.0015	mg/L		10/22/18 09:47	10/23/18 14:32	1

Lab Sample ID: LCS 480-440821/2-A
Matrix: Water
Analysis Batch: 441309

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 440821

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	9.33	^	mg/L		93	80 - 120
Antimony	0.200	0.179		mg/L		89	80 - 120
Arsenic	0.200	0.193		mg/L		97	80 - 120
Barium	0.200	0.189		mg/L		95	80 - 120
Beryllium	0.200	0.201		mg/L		101	80 - 120
Cadmium	0.200	0.184		mg/L		92	80 - 120
Calcium	10.0	9.41		mg/L		94	80 - 120
Chromium	0.200	0.196		mg/L		98	80 - 120
Cobalt	0.200	0.182		mg/L		91	80 - 120
Copper	0.200	0.189		mg/L		95	80 - 120
Iron	10.0	9.89		mg/L		99	80 - 120
Lead	0.200	0.182		mg/L		91	80 - 120
Magnesium	10.0	9.51		mg/L		95	80 - 120

11/13/18

Sample Name: CCV-4954075 Acquired: 10/27/2018 13:35:03 Type: QC

Method: ICAP2 Oct2018(v18) Mode: CONC Corr. Factor: 1.000000

User: EMB Custom ID1: Custom ID2: Custom ID3:

Comment:

CCV calc

JT 11/16/18

Elem	Ag3280	Al3082	As1890	B_2089	Ba4554-2
Line	328.068 {103}	308.215 {109}	189.042 {478}	208.959 {461}	455.403 { 74}2
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.48751**	**23.308**	**.46984**	**.45346**	**.48585**
Stddev	.00234	.182	.00013	.00005	.00065
%RSD	.47898	.78152	.02848	.01173	.13297
#1	.48586	23.179	.46974	.45350	.48540
#2	.48916	23.436	.46993	.45343	.48631
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value					
Range					

Elem	Be3130	Ca3179	Cd2288	**Ce4040	Co2286
Line	313.042 {108}	317.933 {106}	228.802 {447}	404.076 { 83}	228.616 {447}
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.47148**	**23.368**	**.47570**	**.0118**	**.47091**
Stddev	.00165	.127	.00044	.0237	.00047
%RSD	.35020	.54258	.09171	201.2	.10002
#1	.47031	23.278	.47539	-.0050	.47058
#2	.47265	23.458	.47600	.0285	.47124
Check ?	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass
Value					
Range					

Elem	Cr2677	Cu3273	Fe2599	K_7664	Li6707
Line	267.716 {126}	327.396 {103}	259.940 {130}	766.490 { 44}	670.784 { 50}
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.48397**	**.48345**	**23.658**	**23.793**	**.47383**
Stddev	.00055	.00030	.223	.110	.00139
%RSD	.11437	.06223	.94371	.46151	.29248
#1	.48358	.48324	23.500	23.715	.47285
#2	.48436	.48367	23.816	23.871	.47481
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value					
Range					

.48397 / .5 = 96.8 OK

.48345 / .5 = 96.7 OK

Sample Name: 480-143817-C-1-B Acquired: 10/27/2018 13:45:55 Type: Unk Sample check
Method: ICAP2 Oct2018(v18) Mode: CONC Corr. Factor: 1.000000
User: EMB Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3082	As1890	B_2089	Ba4554-2
Line	328.068 {103}	308.215 {109}	189.042 {478}	208.959 {461}	455.403 { 74}2
IS Ref	(Y_3600)	(Y_3774)	(Y_2243)	(Y_2243)	(Y_3600)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.00077**	**.17765**	**-.00014**	**1.2884**	**.03441**
Stddev	.00051	.03828	.00118	.0013	.00020
%RSD	66.563	21.547	853.57	.09673	.57746
#1	.00041	.15058	-.00097	1.2875	.03455
#2	.00114	.20471	.00070	1.2893	.03427
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Be3130	Ca3179	Cd2288	**Ce4040	Co2286
Line	313.042 {108}	317.933 {106}	228.802 {447}	404.076 { 83}	228.616 {447}
IS Ref	(Y_3774)	(Y_3774)	(Y_2243)	(Y_3774)	(In2306)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.00021**	**125.32**	**.00019**	**.0546**	**.00081**
Stddev	.00008	.82	.00007	.0238	.00007
%RSD	37.836	.65109	34.846	43.68	8.3443
#1	.00026	124.75	.00024	.0377	.00086
#2	.00015	125.90	.00014	.0714	.00076
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Cr2677	Cu3273	Fe2599	K_7664	Li6707
Line	267.716 {126}	327.396 {103}	259.940 {130}	766.490 { 44}	670.784 { 50}
IS Ref	(Y_3600)	(Y_3600)	(Y_3774)	(Y_3774)	(Y_3774)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.00182**	**.05459**	**.59395**	**12.992**	**.16302**
Stddev	.00021	.00012	.00539	.129	.00248
%RSD	11.477	.21159	.90702	.98970	1.5192
#1	.00168	.05451	.59014	12.901	.16127
#2	.00197	.05467	.59776	13.083	.16477
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

11/16/18

Sample Name: 480-143817-E-2-B Acquired: 10/27/2018 13:49:39 Type: Unk Sample Check
Method: ICAP2 Oct2018(v18) Mode: CONC Corr. Factor: 1.000000
User: EMB Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3082	As1890	B_2089	Ba4554-2
Line	328.068 {103}	308.215 {109}	189.042 {478}	208.959 {461}	455.403 { 74}2
IS Ref	(Y_3600)	(Y_3774)	(Y_2243)	(Y_2243)	(Y_3600)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**-.00013**	**.04682**	**.00126**	**.07317**	**.02267**
Stddev	.00005	.01930	.00022	.00014	.00016
%RSD	41.758	41.211	17.738	.18909	.69852
#1	-.00017	.06047	.00142	.07307	.02279
#2	-.00009	.03318	.00110	.07327	.02256
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Be3130	Ca3179	Cd2288	**Ce4040	Co2286
Line	313.042 {108}	317.933 {106}	228.802 {447}	404.076 { 83}	228.616 {447}
IS Ref	(Y_3774)	(Y_3774)	(Y_2243)	(Y_3774)	(In2306)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**-.00012**	**105.57**	**.00062**	**-.0262**	**.00015**
Stddev	.00009	.33	.00001	.0014	.00007
%RSD	78.578	.31257	.84833	5.278	46.267
#1	-.00005	105.80	.00062	-.0252	.00020
#2	-.00018	105.34	.00061	-.0272	.00010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Cr2677	Cu3273	Fe2599	K_7664	Li6707
Line	267.716 {126}	327.396 {103}	259.940 {130}	766.490 { 44}	670.784 { 50}
IS Ref	(Y_3600)	(Y_3600)	(Y_3774)	(Y_3774)	(Y_3774)
Units	ppm	ppm	ppm	ppm	ppm
Avg	**.00092**	**.08037** ✓	**.95767** ✓	**19.409**	**.05582**
Stddev	.00046	.00058	.00136	.042	.00186
%RSD	50.081	.71844	.14166	.21691	3.3313
#1	.00059	.08078	.95671	19.439	.05450
#2	.00124	.07996	.95863	19.380	.05713
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

JF 11/16/18

No Quals

GENERAL CHEMISTRY

NYSDEC DUSR PROJECT CHEMIST REVIEW RECORD

Project: Former Bearoff
Method : 7199 Hex Chromium
Laboratory: SGS
SDG(s): JC76020
Date: 11/13/18
Reviewer: Julie Ricardi

Review Level [X] NYSDEC DUSR USEPA Region II Guideline

1. ☑ **Case Narrative Review and Data Package Completeness** COMMENTS
   Were problems noted? No
   Were all the samples on the COC analyzed for the requested analyses? (YES) NO (circle one)
   Are Field Sample IDs and Locations assigned correctly? (YES) NO (circle one)
2. ☑ **Holding time and Sample Collection**
   Were all samples were all prepped and analyzed with the method holding time? (YES) NO
3. ☑ **QC Blanks**
   Are method blanks clean? (YES) NO (circle one)
   Are Initial and continuing calibration blanks clean? YES NO (circle one) (NA)
4. ☑ **Instrument Calibration – Data Package Narrative Review**
   Did the laboratory narrative identify analytes that were not within criteria in the initial and/or continuing calibration standards? YES (NO)
   Did the laboratory qualify results based on initial or continuing calibration exceedances? YES (NO)
   If yes to above, use professional judgment to evaluate data and qualify results if needed
5. ☑ **Laboratory Control Sample Results**
   Were all results were within 80-120% limits? (YES) NO (circle one)
6. ☑ **Matrix Spike**
   Were MS/MSDs submitted/analyzed? (YES) NO

   Were all results were within 75-125% limits? (YES) NO NA (circle one)
7. ☑ **Duplicates**
   Were Field Duplicates submitted/analyzed? (YES) NO

   Aqueous RPD within limit? (20%) (YES) NO NA (circle one) JR 11/13/18
   Soil RPD within limit? (35%) YES NO (NA) (circle one)
   Lab dup RPD <20% for water, 35% for soil values > 5X the CRQL (or ± CRQL) (YES) NO (NA)
8. ☑ Were both **Total and Dissolved** parameters reported? YES (NO) NA (circle one)
   If the dissolved concentration is > 20% of the total concentration then estimate (J) both results
9. ☑ **Percent Solids** < 50% for any soil/sediment sample? YES NO (NA) (circle one)
   If yes, use professional judgment
10. ☑ **Raw Data Review and Calculation Checks**
    See attached
11. ☑ **Electronic Data Review and Edits** Does the EDD match the Form Is? (YES) NO (circle one)
12. ☑ **DUSR Table Review**
    Table 1 (Samples and Analytical Methods)
    Table 2 (Analytical Results)
    Table 3 (Qualification Actions)
    Were all tables produced and reviewed? (YES) NO (circle one)

Sample Summary

Wood Environment & Infrastructure Solut.

Job No: JC76020

Former Bearoff Metallurgical
Project No: 48011515

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
JC76020-1	10/16/18	12:30	JP	10/17/18	AQ	Ground Water	BR-201-680
JC76020-2	10/16/18	11:05	JP	10/17/18	AQ	Ground Water	BR-202-550
JC76020-2D	10/16/18	11:05	JP	10/17/18	AQ	Water Dup/MSD	BR-202MSD-550
JC76020-2S	10/16/18	11:05	JP	10/17/18	AQ	Water Matrix Spike	BR-202MS-550
JC76020-3	10/16/18	11:05	JP	10/17/18	AQ	Ground Water	BR-202D-550
JC76020-4	10/16/18	13:40	JP	10/17/18	AQ	Ground Water	PP-02
JC76020-5	10/16/18	15:00	JP	10/17/18	AQ	Ground Water	PP-03

Summary of Hits

Job Number: JC76020
Account: Wood Environment & Infrastructure Solut.
Project: Former Bearoff Metallurgical
Collected: 10/16/18

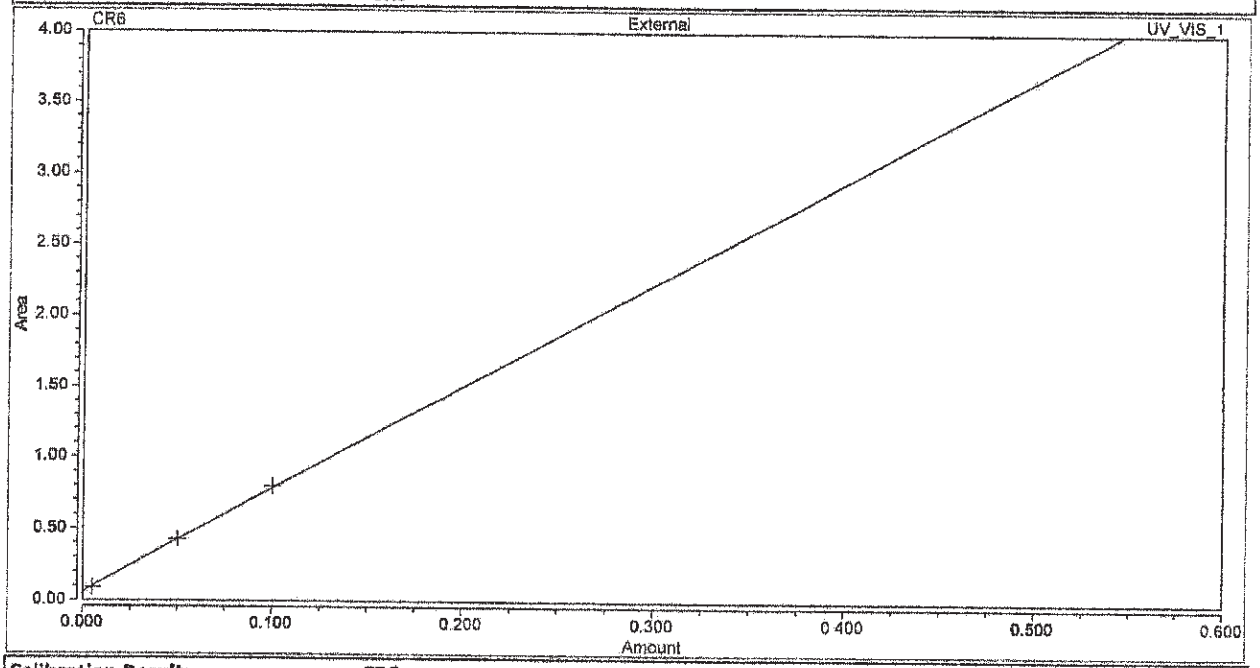
Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC76020-1	**BR-201-680**					
No hits reported in this sample.						
JC76020-2	**BR-202-550**					
No hits reported in this sample.						
JC76020-3	**BR-202D-550**					
No hits reported in this sample.						
JC76020-4	**PP-02**					
Chromium, Hexavalent		3.8	0.050		mg/l	SW846 7199
JC76020-5	**PP-03**					
Chromium, Hexavalent		0.78	0.015		mg/l	SW846 7199

ICAL

Calibration

Calibration Details	CR6		
Calibration Type	Lin, WithOffset	*Offset (C0)*	0.0643
Evaluation Type	Area	*Slope (C1)*	7.2144
Number of Calibration Points	4	*Curve (C2)*	0.0000
Number of disabled Calibration Points	0	*R-Square*	1.0000

Calibration Plot **CR6**



Calibration Results **CR6**

No. CR6	Injection Name CR6	Calibration Level CR6	X Value CR6 UV_VIS_1	Y Value CR6 UV_VIS_1	Y Value CR6 UV_VIS_1	Area mAU*min CR6 UV_VIS_1	Height mAU CR6 UV_VIS_1
1	STDA	01	0.0000	n.a.	n.a.	n.a.	n.a.
2	STDB	02	0.0050	0.0916	0.0916	0.092	0.957
3	STDC	03	0.0500	0.4263	0.4263	0.426	4.378
4	STDD	04	0.1000	0.7954	0.7954	0.795	8.126
5	STDE	05	0.5000	3.6696	3.6696	3.670	38.005

7.1

7

$$\text{Conc} = \frac{\text{Area} - \text{intercept}}{\text{slope}}$$

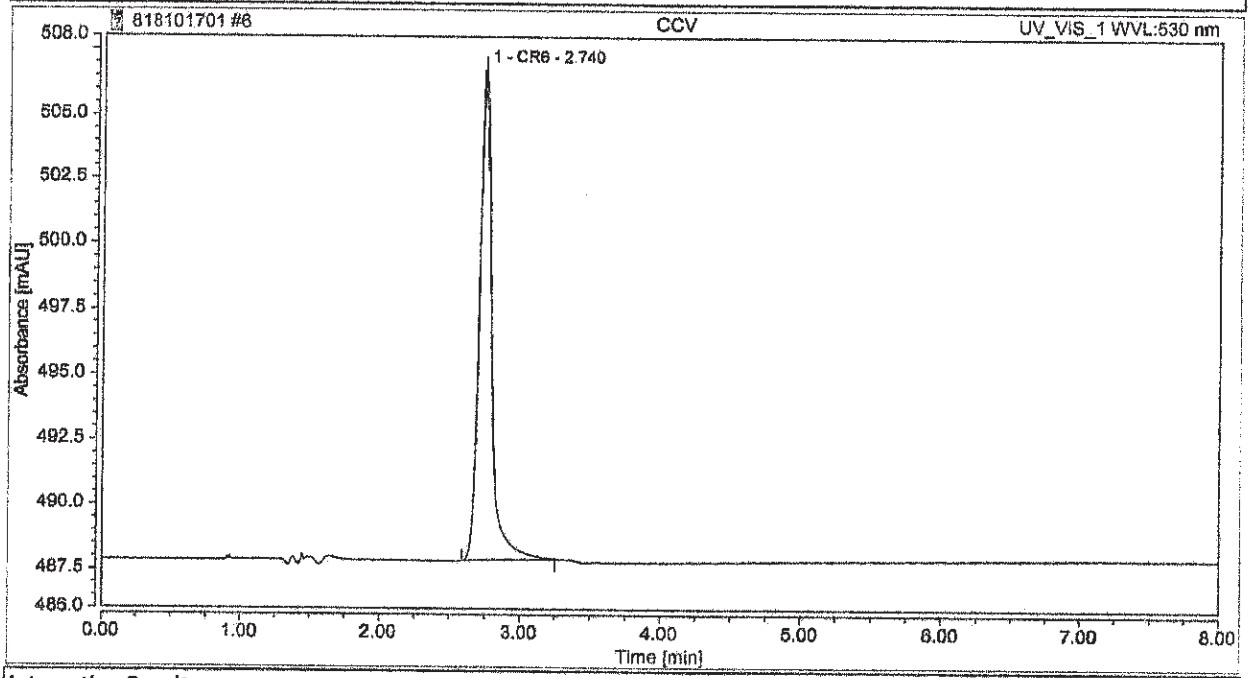
JA 11/16/18

Chromatogram and Results

Injection Details

Injection Name:	**CCV**	*Run Time (min):*	**8.00**
Vial Number:	**7**	*Injection Volume:*	**5000.00**
Injection Type:	**Unknown**	*Channel:*	**UV_VIS_1**
Calibration Level:		*Wavelength:*	**530.0**
Instrument Method:	**7199**	*Bandwidth:*	**n.a.**
Processing Method:	**7199**	*Dilution Factor:*	**1.0000**
Injection Date/Time:	**17/Oct/18 10:04**	*Sample Weight:*	**1.0000**

Chromatogram



Integration Results

No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1	CR6	2.740	1.831	18.971	100.00	100.00	0.2449
Total:			**1.831**	**18.971**	**100.00**	**100.00**	

7.1

7

$$\text{Conc}_{CCV} = \frac{1,831 - ,0643}{7,2144} = 0,24489$$

OK

11/16/18

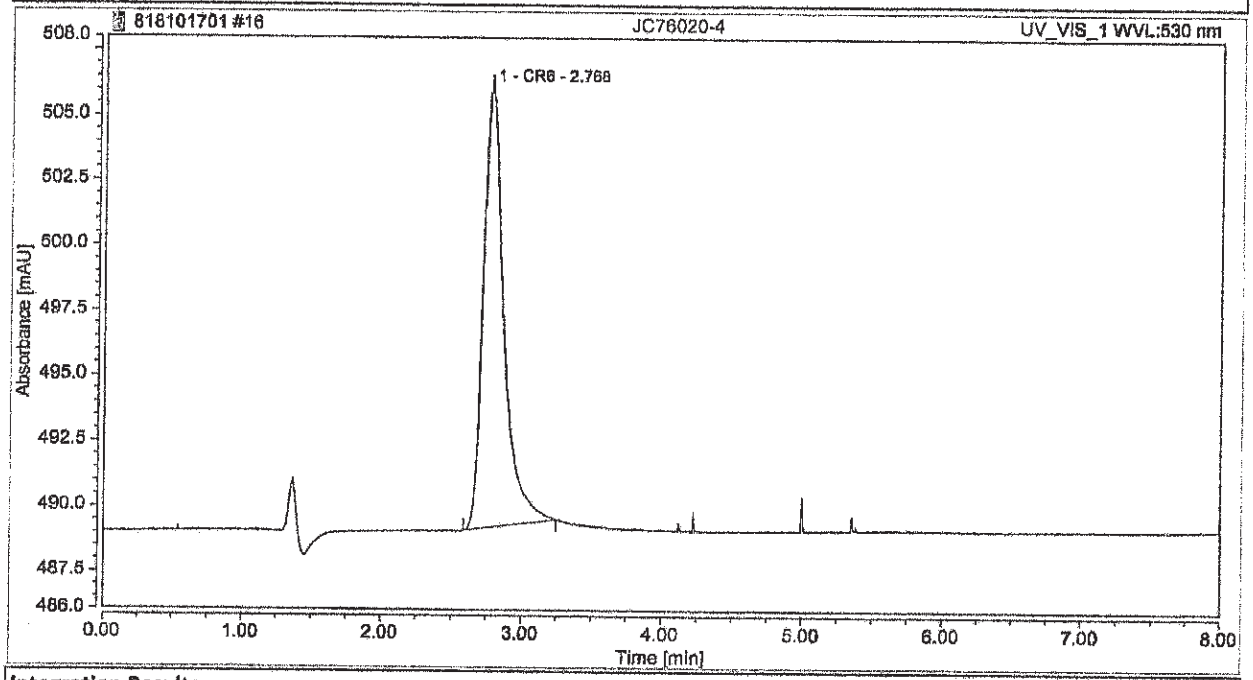
Sample calc

Chromatogram and Results

Injection Details

Injection Name:	**JC76020-4**	*Run Time (min):*	**8.00**
Vial Number:	**17**	*Injection Volume:*	**5000.00**
Injection Type:	**Unknown**	*Channel:*	**UV_VIS_1**
Calibration Level:		*Wavelength:*	**530.0**
Instrument Method:	**7199**	*Bandwidth:*	**n.a.**
Processing Method:	**7199**	*Dilution Factor:*	**10.0000** ✓
Injection Date/Time:	**17/Oct/18 11:52**	*Sample Weight:*	**1.0000**

Chromatogram



Integration Results

No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1	CR6	2.768	2.796	16.921	100.00	100.00	3.7863 ✓
Total:			**2.796**	**16.921**	**100.00**	**100.00**	

$$\text{Conc} = \frac{2.796 - .0643}{7.2144} \times 10 = 3.786$$

OK

11/16/18

7.1

7

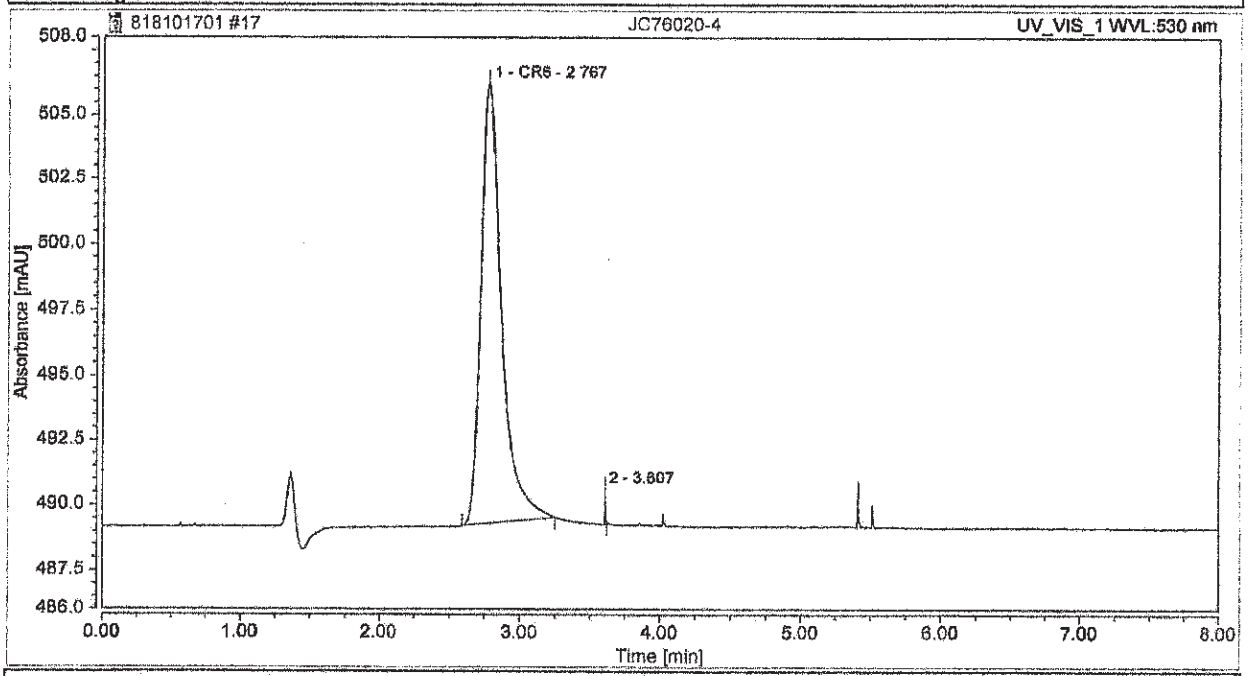
Sample Calc

Chromatogram and Results

Injection Details

Injection Name:	**JC76020-4**	*Run Time (min):*	**8.00**
Vial Number:	**18**	*Injection Volume:*	**5000.00**
Injection Type:	**Unknown**	*Channel:*	**UV_VIS_1**
Calibration Level:		*Wavelength:*	**530.0**
Instrument Method:	**7199**	*Bandwidth:*	**n.a.**
Processing Method:	**7199**	*Dilution Factor:*	**10.0000** ✓
Injection Date/Time:	**17/Oct/18 12:03** reported	*Sample Weight:*	**1.0000**

Chromatogram



Integration Results

No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1	CR6	2.767	2.813	16.978	99.77	92.48	3.8094 ✓
2		3.607	0.006	1.381	0.23	7.52	n.a.
Total:			**2.819**	**18.360**	**100.00**	**100.00**	

$$\text{Conc} = \frac{2,813 - ,0643}{7,2144} \times 10 = 3,81$$

OK

11/16/18

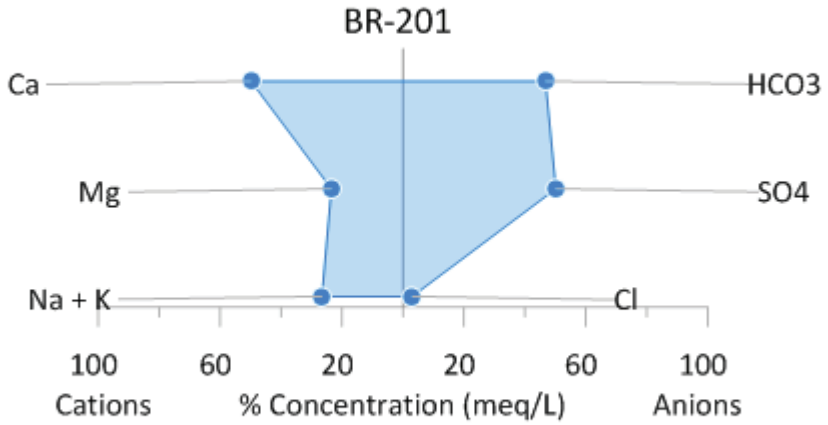
7.1

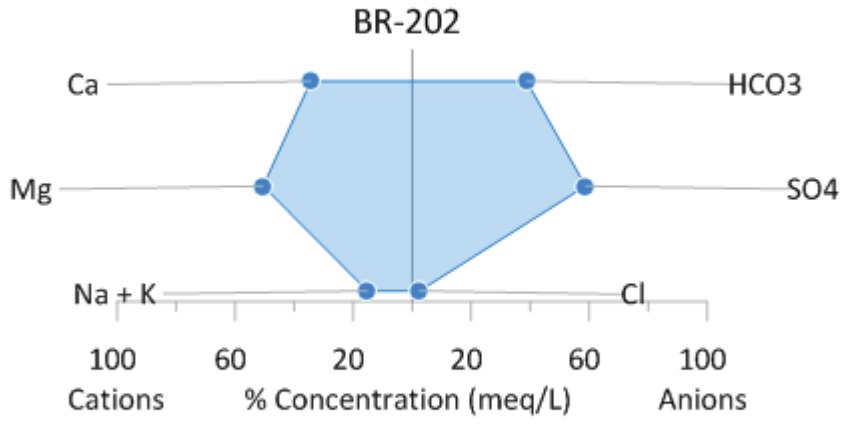
ATTACHMENT 6

GEOCHEMISTRY STIFF PLOTS

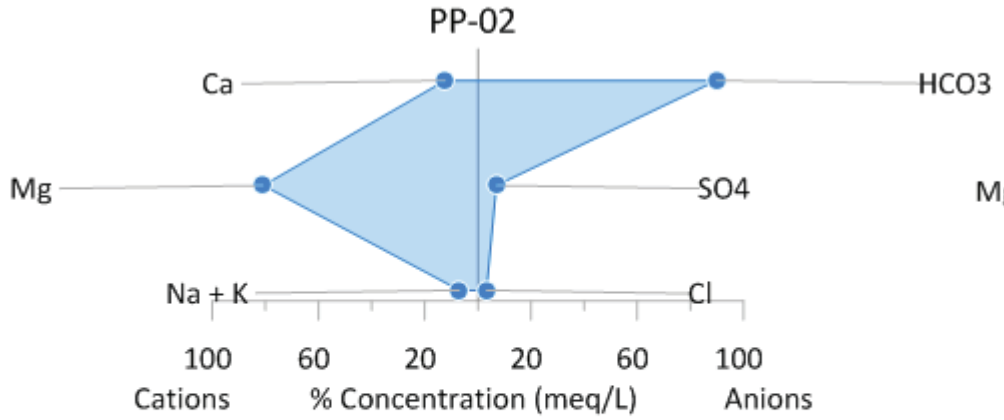
Bedrock Groundwater - Seep Geochemisty Stiff Plots

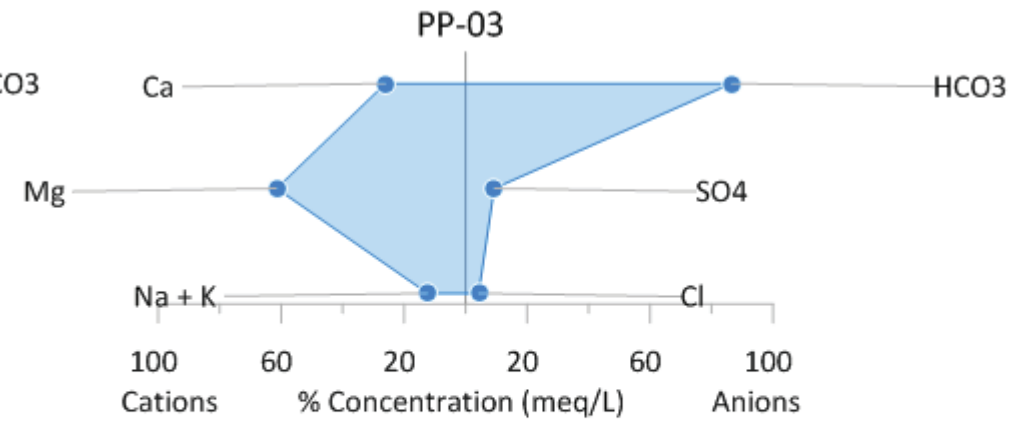
Bedrock Wells





Seeps





Notes:

Percent concentrations are calculated using the normalized concentrations of the displayed cation and anion species alone.

meq/L - milli-equivalent per liter

meq/L = (mass concentration [mg/L]*ionic charge [meq/mmol])/molecular weight[mg/mol]

Cations: Ca - calcium, Mg - magnesium, Na - sodium, K - potassium

Anions: HCO3 - Alkalinity (bicarbonate), SO4 - sulfate, Cl - chloride