FINAL Helena Solvent Site, Soil Vapor Extraction System

Summary Report
Helena, Montana

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1.0 Introduction

This Helena Solvent Site (HSS) soil vapor extraction (SVE) system summary report presents 1) the surface, subsurface, and chemical data collected during investigation activities for the installation of the SVE system, and 2) the design criteria and completion details for the SVE system. HydroSolutions Inc (HydroSolutions) performed this work under Task Order Number No. 8 with the Montana Department of Environmental Quality (DEQ) under DEQ Contract No. 414026 from June 2016 through May 2017. All work under this task order was funded by State of Montana Senate Bill 96. This task order requests that HydroSolutions complete environmental investigations and installation of an SVE system, along with indoor air mitigation system maintenance, monitoring and maintenance of the SVE system, development of an operation and maintenance (O&M) plan, and site restoration. This summary report includes the elements required as outlined by Task No. 8 in Task Order No. 8.

1.1 Report Organization

This SVE summary report is organized in 12 sections, followed by tables and figures, which are followed by appendices and one attachment. The contents of Sections 1.0 through 11.0 are briefly described below.

Section 1.0, Introduction - describes report purpose and objectives and the report organization.

Section 2.0, Site Description and Background – briefly describes the location and issues associated with the HSS, and the past investigations.

Section 3.0, Site Conceptual Model, - describes the site-specific understanding of contaminant release to the subsurface and transport mechanisms that are targeted as part of the SVE installation.

Section 4.0, Pre-Design Investigation - summarizes the direct push technology (DPT), membrane interface hydraulic push technology (MIHPT) investigations and the results from the investigation. A summary of site lithology and groundwater based on field observations is included.

Section 5.0, Remediation Feasibility - summarizes the properties of contaminants of potential concern and contaminant properties to assess the practicality of remediating the contaminants with SVE.

Section 6.0, Pilot Scale Testing - presents the results of pilot tests completed to provide design input for the SVE system.

Section 7.0, SVE System Design and Construction - describes the system operations parameters, the installation of horizontal borings and trenching, SVE system equipment, and treatment of the discharge air.

Section 8.0, SVE System Effectiveness on Indoor Air, Soil Vapor, and Groundwater - presents the results of pre- and post-SVE system sampling pilot tests completed to provide design input for the SVE system.

Section 9.0, Data Validation - presents a summary of the approach used to validate all data collected as part of this investigation and included in an appendix.

Section 10.0, System Performance and Monitoring – describes the performance monitoring and operation of the SVE system, along with radius of influence impacts, contaminant removal, and SVE shutdown criteria.

Section 11.0, Conclusions and Recommendations – presents conclusions and recommendations for the investigation and SVE system installation.

Section 12.0, References – lists references used in the document.

1.2 Purpose and Objectives

The purpose of Task Order 8 was to conduct interim remedial actions and install an SVE system at the Helena Solvent Site (HSS) in Helena, Montana. HydroSolutions designed and installed an SVE system to remove and treat contaminated soil and vapor from beneath Mr. Wise Cleaners operational space located in the privately owned Hustad Center building. The objective of this SVE system is to reduce the source of contamination impacting soils from a release from the dry cleaner operation, reduce the potential for soil vapors to migrate upward and impact indoor air within the building, and reduce impacts of contamination to groundwater. This summary report presents 1) the results of the site investigation to provide data to help design the SVE system; 2) a description of the design and installation of the SVE system; 3) the effect the SVE system has had on indoor air, soil vapor, and groundwater since beginning operation; and 4) the results of performance monitoring completed at the HSS. In addition, an operations and maintenance (O&M) plan was prepared and is included as stand-alone Attachment 1 in this report.

2.0 Site Description and Background

The Hustad Center is a complex of individual business spaces currently occupied by Canine Capitol, Mr. Wise Cleaners, Dermawerx, and the Lash Dolls Salon. The Hustad Center and these businesses are located, respectively at 1116, 1118, 1120, and 1124 Helena Avenue, Helena, Montana 59601. The buildings that comprise the contiguous Hustad Center were constructed in three phases some fifty years ago with slab-on-grade foundation construction. A location map of the HSS project location is provided in Figure 2-1.

The Hustad Center is located within the HSS where chlorinated solvents are known to be present in soil and groundwater. The HSS is broadly defined as four square miles and includes Township 10 North, Range 3 West, Sections 19, 20, 29, and 30. The area includes several locations with solvent-impacted soils and groundwater within the Helena City limits. The site of this interim remedial action, as shown on Figure 2-1, is Mr. Wise Dry Cleaners, a known source of solvent contamination, located at 1118 Helena Avenue in the Hustad Center. The primary contaminants of concern within the HSS are tetrachloroethene (PCE) and trichloroethene (TCE). In 2011 Mr. Wise Cleaners removed all dry-cleaning equipment from the premise. Also in 2011 Hustad Center owner, Hustad LLC, installed an indoor air mitigation

system (sub-slab depressurization and air treatment system); and completed heating, air conditioning and ventilation improvements that reduced vapor intrusion at the Hustad Center. Under the terms of a settlement agreement between DEQ and Hustad, LLC, the indoor air mitigation system is now operated by DEQ and remains operational.

Numerous environmental investigations to evaluate the extent of contamination have been completed within the HSS and Hustad Center area, starting as early as 1998 with the completion of the preliminary assessment (PA) by the U.S. Environmental Protection Agency (URS Operating Services, Inc 1998). Since then, multiple investigations have been completed by DEQ and private parties to evaluate the magnitude and extent of chlorinated solvents and vapor intrusion impacts within the HSS investigation area. Based on the results of groundwater sampling, the HSS PCE plume originates from Mr. Wise Cleaners (see Final Helena Solvent Site Soil and Groundwater Monitoring Sampling and Analytical Results Report, November 2014, prepared by Tetra Tech for DEQ (Tetra Tech 2014)).

HydroSolutions has been involved with investigation and remediation activities at the Hustad Center since 2008, beginning with an environmental site review for the owner of Mr. Wise Cleaners in response to a DEQ enforcement action (HydroSolutions Inc 2008). Following this site review, the property owner, Hustad LLC, responded to DEQ requirements and initiated a focused source investigation, soil and groundwater sampling, indoor air sampling, installation of an indoor air mitigation system, and continued groundwater monitoring, sub-slab air monitoring, and indoor air monitoring on a DEQ-approved monitoring schedule (HydroSolutions Inc 2012). DEQ also completed multiple vapor intrusion and groundwater sampling events, both at the Hustad Center and other locations throughout the HSS. DEQ and Hustad, LLC entered an administrative settlement agreement in 2016, settling Hustad, LLC's liability for the Helena Solvent Site. . Pursuant to the administrative settlement agreement, DEQ took over site investigation and remediation activities. DEQ initiated Task Order 8 with HydroSolutions to conduct interim remedial actions, and monitor the performance of those remedial actions.

3.0 Site Conceptual Model

Much has been learned about the causes for contaminant releases and underlying subsurface site conditions at Mr. Wise Cleaners since the focused source investigation in 2010 (HydroSolutions Inc 2012). The following site conceptual model was developed to help understand specific site conditions and to optimize implementation of Task Order 8.

3.1 Site History and Operations

Construction of the Hustad Center building occurred in three phases in the middle 1960s. The central portion of the building was constructed first and was the original location of Mr. Wise Cleaners. The operation remained in this section of the building for some time. The northern building section was constructed next and was used for office spaces and other business. The southern building section was built last. Mr. Wise used PCE in the cleaning process, but eliminated PCE from the operation by 2011. Mr. Wise Cleaners in Helena is a drop-off location for clothing that is sent to another Mr. Wise facility in Great Falls for dry-cleaning, and returned

to the Helena location for customer pick-up. A halogenated solvent user registration form completed in 1989 by Mr. Wise Cleaner's owners indicated that 300 to 400 gallons of halogenated solvents were used annually. The registration form indicated that on-site reclamation occurred, and still bottoms and other residuals were "dumped".

The dry-cleaning unit was initially located in the northeast corner of the central portion of the building. PCE was reportedly transferred to the dry cleaner through an overhead line. Sometime in the late 1960s or 1970s, a break in the overhead line caused a spill on the concrete floor beneath the break. The current owner reported an estimated 5 gallons of PCE was released. Clean up procedures were not reported although PCE would likely have permeated the concrete, migrated down the foundation wall, or been swept out the adjacent door. Elevated concentrations of PCE in the soil, sub-slab air samples, and groundwater beneath this area have been reported in laboratory analytical results. At some later date, Mr. Wise Cleaners expanded into the northern building and the dry cleaning machines were relocated to the northeast portion of the northern building.

PCE from the machine filters was reclaimed in the reclamation unit and reused in the drycleaner if the condition of the filter allowed. Disposal of spent PCE, still bottoms, and other residuals were either disposed of in a garbage can or dumpster for transportation to a landfill, potentially dumped outside the east-facing entrance door on the building's north side, or dumped down the sanitary sewer line. Apparently, the last few years the dry cleaning machines operated, PCE was pumped into the dry cleaning unit from a drum in a pick-up truck backed up to the northeast entrance door. Unintentional spillage may have occurred while transferring PCE. The potential mechanisms for contaminant release can be summarized as follows:

1) Break in overhead pipe carrying PCE located in northeast corner of the central portion of the building,
2) Small isolated areas of spent PCE released outside the building,
3) Spills occurring near the two drycleaner units and the separator on the back of the dryer,
4) Disposal of spent filters on the ground or in dumpsters,
5) Disposal of other PCE laden materials, including condensate water, into the sanitary sewer,
6) Unintentional spills which occurred during transfer of product into the machine, and
7) Off-gassing and other releases from the large volumes of PCE solvent reported to have been used yearly in the dry cleaning operation.

The Hustad Center building is slab on grade construction. Concrete was poured on several feet of washed gravel, which was placed on 8 to 10 feet of construction fill and other debris (brick, concrete, etc.). In some areas of the building, the concrete slab was poured over metal ductwork. Approximately 5 feet of what appears to be native materials or native–fill materials overlie a white clay found consistently across the site at about 15 feet below ground surface (bgs). Water is encountered at the upper contact between the clay unit and native-fill material. More detail on the subsurface environment and associated lithologic logs are provided in Section 4.0.

3.2 Contaminant Migration

Migration of chlorinated solvent contaminants in the subsurface is controlled by the type of media it is released into and the force which drives it downward (Cohen 1993). After PCE is released at or near the surface, it moves downward under gravitational forces and soil capillarity. Depending upon the amount released, mobile PCE will be trapped in the pore space and fractures in the vadose zone and adsorbed to soil particles, or if a significant amount is released, it can eventually sink into the saturated zone (Cohen 1993). In addition to the downward movement of PCE, some PCE will volatilize into the soil gas.

Given the lack of free product encountered during subsurface investigations at the site, and the relatively low to moderate concentrations of PCE in groundwater, it appears that the source of PCE at the site is trapped in the vadose zone soils and fill beneath the building and outside at isolated potential spill locations adjacent to the building. Outside the building, infiltration of precipitation through the source in the vadose zone will leach soluble organic contaminants into the water table. A dissolved organic contaminant plume likely developed and spread outward in the aquifer. The residual source is likely moving through the environment in two main ways: volatilization into soil gas and infiltration (leaching) into the saturated zone. Isolated sources of PCE also appear to exist outside the building near monitoring well MW-7, monitoring well MW-5, and in the immediate vicinity of the northeast corner of the building (see Figure 4-1).

Vadose zone soils found in and around the building include clay, silt, and sand, some gravel- to cobble-sized rock, concrete blocks, and construction debris and fill. It is not clear if some lower vadose zone soils are native soils or imported fill material. A several foot thick zone dominated by dark black, carbon-rich burnt-looking material was identified during drilling and trenching near the east and northeast side of the building. A 1950's era automobile tail light and steel leaf spring was recovered from the excavation. Due to the inconsistency in soil types and associated debris, various degrees of contaminant adsorptive capacity is expected in the soils.

The mechanism for contaminant migration beneath the building is not well understood. PCE adsorbed to soil in the vadose zone beneath the building does not have precipitation available as a downward driving force. Source areas identified under the building are located beneath the overhead line break and in the area of the historical dry cleaning units and associated equipment. A significant spill may have occurred where a large volume of PCE was released and migrated through the vadose zone into the saturated zone. In spite of what was reported, more than five gallons of PCE may have been released from the overhead pipe break. Historical use of 300 to 400 gallons per year of PCE and careless operational practices may also have been a cause for a significant release of PCE. If a large release occurred, the release of PCE as a slug into the soil and groundwater could have moved downgradient to the north and away from Mr. Wise Cleaners. Over time, it is expected that concentrations of PCE in groundwater would have been reduced by dilution and diffusion. In addition, vapors from a remaining source in the vadose zone will continue to migrate by diffusion and density into groundwater and recharge contamination in the aquifer beneath Mr. Wise Cleaners. PCE vapors in the subsurface are also expected to migrate in the air pore space under the building and into the overlying building via the vapor intrusion process. The indoor air mitigation system and the

newly installed SVE system control migration of contaminant vapors into the businesses overlying the suspected source areas.

This conceptual model provides a level of understanding for contaminant release and migration at the project site and helped refine the investigation and SVE system design parameters. Improvements and updates to the site conceptual model can continue to be made as new data are obtained.

4.0 Pre-Design Investigation

A pre-design investigation was conducted to evaluate the location and extent of contaminated soils and to understand the physical soil properties for use in planning and designing the SVE system. HydroSolutions contracted with Cascade Drilling and Technical Services (Cascade) to use direct push technology (DPT) to install six soil vapor monitoring points, collect vadose zone soil samples from selected intervals, and install one groundwater monitoring well. In addition, soil and groundwater volatile organic compound (VOC) data were collected from 12 locations using the DPT with a membrane interface-hydraulic profiling tool (MIHPT) to better identify contaminant source zones. Additionally, HydroSolutions installed one vapor point and three SVE wells using a hand auger and hydro-excavation contractor. The location of DPT MIHPT probe holes, soil vapor monitoring points, soil vapor extraction wells, and groundwater monitoring wells are shown on Figure 4-1.

This section provides the results of the pre-design subsurface investigation and includes information on pre-design utility locates, planning, and permitting; soil sampling, MIHPT investigation, vapor point and monitoring well construction; and general site geology and groundwater, and investigation waste management.

4.1 Utility Location, Clearance, Permitting, and Communication

All buried utilities in and near the work area were located prior to any intrusive and SVE trenching activities using the "*Call Before You Dig*" service. The City of Helena located City sewer and water lines on the property. Northwest Energy located gas and electric lines, shielded overhead lines near where the direct push drill rig was operating, and was periodically on site during drilling and excavation activities due to the location of an underground gas line on the north side of the building. In addition, HydroSolutions consulted with the property manager to discuss placement of soil borings, probe holes, and planned construction activity in proximity to property boundaries.

Prior to any intrusive activities at the site, HydroSolutions obtained an encroachment permit from the City of Helena. This permit allowed for investigation activities on City right-of–way property as well as placement of the temporary shed to house the SVE system surface equipment on the City alley corridor. A copy of the encroachment permit is included in Appendix A.

HydroSolutions coordinated field investigation and construction activities with building tenants and adjacent businesses. Prior to field work, HydroSolutions staff met with the Hustad Center

property manager and the Bullman's Pizza owner to discuss investigation, construction plans, and schedules. Bullman's Pizza is located at 1130 Helena Avenue, and this property immediately abuts the east side of the Hustad Center building. HydroSolutions also met with both following installation of the SVE system to discuss site restoration plans. In addition, coordination with Hustad Center building tenants occurred on a regular basis. A copy of access and other correspondence is included in Appendix A.

During completion of a probe hole inside the building, an unmarked electrical line was encountered just beneath the slab. It was understood from the property owner and manager that all electrical lines were above the slab. HydroSolutions immediately contacted an electrician to repair the line and hired a utility locate company to investigate utilities that might be in the slab. Based on the results, and the uncertainty of additional utilities in the slab due to the unsystematic nature of the building's construction, further drilling inside the building was discontinued.

4.2 Soil Sampling

Field methods and results for the soil samples collected by Cascade as part of the DPT investigation between the dates of September 20 and September 23, 2016 are described in the following sections.

4.2.1 Field Methods

Ten soil samples were collected from seven DPT locations during the investigation. Continuous soil samples were collected during advance of the DPT with a PVC liner. On-site screening of soil samples obtained from each boring was completed using a photoionization detector (PID). HydroSolutions observed soil cuttings from the probe holes for indications of potential subsurface contamination. Soils were inspected for unusual staining, odors, or other signs of apparent contamination.

Soil samples were scanned for the presence of organic vapors using a PID. Prior to onsite activities, the PID was calibrated using 100 part per million by volume (ppmv) isobutylene span gas according to the manufacturers procedures. The PID was equipped with a 10.2 electronvolt (eV) ionization lamp which was sufficient to measure PCE and the degradation products, which have an ionization potential of 9.32 eV (NIOSH 1985). Selected samples with the highest PID reading in the selected probe holes were sent to Energy Laboratories in Helena and analyzed for total organic carbon (TOC) and VOCs (EPA Method 8260).

4.2.2 Soil Sample Results

The sample location, sample depths, and laboratory reported concentration of PCE are provided on Table 4-1. As shown in Table 4-1, PCE was reported in all but one of the ten soil samples submitted to the laboratory for VOC analysis. Probe hole DPT-1 was located upgradient and sampled for background soil analysis. While no VOCs were reported with the PID for any depths in DPT-1, a PCE concentration of 3.2 milligram per kilogram (mg/kg) was reported at a depth of 8 to 8.5 feet bgs in the upgradient probe hole DPT-1. Vapor point VP-1 is located 20 feet from the northeast corner of the building. A PCE concentration of less than 0.20 mg/kg was reported at a depth of 13 to 14 feet bgs from vapor point VP-1. PCE concentrations reported in samples

from vapor points VP-2, VP-4, VP-5, and VP-6 were relatively high and ranged from a low of 22 mg/kg to a high of 650 mg/kg. Additional discussion on PCE and TCE concentrations versus sampled depth is presented in Section 5.3. Full analytical results and data validation reports are found in Appendix B.

4.3 MIHPT Investigation

The MIHPT is a combination of Membrane Interface Probe (MIP) and Hydraulic Profiling Tool (HPT) and is a technology used to help identify the spatial distribution of VOC contamination in the soil and groundwater. The technology allows for real-time data collection and display of information. Field techniques, methods, and results for the MIHPT investigation are provided in the following sections.

4.3.1 MIHPT Field Methods

Cascade completed MIHPT field investigation using a Geoprobe 7822 Series Direct Push Drill Rig along with the following instrumentation:

- MIP (Membrane Interface Probe) Controller (Nitrogen Flow and Heater)
- Geoprobe FI 6000 Computer
- SRI Model 310 GC Gas Chromatograph K6300 HPT (Hydraulic Profiling Tool)
- Electrical Conductivity (EC) meter
- ECD (Electron Capture Detector)
- XSD (Halogen Specific Detector)
- PID (Photo Ionization Detector) 10.2 eV Lamp
- FID (Flame Ionization Detector)
- 150' MIP/HPT Trunkline
- 1.75" outside diameter (O.D.) MIHPT Probe
- 1.75" O.D. Drive Rods

Information on the technology and methods are summarized below and found in the *Final Data Package for Membrane Interface Probe – Hydraulic Profiling Tool Services Report* prepared by Cascade. The final report along with MIHPT logs are found in Appendix C. Twelve locations were investigated with the MIHPT ranging in depth from 9.95 feet to 25.10 feet bgs and are presented in Table 4-2.

The MIP detector responds where elevated VOC soil concentrations are likely. The MIP provided real-time information useful in focusing probe hole locations. The MIP works by heating the soils and groundwater adjacent to the probe to 120 degrees C (ºC). This volatilizes the VOCs and allows the VOCs to transfer through a Teflon membrane via a combination of concentration and pressure gradients. These VOCs are then swept into a nitrogen gas loop that carries these vapors to a series of detectors housed in the vehicle. Continuous chemical profiles are generated from each hole. Detectors used in the MIP investigation included ECD, XSD, PID, and FID, and data collected included depth, electrical conductivity, rate of penetration, temperature, and pressure.

The HPT system was used to evaluate relative formation permeability of unconsolidated materials. The probe was pushed at two centimeters per second and clean water is injected through a screen on the side of the HPT probe at a flow rate usually less than 300 milliliters per minute. The injection pressure, which is monitored and plotted with depth, is an indication of the hydraulic properties of the soil. A relatively low pressure response indicates a relatively large grain size, and the ability to easily transmit water. However, a relatively high pressure response indicates a relatively small grain size, which correlates with the inability to transmit water. Data collected included depth, EC, pressure, flow, and estimated hydraulic conductivity (K) in the saturated zone.

4.3.2 Results

The location of the precise source or sources for PCE at this site had not been previously identified, although the presence of elevated VOC concentrations in the indoor air and subslab vapor of the Hustad Center indicated that the source exists within the Hustad Center. . The MIHPT technology was used to explore selected locations for the presence or absence of PCE contamination. The area along the northeast corner of the Hustad building was the primary target area for further sampling to evaluate soil contamination. Some locations inside Mr. Wise Cleaners were selected for DPT probe holes to install vapor points but were not evaluated using the MIHPT due to low overhead ceiling height.

In general, all DPT probe holes screened with the MIHPT appeared to have PID or FID detector responses but at relatively low readings. It is not clear if these detector responses indicate PCE contaminants or some other VOC. A comparison of laboratory analytical results from soil samples analyzed for chlorinated solvents correlated with responses to the PID or FID detector at similar depths are shown in Table 4-3. Elevated responses from the PID or FID detector readings on the low range scale correlated with reported concentration of PCE from laboratory analysis. However, elevated responses from the PID or FID detector readings on the high range scale correlated slightly with reported PCE concentrations. Direct laboratory analytical data from soil samples collected with the DPT was more valuable than MIHPT detector responses to help identify source locations at the project site.

The HPT was used to estimate relative permeability of the formation materials in the saturated zone at DPT-1, DPT-8, and DPT-12. DPT-1 had an estimated hydraulic conductivity (K) of 60 feet per day (feet/day), DPT-8 had an estimated K of 150 feet/day, and DPT-12 had an estimated K of 100 feet/day. The higher K values corresponded to lower HPT pressure, which is indicative of more permeable materials whereas the higher HPT pressure is indicative of less permeable materials and a lower K value. The MIHPT logs are included with the full report found in Appendix C.

4.4 Vapor Point and Monitoring Well Installation

Cascade installed six soil vapor monitoring points, VP-1 through VP-6 using the DPT. A map showing the location of soil vapor monitoring points is shown on Figure 4-1. Five of six vapor points were completed with 1-inch diameter schedule 40 polyvinyl chloride (PVC) casing, and screened in the vadose zone above the groundwater table at approximately 10 feet bgs. Due to

DPT refusal at 4 feet below the building floor, completion of vapor point VP-6 was modified by using a 6-inch length of 10-slot, 0.25 diameter pre-made soil vapor screen and three feet of PVC tubing. Logs for vapor monitoring points VP-1 through VP-6 are provided in Appendix D.

Cascade also installed groundwater monitoring well MW-7 using DPT. The probe hole for monitoring well MW-7 was advanced to 25.3 feet bgs. Before the monitoring well could be completed, the probe hole wall caved in back to 22 feet bgs. Monitoring well MW-7 was completed at a depth of 22 feet bgs using 1-inch diameter, schedule 40 PVC casing and 10 slot screen. The well is screened from 12 feet to 22 feet bgs.

Following completion of work by Cascade, HydroSolutions installed one vapor point (VP-7) and one SVE well (SVE-1) using a hand auger, and two SVE wells (SVE-2 and SVE-3) using a hydro-excavation contractor in locations that could not be accessed by the DPT. Soil vapor well SVE-1 and vapor point VP-7 were installed on August 18, 2016. Soil vapor well SVE-1 was completed at a depth of 10 feet bgs using 2-inch diameter, schedule 40 PVC pipe and 2.5 feet of 10 slot screen. Vapor point VP-7 was completed at a depth of 7.7 feet bgs using 1-inch diameter, schedule 40 PVC pipe and 2.2 feet of 10 slot screen.

Soil vapor wells SVE-2 and SVE-3 were installed with the assistance of a hydro-excavation contractor to water jet the borings. Both soil vapor wells were installed on November 2, 2016 and were completed at a depth of 10 feet bgs using 2-inch diameter, schedule 40 PVC casing and 4.5 feet of 10 slot screen. Each SVE well was completed using 10/20 silica sand placed to one foot above the screen and topped with hydrated bentonite to the surface. Lithologic logs for all soil vapor wells, vapor points, and monitoring well MW-7 completed during this investigation are provided in Appendix D.

4.5 Site Lithology and Groundwater

Lithology and groundwater in the immediate vicinity of the project area are described in the following sections. More detailed information on the overall geology of the site is found in reports completed previously for the HSS (HydroSolutions Inc 2012).

4.5.1 Site Lithology

Near surface lithology at the site was investigated using the DPT to evaluate physical soil properties in the vadose zone. In general, below about 6- to 8-inches of surface concrete or 2-inches of surface asphalt is a variable thickness zone of gravels and construction debris fill material placed to an approximate depth of about 8 to 9 feet or more bgs. Near the northeast corner of the building, a small but continuous zone of what appears to be burnt debris and soils is found at a depth of about 3 feet to 6 feet bgs within the fill, and this zone was excavated to a depth of 9.5 feet bgs during trenching for the SVE system. This zone varies in thickness from 3 to more than 6 feet. The origin of this unit is not understood since no reported fire occurred in the area and it may be associated with imported fill material or historical industrial operations in the vicinity. Under the fill/burnt debris layer, sandy silty materials with varying amounts of gravels up to 1.5 inches in diameter are found down to about 13 to 14 feet bgs, and may represent a mixture of fill and native materials. A tight, plastic white clay unit with variable amounts of small mafic sand-sized fragments is found to at least a depth of 25 feet bgs, the

depth of the deepest probe or boreholes completed at the site. At some locations, angular to semi-angular limestone fragments are found just above the contact with the clay. This clay is likely of volcanic origin and may act as an aquitard to vertical migration of contaminated groundwater.

4.5.2 Groundwater Elevation

Understanding groundwater elevations was an important part of the pre-design investigation and the data were used for designing the SVE system so that it was completed entirely above the water table. Groundwater level measurements and groundwater sampling occurred during pre- and post-SVE system sampling events. The groundwater level results from each monitoring well are presented in Table 4-4. In order to put the depth to water in perspective, a hydrograph showing groundwater elevations from the current and historic sampling events are shown on Figure 4-2. More detailed information on historical groundwater levels are found in reports previously completed for the HSS (Tetra Tech 2014).

Groundwater elevations measured in upgradient monitoring well MW-1 varied from 3,977.85 feet above mean sea level (amsl) in November 2016 and 3,978.01 feet amsl in March 2017 to a low at downgradient monitoring well MW-3 from 3,970.57 feet amsl in March 2016 and 3,971.14 feet amsl in March 2017. Groundwater is encountered approximately 13 to 15 feet bgs across the site. Groundwater flow at the Hustad Center is primarily in a northerly direction with some local north-northwest and north-northeast flow component. Groundwater elevations have remained very consistent at the Hustad Center throughout the period of record with minimal seasonal and year-to-year variations. The groundwater elevations and flow direction measured during this monitoring event are consistent with data from previous monitoring at the Hustad Center as well as work completed by the United States Geological Survey (Briar 1992). Groundwater elevation contour maps for both November 2016 and March 2017 monitoring events are shown on Figures 4-3 and 4-4. Analytical results for pre- and post-SVE system groundwater sampling events are presented in Section 8.3.

4.6 Soil Investigation-Derived Waste

Minimal investigation-derived waste (IDW) was generated from the soil sampled from the probe holes using the DPT. Approximately one-third of a 55-gallon drum was collected during the subsurface investigation. This soil was combined with the soil generated from the SVE system trench excavation (see Section 7.2.2) and was sampled for Toxicity Characteristic Leaching Procedure (TCLP) analysis and VOC analysis using SW8260 to evaluate disposal options. Results were used to determine the mobility of contaminants present in the soil waste and the proper disposal option for the IDW, either transported to a hazardous waste landfill or a solid waste landfill. Complete description of analytic results and appropriate disposal methods are included in Section 7.2.2.

5.0 Remediation Feasibility

The feasibility of remediating PCE and TCE from soils and vapors in the vadose zone was evaluated in order to assess the likelihood of success of the operation of an SVE system at the

site. Specifically, the feasibility was evaluated by 1) using information obtained from the pre-design Investigation and previous investigations, 2) examining contaminant properties and contaminant partitioning in the subsurface, and 3) estimating the potential for removal using soil vapor extraction.

5.1 Contaminant Properties

The contaminants of concern, PCE and TCE, are chlorinated organic compounds which exceed Montana Numeric Water Quality Standards, HHS in groundwater (Montana Department of Environmental Quality 2017). The presence of PCE and TCE in groundwater is consistent with sites contaminated with dry cleaning fluids.

PCE is a primary component of dry cleaning fluid. It has a high volatility (vapor pressure) at 17.8 millimeter of mercury (mmHg) and a solubility of 0.15 grams/Liter (g/L). The molecular weight (MWT) is 165.82 grams/mole (g/mol). The organic carbon partition coefficient for PCE was reported as 364 milliliters per gram (mL/g) (Mercer and Cohen 1990).

TCE is a degradation daughter product of PCE and is commonly found at PCE contaminated sites. TCE also has a high vapor pressure of 57.9 mmHg and a solubility of 1.1 g/L, both of which are higher in comparison to PCE. The MWT for TCE is slightly less than PCE and reported to be 131.4 g/mol. Organic carbon partition coefficients for TCE was reported as 126 mL/g (Mercer and Cohen 1990).

5.2 Contaminant Partition and Phase Distribution

Estimating the contaminant partitioning and phase distribution of contaminant components in the soil vapor assists in evaluating the feasibility of a selected remediation alternative. This can be accomplished through assessing the soil vapor as a single component in the soil, either free or adsorbed to the soil, in the groundwater, or as vapors emanating from the groundwater.

Contaminant partition and phase distribution and adsorption to soil materials can be estimated with soil and groundwater laboratory results for total organic carbon, published values for MWT, solubility, and vapor pressure, Henry's law coefficients, and adsorption coefficients.

5.3 Contaminant Partition and Phase Distribution Results

As part of the contaminant phase distribution analysis, adsorption to soils was evaluated through correlation to total organic carbon (TOC) analysis with respect to depth from probe and boreholes completed in 2010 and 2016. TOC levels were converted to fraction organic carbon (f_{oc}) and plotted against depth of sample. A comparison of PCE, f_{oc}, and soil sample depth is shown on Figure 5-1. The graph shows that f_{oc} is significantly higher at sample depths 6 feet or less below ground surface (bgs) with an average f_{oc} value of 0.102. Sample depths greater than 6 feet have an average of 0.007 f_{oc}. The graph illustrates significant concentrations of PCE are found at depths of 6 feet or less. This may indicate that shallower soils have a higher capacity of adsorption of organic compounds.

The soil saturation limit (C_{sat}) for PCE is 111 mg/kg, which is the concentration at which PCE is saturated in the pore volume water and PCE vapor is saturated in the pore spaces in the unsaturated zone. Based on results from the recent MIHPT and the 2010 focused source field investigations, soil sample results exceeded the C_{sat} concentration for saturated PCE at depths of less than 6 feet bgs in the area of vapor points VP-4 and VP-6 beneath Mr. Wise Cleaners, and probe hole DPT-5 located near the northeast corner of the building. This indicates that saturated PCE is likely to be present near and within the northeast corner of the building.

5.4 Soil Vapor Extraction Contaminant Applicability

SVE is applicable for remediation of volatile organic compounds in soils (Suthersan 1999). Generally, the vapor pressure must be greater than 1.0 millimeters of mercury (mmHg), 0.54 inches of water column (WC), or greater to assure that adequate vapors are present for extraction, and the Henry's Law coefficient must be greater than 1.0 atmosphere liters per mole (atm-L/mol) to assure that adequate vapors can be generated from contaminants in solution.

With respect to the contaminants found at HSS, PCE and TCE, the vapor pressure are 17.8 and 57.9 mmHg, respectively. As for the Henry's law coefficient, PCE and TCE are reported to be 25.9 and 9.1 atm-L/mol, respectively (Mercer and Cohen 1990).

In comparison to the suitability threshold guidelines presented above, the properties of each contaminant of concern exceeds the minimum threshold for vapor pressure and Henry's Law coefficient indicating that each contaminant is amenable for SVE remediation. Should the site encounter additional degradation of PCE and TCE contaminants into *cis*-1, 2-dichloroethlyene (DCE), and vinyl chloride (VC), vapor pressure and Henry's Law coefficient of the degradation components would still exceed the SVE suitability thresholds.

6.0 Pilot Scale Testing

Two pilot scale SVE tests were completed to estimate the radius of influence (ROI) from the vapor points outside the building and the vapor points inside the building, and to estimate the potential contaminant mass removal rates. The preliminary pilot test (outside pilot test), was used to estimate the potential ROI so that the more expensive interior vapor points could be located at appropriate separation to derive additional ROI information through the subsequent pilot test. A description of the pilot test methods and results are included below.

Since PCE and TCE are suitable for soil vapor extraction at the site, the implementation of an SVE system must address cleanup of the contaminant area identified during the subsurface investigation of this task order and in previous investigations. Due to variable soil properties, each SVE well must have a ROI to remove PCE and TCE vapors. Estimation of the ROI was completed through the SVE pilot scale tests.

6.1 Methods

The SVE pilot test was conducted at various flow rates (vacuum) to measure the vacuum response at various distances. By correlating the information, a radius of influence was

estimated to indicate that an adequate level of vacuum and airflow is able to propagate the subsurface. This adequate vacuum level has been defined as between 0.1 and 1.0 inches of H_2O WC (0.187 to 1.87 mmHg) to or 10% of the applied vacuum at the extraction well (Suthersan 1999). For the purposes of this pilot test and project, a level of 0.1 inches of WC was chosen at the minimum ROI to remove volatile components of the contaminants in soils at the HSS due to the high volatility of PCE and degradation products and the permeability of the soils.

Two SVE pilot tests were performed at the HSS to determine the ROI and an estimated potential contaminant mass removal rate. A 1 horsepower (hp) intrinsically safe, regenerative blower was connected to the extraction wells (SVE-1 and SVE-3). Several vapor points and existing monitoring wells were used as observation wells to measure vacuum response and in the case of monitor wells, the groundwater elevation response to the various steady state vacuum levels generated at the extraction wells. Observation wells are installed at various distances from the SVE wells to observe and measure the response of these wells to the applied vacuum at the SVE well.

Along with observing vacuum responses and groundwater elevations in adjacent monitoring wells, other parameters were measured at the extraction well. These included blower inlet vacuum and discharge pressure and velocity, exhaust temperature, PID measurements (calibrated to 100 ppmv isobutylene span gas), multi-gas meter (oxygen - O_2, carbon dioxide - CO_2) and Tedlar bag samples for laboratory analysis of volatile organic compounds. The PID measurements were based on isobutylene and corrected for relative response to PCE with the procedure outlined in the PID owner's manual. Relative response for PCE with respect to isobutylene is 0.5 or half of the reading.

Due to unknown localized subsurface conditions, several SVE pilot wells were installed to apply a vacuum to the subsurface in different areas of the site. Initially, SVE and vapor point wells were installed on the north side (outside) of the building (SVE-1 and VP-7) for a preliminary pilot test to aid in locating the interior vapor points. Locating interior vapor points was critical since installation would be challenging with the interior building environment and currently operating businesses. Following the preliminary pilot test, additional SVE wells (SVE-2 and SVE-3) and interior vapor points were constructed near the northeast corner and adjacent to the building in proximity to interior vapor points VP-4 and VP-5. These SVE wells and vapor points were used to conduct the indoor SVE pilot test. SVE wells, vapor points, and monitoring well locations are shown on Figure 4-1. Tedlar bag samples were collected from the discharge of the extraction well during the second pilot test in accordance with standard operating procedures referenced by the laboratory (Eurofins 2014)

The need for vapor treatment from the blower discharge during pilot scale testing was evaluated. Since the test was short-term (less than 8-hours), there were no sensitive receptors (e.g. daycare facilities, schools, nursing homes, etc.) within 500 feet of the HSS, relatively low concentrations of PCE(less than 20 ppmv as isobutylene at the time of pilot testing were found in the indoor sub-slab system discharge), and the blower exhaust was piped at least 10 feet above ground surface in an open area, it was concluded that the acute industrial Regional Screening Level (RSL) for PCE (2.08 micrograms per cubic meter ($\mu g/m^3$)) was not likely to be

exceeded within outdoor occupied areas. During pilot scale testing, near continuous monitoring of the discharge was completed using a PID meter. Contingency plans were in place during the pilot test to shut down the test, increase bleed air to the exhaust discharge, or enact other mitigations to increase dispersion or treat the vapor discharge should PID measurements show an elevated response.

6.2 Pilot Test Evaluation Results

The following provides a summary of the results of the pilot scale testing. All field sheets from the testing are included in Appendix E. A photographic log of the field activities, including pilot testing is included in Appendix F.

6.2.1 Preliminary Pilot Test

On September 15, 2016, a preliminary SVE pilot test was completed to aid in locating interior vapor points to evaluate the ROI beneath the building and evaluate PCE presence outside of the building. Vacuum was applied to the extraction well SVE-1 and vacuum responses were measured in vapor point VP-7 and monitoring well MW-6. Results of the test indicated a steady vacuum of approximately 44 inches of WC, an exhaust temperature of about 124 degrees Fahrenheit (° F), which resulted in a flow rate of 30 standard cubic feet per minute (SCFM) according to the manufacturer's pump curve. PID levels were initially reported at 1.4 ppmv as isobutylene but quickly diminished; therefore, no exhaust air samples were taken. This was an indication that the wells were possibly located near, but outside of significant subsurface contamination.

Semi-log plots of the vacuum response with respect to distance from the SVE well were used to estimate the ROI. An ROI of 7.2 feet at 0.10 inches WC was estimated for the preliminary pilot test and is shown on Figure 6-1. This estimated ROI was used to help locate proposed vapor points within the building since indoor locations were more expensive to install and space was limited for installation.

6.2.2 Pilot Test

On November 9, 2016, an SVE pilot test was completed. With the estimated ROI from the preliminary pilot test, a second pilot test was conducted with SVE and vapor points both inside the building footprint and near the adjacent exterior wall along the northeast corner of the building. The SVE pilot test was performed with a 1 hp regenerative blower on extraction well SVE-3 operating at a vacuum of 26 inches of WC at a temperature of about 80° F. This resulted in a flow rate of about 70 SCFM according to the manufacturer's pump curve. PID measurements climbed throughout the test, but steadied after about 3 hours of operations. A gas instrument measured CO_2 and O_2 throughout the test and indicated steady levels in CO_2 and a 1.6% drop in O_2 with respect to ambient surface conditions.

During the pilot test vacuum response measurements were monitored at two locations on the interior wall of the building, vapor points, VP-4 and VP-5. . Vacuum response was also monitored at soil vapor well SVE-2 and vapor points VP-1 and VP-3, which are located outside of the building.

Semi-log plots of the vacuum response with respect to distance from the SVE well were used to estimate the ROI. An ROI was estimated at 19.5 feet at the interior vapor points VP-4 and VP-5), and 29.0 feet at the exterior extraction well SVE-2 and vapor points VP-1 and VP-3 at 0.10 inches WC. ROI estimates are shown on Figure 6-2. The ROI may exhibit some anisotropic properties as a result of the building footer and may provide additional resistance to the vacuum extending from the extraction well SVE-3 toward the building footer.

6.2.3 Contaminant Mass Flow Estimate

Airflow during the second pilot test was estimated at a constant rate of 70 SCFM. During the pilot test, two discharge effluent air samples were collected with a Tedlar bag and analyzed for VOCs from extraction well SVE-3. The first air sample was collected around the time of test startup, and the second air sample was collected at the end of the 3 hour test when the PID reading remained steady. For the start-up sample, the lab reported a concentration of 86 mg/m^3 of PCE at a corresponding in-field PID measurement of 12.8 ppmv (86.81 mg/m^3) as PCE. For the second air sample, the lab reported a concentration of 158 mg/m^3 PCE at a corresponding in-field PID measurement of 30.5 ppmv (206.86 mg/m^3) as PCE. No other degradation products were indicated in the lab results.

Based on the steady state flow measurements and laboratory analysis, a mass removal rate was estimated to be 0.96 pounds of PCE per day. Alternately, the removal rate was estimated with the PCE corrected PID measurement and resulted in 1.25 pounds PCE per day. This is an estimated initial rate and is expected to decline steadily over time.

7.0 SVE System Design and Construction

This section describes the SVE system design parameters and construction activities. Completion of the subsurface investigation and pilot scale testing provided the necessary information to design and plan the construction of the SVE system including by determining the ROI, the number of SVE wells and location, blower specifications, and the required discharge air treatment. SVE system design was also determined by contaminant magnitude and extent estimated from previous investigations and consideration of field constraints such as utilities, building structures, and property boundaries. SVE system design and operation parameters, construction activities, SVE system equipment, and treatment of discharge air are described below.

7.1 SVE Design Parameters

The conceptual design of the SVE system was to target the areas of higher vapor concentrations of PCE based on ambient air samples inside the building, sub-slab samples from beneath the building, and results of the MIHPT investigation outside, and vapor point installation and sampling inside the building. Based on the findings, a system was designed to install four (4) horizontal SVE wells beneath the Mr. Wise Cleaners building footprint to target the area of suspected pipe leak and other suspected spills, and install a horizontal SVE well in a trench along the building's east side to target areas of suspected historic surface disposal of PCE on the parking lot surface.

Extraction rates were determined based on results of the pilot test, experience with other SVE systems in low permeable materials, and other published guidelines. For the purpose of sizing the system, it was assumed that each horizontal SVE well beneath the building and the horizontal well located in the trench would be extracted at 40 SCFM each. This results in a total flow rate of 200 SCFM for the complete system. In operation, each horizontal SVE well is equipped with a valve to modify extraction rates independently to optimize removal within the total flow constraints.

The system design included piping the SVE wells to a surface manifold feeding a regenerative blower discharging to granulated activated carbon (GAC) canisters to treat the vapors prior to discharge. A blower capable of a maximum flow rate of 280 SCFM and a maximum vacuum of 85 inches of WC would be needed. The surface components would be housed in a temporary shed located at the northeast corner of the building with a separate power supply. All components housed in the shed were specified to be intrinsically safe. The SVE system surface equipment as-built and shed layouts are shown in Figure 7-1. Design parameters of the air discharge system are described later in this section.

7.2 Horizontal SVE Well and Trench Construction, and Site Restoration

The results of SVE system horizontal drilling, construction, and site restoration are described below.

7.2.1 Horizontal Boring, Trenching, and Construction

HydroSolutions oversaw the installation of a SVE trench and four horizontal wells completed by subcontractor, Four O Six Underground, Inc. The horizontal wells were placed beneath the building at a depth of approximately 6 feet bgs. The horizontal borings were 4 inches in diameter and reamed to 8 inches in diameter. Completed wells consisted of 2 inch inside diameter (I.D.) schedule 40 PVC slotted well screen (0.020 inch), 40 feet in length each. Due to primarily silt sand with variable amounts of clay soils and stable nature of the soils surrounding the borehole, no filter pack was used in the boring annulus. Minimal cuttings were produced during the boring installation and were retained in the trench.

An as-built diagram and construction details of the SVE horizontal well construction including the horizontal borings and the SVE trench is provided on Figure 7-2. The trench was approximately 50 feet in length to accommodate a horizontal SVE pipe, and set approximately 6 feet bgs. Prior to trenching, the surface asphalt was cut and removed to ensure a clean restoration.

A 4 inch I.D. schedule 40 PVC with 10-slot well screen (0.010 inch) pipe was laid in the trench and covered in 3/8 inch pea gravel. The screened length is 40 feet. The four horizontal borings with well screen pipes entered the trench and elbowed adjacent to the 4 inch screened pipe with 2 inch I.D. schedule 40 PVC solid pipe to the terminus of the excavation. All 2 inch and 4 inch I.D. pipes were traced with copper wire and elbowed to the surface with corresponding solid schedule 40 PVC pipe. Each vertical section of pipe was wrapped with self-limiting heat tape

and mated to the header assembly inside of the shed. The heat tape is intended to be used as needed for operation in colder weather and to avoid freeze up during temporary shutdown.

Inlet holes located on the west side of the building were abandoned with bentonite to inhibit short circuiting of air flow until the remaining borehole collapsed and consolidated. Excess subsurface soils were segregated through a PID and visual screening process. Contaminated soils were replaced and compacted in the trench to be remediated by the SVE system. Excess soils were stockpiled onsite in a roll off bin and were used for additional backfill in the trench as the ground thawed and consolidated in the spring.

One grab soil sample was collected from a test pit excavated near the north end of the SVE horizontal system trench, near where horizontal well SVEH-2 intersected the trench. The sample was collected at a depth of approximately 7.0 to 9.5 feet bgs. A high PID reading was recorded and a sample was containerized for laboratory analysis to evaluate VOC concentration. A PCE concentration of 82 mg/kg was reported by the laboratory in the grab sample.

7.2.2 Construction Derived Waste and Site Restoration

Approximately 5-6 cubic yards of excess soil remain following completion of backfill in the SVE trench. These soils were stockpiled in a roll off bin and stored on site. As described in Section 4.6, a composite soil sample was collected from the roll off bin and analyzed for TCLP and SW 8260. Leachate generated from the TCLP analysis was reported to contain PCE at a concentration of 0.039 µg/L, well below Montana Numeric Water Quality Standards, Human Health Standard of 5 µg/L (Montana Department of Environmental Quality 2012).

A soil sample was collected directly from the roll off bin. Samples were collected in five jars and delivered to Energy Laboratories where the samples were composited and analyzed for VOCs using Method 8260. PCE was reported at a concentration of 34 mg/kg and TCE was reported at a concentration of 0.083 J-flagged. Both concentrations are below EPA Regional industrial screening levels. EPA Regional screening levels for PCE and TCE include the following:

PCE: Residential soil = 24 mg/kg; Industrial soil = 100 mg/kg
TCE: Residential soil = 0.94 mg/kg; Industrial soil = 6 mg/kg

Given the results of TCLP and solid soil analysis, the soil waste will be disposed of at Lewis and Clark County Landfill or Tri County Landfill under direction of DEQ guidance.

Final site restoration activities are to be completed by the construction subcontractor and include final site cleanup, and asphalt patching of the trench site and also on the west side of the Hustad Center where horizontal soil borings were initiated. Site reclamation activities were delayed due to a Northwestern Energy project that disturbed the site with underground boring and replacement of a gas line. Additionally, a new privacy fence was constructed to replace the one that was removed during excavation of the trench on the east side of the Hustad Center. Fence construction was completed on May 26, 2017.

7.3 SVE System Equipment

The installed system is rated to extract up to approximately 280 cubic feet per minute of soil vapor containing PCE, is explosion proof and operates on single phase power. It is connected to a 2 inch I.D. schedule 40 PVC inlet header with sample ports and vacuum gauges, 30 gallon knock-out drum with high level float shut-off, inline filter, vacuum relief valve, and a 2 inch discharge line. The system was installed in an onsite temporary shed.

7.3.1 Electrical Service

The electrical service for the SVE system is single phase 220 volt, 100 amp power from Northwest Energy's electrical distribution pole located adjacent to the north side of the Hustad building. The electrical service was installed in September 2016 to serve both the existing Hustad Center indoor air mitigation system and the SVE system to allow electrical service on a dedicated and independent meter. The electrical supply was only capable of providing single phase power which limited the maximum blower size to no greater than 5.5 hp.

The electrical breaker box for the SVE and indoor air mitigation systems is mounted adjacent to the electrical service meter on the north side of the Hustad Center. The breaker box has two 30 amp breakers (Breaker 4) serving the 220 volt power servicing the blower, Breaker 6a for an intrinsically safe electrical outlet and light in the shed, and Breaker 6b for the blower controller.

The entrance is also equipped with a locked 110 volt grounded outlet for ancillary equipment such as drills, lights, and heaters use during installation and operation, if needed. The electrical power from the breaker box is connected to the blower via a conduit and controller (relay) box mounted on the west side of the shed.

7.3.2 SVE Equipment

SVE system layout and flow diagrams are shown on Figure 7-1 and includes the following specifications:

- Inlet Header
    - 5 - 2 inch Ball Valves
    - 5 - Sample ports
    - 5 - Magnehelic Vacuum Gauges (0 to 80 inches WC)
- Inlet Vacuum Gauge (0 to 100 inches of WC)
- 30 Gallon Knockout Tank with drain
- High Level Float Shut-Off Switch
- Inlet Filter
- Vacuum Relief Valve
- 1 – SVE Blower
    - Explosion Proof Blower (Division 1 and 2, for Group D explosive atmosphere)
    - Maximum Air Flow of up to 280 standard cubic feet per minute
    - Single phase 230 volt
    - Maximum Vacuum 85 inches WC vacuum
- Outlet Pressure Gauge on discharge pipe (0 to 100 inches WC)
- Pitot Tube for flow measurement (0 to 300 cubic feet per minute (cfm))

- Temperature Gauge (0 to 250° F)

Manufacturer supplied equipment literature is supplied in the Attachment 1, Operations and Maintenance (O&M) Manual.

7.4 Discharge Air Treatment

Treatment control design guidelines used for system selection consisted of determination of the compounds requiring control, primarily VOCs consisting of PCE and TCE; however, pollutants such as *cis*-1,2-DCE, trans-1,2-DCE, and VC may be encountered as a result of natural or enhanced degradation. Both GAC and zeolite are suitable media for the removal of these components from the SVE discharge stream.

An air treatment evaluation was conducted to select the adsorption media type for PCE and other volatiles removed via the SVE system. As directed in the task order, carbon and zeolite were evaluated as potential media types. The following sections describe operational characteristics of each media, selection and design parameters, and air treatment system description.

7.4.1 Characteristics

Carbon in its activated form is generally hydrophilic which means it can take on water at relative humidity greater than 50%. It also has a near linear isotherm, meaning its adsorption of the desired components at a given temperature is based upon the inlet concentration of the adsorbate, in this case, PCE.

Zeolite is hydrophobic which means it is generally unaffected by water as humidity. It also has a nonlinear adsorption isotherm which allows efficient adsorption at low concentrations but tends to quickly reach a maximum adsorption rate across a wide inlet adsorbate concentration range. Adsorption capacity characteristics of carbon and zeolite are shown on Figures 7-3 and 7-4 (U.S. Environmental Protection Agency 2006).

7.4.2 Selection

Due to the high levels of PCE observed during drilling of the horizontal wells and using Figures 7-3 and 7-4 referenced above, carbon was selected as the adsorption media due to its near linear isotherm which facilitates adsorption at levels of VOCs greater than approximately 30 ppmv in comparison to zeolite. Also, limited levels of water condensation were observed during the outdoor and indoor pilot scale tests. It was anticipated that high levels of humidity would not be encountered; therefore, carbon could be used with little effect of humidity on the adsorption efficiency.

7.4.3 Design Parameters

Basic guidelines to increase effectiveness for carbon adsorption systems for removal of VOCs include limiting the maximum inlet concentration to less than 10,000 ppmv, the inlet temperature to less than 140° F, and relative humidity to less than 50% (Suthersan 1999).

Based on the pilot test, the maximum concentration of the PID reading was approximately 60 ppmv as isobutylene. With the relative response correction, the PID reading for PCE would be

about 30 ppmv as PCE. The anticipated operating flow rate to the system was estimated at approximately 200 cfm at a maximum temperature of 120° F as measured during the pilot test. Since the extraction wells are not in direct contact with groundwater, relative humidity is likely to remain below 50%. The expected inlet pressure to the GAC canisters is 78 inches WC (2.81 pounds per square inch gauge (psig)) based on the pump curve of the selected blower, which is below the maximum pressure rating of the GAC listed at 4 psig.

7.4.4 Air Treatment System Description

In order to meet the constraints discussed above, the granular activated carbon chosen includes approximately 250 pounds of activated carbon capable of handling up to 350 cfm at a maximum temperature of 250° F and a pressure drop of less than 4 psig (110 inches WC). Equipment manufacturer's sheets for the Geotech/tetraSOLV Vapor Phase Carbon Media GAC-V-85 product bulletin are included in the O&M manual included in Attachment 1. A similar system was previously implemented for the indoor mitigation system and has performed as required.

The system is operated with two GAC canisters in series to provide backup in the event of contaminant breakthrough. If breakthrough occurs, the system can maintain operation while a replacement canister is ordered. Upon delivery, the used canister can be disposed or sent for recycle in accordance with RCRA requirements. The second canister can be swapped to replace the first, and the new canister installed as the backup in series.

The 2-inch I.D. schedule 40 PVC discharge pipe from the second GAC drum is run through the north wall of the shed and up the side to its terminus approximately 10 feet above ground level. The end of the discharge pipe is capped with a tee-fitting to reduce infiltration of precipitation into the discharge pipe and direct the vent with prevailing easterly winds.

8.0 SVE System Effectiveness on Indoor Air, Soil Vapor, and Groundwater

Pre- and post-SVE system indoor air, soil vapor, and groundwater samples were collected and used to evaluate the effectiveness of the SVE system on each media. Each sampling event is described in the following sections.

8.1 Indoor Air

Pre- and post-SVE system indoor air background, sampling methods, and results are described below.

8.1.1 Background and Methods

Regular indoor air sampling and analysis at the Hustad Center has occurred since 2011 and an indoor air mitigation system has been operating to control vapor intrusion contaminants since that time. Historical data and results of indoor air sampling events have identified VOCs, namely PCE and TCE as contaminants of concern at the site (HydroSolutions Inc 2016). Commercial

site specific indoor air screening levels of 105 µg/m^3 for PCE and 7 µg/m^3 for TCE were established in 2016 by Montana DEQ for use at the HSS.

Since installation of the indoor air mitigation system by Hustad LLC, HydroSolutions has monitored and maintained the system, and continued to do so for DEQ under this task order. The owner of the building installed a sub-slab depressurization system with discharge air treatment to a GAC to mitigate elevated PCE concentrations in indoor air. Monitoring vapor extraction points, and influent and effluent concentrations at the GAC, was completed during this task order.

To evaluate the effectiveness of the SVE system on the indoor air at the Hustad Center, pre-SVE system installation and post-SVE system installation air samples were collected and analyzed for comparison. The air samples were analyzed for contaminants of concern by Pace Analytical Services, LLC (Pace) in Minneapolis, MN using EPA Method TO-15. Because low reporting limits were expected to be necessary, EPA Method TO-15 was run in the selective ion monitoring (SIM) mode and canisters were individually certified contaminant-free. Ambient air sample collection and laboratory methods followed the protocols of the Montana Vapor Intrusion Guide (Montana Department of Environmental Quality 2011).

Pre-SVE system and post-SVE system samples were collected in four office spaces within the Hustad Center building complex. One background air sample was also collected outside the Hustad Center during each sampling event to assess the background concentration of VOCs. The following specific locations were used for indoor and background air sampling:

- Canine Capitol: behind the front desk
- Mr. Wise Dry Cleaners: On the work table along the north partition
- Outside Mr. Wise Dry Cleaners: North of the front door
- Lash Dolls Salon: On the work table along the east partition wall
- DermaWerx Tattoo: On the shelf in center of waiting room

Individually-clean certified six-liter Summa canisters were placed in the breathing zone during the eight-hour work shift to assess the targeted exposure scenario for all samples including the sample duplicate. Canister flow regulators were set by the laboratory at a flow rate corresponding with the 8-hour target timeframe.

Pre-SVE system indoor air samples were collected on October 28, 2016 at the five identified locations. During this time, the indoor air mitigation system was in operation. Outside air temperature ranged from 45 to 61 degree Fahrenheit (ºF). The ground was presumed to not be frozen. There were no significant weather conditions, with clear to partly cloudy skies and moderate west winds noted. Following sample collection, canisters were packed in original boxes and shipped to Pace on October 31, 2016 following laboratory protocol and under chain-of-custody where they were received on November 2, 2016.

Post-SVE system indoor air samples were collected on March 15, 2017 at the same collection locations used to obtain the pre-SVE system indoor air samples. In order to isolate the impacts of the SVE system on indoor air quality, the indoor air mitigation system was temporarily shut

down. Shut down of the indoor air mitigation system occurred on March 13, 2017 at 1400 hours to allow for the soil vapors time to reestablish natural preferential pathways prior to initiation of indoor air sampling activities, approximately 43 hours later.

Outside air temperature during this sampling event ranged from 42 to 67 ºF. No significant weather conditions were observed, with partly cloudy skies and light southwestern winds noted. Despite unseasonably warm temperatures on the day of sampling, the preceding ambient temperatures and weather conditions are considered to have presented a “worst-case” vapor-intrusion scenario, with presumably frozen ground outside and minimal ventilation (closed doors and windows) in the work spaces. Following sample collection, the collection canisters were packed in original boxes and shipped following laboratory protocol and under chain-of-custody to Pace on March 16, 2017. Pace acknowledged receipt of the samples on March 21, 2017.

8.1.2 Indoor Air Sample Results

PCE and TCE were reported above the laboratory reporting limits in all pre-SVE system samples, including the outdoor air. Concentrations of PCE in the samples ranged from 0.4 µg/m^3 (in outside air) to 221 µg/m^3 (in Mr. Wise Cleaners).Concentrations of TCE reported in the samples ranged from 0.25 µg/m^3 (in outside air) to 7.9 µg/m^3 (in Mr. Wise Cleaners). At Mr. Wise, both PCE and TCE were reported at concentrations that exceeded the DEQ site specific screening levels. At DermaWerx, PCE was reported at a concentration that exceeded the DEQ-established site specific screening levels. The degradation daughter product c*is*-1,2-DCE was reported in the outdoor air sample at a concentration above the reporting limit. No other degradation product analytes were reported above the reporting limits in any samples. A summary of the laboratory results and analyte concentrations reported for pre-SVE system indoor air samples is presented in Table 8-1. The complete laboratory report is included in Appendix B.

PCE was reported above the laboratory reporting limits in all of the post-SVE system installation samples, including the outdoor air sample. Concentrations of PCE in the samples ranged from 0.13 µg/m^3 (in outside air) to 20 µg/m^3 (in Canine Capitol). TCE was reported above reporting limits in the samples at Canine Capitol, Mr. Wise, and Lash Dolls Salon. Concentrations of TCE ranged from 0.053 µg/m^3 to 2.1 µg/m^3. The concentrations of PCE and TCE reported in all samples were below the DEQ-established site-specific screening levels. C*is*-1,2-DCE was reported at Mr. Wise in the original sample at 0.038 µg/m^3 and in the duplicate sample at 0.12 µg/m^3. 1,1,2,2-tetrachloroethane was reported in all of the samples at concentrations that ranged from 0.15 µg/m^3 to 1.6 µg/m^3. A summary of the laboratory results and analyte concentrations reported for post-SVE system indoor air samples is presented in Table 8-1. The complete laboratory report is included in Appendix B.

A comparison of contaminant concentrations in the indoor air from the pre-SVE system samples with those reported in the post-SVE system samples is provided in Table 8-1. These results show that following the installation of the SVE system, PCE concentrations reported in the indoor air were reduced by 67% to 99% at all sample locations, despite the shutdown of the existing indoor air mitigation system. Concentrations of TCE reported in the indoor air were reduced by 66% at Mr. Wise and by 84% at Lash Dolls Salon. At Canine Capitol, the

concentration of TCE increased by 89% over this same timeframe (0.27 µg/m^3 pre-SVE to 0.51 µg/m^3 post-SVE), and was the only instance in which TCE appeared to increase TCE was not reported above the reporting limits at DermaWerx or the outdoor air in the samples collected after the SVE system installation. At these locations, a decrease in TCE concentrations can be identified, but it is not possible to quantify the reduction. *Cis*-1,2-DCE increased slightly in the duplicate sample at Mr. Wise and decreased slightly in the outdoor air sample by indeterminate amounts. It was not reported in the other indoor air samples. Other degradation daughter products were not reported above reporting limits in any samples. At each sampling location, 1,1,2,2-tetracholoroethane concentrations in the samples increased from pre-SVE system concentrations but the amount cannot be quantified because it was not reported at the reporting limit in the pre-SVE system samples.

8.2 Soil Vapor

Pre- and post-SVE system soil vapor background, methods, and sample results are described below.

8.2.1 Background and Methods

Pre-SVE system and post-SVE system soil vapor sampling was conducted to provide comparison data and to evaluate the effectiveness of the SVE system on the soil vapor at selected locations. Historical sub-slab soil vapor data exists for some of the office spaces at the Hustad Center from previous investigations which were conducted by DEQ (Montana Department of Environmental Quality 2015) (CDM 2010). As previously discussed, soil vapor wells were installed at selected locations as part of the initial site investigation for the SVE project. Three of these soil vapor wells served dual purpose and were selected as points of interest due to their proximity to the estimated location of underground contamination and usefulness in evaluating the effect of the SVE system on contaminant concentrations in the soil vapor. Additionally, the pre-existing indoor air mitigation system extraction points provided access to sub-slab soil vapors at a depth of six inches at selected locations throughout the Hustad Center. Three of these mitigation system extraction points were selected as soil vapor sampling locations based on their strategic proximity to the probable contamination under the building and according to the evaluation of historic indoor air concentrations of PCE in the corresponding office spaces.

Soil vapor samples were collected from the following sub-slab vapor extraction points, which are existing components of the indoor air mitigation system:

- Z-3 (located in Mr. Wise)
- Z-4 (located in Mr. Wise)
- Z-6 (located in DermaWerx)

Soil vapor samples were collected from the following soil vapor point wells:

- VP-5 (located in Mr. Wise)
- VP-4 (located in Mr. Wise)
- VP-2 (located outside Mr. Wise, near the eastern loading pad)

The locations of the sub-slab vapor extraction points and soil vapor point wells are shown on Figure 7-2.

Individual one-liter summa canisters were used to collect the soil vapor with flow control regulators set by the laboratory to target approximately 60 minutes of vapor collection. Prior to sample collection, each soil vapor probe and assembly was leak tested in the field using helium gas to assess the integrity of the vapor well and sampling assembly. Additionally, the purge vapor from each well and sampling probe was field screened for the presence of VOCs using a PID. During sample collection and leak testing, a helium-enriched atmosphere was maintained around the sampling apparatus using a transparent plastic shroud into which helium gas was pumped. Soil vapor sample collection and methodology followed the protocols of the Montana Vapor Intrusion Guide (Montana Department of Environmental Quality 2011).

Soil vapor samples were submitted to Pace laboratory for analysis of PCE, TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, VC, and 1,1,2,2-tetrachloroethane, according to EPA Method TO-15. In addition, the samples were analyzed for helium by Method 3C for gases as a quality assurance/quality control (QA/QC) measure to verify the integrity of the sampling assembly and vapor well used for sample collection.

Six pre-SVE system soil vapor samples were collected on November 1 and November 2, 2017 from three sub-slab locations and three deep soil vapor wells. To allow the soil vapors time to reestablish natural preferential pathways and enable the desired assessment of ambient soil vapor conditions, the indoor air mitigation system was temporarily shut down on October 28, 2017. Outside air temperature ranged from 37 to 57 ºF during the sampling events and the ground was presumed to not be frozen. There were no significant weather conditions, with clear skies and calm winds noted. Following sample collection, canisters were packed in original boxes and shipped to Pace Laboratory under chain-of-custody on November 3, 2016. Pace acknowledged receipt of samples on November 7, 2017.

For this initial pre-SVE system sampling event, in accordance with DEQ's Vapor Intrusion guidance (DEQ, 2011) and sub-slab sampling protocols, ultra-high purity helium was used to fill the shroud during leak testing and sampling. All collection canisters used for the initial pre-SVE system samples were individually certified. Vapor point well VP-6 was originally selected as a location for this sampling event. However, due to a failed leak test, verified by the presence of helium in the sampling probe, this well was not sampled. Vapor point well VP-2 was selected as the alternate sampling location.

Due to high contaminant concentrations reported in the first set of pre-SVE system vapor point samples, additional samples were collected to verify the results. The same three soil vapor point wells were sampled during a subsequent sampling event on December 28, 2016. To replicate the conditions of the initial sampling, the indoor mitigation system was temporarily shut down more than 24-hours before collecting the soil vapor samples. Outside air temperature during sampling ranged from 29 to 33 ºF during the sampling events and the ground was presumed to be frozen. There were no significant weather conditions noted. Following sample collection, canisters were packed in original boxes and shipped under chain-of-custody to Pace on

December 29, 2016, who acknowledged receipt within method-specified holding time on January 3, 2017.

For the second set of pre-SVE system samples, high contaminant concentrations were expected. Therefore, canisters were batch certified instead of individually certified. Additionally, commercial-grade helium was used instead of ultra-high purity helium.

To evaluate the effectiveness of the SVE system on the soil vapor, six post-SVE system soil vapor samples were collected on March 21 and 22, 2017 from the same three sub-slab locations and three deep soil vapor wells that were sampled during pre-SVE system sampling. To allow the soil vapors time to reestablish natural preferential pathways and enable the desired assessment of ambient soil vapor conditions, both the SVE system and the indoor air mitigation system were temporarily shut down on March 20, 2017. Outside air temperature ranged from 35 to 41 ºF during the sampling events and the ground was presumed to be frozen. There were no significant weather conditions noted. Following sample collection, canisters were packed in original boxes and shipped under chain-of-custody to Pace on March 23, 2017, who acknowledged receipt on March 24, 2017.

Because high contaminant concentrations were expected, canisters were batch certified instead of individually certified for the post-SVE sampling event. Additionally, commercial-grade helium was used instead of ultra-high purity helium. These deviations from the DEQ sub-slab sampling protocols were identical to the methods used to obtain the second set of pre-SVE system samples.

8.2.2 Soil Vapor Sample Results

PCE was reported above the laboratory reporting limits in all pre-SVE system soil vapor samples in concentrations ranging from 2,500 µg/m^3 to 3,730,000 µg/m^3. TCE was reported above the laboratory reporting limits in all pre-SVE system soil vapor samples with the exception of the second sample collected at vapor point VP-2, where the reporting limit was relatively high due to the serial dilution required for analysis. Where it was reported above the reporting limit, concentrations of TCE ranged from 5.1 µg/m^3 to 7,830 µg/m^3. *Trans*-1,2-DCE was reported at vapor point VP-2 in both pre-SVE system soil vapor samples at concentrations of 10.6 µg/m^3 and 7.1 µg/m^3. No other contaminants of concern were reported in any other soil vapor samples. A summary of the laboratory results and analyte concentrations reported in the pre- and post- SVE system soil vapor samples is presented Table 8-2

Helium was reported at 12.8% in the pre-SVE system soil vapor sample collection at vapor extraction point Z-3. Field sheets from this event note a loose connection with the Teflon sampling tubing. The presence of helium in this sample verifies the leakage of air from under the sampling shroud into the sample canister. Intrusion of air from outside of the sub-slab will bias the sample results low. Therefore, PCE and TCE may have been present in the sub-slab soil vapor in concentrations greater than those reported by the laboratory for the samples collected at vapor extraction point Z-3.

PCE was reported above the laboratory reporting limits in all of the soil vapor samples collected after the installation of the SVE system. Concentrations of PCE in these post-SVE system

samples ranged from 925 µg/m^3 to 802,000 µg/m^3. TCE was reported above laboratory reporting limits in the post-SVE soil vapor samples Z-3, Z-4, Z-6, VP-2, and VP-4, ranging in concentration from 1.7 µg/m^3 to 471 µg/m^3. TCE was not reported above the reporting limit at VP-5. No other PCE degradation products were reported in any other soil vapor samples collected after the installation of the SVE system.

Helium was reported at 9.2% in the post-SVE system soil vapor sample collected at vapor extraction point Z-6. Difficulty with the extraction point fitting was noted on the field sheet during sample collection at this location. The presence of helium in this sample verifies the leakage of air from under the sampling shroud into the sample canister. Intrusion of air from outside of the sub-slab will bias the sample results low. Therefore, PCE and TCE may have been present in the sub-slab soil vapor in concentrations greater than those reported by the laboratory for the samples collected at vapor extraction point Z-6.

The complete laboratory report for these samples is included in Appendix B. As shown in Table 8-2, PCE and TCE concentrations reported in the soil vapor samples decreased after the installation of the SVE system at all sampling locations by more than 50 percent. In some cases, this percent reduction is based on reported results that are flagged as estimated by the laboratory.

8.3 Groundwater

Pre- and post-SVE system groundwater background, methods, and sample results are described below.

8.3.1 Background and Methods

Historical groundwater sampling data exists for the Hustad Center wells. Previous investigations were conducted by DEQ and are summarized in multiple documents (Tetra Tech 2014). A focused source area investigation was completed in 2010 by Hustad LLC to evaluate soil and groundwater contamination at the site (HydroSolutions Inc 2012). Since 2012, groundwater monitoring has been completed at the Hustad Center. In general, concentrations of chlorinated solvents associated with dry cleaner operations are consistently reported in groundwater during twice per year (semi-annual) sampling events.

Pre-SVE system and post-SVE system groundwater sampling was conducted to evaluate the system's potential effect on this media. Pre-SVE system sampling occurred on November 30 and December 1, 2016. Outside air temperature during this sampling event ranged from 24 to 36 ºF with variable conditions from periods of sunny skies to intermittent light snow. Post-SVE system sampling occurred on March 30, 31, and April 4, 2017. Air temperatures during sampling were approximately 50 ºF with clear skies and light and variable winds noted. Groundwater samples for both sampling events were collected from the following monitoring wells:

- MW-1
- MW-2
- MW-3
- MW-5

- MW-7

The locations of these monitoring wells are shown on Figure 4-1. Monitoring well information, including location, and depth to ground water measurements during this and previous sampling events are provided in Table 4-4.

PID measurements were taken in each monitoring well immediately upon opening the well cap. Groundwater levels in all five monitoring wells were measured to the nearest 0.01 feet below the top of the casing (TOC) using an electronic water level meter. Groundwater samples were collected using low-flow purging methods. A 1.66 inch O.D. bladder pump was used to collect groundwater samples from the 2-inch I.D. wells (monitoring wells MW-1, MW-2, and MW-3). A 0.75 inch O.D. bladder pump was used to collect groundwater samples from the 1.0 inch I.D. diameter well (monitoring well MW-7), except for the samples collected before SVE system installation, when it was sampled with a 0.66 inch O.D. bladder pump. The 0.66 inch O.D. bladder pump was also used to collect groundwater samples from the 0.75 inch I.D. diameter well (monitoring well MW-5) for both sampling events.

Sampling methods followed DEQ low-flow purging and sampling guidelines, US Environmental Protection Agency Region 1 low-flow and sampling procedures for the collection of groundwater samples, and HydroSolutions' Standard Operating Procedures (SOP) for Groundwater Sampling (Montana Department of Environmental Quality 2005) (U.S. Environmental Protection Agency Region 1 2010). Field parameters, including temperature, pH, specific conductance (SC), oxidation/reduction potential (ORP), and dissolved oxygen (DO) were measured using a flow-through cell and a calibrated YSI 556 multi-parameter meter during groundwater purging. Turbidity measurements were not collected. Each parameter was recorded on a field sheet along with well purge and sample collection details. Field sheets and HydroSolutions sampling SOP are included in Appendix E.

Following stabilization of parameters, one groundwater sample was obtained from each monitoring well using a decontaminated bladder pump. Samples were collected in 40-milliliter volatile organic analysis (VOA) vials. Additional samples were collected during the post-SVE system installation sampling event for natural attenuation (NA) analysis from monitoring wells MW-1, MW-2, MW-3, and MW-7. These samples were collected and stored in laboratory-provided sampling containers. The parameter, analytical method, and sample container type are provided in Table 8-3. The samples were preserved as required with laboratory-supplied preservatives, stored on ice in a cooler, and transported to Energy Laboratories, Inc. in Helena using chain-of-custody procedures. All samples were hand-delivered to the laboratory within the required holding time. During each sampling event, one trip blank was supplied by Energy Laboratories and kept with the samples at all times. One equipment rinsate sample was collected as part of each sampling event by rinsing the decontaminated sampling pump with distilled water and collecting a sample (identified as "Rinse Blank") from the rinsate sample. One duplicate groundwater sample was collected from monitoring well MW-3 during each sampling event. These QA/QC samples were submitted to the laboratory for analysis along with groundwater samples. All groundwater samples were analyzed for VOCs using EPA method

8260. Natural attenuation (NA) parameters and associated analytical methods are shown in Table 8-3.

8.3.2 Groundwater Sample Results

Both PCE and TCE were reported in the groundwater samples collected prior to the installation of the SVE system. PCE was reported above the laboratory reporting limits in the samples from monitoring wells MW-2, MW-3, MW-5, and MW-7 at concentrations ranging from 5 µg/L to 126 µg/L. PCE was also reported in the samples collected from upgradient monitoring well MW-1, but at a concentration below the reporting limit. TCE was reported above the reporting limits in the samples collected at monitoring well MW-7 at a concentration of 1.1 µg/L and was reported in the samples at monitoring wells MW-2 and MW-5 at estimated concentrations below the reporting limits. No other degradation daughter products of PCE were reported in any of the samples. A summary of analytical results for contaminants of concern for groundwater samples collected as part of this project are provided in Table 8-4. Complete laboratory analytical results are found in Appendix B.

PCE and TCE were also reported in the groundwater samples collected after the installation of the SVE system. PCE was reported above the reporting limits in the samples from monitoring wells MW-2, MW-3, MW-5, and MW-7 at concentrations ranging from 4.6 µg/L to 99 µg/L. PCE was also reported in the samples collected at upgradient monitoring well MW-1, but at an estimated concentration below the laboratory reporting limit. TCE was reported in the samples from monitoring wells MW-2, MW-5, and MW-7 at estimated concentrations below the laboratory reporting limits. No other degradation daughter products of PCE were reported in any of the samples.

A comparison of pre-SVE system and post-SVE system concentrations in the groundwater shows an apparent reduction in PCE concentrations of 8 percent at monitoring well MW-3, and 58 percent at monitoring well MW-7. An increase in PCE concentrations occurred in samples collected from monitoring wells MW-2 and MW-5. Since TCE was not reported above laboratory reporting limits after the installation of the SVE system at any of the monitoring wells, a comparison of pre- and post-SVE system concentrations cannot be made.

8.3.3 Groundwater Investigation-Derived Waste

Approximately 30 gallons of purge water and field equipment rinse water was collected during two groundwater sampling events at the HSS. Groundwater was containerized in 3-14 gallon drums and is stored in the SVE system shed. One water sample was collected from the three containers and analyzed for VOCs using method SW8260. PCE was reported at a concentration of 2.4 µg/L and TCE at a concentration of 0.42 µg/L. As described in a letter from DEQ dated May 25, 2017, IDW water no longer contains a listed waste and can be discharged to the land-surface on the property. The water was discharged on the asphalt adjacent to the SVE shed on May 26, 2017. A copy of the letter and analytical results is included in Appendix G.

9.0 Data Validation/Data Quality

Data validation was performed in accordance with guidance from EPA National Functional Guidelines and Montana DEQ data validation templates. All laboratory data were reviewed and assessed by completing a Montana DEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16). A sampling and analysis plan or quality assurance project plan was not required by DEQ for this project. Criteria for data validation relied on previous investigations at the HSS and criteria provided directly from DEQ. Because specific guidance was not available, the data were evaluated in a conservative manner consistent with industry standards, standard operating procedures guidelines, and professional judgement. The following items were evaluated for all data sets relied on in this report including air, soil, and groundwater sample data:

- Holding times
- Cooler temperatures, when applicable
- Instrument calibration
- Equipment rinsate and trip blanks
- Surrogates
- Matrix spike and matrix spike duplicates
- Laboratory control samples
- Reporting limits
- Reporting units
- Duplicate samples and relative percent differences

Data validation narrative reports were prepared for unique sampling events. Narrative reports discuss laboratory analytical results and collection events associated with indoor air samples, soil vapor samples, groundwater samples, soil samples collected during the MIHPT investigation, and select vapor samples collected for SVE system performance monitoring. These reports provide a case narrative summary and present data validation criteria and guidelines. For sample sets, the data's acceptability and usability for decision-making purposes is discussed through the evaluation of representativeness, completeness, precision, accuracy, and comparability. Complete data validation narrative reports, DEQ data validation summary forms, and laboratory analytical results for each sampling event are included Appendix B.

10.0 System Performance and Operation Monitoring

SVE performance and operation monitoring was completed to ensure that remediation goals were addressed and that system operation was optimized. The remediation goal of the SVE system was to remove and treat subsurface soil vapor from contaminant source zones under the Hustad Center building with the objective of reducing the contaminant source material and the potential for vapors to migrate upward and impact indoor air within the building. The sections below summarize performance and operation monitoring of the SVE system, and also provide recommended guidance on evaluating SVE system shut down.

10.1 Remediation Performance Monitoring

Performance monitoring of the SVE system was completed to assess system performance, monitor for GAC breakthrough, and record operational parameters of the SVE system. To accomplish these goals, a sampling schedule was developed to monitor the SVE system vapor influent (pretreatment) at sampling port S-1 and the vapor effluent (post treatment) at sampling port S-3. In addition, SVE system parameters including vapor stream temperatures, pressures, PID readings, and flow were recorded on a regular basis. The PID was calibrated with isobutylene and maintained in accordance with manufacturers' recommendations. PID results were recorded on field sheets as ppmv isobutylene. The radius of influence (ROI) of the SVE system was assessed through measurement with vacuum gages at vapor wells.

10.1.1 Vapor Sampling

With DEQ coordination and approval, the vapor streams were sampled by using a combination of Tedlar bags and Summa canisters. Tedlar bag samples were analyzed according to Method 8260 by Energy Laboratories. Summa canister samples were analyzed according to EPA Method TO-15 by Pace laboratory. All air samples were analyzed for the presence of PCE and its degradation breakdown products.

SVE system startup occurred on February 3, 2017. The system was allowed to run for approximately 4 hours to equilibrate temperatures and vacuum pressures prior to sampling. Startup samples were collected in the pretreatment and post treatment vapor streams at sampling port S-1 and S-3 respectively. Both Tedlar bags and Summa canisters were used for sample collection at startup. Thereafter, the pretreatment vapor stream at sampling port S-1 was collected with a Tedlar bag twice a month for the first two months, then quarterly. Subsequent samples of post treatment vapor stream at vapor point S-3 were collected with Tedlar bags samples on a quarterly basis. PID readings were recorded in conjunction with all sample collection events. The following vapor samples were collected as part of SVE system performance monitoring:

- February 3, 2017: S-1 and S-3 with Tedlar bags and Summa canisters (start-up)
- February 21, 2017: S-1 with Tedlar bag (biweekly)
- March 7, 2017: S-1 with Tedlar bag (biweekly)
- March 20, 2017: S-1 with Tedlar bag (biweekly)
- April 3, 2017: S-1 and S-3 with Tedlar bags (quarterly)

10.1.2 SVE System Parameter Monitoring

Various operational parameters were assessed on a routine basis to monitor SVE system operation and predict GAC breakthrough. Field measurements were recorded on a weekly basis which included a general visual inspection as well as system pressure, temperature, flow, and PID readings (in ppmv isobutylene) at selected points. At least weekly, the following field measurements were recorded:

- Inlet Vacuum VG-1
- Outlet Pressure at PG-1
- Flow at FM-1

- Temperature at TP-1
- Carbon Pressure at PG-2
- Exhaust PID at S-1, S-2, and S-3

10.1.3 Radius of Influence Monitoring

To evaluate the effective radius of influence of the SVE system, SVE and vapor point wells were monitored for vacuum response using magnehelic gauges. These field measurements were taken to correlate with SVE system startup and planned for periodic reassessment as needed. SVE start-up measurements were taken on February 13, 2017 at extraction wells SVE-2 and SVE-3, and vapor points VP-4 and VP-5. At that time, vapor point VP-2 and extraction wells SVE-4 and SVE-5 were inaccessible due to field construction. On April 6, 2017, measurements of vacuum response were collected in extraction wells SVE-2 and SVE-3 and vapor points VP-2, VP-3, VP-4, and VP-5. The locations of these monitoring points with respect to the SVE system are shown on Figure 4-1. Results of the ROI monitoring are detailed below in Section 10.2.3.

10.2 Performance Monitoring Results

A description of performance monitoring results including removal of PCE, GAC breakthrough, radius of influence estimates, pore volume evaluations, and ongoing operational monitoring are provided below.

10.2.1 PCE Removal

Initial (startup) SVE system measurements and sampling resulted in a vacuum of 20 inches of WC, a flow of 150 cfm at a temperature of 68 °F, and an outlet pressure of 36 inches of WC (1.3 psig). A PID measurement of 18.8 ppmv as PCE was measured at blower discharge sample port S-1. This resulted in an estimated mass removal rate at startup of approximately 1.63 pounds PCE per day. Using the reported laboratory results from the Tedlar bag and Summa canister samples collected at startup, estimated mass removal rates were 0.92 and 1.83 pounds PCE per day, respectively. Temperature and pressure drops between GAC drums were within design parameters for GAC operation.

Initial startup monitoring indicated no break-through of VOCs from GAC #1 based on PID readings at sample port S-2 located in the discharge line from GAC #1. Laboratory samples taken on February 3, 2017 confirmed non-reportable levels of VOCs in the Tedlar bag sample collected at the discharge stream at sample port S-3. PCE was reported in the Summa canister samples collected at sample port S-3 that day at a concentration of 7.4 µg/m^3.

Subsequent Tedlar bag samples and corresponding PID readings indicated that PCE concentrations in the pretreatment vapor stream have declined slightly since startup of the SVE system, but remain significant. Concentrations of PCE in Tedlar bag samples ranged from 158,000 µg/m^3 to 64,000 µg/m^3. Associated PID readings from 26.6 to 11.2 ppmv as PCE support a similar trend. Air samples collected in the post treatment vapor stream show that the SVE system continues to effectively remove PCE through the GAC. The results of the Tedlar bag and Summa canister samples PID measurements are provided in Table 10-1.

The data collected, including laboratory samples, PID readings, temperature, pressure, and flow parameters were collectively used to quantify the PCE removal rate and cumulative PCE removed over time. Graphs showing PCE removal rate and cumulative PCE removed are presented on Figures 10-1 and Figure 10-2. As noted on Figure 10-1, removal rates have declined slightly since initial operation of the SVE system, but remain significant. As of early May, 2017, an estimated 100 pounds of PCE has been removed since system start up, based on the PID readings and confirmed with the Tedlar bag sample analysis results. A summary of estimated PCE removal estimates are shown on Figure 10-2.

10.2.2 GAC Break-Through and Change Out

Operational monitoring is performed to optimize system performance and evaluate the air treatment system for effective treatment of VOCs in the SVE system discharge. The monitoring determines if VOC breakthrough has occurred in the first GAC canister. A positive breakthrough test would require the replacement of the GAC to ensure that no VOCs are discharged. A GAC replacement procedure is provided in Attachment 1, Operations and Maintenance (O&M) Manual.

On March 7, 2017, PID readings indicated 15.2 ppmv as PCE when measured in sample port S-2, located at the discharge of the first GAC canister. This indicated break-through at approximately 32 days of SVE system operation. The GAC was to be replaced in accordance the GAC removal procedure outlined in the O&M Manual. However, on March 8, 2017, instead of moving GAC#2 to the GAC#1 position and replacing GAC#2, the new GAC was installed in place of GAC #1. This was a deviation from the O&M manual GAC change out procedure since timely subsequent replacement GAC was uncertain and to provide the highest capacity available to the discharge stream prior to its replacement. An additional reserve GAC was ordered following DEQ authorization.

On April 18, 2017, PID readings indicated 4.6 ppmv as PCE when measured in sample port S-2, located at the discharge of the first GAC canister. This indicated break-through at approximately 41 days of SVE system operation since the previous GAC change out. The GAC was replaced in accordance with the GAC removal procedure outlined in the O&M Manual by installing a new GAC in place of GAC #2 and moving the canister originally in the GAC #2 position to the GAC #1 position. An additional reserve GAC will be ordered following DEQ authorization.

All GAC was disposed in accordance with the procedures outlined in the O&M manual and in accordance with regulatory requirements. The GAC canister was transported to a licensed hazardous waste facility for disposal. Copies of the waste manifests are included in Appendix H.

10.2.3 Radius of Influence

ROI measurement results collected on April 6, 2017 projected that a vacuum of 0.10 inches of WC, which is considered the lower effective limit of vacuum, is apparent at a distance of 10 to 12 feet from the SVE system wells. This ROI was slightly more than the most conservative ROI of 7.2 feet determined in the preliminary pilot test. The graph shown on Figure 10-3 illustrates the measured vacuum responses at various observation vapor points and soil vapor wells and

shows the minimum design ROI. Details of all ROI field measurements are included in copies of the field notebook provided in Appendix E.

10.2.4 Pore Volume Evaluation

A pore volume extraction evaluation was completed for the SVE system. The system layout of both horizontal SVE extraction wells beneath the building and the horizontal trench located on the east side of the structure were used along with a conservative ROI of approximately 7.2 feet to estimate the extent of remediation limits. A total volume remediated was estimated to be 33,526 cubic feet. Porosity was estimated from a range of values for clay (33 percent to 60 percent) and sand (25 percent to 50 percent) based on the consolidated sandy clay materials encountered beneath the building. An estimated overall porosity range of approximately 33 percent to 50 percent (Fetter 1994) was chosen for the evaluation. Using the range of porosity, ROI of 7.2 feet described above, and a measured extraction rate from February 13, 2017 of 150 cubic feet per minute, one pore volume could be removed every 74 to 123 minutes or roughly 16 pore volumes per day.

10.2.5 Ongoing Operational Monitoring Results

Ongoing operational monitoring is performed on a regular basis with field measurements of SVE system parameters collected every two weeks, and monthly and quarterly air samples, collected at sample ports S-1 and S-3. All field data are recorded on field sheets and are provided in Appendix E. Laboratory data collected to date as part of this task order is provided in Appendix B.

10.3 SVE Shutdown Guidance

SVE System operation and its continued effectiveness on indoor air, soil vapor, and groundwater should be further evaluated to determine the time when the SVE system can be permanently shut down. Based on the remediation project objective of reducing the contaminant source material and the potential for vapors to migrate upward and impact indoor air within the building, the primary shut down criteria would be reducing the impacts to indoor air within the building below the site-specific screening level for contaminants. This can be measured through ambient air and sub-slab vapor monitoring. The reduction of the contaminant source material can also be monitored by sampling the SVE system effluent and verifying ROI of the system with respect to areas of known contaminants beneath the building.

Prior to final shutdown, a preliminary/temporary shutdown should be performed in order to allow volatile organic compounds to volatilize and diffuse through re-equilibration. Based on PID reading declination to date, it was projected that approximately one year of operation would be needed to achieve low to negligible PCE levels of less than 1 ppmv in the SVE system discharge. Following the re-equilibration period, other system optimization procedures could be employed to target SVE legs with the highest contaminant concentrations by using higher vacuum levels while shutting in SVE legs with lower or depleted contaminant concentrations.

Following the preliminary/temporary shutdown procedures above, the final shutdown procedure criteria were developed to achieve project objectives and described below.

- Mass removal SVE remediation system
    - System discharge PID readings for PCE at sample port S-1 remain less than 1 ppmv
    - Contaminant concentrations from vapor point samples stabilize at concentrations that maintain indoor air contaminant concentrations below site-specific or other applicable commercial screening levels
- Indoor air mitigation system
    - Indoor air mitigation system discharge PID readings for PCE remain less than 1 ppmv
    - Contaminant concentrations from sub-slab samples stabilize at concentrations that maintain indoor air contaminant concentrations below site-specific or other applicable screening levels
    - Contaminant concentrations in indoor air samples collected at least 30 days after the indoor air mitigation system has been shut down and during conservative conditions (frozen ground, doors and windows closed, etc.) remain below site-specific or other applicable commercial screening levels
- Indoor air quality
    - Contaminant concentrations in indoor air samples analyzed by Method TO-15 and collected during conservative conditions remain below site-specific or other applicable commercial screening levels established for indoor air. This is estimated to occur approximately 18 months from startup of the SVE system. Indoor air samples should be collected according to the following criteria and sequence:
        - Prior to indoor air sampling, the SVE and indoor air mitigation systems should remain off for a period of at least 30 days to allow for stabilization of ambient conditions within and under the building.
        - If indoor air contaminant concentrations in samples collected after 30 days of SVE system shutdown are below applicable screening levels, the system should remain off and additional indoor air samples should be collected 120 days (3 months) later.
        - If indoor air contaminant concentrations from samples collected after 120 days of SVE system shutdown are below applicable screening levels, additional samples should be collected annually for two years.
        - The SVE system can be permanently shut-down when contaminant concentrations in annual indoor air samples remain below site-specific or other applicable commercial screening levels for two consecutive years.

11.0 Conclusions and Recommendations

An effective SVE system has been installed at the HSS Mr. Wise Cleaners location to remediate chlorinated solvents associated with historic dry cleaning operations. This section presents the conclusions of the investigation and SVE system installation and provides recommendations to further assess cleanup of associated soil, groundwater, and indoor air contamination at the site.

11.1 Conclusions

The purpose of this project was to conduct interim remedial actions, including installation of an SVE system, at the HSS. The objective of this SVE system is to reduce the contaminant source material associated with the dry cleaner operation and reduce the potential for vapors to migrate upward and impact indoor air within the building. An ancillary objective is to reduce the amount of contaminated source available for migration into shallow groundwater. Preliminary monitoring results indicate that these objectives have been met. The DPT, MIHPT, and horizontal well drilling identified primary sources of soil contamination that were targeted during the SVE system installation. These include an area beneath the building associated with an overhead pipe break which contained PCE, a contaminated burnt soil zone that appears to readily adsorb PCE, and smaller isolated spills concentrated around the northeast corner of the building that likely occurred regularly over the course of forty-some years of dry cleaning operation. Soil samples collected at these locations contain chemicals at concentrations greater than EPA Regional Screening Levels. The extent of soil contamination appears to be concentrated along the north and east side of the Hustad building immediately adjacent to Mr. Wise Cleaners. Aerobic conditions in the subsurface appear to minimize biodegradation of PCE.

Subsurface investigation using the DPT and MIHPT provided site specific information that contributed to information to help design the SVE system parameters. The location of contaminated soils from soil samples collected using the DPT and analyzed at the laboratory, and detector responses from the MIHPT investigation, provided information to refine our understanding of location of contaminant sources, amount and extent of fill material, and material heterogeneity. The investigation allowed for real-time data collection of subsurface material and contaminant data.

Horizontal drilling beneath the building provided direct evidence of subsurface material properties to help confirm SVE system design parameters. High concentrations of PCE contamination were located during drilling and placement of horizontal SVE wells, and confirmed with laboratory analytical results. Operation of the SVE system has effectively removed nearly 100 pounds of PCE since startup on February 3, 2017. This removal rate is based on the PID readings and confirmed with laboratory results. Removal rates are expected to decrease as contaminant source concentrations decrease.

Pre-SVE system installation and post-SVE system installation indoor air samples were collected. The Pre-SVE indoor air samples were collected while the indoor air mitigation system was running, while the Post-SVE indoor air samples were collected with the indoor air mitigation system off to evaluate effectiveness of the SVE system alone. During pre-SVE system sampling at Mr. Wise both PCE and TCE were reported at concentrations that exceeded DEQ site-specific screening levels, and at DermaWerx, PCE was reported at a concentration that exceeded the DEQ-established site specific screening levels. During the post-SVE system sampling event, the concentrations of PCE and TCE reported in all samples were below the DEQ-established site-specific screening levels. Overall, the indoor air sample results suggest that the SVE system has significantly improved indoor air quality at the Hustad Center building.

Soil vapor samples were collected using sub-slab vapor extraction points and soil vapor point wells. PCE was reported above the laboratory reporting limits in all pre-SVE system soil vapor samples. TCE was reported above the laboratory reporting limits in all but one pre-SVE system soil vapor samples, but the reporting limit was several orders of magnitude higher than the screening level due to overall high PCE concentrations. PCE was reported above the laboratory reporting limits in all of the post-SVE system installation soil vapor samples. However, PCE and TCE concentrations reported in the soil vapor samples decreased significantly after the installation of the SVE system at all sampling locations

Groundwater samples were collected both before and after the installation of the SVE system to evaluate the system's potential effect on this media. Both PCE and TCE were reported in the groundwater samples collected prior to the installation of the SVE system at concentrations exceeding DEQ-7 screening criteria. PCE and TCE were also reported in the groundwater samples collected after the installation of the SVE system. PCE was reported above the reporting limits in several monitoring wells, and TCE was reported in the samples from several monitoring wells at estimated concentrations below the laboratory reporting limits. However, at monitoring well MW-7, closest to the spill area and within several feet of the footprint of the SVE system, a 58 percent decrease in PCE was estimated between pre- and post-SVE system sampling results.

Although analytical results from pre- and post-SVE system samples are encouraging, additional SVE system operation and associated monitoring indoor air, soil vapor, and groundwater is necessary to confirm effectiveness of the SVE system. Operation of the system for only 3 months provides a limited data set to assess contaminant decreases expected over time and provide limited data to help predict site cleanup completion. Further monitoring of the SVE system and associated contaminated media is necessary to provide data to evaluate the continual reduction of VOC contamination and eventual shut down of the SVE system.

11.2 Recommendations

In order to continue reducing the level of indoor air contamination, and to better understand the magnitude and extent of contamination of soil and groundwater impacted by the SVE system at the HSS, the following recommendations for the site include the following:

- Complete an analysis of natural attenuation samples in groundwater collected in May 2017 to understand how best to enhance bacteria and encourage reductive dechlorination processes in contaminated groundwater.
- Monitor SVE system to maintain optimal working conditions and follow O&M manual procedures and recommendations.
- Monitor indoor air to evaluate effectiveness of SVE system in reducing or eliminating VOCs in the work spaces and review need for the indoor air mitigation system.
- Continue to sample groundwater at selected monitoring wells in the HSS to evaluate effectiveness of SVE system in reducing source area contamination.

- Consider system and operational modifications prior to considering shutdown, such as cycling the system operation if remediation is diffusion dependent, or targeting high level VOC concentration horizontal wells and shutting in low producing horizontal wells if remediation is volatilization dependent.
- Consider effects of groundwater to vapors beneath the building, and the potential feasibility of direct remediation of dissolved phase organics by evaluating need for bioaugmentation, air sparging, or other enhanced remediation technology.
- Follow SVE system shut down recommendations presented in Section 10.3 when monitoring data supports this action.
- Recommend monitoring SVE system effluent concentrations using laboratory method TO-15 with Summa Canisters when effluent concentrations are expected to be below 500 $\mu g/m^3$ (the reporting limit for laboratory method EPA 8260 collected with Tedlar bags).

12.0 References

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Figures

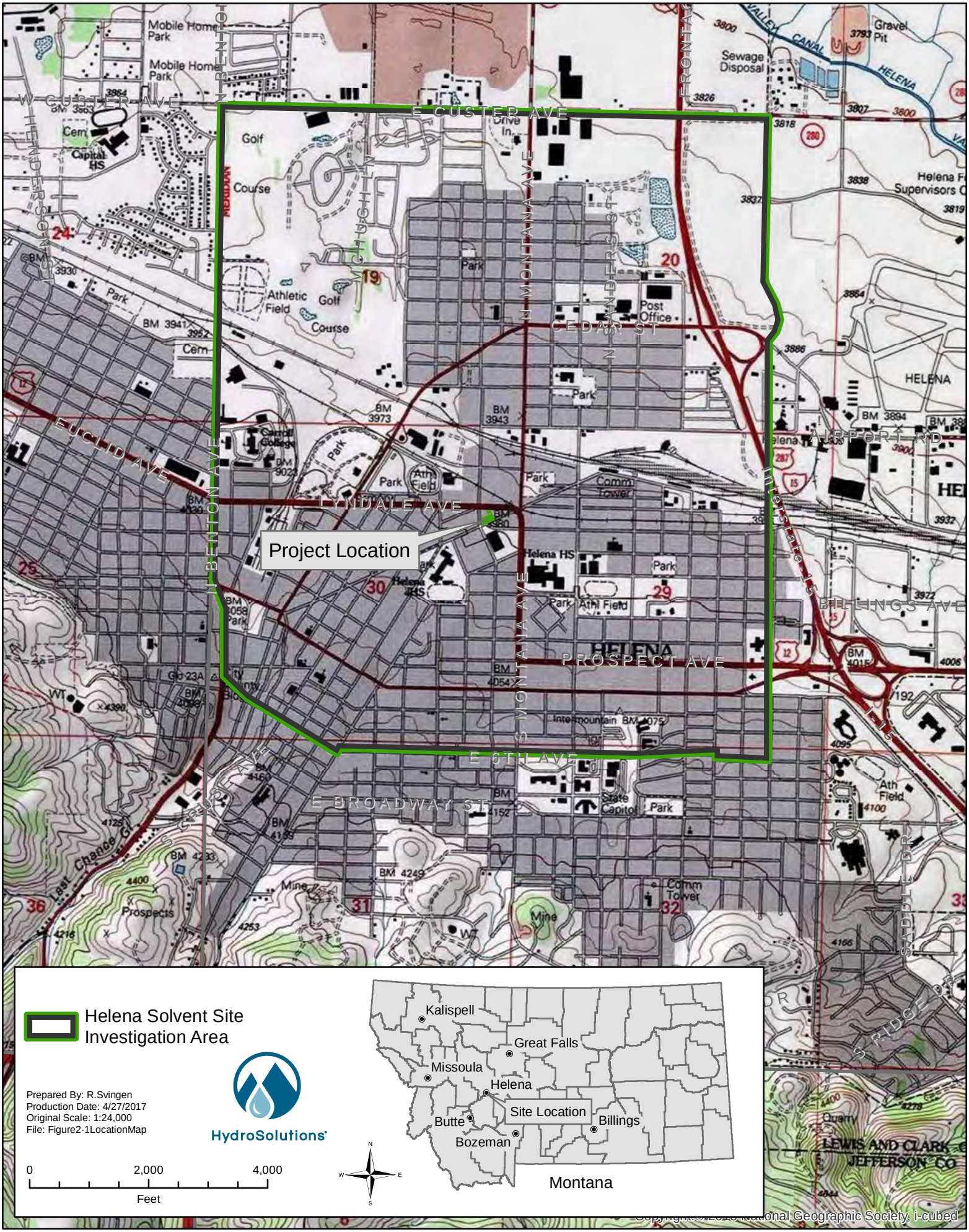


Figure 2-1. Location Map - Helena Solvent Site

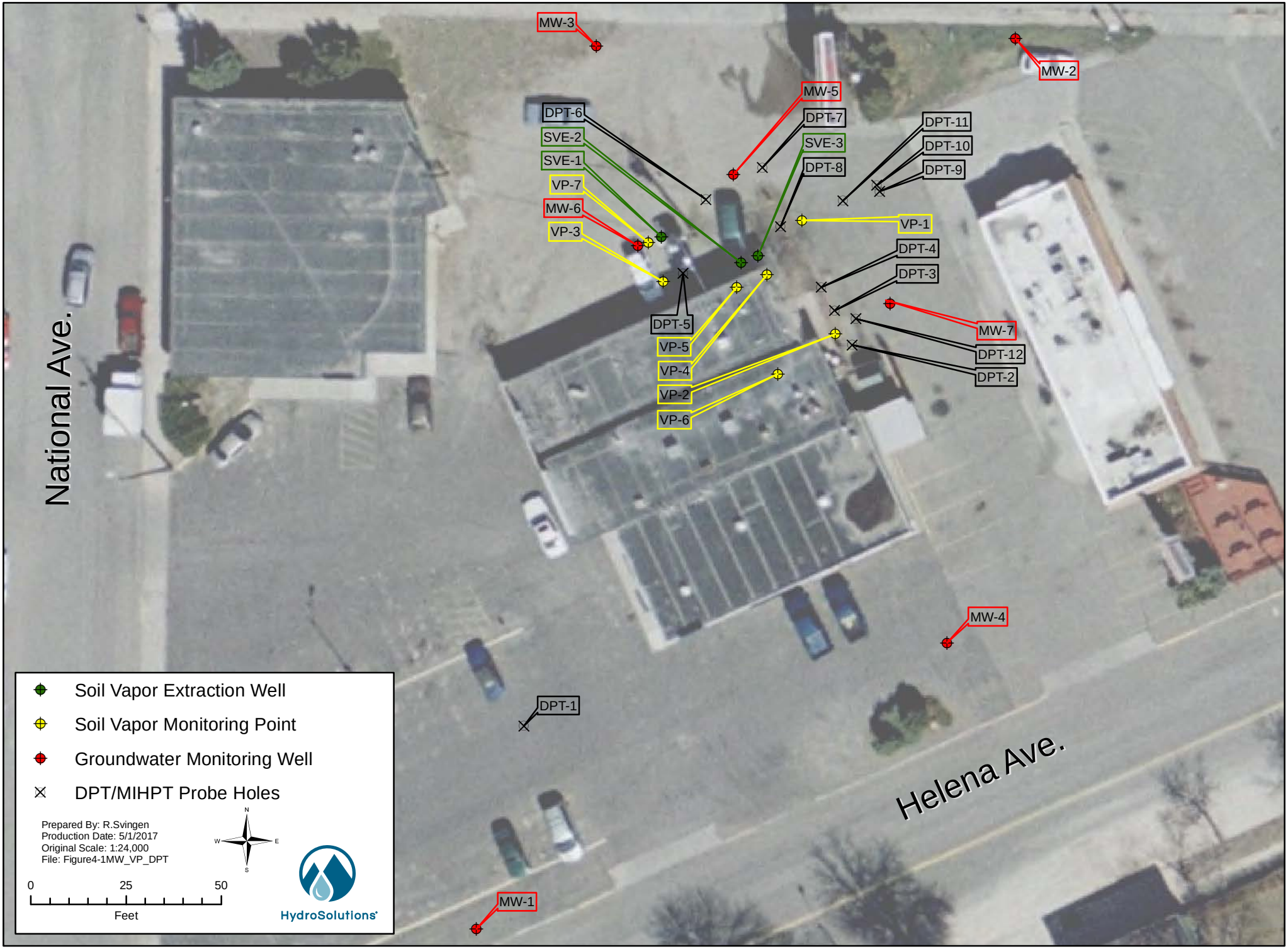


Figure 4-1. Monitoring Wells, DPT/MIHPT Probe Holes, Soil Vapor Monitoring Points, and Soil Vapor Extraction Wells

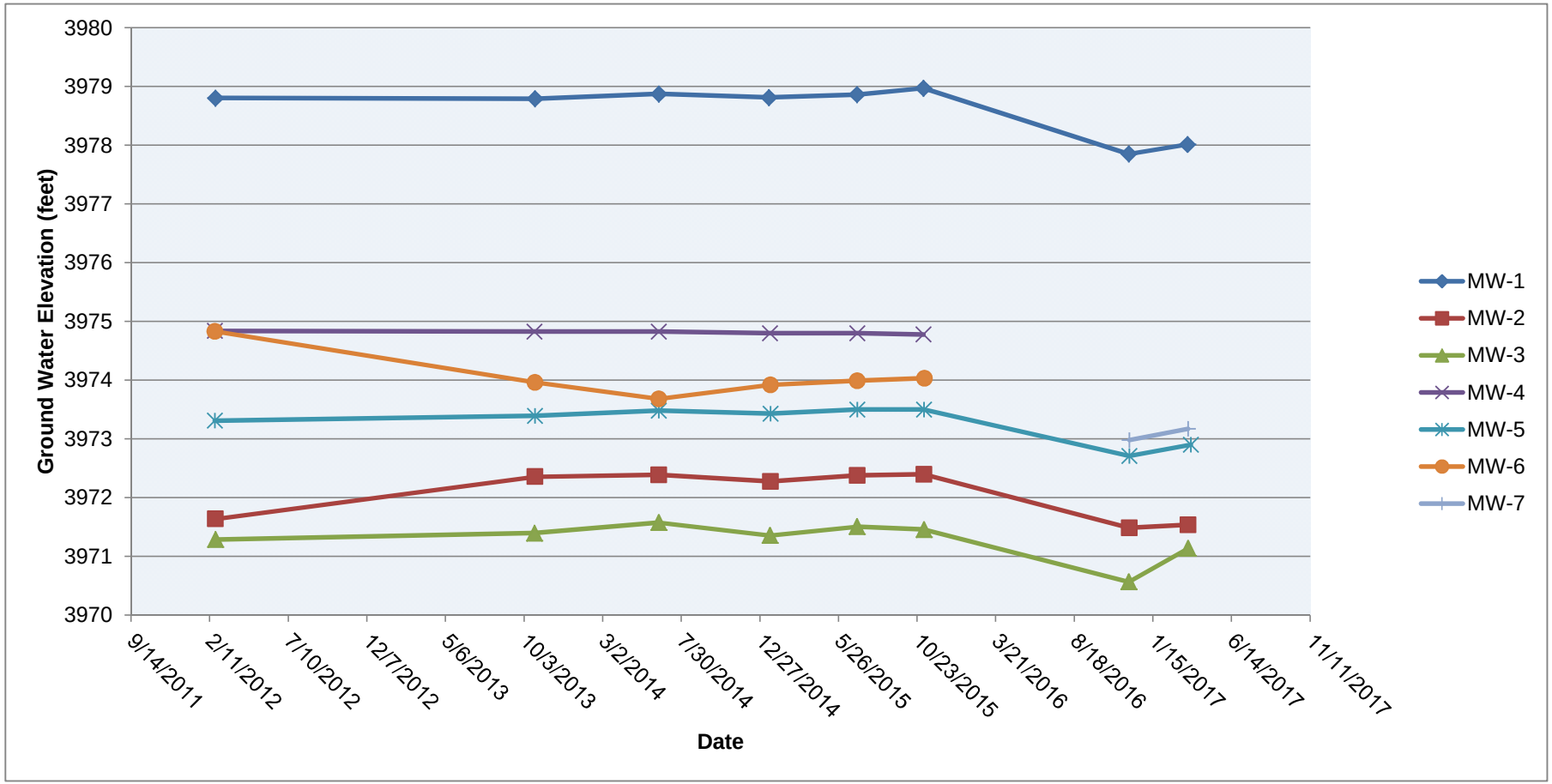


Figure 4-2. Groundwater Elevation Hydrograph

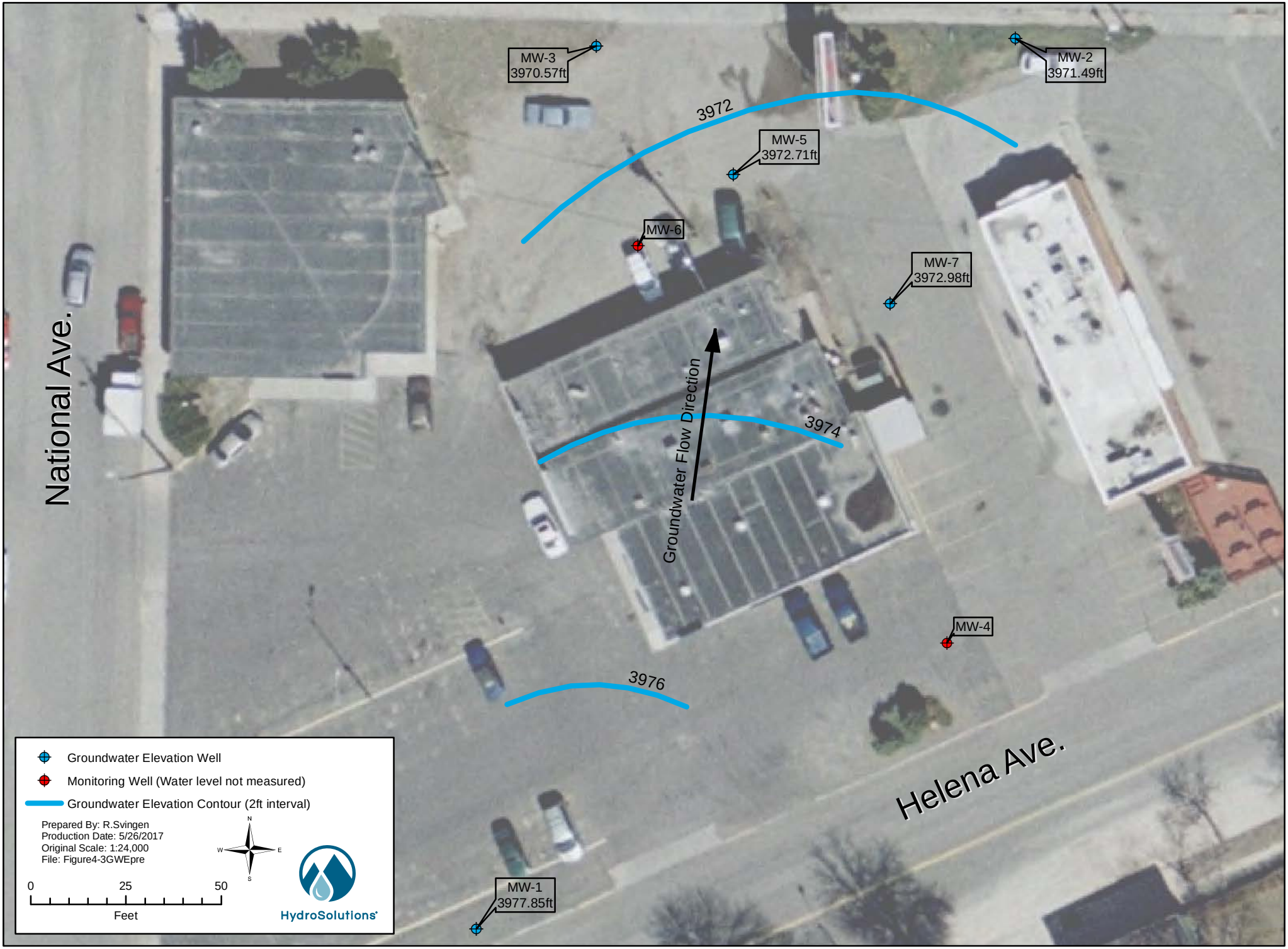


Figure 4-3. Groundwater Elevation Contour Map - Pre-Soil Vapor Extraction System November, 2016

Figure 4-4. Groundwater Elevation Contour Map - Post-Soil Vapor Extraction System March, 2017

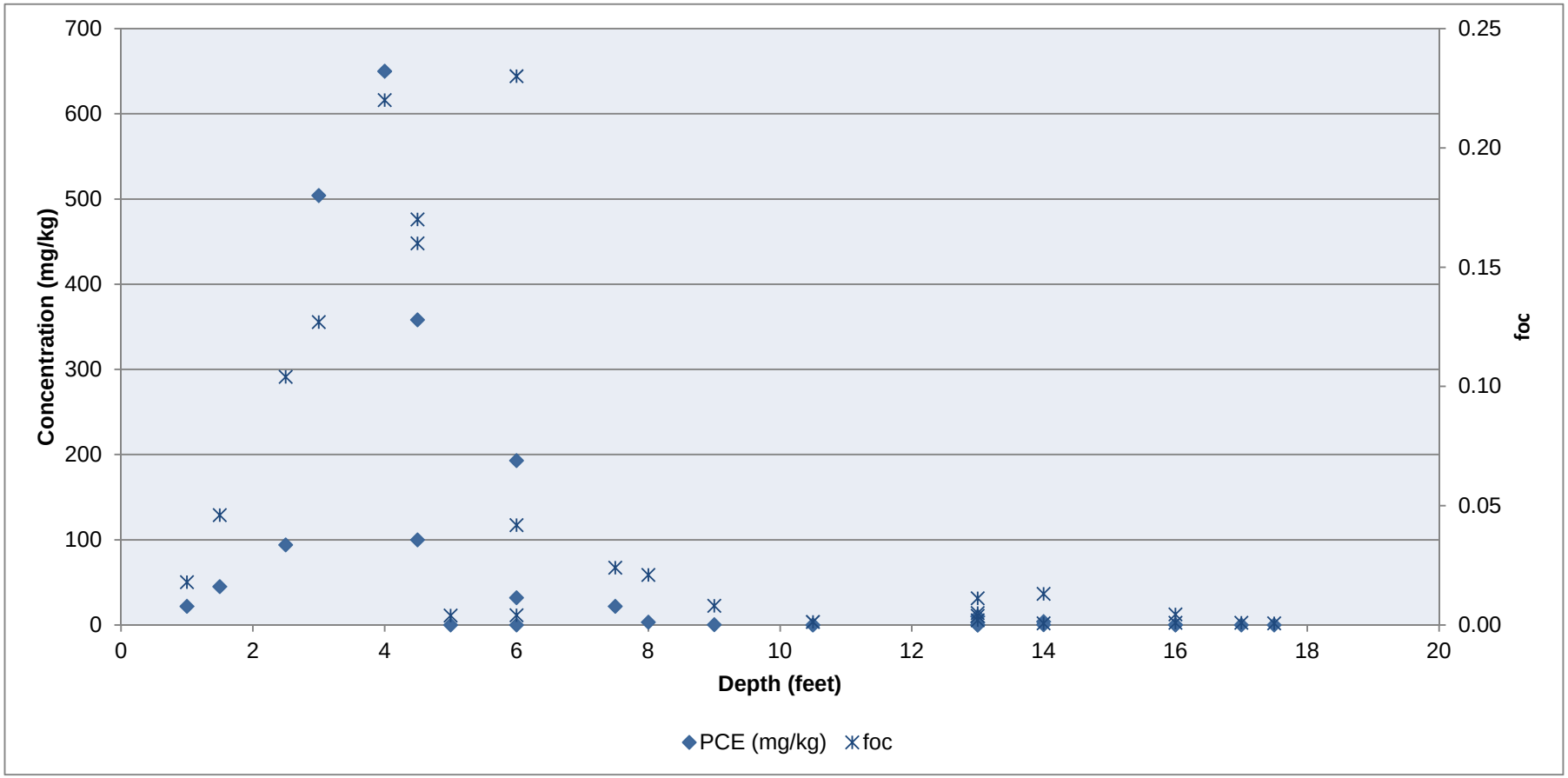


Figure 5-1. PCE, $f_{oc,}$ and Soil Sample Depth

f_{oc}	Fractionaztion of Organic Carbon
PCE	Tetrachloroethylene
mg/kg	milligram per kilogram

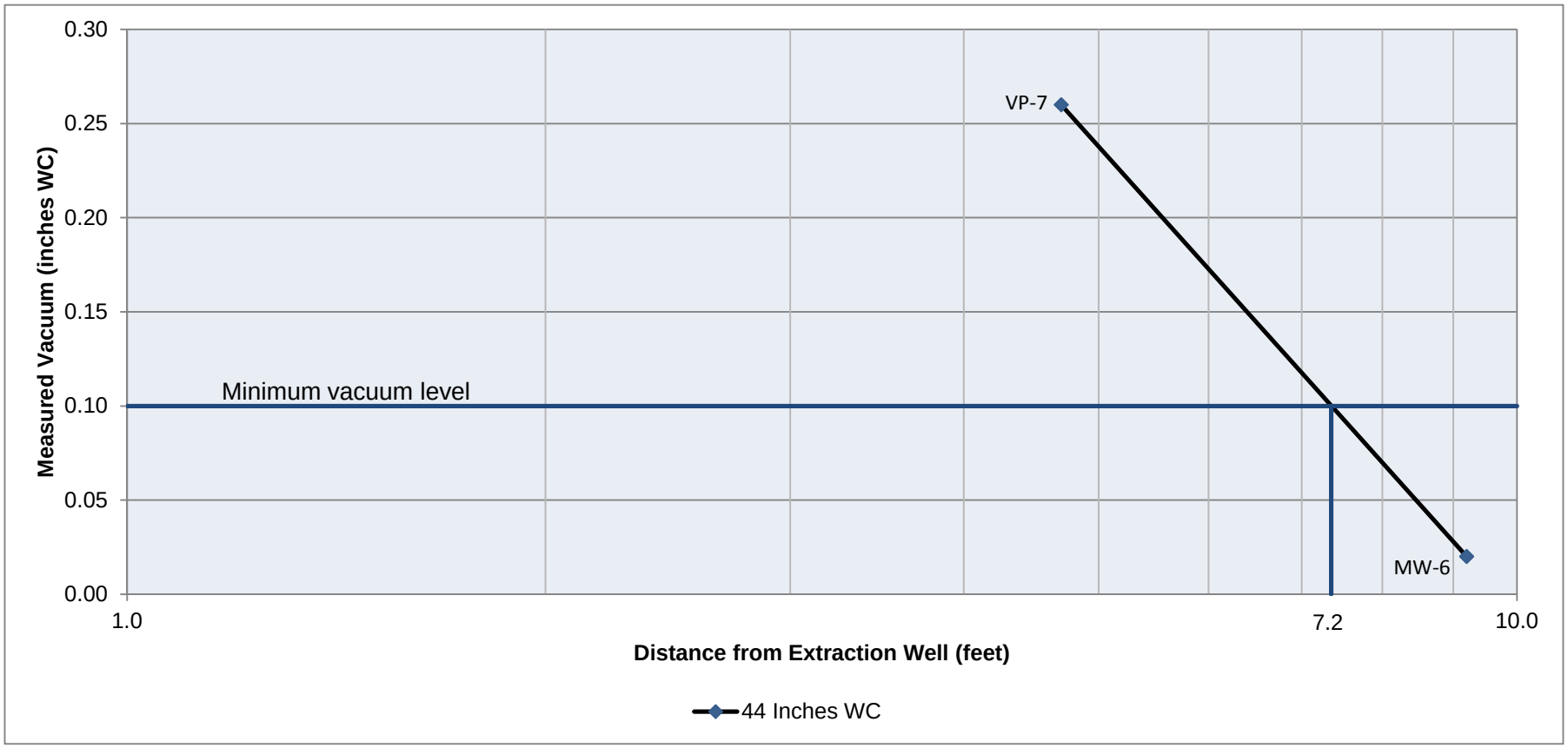


Figure 6-1. Preliminary Pilot Test Results and Estimated Radius of Influence (from Extraction Well SVE-1)

Note An adequate level of vacuum to propagate airflow has been defined as between 0.1 and 1.0 inches of H2O (inches WC) (0.187 to 1.87 mmHg) of the applied vacuum at the extraction well (Suthersan 1999).

WC Water Column

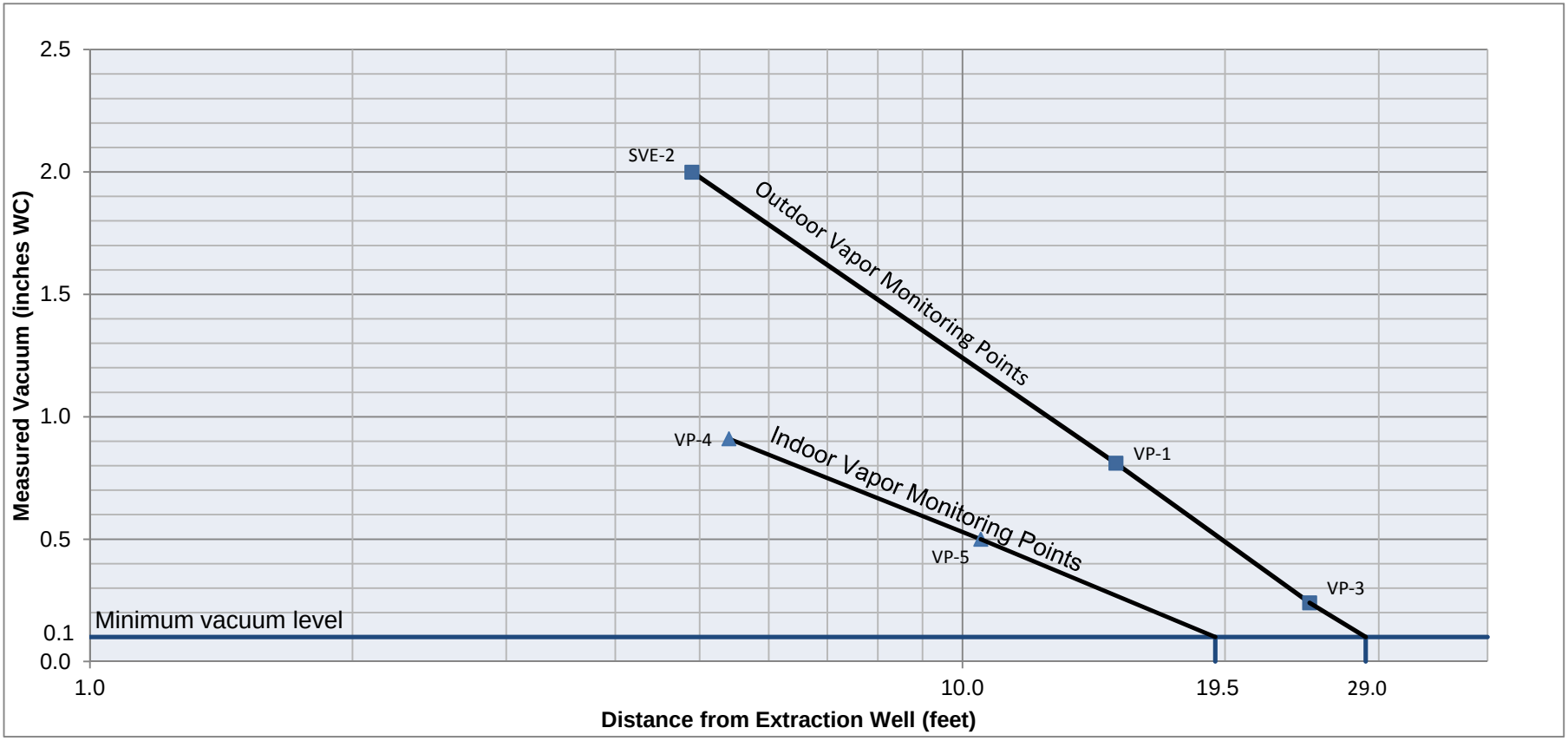


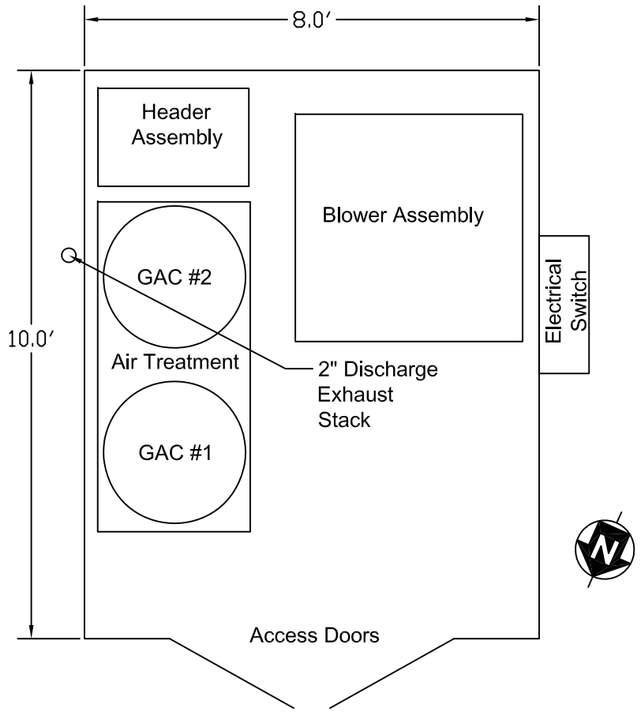
Figure 6-2. Pilot Test Results and Estimated Radius of Influence (from Extraction Well SVE-3)

Note An adequate level of vacuum to propagate airflow has been defined as between 0.1 and 1.0 inches of H2O (inches WC) (0.187 to 1.87 mmHg) of the applied vacuum at the extraction well (Suthersan 1999).

WC Water Column

HELENA SOLVENT SITE SOIL VAPOR EXTRACTION (SVE) SYSTEM SHED AND SURFACE EQUIPMENT

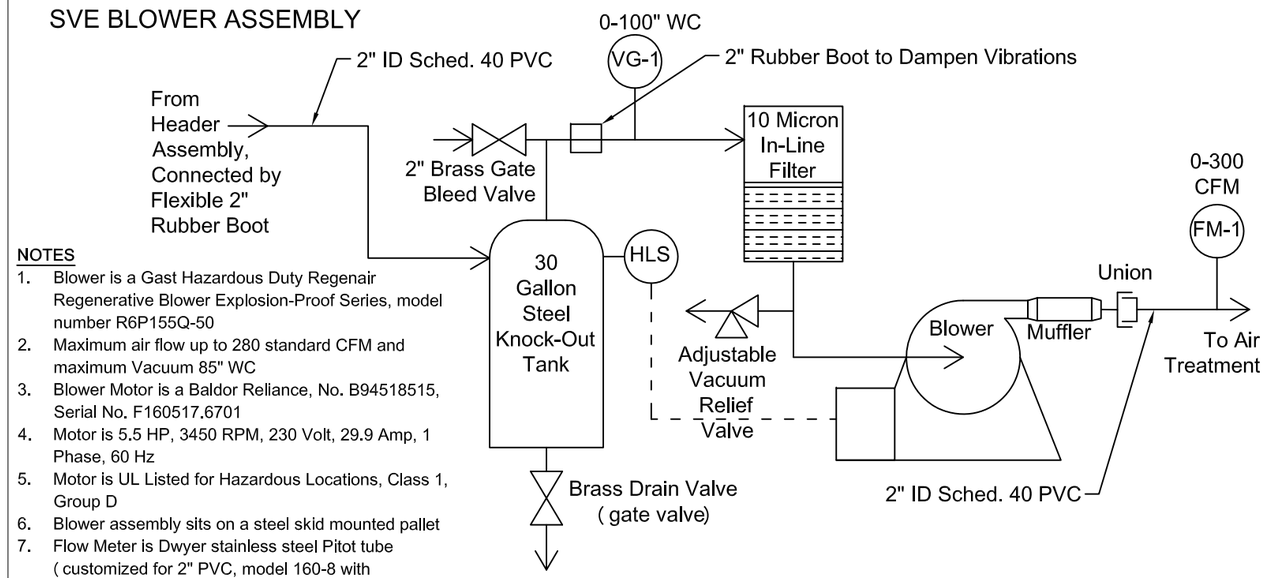
SVE SHED LAYOUT



LEGEND

- VG - Vacuum Gauge
- PG - Pressure Gauge
- HLS - High Level Switch
- FM - Flow Meter
- TP - Temperature Probe
- WC - Water Column
- CFM - Cubic feet per minute
- GAC - Granulated Activated Carbon
- Valve
- NTS - Not to Scale

SVE BLOWER ASSEMBLY

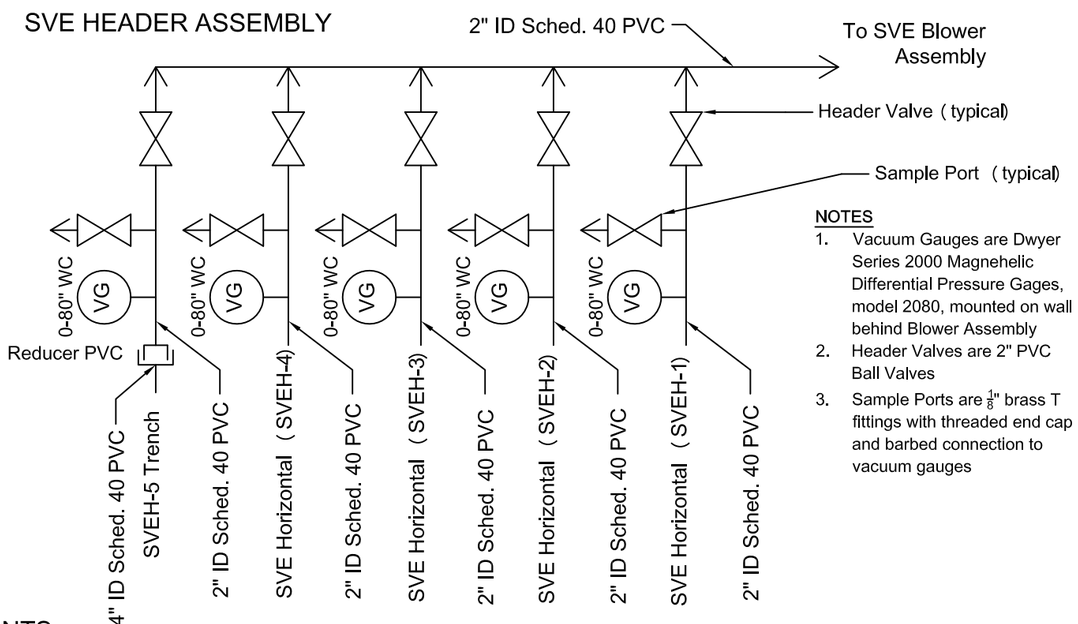


NOTES

1. Blower is a Gast Hazardous Duty Regenair Regenerative Blower Explosion-Proof Series, model number R6P155Q-50
2. Maximum air flow up to 280 standard CFM and maximum Vacuum 85" WC
3. Blower Motor is a Baldor Reliance, No. B94518515, Serial No. F160517.6701
4. Motor is 5.5 HP, 3450 RPM, 230 Volt, 29.9 Amp, 1 Phase, 60 Hz
5. Motor is UL Listed for Hazardous Locations, Class 1, Group D
6. Blower assembly sits on a steel skid mounted pallet
7. Flow Meter is Dwyer stainless steel Pitot tube (customized for 2" PVC, model 160-8 with Magnehelic gauge in CFM
8. In-Line Filter is Gast part no. AJ151G
9. Muffler is Gast part no. AJ121F
10. Vacuum Relief Valve is Gast part no. AG252

NTS

SVE HEADER ASSEMBLY



NOTES

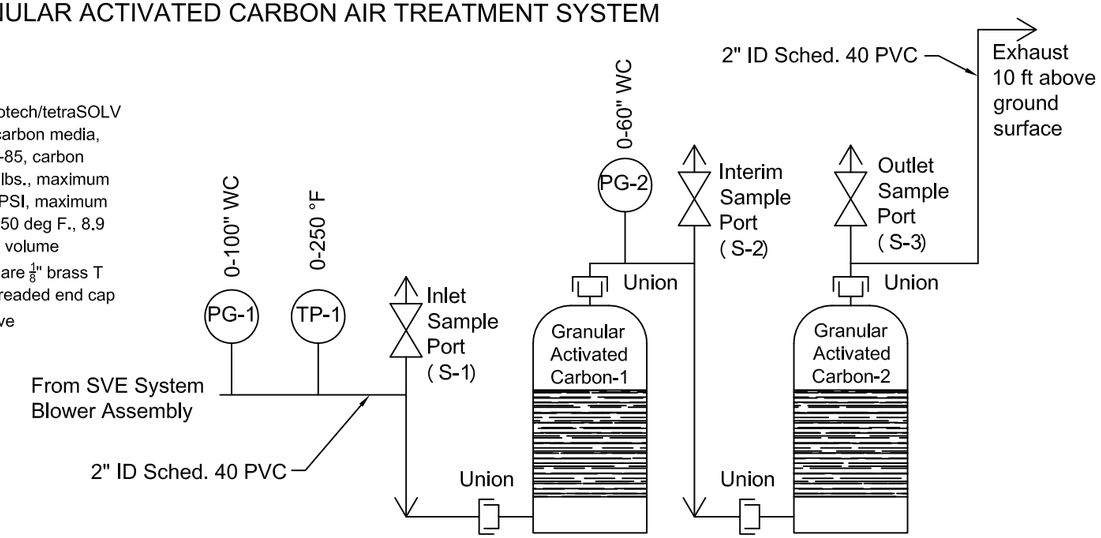
1. Vacuum Gauges are Dwyer Series 2000 Magnehelic Differential Pressure Gages, model 2080, mounted on wall behind Blower Assembly
2. Header Valves are 2" PVC Ball Valves
3. Sample Ports are $\frac{1}{8}$" brass T fittings with threaded end cap and barbed connection to vacuum gauges

NTS

SVE GRANULAR ACTIVATED CARBON AIR TREATMENT SYSTEM

NOTES

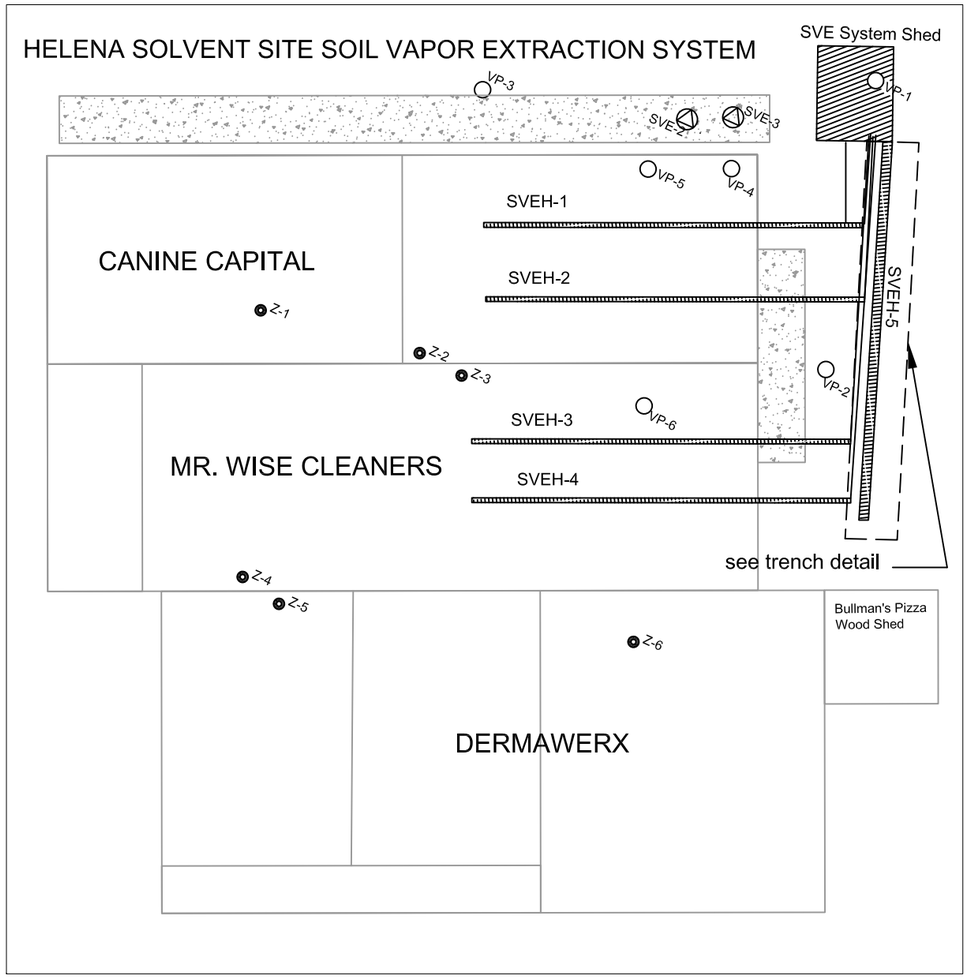
1. GACs are Geotech/tetraSOLV vapor phase carbon media, model GAC-V-85, carbon weight of 250 lbs., maximum pressure of 4 PSI, maximum temperature 250 deg F., 8.9 cubic feet bed volume
2. Sample Ports are $\frac{1}{8}$" brass T fittings with threaded end cap and $\frac{1}{8}$" ball valve



NTS

SOIL VAPOR EXTRACTION SYSTEM SURFACE EQUIPMENT AS-BUILT HELENA SOLVENT SITE, 1118 HELENA AVENUE, HELENA, MONTANA	DEQ CONTRACT 414026 TASK ORDER 8	DRAWN BY: LJO
	DATE: 2017.04.27	APPROVED BY: DD
	HydroSolutions®	303 Clarke Street | Helena, MT 59601 406.443.6169 www.hydrosi.com

Figure 7-1 SVE System Surface Equipment As-Built



NOTES

1. Soil Vapor Extraction Horizontal Wells SVEH-1, SVEH-2, SVEH-3, and SVEH-4 are 2-inch diameter, Schedule 40 PVC Screens with 0.020-inch openings, 40-feet long each, with end caps. See Elevation Profile Sheet for depths of the SVE horizontal wells.
2. Soil Vapor Extraction Horizontal Well SVEH-5 is 4-inch diameter, Schedule 40 PVC Screen with 0.010-inch openings, 40-feet long, with end cap. SVEH-5 is set 4.0 feet below ground surface.
3. Soil Vapor Extraction Well SVEH-5 was constructed in a trench 5.0-feet wide by 4.5-feet deep, and backfilled with 3 cubic yards of pea gravel. Native fill was added to the trench and compacted to the surface. See trench detail and cross section.
4. Soil Vapor Extraction Horizontal Wells SVEH-1, SVEH-2, SVEH-3, SVEH-4, and SVEH-5 all manifold from separate connection pipes in the SVE System Shed. All riser pipes are wrapped with heat tape to 4-feet below ground surface. Details of the SVE System are shown on a separate schematic.
5. Utility Line Tracer Wire extends along SVEH-5 and 10 feet into SVEH-1, SVEH-2, SVEH-3, and SVEH-4.

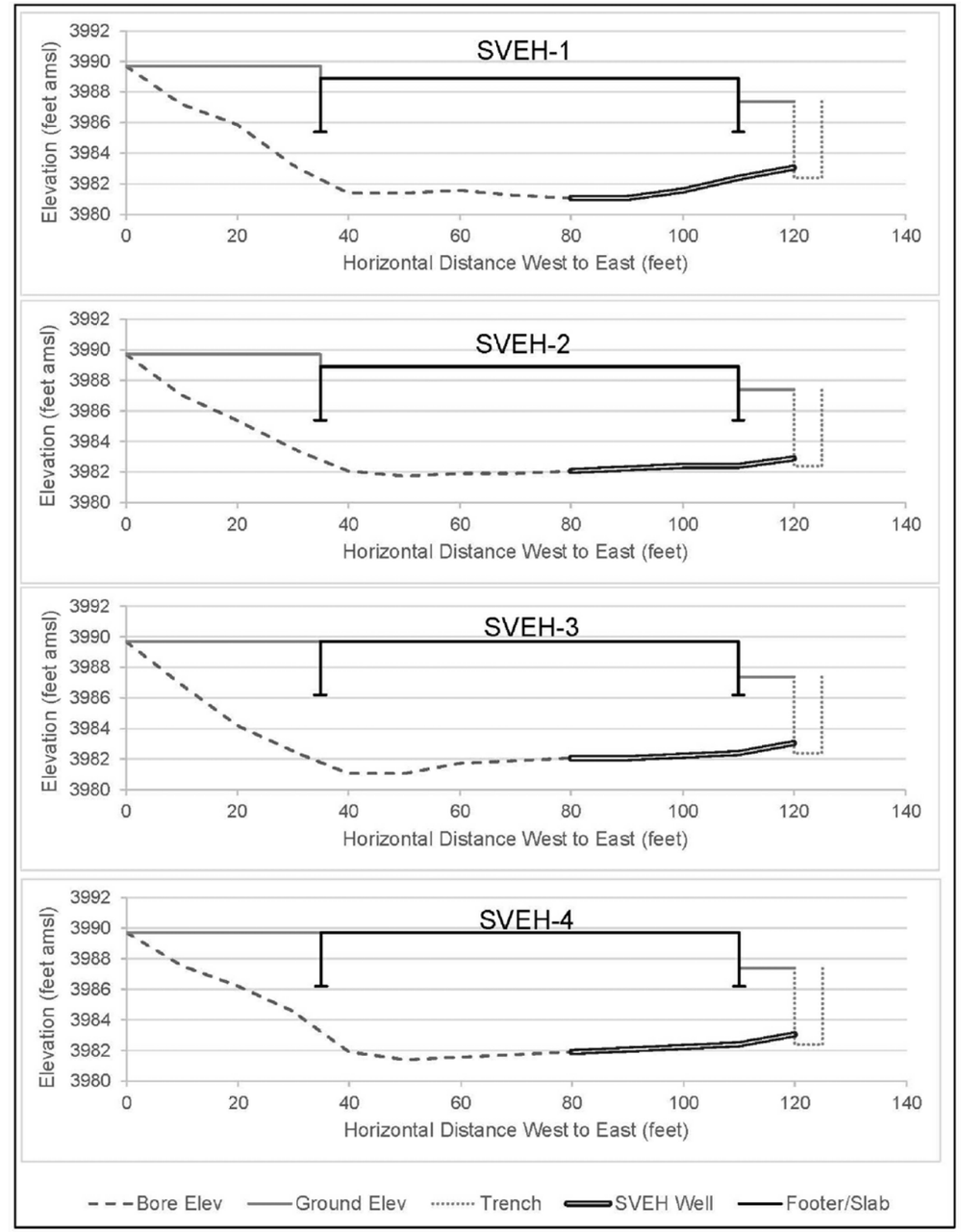
LEGEND

Vapor Point	VP-6
Groundwater Monitoring Well	MW-7
Soil Vapor Well	SVE-1
Sub-Slab Vapor Extraction Point	Z-3

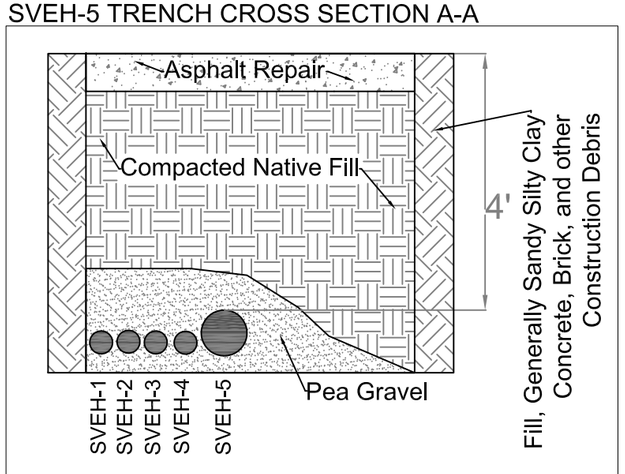
16 0 16

Scale in Feet

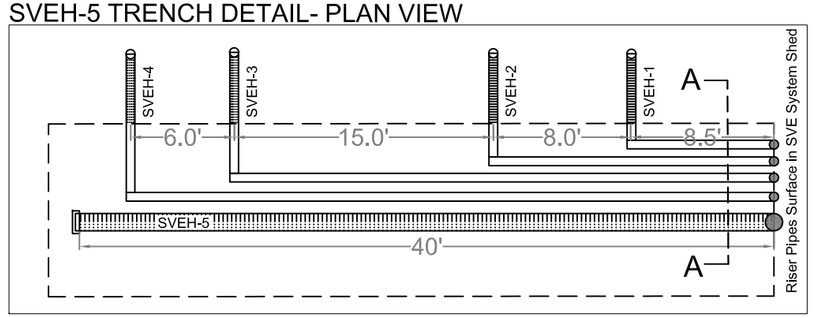
ELEVATION PROFILES OF SVE HORIZONTAL WELLS



SVEH-5 TRENCH CROSS SECTION A-A



SVEH-5 TRENCH DETAIL- PLAN VIEW



SOIL VAPOR EXTRACTION SYSTEM AS-BUILT

HELENA SOLVENT SITE, 1118 HELENA AVENUE, HELENA, MONTANA

DEQ CONTRACT 414026 TASK ORDER 8	DRAWN BY: LJO
DATE: 2017.04.27	APPROVED BY: DD

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Figure 7-2 SVE System Layout As-Built

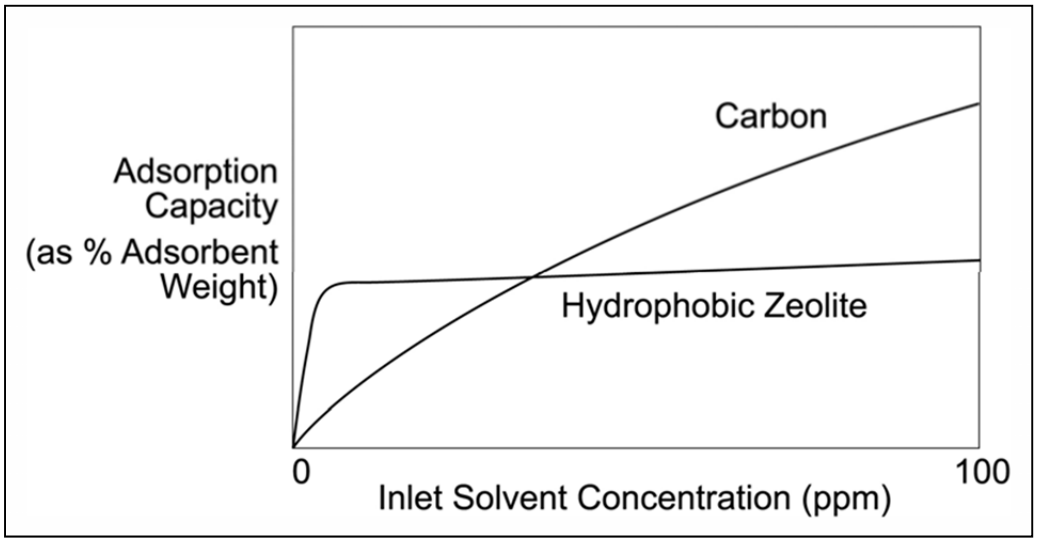


Figure 7-3. Comparison of Inlet Concentration Effects on Adsorption Capacity of Adsorbents

ppm Part per million

Reference Off-Gas Treatment Technologies for Soil Vapor Extraction Systems: State of Practice, EPA-542-R-05-028, March 2006

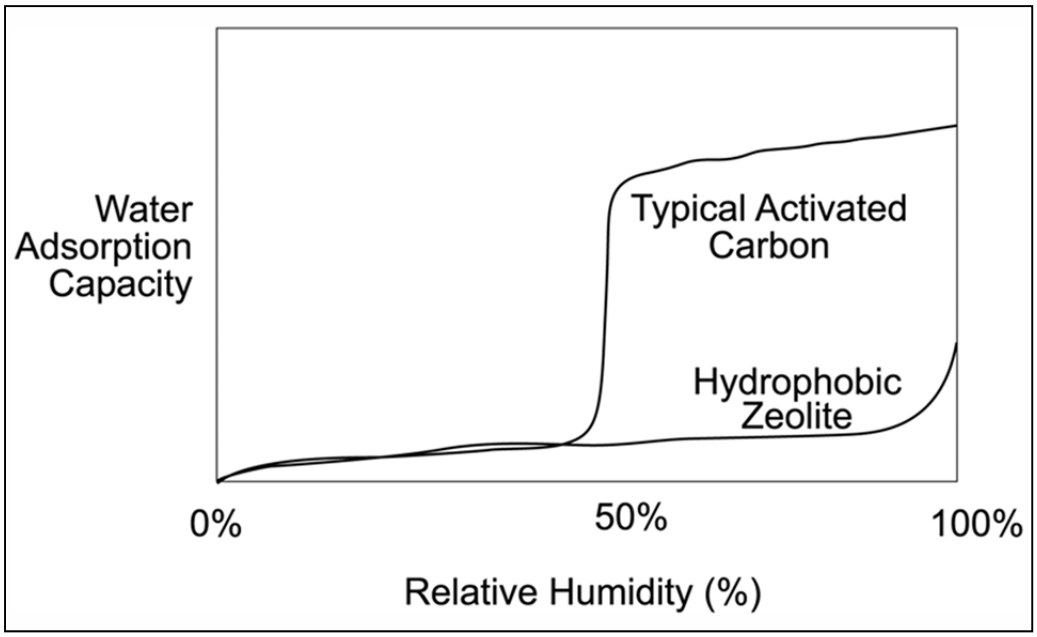
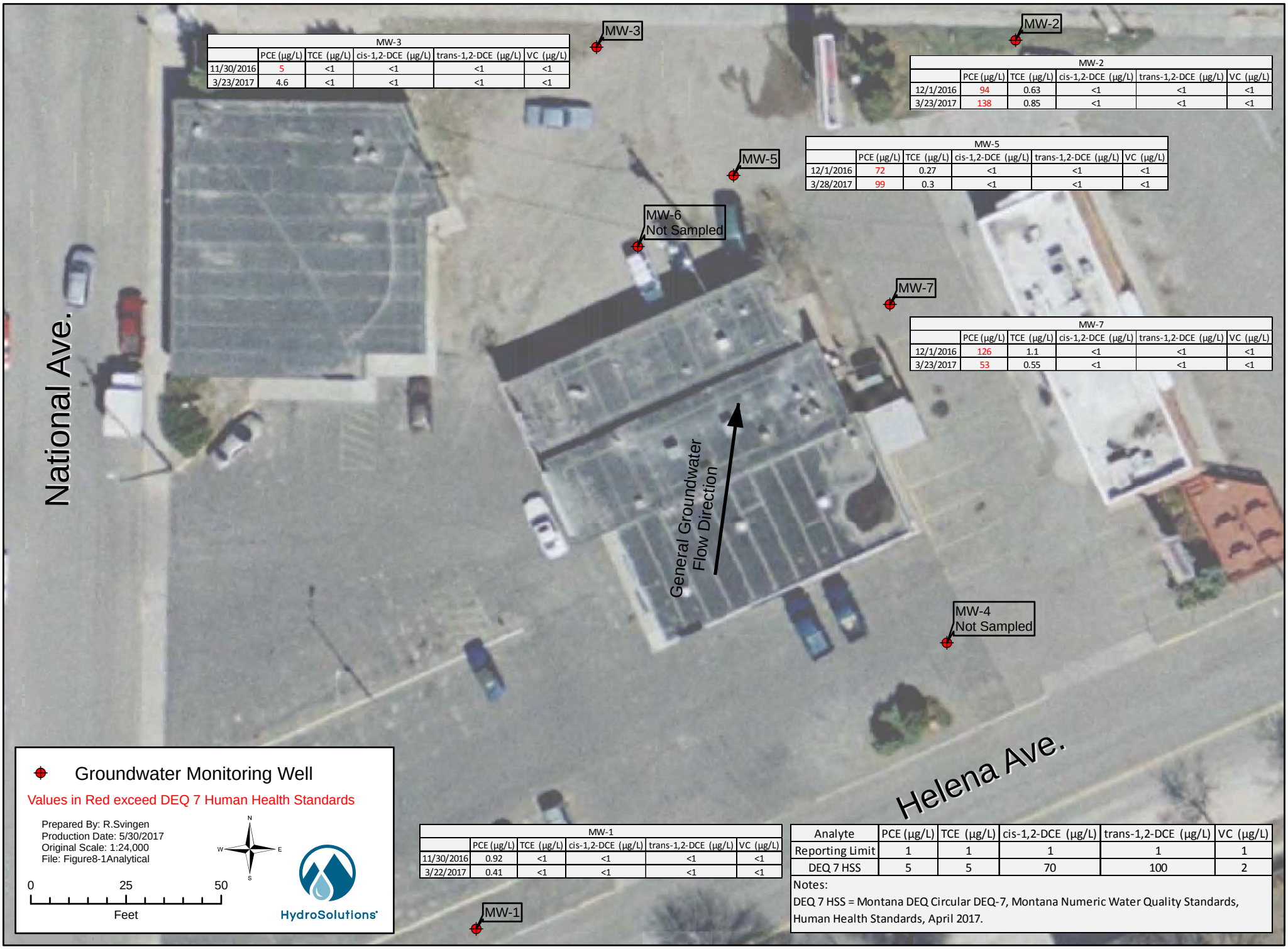


Figure 7-4. Comparison of Humidity Effects on Adsorption Capacity of Adsorbents

Reference Off-Gas Treatment Technologies for Soil Vapor Extraction Systems: State of Practice, EPA-542-R-05-028, March 2006



MW-3	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
11/30/2016	5	<1	<1	<1	<1
3/23/2017	4.6	<1	<1	<1	<1

MW-2	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
12/1/2016	94	0.63	<1	<1	<1
3/23/2017	138	0.85	<1	<1	<1

MW-5	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
12/1/2016	72	0.27	<1	<1	<1
3/28/2017	99	0.3	<1	<1	<1

MW-7	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
12/1/2016	126	1.1	<1	<1	<1
3/23/2017	53	0.55	<1	<1	<1

MW-1	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
11/30/2016	0.92	<1	<1	<1	<1
3/22/2017	0.41	<1	<1	<1	<1

Analyte	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	VC (µg/L)
Reporting Limit	1	1	1	1	1
DEQ 7 HSS	5	5	70	100	2

Notes:
DEQ 7 HSS = Montana DEQ Circular DEQ-7, Montana Numeric Water Quality Standards, Human Health Standards, April 2017.

Figure 8-1. Groundwater Sample Analytical Results for Selected Chlorinated Hydrocarbons, Pre- and Post-Soil Vapor Extraction System

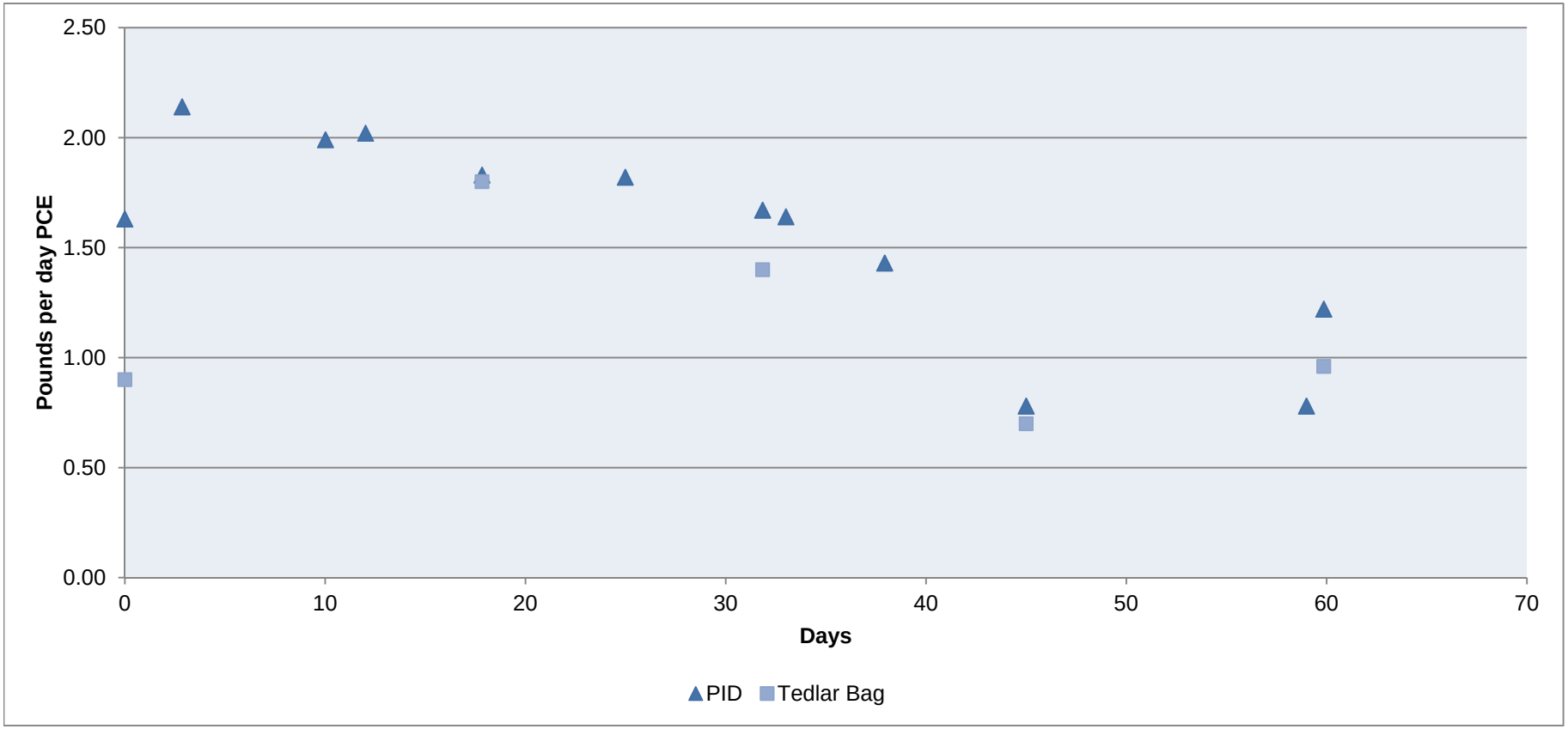


Figure 10-1. PCE Removal Rate

PCE Tetrachloroethylene
PID Photoionization detector

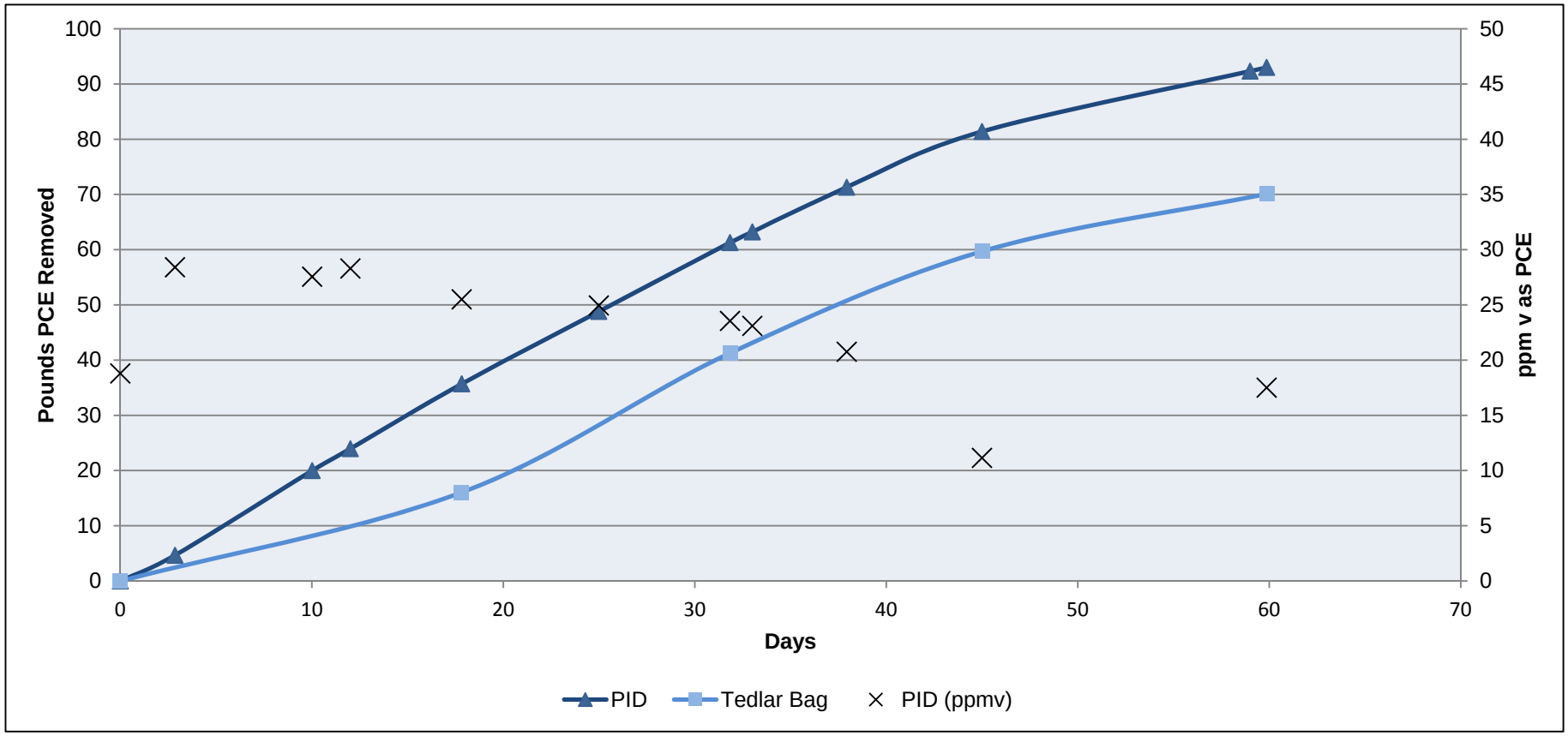


Figure 10-2. PCE Cumulative Removal

PCE Tetrachloroethylene
ppmv Parts per million by volume
PID Photoionization detector

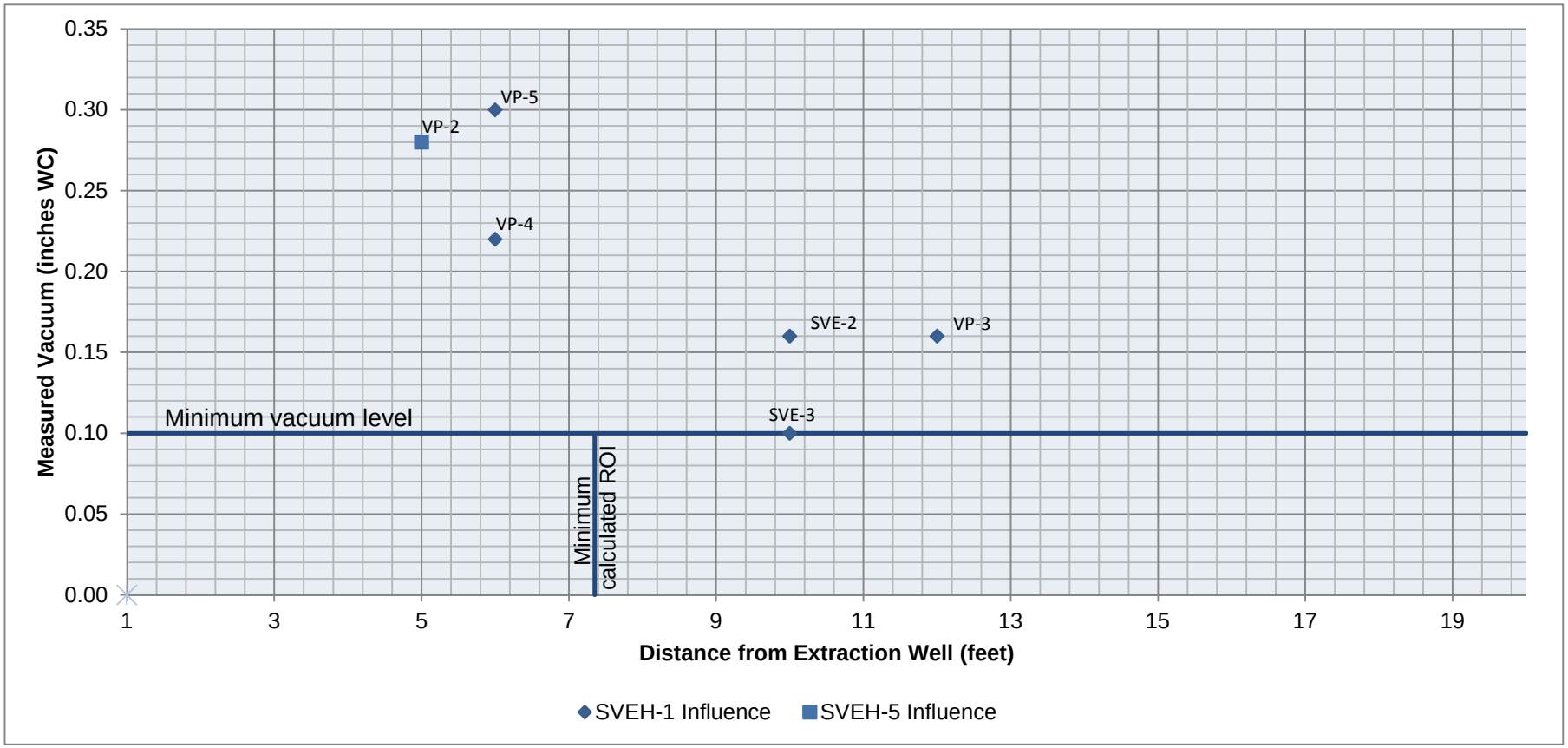


Figure 10-3. Radius of Influence of SVE System

Note An adequate level of vacuum to propagate airflow has been defined as between 0.1 and 1.0 inches of H2O (inches WC) (0.187 to 1.87 mmHg) of the applied vacuum at the extraction well (Suthersan 1999).

WC Water Column

ROI Radius of Influence

Tables

TABLE 4-1
DIRECT PUSH TECHNOLOGY AND VAPOR POINT SOIL SAMPLE LOCATIONS, SAMPLE DEPTHS, AND LABORATORY ANALYTICAL RESULTS FOR PCE

Sample Location	Sample Depth (feet below ground surface)	PCE Concentration (mg/kg)
DPT-1	8.0 - 8.5	**3.2**
VP-1	13.0 – 14.0	< 0.20
VP-2	6.0 -7.0	**193**
VP-3	5.0 – 5.5	**0.046 J**
VP-4	1.5 – 2.5	**45**
	4.0 – 5.5	**358**
VP-5	4.5 – 5.5	**100**
	7.5 – 8.0	**22**
VP-6	1.0 – 2.0	**22**
	4.0 – 4.5	**650**

DPT Direct push technology
VP Vapor point
mg/kg milligram per kilogram
J Estimated value. The analyte was present but less than the reporting limit.
Bolded Result Indicates DEQ Soil Screening Level Exceedance

Screening Levels:
EPA Residential Surface Soil: 8.1 mg/kg (U.S. EPA Regional Screening Levels, May 2016)
DEQ Surface and Subsurface Soil Screening Process, Leaching to Groundwater (Dilution-Attenuation Factor =10): 0.023 mg/kg (DEQ 2016).

TABLE 4-2
MEMBRANE INTERFACE HYDRAULIC PROFILING TOOL (MIHPT) LOCATIONS AND DEPTH OF PROBE HOLES

MIHPT Location	Total Depth (feet below ground surface)
DPT-1	21.50
DPT-2	20.00
DPT-3	20.00
DPT-4	25.10
DPT-5	22.10
DPT-6	20.05
DPT-7	20.05
DPT-8	20.05
DPT-9	13.35
DPT-10	10.65
DPT-11	9.95
DPT-12	25.00

MIHPT Membrane Interface Hydraulic Profiling Tool

TABLE 4-3
LABORATORY ANALYTICAL RESULTS FOR PCE CONCENTRATIONS FROM DIRECT PUSH TECHNOLOGY SOIL SAMPLES AND QUALITATIVE CORRELATION WITH MIHPT DATA

Sample Location	Corresponding DPT	Sample Depth (feet below ground surface)	PCE Concentration (mg/kg)	Detector Response Low Range Scale	Detector Response High Range Scale
DPT-1	na	8.0 - 8.5	3.2	no	no
VP-1	DPT-8	13.0 – 14.0	>0.20	yes	slight
VP-2	DPT-2	6.0 -7.0	193	yes	slight
VP-3	DPT-5	5.0 – 5.5	0.046 J	yes	no
VP-4	NA	1.5 – 2.5	45	NM	NM
		4.0 – 5.5	358	NM	NM
VP-5	NA	4.5 – 5.5	100	NM	NM
		7.5 – 8.0	22	NM	NM
VP-6	NA	1.0 – 2.0	22	NM	NM
		4.0 – 4.5	650	NM	NM

DPT Direct push technology
mg/kg milligram per kilogram
J Estimated value. The analyte was present but less than the reporting limit.
NM Not measured
NA Not applicable

TABLE 4-4
MONITORING WELL INFORMATION AND GROUNDWATER ELEVATIONS

Monitoring Well	Well Data		Measurement Date	Depth to Ground Water from Top of PVC (feet)	Ground Water Elevation (feet)
MW-1	Latitude	46.5974	11/30/2016	13.24	3977.85
	Longitude	-112.0228	3/22/2017	13.08	3978.01
	Top of PVC Elevation (feet)	3991.09			
	Ground Elevation (feet)	3991.50			
MW-2	Latitude	46.5980	12/1/2016	12.10	3971.49
	Longitude	-112.0222	3/23/2017	12.05	3971.54
	Top of PVC Elevation (feet)	3983.59			
	Ground Elevation (feet)	3983.92			
MW-3	Latitude	46.5980	11/30/2016	13.02	3970.57
	Longitude	-112.0222	3/23/2017	12.45	3971.14
	Top of PVC Elevation (feet)	3983.59			
	Ground Elevation (feet)	3983.92			
MW-5	Latitude	46.5979	12/1/2016	13.00	3972.71
	Longitude	-112.0225	3/28/2017	12.81	3972.90
	Top of PVC Elevation (feet)	3985.71			
	Ground Elevation (feet)	3985.86			
MW-7	Latitude	46.5979	12/1/2016	13.84	3972.98
	Longitude	-112.02242	3/23/2017	13.65	3973.17
	Top of PVC Elevation (feet)	3986.82			
	Ground Elevation (feet)	3987.01			

Latitude and Longitude based on NAD83

TABLE 8-1
SUMMARY OF CONTAMINANT CONCENTRATIONS REPORTED IN THE INDOOR AIR AT THE HUSTAD CENTER

	PCE (µg/m^3)	TCE (µg/m^3)	*cis* -1,2-DCE (µg/m^3)	*trans* -1,2-DCE (µg/m^3)	Vinyl Chloride (µg/m^3)	1,1,2,2-tetrachloroethane (µg/m^3)
	MT DEQ Site Specific Screening Levels					
	105	7	N/A	N/A	N/A	N/A
	EPA Regional Screening Level May 2016					
	na	na	N/A	N/A	2.8	1.7
	Sample 1116 - Canine Capitol					
Pre-SVE System	60.6	0.27	<0.12	<0.12	<0.081	<0.11
Post-SVE System	20	0.51	<0.034	<0.034	<0.022	0.19
Percent Change	*-67%*	*89%*	-	-	-	increase
	Sample 1118 - Mr. Wise					
Pre-SVE System	**206**	**7.5**	< 0.074	< 0.074	< 0.048	< 0.064
Post-SVE System	2.8	1.2	0.038	<0.037	<0.024	1.6
Percent Change	*-99%*	*-84%*	-	-	-	increase
	Sample 1118D - Mr. Wise (Duplicate)					
Pre-SVE System	**221**	**7.9**	<0.074	<0.074	<0.048	<0.064
Post-SVE System	3.9	2.7	0.12	<0.037	<0.024	0.16
Percent Change	*-98%*	*-66%*	increase	-	-	increase
	Sample 1120 - Lash Dolls Salon					
Pre-SVE System	32.9	0.25	<0.065	<0.065	<0.042	< 0.056
Post-SVE System	3.4	0.053	<0.033	<0.033	<0.021	0.2
Percent Change	*-90%*	*-79%*	-	-	-	increase
	Sample 1124 - DermaWerx Tattoo					
Pre-SVE System	**141**	0.31	<0.068	<0.068	<0.044	<0.059
Post-SVE System	4	<0.048	<0.035	<0.035	<0.023	0.25
Percent Change	*-97%*	-	-	-	-	increase
	Outside Air					
Pre-SVE System	0.4	0.34	0.066	<0.065	<0.042	<0.065
Post-SVE System	0.13	<0.048	<0.035	<0.035	<0.023	0.15
Percent Change	*-68%*	-	decrease	-	-	increase

µg/m^3	microgram per cubic meter
N/A	Not Available
na	Not Applicable
PCE	Tetrachloroethylene
TCE	Trichloroethylene
DCE	Dichloroethene

Pre-SVE samples were collected with the indoor air mitigation system in operation.
Post-SVE samples were collected with the indoor air mitigation system shut down and the SVE system in operation.

TABLE 8-2
SUMMARY OF CONTAMINANT CONCENTRATIONS REPORTED IN THE SOIL VAPOR BELOW THE HUSTAD CENTER

	PCE (µg/m^3)	TCE (µg/m^3)	*cis* -1,2-DCE (µg/m^3)	*trans* -1,2-DCE (µg/m^3)	Vinyl Chloride (µg/m^3)	1,1,2,2-tetrachloroethane (µg/m^3)	Helium (%)
	Z-3 - Subslab at Mr Wise						
Pre-SVE System	3,730,000[1]	538[1]	<1.7	<1.7	<0.55	<7.3	12.8
Post-SVE System	41,000[2]	22.3	<1.8	<1.8	<0.57	<1.5	<3.6
Percent Change	-99%	-96%	-	-	-	-	-
	Z-4 - Subslab at Mr Wise						
Pre-SVE System	318,000	88.8	<1.9	<1.9	<0.6	<8.0	<3.6
Post-SVE System	1,600	4.3	<1.9	<1.9	<0.6	<1.6	<3.6
Percent Change	-99%	-95%	-	-	-	-	-
	Z-6 - Subslab at DermaWerx						
Pre-SVE System	2,500	5.1	<1.9	<1.9	<0.6	<8.0	<3.6
Post-SVE System	925	1.7	<1.7	<1.7	<0.55	<1.5	9.2
Percent Change	-63%	-67%	-	-	-	-	-
	VP-2 - Vapor Point Well						
Pre-SVE System 1	3,110,000[1]	7,830	<1.8	10.6	<0.57	<7.6	<3.6
Pre-SVE System 2	1,760,000	<5,690	<1.7	7.1	<0.55	<1.5	<3.6
Post-SVE System	802,000[2]	471	<68.0	<68.0	<21.8	<58.6	<3.6
Percent Change	-54%	-94%	-	-	-	-	-
	VP-4 - Vapor Point Well						
Pre-SVE System 1	3,450,000[1]	438[1]	<1.8	<1.8	<0.57	<7.6	<3.6
Pre-SVE System 2	1,450,000	360	<1.7	<1.7	<0.55	<1.5	<3.6
Post-SVE System	570,000[2]	104	<68.0	<68.0	<21.8	<58.6	<3.6
Percent Change	-61%	-71%	-	-	-	-	-
	VP-5 - Vapor Point Well						
Pre-SVE System 1	1,920,000	588[1]	<1.9	<1.9	<0.62	<8.4	<3.6
Pre-SVE System 2	730,000[1]	422[1]	<1.7	<1.7	<0.55	<1.5	<3.6
Post-SVE System	55,500[2]	<50.4	<74.2	<74.2	<23.8	<63.9	<3.6
Percent Change	-92%	>88%	-	-	-	-	-

1 Analyte concentration exceeded the calibration range. The reported result is estimated.

2 The internal standard recovery associated with this result exceeds the lower control limit. The reported result should be considered an estimated value. These results would be biased low and an associated J- data

TABLE 8-3
GROUNDWATER SAMPLES - PARAMETER, ANALYTICAL METHOD, AND BOTTLE TYPE

Parameter	Analytical Method	Preservative	Bottle Type
Anions by Ion Chromatography	E300.0		1-500 mL Plastic
Conductivity	A2510 B		
Alkalinity	A2320 B		
Nitrogen, Nitrite	E353.2		1-250 mL Plastic
Metals by ICP/ICPMS, Dissolved	E200.7_8	Nitric acid	1-250 mL Plastic
Metals by ICP/ICPMS, Total	E200.7_8	Nitric acid	1-250 mL Plastic
Iron, Ferric	Calculation		
Sulfide, Iodine Titrimetric	A4500-S F (zero headspace)	Zinc acetate	1-250 mL Plastic
Sulfide, Iodine Titrimetric	A4500-S F	Sodium hydroxide	
Methane	SW8015M (zero headspace)	Sulfuric acid	2- 40 mL Clear Glass VOA
8260-Volatile Organic Compounds-Extended List	SW8260B (zero headspace)	Hydrochloric acid	6-40 mL Clear Glass VOA
Carbon, Total Organic	A5310 C	Phosphoric acid	3-40 mL Amber Glass VOA
Nitrogen, Nitrate + Nitrite	E353.2	Sulfuric acid	1-250 mL Plastic
Nitrogen, Nitrate	E353.2	Sulfuric acid	

mL milliliter

TABLE 8-4
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS FOR CONTAMINANTS OF CONCERN AT THE HUSTAD CENTER

	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
	Montana DEQ-7 Numerical Water Quality Standards for Groundwater				
	5	**5**	**70**	**100**	**2**
	MW-1				
Pre-SVE Installation	0.92[1]	<1.0	<1.0	<1.0	<1.0
Post-SVE Installation	0.41[1]	<1.0	<1.0	<1.0	<1.0
Percent Change	*-55%*	-	-	-	-
	MW-2				
Pre-SVE Installation	**94**	0.63[1]	<1.0	<1.0	<1.0
Post-SVE Installation	**138**	0.85[1]	<1.0	<1.0	<1.0
Percent Change	*47%*	*35%*	-	-	-
	MW-3				
Pre-SVE Installation	**5**	<1.0	<1.0	<1.0	<1.0
Post-SVE Installation	4.6	<1.0	<1.0	<1.0	<1.0
Percent Change	*-8%*	-	-	-	-
	MW-3 (Duplicate)				
Pre-SVE Installation	**5.5**	<1.0	<1.0	<1.0	<1.0
Post-SVE Installation	**5.1**	<1.0	<1.0	<1.0	<1.0
Percent Change	*-7%*	-	-	-	-
	MW-5				
Pre-SVE Installation	**72**	0.27[1]	<1.0	<1.0	<1.0
Post-SVE Installation	**99**[2]	0.30[1]	<1.0	<1.0	<1.0
Percent Change	*38%*	*11%*	-	-	-
	MW-7				
Pre-SVE Installation	**126**	1.1	<1.0	<1.0	<1.0
Post-SVE Installation	**53**	0.55[1]	<1.0	<1.0	<1.0
Percent Change	*-58%*	*-50%*	-	-	-

[1] Estimated value. The analyte was present but less than the reporting limit. The result is

TABLE 10-1
SUMMARY OF LABORATORY ANALYTICAL RESULTS FOR SOIL VAPOR EXTRACTION SYSTEM PERFORMANCE MONITORING

Date	Method	PCE ($\mu g/m^3$)	TCE ($\mu g/m^3$)	*cis* -1,2-DCE ($\mu g/m^3$)	*trans* -1,2-DCE ($\mu g/m^3$)	Vinyl Chloride ($\mu g/m^3$)	1,1,2,2-tetrachloroethane ($\mu g/m^3$)	PID reading (ppmv PCE)
S-1 (GAC Inlet)								
2/3/2017	TO-15	148000	107	<1.7	<1.7	<0.55	<1.5	18.8
2/3/2017	8260	73000	<500	<500	<500	<500	<500	18.8
2/21/2017	8260	158000	<500	<500	<500	<500	<500	26
3/7/2017	8260	126000	<500	<500	<500	<500	<500	15.2
3/20/2017	8260	64000	<500	<500	<500	<500	<500	11.2
4/3/2017	8260	86000	<500	<500	<500	<500	<500	17.5
S-3 (SVE Exhaust)								
2/3/2017	TO-15	7.4	<1.0	<1.5	<1.5	<0.49	<1.3	0
2/3/2017	8260	<500	<500	<500	<500	<500	<500	0
4/3/2017	8260	<500	<500	<500	<500	<500	<500	2.4

($\mu g/m^3$) microgram per cubic meter
ppmv parts per million by volume
SVE soil vapor extraction
PID photoionization detector
GAC granular activated carbon
PCE Tetrachloroethylene
TCE Trichloroethylene
DCE Dichloroethene

Samples collected for analysis by EPA Method TO-15 were collected in laboratory-provided summa canisters.
Samples collected for analysis by EPA Method 8260 were collected in laboratory-provided Tedlar bags.

Appendices and Attachment

Appendix A
Access Correspondence and Encroachment Permit

September 6, 2016

Mr. Greg Hampton
2012 Sweetgrass Road
Helena, Montana 59601-5881

Re: Follow Up on Approval to Allow HydroSolutions Access to Complete Investigation and Remediation Work on a Portion of Bullman's Pizza Property Adjacent to Mr. Wise Cleaners at the Helena Solvent Site

Dear Hampton:

I want to thank you for taking the time to meet with me on August 23, 2016 at 8:00 AM at Bullman's Pizza to discuss the work HydroSolutions Inc (HydroSolutions) will complete at Mr. Wise Cleaners building. As we discussed, we will be completing investigation field work the week of September 19. A small truck-mounted hydraulic push-probe rig will install vapor points, collect subsurface soil samples, and install vapor extraction wells at select locations. Work will be completed on the north and east sides of Mr. Wise Cleaners building and will slightly overlap Bullman's Pizza property. After this investigation, data will be evaluated and used to finalize the design of a soil vapor extraction (SVE) system to be installed on the north and east side of the building sometime before the end of December. Temporary construction activities (excavation, piping installation, and backfilling) will take place. Although the east leg of the SVE system will be installed adjacent to Mr. Wise Cleaners building but on Bullman's Pizza western property boundary, no surface piping or structures will be visible and the surface will be finished with similar asphalt materials. HydroSolutions personnel will be onsite and oversee all field work. Both field efforts will be completed as quickly as possible and will be designed to not cause any access issues for your customers.

HydroSolutions and the Montana Department of Environmental Quality (DEQ) appreciate Bullman's Pizza cooperating to provide access to complete investigation and remediation work at Mr. Wise Cleaners building. We will notify you prior to performing any work on your property. If you have any questions, please contact me at 406-443-6169 x103 or email me at davidd@hydrosi.com.

Respectfully submitted,
HydroSolutions Inc

David A. Donohue

David A. Donohue, P.G.
Senior Hydrogeologist | Helena Office Manager

Cc: Laura Alvey, DEQ (electronic email only)

December 7, 2016

Mr. Greg Hampton
2012 Sweetgrass Road
Helena, Montana 59601-5881

Sent via email greg@brokersfirstrealestate.com

Re: Notification of Horizontal Drilling Planned for Week of December 12, 2016 HydroSolutions Inc Remediation Work on a Portion of Bullman's Pizza Property Adjacent to Mr. Wise Cleaners at the Helena Solvent Site

Dear Mr. Hampton:

As I mentioned on the phone yesterday, I want to update you on the upcoming plans for drilling at the HSS/Mr. Wise Cleaners during the week of December 12, 2016. HydroSolutions Inc (HydroSolutions) has contracted with FourOSix Underground, Inc. of Helena to install four horizontal boreholes underneath Mr. Wise Cleaners building and complete them as soil vapor extraction (SVE) system wells. These wells will run in an east-west direction beneath the building. In addition, one north-south, 8- to 10-foot deep trench will be excavated to connect the four SVE wells to the blower system to be located at the northeast corner of Mr. Wise Cleaners. We anticipate that the work will take approximately one week.

In order to complete the drilling and excavation in a safe and efficient manner, we would like to complete the following:

1) We will maintain a work zone blocked off with cones and flagging in the access between Bullman's Pizza and Mr. Wise Cleaners. There will be an access lane maintained for your customers to drive adjacent to your business.
2) We will be installing the excavation trench from the north side of Mr. Wise Cleaners to approximately 5 feet from the door of your wood shed. We will be sure to maintain safe access to the shed door for you and your staff while the excavation is open.
3) We will need to temporarily remove the fence to excavate the SVE trench and drill two of the horizontal boreholes. The fence will be reinstalled following excavation backfill and surface patch.
4) The surface will be patched with a concrete grout at this time since hot asphalt plants are not operating in the winter. In the spring, the patch will be replaced by asphalt to match the current surface material.

<u>Schedule:</u>
HydroSolutions personnel will be onsite and oversee all field work. Field efforts will be completed as quickly as possible. We have scheduled FourOSix Underground, Inc. to mobilize to the site Monday morning, December 12, and begin drilling by early afternoon. They plan to

have all drilling completed and excavation backfilled by Friday, December 16. The cement patch will be completed shortly after.

I have attached an information sheet prepared for the tenants of the building and I brought one into Bullman's Pizza yesterday to be given to Mike. Please let me know if you would like to meet onsite anytime to discuss our remediation work. HydroSolutions and the Montana Department of Environmental Quality (DEQ) appreciate Bullman's Pizza cooperating to provide access to complete investigation and remediation work at Mr. Wise Cleaners building. If you have any questions, please contact me at 406-443-6169 x103 or email me at davidd@hydrosi.com.

Respectfully submitted,
HydroSolutions Inc

David A. Donohue, P.G.
Senior Hydrogeologist | Helena Office Manager

Cc: Laura Alvey, DEQ (electronic email only)

MEMORANDUM

Date: December 6, 2015

To: Hustad Building Tenants

From: Dave Donohue, Project Manager

Subject: Field Activity – Mr. Wise Cleaners; Week of December 12, 2016

Activity: install four horizontal boreholes beneath Mr. Wise Cleaners building and complete them as soil vapor extraction (SVE) system wells. These wells will run in an east-west direction beneath the building. (A schematic diagram of the wells and location is provided below.

In order to complete the drilling and excavation in a safe and efficient manner, we plan to complete the following:

1) We will maintain a work zone blocked off with cones and flagging in the access between Bullman's Pizza and Mr. Wise Cleaners, and in the parking lot adjacent to Canine Capital and Mr. Wise Cleaners.
2) There will at all times be access to your business.
3) The horizontal drilling company, FourOSix Underground, Inc., will need to access Mr. Wise Cleaners and Canine Capital at various times when drilling the four horizontal wells beneath the building. (A schematic diagram is attached).
4) We will need to temporarily relocate the dumpster and remove the wooden fence on the east side of the building, but will replace them when the field effort is completed.

The surface areas that are excavated will be patched with a concrete grout at this time since hot asphalt plants are not operating in the winter. In the spring, the patch will be replaced by asphalt to match the current surface material.

<u>Schedule:</u>

HydroSolutions personnel will be onsite and oversee all field work. Field efforts will be completed as quickly as possible. We have scheduled FourOSix Underground, Inc. to

mobilize to the site Monday morning, December 12, and begin drilling by early afternoon. They plan to have all drilling completed and excavation backfilled by Friday, December 16. The cement patch will be completed shortly thereafter.

Please let me know if you would like to meet onsite this week to discuss our remediation work. HydroSolutions and the Montana Department of Environmental Quality (DEQ) appreciate your cooperation while we continue to work on remediation work at Mr. Wise Cleaners building. If you have any questions, please contact us.

Thank you

Dave Donohue
Office: 406-443-6169 x103
Cell: 406-465-2765
davidd@hydrosi.com

Luke Osborne
Office: 406-443-6169 x105
Cell: 406-465-2765
lukeo@hydrosi.com

City Attorney's Office
City-County Bldg., Room 203
316 North Park Avenue
Helena, MT 59623
(406) 457-8595

ENCROACHMENT AGREEMENT

THIS AGREEMENT is made and entered into this 7th day of September, 2016, by and between the **CITY OF HELENA, MONTANA,** a municipal corporation organized and existing under the laws of the State of Montana, 316 North Park Avenue, Helena, Montana 59623, hereinafter referred to as "City," and **HYDROSOLUTIONS INC.**, 303 Clarke Street, Helena, Montana 59601, hereinafter referred to as "HydroSolutions."

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained, the receipt and sufficiency whereof being hereby acknowledged, the parties hereto agree as follows:

1. City owns that certain property in the City of Helena, Lewis and Clark County, Montana, described as follows: the east-west alley adjacent to the west 1' of Lot 22, Lots 23 through 29, and portions of Lots 30-32, all in Block 25 of the Lockey Addition (1118 Helena Avenue).

2. In order for HydroSolutions to remediate chlorinated soils at 1118 Helena Avenue for the Montana Department of Environmental Quality, the City agrees to allow HydroSolutions to install and maintain a soil vapor extraction system as more particularly shown on the attached Exhibit "A," in the City alley right-of-way described above, adjacent to 1118 Helena Avenue, subject to the conditions listed below.

3. The parties hereto agree that when the soil vapor extraction system, the installation and maintenance of which is hereby allowed, is worn out or damaged, said system may not be repaired or replaced without the express written consent of City.

4. HydroSolutions agrees that it is not acquiring any property interest in the City's property or gaining any right to use any City property beyond that permitted in this Agreement.

3295004 B: M51 P: 8454 ENCR
09/08/2016 11:31 AM Pages: 1 of 4 Fees: 28.00
Paulette DeHart Clerk & Recorder, Lewis & Clark MT

5. HydroSolutions agrees not to place soil, debris, groundwater, or any non-stormwater substance in or on the alley as part of the installation of the soil vapor extraction system. HydroSolutions agrees to comply with local, state, and federal laws applicable to construction stormwater management during the installation and maintenance of the soil vapor extraction system to prevent the movement of any soil, debris, groundwater, or any non-stormwater substance from entering the City's Municipal Separate Storm Sewer System.

6. HydroSolutions agrees to return any disturbed boulevards to their previous state.

7. HydroSolutions agrees to indemnify, defend and save City, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional or negligent act in any way arising out of the placement and maintenance of the soil vapor extraction system on City property as herein authorized.

IN WITNESS WHEREOF, the parties hereto have executed this instrument the day and year first above written.

ATTEST:

By _____
Debbie Havens, City Clerk

CITY OF HELENA, MONTANA

By _____
Ronald J. Alles, City Manager

CITY OF HELENA
LEWIS & CLARK CO.
1881
MONTANA

APPROVED AS TO FORM:

By _____
Thomas J. Jodoin, City Attorney

HYDROSOLUTIONS INC.

By _____
David Donohue, Senior Hydrogeologist/
Helena Office Manager

STATE OF MONTANA)
) ss.
COUNTY OF LEWIS & CLARK)

On this 7 day of September, 2016, before me, a Notary Public for the State of Montana, personally appeared **Ronald J. Alles and Debbie Havens,** the City Manager and City Clerk of the City of Helena, known to me to be the persons whose names are subscribed to the foregoing instrument, and acknowledged to me that they executed the same in such capacities.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year first above written.

KIMBERLY ANN SELL
NOTARY PUBLIC for the
State of Montana
Residing at Helena, Montana
My Commission Expires
April 30, 2019

Kimberly Ann Sell
Notary Public for State of Montana
Residing in Helena, Montana
My Commission expires 4/15/2019.

STATE OF MONTANA)
) ss.
COUNTY OF LEWIS & CLARK)

On this 7 day of September, 2016, before me, a Notary Public for the State of Montana, personally appeared **David Donohue,** Senior Hydrogeologist/Helena Office Manager of HydroSolutions Inc., known to me or proved to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same in such capacity.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year first above written.

KIMBERLY ANN SELL
NOTARY PUBLIC for the
State of Montana
Residing at Helena, Montana
My Commission Expires
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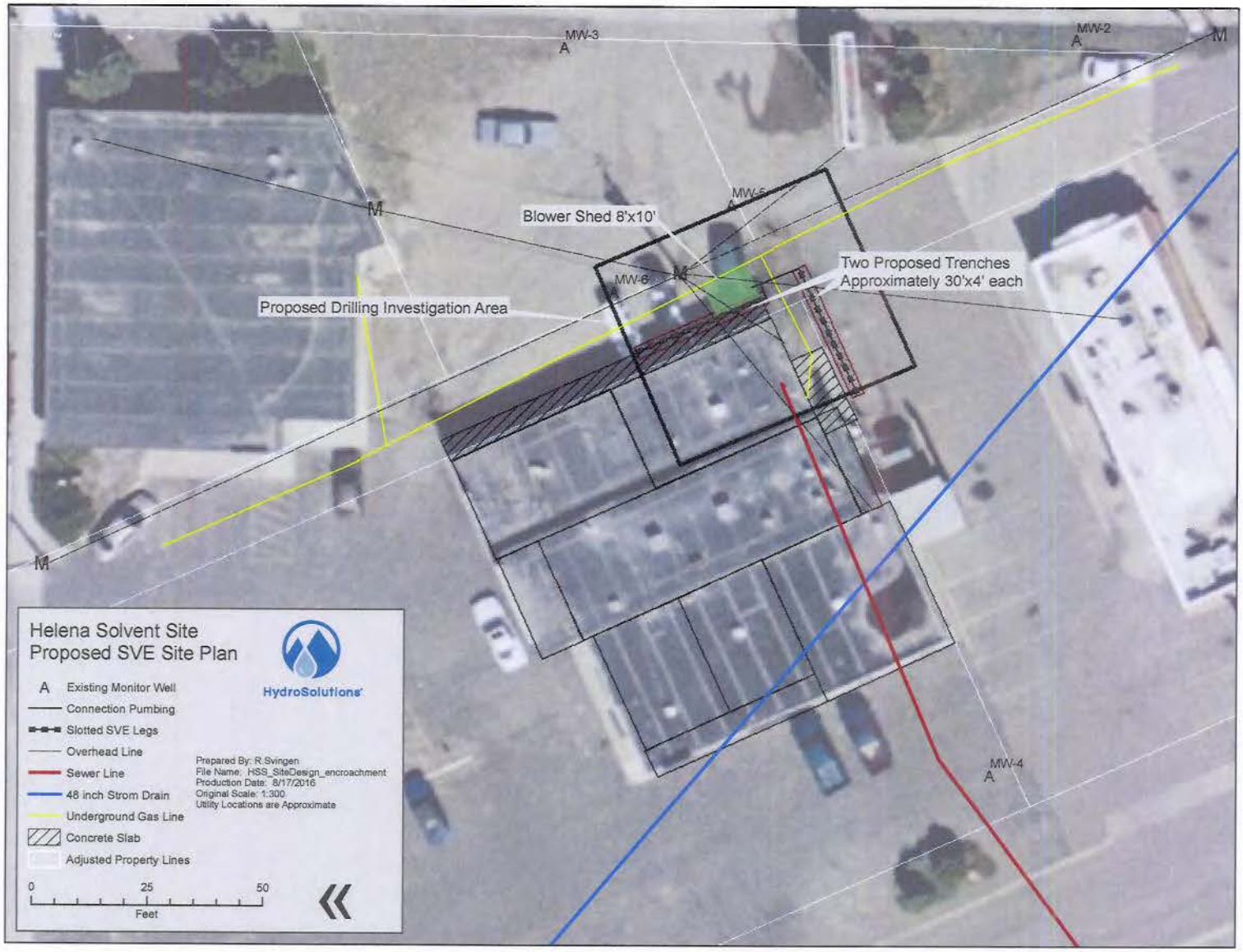
MW-3
MW-2
MW-5
MW-6
MW-4
Blower Shed 8'x10'
Two Proposed Trenches
Approximately 30'x4' each
Proposed Drilling Investigation Area
Helena Solvent Site
Proposed SVE Site Plan
HydroSolutions
Existing Monitor Well
Connection Pumbing
Slotted SVE Legs
Overhead Line
Sewer Line
48 inch Strom Drain
Underground Gas Line
Concrete Slab
Adjusted Property Lines
Prepared By: R.Svingen
File Name: HSS_SiteDesign_encroachment
Production Date: 8/17/2016
Original Scale: 1:300
Utility Locations are Approximate
0
25
50
Feet

Exhibit A

Appendix B
Data Validation and Laboratory Analytical Reports

Data Validation
Indoor Air Analytical Results

HydroSolutions

Data Validation Report – Pre SVE System Indoor Air Analytical Results

Project Name	Helena Solvent Site – SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10368384
Sample Matrix	Air
Sample Start and End Dates	10/28/2016
Parameters Included	VOCs using EPA Method TO-15 by SIM
Date Validated	3/1/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six total indoor air samples were collected by HydroSolutions on October 28, 2016 as part of continued monitoring of the indoor air mitigation system at the Hustad Center. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on October 31, 2016. Samples were received by Pace on November 2, 2016 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. The six samples were distributed between two laboratory batches, with five samples in one batch and one sample in another batch. All samples were analyzed according to EPA Method TO-15 on November 3, 2016, November 4, 2016, and November 6, 2016.

One field duplicate sample was included in the sample set to yield a duplicate collection frequency of 20%. The duplicate sample was collected at Mr. Wise Cleaners. The duplicate sample is identified as 1118-IAD-102816, which is duplicate of the sample identified as 1118-IA-102816. Table 1 presents an inventory of the samples collected and analyzed as part of the baseline indoor air sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
1116 Canine Capitol	10368634001	1116-IA-102816
1118 Mr Wise (duplicate)	10368384002	1118-IAD-102816
1118 Mr Wise	10368384003	1118-IA-102816
Outside Mr Wise	10368384004	AA-102816
1120 Lash Dolls Salon	10368384005	1120-IA-102816
1124 DermaWerx	10368384006	1124-IA-102816

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required continued operation and maintenance of the existing indoor air mitigation system, located at Mr. Wise Cleaners at the Hustad Center. This objective was accomplished in part, by obtaining baseline indoor air quality data prior to the soil vapor extraction (SVE) system installation. Historic indoor air quality data exists for the five office spaces at the Hustad Center as well as for the background outdoor air. The sampling locations selected for air sampling as part of this sampling event were consistent with historic collection locations.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for the VOCs that were identified as contaminants of concern based on historic analytical results. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The selection of consistent air sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Five indoor air samples and one duplicate sample were collected and analyzed. All samples were collected and analyzed in accordance with quality control objectives and no criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. MDEQ validation guidelines establish a relative percent difference (RPD) target of 0-25% (MDEQ 2010). Professional judgement and industry standard were used to determine that this RPD target applies when the result is at least five times the reporting limit. A comparison of the field duplicate result with the original sample result was used to assess the field precision of the laboratory results. When the analyte was not reported above the reporting limits, an RPD is not reported on the table. The analytical results of this sampling event meet the established RPD target as shown in Table 2. In this way the data is considered precise.

Table 2. Field Precision

Contaminant of Concern	Natural Sample	Result (ug/m^3)	Duplicate Sample	Result (ug/m^3)	RPD (%)
1,1,2,2-tetrachloroethane	1118-IA-102816	< 0.064	1118-IAD-102816	< 0.064	-
cis-1,2-dichloroethene	1118-IA-102816	< 0.074	1118-IAD-102816	< 0.074	-
tetrachloroethene (PCE)	1118-IA-102816	206	1118-IAD-102816	221	7.0
trichloroethene (TCE)	1118-IA-102816	7.5	1118-IAD-102816	7.9	5.2
trans-1,2-Dichloroethene	1118-IA-102816	< 0.074	1118-IAD-102816	< 0.074	-
vinyl chloride	1118-IA-102816	< 0.048	1118-IAD-102816	< 0.048	-

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with EPA Method TO-15, laboratory control samples were prepared and analyzed by Pace to assess laboratory and method accuracy. The six indoor air samples were split into two separate batches. As a result, two laboratory blank samples were analyzed (one for each batch). Both were both found to be free of analyte contamination. Similarly, two laboratory control samples with known spike concentrations were analyzed for percent recovery. The percent recovery results were within the percent recovery limits, as shown in the analytical report. In this way, the data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15. Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Summary

A review of field sheets, sampling log books, and laboratory analytical results identified no QC issues for this data set. The data are usable for decision making purposes.

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Indoor Air Project Baseline Sampling
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, DEQ Vapor Intrusion Guide (2011), Laboratory-provided sampling instructions
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	2/28/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	10/28/2016 M/D/YY
12. Sample collection end date	10/28/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method — Analytical Method(s): TO15 SIM Analysis of Volatile Organic Compounds (Vocs) In Air

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC 1700 Elm Street Suite 200 Minneapolis, MN 55414		
15. Laboratory project ID	10368384		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	Yes ●	No ○	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	Yes ●	No ○	Comments 2 lab method blanks (one each batch), 20%, 100%
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	Yes ○	No ●	Comments

If no, explain

Lab matrix spikes and matrix spike duplicates are not a requirement of EPA Method TO-15.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

22. Is the total number of laboratory control samples at least 5% of the total number of samples?	Yes ●	No ○	Comments

Consultant/Validator Questions

23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	Yes ●	No ○	Comments
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	Yes ●	No ○	Comments reported units are ug/m3
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	Yes ●	No ○	Comments
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	Yes ●	No ○	Comments
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	Yes ○	No ●	Comments

If no, explain

Collection of equipment, trip, or field blanks are not required by MDEQ as part of EPA Method TO-15.

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ○	Comments N/A (no field blanks)

	Yes	No	Comments
28a. Were all blank samples free of analyte contamination?	○	○	N/A (no field blanks)
28b. Were field duplicates collected as required?	●	○	one field duplicate sample collected
28c. Are field duplicate relative percent differences within data validation quality control limits?	●	○	RPD for duplicates <25%, see attached table

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

		Comments
30. What is the percent completeness (samples planned versus valid samples collected)?	100	

	Yes	No	Comments
31. Was the completeness goal met?	●	○	

32. Other general comments or observations?

Split Samples

	Yes	No	Comments
33. Did DEQ collect split samples?	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

November 15, 2016

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: HSS
Pace Project No.: 10368384

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on November 02, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
Project Manager

Enclosures

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: HSS
Pace Project No.: 10368384

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
Alaska Certification UST-107
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: HSS
Pace Project No.: 10368384

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10368384001	**1116-IA-102816**	Air	10/28/16 15:17	11/02/16 09:10
10368384002	**1118-IAD-102816**	Air	10/28/16 15:24	11/02/16 09:10
10368384003	**1118-IA-102816**	Air	10/28/16 15:24	11/02/16 09:10
10368384004	**AA-102816**	Air	10/28/16 15:35	11/02/16 09:10
10368384005	**1120-IA-102816**	Air	10/28/16 19:37	11/02/16 09:10
10368384006	**1124-IA-102816**	Air	10/28/16 19:28	11/02/16 09:10

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SAMPLE ANALYTE COUNT

Project: HSS
Pace Project No.: 10368384

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10368384001	**1116-IA-102816**	TO-15 by SIM	DR1	6
10368384002	**1118-IAD-102816**	TO-15 by SIM	DR1	6
10368384003	**1118-IA-102816**	TO-15 by SIM	DR1	6
10368384004	**AA-102816**	TO-15 by SIM	DR1	6
10368384005	**1120-IA-102816**	TO-15 by SIM	DR1	6
10368384006	**1124-IA-102816**	TO-15 by SIM	DR1	6

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ANALYTICAL RESULTS

Project: HSS
Pace Project No.: 10368384

Sample: 1116-IA-102816 **Lab ID: 10368384001** Collected: 10/28/16 15:17 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	ND	ug/m3	0.12	3.1		11/03/16 22:08	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.12	3.1		11/03/16 22:08	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.11	3.1		11/03/16 22:08	79-34-5	
Tetrachloroethene	**60.6**	ug/m3	0.43	3.1		11/06/16 15:51	127-18-4	
Trichloroethene	**0.27**	ug/m3	0.085	3.1		11/03/16 22:08	79-01-6	
Vinyl chloride	ND	ug/m3	0.081	3.1		11/03/16 22:08	75-01-4	

Sample: 1118-IAD-102816 **Lab ID: 10368384002** Collected: 10/28/16 15:24 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	ND	ug/m3	0.074	1.83		11/03/16 22:36	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.074	1.83		11/03/16 22:36	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.064	1.83		11/03/16 22:36	79-34-5	
Tetrachloroethene	**221**	ug/m3	0.25	1.83		11/06/16 16:23	127-18-4	
Trichloroethene	**7.9**	ug/m3	0.050	1.83		11/06/16 16:23	79-01-6	
Vinyl chloride	ND	ug/m3	0.048	1.83		11/03/16 22:36	75-01-4	

Sample: 1118-IA-102816 **Lab ID: 10368384003** Collected: 10/28/16 15:24 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	ND	ug/m3	0.074	1.83		11/04/16 11:08	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.074	1.83		11/04/16 11:08	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.064	1.83		11/04/16 11:08	79-34-5	
Tetrachloroethene	**206**	ug/m3	0.34	2.45		11/06/16 16:56	127-18-4	
Trichloroethene	**7.5**	ug/m3	0.067	2.45		11/06/16 16:56	79-01-6	
Vinyl chloride	ND	ug/m3	0.048	1.83		11/04/16 11:08	75-01-4	

Sample: AA-102816 **Lab ID: 10368384004** Collected: 10/28/16 15:35 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	**0.066**	ug/m3	0.065	1.61		11/03/16 23:02	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.065	1.61		11/03/16 23:02	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.056	1.61		11/03/16 23:02	79-34-5	
Tetrachloroethene	**0.40**	ug/m3	0.22	1.61		11/03/16 23:02	127-18-4	
Trichloroethene	**0.34**	ug/m3	0.044	1.61		11/03/16 23:02	79-01-6	
Vinyl chloride	ND	ug/m3	0.042	1.61		11/03/16 23:02	75-01-4	

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ANALYTICAL RESULTS

Project: HSS
Pace Project No.: 10368384

Sample: 1120-IA-102816 **Lab ID: 10368384005** Collected: 10/28/16 19:37 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	ND	ug/m3	0.065	1.61		11/03/16 21:15	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.065	1.61		11/03/16 21:15	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.056	1.61		11/03/16 21:15	79-34-5	
Tetrachloroethene	**32.9**	ug/m3	0.22	1.61		11/06/16 17:59	127-18-4	
Trichloroethene	**0.25**	ug/m3	0.044	1.61		11/03/16 21:15	79-01-6	
Vinyl chloride	ND	ug/m3	0.042	1.61		11/03/16 21:15	75-01-4	

Sample: 1124-IA-102816 **Lab ID: 10368384006** Collected: 10/28/16 19:28 Received: 11/02/16 09:10 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM	Analytical Method: TO-15 by SIM							
cis-1,2-Dichloroethene	ND	ug/m3	0.068	1.68		11/03/16 21:41	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.068	1.68		11/03/16 21:41	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.059	1.68		11/03/16 21:41	79-34-5	
Tetrachloroethene	**141**	ug/m3	0.23	1.68		11/06/16 18:30	127-18-4	
Trichloroethene	**0.31**	ug/m3	0.046	1.68		11/03/16 21:41	79-01-6	
Vinyl chloride	ND	ug/m3	0.044	1.68		11/03/16 21:41	75-01-4	

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Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: HSS
Pace Project No.: 10368384

QC Batch: 446353 | Analysis Method: TO-15 by SIM
QC Batch Method: TO-15 by SIM | Analysis Description: TO-15 GC/MSV AIR SIM
Associated Lab Samples: 10368384001, 10368384002, 10368384004, 10368384005, 10368384006

METHOD BLANK: 2439845 | Matrix: Air
Associated Lab Samples: 10368384001, 10368384002, 10368384004, 10368384005, 10368384006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.035	11/03/16 11:30	
cis-1,2-Dichloroethene	ug/m3	ND	0.040	11/03/16 11:30	
Tetrachloroethene	ug/m3	ND	0.14	11/03/16 11:30	
trans-1,2-Dichloroethene	ug/m3	ND	0.040	11/03/16 11:30	
Trichloroethene	ug/m3	ND	0.027	11/03/16 11:30	
Vinyl chloride	ug/m3	ND	0.026	11/03/16 11:30	

LABORATORY CONTROL SAMPLE: 2439846

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	.35	0.34	99	56-142	
cis-1,2-Dichloroethene	ug/m3	.2	0.20	99	64-137	
Tetrachloroethene	ug/m3	.34	0.36	103	61-134	
trans-1,2-Dichloroethene	ug/m3	.2	0.19	95	59-142	
Trichloroethene	ug/m3	.27	0.26	94	60-140	
Vinyl chloride	ug/m3	.13	0.12	94	64-142	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: HSS
Pace Project No.: 10368384

QC Batch: 446354
QC Batch Method: TO-15 by SIM
Analysis Method: TO-15 by SIM
Analysis Description: TO-15 GC/MSV AIR SIM
Associated Lab Samples: 10368384003

METHOD BLANK: 2439848
Matrix: Air
Associated Lab Samples: 10368384003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.035	11/04/16 10:41	
cis-1,2-Dichloroethene	ug/m3	ND	0.040	11/04/16 10:41	
Tetrachloroethene	ug/m3	ND	0.14	11/04/16 10:41	
trans-1,2-Dichloroethene	ug/m3	ND	0.040	11/04/16 10:41	
Trichloroethene	ug/m3	ND	0.027	11/04/16 10:41	
Vinyl chloride	ug/m3	ND	0.026	11/04/16 10:41	

LABORATORY CONTROL SAMPLE: 2439849

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	.35	0.34	97	56-142	
cis-1,2-Dichloroethene	ug/m3	.2	0.21	103	64-137	
Tetrachloroethene	ug/m3	.34	0.39	112	61-134	
trans-1,2-Dichloroethene	ug/m3	.2	0.20	98	59-142	
Trichloroethene	ug/m3	.27	0.29	106	60-140	
Vinyl chloride	ug/m3	.13	0.13	101	64-142	

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QUALIFIERS

Project: HSS
Pace Project No.: 10368384

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: HSS
Pace Project No.: 10368384

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10368384001	**1116-IA-102816**	TO-15 by SIM	446353		
10368384002	**1118-IAD-102816**	TO-15 by SIM	446353		
10368384003	**1118-IA-102816**	TO-15 by SIM	446354		
10368384004	**AA-102816**	TO-15 by SIM	446353		
10368384005	**1120-IA-102816**	TO-15 by SIM	446353		
10368384006	**1124-IA-102816**	TO-15 by SIM	446353		

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10368384

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

22149

Page: 1 of 1

Section A Required Client Information:

Company: HYDROSOLUTIONS
Address: 303 Clarke St Helena MT 59601
Email To: amanda@hydrosi.com
Phone: 406.965.8330 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: AMANDA OSBORNE
Copy To:
Purchase Order No.: 10255502
Project Name: HSS
Project Number:

Section C Invoice Information:

Attention: Amanda Osborne
Company Name: Hydro Solutions
Address: 303 Clarke St Helena MT 59601
Pace Quote Reference: 00032220
Pace Project Manager/Sales Rep. Carolynne Trout
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other____

Location of Sampling by State: MT

Reporting Units: ug/m³ X mg/m³ ___ PPBV ___ PPMV ___ Other ___

Report Level II.___ III.___ IV.___ Other_____

Valid Media Codes: Tedlar Bag TB; 1 Liter Summa Can 1LC; 6 Liter Summa Can 6LC; Low Volume Puff LVP; High Volume Puff HVP; Other PM10

ITEM #	'Section D Required Client Information AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	PID Reading (Client only)	COLLECTED COMPOSITE START END/GRAB DATE	TIME	COMPOSITE - DATE	TIME	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	PM10	3C- Fixed Gas (%)	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	1116-IA-102816	6LC		10/28/16	0727	10/28/16	1517	25	15	2657	FC1036								X		001
2	1118-IAD-102816	6LC		10/28/16	0715	10/28/16	1524	25	4	1260	FC0049								X		002
3	1118-IA-102816	6LC		10/28/16	0715	10/28/16	1524	25	4	1272	FC0049								X		003
4	AA-102816	6LC		10/28/16	0736	10/28/16	1535	23	2.5	1242	FC0258								X		004
5	1120-IA-102816	6LC		10/28/16	1134	10/28/16	1937	25.5	2	2806	FC0016								X		005
6	1124-IA-102816	6LC		10/28/16	1141	10/28/16	1928	24.5	2.5	2165	FC0394								X		006
7																					
8																					
9																					
10																					
11																					
12																					

Comments:

SHIPPED IN TWO DIFFERENT BOXES

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE	10/31/16	0915	[signature]	11216	0910

SAMPLE CONDITIONS

	Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
AMB		Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: AMANDA OSBORNE
SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY): 10/28/16

ORIGINAL

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro solutions

Project #: WO#: 10368384

10368384

Courier: ☑ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 6637 5039 8470, 6637 5039 8480

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ Foam ☐ None ☐ Tin Can ☐ Other: **Temp Blank rec:** ☐ Yes ☒ No

Temp. (TO17 and TO13 samples only) (°C): 20 **Corrected Temp (°C):** P **Thermom. Used:** ☐ B88A912167504 ☐ B88A0143310098 ☐ 151401163 ☐ 151401164

Temp should be above freezing to 6°C **Correction Factor:** P **Date & Initials of Person Examining Contents:** 4/11/16

Type of ice Received ☐ Blue ☐ Wet ☒ None

				Comments:
Chain of Custody Present?	☒ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☒ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☒ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☒ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☒ No	☐ N/A	7.
Sufficient Volume?	☒ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☒ Yes	☐ No	☐ N/A	
Containers Intact?	☒ Yes	☐ No	☐ N/A	10.
Media: Air Can Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☒ Yes	☐ No	☐ N/A	12.

Samples Received:

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Nathan Roberg **Date:** 11/3/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Data Validation Report – Post SVE Installation Indoor Air Analytical Results

Project Name	Helena Solvent Site – SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10382350
Sample Matrix	Air
Sample Start and End Dates	03/15/2017
Parameters Included	VOCs using EPA Method TO-15 by SIM
Date Validated	04/12/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six total indoor air samples were collected by HydroSolutions on March 15, 2017 as part of post SVE installation sampling at the Hustad Center. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on March 16. 2017. Samples were received by Pace on March 21, 2017 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. Samples were analyzed according to EPA Method TO-15 on April 5, 2017.

One field duplicate sample was included in the sample set to yield a duplicate collection frequency of 20%. The duplicate sample was collected at Mr. Wise Cleaners. The duplicate sample is identified as 1118-IAD-031517, which is duplicate of the sample identified as 1118-IA-031517. Table 1 presents an inventory of the samples collected and analyzed as part of the baseline indoor air sampling event and validated in this report.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
1116 Canine Capitol	10382350003	1116-IA-031517
1118 Mr Wise (duplicate)	10382350002	1118-IAD-031517
1118 Mr Wise	10382350001	1118-IA-031517
Outside Mr Wise	10382350004	AA-031517
1120 Lash Dolls Salon	10382350005	1120-IA-031517
1124 DermaWerx	10382350006	1124-IA-031517

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required post remediation sampling of the indoor air at the Hustad Center. This objective was accomplished by obtaining indoor air samples after the installation of the soil vapor extraction (SVE) system in a manner consistent with sample collection that occurred prior to installation. Historic indoor air quality data exists for the five office spaces at the Hustad Center as well as for the background outdoor air. The sampling locations selected for this event are consistent with historic collection locations and those used to obtain the project baseline samples.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for the VOCs that were identified as contaminants of concern based on historic analytical results and requested on the CoC. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The selection of consistent air sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. All results for the samples collected for this data event were usable. All samples were collected and analyzed in accordance with quality control objectives and no criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. MDEQ validation guidelines establish a relative percent difference (RPD) target of 0-25% (MDEQ 2010). For this project, professional judgement and industry standard was used to determine that this RPD target applies when the reported result is at least five times the reporting limit. Because concentrations of 1,1,2,2-tetrachloroethane and cis-1,2-dichloroethene in either the duplicate or original sample were not greater than five times the reporting limit, the RPD is not meaningful those analytes and a high RPD does not affect the precision or usability of the data. A J qualifier is assigned to the results for exceeding the RPD target for PCE and TCE. In this way, the field precision is lower than what is considered optimal, but this does not

render the data unusable because both PCE and TCE were reported at concentrations below the site-specific screening levels. Field precision is summarized in Table 2.

Table 2. Field Precision

Contaminant of Concern	Natural Sample	Result (ug/m^3)	Duplicate Sample	Result (ug/m^3)	RPD (%)	Reporting Limit	> 5 Times RL?
1,1,2,2-tetrachloroethane	1118-IA-031517	1.6	1118-IAD-031517	0.16	164	0.13	No
cis-1,2-dichloroethene	1118-IA-031517	0.038	1118-IAD-031517	0.12	104	0.037	No
tetrachloroethene (PCE)	1118-IA-031517	2.8	1118-IAD-031517	3.9	33	0.1	Yes
trichloroethene (TCE)	1118-IA-031517	1.2	1118-IAD-031517	2.7	77	0.1	Yes
trans-1,2-Dichloroethene	1118-IA-031517	<0.037	1118-IAD-031517	<0.037	-	0.037	No
vinyl chloride	1118-IA-031517	<0.024	1118-IAD-031517	<0.024	-	0.024	No

Laboratory precision was assessed in a similar manner, by evaluating a laboratory-prepared sample duplicate. RPD targets were achieved for the laboratory duplicate, as can been seen in the laboratory analytical results.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with EPA Method TO-15, laboratory control samples were prepared and analyzed by Pace to assess laboratory and method accuracy. One method blank, one laboratory control sample, and one sample duplicate were analyzed for this purpose. The blank was found to be free of analyte contamination. The laboratory control sample with a known spike concentrations were analyzed for percent recovery. The percent recovery results were within the percent recovery limits, as shown in the analytical report. In this way, the data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15. Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Summary

A qualified data summary is presented in Table 3. Although RPD targets were exceeded for PCE and TCE in the original and sample duplicates, this does not introduce quantifiable bias or make the data unusable for the purpose of project decision-making because both results are below the site-specific screening levels established for indoor air. A review of field sheets,

sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes.

Table 3. Qualified Data Summary

Sample ID	Lab ID	Analyte	Result (ug/m^3)	Qualifier	Reason for Qualification
1118-IA-031517	10382350001	PCE	2.8	J	RPD exceeded
1118-IAD-031517	10382350002	PCE	3.9	J	RPD exceeded
1118-IA-031517	10382350001	TCE	1.2	J	RPD exceeded
1118-IAD-031517	10382350002	TCE	2.7	J	RPD exceeded

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Indoor Air Post SVE Installation Sampling
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, DEQ Vapor Intrusion Guide (2011), Laboratory-provided sampling instructions
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/13/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	3/15/2017 M/D/YY
12. Sample collection end date	3/15/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method — Analytical Method(s): TO15 SIM Analysis of Volatile Organic Compounds (Vocs) In Air

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC 1700 Elm Street Suite 200 Minneapolis, MN 55414		
15. Laboratory project ID	10382350		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	Yes ●	No ○	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	Yes ●	No ○	Comments: 1 lab method blank, 20%
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	Yes ○	No ●	Comments

If no, explain

Lab matrix spikes and matrix spike duplicates are not a requirement of EPA Method TO-15.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

22. Is the total number of laboratory control samples at least 5% of the total number of samples?	Yes ●	No ○	Comments

Consultant/Validator Questions

23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	Yes ●	No ○	Comments
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	Yes ●	No ○	Comments: reported units are ug/m3
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	Yes ●	No ○	Comments
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	Yes ●	No ○	Comments
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	Yes ○	No ●	Comments

If no, explain

Collection of equipment, trip, or field blanks are not required by MDEQ as part of EPA Method TO-15.

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ●	Comments: no field blanks

	Yes	No	Comments
28a. Were all blank samples free of analyte contamination?	○	○	N/A (no field blanks)
28b. Were field duplicates collected as required?	●	○	one field duplicate sample collected
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	RPD exceeded for PCE, TCE, 1,1,2,2-tetrachloroethane, cis-1,2-DCE, only PCE and TCE qualified; see table 2 in data validation report and associated discussion

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

		Comments
30. What is the percent completeness (samples planned versus valid samples collected)?	100	

	Yes	No	Comments
31. Was the completeness goal met?	●	○	

32. Other general comments or observations?

Split Samples

	Yes	No	Comments
33. Did DEQ collect split samples?	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

April 07, 2017

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: Helena Solvent Site
Pace Project No.: 10382350

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on March 21, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Scott Unze for
Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

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Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: Helena Solvent Site
Pace Project No.: 10382350

Minnesota Certification IDs

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: UST-078
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas Certification #: 88-0680
California Certification #: MN00064
CNMI Saipan Certification #:MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia WW Certification #: 382
Wisconsin Certification #: 999407970
Wyoming via EPA Region 8 Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: Helena Solvent Site
Pace Project No.: 10382350

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10382350001	**1118-IA-031517**	Air	03/15/17 16:54	03/21/17 09:45
10382350002	**1118-IAD-031517**	Air	03/15/17 16:54	03/21/17 09:45
10382350003	**1116-IA-031517**	Air	03/15/17 17:23	03/21/17 09:45
10382350004	**AA-031517**	Air	03/15/17 17:02	03/21/17 09:45
10382350005	**1120-IA-031517**	Air	03/15/17 17:38	03/21/17 09:45
10382350006	**1124-IA-031517**	Air	03/15/17 17:31	03/21/17 09:45

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SAMPLE ANALYTE COUNT

Project: Helena Solvent Site
Pace Project No.: 10382350

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10382350001	**1118-IA-031517**	TO-15	DR1	6
10382350002	**1118-IAD-031517**	TO-15	DR1	6
10382350003	**1116-IA-031517**	TO-15	DR1	6
10382350004	**AA-031517**	TO-15	DR1	6
10382350005	**1120-IA-031517**	TO-15	DR1	6
10382350006	**1124-IA-031517**	TO-15	DR1	6

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10382350

Sample: 1118-IA-031517 **Lab ID: 10382350001** Collected: 03/15/17 16:54 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	**0.038**	ug/m3	0.037	1.83		04/05/17 21:36	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.037	1.83		04/05/17 21:36	156-60-5	
1,1,2,2-Tetrachloroethane	**1.6**	ug/m3	0.13	1.83		04/05/17 21:36	79-34-5	
Tetrachloroethene	**2.8**	ug/m3	0.063	1.83		04/05/17 21:36	127-18-4	
Trichloroethene	**1.2**	ug/m3	0.050	1.83		04/05/17 21:36	79-01-6	
Vinyl chloride	ND	ug/m3	0.024	1.83		04/05/17 21:36	75-01-4	

Sample: 1118-IAD-031517 **Lab ID: 10382350002** Collected: 03/15/17 16:54 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	**0.12**	ug/m3	0.037	1.83		04/05/17 22:05	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.037	1.83		04/05/17 22:05	156-60-5	
1,1,2,2-Tetrachloroethane	**0.16**	ug/m3	0.13	1.83		04/05/17 22:05	79-34-5	
Tetrachloroethene	**3.9**	ug/m3	0.063	1.83		04/05/17 22:05	127-18-4	
Trichloroethene	**2.7**	ug/m3	0.050	1.83		04/05/17 22:05	79-01-6	
Vinyl chloride	ND	ug/m3	0.024	1.83		04/05/17 22:05	75-01-4	

Sample: 1116-IA-031517 **Lab ID: 10382350003** Collected: 03/15/17 17:23 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.034	1.68		04/05/17 22:33	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.034	1.68		04/05/17 22:33	156-60-5	
1,1,2,2-Tetrachloroethane	**0.19**	ug/m3	0.12	1.68		04/05/17 22:33	79-34-5	
Tetrachloroethene	**20.0**	ug/m3	0.058	1.68		04/05/17 22:33	127-18-4	
Trichloroethene	**0.51**	ug/m3	0.046	1.68		04/05/17 22:33	79-01-6	
Vinyl chloride	ND	ug/m3	0.022	1.68		04/05/17 22:33	75-01-4	

Sample: AA-031517 **Lab ID: 10382350004** Collected: 03/15/17 17:02 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.035	1.75		04/05/17 23:01	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.035	1.75		04/05/17 23:01	156-60-5	
1,1,2,2-Tetrachloroethane	**0.15**	ug/m3	0.12	1.75		04/05/17 23:01	79-34-5	
Tetrachloroethene	**0.13**	ug/m3	0.060	1.75		04/05/17 23:01	127-18-4	
Trichloroethene	ND	ug/m3	0.048	1.75		04/05/17 23:01	79-01-6	
Vinyl chloride	ND	ug/m3	0.023	1.75		04/05/17 23:01	75-01-4	

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10382350

Sample: 1120-IA-031517 **Lab ID: 10382350005** Collected: 03/15/17 17:38 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.033	1.61		04/05/17 23:29	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.033	1.61		04/05/17 23:29	156-60-5	
1,1,2,2-Tetrachloroethane	**0.20**	ug/m3	0.11	1.61		04/05/17 23:29	79-34-5	
Tetrachloroethene	**3.4**	ug/m3	0.056	1.61		04/05/17 23:29	127-18-4	
Trichloroethene	**0.053**	ug/m3	0.044	1.61		04/05/17 23:29	79-01-6	
Vinyl chloride	ND	ug/m3	0.021	1.61		04/05/17 23:29	75-01-4	

Sample: 1124-IA-031517 **Lab ID: 10382350006** Collected: 03/15/17 17:31 Received: 03/21/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR SIM SCAN	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.035	1.75		04/05/17 23:57	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.035	1.75		04/05/17 23:57	156-60-5	
1,1,2,2-Tetrachloroethane	**0.25**	ug/m3	0.12	1.75		04/05/17 23:57	79-34-5	
Tetrachloroethene	**4.0**	ug/m3	0.060	1.75		04/05/17 23:57	127-18-4	
Trichloroethene	ND	ug/m3	0.048	1.75		04/05/17 23:57	79-01-6	
Vinyl chloride	ND	ug/m3	0.023	1.75		04/05/17 23:57	75-01-4	

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QUALITY CONTROL DATA

Project: Helena Solvent Site
Pace Project No.: 10382350

QC Batch: 467181 Analysis Method: TO-15
QC Batch Method: TO-15 Analysis Description: TO15 MSV AIR SIM SCAN
Associated Lab Samples: 10382350001, 10382350002, 10382350003, 10382350004, 10382350005, 10382350006

METHOD BLANK: 2552375 Matrix: Air
Associated Lab Samples: 10382350001, 10382350002, 10382350003, 10382350004, 10382350005, 10382350006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.070	04/05/17 21:07	
cis-1,2-Dichloroethene	ug/m3	ND	0.020	04/05/17 21:07	
Tetrachloroethene	ug/m3	ND	0.034	04/05/17 21:07	
trans-1,2-Dichloroethene	ug/m3	ND	0.020	04/05/17 21:07	
Trichloroethene	ug/m3	ND	0.027	04/05/17 21:07	
Vinyl chloride	ug/m3	ND	0.013	04/05/17 21:07	

LABORATORY CONTROL SAMPLE: 2552376

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	.75	0.78	105	70-130	
cis-1,2-Dichloroethene	ug/m3	.44	0.41	94	70-130	
Tetrachloroethene	ug/m3	.72	0.70	97	70-130	
trans-1,2-Dichloroethene	ug/m3	.42	0.42	99	70-130	
Trichloroethene	ug/m3	.58	0.58	100	70-130	
Vinyl chloride	ug/m3	.27	0.27	100	70-130	

SAMPLE DUPLICATE: 2553072

Parameter	Units	10383190001 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
cis-1,2-Dichloroethene	ug/m3	ND	ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3	ND	ND		25	
Trichloroethene	ug/m3	0.54	0.53	2	25	
Vinyl chloride	ug/m3	ND	ND		25	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Helena Solvent Site
Pace Project No.: 10382350

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Helena Solvent Site
Pace Project No.: 10382350

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10382350001	**1118-IA-031517**	TO-15	467181		
10382350002	**1118-IAD-031517**	TO-15	467181		
10382350003	**1116-IA-031517**	TO-15	467181		
10382350004	**AA-031517**	TO-15	467181		
10382350005	**1120-IA-031517**	TO-15	467181		
10382350006	**1124-IA-031517**	TO-15	467181		

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

26163

Page: 1 of 1

Section A Required Client Information:

Company: HYDROSOLUTIONS
Address: 303 Clarke St
Helena MT 59601
Email To: aosborne@hydrosi.com
Phone: 406-443-6169 Fax: x106
Requested Due Date/TAT:

Section B Required Project Information:

Report To: A OSBORNE
Copy To: amanda@hydrosi.com
Media Order #
Purchase Order No.: 1027016
Project Name: Helena Solvent Site
Project Number:

Section C Invoice Information:

Attention: Amanda Osborne
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager/Sales Rep.: Carolynne Trout
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other

Location of Sampling by State: MT

Reporting Units: ug/m³ ☒ mg/m³ ___ PPBV ___ PPMV ___ Other ___

Report Level II.___ III.___ IV.___ Other___

Section D Required Client Information

AIR SAMPLE ID
Sample IDs MUST BE UNIQUE

Valid Media Codes

MEDIA	CODE
Tedlar Bag	TB
1 Liter Summa Can	1LC
6 Liter Summa Can	6LC
Low Volume Puff	LVP
High Volume Puff	HVP
Other	PM10

ITEM #	AIR SAMPLE ID	MEDIA CODE	PID Reading (Client only)	COLLECTED Composite Start End/Grab DATE	TIME	Composite - DATE	TIME	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	PM10	3C- Fixed Gas (%)	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	1118-IA-031517	6LC		3/15/17	0905	3/15/17	1654	-26.5	-4	944	FC0091								X		
2	1118-IAD-031517	6LC		3/15/17	0905	3/15/17	1654	-26.5	-4	2111	FC0091								X		
3	1116-IA-031517	6LC		3/15/17	0920	3/15/17	1703	-28.5	-5	2698	FC0286								X		
4	-AA-031517	6LC		3/15/17	0915	3/15/17	1702	-27.5	-3.5	567	FC0052								X		
5	1120-IA-031517	6LC		3/15/17	0925	3/15/17	1738	-27.5	-3	1687	FC0752								X		
6	1124-IA-031517	6LC		3/15/17	0946	3/15/17	1731	-25.5	-3.5	1737	FC1092								X		
7																					
8																					
9																					
10																					
11																					
12																					

Comments:
SHIPPED IN TWO BOXES W/ PRE PRINTED LABELS

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE / HYDROSI	3/16/17	0800	[illegible]	3-21-17	945

SAMPLE CONDITIONS

Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
—	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: AMANDA OSBORNE
SIGNATURE of SAMPLER: [signature]
DATE Signed (MM / DD / YY): 03/15/17

ORIGINAL

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro Solutions

Project #: **WO# : 10382350**

10382350

Courier: ☐ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 6637 5042 1850 / 1861

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☑ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Tin Can ☐ Other: Temp Blank rec: ☐ Yes ☑ No

Temp. (TO17 and TO13 samples only) (°C): X Corrected Temp (°C): X Thermom. Used: ☐ B88A912167504 ☐ 151401163 ☐ B88A0143310098 ☐ 151401164

Temp should be above freezing to 6°C Correction Factor: X Date & Initials of Person Examining Contents: 3-21-17 AK

Type of ice Received ☐ Blue ☐ Wet ☑ None

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Media: Air Can Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12.

Samples Received: Sim Scan cones, sampling cone

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION Field Data Required? ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Scott Unze Date: 03/21/17

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Data Validation

SVE Performance Monitoring Analytical Results

HydroSolutions

Data Validation Report – SVE Start-Up Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10378477
Sample Matrix	Air
Sample Start and End Dates	2/3/2017
Parameters Included	VOCs by EPA Method TO-15
Date Validated	3/15/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Two air samples from soil vapor extraction (SVE) system piping were collected in Summa canisters by HydroSolutions on February 3, 2017 to provide data on start-up conditions for the SVE system. The two samples were collected at sampling ports located prior to treatment by the granular activated carbon (GAC), and after treatment by the GAC. Points were selected to verify system operation and calculate contaminant loading to the GAC. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on February 6, 2017. Samples were received by Pace on February 8, 2017 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. The samples were analyzed according to EPA Method TO-15 on February 20, 2017.

Table 1 presents an inventory of the samples collected and analyzed as part of the SVE start-up sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
S-3 (GAC outlet)	10378477001	S3020317
S-1 (GAC inlet)	10378477002	S1020317

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required the collection of start-up SVE effluent samples to document start-up conditions for the SVE system to use for future comparison. During this sampling event, vapor was sampled from a sampling port, known as S-1, at the inlet to the GAC treatment unit as a pretreatment sample. Vapor was also collected at the effluent port, known as S-3, as a post-treatment sample. Tedlar bag samples were also collected at these locations on the same day for comparison.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs that are identified as contaminants of concern based on historic information of site contamination. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The careful selection of sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Both SVE vapor point samples were collected and analyzed in accordance with quality control objectives. No criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. A field duplicate sample was not collected for the documentation of SVE start-up conditions, because alternate method samples (Tedlar bags) were also collected. Therefore, no field duplicate was collected for this sampling event. As a result, field precision cannot be assessed by analyzing relative percent differences (RPDs) for original and duplicate field samples. No criteria are identified that affect the field precision of this data.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, and EPA Method TO-15, a method blank and a laboratory control sample were prepared and analyzed by Pace in a single laboratory quality control (QC) batch. These laboratory QC samples were used to assess laboratory and method accuracy. There were no qualifiers associated with any of the QC samples. Method blanks were free of analyte contamination, analyte recovery in laboratory control samples were within target recovery thresholds, and RPDs for sample duplicates are within target ranges. As a result, this data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15. Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

Data usability qualifiers are summarized in Table 2. The PCE result at the GAC inlet was qualified with an “A3” due to the high concentration of PCE detected in the samples. This high concentration required serial dilution in order to be analyzed. This reported qualifier does not introduce bias to the results. A review of field sheets, sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes.

Table 2. Qualified Data Summary

Sample ID	Lab ID	Analyte	Result (ug/m^3)	Qualifier	Reason for Qualification
S1020317	10378477002	PCE	148,000	A3	A3 - The sample was analyzed by serial dilution.

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	SVE Start-up Sampling by TO-15
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, Laboratory-supplied Summa canister sampling instructions
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/15/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	2/3/2017 M/D/YY
12. Sample collection end date	2/3/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s) TO15 Analysis of Volatile Organic Compounds (Vocs) In Air

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC Minneapolis, MN		
15. Laboratory project ID	10378477		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	Matrix spikes and matrix spike duplicates are not a requirement for EPA Method TO-15.

If no, explain

Lab matrix spikes and matrix spike duplicates are not a requirement of EPA Method TO-15.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks or duplicates were collected. All detected analytes are assumed to be attributable to the contaminants in the sample and the site. Blanks are not generally collected when sampling with Summa canisters.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A. Laboratory blanks were all ND. All canisters were 100% clean certified.

28a. Were all blank samples free of analyte contamination?	Yes ●	No ○	Comments: Lab blanks were all ND.
28b. Were field duplicates collected as required?	Yes ○	No ●	Comments:

If no, explain

No field duplicates were collected. Additional Tedlar Bag samples were collected per coordination with DEQ.

28c. Are field duplicate relative percent differences within data validation quality control limits?	Yes ○	No ●	Comments: N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)?	100	Comments:
31. Was the completeness goal met?	Yes ● No ○	Comments:

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples?	Yes ○	No ●	Comments:

Print Form | Save As | Open Instructions | Hide Instructions

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

February 22, 2017

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: DEQ08
Pace Project No.: 10378477

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on February 08, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: DEQ08
Pace Project No.: 10378477

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
Alaska Certification UST-107
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: DEQ08
Pace Project No.: 10378477

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10378477001	**S3020317**	Air	02/03/17 14:56	02/08/17 10:00
10378477002	**S1020317**	Air	02/03/17 15:11	02/08/17 10:00

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SAMPLE ANALYTE COUNT

Project: DEQ08
Pace Project No.: 10378477

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10378477001	**S3020317**	TO-15	CH1	6
10378477002	**S1020317**	TO-15	CH1	6

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ANALYTICAL RESULTS

Project: DEQ08
Pace Project No.: 10378477

Sample: S3020317 **Lab ID: 10378477001** Collected: 02/03/17 14:56 Received: 02/08/17 10:00 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.5	1.87		02/20/17 04:08	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.5	1.87		02/20/17 04:08	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.3	1.87		02/20/17 04:08	79-34-5	
Tetrachloroethene	**7.4**	ug/m3	2.6	1.87		02/20/17 04:08	127-18-4	
Trichloroethene	ND	ug/m3	1.0	1.87		02/20/17 04:08	79-01-6	
Vinyl chloride	ND	ug/m3	0.49	1.87		02/20/17 04:08	75-01-4	

Sample: S1020317 **Lab ID: 10378477002** Collected: 02/03/17 15:11 Received: 02/08/17 10:00 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		02/20/17 04:40	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		02/20/17 04:40	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.1		02/20/17 04:40	79-34-5	
Tetrachloroethene	**148000**	ug/m3	7410	10752		02/22/17 09:01	127-18-4	A3
Trichloroethene	**107**	ug/m3	1.2	2.1		02/20/17 04:40	79-01-6	
Vinyl chloride	ND	ug/m3	0.55	2.1		02/20/17 04:40	75-01-4	

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QUALITY CONTROL DATA

Project: DEQ08
Pace Project No.: 10378477

QC Batch: 460729 | Analysis Method: TO-15
QC Batch Method: TO-15 | Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 10378477001, 10378477002

METHOD BLANK: 2519946 | Matrix: Air
Associated Lab Samples: 10378477001, 10378477002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.70	02/19/17 17:37	
cis-1,2-Dichloroethene	ug/m3	ND	0.81	02/19/17 17:37	
Tetrachloroethene	ug/m3	ND	1.4	02/19/17 17:37	
trans-1,2-Dichloroethene	ug/m3	ND	0.81	02/19/17 17:37	
Trichloroethene	ug/m3	ND	0.55	02/19/17 17:37	
Vinyl chloride	ug/m3	ND	0.26	02/19/17 17:37	

LABORATORY CONTROL SAMPLE: 2519947

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	74.7	96.4	129	49-150	
cis-1,2-Dichloroethene	ug/m3	43.9	50.6	115	65-139	
Tetrachloroethene	ug/m3	72.4	79.0	109	60-142	
trans-1,2-Dichloroethene	ug/m3	41.9	50.5	120	67-137	
Trichloroethene	ug/m3	57.9	68.6	118	60-144	
Vinyl chloride	ug/m3	27	31.1	115	63-135	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: DEQ08
Pace Project No.: 10378477

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

A3 The sample was analyzed by serial dilution.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: DEQ08
Pace Project No.: 10378477

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10378477001	**S3020317**	TO-15	460729		
10378477002	**S1020317**	TO-15	460729		

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10378477

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

26604

Page: 1 of 1

Section A Required Client Information:

Company: HYDROSOLUTIONS
Address: 303 Clarke St Helena MT 59601
Email To: amandao@hydrosi.com
Phone: 4064436169 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: AMANDA OSBORNE
Copy To:
Purchase Order No.: media 10267790
Project Name:
Project Number: DEQ08

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager/Sales Rep. Carolynne Trout
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other____

Location of Sampling by State: MT

Reporting Units: ug/m³ ☒ mg/m³ ___ PPBV ___ PPMV ___ Other ___

Report Level II.___ III.___ IV.___ Other_____

Valid Media Codes

MEDIA	CODE
Tedlar Bag	TB
1 Liter Summa Can	1LC
6 Liter Summa Can	6LC
Low Volume Puff	LVP
High Volume Puff	HVP
Other	PM10

ITEM #	'Section D Required Client Information AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	PID Reading (Client only)	COLLECTED COMPOSITE START END/GRAB DATE	TIME	COMPOSITE - END/GRAB DATE	TIME	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	PM10	3C- Fixed Gas (%)	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	S3020317	1LC		2/3/17	1449	1456	2/3/17	26.5	3	874	FC0922								X		001
2	S1020317	1LC		2/3/17	1505	2/3/17	1511	24.5	3	2864	FC1200								X		002
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Comments :

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE / HSI	2/6/17	0800	[illegible]	2/8/17	1000

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: AMANDA OSBORNE

SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY) 02/03/17

SAMPLE CONDITIONS

Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
Amb	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

ORIGINAL

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro Solutions

Project #: WO#: 10378477

10378477

Courier: ☑ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other: _____

Tracking Number: 6637 5041 3028

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ Foam ☐ None ☐ Tin Can ☐ Other: _____ **Temp Blank rec:** ☐ Yes ☒ No

Temp. (TO17 and TO13 samples only) (°C): X **Corrected Temp (°C):** X **Thermom. Used:** ☐ B88A912167504 ☐ B88A0143310098 ☐ 151401163 ☐ 151401164

Temp should be above freezing to 6°C **Correction Factor:** X **Date & Initials of Person Examining Contents:** R 2817

Type of ice Received ☐ Blue ☐ Wet ☒ None

				Comments:
Chain of Custody Present?	☒ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☒ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☒ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☒ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☒ No	☐ N/A	7.
Sufficient Volume?	☒ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☒ Yes	☐ No	☐ N/A	
Containers Intact?	☒ Yes	☐ No	☐ N/A	10.
Media: (Air Can) Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☒ Yes	☐ No	☐ N/A	12.

Samples Received:

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: Scott Unze **Date:** 02/09/17

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Data Validation Report – SVE Start-Up Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Energy Laboratories, Inc.
Laboratory Project ID	H17020053
Sample Matrix	Air
Sample Start and End Dates	2/3/2017
Parameters Included	VOCs by EPA Method 8260
Date Validated	3/23/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Two air samples from soil vapor extraction (SVE) system piping were collected in Tedlar bags by HydroSolutions on February 3, 2017 to provide data on start-up conditions for the SVE system. The two samples were collected at sampling ports located prior to treatment by the granular activated carbon (GAC), and after treatment by the GAC. Points were selected to verify system operation and calculate contaminant loading to the GAC. Samples were hand-delivered to Energy Laboratories, Inc. in Helena, MT on February 3, 2017. Samples were analyzed for volatile organic compounds (VOCs) according to EPA Method 8260 on February 13, 2017.

Table 1 presents an inventory of the samples collected and analyzed as part of this SVE start-up sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
S-3 (GAC outlet)	H17020053-001	S3020317
S-1 (GAC inlet)	H17020053-002	S1020317

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required the collection of start-up SVE effluent samples to document start-up conditions for the SVE system to use for future comparison. During this sampling event, vapor was sampled from a sampling port, known as S-1, at the inlet to the GAC treatment unit as a pretreatment sample. Vapor was also collected at the effluent port, known as S-3, as a post-treatment sample. Summa canister samples were also collected at these

locations on the same day for comparison. Data validation for the Summa canister samples is presented in a separate data validation report.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs, which are identified as contaminants of concern based on historic information of site contamination. Samples were properly handled and delivered to the laboratory with no discrepancies or corrective actions noted on the chain of custody form or laboratory notes. The careful selection of sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Both SVE system vapor point samples were collected and analyzed in accordance with quality control objectives. No criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. Field duplicate samples were not collected for the documentation of SVE start-up conditions, because alternate method samples (Summa canisters) were also collected. Therefore, no field duplicate was collected for this sampling event. As a result, field precision cannot be assessed by analyzing relative percent differences (RPDs) for original and duplicate field samples. No other criteria are identified that affect the field precision of this data.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, the quality assurance and control (QA/QC) measures included analysis of a continuing calibration verification standard (CCV), laboratory control sample (LCS), and a method blank. These laboratory QA/QC were analyzed and prepared by Energy Laboratories, Inc. in a single laboratory quality control (QC) batch. These laboratory QC samples were used to assess laboratory and method accuracy. There was an “S” qualifier associated with Bromomethane in the LCS and the CCV, shown in table 2. Bromomethane is not a contaminate of concern at this site, and it was not detected above the reporting limits in either sample. Therefore, the “S” qualifier does not bias the results. Laboratory method blanks were free of analyte contamination. For all of these reasons, this data is considered accurate.

Table 2. Summary of Qualifiers in Laboratory QA/QC Report

Sample ID	Analyte	Lab IDs	Laboratory Qualifier	Reason for Qualification
Laboratory Control Sample	Bromomethane	AIRLCS021317_	S (high)	S - Spike recovery outside of advisory limits.
Continuing Calibration Verification Standard	Bromomethane	CCV021317_	S (low)	

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures and protocols. Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

No qualified data was reported for any analyte in the samples collected during this event. Therefore, there are no known biases introduced into the results. A review of field sheets, sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes.

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	SVE Start-up Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, standard protocols for Tedlar Bag sampling
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/23/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	2/3/2017 M/D/YY
12. Sample collection end date	2/3/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method: Analytical Method(s): SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17020053		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments:
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments: Samples were received at the lab within holding times.

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S for Bromomethane % recovery above high limit. No data qualified as a result because this compound was not detected in the samples.
18a. Were all calibration verification results within acceptable limits?	○	●	S for Bromomethane % recovery above high limit. No data qualified as a result because this compound was not detected in the samples.

If no, explain

	Yes	No	Comments
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	N/A

If no, explain

MS/MSD is not conducted for SW8260B Tedlar bag air samples

	Yes	No	Comments
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	Tedlar bag and Method 8260 approved per DEQ in lieu of TO-15.
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks or duplicate samples were collected. Analytes detected in the samples are assumed to be attributable to the site.

If no, explain

Collection of equipment, trip, or field blanks is not typically conducted for SW8260 Tedlar bag air samples.

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A
28a. Were all blank samples free of analyte contamination?	●	○	Laboratory blanks were all ND.
28b. Were field duplicates collected as required?	○	●	No field duplicates were collected. Additional Summa can samples were collected per coordination with DEQ for analysis with EPA Method TO-15.

If no, explain

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)?	100	Comments
31. Was the completeness goal met?	Yes ● No ○	Comments
32. Other general comments or observations?		

Split Samples

33. Did DEQ collect split samples?	Yes ○ No ●	Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

February 15, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17020053

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 2 samples for HydroSolutions on 2/3/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17020053-001	S3020317	02/03/17 15:00	02/03/17	Air	8260-Volatile Organic Compounds - Short List
H17020053-002	S1020317	02/03/17 15:20	02/03/17	Air	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17020053

Report Date: 02/15/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020053-001
Client Sample ID: S3020317

Report Date: 02/15/17
Collection Date: 02/03/17 15:00
DateReceived: 02/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	02/13/17 14:08 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Tetrachloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020053-001
Client Sample ID: S3020317

Report Date: 02/15/17
Collection Date: 02/03/17 15:00
DateReceived: 02/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	02/13/17 14:08 / eli-b
Surr: 1,2-Dichloroethane-d4	91.0	%REC		70-130		SW8260B	02/13/17 14:08 / eli-b
Surr: Dibromofluoromethane	94.0	%REC		77-126		SW8260B	02/13/17 14:08 / eli-b
Surr: p-Bromofluorobenzene	100	%REC		76-127		SW8260B	02/13/17 14:08 / eli-b
Surr: Toluene-d8	107	%REC		79-122		SW8260B	02/13/17 14:08 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020053-002
Client Sample ID: S1020317

Report Date: 02/15/17
Collection Date: 02/03/17 15:20
DateReceived: 02/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	02/13/17 14:45 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Tetrachloroethene	73	mg/m3		5.0		SW8260B	02/13/17 16:07 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020053-002
Client Sample ID: S1020317

Report Date: 02/15/17
Collection Date: 02/03/17 15:20
DateReceived: 02/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	02/13/17 14:45 / eli-b
Surr: 1,2-Dichloroethane-d4	92.0	%REC		70-130		SW8260B	02/13/17 14:45 / eli-b
Surr: Dibromofluoromethane	96.0	%REC		77-126		SW8260B	02/13/17 14:45 / eli-b
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	02/13/17 14:45 / eli-b
Surr: Toluene-d8	102	%REC		79-122		SW8260B	02/13/17 14:45 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/15/17

Project: DEQ 08 **Work Order:** H17020053

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R274822	
Lab ID: CCV021317_	Continuing Calibration Verification Standard							02/13/17 09:29	
Benzene	4.56	mg/m3	0.50	91	70	130			
Bromobenzene	4.80	mg/m3	0.50	96	70	130			
Bromochloromethane	4.60	mg/m3	0.50	92	70	130			
Bromodichloromethane	4.56	mg/m3	0.50	91	70	130			
Bromoform	4.48	mg/m3	0.50	90	70	130			
Bromomethane	6.96	mg/m3	0.50	139	70	130			S
Carbon tetrachloride	4.80	mg/m3	0.50	96	70	130			
Chlorobenzene	4.76	mg/m3	0.50	95	70	130			
Chlorodibromomethane	4.28	mg/m3	0.50	86	70	130			
Chloroethane	5.60	mg/m3	0.50	112	70	130			
Chloroform	4.48	mg/m3	0.50	90	80	120			
Chloromethane	5.56	mg/m3	0.50	111	70	130			
1,2-Dibromoethane	4.24	mg/m3	0.50	85	70	130			
2-Chlorotoluene	5.36	mg/m3	0.50	107	70	130			
Dibromomethane	4.72	mg/m3	0.50	94	70	130			
1,2-Dichlorobenzene	4.60	mg/m3	0.50	92	70	130			
4-Chlorotoluene	5.36	mg/m3	0.50	107	70	130			
1,4-Dichlorobenzene	4.76	mg/m3	0.50	95	70	130			
Dichlorodifluoromethane	6.16	mg/m3	0.50	123	70	130			
1,1-Dichloroethane	4.84	mg/m3	0.50	97	70	130			
1,2-Dichloroethane	3.96	mg/m3	0.50	79	70	130			
1,1-Dichloroethene	4.96	mg/m3	0.50	99	80	120			
cis-1,2-Dichloroethene	4.56	mg/m3	0.50	91	70	130			
trans-1,2-Dichloroethene	4.96	mg/m3	0.50	99	70	130			
1,2-Dichloropropane	4.52	mg/m3	0.50	90	80	120			
2,2-Dichloropropane	4.76	mg/m3	0.50	95	70	130			
1,1-Dichloropropene	5.04	mg/m3	0.50	101	70	130			
cis-1,3-Dichloropropene	4.44	mg/m3	0.50	89	70	130			
trans-1,3-Dichloropropene	4.44	mg/m3	0.50	89	70	130			
Ethylbenzene	5.28	mg/m3	0.50	106	80	120			
Methyl tert-butyl ether (MTBE)	3.92	mg/m3	0.50	78	70	130			
Methyl ethyl ketone	35.6	mg/m3	10	71	70	130			
Methylene chloride	4.32	mg/m3	0.50	86	70	130			
Styrene	4.80	mg/m3	0.50	96	70	130			
1,1,1,2-Tetrachloroethane	4.80	mg/m3	0.50	96	70	130			
1,1,2,2-Tetrachloroethane	4.04	mg/m3	0.50	81	70	130			
Tetrachloroethene	5.04	mg/m3	0.50	101	70	130			
Toluene	5.12	mg/m3	0.50	102	80	120			
1,1,1-Trichloroethane	4.80	mg/m3	0.50	96	70	130			
1,1,2-Trichloroethane	3.99	mg/m3	0.50	80	70	130			
Trichloroethene	5.12	mg/m3	0.50	102	70	130			
Trichlorofluoromethane	5.48	mg/m3	0.50	110	70	130			
1,2,3-Trichloropropane	4.04	mg/m3	0.50	81	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/15/17

Project: DEQ 08 **Work Order:** H17020053

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R274822	
Lab ID: CCV021317_	Continuing Calibration Verification Standard							02/13/17 09:29	
Vinyl chloride	5.52	mg/m3	0.50	110	80	120			
m+p-Xylenes	10.9	mg/m3	0.50	109	70	130			
o-Xylene	5.04	mg/m3	0.50	101	70	130			
Xylenes, Total	16.0	mg/m3	0.50	106	70	130			
Surr: 1,2-Dichloroethane-d4			0.50	88	75	125			
Surr: Dibromofluoromethane			0.50	90	85	119			
Surr: p-Bromofluorobenzene			0.50	101	85	122			
Surr: Toluene-d8			0.50	111	89	119			
Method: SW8260B								Batch: B_R274822	
Lab ID: AIRLCS021317_	Laboratory Control Sample				Run: SUB-B274822			02/13/17 12:11	
Benzene	4.92	mg/m3	0.50	98	65	131			
Bromobenzene	5.04	mg/m3	0.50	101	78	133			
Bromochloromethane	4.76	mg/m3	0.50	95	68	131			
Bromodichloromethane	5.32	mg/m3	0.50	106	67	138			
Bromoform	4.68	mg/m3	0.50	94	64	136			
Bromomethane	2.67	mg/m3	0.50	53	60	138			S
Carbon tetrachloride	4.96	mg/m3	0.50	99	61	144			
Chlorobenzene	5.20	mg/m3	0.50	104	78	136			
Chlorodibromomethane	5.04	mg/m3	0.50	101	72	136			
Chloroethane	5.00	mg/m3	0.50	100	64	136			
Chloroform	4.92	mg/m3	0.50	98	69	133			
Chloromethane	5.04	mg/m3	0.50	101	63	149			
1,2-Dibromoethane	4.16	mg/m3	0.50	83	75	131			
2-Chlorotoluene	5.72	mg/m3	0.50	114	74	135			
Dibromomethane	4.56	mg/m3	0.50	91	72	133			
1,2-Dichlorobenzene	4.92	mg/m3	0.50	96	78	129			
4-Chlorotoluene	5.60	mg/m3	0.50	112	79	135			
1,4-Dichlorobenzene	4.92	mg/m3	0.50	98	78	131			
Dichlorodifluoromethane	6.12	mg/m3	0.50	122	55	141			
1,1-Dichloroethane	4.32	mg/m3	0.50	86	72	130			
1,2-Dichloroethane	4.16	mg/m3	0.50	83	57	146			
1,1-Dichloroethene	5.52	mg/m3	0.50	110	66	142			
cis-1,2-Dichloroethene	5.20	mg/m3	0.50	104	74	133			
trans-1,2-Dichloroethene	5.72	mg/m3	0.50	114	76	138			
1,2-Dichloropropane	5.00	mg/m3	0.50	100	72	135			
2,2-Dichloropropane	2.26	mg/m3	0.50	45	42	167			
1,1-Dichloropropene	4.80	mg/m3	0.50	96	72	140			
cis-1,3-Dichloropropene	4.04	mg/m3	0.50	81	75	132			
trans-1,3-Dichloropropene	4.24	mg/m3	0.50	85	77	145			
Ethylbenzene	5.64	mg/m3	0.50	113	63	133			
Methyl tert-butyl ether (MTBE)	3.93	mg/m3	0.50	79	46	136			
Methyl ethyl ketone	33.8	mg/m3	10	68	38	132			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/15/17

Project: DEQ 08 **Work Order:** H17020053

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R274822
Lab ID: AIRLCS021317_	Laboratory Control Sample				Run: SUB-B274822				02/13/17 12:11
Methylene chloride	5.44	mg/m3	0.50	109	73	126			
Styrene	5.20	mg/m3	0.50	104	76	134			
1,1,1,2-Tetrachloroethane	5.08	mg/m3	0.50	102	75	135			
1,1,2,2-Tetrachloroethane	3.95	mg/m3	0.50	79	72	132			
Tetrachloroethene	5.44	mg/m3	0.50	109	78	137			
Toluene	5.60	mg/m3	0.50	112	66	132			
1,1,1-Trichloroethane	4.84	mg/m3	0.50	97	64	141			
1,1,2-Trichloroethane	4.40	mg/m3	0.50	88	72	133			
Trichloroethene	5.28	mg/m3	0.50	106	75	138			
Trichlorofluoromethane	4.84	mg/m3	0.50	97	58	139			
1,2,3-Trichloropropane	4.08	mg/m3	0.50	82	67	133			
Vinyl chloride	5.28	mg/m3	0.50	106	53	146			
m+p-Xylenes	11.5	mg/m3	0.50	115	64	134			
o-Xylene	5.56	mg/m3	0.50	111	61	132			
Xylenes, Total	17.1	mg/m3	0.50	114	72	128			
Surr: 1,2-Dichloroethane-d4			0.50	84	75	125			
Surr: Dibromofluoromethane			0.50	91	85	119			
Surr: p-Bromofluorobenzene			0.50	99	85	122			
Surr: Toluene-d8			0.50	108	89	119			
Lab ID: AIRBLK021317_	Method Blank				Run: SUB-B274822				02/13/17 13:26
Benzene	ND	mg/m3	0.50						
Bromobenzene	ND	mg/m3	0.50						
Bromochloromethane	ND	mg/m3	0.50						
Bromodichloromethane	ND	mg/m3	0.50						
Bromoform	ND	mg/m3	0.50						
Bromomethane	ND	mg/m3	0.50						
Carbon tetrachloride	ND	mg/m3	0.50						
Chlorobenzene	ND	mg/m3	0.50						
Chlorodibromomethane	ND	mg/m3	0.50						
Chloroethane	ND	mg/m3	0.50						
Chloroform	ND	mg/m3	0.50						
Chloromethane	ND	mg/m3	0.50						
1,2-Dibromoethane	ND	mg/m3	0.50						
2-Chlorotoluene	ND	mg/m3	0.50						
Dibromomethane	ND	mg/m3	0.50						
1,2-Dichlorobenzene	ND	mg/m3	0.50						
4-Chlorotoluene	ND	mg/m3	0.50						
1,4-Dichlorobenzene	ND	mg/m3	0.50						
Dichlorodifluoromethane	ND	mg/m3	0.50						
1,1-Dichloroethane	ND	mg/m3	0.50						
1,2-Dichloroethane	ND	mg/m3	0.50						
1,1-Dichloroethene	ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/15/17

Project: DEQ 08 **Work Order:** H17020053

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R274822
Lab ID: AIRBLK021317_	Method Blank				Run: SUB-B274822				02/13/17 13:26
cis-1,2-Dichloroethene	ND	mg/m3	0.50						
trans-1,2-Dichloroethene	ND	mg/m3	0.50						
1,2-Dichloropropane	ND	mg/m3	0.50						
2,2-Dichloropropane	ND	mg/m3	0.50						
1,1-Dichloropropene	ND	mg/m3	0.50						
cis-1,3-Dichloropropene	ND	mg/m3	0.50						
trans-1,3-Dichloropropene	ND	mg/m3	0.50						
Ethylbenzene	ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)	ND	mg/m3	0.50						
Methyl ethyl ketone	ND	mg/m3	10						
Methylene chloride	ND	mg/m3	0.50						
Styrene	ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane	ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane	ND	mg/m3	0.50						
Tetrachloroethene	ND	mg/m3	0.50						
Toluene	ND	mg/m3	0.50						
1,1,1-Trichloroethane	ND	mg/m3	0.50						
1,1,2-Trichloroethane	ND	mg/m3	0.50						
Trichloroethene	ND	mg/m3	0.50						
Trichlorofluoromethane	ND	mg/m3	0.50						
1,2,3-Trichloropropane	ND	mg/m3	0.50						
Vinyl chloride	ND	mg/m3	0.50						
m+p-Xylenes	ND	mg/m3	0.50						
o-Xylene	ND	mg/m3	0.50						
Xylenes, Total	ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	84	75	125			
Surr: Dibromofluoromethane			0.50	90	85	119			
Surr: p-Bromofluorobenzene			0.50	102	85	122			
Surr: Toluene-d8			0.50	107	89	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17020053

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\wjohnson

Reviewed Date: 2/15/2017

Date Received: 2/3/2017

Received by: TLL

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	8.7°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information (Billing information)

Company/Name	Hydro Solutions
Contact	Rye Svingen
Phone	406 443 0169
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	rys@hydros.com
Receive Invoice	☐ Hard Copy ☒ Email
Receive Report	☐ Hard Copy ☒ Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐ Hard Copy ☐ Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other _____

Comments

Project Information

Project Name, PWSID, Permit, etc.	Dry Ck
Sampler Name	Rye Svingen
Sampler Phone	406 443 0169 x 10
Sample Origin State	WY
EPA/State Compliance	☐ Yes ☒ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Analysis Requested: 8260	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1 SS020317	2/3/17	2/3/17 1500	1	A	X			H17020053
2 S1020317	2/3/17	1520	1	A	X			
3								
4								
5								
6								
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Rye Svingen	2/3/17 1545		Tracy Orozl	2/3/17 15:45	
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
Hand		Y (N) C B	Y N	8.7 °C	Y (N)	Y (N)	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Biweekly SVE Performance Monitoring - Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, standard procedures for sampling with Tedlar bags
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/3/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	2/21/2017 M/D/YY
12. Sample collection end date	2/21/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method: Analytical Method(s): SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17020260		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	
18a. Were all calibration verification results within acceptable limits?	○	●	S qualifier for Methyl ethyl ketone % recovery below low limit - does not bias results
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	N/A - no matrix spike or matrix spike duplicates for single-tedlar bag
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

Limitations of tedlar bag air sampling exists and laboratory duplicates are not practical.

	Yes	No	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	Tedlar bag and Method 8260 approved per DEQ in lieu of TO-15.
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	Field blanks not collected for air sampling (impractical). All analytes detected in the samples are assumed to be attributable to the site. Duplicates not collected, and this does not affect the interpretation of the results.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A- see above
28a. Were all blank samples free of analyte contamination?	●	○	laboratory blanks were all ND
28b. Were field duplicates collected as required?	○	●	

If no, explain

No field duplicates were collected. Additional Summa can samples were collected per coordination with DEQ for analysis with EPA Method TO-15.

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS

J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)? 100

Comments

31. Was the completeness goal met? Yes ● No ○

Comments

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples? Yes ○ No ●

Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

February 28, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17020260

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 2/21/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17020260-001	S-1-022117	02/21/17 10:30	02/21/17	Air	8260-Volatile Organic Compounds - Short List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17020260

Report Date: 02/28/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020260-001
Client Sample ID: S-1-022117

Report Date: 02/28/17
Collection Date: 02/21/17 10:30
DateReceived: 02/21/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	02/24/17 14:00 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Tetrachloroethene	158	mg/m3		5.0		SW8260B	02/24/17 14:33 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17020260-001
Client Sample ID: S-1-022117

Report Date: 02/28/17
Collection Date: 02/21/17 10:30
DateReceived: 02/21/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	02/24/17 14:00 / eli-b
Surr: 1,2-Dichloroethane-d4	90.0	%REC		70-130		SW8260B	02/24/17 14:00 / eli-b
Surr: Dibromofluoromethane	94.0	%REC		77-126		SW8260B	02/24/17 14:00 / eli-b
Surr: p-Bromofluorobenzene	99.0	%REC		76-127		SW8260B	02/24/17 14:00 / eli-b
Surr: Toluene-d8	102	%REC		79-122		SW8260B	02/24/17 14:00 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/28/17

Project: DEQ 08 **Work Order:** H17020260

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R275389	
Lab ID: CCV024217_	51	Continuing Calibration Verification Standard							02/24/17 10:05	
Benzene		4.88	mg/m3	0.50	98	70	130			
Bromobenzene		4.84	mg/m3	0.50	97	70	130			
Bromochloromethane		5.40	mg/m3	0.50	108	70	130			
Bromodichloromethane		4.84	mg/m3	0.50	97	70	130			
Bromoform		4.80	mg/m3	0.50	96	70	130			
Bromomethane		5.24	mg/m3	0.50	105	70	130			
Carbon tetrachloride		4.96	mg/m3	0.50	99	70	130			
Chlorobenzene		5.04	mg/m3	0.50	101	70	130			
Chlorodibromomethane		4.64	mg/m3	0.50	93	70	130			
Chloroethane		4.68	mg/m3	0.50	94	70	130			
Chloroform		4.84	mg/m3	0.50	97	80	120			
Chloromethane		5.08	mg/m3	0.50	102	70	130			
1,2-Dibromoethane		4.56	mg/m3	0.50	91	70	130			
2-Chlorotoluene		5.36	mg/m3	0.50	107	70	130			
Dibromomethane		5.00	mg/m3	0.50	100	70	130			
1,2-Dichlorobenzene		4.72	mg/m3	0.50	94	70	130			
4-Chlorotoluene		5.32	mg/m3	0.50	106	70	130			
1,4-Dichlorobenzene		4.84	mg/m3	0.50	97	70	130			
Dichlorodifluoromethane		5.44	mg/m3	0.50	109	70	130			
1,1-Dichloroethane		5.20	mg/m3	0.50	104	70	130			
1,2-Dichloroethane		4.12	mg/m3	0.50	82	70	130			
1,1-Dichloroethene		5.32	mg/m3	0.50	106	80	120			
cis-1,2-Dichloroethene		4.68	mg/m3	0.50	94	70	130			
trans-1,2-Dichloroethene		5.36	mg/m3	0.50	107	70	130			
1,2-Dichloropropane		4.92	mg/m3	0.50	98	80	120			
2,2-Dichloropropane		4.00	mg/m3	0.50	80	70	130			
1,1-Dichloropropene		5.12	mg/m3	0.50	102	70	130			
cis-1,3-Dichloropropene		4.52	mg/m3	0.50	90	70	130			
trans-1,3-Dichloropropene		4.28	mg/m3	0.50	86	70	130			
Ethylbenzene		5.48	mg/m3	0.50	110	80	120			
Methyl tert-butyl ether (MTBE)		3.88	mg/m3	0.50	78	70	130			
Methyl ethyl ketone		34.6	mg/m3	10	69	70	130			S
Methylene chloride		4.32	mg/m3	0.50	86	70	130			
Styrene		5.12	mg/m3	0.50	102	70	130			
1,1,1,2-Tetrachloroethane		4.96	mg/m3	0.50	99	70	130			
1,1,2,2-Tetrachloroethane		4.08	mg/m3	0.50	82	70	130			
Tetrachloroethene		5.52	mg/m3	0.50	110	70	130			
Toluene		5.68	mg/m3	0.50	114	80	120			
1,1,1-Trichloroethane		5.04	mg/m3	0.50	101	70	130			
1,1,2-Trichloroethane		4.36	mg/m3	0.50	87	70	130			
Trichloroethene		5.36	mg/m3	0.50	107	70	130			
Trichlorofluoromethane		5.04	mg/m3	0.50	101	70	130			
1,2,3-Trichloropropane		4.24	mg/m3	0.50	85	70	130			
Vinyl chloride		4.80	mg/m3	0.50	96	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/28/17

Project: DEQ 08 **Work Order:** H17020260

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R275389	
Lab ID: CCV024217_	51	Continuing Calibration Verification Standard							02/24/17 10:05	
m+p-Xylenes		11.5	mg/m3	0.50	115	70	130			
o-Xylene		5.24	mg/m3	0.50	105	70	130			
Xylenes, Total		16.7	mg/m3	0.50	111	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	84	75	125			
Surr: Dibromofluoromethane				0.50	94	85	119			
Surr: p-Bromofluorobenzene				0.50	95	85	122			
Surr: Toluene-d8				0.50	111	89	119			
Method: SW8260B									Batch: B_R275389	
Lab ID: AIRLCS024217_	51	Laboratory Control Sample				Run: SUB-B275389			02/24/17 11:29	
Benzene		4.64	mg/m3	0.50	93	65	131			
Bromobenzene		5.04	mg/m3	0.50	101	78	133			
Bromochloromethane		5.20	mg/m3	0.50	104	68	131			
Bromodichloromethane		5.08	mg/m3	0.50	102	67	138			
Bromoform		4.64	mg/m3	0.50	93	64	136			
Bromomethane		3.40	mg/m3	0.50	68	60	138			
Carbon tetrachloride		4.88	mg/m3	0.50	98	61	144			
Chlorobenzene		5.00	mg/m3	0.50	100	78	136			
Chlorodibromomethane		4.88	mg/m3	0.50	98	72	136			
Chloroethane		4.60	mg/m3	0.50	92	64	136			
Chloroform		4.68	mg/m3	0.50	94	69	133			
Chloromethane		4.56	mg/m3	0.50	91	63	149			
1,2-Dibromoethane		3.97	mg/m3	0.50	79	75	131			
2-Chlorotoluene		5.32	mg/m3	0.50	106	74	135			
Dibromomethane		4.60	mg/m3	0.50	92	72	133			
1,2-Dichlorobenzene		4.80	mg/m3	0.50	96	78	129			
4-Chlorotoluene		5.04	mg/m3	0.50	101	79	135			
1,4-Dichlorobenzene		4.72	mg/m3	0.50	94	78	131			
Dichlorodifluoromethane		5.72	mg/m3	0.50	114	55	141			
1,1-Dichloroethane		5.04	mg/m3	0.50	101	72	130			
1,2-Dichloroethane		3.94	mg/m3	0.50	79	57	146			
1,1-Dichloroethene		5.00	mg/m3	0.50	100	66	142			
cis-1,2-Dichloroethene		5.08	mg/m3	0.50	102	74	133			
trans-1,2-Dichloroethene		5.36	mg/m3	0.50	107	76	138			
1,2-Dichloropropane		4.76	mg/m3	0.50	95	72	135			
2,2-Dichloropropane		3.40	mg/m3	0.50	68	42	167			
1,1-Dichloropropene		4.40	mg/m3	0.50	88	72	140			
cis-1,3-Dichloropropene		4.04	mg/m3	0.50	81	75	132			
trans-1,3-Dichloropropene		4.08	mg/m3	0.50	82	77	145			
Ethylbenzene		5.20	mg/m3	0.50	104	63	133			
Methyl tert-butyl ether (MTBE)		3.72	mg/m3	0.50	74	46	136			
Methyl ethyl ketone		33.9	mg/m3	10	68	38	132			
Methylene chloride		5.36	mg/m3	0.50	107	73	126			
Styrene		5.04	mg/m3	0.50	101	76	134			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/28/17

Project: DEQ 08 **Work Order:** H17020260

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R275389
Lab ID: AIRLCS024217_	51	Laboratory Control Sample				Run: SUB-B275389				02/24/17 11:29
1,1,1,2-Tetrachloroethane		4.84	mg/m3	0.50	97	75	135			
1,1,2,2-Tetrachloroethane		3.68	mg/m3	0.50	74	72	132			
Tetrachloroethene		5.20	mg/m3	0.50	104	78	137			
Toluene		5.40	mg/m3	0.50	108	66	132			
1,1,1-Trichloroethane		4.60	mg/m3	0.50	92	64	141			
1,1,2-Trichloroethane		4.04	mg/m3	0.50	81	72	133			
Trichloroethene		5.04	mg/m3	0.50	101	75	138			
Trichlorofluoromethane		4.44	mg/m3	0.50	89	58	139			
1,2,3-Trichloropropane		3.52	mg/m3	0.50	70	67	133			
Vinyl chloride		4.80	mg/m3	0.50	96	53	146			
m+p-Xylenes		10.8	mg/m3	0.50	108	64	134			
o-Xylene		5.20	mg/m3	0.50	104	61	132			
Xylenes, Total		16.0	mg/m3	0.50	107	72	128			
Surr: 1,2-Dichloroethane-d4				0.50	88	75	125			
Surr: Dibromofluoromethane				0.50	92	85	119			
Surr: p-Bromofluorobenzene				0.50	98	85	122			
Surr: Toluene-d8				0.50	111	89	119			
Lab ID: AIRBLK024217_	51	Method Blank				Run: SUB-B275389				02/24/17 12:14
Benzene		ND	mg/m3	0.50						
Bromobenzene		ND	mg/m3	0.50						
Bromochloromethane		ND	mg/m3	0.50						
Bromodichloromethane		ND	mg/m3	0.50						
Bromoform		ND	mg/m3	0.50						
Bromomethane		ND	mg/m3	0.50						
Carbon tetrachloride		ND	mg/m3	0.50						
Chlorobenzene		ND	mg/m3	0.50						
Chlorodibromomethane		ND	mg/m3	0.50						
Chloroethane		ND	mg/m3	0.50						
Chloroform		ND	mg/m3	0.50						
Chloromethane		ND	mg/m3	0.50						
1,2-Dibromoethane		ND	mg/m3	0.50						
2-Chlorotoluene		ND	mg/m3	0.50						
Dibromomethane		ND	mg/m3	0.50						
1,2-Dichlorobenzene		ND	mg/m3	0.50						
4-Chlorotoluene		ND	mg/m3	0.50						
1,4-Dichlorobenzene		ND	mg/m3	0.50						
Dichlorodifluoromethane		ND	mg/m3	0.50						
1,1-Dichloroethane		ND	mg/m3	0.50						
1,2-Dichloroethane		ND	mg/m3	0.50						
1,1-Dichloroethene		ND	mg/m3	0.50						
cis-1,2-Dichloroethene		ND	mg/m3	0.50						
trans-1,2-Dichloroethene		ND	mg/m3	0.50						
1,2-Dichloropropane		ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 02/28/17

Project: DEQ 08 **Work Order:** H17020260

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R275389	
Lab ID: AIRBLK024217_	51	Method Blank				Run: SUB-B275389			02/24/17 12:14	
2,2-Dichloropropane		ND	mg/m3	0.50						
1,1-Dichloropropene		ND	mg/m3	0.50						
cis-1,3-Dichloropropene		ND	mg/m3	0.50						
trans-1,3-Dichloropropene		ND	mg/m3	0.50						
Ethylbenzene		ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)		ND	mg/m3	0.50						
Methyl ethyl ketone		ND	mg/m3	10						
Methylene chloride		ND	mg/m3	0.50						
Styrene		ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane		ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane		ND	mg/m3	0.50						
Tetrachloroethene		ND	mg/m3	5.0						
Toluene		ND	mg/m3	0.50						
1,1,1-Trichloroethane		ND	mg/m3	0.50						
1,1,2-Trichloroethane		ND	mg/m3	0.50						
Trichloroethene		ND	mg/m3	0.50						
Trichlorofluoromethane		ND	mg/m3	0.50						
1,2,3-Trichloropropane		ND	mg/m3	0.50						
Vinyl chloride		ND	mg/m3	0.50						
m+p-Xylenes		ND	mg/m3	0.50						
o-Xylene		ND	mg/m3	0.50						
Xylenes, Total		ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	86	75	125			
Surr: Dibromofluoromethane				0.50	95	85	119			
Surr: p-Bromofluorobenzene				0.50	100	85	122			
Surr: Toluene-d8				0.50	109	89	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17020260

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\acarlson

Reviewed Date: 2/28/2017

Date Received: 2/21/2017

Received by: TLL

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	18.3°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

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Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information *(Billing information)*

Company/Name	HydroSolutions
Contact	Amanda Osborne
Phone	406-443-6169 X106
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	amanda@hydrosi.com
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	
Bottle Order	

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	A OSBORNE
Sampler Phone	465-8330
Sample Origin State	MT
EPA/State Compliance	☐ Yes ☒ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W- Water
S - Soils/ Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Analysis Requested

Sample Identification *(Name, Location, Interval, etc.)*	Collection Date	Collection Time	Number of Containers	Matrix *(See Codes Above)*	8260	See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
1 S-1-022117	02/21/17	1030	1	A	X			H7020260
2								
3								
4								
5								
6								
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	AMANDA OSBORNE	02/21/17 1105	Amanda Osborne	Tracy Grant	2/21/17 11:05	Tracy Grant
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number *(cash/check only)*
Hand	4	Y (N) C B	Y N	18.3 °C	Y (N)	Y (N)	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Biweekly SVE Performance Monitoring - Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, standard Tedlar Bag sampling procedures.
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/3/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	3/7/2017 M/D/YY
12. Sample collection end date	3/7/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method: Analytical Method(s): SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17030093		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments:
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ○	No ●	Comments: No collection time was noted on the Tedlar bag. The time from the CoC was used. Only one sample collected and does not bias results.

	Yes	No	Comments
17a. Were chain-of-custody forms complete?	●	○	
17b. Were samples received in good condition, preserved, and at appropriate temperature (VOA no headspace, appropriate pH, temperature 4° C +/- 2° for most samples)?	●	○	
17c. Were the samples analyzed within method-specified or technical holding times?	●	○	
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S qualifier in laboratory control sample for Bromomethane % recovery below low limit - does not bias results.
18a. Were all calibration verification results within acceptable limits?	○	●	S qualifier for 2,2-Dichloropropane % recovery above high limit - does not bias results
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	N/A - no matrix spike or matrix spike duplicates for single-tedlar bag for this method
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	LCS results were within limits. No LCS duplicate performed.
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	○	●	N/A - no laboratory duplicates for single-tedlar bag

If no, explain

Limitations of tedlar bag air sampling render laboratory duplicates impractical.

	Yes	No	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	Tedlar bag and Method 8260 approved per DEQ in lieu of TO-15.
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks or duplicates were collected. All analytes detected in the samples are assumed to be attributable to the site.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A
28a. Were all blank samples free of analyte contamination?	●	○	Lab blanks were all ND
28b. Were field duplicates collected as required?	○	●	N/A

If no, explain

No field duplicates were collected for SVE performance monitoring.

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

N/A

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)? 100 Comments

31. Was the completeness goal met? Yes ● No ○ Comments

32. Other general comments or observations?

Results deemed complete and usable.

Split Samples

33. Did DEQ collect split samples? Yes ○ No ● Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

March 22, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17030093

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 3/7/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17030093-001	S1030717	03/07/17 11:00	03/07/17	Air	8260-Volatile Organic Compounds - Short List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17030093

Report Date: 03/22/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030093-001
Client Sample ID: S1030717

Report Date: 03/22/17
Collection Date: 03/07/17 11:00
DateReceived: 03/07/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	03/14/17 14:14 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Tetrachloroethene	126	mg/m3		5.0		SW8260B	03/14/17 14:51 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030093-001
Client Sample ID: S1030717

Report Date: 03/22/17
Collection Date: 03/07/17 11:00
DateReceived: 03/07/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	03/14/17 14:14 / eli-b
Surr: 1,2-Dichloroethane-d4	106	%REC		70-130		SW8260B	03/14/17 14:14 / eli-b
Surr: Dibromofluoromethane	105	%REC		77-126		SW8260B	03/14/17 14:14 / eli-b
Surr: p-Bromofluorobenzene	114	%REC		76-127		SW8260B	03/14/17 14:14 / eli-b
Surr: Toluene-d8	103	%REC		79-122		SW8260B	03/14/17 14:14 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/22/17

Project: DEQ 08 **Work Order:** H17030093

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R276367	
Lab ID: CCV031417_	Continuing Calibration Verification Standard							03/14/17 09:50	
Benzene	4.92	mg/m3	0.50	98	70	130			
Bromobenzene	4.96	mg/m3	0.50	99	70	130			
Bromochloromethane	4.84	mg/m3	0.50	97	70	130			
Bromodichloromethane	4.72	mg/m3	0.50	94	70	130			
Bromoform	4.96	mg/m3	0.50	99	70	130			
Bromomethane	5.24	mg/m3	0.50	105	70	130			
Carbon tetrachloride	4.84	mg/m3	0.50	97	70	130			
Chlorobenzene	4.76	mg/m3	0.50	95	70	130			
Chlorodibromomethane	4.92	mg/m3	0.50	98	70	130			
Chloroethane	5.68	mg/m3	0.50	114	70	130			
Chloroform	4.84	mg/m3	0.50	97	80	120			
Chloromethane	4.88	mg/m3	0.50	98	70	130			
1,2-Dibromoethane	4.92	mg/m3	0.50	98	70	130			
2-Chlorotoluene	4.96	mg/m3	0.50	99	70	130			
Dibromomethane	4.68	mg/m3	0.50	94	70	130			
1,2-Dichlorobenzene	4.80	mg/m3	0.50	96	70	130			
4-Chlorotoluene	5.04	mg/m3	0.50	101	70	130			
1,4-Dichlorobenzene	4.84	mg/m3	0.50	97	70	130			
Dichlorodifluoromethane	4.92	mg/m3	0.50	98	70	130			
1,1-Dichloroethane	5.28	mg/m3	0.50	106	70	130			
1,2-Dichloroethane	4.88	mg/m3	0.50	98	70	130			
1,1-Dichloroethene	4.52	mg/m3	0.50	90	80	120			
cis-1,2-Dichloroethene	4.80	mg/m3	0.50	96	70	130			
trans-1,2-Dichloroethene	4.56	mg/m3	0.50	91	70	130			
1,2-Dichloropropane	4.76	mg/m3	0.50	95	80	120			
2,2-Dichloropropane	9.44	mg/m3	0.50	189	70	130			S
1,1-Dichloropropene	4.88	mg/m3	0.50	98	70	130			
cis-1,3-Dichloropropene	5.28	mg/m3	0.50	106	70	130			
trans-1,3-Dichloropropene	5.32	mg/m3	0.50	106	70	130			
Ethylbenzene	4.84	mg/m3	0.50	97	80	120			
Methyl tert-butyl ether (MTBE)	5.20	mg/m3	0.50	104	70	130			
Methyl ethyl ketone	46.8	mg/m3	10	94	70	130			
Methylene chloride	4.52	mg/m3	0.50	90	70	130			
Styrene	4.76	mg/m3	0.50	95	70	130			
1,1,1,2-Tetrachloroethane	4.52	mg/m3	0.50	90	70	130			
1,1,2,2-Tetrachloroethane	5.00	mg/m3	0.50	100	70	130			
Tetrachloroethene	4.48	mg/m3	0.50	90	70	130			
Toluene	4.88	mg/m3	0.50	98	80	120			
1,1,1-Trichloroethane	4.80	mg/m3	0.50	96	70	130			
1,1,2-Trichloroethane	4.96	mg/m3	0.50	99	70	130			
Trichloroethene	4.92	mg/m3	0.50	98	70	130			
Trichlorofluoromethane	4.64	mg/m3	0.50	93	70	130			
1,2,3-Trichloropropane	5.20	mg/m3	0.50	104	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/22/17

Project: DEQ 08 **Work Order:** H17030093

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R276367	
Lab ID: CCV031417_	Continuing Calibration Verification Standard							03/14/17 09:50	
Vinyl chloride	5.04	mg/m3	0.50	101	80	120			
m+p-Xylenes	9.88	mg/m3	0.50	99	70	130			
o-Xylene	4.80	mg/m3	0.50	96	70	130			
Xylenes, Total	14.7	mg/m3	0.50	98	70	130			
Surr: 1,2-Dichloroethane-d4			0.50	100	75	125			
Surr: Dibromofluoromethane			0.50	110	85	119			
Surr: p-Bromofluorobenzene			0.50	107	85	122			
Surr: Toluene-d8			0.50	107	89	119			
Method: SW8260B								Batch: B_R276367	
Lab ID: AIRLCS031417_	Laboratory Control Sample				Run: SUB-B276367			03/14/17 13:00	
Benzene	4.84	mg/m3	0.50	97	65	131			
Bromobenzene	5.16	mg/m3	0.50	103	78	133			
Bromochloromethane	5.04	mg/m3	0.50	101	68	131			
Bromodichloromethane	5.20	mg/m3	0.50	104	67	138			
Bromoform	5.04	mg/m3	0.50	101	64	136			
Bromomethane	2.16	mg/m3	0.50	43	60	138			S
Carbon tetrachloride	4.60	mg/m3	0.50	92	61	144			
Chlorobenzene	4.80	mg/m3	0.50	96	78	136			
Chlorodibromomethane	5.16	mg/m3	0.50	103	72	136			
Chloroethane	5.40	mg/m3	0.50	108	64	136			
Chloroform	4.88	mg/m3	0.50	98	69	133			
Chloromethane	4.76	mg/m3	0.50	95	63	149			
1,2-Dibromoethane	4.48	mg/m3	0.50	90	75	131			
2-Chlorotoluene	5.12	mg/m3	0.50	102	74	135			
Dibromomethane	4.96	mg/m3	0.50	99	72	133			
1,2-Dichlorobenzene	5.04	mg/m3	0.50	101	78	129			
4-Chlorotoluene	4.96	mg/m3	0.50	99	79	135			
1,4-Dichlorobenzene	4.84	mg/m3	0.50	97	78	131			
Dichlorodifluoromethane	5.12	mg/m3	0.50	102	55	141			
1,1-Dichloroethane	4.96	mg/m3	0.50	99	72	130			
1,2-Dichloroethane	4.68	mg/m3	0.50	94	57	146			
1,1-Dichloroethene	4.64	mg/m3	0.50	93	66	142			
cis-1,2-Dichloroethene	5.20	mg/m3	0.50	104	74	133			
trans-1,2-Dichloroethene	4.76	mg/m3	0.50	95	76	138			
1,2-Dichloropropane	4.76	mg/m3	0.50	95	72	135			
2,2-Dichloropropane	4.28	mg/m3	0.50	86	42	167			
1,1-Dichloropropene	4.32	mg/m3	0.50	86	72	140			
cis-1,3-Dichloropropene	5.00	mg/m3	0.50	100	75	132			
trans-1,3-Dichloropropene	5.48	mg/m3	0.50	110	77	145			
Ethylbenzene	4.64	mg/m3	0.50	93	63	133			
Methyl tert-butyl ether (MTBE)	5.36	mg/m3	0.50	107	46	136			
Methyl ethyl ketone	39.4	mg/m3	10	79	38	132			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/22/17

Project: DEQ 08 **Work Order:** H17030093

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R276367
Lab ID: AIRLCS031417_	Laboratory Control Sample				Run: SUB-B276367				03/14/17 13:00
Methylene chloride	5.84	mg/m3	0.50	117	73	126			
Styrene	4.68	mg/m3	0.50	94	76	134			
1,1,1,2-Tetrachloroethane	4.52	mg/m3	0.50	90	75	135			
1,1,2,2-Tetrachloroethane	4.20	mg/m3	0.50	84	72	132			
Tetrachloroethene	4.44	mg/m3	0.50	89	78	137			
Toluene	4.76	mg/m3	0.50	95	66	132			
1,1,1-Trichloroethane	4.28	mg/m3	0.50	86	64	141			
1,1,2-Trichloroethane	4.64	mg/m3	0.50	93	72	133			
Trichloroethene	4.48	mg/m3	0.50	90	75	138			
Trichlorofluoromethane	4.36	mg/m3	0.50	87	58	139			
1,2,3-Trichloropropane	4.72	mg/m3	0.50	94	67	133			
Vinyl chloride	5.04	mg/m3	0.50	101	53	146			
m+p-Xylenes	9.44	mg/m3	0.50	94	64	134			
o-Xylene	4.68	mg/m3	0.50	94	61	132			
Xylenes, Total	14.1	mg/m3	0.50	94	72	128			
Surr: 1,2-Dichloroethane-d4			0.50	100	75	125			
Surr: Dibromofluoromethane			0.50	104	85	119			
Surr: p-Bromofluorobenzene			0.50	106	85	122			
Surr: Toluene-d8			0.50	104	89	119			
Lab ID: AIRBLK031417_	Method Blank				Run: SUB-B276367				03/14/17 13:40
Benzene	ND	mg/m3	0.50						
Bromobenzene	ND	mg/m3	0.50						
Bromochloromethane	ND	mg/m3	0.50						
Bromodichloromethane	ND	mg/m3	0.50						
Bromoform	ND	mg/m3	0.50						
Bromomethane	ND	mg/m3	0.50						
Carbon tetrachloride	ND	mg/m3	0.50						
Chlorobenzene	ND	mg/m3	0.50						
Chlorodibromomethane	ND	mg/m3	0.50						
Chloroethane	ND	mg/m3	0.50						
Chloroform	ND	mg/m3	0.50						
Chloromethane	ND	mg/m3	0.50						
1,2-Dibromoethane	ND	mg/m3	0.50						
2-Chlorotoluene	ND	mg/m3	0.50						
Dibromomethane	ND	mg/m3	0.50						
1,2-Dichlorobenzene	ND	mg/m3	0.50						
4-Chlorotoluene	ND	mg/m3	0.50						
1,4-Dichlorobenzene	ND	mg/m3	0.50						
Dichlorodifluoromethane	ND	mg/m3	0.50						
1,1-Dichloroethane	ND	mg/m3	0.50						
1,2-Dichloroethane	ND	mg/m3	0.50						
1,1-Dichloroethene	ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/22/17

Project: DEQ 08 **Work Order:** H17030093

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R276367
Lab ID: AIRBLK031417_	Method Blank				Run: SUB-B276367				03/14/17 13:40
cis-1,2-Dichloroethene	ND	mg/m3	0.50						
trans-1,2-Dichloroethene	ND	mg/m3	0.50						
1,2-Dichloropropane	ND	mg/m3	0.50						
2,2-Dichloropropane	ND	mg/m3	0.50						
1,1-Dichloropropene	ND	mg/m3	0.50						
cis-1,3-Dichloropropene	ND	mg/m3	0.50						
trans-1,3-Dichloropropene	ND	mg/m3	0.50						
Ethylbenzene	ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)	ND	mg/m3	0.50						
Methyl ethyl ketone	ND	mg/m3	10						
Methylene chloride	ND	mg/m3	0.50						
Styrene	ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane	ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane	ND	mg/m3	0.50						
Tetrachloroethene	ND	mg/m3	5.0						
Toluene	ND	mg/m3	0.50						
1,1,1-Trichloroethane	ND	mg/m3	0.50						
1,1,2-Trichloroethane	ND	mg/m3	0.50						
Trichloroethene	ND	mg/m3	0.50						
Trichlorofluoromethane	ND	mg/m3	0.50						
1,2,3-Trichloropropane	ND	mg/m3	0.50						
Vinyl chloride	ND	mg/m3	0.50						
m+p-Xylenes	ND	mg/m3	0.50						
o-Xylene	ND	mg/m3	0.50						
Xylenes, Total	ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	94	75	125			
Surr: Dibromofluoromethane			0.50	104	85	119			
Surr: p-Bromofluorobenzene			0.50	110	85	122			
Surr: Toluene-d8			0.50	106	89	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17030093

Login completed by: Brandy J. Seher

Reviewed by: BL2000\sdull

Reviewed Date: 3/8/2017

Date Received: 3/7/2017

Received by: bjs

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	23.4°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

No collection time on Tedlar Bag. Logged in with time from COC. BS 03/08/2017

ENERGY LAB
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	HYDROSOLUTIONS
Contact	AMANDA OSBORNE
Phone	443-6169 x106
Mailing Address	303 Clarke
City, State, Zip	Helena MT
Email	amanda@hydrosi.com
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	A OSBORNE
Sampler Phone	
Sample Origin State	MT
EPA/State Compliance	☐ Yes ☐ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Analysis Requested

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	8260 Short									See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	S1030717	3/7/17	1100	1	A	X											H17030093
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	AMANDA OSBORNE	3/7/17 1130	Amanda Osborne			
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				B. Seiler	3/7/17 11:36	Brandy Schur

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
hand del	395	Y (N) C B	Y N	23.4 °C	Y (N)	Y (N)	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Biweekly SVE Performance Monitoring - Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, standard methods for collection of air samples using Tedlar bags
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/3/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	3/20/2017 M/D/YY
12. Sample collection end date	3/20/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method: Analytical Method(s): SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17030287		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S qualifier in laboratory control sample for Bromochloromethane % recovery above high limit - does not bias results.
18a. Were all calibration verification results within acceptable limits?	●	○	
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	N/A - no matrix spike or matrix spike duplicates for single-tedlar bag
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	LCS samples met criteria. No laboratory control sample duplicates for single-tedlar bag (impractical)
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	○	●	N/A - no laboratory duplicates for single-tedlar bag (impractical)

If no, explain

Limitations of tedlar bag air sampling render laboratory duplicates impractical.

	Yes	No	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	Tedlar bag and Method 8260 approved per DEQ in lieu of TO-15.
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks were collected, and all detected analytes are assumed to be attributable to the site. No duplicates were collected, which does not affect the interpretation of the results.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A
28a. Were all blank samples free of analyte contamination?	●	○	Lab blanks were all ND
28b. Were field duplicates collected as required?	○	●	N/A

If no, explain

No field duplicates were collected for SVE performance monitoring.

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low

J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)? 100

Comments

31. Was the completeness goal met? Yes ● No ○

Comments

32. Other general comments or observations?

Results deemed complete and usable.

Split Samples

33. Did DEQ collect split samples? Yes ○ No ●

Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

March 29, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17030287

Project Name: Helena Solvent Site

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 3/20/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17030287-001	S1-032017	03/20/17 14:30	03/20/17	Air	8260-Volatile Organic Compounds - Short List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: Helena Solvent Site
Work Order: H17030287

Report Date: 03/29/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H17030287-001
Client Sample ID: S1-032017

Report Date: 03/29/17
Collection Date: 03/20/17 14:30
DateReceived: 03/20/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	03/28/17 14:55 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Tetrachloroethene	64	mg/m3		5.0		SW8260B	03/28/17 15:35 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H17030287-001
Client Sample ID: S1-032017

Report Date: 03/29/17
Collection Date: 03/20/17 14:30
DateReceived: 03/20/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	03/28/17 14:55 / eli-b
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	03/28/17 14:55 / eli-b
Surr: Dibromofluoromethane	98.0	%REC		77-126		SW8260B	03/28/17 14:55 / eli-b
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	03/28/17 14:55 / eli-b
Surr: Toluene-d8	99.0	%REC		79-122		SW8260B	03/28/17 14:55 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/29/17

Project: Helena Solvent Site **Work Order:** H17030287

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R277054	
Lab ID: CCV032817_	Continuing Calibration Verification Standard							03/28/17 12:00	
Benzene	4.64	mg/m3	0.50	93	70	130			
Bromobenzene	4.68	mg/m3	0.50	94	70	130			
Bromochloromethane	5.36	mg/m3	0.50	107	70	130			
Bromodichloromethane	4.68	mg/m3	0.50	94	70	130			
Bromoform	4.60	mg/m3	0.50	92	70	130			
Bromomethane	4.44	mg/m3	0.50	89	70	130			
Carbon tetrachloride	4.72	mg/m3	0.50	94	70	130			
Chlorobenzene	4.76	mg/m3	0.50	95	70	130			
Chlorodibromomethane	4.68	mg/m3	0.50	94	70	130			
Chloroethane	5.44	mg/m3	0.50	109	70	130			
Chloroform	4.72	mg/m3	0.50	94	80	120			
Chloromethane	5.12	mg/m3	0.50	102	70	130			
1,2-Dibromoethane	5.20	mg/m3	0.50	104	70	130			
2-Chlorotoluene	4.96	mg/m3	0.50	99	70	130			
Dibromomethane	5.16	mg/m3	0.50	103	70	130			
1,2-Dichlorobenzene	4.72	mg/m3	0.50	94	70	130			
4-Chlorotoluene	4.92	mg/m3	0.50	98	70	130			
1,4-Dichlorobenzene	4.64	mg/m3	0.50	93	70	130			
Dichlorodifluoromethane	5.64	mg/m3	0.50	113	70	130			
1,1-Dichloroethane	4.80	mg/m3	0.50	96	70	130			
1,2-Dichloroethane	4.48	mg/m3	0.50	90	70	130			
1,1-Dichloroethene	5.36	mg/m3	0.50	107	80	120			
cis-1,2-Dichloroethene	4.76	mg/m3	0.50	95	70	130			
trans-1,2-Dichloroethene	5.00	mg/m3	0.50	100	70	130			
1,2-Dichloropropane	4.72	mg/m3	0.50	94	80	120			
2,2-Dichloropropane	5.68	mg/m3	0.50	114	70	130			
1,1-Dichloropropene	5.00	mg/m3	0.50	100	70	130			
cis-1,3-Dichloropropene	4.84	mg/m3	0.50	97	70	130			
trans-1,3-Dichloropropene	4.92	mg/m3	0.50	98	70	130			
Ethylbenzene	5.08	mg/m3	0.50	102	80	120			
Methyl tert-butyl ether (MTBE)	5.24	mg/m3	0.50	105	70	130			
Methyl ethyl ketone	45.2	mg/m3	10	90	70	130			
Methylene chloride	4.72	mg/m3	0.50	94	70	130			
Styrene	5.12	mg/m3	0.50	102	70	130			
1,1,1,2-Tetrachloroethane	4.72	mg/m3	0.50	94	70	130			
1,1,2,2-Tetrachloroethane	4.92	mg/m3	0.50	98	70	130			
Tetrachloroethene	4.68	mg/m3	0.50	94	70	130			
Toluene	5.04	mg/m3	0.50	101	80	120			
1,1,1-Trichloroethane	4.72	mg/m3	0.50	94	70	130			
1,1,2-Trichloroethane	4.64	mg/m3	0.50	93	70	130			
Trichloroethene	4.84	mg/m3	0.50	97	70	130			
Trichlorofluoromethane	5.20	mg/m3	0.50	104	70	130			
1,2,3-Trichloropropane	4.76	mg/m3	0.50	95	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site

Report Date: 03/29/17
Work Order: H17030287

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R277054	
Lab ID: CCV032817_	Continuing Calibration Verification Standard							03/28/17 12:00	
Vinyl chloride	5.20	mg/m3	0.50	104	80	120			
m+p-Xylenes	10.1	mg/m3	0.50	101	70	130			
o-Xylene	5.04	mg/m3	0.50	101	70	130			
Xylenes, Total	15.1	mg/m3	0.50	101	70	130			
Surr: 1,2-Dichloroethane-d4			0.50	96	75	125			
Surr: Dibromofluoromethane			0.50	100	85	119			
Surr: p-Bromofluorobenzene			0.50	97	85	122			
Surr: Toluene-d8			0.50	101	89	119			
Method: SW8260B								Batch: B_R277054	
Lab ID: AIRLCS032817_	Laboratory Control Sample				Run: SUB-B277054			03/28/17 12:42	
Benzene	5.72	mg/m3	0.50	114	65	131			
Bromobenzene	6.24	mg/m3	0.50	125	78	133			
Bromochloromethane	7.32	mg/m3	0.50	146	68	131			S
Bromodichloromethane	6.48	mg/m3	0.50	130	67	138			
Bromoform	5.72	mg/m3	0.50	114	64	136			
Bromomethane	3.91	mg/m3	0.50	78	60	138			
Carbon tetrachloride	5.60	mg/m3	0.50	112	61	144			
Chlorobenzene	6.00	mg/m3	0.50	120	78	136			
Chlorodibromomethane	6.40	mg/m3	0.50	128	72	136			
Chloroethane	5.60	mg/m3	0.50	112	64	136			
Chloroform	5.88	mg/m3	0.50	118	69	133			
Chloromethane	6.28	mg/m3	0.50	126	63	149			
1,2-Dibromoethane	6.28	mg/m3	0.50	126	75	131			
2-Chlorotoluene	6.24	mg/m3	0.50	125	74	135			
Dibromomethane	6.24	mg/m3	0.50	125	72	133			
1,2-Dichlorobenzene	5.92	mg/m3	0.50	118	78	129			
4-Chlorotoluene	6.00	mg/m3	0.50	120	79	135			
1,4-Dichlorobenzene	5.56	mg/m3	0.50	111	78	131			
Dichlorodifluoromethane	6.88	mg/m3	0.50	138	55	141			
1,1-Dichloroethane	5.88	mg/m3	0.50	118	72	130			
1,2-Dichloroethane	4.80	mg/m3	0.50	96	57	146			
1,1-Dichloroethene	6.04	mg/m3	0.50	121	66	142			
cis-1,2-Dichloroethene	6.16	mg/m3	0.50	123	74	133			
trans-1,2-Dichloroethene	6.08	mg/m3	0.50	122	76	138			
1,2-Dichloropropane	6.16	mg/m3	0.50	123	72	135			
2,2-Dichloropropane	6.84	mg/m3	0.50	137	42	167			
1,1-Dichloropropene	5.52	mg/m3	0.50	110	72	140			
cis-1,3-Dichloropropene	6.04	mg/m3	0.50	121	75	132			
trans-1,3-Dichloropropene	5.88	mg/m3	0.50	118	77	145			
Ethylbenzene	6.24	mg/m3	0.50	125	63	133			
Methyl tert-butyl ether (MTBE)	6.12	mg/m3	0.50	122	46	136			
Methyl ethyl ketone	50.8	mg/m3	10	102	38	132			

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/29/17

Project: Helena Solvent Site **Work Order:** H17030287

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277054
Lab ID: AIRLCS032817_	Laboratory Control Sample				Run: SUB-B277054				03/28/17 12:42
Methylene chloride	6.08	mg/m3	0.50	122	73	126			
Styrene	6.56	mg/m3	0.50	131	76	134			
1,1,1,2-Tetrachloroethane	5.76	mg/m3	0.50	115	75	135			
1,1,2,2-Tetrachloroethane	5.52	mg/m3	0.50	110	72	132			
Tetrachloroethene	5.88	mg/m3	0.50	118	78	137			
Toluene	6.20	mg/m3	0.50	124	66	132			
1,1,1-Trichloroethane	5.40	mg/m3	0.50	108	64	141			
1,1,2-Trichloroethane	5.72	mg/m3	0.50	114	72	133			
Trichloroethene	5.52	mg/m3	0.50	110	75	138			
Trichlorofluoromethane	5.40	mg/m3	0.50	108	58	139			
1,2,3-Trichloropropane	5.28	mg/m3	0.50	106	67	133			
Vinyl chloride	5.76	mg/m3	0.50	115	53	146			
m+p-Xylenes	12.0	mg/m3	0.50	120	64	134			
o-Xylene	6.32	mg/m3	0.50	126	61	132			
Xylenes, Total	18.3	mg/m3	0.50	122	72	128			
Surr: 1,2-Dichloroethane-d4			0.50	98	75	125			
Surr: Dibromofluoromethane			0.50	98	85	119			
Surr: p-Bromofluorobenzene			0.50	97	85	122			
Surr: Toluene-d8			0.50	100	89	119			
Lab ID: AIRBLK032817_	Method Blank				Run: SUB-B277054				03/28/17 13:40
Benzene	ND	mg/m3	0.50						
Bromobenzene	ND	mg/m3	0.50						
Bromochloromethane	ND	mg/m3	0.50						
Bromodichloromethane	ND	mg/m3	0.50						
Bromoform	ND	mg/m3	0.50						
Bromomethane	ND	mg/m3	0.50						
Carbon tetrachloride	ND	mg/m3	0.50						
Chlorobenzene	ND	mg/m3	0.50						
Chlorodibromomethane	ND	mg/m3	0.50						
Chloroethane	ND	mg/m3	0.50						
Chloroform	ND	mg/m3	0.50						
Chloromethane	ND	mg/m3	0.50						
1,2-Dibromoethane	ND	mg/m3	0.50						
2-Chlorotoluene	ND	mg/m3	0.50						
Dibromomethane	ND	mg/m3	0.50						
1,2-Dichlorobenzene	ND	mg/m3	0.50						
4-Chlorotoluene	ND	mg/m3	0.50						
1,4-Dichlorobenzene	ND	mg/m3	0.50						
Dichlorodifluoromethane	ND	mg/m3	0.50						
1,1-Dichloroethane	ND	mg/m3	0.50						
1,2-Dichloroethane	ND	mg/m3	0.50						
1,1-Dichloroethene	ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 03/29/17

Project: Helena Solvent Site **Work Order:** H17030287

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277054
Lab ID: AIRBLK032817_	Method Blank				Run: SUB-B277054				03/28/17 13:40
cis-1,2-Dichloroethene	ND	mg/m3	0.50						
trans-1,2-Dichloroethene	ND	mg/m3	0.50						
1,2-Dichloropropane	ND	mg/m3	0.50						
2,2-Dichloropropane	ND	mg/m3	0.50						
1,1-Dichloropropene	ND	mg/m3	0.50						
cis-1,3-Dichloropropene	ND	mg/m3	0.50						
trans-1,3-Dichloropropene	ND	mg/m3	0.50						
Ethylbenzene	ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)	ND	mg/m3	0.50						
Methyl ethyl ketone	ND	mg/m3	10						
Methylene chloride	ND	mg/m3	0.50						
Styrene	ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane	ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane	ND	mg/m3	0.50						
Tetrachloroethene	ND	mg/m3	5.0						
Toluene	ND	mg/m3	0.50						
1,1,1-Trichloroethane	ND	mg/m3	0.50						
1,1,2-Trichloroethane	ND	mg/m3	0.50						
Trichloroethene	ND	mg/m3	0.50						
Trichlorofluoromethane	ND	mg/m3	0.50						
1,2,3-Trichloropropane	ND	mg/m3	0.50						
Vinyl chloride	ND	mg/m3	0.50						
m+p-Xylenes	ND	mg/m3	0.50						
o-Xylene	ND	mg/m3	0.50						
Xylenes, Total	ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	97	75	125			
Surr: Dibromofluoromethane			0.50	98	85	119			
Surr: p-Bromofluorobenzene			0.50	98	85	122			
Surr: Toluene-d8			0.50	96	89	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17030287

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\wjohnson

Reviewed Date: 3/29/2017

Date Received: 3/20/2017

Received by: TLL

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	19.2°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

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Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	HydroSolutions
Contact	Amanda Osborne
Phone	443-6169 X106
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	amanda.o@hydrosi.com
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	HSS
Sampler Name	A OSBORNE
Sampler Phone	443-6169
Sample Origin State	MT
EPA/State Compliance	☐ Yes ☒ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W- Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	8260 Short	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	SI-032017	03/20/17	1430	1	A	X			H17030287
2									
3									
4									
5									
6									
7									
8									
9									
10									

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	AMANDA OSBORNE	3/20/17 1459	Amanda Osborne	Tracy Gerrard	3/20/17 14:30	Tracy Gerrard
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
Hand	9	Y (N) C B	Y N	19.2 °C	Y (N)	Y (N)	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Data Validation Report – SVE Quarterly Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Energy Laboratories, Inc.
Laboratory Project ID	H17040016
Sample Matrix	Air
Sample Start and End Dates	4/3/2017
Parameters Included	VOCs by EPA Method 8260
Date Validated	04/13/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Two air samples from soil vapor extraction (SVE) system piping were collected in Tedlar bags by HydroSolutions on April 3, 2017 to provide data on operational conditions for the SVE system. The two samples were collected at sampling ports located prior to treatment (S-1) by the granular activated carbon (GAC), and after treatment (S-3) by the GAC. Points were selected to verify system operation and calculate contaminant loading to the GAC. Samples were hand-delivered to Energy Laboratories, Inc. in Helena, MT on April 3, 2017. Samples were analyzed for volatile organic compounds (VOCs) according to EPA Method 8260 on April 11, 2017.

Table 1 presents an inventory of the samples collected and analyzed as part of this SVE performance monitoring sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
S-3 (GAC outlet)	H17040016-001	S3-040317
S-1 (GAC inlet)	H17040016-002	S1-040317

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required periodic performance monitoring of SVE system parameters. As part of this task, the vapor stream was sampled from a sampling port, known as S-1, at the inlet to the GAC treatment unit as a pretreatment sample. Vapor was also collected at the effluent port, known as S-3, as a post-treatment sample.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs, which are identified as contaminants of concern based on historic information of site contamination. Samples were properly handled and delivered to the laboratory with no discrepancies or corrective actions noted on the chain of custody form or laboratory notes. The careful selection of sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Both SVE system vapor point samples were collected and analyzed in accordance with quality control objectives. No criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. The task order under which this sampling was conducted did not specify the collection of field duplicate samples for the documentation of SVE operational conditions or performance monitoring. Therefore, no field duplicate was collected for this sampling event. As a result, field precision cannot be assessed by analyzing relative percent differences (RPDs) for original and duplicate field samples. No criteria are otherwise identified that affect the field precision of this data.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, the quality assurance and control (QA/QC) measures included analysis of a continuing calibration verification standard (CCV), laboratory control sample (LCS), and a method blank. These laboratory QA/QC samples were analyzed and prepared by Energy Laboratories in a single laboratory QC batch. These laboratory QC samples were used to assess laboratory and method accuracy. There were no qualifiers assigned by the laboratory to these QC samples. Laboratory method blanks were free of analyte contamination, and surrogate percent recoveries, CCVs, and LCSs were within the targeted limits. For all of these reasons, this data is considered accurate.

Comparability

The collection and sampling methods used during this event followed standard field and laboratory procedures and protocols. Holding time requirements were met. Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

No qualified data was reported for any analyte in the samples collected during this event. Therefore, there are no known biases introduced into the results. A review of field sheets, sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes.

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	SVE Quarterly Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/13/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	4/3/2017 M/D/YY
12. Sample collection end date	4/3/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s) SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17040016		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	Yes ○	No ●	Comments
18a. Were all calibration verification results within acceptable limits?	Yes ●	No ○	Comments
18b. Were laboratory blank samples free of contamination?	Yes ●	No ○	Comments
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	Yes ○	No ●	Comments N/A. MS/MSD not part of SW8260B Tedlar bag analysis

If no, explain

18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	Yes ●	No ○	Comments
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	Yes ●	No ○	Comments LCS results were within criteria. No LCS duplicate samples performed.
18f. Were surrogate recoveries within laboratory quality control limits?	Yes ●	No ○	Comments
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	Yes ○	No ●	Comments NA, see above

If no, explain

19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	Yes ●	No ○	Comments
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	Yes ○	No ●	Comments N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	Tedlar bag and Method 8260 approved per DEQ in lieu of TO-15 for performance monitoring.
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No field blanks were collected. All detected analytes are assumed to be attributable to contaminants at the site. No duplicates were collected as part of this field event, and this does not affect the interpretation of the results.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A
28a. Were all blank samples free of analyte contamination?	●	○	All lab blank results were ND
28b. Were field duplicates collected as required?	○	●	

If no, explain

No field duplicates were collected for performance monitoring.

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)?	100	Comments
31. Was the completeness goal met?	Yes ● No ○	Comments
32. Other general comments or observations?		

Split Samples

33. Did DEQ collect split samples?	Yes ○ No ●	Comments

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ANALYTICAL SUMMARY REPORT

April 12, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17040016 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 2 samples for HydroSolutions on 4/3/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17040016-001	S3-040317	04/03/17 14:35	04/03/17	Air	8260-Volatile Organic Compounds - Short List
H17040016-002	S1-040317	04/03/17 14:45	04/03/17	Air	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17040016

Report Date: 04/12/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17040016-001
Client Sample ID: S3-040317

Report Date: 04/12/17
Collection Date: 04/03/17 14:35
DateReceived: 04/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	04/11/17 14:04 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Tetrachloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17040016-001
Client Sample ID: S3-040317

Report Date: 04/12/17
Collection Date: 04/03/17 14:35
DateReceived: 04/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	04/11/17 14:04 / eli-b
Surr: 1,2-Dichloroethane-d4	98.0	%REC		70-130		SW8260B	04/11/17 14:04 / eli-b
Surr: Dibromofluoromethane	103	%REC		77-126		SW8260B	04/11/17 14:04 / eli-b
Surr: p-Bromofluorobenzene	93.0	%REC		76-127		SW8260B	04/11/17 14:04 / eli-b
Surr: Toluene-d8	99.0	%REC		79-122		SW8260B	04/11/17 14:04 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17040016-002
Client Sample ID: S1-040317

Report Date: 04/12/17
Collection Date: 04/03/17 14:45
DateReceived: 04/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	04/11/17 14:36 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Tetrachloroethene	86	mg/m3		5.0		SW8260B	04/11/17 15:12 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17040016-002
Client Sample ID: S1-040317

Report Date: 04/12/17
Collection Date: 04/03/17 14:45
DateReceived: 04/03/17
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	04/11/17 14:36 / eli-b
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/11/17 14:36 / eli-b
Surr: Dibromofluoromethane	106	%REC		77-126		SW8260B	04/11/17 14:36 / eli-b
Surr: p-Bromofluorobenzene	96.0	%REC		76-127		SW8260B	04/11/17 14:36 / eli-b
Surr: Toluene-d8	95.0	%REC		79-122		SW8260B	04/11/17 14:36 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/12/17

Project: DEQ 08 **Work Order:** H17040016

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R277874	
Lab ID: CCV041117_	Continuing Calibration Verification Standard							04/11/17 09:51	
Benzene	4.24	mg/m3	0.50	85	70	130			
Bromobenzene	4.24	mg/m3	0.50	85	70	130			
Bromochloromethane	5.08	mg/m3	0.50	102	70	130			
Bromodichloromethane	4.52	mg/m3	0.50	90	70	130			
Bromoform	4.48	mg/m3	0.50	90	70	130			
Bromomethane	5.96	mg/m3	0.50	119	70	130			
Carbon tetrachloride	4.44	mg/m3	0.50	89	70	130			
Chlorobenzene	4.64	mg/m3	0.50	93	70	130			
Chlorodibromomethane	4.80	mg/m3	0.50	96	70	130			
Chloroethane	4.48	mg/m3	0.50	90	70	130			
Chloroform	4.24	mg/m3	0.50	85	80	120			
Chloromethane	4.84	mg/m3	0.50	97	70	130			
1,2-Dibromoethane	5.08	mg/m3	0.50	102	70	130			
2-Chlorotoluene	4.40	mg/m3	0.50	88	70	130			
Dibromomethane	4.52	mg/m3	0.50	90	70	130			
1,2-Dichlorobenzene	4.32	mg/m3	0.50	86	70	130			
4-Chlorotoluene	4.24	mg/m3	0.50	85	70	130			
1,4-Dichlorobenzene	4.20	mg/m3	0.50	84	70	130			
Dichlorodifluoromethane	5.12	mg/m3	0.50	102	70	130			
1,1-Dichloroethane	4.32	mg/m3	0.50	86	70	130			
1,2-Dichloroethane	3.93	mg/m3	0.50	79	70	130			
1,1-Dichloroethene	4.64	mg/m3	0.50	93	80	120			
cis-1,2-Dichloroethene	4.32	mg/m3	0.50	86	70	130			
trans-1,2-Dichloroethene	4.40	mg/m3	0.50	88	70	130			
1,2-Dichloropropane	4.56	mg/m3	0.50	91	80	120			
2,2-Dichloropropane	5.00	mg/m3	0.50	100	70	130			
1,1-Dichloropropene	4.40	mg/m3	0.50	88	70	130			
cis-1,3-Dichloropropene	4.56	mg/m3	0.50	91	70	130			
trans-1,3-Dichloropropene	4.08	mg/m3	0.50	82	70	130			
Ethylbenzene	4.44	mg/m3	0.50	89	80	120			
Methyl tert-butyl ether (MTBE)	4.48	mg/m3	0.50	90	70	130			
Methyl ethyl ketone	41.6	mg/m3	10	83	70	130			
Methylene chloride	4.24	mg/m3	0.50	85	70	130			
Styrene	4.76	mg/m3	0.50	95	70	130			
1,1,1,2-Tetrachloroethane	4.64	mg/m3	0.50	93	70	130			
1,1,2,2-Tetrachloroethane	4.28	mg/m3	0.50	86	70	130			
Tetrachloroethene	4.56	mg/m3	0.50	91	70	130			
Toluene	4.80	mg/m3	0.50	96	80	120			
1,1,1-Trichloroethane	4.36	mg/m3	0.50	87	70	130			
1,1,2-Trichloroethane	4.48	mg/m3	0.50	90	70	130			
Trichloroethene	4.40	mg/m3	0.50	88	70	130			
Trichlorofluoromethane	4.72	mg/m3	0.50	94	70	130			
1,2,3-Trichloropropane	4.40	mg/m3	0.50	88	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/12/17

Project: DEQ 08 **Work Order:** H17040016

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R277874	
Lab ID: CCV041117_	Continuing Calibration Verification Standard							04/11/17 09:51	
Vinyl chloride	4.56	mg/m3	0.50	91	80	120			
m+p-Xylenes	9.60	mg/m3	0.50	96	70	130			
o-Xylene	4.60	mg/m3	0.50	92	70	130			
Xylenes, Total	14.2	mg/m3	0.50	95	70	130			
Surr: 1,2-Dichloroethane-d4			0.50	95	75	125			
Surr: Dibromofluoromethane			0.50	101	85	119			
Surr: p-Bromofluorobenzene			0.50	88	85	122			
Surr: Toluene-d8			0.50	104	89	119			
Method: SW8260B								Batch: B_R277874	
Lab ID: AIRLCS041117_	Laboratory Control Sample				Run: SUB-B277874			04/11/17 11:49	
Benzene	4.32	mg/m3	0.50	86	65	131			
Bromobenzene	4.48	mg/m3	0.50	90	78	133			
Bromochloromethane	5.44	mg/m3	0.50	109	68	131			
Bromodichloromethane	4.64	mg/m3	0.50	93	67	138			
Bromoform	4.20	mg/m3	0.50	84	64	136			
Bromomethane	3.54	mg/m3	0.50	71	60	138			
Carbon tetrachloride	4.60	mg/m3	0.50	92	61	144			
Chlorobenzene	4.72	mg/m3	0.50	94	78	136			
Chlorodibromomethane	5.04	mg/m3	0.50	101	72	136			
Chloroethane	4.60	mg/m3	0.50	92	64	136			
Chloroform	4.44	mg/m3	0.50	89	69	133			
Chloromethane	4.52	mg/m3	0.50	90	63	149			
1,2-Dibromoethane	4.36	mg/m3	0.50	87	75	131			
2-Chlorotoluene	4.68	mg/m3	0.50	94	74	135			
Dibromomethane	4.52	mg/m3	0.50	90	72	133			
1,2-Dichlorobenzene	4.48	mg/m3	0.50	90	78	129			
4-Chlorotoluene	4.24	mg/m3	0.50	85	79	135			
1,4-Dichlorobenzene	4.40	mg/m3	0.50	88	78	131			
Dichlorodifluoromethane	5.64	mg/m3	0.50	113	55	141			
1,1-Dichloroethane	4.60	mg/m3	0.50	92	72	130			
1,2-Dichloroethane	4.08	mg/m3	0.50	82	57	146			
1,1-Dichloroethene	5.00	mg/m3	0.50	100	66	142			
cis-1,2-Dichloroethene	4.64	mg/m3	0.50	93	74	133			
trans-1,2-Dichloroethene	4.96	mg/m3	0.50	99	76	138			
1,2-Dichloropropane	4.40	mg/m3	0.50	88	72	135			
2,2-Dichloropropane	5.60	mg/m3	0.50	112	42	167			
1,1-Dichloropropene	3.99	mg/m3	0.50	80	72	140			
cis-1,3-Dichloropropene	4.24	mg/m3	0.50	85	75	132			
trans-1,3-Dichloropropene	4.44	mg/m3	0.50	89	77	145			
Ethylbenzene	4.44	mg/m3	0.50	89	63	133			
Methyl tert-butyl ether (MTBE)	4.16	mg/m3	0.50	83	46	136			
Methyl ethyl ketone	35.7	mg/m3	10	71	38	132			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/12/17

Project: DEQ 08 **Work Order:** H17040016

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277874
Lab ID: AIRLCS041117_	Laboratory Control Sample				Run: SUB-B277874				04/11/17 11:49
Methylene chloride	4.96	mg/m3	0.50	99	73	126			
Styrene	4.84	mg/m3	0.50	97	76	134			
1,1,1,2-Tetrachloroethane	4.80	mg/m3	0.50	96	75	135			
1,1,2,2-Tetrachloroethane	3.83	mg/m3	0.50	77	72	132			
Tetrachloroethene	4.44	mg/m3	0.50	89	78	137			
Toluene	4.88	mg/m3	0.50	98	66	132			
1,1,1-Trichloroethane	4.24	mg/m3	0.50	85	64	141			
1,1,2-Trichloroethane	4.20	mg/m3	0.50	84	72	133			
Trichloroethene	4.28	mg/m3	0.50	86	75	138			
Trichlorofluoromethane	4.36	mg/m3	0.50	87	58	139			
1,2,3-Trichloropropane	3.76	mg/m3	0.50	75	67	133			
Vinyl chloride	4.96	mg/m3	0.50	99	53	146			
m+p-Xylenes	9.68	mg/m3	0.50	97	64	134			
o-Xylene	4.60	mg/m3	0.50	92	61	132			
Xylenes, Total	14.3	mg/m3	0.50	95	72	128			
Surr: 1,2-Dichloroethane-d4			0.50	104	75	125			
Surr: Dibromofluoromethane			0.50	106	85	119			
Surr: p-Bromofluorobenzene			0.50	89	85	122			
Surr: Toluene-d8			0.50	104	89	119			
Lab ID: AIRBLK041117_	Method Blank				Run: SUB-B277874				04/11/17 13:22
Benzene	ND	mg/m3	0.50						
Bromobenzene	ND	mg/m3	0.50						
Bromochloromethane	ND	mg/m3	0.50						
Bromodichloromethane	ND	mg/m3	0.50						
Bromoform	ND	mg/m3	0.50						
Bromomethane	ND	mg/m3	0.50						
Carbon tetrachloride	ND	mg/m3	0.50						
Chlorobenzene	ND	mg/m3	0.50						
Chlorodibromomethane	ND	mg/m3	0.50						
Chloroethane	ND	mg/m3	0.50						
Chloroform	ND	mg/m3	0.50						
Chloromethane	ND	mg/m3	0.50						
1,2-Dibromoethane	ND	mg/m3	0.50						
2-Chlorotoluene	ND	mg/m3	0.50						
Dibromomethane	ND	mg/m3	0.50						
1,2-Dichlorobenzene	ND	mg/m3	0.50						
4-Chlorotoluene	ND	mg/m3	0.50						
1,4-Dichlorobenzene	ND	mg/m3	0.50						
Dichlorodifluoromethane	ND	mg/m3	0.50						
1,1-Dichloroethane	ND	mg/m3	0.50						
1,2-Dichloroethane	ND	mg/m3	0.50						
1,1-Dichloroethene	ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/12/17

Project: DEQ 08 **Work Order:** H17040016

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277874
Lab ID: AIRBLK041117_	Method Blank				Run: SUB-B277874				04/11/17 13:22
cis-1,2-Dichloroethene	ND	mg/m3	0.50						
trans-1,2-Dichloroethene	ND	mg/m3	0.50						
1,2-Dichloropropane	ND	mg/m3	0.50						
2,2-Dichloropropane	ND	mg/m3	0.50						
1,1-Dichloropropene	ND	mg/m3	0.50						
cis-1,3-Dichloropropene	ND	mg/m3	0.50						
trans-1,3-Dichloropropene	ND	mg/m3	0.50						
Ethylbenzene	ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)	ND	mg/m3	0.50						
Methyl ethyl ketone	ND	mg/m3	10						
Methylene chloride	ND	mg/m3	0.50						
Styrene	ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane	ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane	ND	mg/m3	0.50						
Tetrachloroethene	ND	mg/m3	0.50						
Toluene	ND	mg/m3	0.50						
1,1,1-Trichloroethane	ND	mg/m3	0.50						
1,1,2-Trichloroethane	ND	mg/m3	0.50						
Trichloroethene	ND	mg/m3	0.50						
Trichlorofluoromethane	ND	mg/m3	0.50						
1,2,3-Trichloropropane	ND	mg/m3	0.50						
Vinyl chloride	ND	mg/m3	0.50						
m+p-Xylenes	ND	mg/m3	0.50						
o-Xylene	ND	mg/m3	0.50						
Xylenes, Total	ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	99	75	125			
Surr: Dibromofluoromethane			0.50	106	85	119			
Surr: p-Bromofluorobenzene			0.50	91	85	122			
Surr: Toluene-d8			0.50	103	89	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions H17040016

Login completed by: Tracy L. Lorash
Reviewed by: BL2000\rtooke
Reviewed Date: 4/4/2017

Date Received: 4/3/2017
Received by: bjs
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	17.6°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

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Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	HYDRO SOLUTIONS
Contact	AMANDA OSBORNE
Phone	406-443-6169 x106
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	amanda@hydrosi.com
Receive Invoice	☐ Hard Copy ☒ Email
Receive Report	☐ Hard Copy ☒ Email
Purchase Order	
Quote	1382
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐ Hard Copy ☐ Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	AMANDA OSBORNE
Sampler Phone	406443-6169 x106
Sample Origin State	MT
EPA/State Compliance	☐ Yes ☒ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Analysis Requested: 8260 - Short List	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	S3-040317	04/03/17	1435	1	A	X			H17040016
2	S1-040317	04/03/17	1445	1	A	X			
3									
4									
5									
6									
7									
8									
9									
10									

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	AMANDA OSBORNE	04/03/17 1509	[signature]			
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
		04/03/17		B. Seiler	04/3/17 15:09	Brandy Seiler

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	Ordice	Payment Type	Amount	Receipt Number (cash/check only)
hand del	264	Y N C B	Y N	17.6°C	Y N	Y N	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.

Data Validation
Soils Analytical Results

HydroSolutions

Data Validation Report – Soils Analytical Results

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8
Laboratory Name	Energy Laboratories, Inc.
Laboratory Project ID	H16090602
Sample Matrix	Soil
Sample Start and End Dates	9/20/16 - 9/23/16
Parameters Included	8260 - VOCs Short List
Date Validated	3/10/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Ten soil samples were collected by HydroSolutions on September 20, 22, and 23, 2016 as part of the soil vapor extraction (SVE) system preliminary design investigation at the Hustad Center. The samples were collected at various depths during vapor point drilling and installation using direct push technology and the membrane interface probe (MIP) system. Samples were hand delivered to Energy Laboratories, Inc. (Energy Lab) in Helena, MT on September 28, 2016. The samples were analyzed by Energy Lab for total carbon, total organic carbon (TOC), volatile organic compounds (VOCs) by methanol extraction, and VOCs by EPA Method SW8260B on September 30 and October 1, 4, 5, and 6, 2016.

Table 1 presents an inventory of the soil samples collected and analyzed as part of the SVE system preliminary design investigation.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
SW Mr Wise Parking Lot (18-18.5 ft depth)	H16090602-001	DPT-18-18.5
Vapor Point 1 (13-14 ft depth)	H16090602-002	VP-1 13-14
Vapor Point 2 (6-7 ft depth)	H16090602-003	VP-2 6-7
Vapor Point 3 (5-5.5 depth)	H16090602-004	VP-3 5-5.5
Vapor Point 4 (4-5.5 ft depth)	H16090602-005	VP-4 4-5.5
Vapor Point 4 (1.5-2.5 ft depth)	H16090602-006	VP-4 1.5-2.5
Vapor Point 5 (4.5-5.5 depth)	H16090602-007	VP-5 4.5-5.5
Vapor Point 5 (7.5-8 depth)	H16090602-008	VP-5 7.5-8
Vapor Point 6 (1-2 ft depth)	H16090602-009	VP-6 1-2
Vapor Point 6 (4-4.5 ft depth)	H16090602-010	VP-6 4-4.5

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The approved task order for this project directed the use of an existing approved sampling and analysis work plan within the May 2011 *Hustad LLC Property Source Area Investigation Work Plan* (HydroSolutions 2011). The soil samples for this project were collected and submitted in general accordance with this work plan and HydroSolutions' *Surface Water, Groundwater, and Soil/Sediment Sampling Standard Operating Procedures* on file with MDEQ. The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project specified a pre-design investigation to gain information for planning the SVE system. A direct-push MIP system was used to fulfill a portion of this information gathering objective. Nine soil samples were collected at various depths during the installation of soil vapor monitoring wells to identify high contamination areas. One additional sample was collected at a southwest location in the Mr. Wise Cleaners parking lot for the purpose of obtaining a background soil condition. The task order objective was accomplished in part by this soil sampling activity, which identified areas of high contamination and were used as input for SVE system placement.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The soil samples were analyzed for VOCs, the contaminants of concern based on historic analytical results. Field and handling protocols consistent with soil sampling activities were followed and sampling locations were carefully selected according to the site's history of PCE contamination. Laboratory method blank samples were analyzed for the presence of contaminants with none reported above laboratory reporting limits. For all of these reasons, this data is considered representative.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Ten soil samples were collected and analyzed. All samples were collected, prepared, handled, and analyzed in accordance with quality control objectives and no criteria are identified which affect the data's usability. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. Collection of field duplicate samples was not part of the protocol for this soil sampling event. Therefore, field precision was not evaluated in this way. Laboratory analytical precision was evaluated by analyzing matrix spike and matrix spike duplicates samples and

using the results to calculate a relative percent difference (RPD). The laboratory RPDs are all reported to be less than the 20% target. In this way, the results are considered precise.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with EPA Method SW8260B and laboratory protocol, laboratory control samples were prepared and analyzed by Energy Lab to assess laboratory and method accuracy for VOC and TOC analyses. Laboratory equipment was calibrated prior to each analytical run. One S qualifier was reported in association with chloroethane for the calibration on September 30, 2016. This analyte was not detected in any of the soil samples at or above the reporting limits, so this qualifier does not bias the results. S qualifiers are reported for the sample matrix spike and sample matrix spike duplicate for three analytes that were not detected in any of the soil samples at the reporting limit. Therefore, these qualifiers do not bias the lab results. All percent recoveries were below the percent recovery targets for the laboratory control samples but no additional qualifiers were reported in the laboratory QA/QC report. For these reasons, the data is considered accurate. Table 2 presents the specific samples and analytes associated with the qualifiers reported in the Laboratory QA/QC report.

Table 2. Summary of Qualifiers in Laboratory QA/QC Report

Sample ID	Lab IDs	Analyte	Lab Qualifier (and bias)	Reason for Qualification
Sample Matrix Spike	H16090602-004AMS	Chloroethane	S (low)	S - Spike recovery outside of advisory limits
		1,1,2-Trichloroethane		
		1,2,3-Trichloropropane		
Sample Matrix Spike Duplicate	H16090602-004AMSD	Chloroethane	S (low)	
Continuing Calibration Verification Standard	093016_CCV_25	Chloroethane	S (high)	

Comparability

The collection and sampling methods for this event followed HydroSolutions' soil/sediment standard operating procedures and standard field and laboratory procedures for soil sampling and analysis by EPA Method SW8260B. The analytical results are reported in standard measurement units. For these reasons, the data from this sampling event is considered comparable to other similar data collection events and results.

Qualified Data Summary

Data usability qualifiers are summarized in Table 3. Several J qualifiers were assigned to the results. The J qualifier indicates that an analyte was detected, but at a level less than the reporting limit. Therefore, the reported results are estimated but no bias is introduced into the results due to the assignment of a J qualifier. S qualifiers were also reported. In all cases, they were assigned to the surrogate recovery of Toluene-d8 for a recovery that was reported below

the target range. Surrogate recovery data evaluates the capability of the analytical methods to detect target analytes. Low surrogate recoveries indicate that target analytes may not have been detected if present in low concentrations. Therefore, the potential exists that the data results are biased low in the samples with an S qualifier assigned. Therefore the concentrations of detected VOCs in the samples listed with an S qualifier in Table 3 may have been greater than the concentration that was reported. In this instance, the implication to the data is likely minimal, since the surrogate was recovered just slightly below the threshold.

The laboratory reported two corrective action comments. 1) Density was erroneously requested on the CoC, but verbal follow-up with Energy Lab by a HydroSolutions technician clarified that this was not needed. As a result, it was not analyzed or reported. 2) Dashes and marks were inconsistent between sample ID on the CoC and bottles. The laboratory logged the samples according to the ID listed on the CoC. The labeling clearly differentiated the samples, and this did not cause any erroneous reporting and this does not have implications to the data's usability.

A review of field sheets, sampling log books, and laboratory data identified no further QC issues for this data set. The data are usable for decision making purposes related to this project.

Table 3. Qualified Data Summary- laboratory data qualifiers (note, the data validation process did not cause data to be qualified)

Sample ID	Lab ID	Analyte	Result (mg/kg)	Qualifier	Reasons for Qualification
VP-2 6-7	H16090602-003	1,2-Dichlorobenzene	0.028	J	J - Estimated value. The analyte was present but less than the reporting limit.
		1,1,1,2-Tetrachloroethane	0.054	J	
		Surr: Toluene-d8	70%REC	S (low)	
VP-3 5-5.5	H16090602-004	Tetrachloroethene	0.046	J	
VP-4 4-5.5	H16090602-005	1,1,1,2-Tetrachloroethane	0.076	J	
		Trichloroethene	0.075	J	
		Surr: Toluene-d8	65%REC	S (low)	
VP-4 1.5-2.5	H16090602-006	1,2-Dichlorobenzene	0.051	J	
		Surr: Toluene-d8	73%REC	S (low)	
VP-5 4.5-5.5	H16090602-007	Trichloroethene	0.065	J	
		Surr: Toluene-d8	68%REC	S (low)	
VP-5 7.5-8	H16090602-008	Surr: Toluene-d8	68%REC	S (low)	S - Spike recovery outside of advisory limits.
VP-6 1-2	H16090602-009	Surr: Toluene-d8	74%REC	S (low)	
VP-6 4-4.5	H16090602-010	1,1,1,2-Tetrachloroethane	0.096	J	
		Surr: Toluene-d8	68%REC	S (low)	

References

HydroSolutions. 2011. "Hustad LLC Property Source Area Investigation Work Plan."

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Preliminary Design Investigation Soil Samples
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, HydroSolutions standard operating procedures
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/8/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☒ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☐ Air (including soil gas) ☐ Other
11. Sample collection start date	9/20/2016 M/D/YY
12. Sample collection end date	9/23/2016 M/D/YY

13. Analytical methods used

Use Add Method button to list multiple methods. Enter any other methods in the field manually.

Add Method	Analytical Method(s)
Delete Method	E8260 EPA Method For Volatile Organic Compounds (VOCs)
Delete Method	Total Carbon
Delete Method	VOCs, Methanol Extraction
Delete Method	Total Organic Carbon Prep Soil Preparation

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H16090602		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S qualifiers on analytes in MS/MSD QA samples
18a. Were all calibration verification results within acceptable limits?	○	●	S qualifiers on tolunene-d8 surrogate recoveries

If no, explain

S qualifier (spike recovery outside of advisory limits) for Chloroethane

	Yes	No	Comments
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	

If no, explain

RPDs all within limits. Percent recoveries for Chloroethane, 1,1,2-Trichloroethane, 1-2-3-Trichloropropane in matrix spike and matrix spike duplicate qualified with S for spike recovery below advisory limits. See Table 2 in Data Validation Report.

	Yes	No	Comments
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	
18f. Were surrogate recoveries within laboratory quality control limits?	○	●	

If no, explain

Surrogate recovery for Toluene-d8 qualified with S in some samples for spike recovery below the advisory limit. See Table 3 of Data Validation Report for details. This does not cause any detected results to be qualified, because Toluene-d8 is not a surrogate for the contaminants detected in the samples.

	Yes	No	Comments
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	1 method blank for 10 samples (10%)
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	●	○	1 matrix spike, 1 matrix duplicate, 10 samples (20%)

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments

Delete Sample	H16090602-004	VP-3 5-5.5	

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	1 LCS for VOCs, 1 LCS for total organic carbon (10%)

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	reported units are mg/kg for soils
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	○	●	

If no, explain

Density was erroneously requested on the CoC. Sampling technician notified the lab verbally that this was not needed.

	Yes	No	Comments
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	Field and trip blanks were not collected. All analytes detected in the samples are assumed to be attributable to the concentrations in the sample. Rinsate blanks were not collected because all sampling equipment was clean, single-use equipment. Duplicates were not collected because duplicates are typically not collected for Method 8260SW in soil due to sample heterogeneity.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	Field duplicates not collected, see above.
28a. Were all blank samples free of analyte contamination?	●	○	Laboratory blanks were all ND.
28b. Were field duplicates collected as required?	○	●	No field duplicates collected.

If no, explain

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	NA/ no field duplicates collected, see above.

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)? 100 Comments

31. Was the completeness goal met? Yes ● No ○ Comments

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples? Yes ○ No ● Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

October 07, 2016

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H16090602

Project Name: Helena Solvent Site

Energy Laboratories Inc Helena MT received the following 10 samples for HydroSolutions on 9/28/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H16090602-001	DPT-18-8.5	09/20/16 13:55	09/28/16	Soil	Total Carbon Total Organic Carbon Prep Soil Preparation Volatile Organics, Methanol Extraction 8260-Volatile Organic Compounds - Short List
H16090602-002	VP-1 13-14	09/22/16 9:15	09/28/16	Soil	Total Carbon Total Organic Carbon Prep Volatile Organics, Methanol Extraction 8260-Volatile Organic Compounds - Short List
H16090602-003	VP-2 6-7	09/22/16 13:05	09/28/16	Soil	Same As Above
H16090602-004	VP-3 5-5.5	09/22/16 15:30	09/28/16	Soil	Same As Above
H16090602-005	VP-4 4-5.5	09/22/16 16:45	09/28/16	Soil	Same As Above
H16090602-006	VP-4 1.5-2.5	09/22/16 16:40	09/28/16	Soil	Same As Above
H16090602-007	VP-5 4.5-5.5	09/22/16 17:30	09/28/16	Soil	Same As Above
H16090602-008	VP-5 7.5-8	09/22/16 17:52	09/28/16	Soil	Same As Above
H16090602-009	VP-6 1-2	09/23/16 8:30	09/28/16	Soil	Same As Above
H16090602-010	VP-6 4-4.5	09/23/16 8:45	09/28/16	Soil	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-001
Client Sample ID: DPT-18-8.5

Report Date: 10/07/16
Collection Date: 09/20/16 13:55
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	2.1	%		0.1		Leco	10/06/16 17:00 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Benzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	09/30/16 23:04 / abc
Styrene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Tetrachloroethene	3.2	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-001
Client Sample ID: DPT-18-8.5

Report Date: 10/07/16
Collection Date: 09/20/16 13:55
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	09/30/16 23:04 / abc
Surr: p-Bromofluorobenzene	123	%REC		60-143		SW8260B	09/30/16 23:04 / abc
Surr: Dibromofluoromethane	96.0	%REC		71-135		SW8260B	09/30/16 23:04 / abc
Surr: 1,2-Dichloroethane-d4	96.0	%REC		65-147		SW8260B	09/30/16 23:04 / abc
Surr: Toluene-d8	78.0	%REC		76-133		SW8260B	09/30/16 23:04 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-002
Client Sample ID: VP-1 13-14

Report Date: 10/07/16
Collection Date: 09/22/16 09:15
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	0.2	%		0.1		Leco	10/06/16 17:03 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Benzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	09/30/16 23:37 / abc
Styrene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Tetrachloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-002
Client Sample ID: VP-1 13-14

Report Date: 10/07/16
Collection Date: 09/22/16 09:15
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	09/30/16 23:37 / abc
Surr: p-Bromofluorobenzene	130	%REC		60-143		SW8260B	09/30/16 23:37 / abc
Surr: Dibromofluoromethane	105	%REC		71-135		SW8260B	09/30/16 23:37 / abc
Surr: 1,2-Dichloroethane-d4	100	%REC		65-147		SW8260B	09/30/16 23:37 / abc
Surr: Toluene-d8	81.0	%REC		76-133		SW8260B	09/30/16 23:37 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-003
Client Sample ID: VP-2 6-7

Report Date: 10/07/16
Collection Date: 09/22/16 13:05
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	23	%		0.1		Leco	10/06/16 17:05 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,2-Dichlorobenzene	0.028	mg/kg	J	0.20		SW8260B	10/01/16 00:10 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 00:10 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1,1,2-Tetrachloroethane	0.054	mg/kg	J	0.20		SW8260B	10/01/16 00:10 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Tetrachloroethene	193	mg/kg		7.5		SW8260B	10/05/16 22:09 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-003
Client Sample ID: VP-2 6-7

Report Date: 10/07/16
Collection Date: 09/22/16 13:05
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Trichloroethene	0.23	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 00:10 / abc
Surr: p-Bromofluorobenzene	103	%REC		60-143		SW8260B	10/01/16 00:10 / abc
Surr: Dibromofluoromethane	94.0	%REC		71-135		SW8260B	10/01/16 00:10 / abc
Surr: 1,2-Dichloroethane-d4	92.0	%REC		65-147		SW8260B	10/01/16 00:10 / abc
Surr: Toluene-d8	70.0	%REC	S	76-133		SW8260B	10/01/16 00:10 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
S - Spike recovery outside of advisory limits.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-004
Client Sample ID: VP-3 5-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 15:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	0.4	%		0.1		Leco	10/06/16 17:08 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 00:42 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Tetrachloroethene	0.046	mg/kg	J	0.20		SW8260B	10/04/16 21:36 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-004
Client Sample ID: VP-3 5-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 15:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 00:42 / abc
Surr: p-Bromofluorobenzene	127	%REC		60-143		SW8260B	10/01/16 00:42 / abc
Surr: Dibromofluoromethane	97.0	%REC		71-135		SW8260B	10/01/16 00:42 / abc
Surr: 1,2-Dichloroethane-d4	96.0	%REC		65-147		SW8260B	10/01/16 00:42 / abc
Surr: Toluene-d8	78.0	%REC		76-133		SW8260B	10/01/16 00:42 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-005
Client Sample ID: VP-4 4-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 16:45
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	16	%		0.1		Leco	10/06/16 17:11 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 01:15 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1,1,2-Tetrachloroethane	0.076	mg/kg	J	0.20		SW8260B	10/01/16 01:15 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Tetrachloroethene	358	mg/kg		15		SW8260B	10/05/16 22:42 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-005
Client Sample ID: VP-4 4-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 16:45
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Trichloroethene	0.075	mg/kg	J	0.20		SW8260B	10/01/16 01:15 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 01:15 / abc
Surr: p-Bromofluorobenzene	131	%REC		60-143		SW8260B	10/01/16 01:15 / abc
Surr: Dibromofluoromethane	95.0	%REC		71-135		SW8260B	10/01/16 01:15 / abc
Surr: 1,2-Dichloroethane-d4	98.0	%REC		65-147		SW8260B	10/01/16 01:15 / abc
Surr: Toluene-d8	65.0	%REC	S	76-133		SW8260B	10/01/16 01:15 / abc

Report Definitions:

RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-006
Client Sample ID: VP-4 1.5-2.5

Report Date: 10/07/16
Collection Date: 09/22/16 16:40
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	4.6	%		0.1		Leco	10/06/16 17:14 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,2-Dichlorobenzene	0.051	mg/kg	J	0.20		SW8260B	10/01/16 01:48 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 01:48 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Tetrachloroethene	45	mg/kg		1.5		SW8260B	10/04/16 23:14 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-006
Client Sample ID: VP-4 1.5-2.5

Report Date: 10/07/16
Collection Date: 09/22/16 16:40
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 01:48 / abc
Surr: p-Bromofluorobenzene	124	%REC		60-143		SW8260B	10/01/16 01:48 / abc
Surr: Dibromofluoromethane	100	%REC		71-135		SW8260B	10/01/16 01:48 / abc
Surr: 1,2-Dichloroethane-d4	98.0	%REC		65-147		SW8260B	10/01/16 01:48 / abc
Surr: Toluene-d8	73.0	%REC	S	76-133		SW8260B	10/01/16 01:48 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
S - Spike recovery outside of advisory limits.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-007
Client Sample ID: VP-5 4.5-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 17:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	17	%		0.1		Leco	10/06/16 17:16 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 02:53 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Tetrachloroethene	100	mg/kg		3.5		SW8260B	10/05/16 21:36 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-007
Client Sample ID: VP-5 4.5-5.5

Report Date: 10/07/16
Collection Date: 09/22/16 17:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Trichloroethene	0.065	mg/kg	J	0.20		SW8260B	10/01/16 02:53 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 02:53 / abc
Surr: p-Bromofluorobenzene	134	%REC		60-143		SW8260B	10/01/16 02:53 / abc
Surr: Dibromofluoromethane	98.0	%REC		71-135		SW8260B	10/01/16 02:53 / abc
Surr: 1,2-Dichloroethane-d4	101	%REC		65-147		SW8260B	10/01/16 02:53 / abc
Surr: Toluene-d8	68.0	%REC	S	76-133		SW8260B	10/01/16 02:53 / abc

Report Definitions:

RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-008
Client Sample ID: VP-5 7.5-8

Report Date: 10/07/16
Collection Date: 09/22/16 17:52
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	2.4	%		0.1		Leco	10/06/16 17:19 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 03:59 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Tetrachloroethene	22	mg/kg		1.0		SW8260B	10/05/16 21:03 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-008
Client Sample ID: VP-5 7.5-8

Report Date: 10/07/16
Collection Date: 09/22/16 17:52
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 03:59 / abc
Surr: p-Bromofluorobenzene	132	%REC		60-143		SW8260B	10/01/16 03:59 / abc
Surr: Dibromofluoromethane	92.0	%REC		71-135		SW8260B	10/01/16 03:59 / abc
Surr: 1,2-Dichloroethane-d4	97.0	%REC		65-147		SW8260B	10/01/16 03:59 / abc
Surr: Toluene-d8	68.0	%REC	S	76-133		SW8260B	10/01/16 03:59 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
S - Spike recovery outside of advisory limits.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-009
Client Sample ID: VP-6 1-2

Report Date: 10/07/16
Collection Date: 09/23/16 08:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	1.8	%		0.1		Leco	10/06/16 17:22 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 05:04 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1,1,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Tetrachloroethene	22	mg/kg		1.0		SW8260B	10/04/16 22:41 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-009
Client Sample ID: VP-6 1-2

Report Date: 10/07/16
Collection Date: 09/23/16 08:30
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Trichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 05:04 / abc
Surr: p-Bromofluorobenzene	141	%REC		60-143		SW8260B	10/01/16 05:04 / abc
Surr: Dibromofluoromethane	101	%REC		71-135		SW8260B	10/01/16 05:04 / abc
Surr: 1,2-Dichloroethane-d4	104	%REC		65-147		SW8260B	10/01/16 05:04 / abc
Surr: Toluene-d8	74.0	%REC	S	76-133		SW8260B	10/01/16 05:04 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
S - Spike recovery outside of advisory limits.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-010
Client Sample ID: VP-6 4-4.5

Report Date: 10/07/16
Collection Date: 09/23/16 08:45
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CHEMICAL CHARACTERISTICS							
Organic Carbon, Total (TOC)	22	%		0.1		Leco	10/06/16 17:24 / stp
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Benzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Bromobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Bromochloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Bromodichloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Bromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Carbon tetrachloride	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Chlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Chloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
2-Chloroethyl vinyl ether	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Chloroform	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Chloromethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
2-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
4-Chlorotoluene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Chlorodibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,2-Dibromoethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Dibromomethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,2-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,3-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,4-Dichlorobenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Dichlorodifluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,2-Dichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
cis-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
trans-1,2-Dichloroethene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,3-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
2,2-Dichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
cis-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
trans-1,3-Dichloropropene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Ethylbenzene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Methyl tert-butyl ether (MTBE)	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Methylene chloride	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Methyl ethyl ketone	ND	mg/kg		4.0		SW8260B	10/01/16 06:09 / abc
Styrene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1,1,2-Tetrachloroethane	0.096	mg/kg	J	0.20		SW8260B	10/01/16 06:09 / abc
1,1,2,2-Tetrachloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Tetrachloroethene	650	mg/kg		30		SW8260B	10/05/16 23:15 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16090602-010
Client Sample ID: VP-6 4-4.5

Report Date: 10/07/16
Collection Date: 09/23/16 08:45
DateReceived: 09/28/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1,1-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,1,2-Trichloroethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Trichloroethene	0.35	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Trichlorofluoromethane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
1,2,3-Trichloropropane	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Vinyl chloride	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
m+p-Xylenes	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
o-Xylene	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Xylenes, Total	ND	mg/kg		0.20		SW8260B	10/01/16 06:09 / abc
Surr: p-Bromofluorobenzene	125	%REC		60-143		SW8260B	10/01/16 06:09 / abc
Surr: Dibromofluoromethane	99.0	%REC		71-135		SW8260B	10/01/16 06:09 / abc
Surr: 1,2-Dichloroethane-d4	99.0	%REC		65-147		SW8260B	10/01/16 06:09 / abc
Surr: Toluene-d8	68.0	%REC	S	76-133		SW8260B	10/01/16 06:09 / abc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
S - Spike recovery outside of advisory limits.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Report Date: 10/07/16
Project: Helena Solvent Site
Work Order: H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Leco									Batch: 34683
Lab ID: LCS-34683	Laboratory Control Sample				Run: LECO632_161006A				10/06/16 16:57
Organic Carbon, Total (TOC)	3.4	%	0.10	96	80	120			
Lab ID: H16090602-010ADUP	Sample Duplicate				Run: LECO632_161006A				10/06/16 17:27
Organic Carbon, Total (TOC)	21	%	0.10				5.7	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: MB-34596	Method Blank				Run: 1SATURN_160930A				09/30/16 22:31
Benzene	ND	mg/kg	0.20						
Bromobenzene	ND	mg/kg	0.20						
Bromochloromethane	ND	mg/kg	0.20						
Bromodichloromethane	ND	mg/kg	0.20						
Bromoform	ND	mg/kg	0.20						
Bromomethane	ND	mg/kg	0.20						
Carbon tetrachloride	ND	mg/kg	0.20						
Chlorobenzene	ND	mg/kg	0.20						
Chlorodibromomethane	ND	mg/kg	0.20						
Chloroethane	ND	mg/kg	0.20						
2-Chloroethyl vinyl ether	ND	mg/kg	0.20						
Chloroform	ND	mg/kg	0.20						
Chloromethane	ND	mg/kg	0.20						
2-Chlorotoluene	ND	mg/kg	0.20						
4-Chlorotoluene	ND	mg/kg	0.20						
1,2-Dibromoethane	ND	mg/kg	0.20						
Dibromomethane	ND	mg/kg	0.20						
1,2-Dichlorobenzene	ND	mg/kg	0.20						
1,3-Dichlorobenzene	ND	mg/kg	0.20						
1,4-Dichlorobenzene	ND	mg/kg	0.20						
Dichlorodifluoromethane	ND	mg/kg	0.20						
1,1-Dichloroethane	ND	mg/kg	0.20						
1,2-Dichloroethane	ND	mg/kg	0.20						
1,1-Dichloroethene	ND	mg/kg	0.20						
cis-1,2-Dichloroethene	ND	mg/kg	0.20						
trans-1,2-Dichloroethene	ND	mg/kg	0.20						
1,2-Dichloropropane	ND	mg/kg	0.20						
1,3-Dichloropropane	ND	mg/kg	0.20						
2,2-Dichloropropane	ND	mg/kg	0.20						
1,1-Dichloropropene	ND	mg/kg	0.20						
cis-1,3-Dichloropropene	ND	mg/kg	0.20						
trans-1,3-Dichloropropene	ND	mg/kg	0.20						
Ethylbenzene	ND	mg/kg	0.20						
Methyl tert-butyl ether (MTBE)	ND	mg/kg	0.20						
Methyl ethyl ketone	ND	mg/kg	4.0						
Methylene chloride	ND	mg/kg	0.20						
Styrene	ND	mg/kg	0.20						
1,1,1,2-Tetrachloroethane	ND	mg/kg	0.20						
1,1,2,2-Tetrachloroethane	ND	mg/kg	0.20						
Tetrachloroethene	ND	mg/kg	0.20						
Toluene	ND	mg/kg	0.20						
1,1,1-Trichloroethane	ND	mg/kg	0.20						
1,1,2-Trichloroethane	ND	mg/kg	0.20						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: MB-34596	Method Blank				Run: 1SATURN_160930A				09/30/16 22:31
Trichloroethene	ND	mg/kg	0.20						
Trichlorofluoromethane	ND	mg/kg	0.20						
1,2,3-Trichloropropane	ND	mg/kg	0.20						
Vinyl chloride	ND	mg/kg	0.20						
m+p-Xylenes	ND	mg/kg	0.20						
o-Xylene	ND	mg/kg	0.20						
Surr: 1,2-Dichloroethane-d4			0.20	108	65	147			
Surr: Dibromofluoromethane			0.20	106	71	135			
Surr: p-Bromofluorobenzene			0.20	132	60	143			
Surr: Toluene-d8			0.20	86	76	133			
Lab ID: LCS-34596	Laboratory Control Sample				Run: 1SATURN_161004A				10/04/16 19:16
Benzene	0.928	mg/kg	0.20	93	71	119			
Bromobenzene	1.01	mg/kg	0.20	101	77	134			
Bromochloromethane	0.791	mg/kg	0.20	79	61	129			
Bromodichloromethane	0.992	mg/kg	0.20	99	64	139			
Bromoform	0.912	mg/kg	0.20	91	52	141			
Bromomethane	1.19	mg/kg	0.20	119	40	121			
Carbon tetrachloride	0.976	mg/kg	0.20	98	65	131			
Chlorobenzene	1.02	mg/kg	0.20	102	74	131			
Chlorodibromomethane	0.960	mg/kg	0.20	96	58	135			
Chloroethane	0.639	mg/kg	0.20	64	53	140			
2-Chloroethyl vinyl ether	0.992	mg/kg	0.20	99	67.2	113			
Chloroform	0.856	mg/kg	0.20	86	65	126			
Chloromethane	1.08	mg/kg	0.20	108	46	144			
2-Chlorotoluene	0.968	mg/kg	0.20	97	72	137			
4-Chlorotoluene	1.07	mg/kg	0.20	107	70	133			
1,2-Dibromoethane	1.04	mg/kg	0.20	104	54	131			
Dibromomethane	0.888	mg/kg	0.20	89	60	140			
1,2-Dichlorobenzene	1.01	mg/kg	0.20	101	61	137			
1,3-Dichlorobenzene	1.02	mg/kg	0.20	102	67	133			
1,4-Dichlorobenzene	1.05	mg/kg	0.20	105	62	137			
Dichlorodifluoromethane	0.888	mg/kg	0.20	89	38	132			
1,1-Dichloroethane	0.928	mg/kg	0.20	93	66	124			
1,2-Dichloroethane	1.06	mg/kg	0.20	106	54	125			
1,1-Dichloroethene	1.04	mg/kg	0.20	104	64	113			
cis-1,2-Dichloroethene	0.936	mg/kg	0.20	94	68	133			
trans-1,2-Dichloroethene	0.912	mg/kg	0.20	91	70	130			
1,2-Dichloropropane	1.06	mg/kg	0.20	106	78	143			
1,3-Dichloropropane	0.944	mg/kg	0.20	94	63	140			
2,2-Dichloropropane	0.976	mg/kg	0.20	98	71	137			
1,1-Dichloropropene	1.02	mg/kg	0.20	102	66	136			
cis-1,3-Dichloropropene	1.03	mg/kg	0.20	103	75	137			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: LCS-34596	Laboratory Control Sample				Run: 1SATURN_161004A				10/04/16 19:16
trans-1,3-Dichloropropene	0.912	mg/kg	0.20	91	70	107			
Ethylbenzene	0.992	mg/kg	0.20	99	78	132			
Methyl tert-butyl ether (MTBE)	0.808	mg/kg	0.20	81	57	132			
Methyl ethyl ketone	8.16	mg/kg	4.0	82	50	150			
Methylene chloride	0.944	mg/kg	0.20	94	62	125			
Styrene	0.960	mg/kg	0.20	96	70	132			
1,1,1,2-Tetrachloroethane	0.944	mg/kg	0.20	94	73	127			
1,1,2,2-Tetrachloroethane	0.984	mg/kg	0.20	98	74	120			
Tetrachloroethene	1.05	mg/kg	0.20	105	84	108			
Toluene	1.05	mg/kg	0.20	105	78	125			
1,1,1-Trichloroethane	0.944	mg/kg	0.20	94	73	124			
1,1,2-Trichloroethane	0.952	mg/kg	0.20	95	78	114			
Trichloroethene	1.09	mg/kg	0.20	109	70	144			
Trichlorofluoromethane	1.06	mg/kg	0.20	106	60	128			
1,2,3-Trichloropropane	0.952	mg/kg	0.20	95	63	148			
Vinyl chloride	1.14	mg/kg	0.20	114	64	124			
m+p-Xylenes	1.97	mg/kg	0.20	98	74	136			
o-Xylene	1.02	mg/kg	0.20	102	70	134			
Surr: 1,2-Dichloroethane-d4			0.20	107	65	147			
Surr: Dibromofluoromethane			0.20	90	71	135			
Surr: p-Bromofluorobenzene			0.20	101	60	143			
Surr: Toluene-d8			0.20	101	76	133			
Lab ID: H16090602-004AMS	Sample Matrix Spike				Run: 1SATURN_161004A				10/04/16 19:57
Benzene	0.872	mg/kg	0.20	87	71	119			
Bromobenzene	0.832	mg/kg	0.20	83	77	134			
Bromochloromethane	0.738	mg/kg	0.20	74	61	129			
Bromodichloromethane	0.832	mg/kg	0.20	83	64	139			
Bromoform	0.698	mg/kg	0.20	70	52	141			
Bromomethane	1.02	mg/kg	0.20	102	40	121			
Carbon tetrachloride	0.880	mg/kg	0.20	88	65	131			
Chlorobenzene	0.848	mg/kg	0.20	85	74	131			
Chlorodibromomethane	0.824	mg/kg	0.20	82	58	135			
Chloroethane	0.344	mg/kg	0.20	34	53	140			S
2-Chloroethyl vinyl ether	0.794	mg/kg	0.20	79	67.2	113			
Chloroform	0.762	mg/kg	0.20	76	65	126			
Chloromethane	0.808	mg/kg	0.20	81	46	144			
2-Chlorotoluene	0.785	mg/kg	0.20	78	72	137			
4-Chlorotoluene	0.880	mg/kg	0.20	88	70	133			
1,2-Dibromoethane	0.912	mg/kg	0.20	91	54	131			
Dibromomethane	0.710	mg/kg	0.20	71	60	140			
1,2-Dichlorobenzene	0.816	mg/kg	0.20	82	61	137			
1,3-Dichlorobenzene	0.840	mg/kg	0.20	84	67	133			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: H16090602-004AMS	Sample Matrix Spike				Run: 1SATURN_161004A				10/04/16 19:57
1,4-Dichlorobenzene	0.888	mg/kg	0.20	89	62	137			
Dichlorodifluoromethane	0.604	mg/kg	0.20	60	38	132			
1,1-Dichloroethane	0.832	mg/kg	0.20	83	66	124			
1,2-Dichloroethane	0.968	mg/kg	0.20	97	54	125			
1,1-Dichloroethene	0.912	mg/kg	0.20	91	64	113			
cis-1,2-Dichloroethene	0.840	mg/kg	0.20	84	68	133			
trans-1,2-Dichloroethene	0.872	mg/kg	0.20	87	70	130			
1,2-Dichloropropane	0.856	mg/kg	0.20	86	78	143			
1,3-Dichloropropane	0.824	mg/kg	0.20	82	63	140			
2,2-Dichloropropane	0.872	mg/kg	0.20	87	71	137			
1,1-Dichloropropene	0.888	mg/kg	0.20	89	66	136			
cis-1,3-Dichloropropene	0.816	mg/kg	0.20	82	75	137			
trans-1,3-Dichloropropene	0.777	mg/kg	0.20	78	70	107			
Ethylbenzene	0.848	mg/kg	0.20	85	78	132			
Methyl tert-butyl ether (MTBE)	0.784	mg/kg	0.20	78	57	132			
Methyl ethyl ketone	7.18	mg/kg	4.0	72	50	150			
Methylene chloride	0.832	mg/kg	0.20	83	62	125			
Styrene	0.840	mg/kg	0.20	84	70	132			
1,1,1,2-Tetrachloroethane	0.816	mg/kg	0.20	82	73	127			
1,1,2,2-Tetrachloroethane	0.896	mg/kg	0.20	90	74	120			
Tetrachloroethene	0.896	mg/kg	0.20	85	84	108			
Toluene	0.856	mg/kg	0.20	86	78	125			
1,1,1-Trichloroethane	0.816	mg/kg	0.20	82	73	124			
1,1,2-Trichloroethane	0.754	mg/kg	0.20	75	78	114			S
Trichloroethene	0.856	mg/kg	0.20	86	70	144			
Trichlorofluoromethane	0.936	mg/kg	0.20	94	60	128			
1,2,3-Trichloropropane	0.621	mg/kg	0.20	62	63	148			S
Vinyl chloride	0.856	mg/kg	0.20	86	64	124			
m+p-Xylenes	1.64	mg/kg	0.20	82	74	136			
o-Xylene	0.848	mg/kg	0.20	85	70	134			
Surr: 1,2-Dichloroethane-d4			0.20	91	65	147			
Surr: Dibromofluoromethane			0.20	79	71	135			
Surr: p-Bromofluorobenzene			0.20	79	60	143			
Surr: Toluene-d8			0.20	78	76	133			
Lab ID: H16090602-004AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_161004A				10/04/16 20:30
Benzene	0.856	mg/kg	0.20	86	71	119	1.9	20	
Bromobenzene	0.793	mg/kg	0.20	79	77	134	4.8	20	
Bromochloromethane	0.722	mg/kg	0.20	72	61	129	2.3	20	
Bromodichloromethane	0.920	mg/kg	0.20	92	64	139	10	20	
Bromoform	0.675	mg/kg	0.20	68	52	141	3.3	20	
Bromomethane	1.00	mg/kg	0.20	100	40	121	1.6	20	
Carbon tetrachloride	0.848	mg/kg	0.20	85	65	131	3.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: H16090602-004AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_161004A			10/04/16 20:30	
Chlorobenzene	0.856	mg/kg	0.20	86	74	131	0.9	20	
Chlorodibromomethane	0.832	mg/kg	0.20	83	58	135	1.0	20	
Chloroethane	0.326	mg/kg	0.20	33	53	140	5.3	20	S
2-Chloroethyl vinyl ether	0.896	mg/kg	0.20	90	67.2	113	12	20	
Chloroform	0.771	mg/kg	0.20	77	65	126	1.3	20	
Chloromethane	0.777	mg/kg	0.20	78	46	144	3.9	20	
2-Chlorotoluene	0.748	mg/kg	0.20	75	72	137	4.8	20	
4-Chlorotoluene	0.824	mg/kg	0.20	82	70	133	6.6	20	
1,2-Dibromoethane	0.904	mg/kg	0.20	90	54	131	0.9	20	
Dibromomethane	0.766	mg/kg	0.20	77	60	140	7.7	20	
1,2-Dichlorobenzene	0.816	mg/kg	0.20	82	61	137	0.0	20	
1,3-Dichlorobenzene	0.840	mg/kg	0.20	84	67	133	0.0	20	
1,4-Dichlorobenzene	0.880	mg/kg	0.20	88	62	137	0.9	20	
Dichlorodifluoromethane	0.536	mg/kg	0.20	54	38	132	12	20	
1,1-Dichloroethane	0.816	mg/kg	0.20	82	66	124	1.9	20	
1,2-Dichloroethane	0.960	mg/kg	0.20	96	54	125	0.8	20	
1,1-Dichloroethene	0.920	mg/kg	0.20	92	64	113	0.9	20	
cis-1,2-Dichloroethene	0.816	mg/kg	0.20	82	68	133	2.9	20	
trans-1,2-Dichloroethene	0.808	mg/kg	0.20	81	70	130	7.6	20	
1,2-Dichloropropane	0.952	mg/kg	0.20	95	78	143	11	20	
1,3-Dichloropropane	0.880	mg/kg	0.20	88	63	140	6.6	20	
2,2-Dichloropropane	0.864	mg/kg	0.20	86	71	137	0.9	20	
1,1-Dichloropropene	0.880	mg/kg	0.20	88	66	136	0.9	20	
cis-1,3-Dichloropropene	0.888	mg/kg	0.20	89	75	137	8.5	20	
trans-1,3-Dichloropropene	0.824	mg/kg	0.20	82	70	107	5.9	20	
Ethylbenzene	0.816	mg/kg	0.20	82	78	132	3.8	20	
Methyl tert-butyl ether (MTBE)	0.832	mg/kg	0.20	83	57	132	5.9	20	
Methyl ethyl ketone	8.16	mg/kg	4.0	82	50	150	13	20	
Methylene chloride	0.832	mg/kg	0.20	83	62	125	0.0	20	
Styrene	0.816	mg/kg	0.20	82	70	132	2.9	20	
1,1,1,2-Tetrachloroethane	0.795	mg/kg	0.20	80	73	127	2.6	20	
1,1,2,2-Tetrachloroethane	0.840	mg/kg	0.20	84	74	120	6.5	20	
Tetrachloroethene	0.896	mg/kg	0.20	85	84	108	0.0	20	
Toluene	0.856	mg/kg	0.20	86	78	125	0.0	20	
1,1,1-Trichloroethane	0.808	mg/kg	0.20	81	73	124	1.0	20	
1,1,2-Trichloroethane	0.856	mg/kg	0.20	86	78	114	13	20	
Trichloroethene	0.872	mg/kg	0.20	87	70	144	1.9	20	
Trichlorofluoromethane	0.896	mg/kg	0.20	90	60	128	4.4	20	
1,2,3-Trichloropropane	0.666	mg/kg	0.20	67	63	148	7.0	20	
Vinyl chloride	0.800	mg/kg	0.20	80	64	124	6.8	20	
m+p-Xylenes	1.58	mg/kg	0.20	79	74	136	3.5	20	
o-Xylene	0.816	mg/kg	0.20	82	70	134	3.8	20	
Surr: 1,2-Dichloroethane-d4			0.20	95	65	147			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site

Report Date: 10/07/16
Work Order: H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 34596
Lab ID: H16090602-004AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_161004A				10/04/16 20:30
Surr: Dibromofluoromethane			0.20	80	71	135			
Surr: p-Bromofluorobenzene			0.20	77	60	143			
Surr: Toluene-d8			0.20	84	76	133			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 10/07/16

Project: Helena Solvent Site **Work Order:** H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: R119108	
Lab ID: 093016_CCV_25	Continuing Calibration Verification Standard							09/30/16 21:25	
Benzene	1.01	mg/kg	0.20	101	70	130			
Bromobenzene	1.03	mg/kg	0.20	103	70	130			
Bromochloromethane	1.10	mg/kg	0.20	110	70	130			
Bromodichloromethane	1.01	mg/kg	0.20	101	70	130			
Bromoform	1.21	mg/kg	0.20	121	70	130			
Bromomethane	1.08	mg/kg	0.20	108	70	130			
Carbon tetrachloride	1.04	mg/kg	0.20	104	70	130			
Chlorobenzene	0.920	mg/kg	0.20	92	70	130			
Chlorodibromomethane	1.20	mg/kg	0.20	120	70	130			
Chloroethane	1.72	mg/kg	0.20	172	70	130			S
2-Chloroethyl vinyl ether	0.707	mg/kg	0.20	71	70	130			
Chloroform	1.02	mg/kg	0.20	102	80	120			
Chloromethane	1.21	mg/kg	0.20	121	70	130			
2-Chlorotoluene	1.12	mg/kg	0.20	112	70	130			
4-Chlorotoluene	1.02	mg/kg	0.20	102	70	130			
1,2-Dibromoethane	1.16	mg/kg	0.20	116	70	130			
Dibromomethane	1.01	mg/kg	0.20	101	70	130			
1,2-Dichlorobenzene	1.08	mg/kg	0.20	108	70	130			
1,3-Dichlorobenzene	0.968	mg/kg	0.20	97	70	130			
1,4-Dichlorobenzene	1.06	mg/kg	0.20	106	70	130			
Dichlorodifluoromethane	0.968	mg/kg	0.20	97	70	130			
1,1-Dichloroethane	1.26	mg/kg	0.20	126	70	130			
1,2-Dichloroethane	1.09	mg/kg	0.20	109	70	130			
1,1-Dichloroethene	1.10	mg/kg	0.20	110	80	120			
cis-1,2-Dichloroethene	1.18	mg/kg	0.20	118	70	130			
trans-1,2-Dichloroethene	1.14	mg/kg	0.20	114	70	130			
1,2-Dichloropropane	1.20	mg/kg	0.20	120	80	120			
1,3-Dichloropropane	1.03	mg/kg	0.20	103	70	130			
2,2-Dichloropropane	1.12	mg/kg	0.20	112	70	130			
1,1-Dichloropropene	0.896	mg/kg	0.20	90	70	130			
cis-1,3-Dichloropropene	1.02	mg/kg	0.20	102	70	130			
trans-1,3-Dichloropropene	1.02	mg/kg	0.20	102	70	130			
Ethylbenzene	1.04	mg/kg	0.20	104	80	120			
Methyl tert-butyl ether (MTBE)	1.06	mg/kg	0.20	106	70	130			
Methyl ethyl ketone	10.8	mg/kg	4.0	108	70	130			
Methylene chloride	1.09	mg/kg	0.20	109	70	130			
Styrene	0.912	mg/kg	0.20	91	70	130			
1,1,1,2-Tetrachloroethane	1.10	mg/kg	0.20	110	70	130			
1,1,2,2-Tetrachloroethane	1.10	mg/kg	0.20	110	70	130			
Tetrachloroethene	0.984	mg/kg	0.20	98	70	130			
Toluene	0.992	mg/kg	0.20	99	80	120			
1,1,1-Trichloroethane	1.05	mg/kg	0.20	105	70	130			
1,1,2-Trichloroethane	1.07	mg/kg	0.20	107	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site

Report Date: 10/07/16
Work Order: H16090602

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R119108
Lab ID: 093016_CCV_25	Continuing Calibration Verification Standard								09/30/16 21:25
Trichloroethene	1.04	mg/kg	0.20	104	70	130			
Trichlorofluoromethane	1.10	mg/kg	0.20	110	70	130			
1,2,3-Trichloropropane	1.22	mg/kg	0.20	122	70	130			
Vinyl chloride	1.01	mg/kg	0.20	101	80	120			
m+p-Xylenes	2.05	mg/kg	0.20	102	70	130			
o-Xylene	0.952	mg/kg	0.20	95	70	130			
Surr: 1,2-Dichloroethane-d4			0.20	108	70	130			
Surr: Dibromofluoromethane			0.20	103	70	130			
Surr: p-Bromofluorobenzene			0.20	94	70	130			
Surr: Toluene-d8			0.20	96	70	130			
Method: SW8260B									Analytical Run: R119206
Lab ID: 100416_CCV_19	Continuing Calibration Verification Standard								10/04/16 18:20
Tetrachloroethene	1.02	mg/kg	0.20	102	70	130			
Surr: 1,2-Dichloroethane-d4			0.20	101	70	130			
Surr: Dibromofluoromethane			0.20	91	70	130			
Surr: p-Bromofluorobenzene			0.20	101	70	130			
Surr: Toluene-d8			0.20	98	70	130			
Method: SW8260B									Analytical Run: R119216
Lab ID: 100516_CCV_23	Continuing Calibration Verification Standard								10/05/16 19:57
Tetrachloroethene	0.960	mg/kg	0.20	96	70	130			
Surr: 1,2-Dichloroethane-d4			0.20	121	70	130			
Surr: Dibromofluoromethane			0.20	95	70	130			
Surr: p-Bromofluorobenzene			0.20	94	70	130			
Surr: Toluene-d8			0.20	94	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H16090602

Login completed by: Tracy L. Lorash

Date Received: 9/28/2016

Reviewed by: BL2000\rwilliams

Received by: TLL

Reviewed Date: 9/30/2016

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	5.8°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	Not Applicable ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Density is a requested analysis on the COC. Per Rye, we are not analyzing for density.
Dashes and ' marks inconsistent between sample ID on COC and bottles. Logged in with ID from COC. tl 9/28/16

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: HydroSolutions Inc

Project Name, PWS, Permit, Etc.: Helena Solvent Site

Sample Origin State: MT

EPA/State Compliance: Yes ☐ No ☒

Report Mail Address (Required):

Contact Name: Rye Sumgen

Phone/Fax: 406 443 6169 x100

Cell:

Sampler: (Please Print) Rye Sumgen

☒ No Hard Copy Email: rye@hydrosi.com

Invoice Contact & Phone: Mandy Garras 406-655-9555

Purchase Order:

Quote/Bottle Order:

Invoice Address (Required): 1500 Poly Dr Ste 103 Billings MT ~~59601~~ 59102

☒ No Hard Copy Email: Mandy@hydrosi.com

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

ANALYSIS REQUESTED

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: Hand

Cooler ID(s): 4

Receipt Temp: 5.8 °C

On Ice: (Y) N

Custody Seal: On Bottle Y (N); On Cooler Y (N)

Intact: Y N

Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O DW; Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water)	VOC Short 8260	TOC	Density								SEE ATTACHED	Standard Turnaround (TAT)	RUSH
1	DPT-1 8-8.5	9/20/16	1355	S	X	X										X	
2	VP-1 13-14	9/22/16	0915														
3	VP-2 6-7	9/22/16	1305														
4	VP-3 5-5.5	9/22/16	1530				X										
5	VP-4 4-5.5	9/22/16	~~1635~~ 1645														
6	VP-4 1.5-2.5	9/22/16	1640														
7	VP-5 4.5-5.5	9/22/16	1730														
8	VP-5 7.5-8	9/22/16	1752				X										
9	VP-6 1-2	9/23/16	0830														
10	VP-6 4-4.5	9/23/16	0845														

LABORATORY USE ONLY: H16090402

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Rye Sumgen	9/28/16 1530				
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Tracy Grant	Date/Time: 9/28/16 15:30	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Horizontal Drilling Soil Sample
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, HydroSolutions SOPs for soil sample collection
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/3/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☒ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☐ Air (including soil gas) ☐ Other
11. Sample collection start date	12/21/2016 M/D/YY
12. Sample collection end date	12/21/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Analytical Method(s)
	Delete Method: 8260 Volatile Organic Compounds (VOCs) - Short List
	Delete Method: Moisture
	Delete Method: Volatile Organics, Methanol Extraction

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H16120482		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ○	No ●	Comments: Soil moisture analysis was performed past recommended holding time. Does not affect data usability.

	Yes	No	Comments
17a. Were chain-of-custody forms complete?	●	○	
17b. Were samples received in good condition, preserved, and at appropriate temperature (VOA no headspace, appropriate pH, temperature 4° C +/- 2° for most samples)?	●	○	
17c. Were the samples analyzed within method-specified or technical holding times?	○	●	H qualifier for moisture

If no, explain

Soil moisture analysis was performed past recommended holding time. Does not affect data usability.

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S qualifiers for Bromomethane, 2-Chloroethyl vinyl ether, and Tetrachloroethene (PCE) for % recovery above high limit. S qualifier for Chloroethane for % recovery below low limit. Possible high bias in the accuracy of the results for PCE in results, but data usability is not affected for intended purpose of investigation and background information.
18a. Were all calibration verification results within acceptable limits?	○	●	

If no, explain

S qualifier (spike recovery outside of advisory limits) for Chloroethane.

	Yes	No	Comments
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	

If no, explain

RPDs exceeded for 2-Chlorotoluene, 1,4-Dichlorobenzene, trans-1,3-Dichloropropene, Methyl ethyl ketone, Tetrachloroethene, 1,1,2-Trichloroethane, and Trichloroethene. Spike recoveries outside advisory limits for numerous analytes in matrix spike and matrix spike duplicate (see laboratory results). Most of these compounds were not detected in the sample, and are therefore not qualified. The PCE detection in the sample was given a J+ data validation flag. Overall data usability is not affected for intended purpose of investigation and background information.

	Yes	No	Comments
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	○	●	

If no, explain

N/A - no LCS duplicate

	Yes	No	Comments
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	●	○	N/A no LCS duplicate
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	1 method blank for 1 sample (100%)
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	●	○	

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample	H16120482-001AMS	Below SVEH-2 9.5-7	
Delete Sample	H16120482-001AMSD	Below SVEH-2 9.5-7	

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	reported units are mg/kg for soils
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks were collected. All detected analytes are assumed to be attributable to contaminants in the sample. No duplicates were collected because soil duplicates are generally impracticable for Method 8260 due to soil heterogeneity.

If no, explain

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ●	Comments: Field duplicates not collected, see above.
28a. Were all blank samples free of analyte contamination?	Yes ●	No ○	Comments: Laboratory blanks were ND.
28b. Were field duplicates collected as required?	Yes ○	No ●	Comments: No field duplicates collected. See above.

If no, explain

28c. Are field duplicate relative percent differences within data validation quality control limits?	Yes ○	No ●	Comments: N/A. No field duplicates collected. See above

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample	H16120482-001	Below SVEH-1 9.5-7	H	Moisture analysis performed past recommended holding time. Does not bias results.
Delete Sample	H16120482-001	Below SVEH-1 9.5-7	J-	Estimated, low bias for Tetrachlorethene results of 82 mg/kg

30. What is the percent completeness (samples planned versus valid samples collected)?	100	Comments:
31. Was the completeness goal met?	Yes ● / No ○	Comments:

32. Other general comments or observations?
Data is usable for intended purpose of site investigation.

Split Samples

33. Did DEQ collect split samples?	Yes	No	Comments
	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

January 09, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H16120482

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 12/29/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H16120482-001	Below SVEH-2 9.5-7	12/21/16 14:00	12/29/16	Soil	Moisture Volatile Organics, Methanol Extraction 8260-Volatile Organic Compounds - Short List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120482-001
Client Sample ID: Below SVEH-2 9.5-7

Report Date: 01/09/17
Collection Date: 12/21/16 14:00
DateReceived: 12/29/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.0	wt%	H	0.2		SW3550C	12/29/16 11:37 / kjw
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Benzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Bromobenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Bromochloromethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Bromodichloromethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Bromomethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Carbon tetrachloride	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Chlorobenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Chloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
2-Chloroethyl vinyl ether	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Chloroform	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Chloromethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
2-Chlorotoluene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
4-Chlorotoluene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Chlorodibromomethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,2-Dibromoethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Dibromomethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,2-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,3-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,4-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Dichlorodifluoromethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1-Dichloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,2-Dichloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
cis-1,2-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
trans-1,2-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,2-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,3-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
2,2-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
cis-1,3-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
trans-1,3-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Ethylbenzene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Methyl tert-butyl ether (MTBE)	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Methylene chloride	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Methyl ethyl ketone	ND	mg/kg-dry		4.0		SW8260B	12/29/16 22:05 / kjw
Styrene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1,1,2-Tetrachloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1,2,2-Tetrachloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Tetrachloroethene	82	mg/kg-dry		2.4		SW8260B	12/30/16 13:57 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120482-001
Client Sample ID: Below SVEH-2 9.5-7

Report Date: 01/09/17
Collection Date: 12/21/16 14:00
DateReceived: 12/29/16
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1,1-Trichloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,1,2-Trichloroethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Trichloroethene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Trichlorofluoromethane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
1,2,3-Trichloropropane	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Vinyl chloride	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
m+p-Xylenes	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
o-Xylene	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Xylenes, Total	ND	mg/kg-dry		0.20		SW8260B	12/29/16 22:05 / kjw
Surr: p-Bromofluorobenzene	135	%REC		60-143		SW8260B	12/29/16 22:05 / kjw
Surr: Dibromofluoromethane	90.0	%REC		71-135		SW8260B	12/29/16 22:05 / kjw
Surr: 1,2-Dichloroethane-d4	95.0	%REC		65-147		SW8260B	12/29/16 22:05 / kjw
Surr: Toluene-d8	102	%REC		76-133		SW8260B	12/29/16 22:05 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**SW3550C**								Batch: R121716	
Lab ID:	**H16120482-001ADUP**	Sample Duplicate				Run: EXTRACT OV 2_161229A			12/29/16 11:37	
Moisture		16.1	wt%	0.20				11	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: 35823
Lab ID: LCS-35823	53	Laboratory Control Sample				Run: 1SATURN_161230A				12/30/16 11:08
Benzene		1.06	mg/kg	0.20	106	71	119			
Bromobenzene		1.12	mg/kg	0.20	112	77	134			
Bromochloromethane		0.824	mg/kg	0.20	82	61	129			
Bromodichloromethane		1.03	mg/kg	0.20	103	64	139			
Bromoform		1.17	mg/kg	0.20	117	52	141			
Bromomethane		1.39	mg/kg	0.20	139	40	121			S
Carbon tetrachloride		1.06	mg/kg	0.20	106	65	131			
Chlorobenzene		1.15	mg/kg	0.20	115	74	131			
Chlorodibromomethane		0.952	mg/kg	0.20	95	58	135			
Chloroethane		0.414	mg/kg	0.20	41	53	140			S
2-Chloroethyl vinyl ether		1.22	mg/kg	0.20	122	67.2	113			S
Chloroform		1.06	mg/kg	0.20	106	65	126			
Chloromethane		0.960	mg/kg	0.20	96	46	144			
2-Chlorotoluene		1.14	mg/kg	0.20	114	72	137			
4-Chlorotoluene		1.20	mg/kg	0.20	120	70	133			
1,2-Dibromoethane		0.928	mg/kg	0.20	93	54	131			
Dibromomethane		0.904	mg/kg	0.20	90	60	140			
1,2-Dichlorobenzene		1.14	mg/kg	0.20	114	61	137			
1,3-Dichlorobenzene		1.06	mg/kg	0.20	106	67	133			
1,4-Dichlorobenzene		1.14	mg/kg	0.20	114	62	137			
Dichlorodifluoromethane		0.724	mg/kg	0.20	72	38	132			
1,1-Dichloroethane		1.01	mg/kg	0.20	101	66	124			
1,2-Dichloroethane		0.904	mg/kg	0.20	90	54	125			
1,1-Dichloroethene		1.05	mg/kg	0.20	105	64	113			
cis-1,2-Dichloroethene		1.11	mg/kg	0.20	111	68	133			
trans-1,2-Dichloroethene		1.16	mg/kg	0.20	116	70	130			
1,2-Dichloropropane		1.12	mg/kg	0.20	112	78	143			
1,3-Dichloropropane		1.00	mg/kg	0.20	100	63	140			
2,2-Dichloropropane		0.992	mg/kg	0.20	99	71	137			
1,1-Dichloropropene		1.07	mg/kg	0.20	107	66	136			
cis-1,3-Dichloropropene		1.10	mg/kg	0.20	110	75	137			
trans-1,3-Dichloropropene		1.00	mg/kg	0.20	100	70	107			
Ethylbenzene		1.09	mg/kg	0.20	109	78	132			
Methyl tert-butyl ether (MTBE)		0.896	mg/kg	0.20	90	57	132			
Methyl ethyl ketone		8.00	mg/kg	4.0	80	50	150			
Methylene chloride		1.04	mg/kg	0.20	104	62	125			
Styrene		1.06	mg/kg	0.20	106	70	132			
1,1,1,2-Tetrachloroethane		1.10	mg/kg	0.20	110	73	127			
1,1,2,2-Tetrachloroethane		1.10	mg/kg	0.20	110	74	120			
Tetrachloroethene		1.10	mg/kg	0.20	110	84	108			S
Toluene		1.03	mg/kg	0.20	103	78	125			
1,1,1-Trichloroethane		1.10	mg/kg	0.20	110	73	124			
1,1,2-Trichloroethane		0.992	mg/kg	0.20	99	78	114			
Trichloroethene		1.19	mg/kg	0.20	119	70	144			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: 35823
Lab ID: LCS-35823	53	Laboratory Control Sample				Run: 1SATURN_161230A				12/30/16 11:08
Trichlorofluoromethane		0.968	mg/kg	0.20	97	60	128			
1,2,3-Trichloropropane		1.08	mg/kg	0.20	108	63	148			
Vinyl chloride		1.08	mg/kg	0.20	108	64	124			
m+p-Xylenes		2.16	mg/kg	0.20	108	74	136			
o-Xylene		1.10	mg/kg	0.20	110	70	134			
Surr: 1,2-Dichloroethane-d4				0.20	86	65	147			
Surr: Dibromofluoromethane				0.20	78	71	135			
Surr: p-Bromofluorobenzene				0.20	102	60	143			
Surr: Toluene-d8				0.20	94	76	133			
Lab ID: MB-35823	53	Method Blank				Run: 1SATURN_161230A				12/30/16 12:16
Benzene		ND	mg/kg	0.20						
Bromobenzene		ND	mg/kg	0.20						
Bromochloromethane		ND	mg/kg	0.20						
Bromodichloromethane		ND	mg/kg	0.20						
Bromoform		ND	mg/kg	0.20						
Bromomethane		ND	mg/kg	0.20						
Carbon tetrachloride		ND	mg/kg	0.20						
Chlorobenzene		ND	mg/kg	0.20						
Chlorodibromomethane		ND	mg/kg	0.20						
Chloroethane		ND	mg/kg	0.20						
2-Chloroethyl vinyl ether		ND	mg/kg	0.20						
Chloroform		ND	mg/kg	0.20						
Chloromethane		ND	mg/kg	0.20						
2-Chlorotoluene		ND	mg/kg	0.20						
4-Chlorotoluene		ND	mg/kg	0.20						
1,2-Dibromoethane		ND	mg/kg	0.20						
Dibromomethane		ND	mg/kg	0.20						
1,2-Dichlorobenzene		ND	mg/kg	0.20						
1,3-Dichlorobenzene		ND	mg/kg	0.20						
1,4-Dichlorobenzene		ND	mg/kg	0.20						
Dichlorodifluoromethane		ND	mg/kg	0.20						
1,1-Dichloroethane		ND	mg/kg	0.20						
1,2-Dichloroethane		ND	mg/kg	0.20						
1,1-Dichloroethene		ND	mg/kg	0.20						
cis-1,2-Dichloroethene		ND	mg/kg	0.20						
trans-1,2-Dichloroethene		ND	mg/kg	0.20						
1,2-Dichloropropane		ND	mg/kg	0.20						
1,3-Dichloropropane		ND	mg/kg	0.20						
2,2-Dichloropropane		ND	mg/kg	0.20						
1,1-Dichloropropene		ND	mg/kg	0.20						
cis-1,3-Dichloropropene		ND	mg/kg	0.20						
trans-1,3-Dichloropropene		ND	mg/kg	0.20						
Ethylbenzene		ND	mg/kg	0.20						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: 35823
Lab ID: MB-35823	53	Method Blank				Run: 1SATURN_161230A				12/30/16 12:16
Methyl tert-butyl ether (MTBE)		ND	mg/kg	0.20						
Methyl ethyl ketone		ND	mg/kg	4.0						
Methylene chloride		ND	mg/kg	0.20						
Styrene		ND	mg/kg	0.20						
1,1,1,2-Tetrachloroethane		ND	mg/kg	0.20						
1,1,2,2-Tetrachloroethane		ND	mg/kg	0.20						
Tetrachloroethene		ND	mg/kg	0.20						
Toluene		ND	mg/kg	0.20						
1,1,1-Trichloroethane		ND	mg/kg	0.20						
1,1,2-Trichloroethane		ND	mg/kg	0.20						
Trichloroethene		ND	mg/kg	0.20						
Trichlorofluoromethane		ND	mg/kg	0.20						
1,2,3-Trichloropropane		ND	mg/kg	0.20						
Vinyl chloride		ND	mg/kg	0.20						
m+p-Xylenes		ND	mg/kg	0.20						
o-Xylene		ND	mg/kg	0.20						
Surr: 1,2-Dichloroethane-d4				0.20	86	65	147			
Surr: Dibromofluoromethane				0.20	86	71	135			
Surr: p-Bromofluorobenzene				0.20	109	60	143			
Surr: Toluene-d8				0.20	90	76	133			
Lab ID: H16120482-001AMS	53	Sample Matrix Spike				Run: 1SATURN_161230A				12/30/16 14:30
Benzene		1.10	mg/kg-dry	0.20	91	71	119			
Bromobenzene		1.26	mg/kg-dry	0.20	103	77	134			
Bromochloromethane		2.26	mg/kg-dry	0.20	186	61	129			S
Bromodichloromethane		1.05	mg/kg-dry	0.20	86	64	139			
Bromoform		1.39	mg/kg-dry	0.20	114	52	141			
Bromomethane		2.07	mg/kg-dry	0.20	170	40	121			S
Carbon tetrachloride		1.09	mg/kg-dry	0.20	90	65	131			
Chlorobenzene		1.05	mg/kg-dry	0.20	86	74	131			
Chlorodibromomethane		1.00	mg/kg-dry	0.20	82	58	135			
Chloroethane		2.95	mg/kg-dry	0.20	242	53	140			S
2-Chloroethyl vinyl ether		ND	mg/kg-dry	0.20	0	67.2	113			S
Chloroform		1.30	mg/kg-dry	0.20	106	65	126			
Chloromethane		1.01	mg/kg-dry	0.20	83	46	144			
2-Chlorotoluene		1.67	mg/kg-dry	0.20	137	72	137			
4-Chlorotoluene		0.853	mg/kg-dry	0.20	70	70	133			
1,2-Dibromoethane		0.755	mg/kg-dry	0.20	62	54	131			
Dibromomethane		0.895	mg/kg-dry	0.20	73	60	140			
1,2-Dichlorobenzene		0.983	mg/kg-dry	0.20	81	61	137			
1,3-Dichlorobenzene		0.894	mg/kg-dry	0.20	73	67	133			
1,4-Dichlorobenzene		0.815	mg/kg-dry	0.20	67	62	137			
Dichlorodifluoromethane		ND	mg/kg-dry	0.20	0	38	132			S
1,1-Dichloroethane		1.01	mg/kg-dry	0.20	83	66	124			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: 35823
Lab ID: H16120482-001AMS	53	Sample Matrix Spike				Run: 1SATURN_161230A			12/30/16 14:30	
1,2-Dichloroethane		1.63	mg/kg-dry	0.20	134	54	125			S
1,1-Dichloroethene		1.13	mg/kg-dry	0.20	92	64	113			
cis-1,2-Dichloroethene		1.18	mg/kg-dry	0.20	97	68	133			
trans-1,2-Dichloroethene		1.13	mg/kg-dry	0.20	93	70	130			
1,2-Dichloropropane		1.14	mg/kg-dry	0.20	94	78	143			
1,3-Dichloropropane		0.970	mg/kg-dry	0.20	80	63	140			
2,2-Dichloropropane		0.956	mg/kg-dry	0.20	78	71	137			
1,1-Dichloropropene		1.08	mg/kg-dry	0.20	88	66	136			
cis-1,3-Dichloropropene		1.15	mg/kg-dry	0.20	94	75	137			
trans-1,3-Dichloropropene		0.587	mg/kg-dry	0.20	48	70	107			S
Ethylbenzene		1.04	mg/kg-dry	0.20	86	78	132			
Methyl tert-butyl ether (MTBE)		0.966	mg/kg-dry	0.20	79	57	132			
Methyl ethyl ketone		9.13	mg/kg-dry	4.0	75	50	150			
Methylene chloride		1.07	mg/kg-dry	0.20	88	62	125			
Styrene		0.814	mg/kg-dry	0.20	67	70	132			S
1,1,1,2-Tetrachloroethane		1.35	mg/kg-dry	0.20	111	73	127			
1,1,2,2-Tetrachloroethane		1.66	mg/kg-dry	0.20	136	74	120			S
Tetrachloroethene		81.9	mg/kg-dry	0.20	16	84	108			S
Toluene		0.987	mg/kg-dry	0.20	81	78	125			
1,1,1-Trichloroethane		1.15	mg/kg-dry	0.20	94	73	124			
1,1,2-Trichloroethane		1.01	mg/kg-dry	0.20	83	78	114			
Trichloroethene		1.29	mg/kg-dry	0.20	105	70	144			
Trichlorofluoromethane		0.991	mg/kg-dry	0.20	81	60	128			
1,2,3-Trichloropropane		ND	mg/kg-dry	0.20	0	63	148			S
Vinyl chloride		0.905	mg/kg-dry	0.20	74	64	124			
m+p-Xylenes		2.07	mg/kg-dry	0.20	85	74	136			
o-Xylene		1.02	mg/kg-dry	0.20	83	70	134			
Surr: 1,2-Dichloroethane-d4				0.20	69	65	147			
Surr: Dibromofluoromethane				0.20	80	71	135			
Surr: p-Bromofluorobenzene				0.20	117	60	143			
Surr: Toluene-d8				0.20	86	76	133			
Lab ID: H16120482-001AMSD	53	Sample Matrix Spike Duplicate				Run: 1SATURN_161230A			12/30/16 15:04	
Benzene		1.17	mg/kg-dry	0.20	98	71	119	5.6	20	
Bromobenzene		1.18	mg/kg-dry	0.20	99	77	134	6.8	20	
Bromochloromethane		2.23	mg/kg-dry	0.20	187	61	129	1.4	20	S
Bromodichloromethane		1.16	mg/kg-dry	0.20	97	64	139	10	20	
Bromoform		1.20	mg/kg-dry	0.20	101	52	141	14	20	
Bromomethane		2.02	mg/kg-dry	0.20	170	40	121	2.2	20	S
Carbon tetrachloride		1.06	mg/kg-dry	0.20	89	65	131	3.0	20	
Chlorobenzene		1.22	mg/kg-dry	0.20	102	74	131	15	20	
Chlorodibromomethane		0.969	mg/kg-dry	0.20	81	58	135	3.4	20	
Chloroethane		2.94	mg/kg-dry	0.20	246	53	140	0.3	20	S
2-Chloroethyl vinyl ether		ND	mg/kg-dry	0.20	0	67.2	113		20	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 35823	
Lab ID: H16120482-001AMSD	53	Sample Matrix Spike Duplicate				Run: 1SATURN_161230A			12/30/16 15:04	
Chloroform		1.42	mg/kg-dry	0.20	119	65	126	9.0	20	
Chloromethane		0.988	mg/kg-dry	0.20	83	46	144	1.8	20	
2-Chlorotoluene		1.36	mg/kg-dry	0.20	114	72	137	21	20	R
4-Chlorotoluene		1.01	mg/kg-dry	0.20	85	70	133	17	20	
1,2-Dibromoethane		0.801	mg/kg-dry	0.20	67	54	131	5.9	20	
Dibromomethane		0.996	mg/kg-dry	0.20	84	60	140	11	20	
1,2-Dichlorobenzene		1.06	mg/kg-dry	0.20	89	61	137	7.2	20	
1,3-Dichlorobenzene		1.02	mg/kg-dry	0.20	85	67	133	13	20	
1,4-Dichlorobenzene		1.04	mg/kg-dry	0.20	87	62	137	24	20	R
Dichlorodifluoromethane		ND	mg/kg-dry	0.20	0	38	132		20	S
1,1-Dichloroethane		0.965	mg/kg-dry	0.20	81	66	124	4.8	20	
1,2-Dichloroethane		1.43	mg/kg-dry	0.20	120	54	125	13	20	
1,1-Dichloroethene		1.21	mg/kg-dry	0.20	102	64	113	7.3	20	
cis-1,2-Dichloroethene		1.15	mg/kg-dry	0.20	96	68	133	3.2	20	
trans-1,2-Dichloroethene		1.14	mg/kg-dry	0.20	96	70	130	0.7	20	
1,2-Dichloropropane		1.09	mg/kg-dry	0.20	92	78	143	4.7	20	
1,3-Dichloropropane		0.941	mg/kg-dry	0.20	79	63	140	3.0	20	
2,2-Dichloropropane		1.07	mg/kg-dry	0.20	89	71	137	11	20	
1,1-Dichloropropene		1.24	mg/kg-dry	0.20	104	66	136	14	20	
cis-1,3-Dichloropropene		1.11	mg/kg-dry	0.20	93	75	137	3.8	20	
trans-1,3-Dichloropropene		0.904	mg/kg-dry	0.20	76	70	107	43	20	R
Ethylbenzene		1.02	mg/kg-dry	0.20	85	78	132	2.6	20	
Methyl tert-butyl ether (MTBE)		1.08	mg/kg-dry	0.20	90	57	132	11	20	
Methyl ethyl ketone		11.7	mg/kg-dry	4.0	98	50	150	25	20	R
Methylene chloride		1.15	mg/kg-dry	0.20	97	62	125	7.7	20	
Styrene		0.834	mg/kg-dry	0.20	70	70	132	2.4	20	
1,1,1,2-Tetrachloroethane		1.37	mg/kg-dry	0.20	115	73	127	1.6	20	
1,1,2,2-Tetrachloroethane		1.71	mg/kg-dry	0.20	143	74	120	2.8	20	S
Tetrachloroethene		42.5	mg/kg-dry	0.20	-3290	84	108	63	20	SR
Toluene		1.09	mg/kg-dry	0.20	91	78	125	9.8	20	
1,1,1-Trichloroethane		1.10	mg/kg-dry	0.20	93	73	124	3.9	20	
1,1,2-Trichloroethane		1.27	mg/kg-dry	0.20	107	78	114	23	20	R
Trichloroethene		1.03	mg/kg-dry	0.20	87	70	144	22	20	R
Trichlorofluoromethane		0.986	mg/kg-dry	0.20	83	60	128	0.5	20	
1,2,3-Trichloropropane		ND	mg/kg-dry	0.20	0	63	148		20	S
Vinyl chloride		0.855	mg/kg-dry	0.20	72	64	124	5.7	20	
m+p-Xylenes		1.98	mg/kg-dry	0.20	83	74	136	4.1	20	
o-Xylene		1.06	mg/kg-dry	0.20	89	70	134	4.4	20	
Surr: 1,2-Dichloroethane-d4				0.20	62	65	147			S
Surr: Dibromofluoromethane				0.20	89	71	135			
Surr: p-Bromofluorobenzene				0.20	91	60	143			
Surr: Toluene-d8				0.20	91	76	133			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

R - RPD exceeds advisory limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R121688	
Lab ID: 122916_CCV_3	52	Continuing Calibration Verification Standard							12/29/16 10:51	
Benzene		0.968	mg/kg	0.20	97	70	130			
Bromobenzene		0.992	mg/kg	0.20	99	70	130			
Bromochloromethane		0.832	mg/kg	0.20	83	70	130			
Bromodichloromethane		0.944	mg/kg	0.20	94	70	130			
Bromoform		1.04	mg/kg	0.20	104	70	130			
Bromomethane		1.18	mg/kg	0.20	118	70	130			
Carbon tetrachloride		1.01	mg/kg	0.20	101	70	130			
Chlorobenzene		1.01	mg/kg	0.20	101	70	130			
Chlorodibromomethane		0.912	mg/kg	0.20	91	70	130			
Chloroethane		2.48	mg/kg	0.20	248	70	130			S
2-Chloroethyl vinyl ether		0.746	mg/kg	0.20	75	70	130			
Chloroform		1.00	mg/kg	0.20	100	80	120			
Chloromethane		0.896	mg/kg	0.20	90	70	130			
2-Chlorotoluene		1.06	mg/kg	0.20	106	70	130			
4-Chlorotoluene		1.06	mg/kg	0.20	106	70	130			
1,2-Dibromoethane		0.848	mg/kg	0.20	85	70	130			
Dibromomethane		0.888	mg/kg	0.20	89	70	130			
1,2-Dichlorobenzene		0.904	mg/kg	0.20	90	70	130			
1,3-Dichlorobenzene		0.920	mg/kg	0.20	92	70	130			
1,4-Dichlorobenzene		0.952	mg/kg	0.20	95	70	130			
Dichlorodifluoromethane		0.872	mg/kg	0.20	87	70	130			
1,1-Dichloroethane		1.01	mg/kg	0.20	101	70	130			
1,2-Dichloroethane		0.778	mg/kg	0.20	78	70	130			
1,1-Dichloroethene		1.00	mg/kg	0.20	100	80	120			
cis-1,2-Dichloroethene		1.02	mg/kg	0.20	102	70	130			
trans-1,2-Dichloroethene		1.07	mg/kg	0.20	107	70	130			
1,2-Dichloropropane		1.10	mg/kg	0.20	110	80	120			
1,3-Dichloropropane		0.777	mg/kg	0.20	78	70	130			
2,2-Dichloropropane		0.992	mg/kg	0.20	99	70	130			
1,1-Dichloropropene		1.04	mg/kg	0.20	104	70	130			
cis-1,3-Dichloropropene		0.888	mg/kg	0.20	89	70	130			
trans-1,3-Dichloropropene		0.872	mg/kg	0.20	87	70	130			
Ethylbenzene		1.01	mg/kg	0.20	101	80	120			
Methyl tert-butyl ether (MTBE)		0.714	mg/kg	0.20	71	70	130			
Methyl ethyl ketone		7.76	mg/kg	4.0	78	70	130			
Methylene chloride		0.936	mg/kg	0.20	94	70	130			
Styrene		0.960	mg/kg	0.20	96	70	130			
1,1,1,2-Tetrachloroethane		1.09	mg/kg	0.20	109	70	130			
1,1,2,2-Tetrachloroethane		0.984	mg/kg	0.20	98	70	130			
Toluene		1.04	mg/kg	0.20	104	80	120			
1,1,1-Trichloroethane		1.02	mg/kg	0.20	102	70	130			
1,1,2-Trichloroethane		0.912	mg/kg	0.20	91	70	130			
Trichloroethene		1.14	mg/kg	0.20	114	70	130			
Trichlorofluoromethane		0.856	mg/kg	0.20	86	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 01/09/17

Project: DEQ 08 **Work Order:** H16120482

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R121688	
Lab ID: 122916_CCV_3	52	Continuing Calibration Verification Standard							12/29/16 10:51	
1,2,3-Trichloropropane		1.01	mg/kg	0.20	101	70	130			
Vinyl chloride		0.944	mg/kg	0.20	94	80	120			
m+p-Xylenes		2.05	mg/kg	0.20	102	70	130			
o-Xylene		1.00	mg/kg	0.20	100	70	130			
Surr: 1,2-Dichloroethane-d4				0.20	80	70	130			
Surr: Dibromofluoromethane				0.20	78	70	130			
Surr: p-Bromofluorobenzene				0.20	104	70	130			
Surr: Toluene-d8				0.20	96	70	130			
Method: SW8260B									Analytical Run: R121689	
Lab ID: 123016_CCV_3		Continuing Calibration Verification Standard							12/30/16 10:23	
Tetrachloroethene		1.06	mg/kg	0.20	106	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H16120482

Login completed by: Wanda Johnson

Reviewed by: BL2000\kwiegand

Reviewed Date: 12/29/2016

Date Received: 12/29/2016

Received by: wjj

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	5.5°C No Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: HydroSolutions

Project Name, PWS, Permit, Etc.: DEQ08

Sample Origin State: MT

EPA/State Compliance: Yes ☐ No ☒

Report Mail Address (Required):

Contact Name: Rye Svingen

Phone/Fax: 406 443 6167

Cell:

Sampler: (Please Print) Rye Svingen

☒ No Hard Copy Email: ryes@hydros.com

Invoice Contact & Phone:

Purchase Order:

Quote/Bottle Order:

Invoice Address (Required):

☐ No Hard Copy Email:

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: ____
☐ State: ____ ☐ LEVEL IV
☐ Other: ____ ☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids
Vegetation Bioassay Other
DW - Drinking Water

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	8260 Short	SEE ATTACHED	Standard Turnaround (TAT)	RUSH
1 Below SUEH 2 95-7	12/21/16	1400	S			X	
2							
3							
4							
5							
6							
7							
8							
9							
10							

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: Fedex

Cooler ID(s): ____

Receipt Temp 5.5 °C

On Ice: Y (N)

Custody Seal
On Bottle Y (N)
On Cooler Y N

Intact Y N

Signature Match Y N

H16120482

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print): Rye Svingen Date/Time: 12/29/16 0930 Signature: [signature]

Received by (print): Date/Time: Signature:

Relinquished by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Sample Disposal: Return to Client: ____ Lab Disposal: ____

Received by Laboratory: Wandrison Date/Time: 12-29-16 4:30 Signature: [signature]

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Data Validation
Soil Vapor Analytical Results

HydroSolutions

Data Validation Report – Project Baseline Soil Vapor Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8 May 2011 Hustad LLC Property Source Area Investigation
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10368895
Sample Matrix	Air
Sample Start and End Dates	11/01/16, 11/02/16
Parameters Included	VOCs using EPA Method TO-15, Helium by Method 3C Gases
Date Validated	3/14/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six total soil vapor samples were collected by HydroSolutions on November 1 and November 2, 2016 to establish baseline soil vapor conditions at the Hustad Center prior to soil vapor extraction (SVE) system installation. Three samples were collected from the subslab area and three samples were collected at soil vapor monitoring probes, installed at a depth of 10 feet below the slab. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on November 3, 2016. Samples were received by Pace on November 7, 2016 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. The air samples were also analyzed for Helium, which was used as a tracer gas. The three vapor point probe samples and three subslab samples were analyzed according to EPA Method TO-15, and Method 3C Gases on November 13, 15, and 16, 2016.

Six additional samples are shown in the laboratory report which are associated with the individual canister certification that was completed by Pace on October 11, 17, 20, 21, 24, and 25, 2016. Table 1 presents an inventory of the samples collected and analyzed as part of this soil vapor sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
Mr. Wise Mitigation System Point Z-3	10368895001	Z3-SS-110116
Mr. Wise Mitigation System Point Z-4	10368895002	Z4-SS-110116
DermaWerx Mitigation System Point Z-6	10368895003	Z6-SS-110116
Vapor Point 5	10368895004	VP5-110216
Vapor Point 4	10368895005	VP4-110216
Vapor Point 2	10368895006	VP2-110216

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required the collection of baseline subslab samples to document soil vapor condition prior to the installation of the SVE system. Historic subslab vapor sampling data exists for some of the office spaces at the Hustad Center. Some of these previously used sampling locations are no longer accessible due to building remodeling and upgrades. For this and other reasons, subslab soil vapor was sampled from the extraction points associated with the indoor air mitigation system. These locations are comparable to historic sampling locations. Newly installed vapor point wells were used to collect the three vapor point samples at a depth of 10 feet, near to the estimated areas of contamination.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs that are identified as contaminants of concern based on historic analytical results. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The careful selection of air sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Helium was used as a tracer gas as a means to detect leaks in the sample wells. Helium was reported in the sample collected at Z-3, and is explained by a loose fitting on the canister. This finding indicates that air from the surrounding train was leaking into the sample during collection. This will bias the results low for that sample, but does not render the result unusable.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Three subslab soil vapor samples and three deep vapor point samples were collected and analyzed in accordance with quality control objectives. No additional criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. No field duplicate was collected for this sampling event. As a result, field precision cannot be assessed by analyzing relative percent differences (RPDs) for original and duplicate field samples. No other criteria are identified that affect the field precision of this data.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, EPA Method TO-15, and Method 3C Gases, a method blank, laboratory control sample, laboratory control sample duplicate, and sample duplicate were prepared and analyzed in two separate laboratory quality control (QC) batches. One batch is associated with the Helium analysis and the second is associated with the analysis of VOCs. These laboratory quality control samples are used to assess laboratory and method accuracy. There were no qualifiers associated with any of the QC samples. Method blanks were free of analyte contamination, analyte recovery in laboratory control samples were within target recovery thresholds, and RPDs for laboratory sample duplicates are within target ranges. As a result, this data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15 and Montana DEQ's Vapor Intrusion Guide (MDEQ 2011). Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

Data usability qualifiers are summarized in Table 2. All of the PCE results were qualified with an "A3" due to the high concentration of PCE detected in the samples. These high concentrations required serial dilution in order to be analyzed. Additionally, some of the reported concentrations of PCE and TCE were further qualified with an "E" because the high concentrations exceed the calibration range of the equipment and method. In these cases, the result is estimated. Some of the TCE samples are qualified with "C0" which indicated that the result was confirmed with a second analysis. The reported qualifiers do not introduce bias to the results.

The presence of helium in the sample collected at Z-3 biases the reported results low. In other words, contaminants in the soil vapor may have been present in greater concentrations than were reported in the laboratory analysis. However, due to the high analyte concentrations detected, neither this bias, nor the above qualifiers affect the usability of these results.

Table 2. Laboratory-Qualified Data Summary

Sample ID	Lab ID	Analyte	Result (ug/m^3)	Qualifier	Reason for Qualification
Z3-SS-110116	10368895001	PCE	3,730,000	A3, E	A3 - The sample was analyzed by serial dilution. C0 - Result was confirmed by a second analysis. E - Analyte concentration exceeded the calibration range. The reported result is estimated.
		TCE	538	C0, E	
Z4-SS-110116	10368895002	PCE	318,000	A3	
Z6-SS-110116	10368895003	PCE	2,500	A3	
VP5-110216	10368895004	PCE	1,920,000	A3	
		TCE	588	C0, E	
VP4-110216	10368895005	PCE	3,450,000	A3, E	
		TCE	438	C0, E	
VP2-110216	10368895006	PCE	3,110,000	A3, E	
		TCE	7,830	A3	

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

—. 2011. "Montana Vapor Intrusion Guide." April 22. http://deq.mt.gov/Land/statesuperfund/viguide.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Project Baseline Subslab and Soil Vapor Monitoring
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, DEQ Vapor Intrusion Guide (2011), laboratory-specific sampling procedures
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/14/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	11/1/2016 M/D/YY
12. Sample collection end date	11/2/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Analytical Method(s) Delete Method: TO15 Analysis of Volatile Organic Compounds (Vocs) In Air Delete Method: Method 3C Gases

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC Minneapolis, MN		
15. Laboratory project ID	10368895		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	Yes ●	No ○	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	Yes ●	No ○	Comments
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	Yes ○	No ●	Comments N/A. Matrix spikes and matrix spike duplicates are not a requirement for EPA Method TO-15.

If no, explain

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			Not applicable

22. Is the total number of laboratory control samples at least 5% of the total number of samples?	Yes ●	No ○	Comments

Consultant/Validator Questions

23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	Yes ●	No ○	Comments
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	Yes ●	No ○	Comments
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	Yes ●	No ○	Comments
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	Yes ●	No ○	Comments
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	Yes ○	No ●	Comments No blanks collected. All detected analytes are assumed to be attributable to contaminants at the site. Duplicates were not collected as part of this sampling event, and this does not affect the interpretation of the results.

If no, explain

Collection of equipment, trip, or field blanks are not typically conducted as part of EPA Method TO-15.

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ●	Comments see above.

	Yes	No	Comments
28a. Were all blank samples free of analyte contamination?	●	○	All laboratory blanks were ND. All canisters were clean-certified by the laboratory.
28b. Were field duplicates collected as required?	○	●	No field duplicates were collected. See above.

If no, explain

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A, see above. No duplicates were collected.

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

		Comments
30. What is the percent completeness (samples planned versus valid samples collected)?	100	

	Yes	No	Comments
31. Was the completeness goal met?	●	○	

32. Other general comments or observations?

Split Samples

	Yes	No	Comments
33. Did DEQ collect split samples?	○	●	

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1700 Elm Street - Suite 200
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(612)607-1700

November 21, 2016

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: Helena Solvent Site
Pace Project No.: 10368895

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on November 07, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Helena Solvent Site
Pace Project No.: 10368895

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
Alaska Certification UST-107
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: Helena Solvent Site
Pace Project No.: 10368895

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10368895001	**Z3-SS-110116**	Air	11/01/16 11:47	11/07/16 09:20
10368895002	**Z4-SS-110116**	Air	11/01/16 13:34	11/07/16 09:20
10368895003	**Z6-SS-110116**	Air	11/01/16 15:17	11/07/16 09:20
10368895004	**VP5-110216**	Air	11/02/16 10:39	11/07/16 09:20
10368895005	**VP4-110216**	Air	11/02/16 12:25	11/07/16 09:20
10368895006	**VP2-110216**	Air	11/02/16 13:13	11/07/16 09:20
10368895007	**Z3-SS-110116 CERT#2610**	Air	11/01/16 11:47	11/07/16 09:20
10368895008	**Z4-SS-110116 CERT#1019**	Air	11/01/16 13:34	11/07/16 09:20
10368895009	**Z6-SS-110116 CERT#1027**	Air	11/01/16 15:17	11/07/16 09:20
10368895010	**VP5-110216 CERT#2454**	Air	11/02/16 10:39	11/07/16 09:20
10368895011	**VP4-110216 CERT#1014**	Air	11/02/16 12:25	11/07/16 09:20
10368895012	**VP2-110216 CERT#2613**	Air	11/02/16 13:13	11/07/16 09:20

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SAMPLE ANALYTE COUNT

Project: Helena Solvent Site
Pace Project No.: 10368895

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10368895001	**Z3-SS-110116**	Method 3C Gases	RTP	1
		TO-15	MJL, NCK	6
10368895002	**Z4-SS-110116**	Method 3C Gases	RTP	1
		TO-15	MJL, NCK	6
10368895003	**Z6-SS-110116**	Method 3C Gases	RTP	1
		TO-15	NCK	6
10368895004	**VP5-110216**	Method 3C Gases	RTP	1
		TO-15	MJL, NCK	6
10368895005	**VP4-110216**	Method 3C Gases	RTP	1
		TO-15	MJL, NCK	6
10368895006	**VP2-110216**	Method 3C Gases	RTP	1
		TO-15	MJL, NCK	6
10368895007	**Z3-SS-110116 CERT#2610**	TO-15	DR1	6
10368895008	**Z4-SS-110116 CERT#1019**	TO-15	NCK	6
10368895009	**Z6-SS-110116 CERT#1027**	TO-15	MJL	6
10368895010	**VP5-110216 CERT#2454**	TO-15	MJL	6
10368895011	**VP4-110216 CERT#1014**	TO-15	NCK	6
10368895012	**VP2-110216 CERT#2613**	TO-15	NCK	6

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10368895

Sample: Z3-SS-110116 **Lab ID: 10368895001** Collected: 11/01/16 11:47 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	**12.8**	%	3.6	1		11/15/16 08:42	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		11/13/16 21:46	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		11/13/16 21:46	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	7.3	2.1		11/13/16 21:46	79-34-5	
Tetrachloroethene	**3730000**	ug/m3	7410	10752		11/15/16 14:08	127-18-4	A3,E
Trichloroethene	**538**	ug/m3	1.2	2.1		11/13/16 21:46	79-01-6	C0,E
Vinyl chloride	ND	ug/m3	0.55	2.1		11/13/16 21:46	75-01-4	

Sample: Z4-SS-110116 **Lab ID: 10368895002** Collected: 11/01/16 13:34 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		11/15/16 09:05	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		11/13/16 21:15	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		11/13/16 21:15	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	8.0	2.29		11/13/16 21:15	79-34-5	
Tetrachloroethene	**318000**	ug/m3	1010	1465.6		11/15/16 12:40	127-18-4	A3
Trichloroethene	**88.8**	ug/m3	1.3	2.29		11/13/16 21:15	79-01-6	
Vinyl chloride	ND	ug/m3	0.60	2.29		11/13/16 21:15	75-01-4	

Sample: Z6-SS-110116 **Lab ID: 10368895003** Collected: 11/01/16 15:17 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		11/15/16 09:15	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		11/13/16 20:44	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		11/13/16 20:44	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	8.0	2.29		11/13/16 20:44	79-34-5	
Tetrachloroethene	**2500**	ug/m3	516	748.34		11/16/16 10:32	127-18-4	A3
Trichloroethene	**5.1**	ug/m3	1.3	2.29		11/13/16 20:44	79-01-6	
Vinyl chloride	ND	ug/m3	0.60	2.29		11/13/16 20:44	75-01-4	

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10368895

Sample: VP5-110216 **Lab ID: 10368895004** Collected: 11/02/16 10:39 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		11/15/16 09:25	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.9	2.4		11/13/16 20:13	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.9	2.4		11/13/16 20:13	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	8.4	2.4		11/13/16 20:13	79-34-5	
Tetrachloroethene	**1920000**	ug/m3	8470	12288		11/16/16 02:50	127-18-4	A3
Trichloroethene	**588**	ug/m3	1.3	2.4		11/13/16 20:13	79-01-6	C0,E
Vinyl chloride	ND	ug/m3	0.62	2.4		11/13/16 20:13	75-01-4	

Sample: VP4-110216 **Lab ID: 10368895005** Collected: 11/02/16 12:25 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		11/15/16 09:36	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.8	2.19		11/13/16 19:42	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.8	2.19		11/13/16 19:42	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	7.6	2.19		11/13/16 19:42	79-34-5	
Tetrachloroethene	**3450000**	ug/m3	7730	11212.8		11/15/16 13:02	127-18-4	A3,E
Trichloroethene	**438**	ug/m3	1.2	2.19		11/13/16 19:42	79-01-6	C0,E
Vinyl chloride	ND	ug/m3	0.57	2.19		11/13/16 19:42	75-01-4	

Sample: VP2-110216 **Lab ID: 10368895006** Collected: 11/02/16 13:13 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		11/15/16 09:47	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.8	2.19		11/13/16 19:11	156-59-2	
trans-1,2-Dichloroethene	**10.6**	ug/m3	1.8	2.19		11/13/16 19:11	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	7.6	2.19		11/13/16 19:11	79-34-5	
Tetrachloroethene	**3110000**	ug/m3	7730	11212.8		11/15/16 13:46	127-18-4	A3,E
Trichloroethene	**7830**	ug/m3	6170	11212.8		11/15/16 13:46	79-01-6	A3
Vinyl chloride	ND	ug/m3	0.57	2.19		11/13/16 19:11	75-01-4	

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10368895

Sample: Z3-SS-110116 CERT#2610 **Lab ID: 10368895007** Collected: 11/01/16 11:47 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/21/16 11:21	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/21/16 11:21	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/21/16 11:21	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/21/16 11:21	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/21/16 11:21	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/21/16 11:21	75-01-4	

Sample: Z4-SS-110116 CERT#1019 **Lab ID: 10368895008** Collected: 11/01/16 13:34 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/24/16 10:09	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/24/16 10:09	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/24/16 10:09	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/24/16 10:09	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/24/16 10:09	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/24/16 10:09	75-01-4	

Sample: Z6-SS-110116 CERT#1027 **Lab ID: 10368895009** Collected: 11/01/16 15:17 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/25/16 10:44	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/25/16 10:44	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/25/16 10:44	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/25/16 10:44	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/25/16 10:44	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/25/16 10:44	75-01-4	

Sample: VP5-110216 CERT#2454 **Lab ID: 10368895010** Collected: 11/02/16 10:39 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/17/16 13:10	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/17/16 13:10	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/17/16 13:10	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/17/16 13:10	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/17/16 13:10	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/17/16 13:10	75-01-4	

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ANALYTICAL RESULTS

Project: Helena Solvent Site
Pace Project No.: 10368895

Sample: VP4-110216 CERT#1014 **Lab ID: 10368895011** Collected: 11/02/16 12:25 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/11/16 12:08	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/11/16 12:08	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/11/16 12:08	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/11/16 12:08	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/11/16 12:08	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/11/16 12:08	75-01-4	

Sample: VP2-110216 CERT#2613 **Lab ID: 10368895012** Collected: 11/02/16 13:13 Received: 11/07/16 09:20 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Individual Can Certification	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/20/16 09:55	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.81	1		10/20/16 09:55	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	0.70	1		10/20/16 09:55	79-34-5	
Tetrachloroethene	ND	ug/m3	0.69	1		10/20/16 09:55	127-18-4	
Trichloroethene	ND	ug/m3	0.55	1		10/20/16 09:55	79-01-6	
Vinyl chloride	ND	ug/m3	0.26	1		10/20/16 09:55	75-01-4	

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QUALITY CONTROL DATA

Project: Helena Solvent Site
Pace Project No.: 10368895

QC Batch: 447057 | Analysis Method: Method 3C Gases
QC Batch Method: Method 3C Gases | Analysis Description: METHOD 3C AIR - FIXED GASES
Associated Lab Samples: 10368895001, 10368895002, 10368895003, 10368895004, 10368895005, 10368895006

METHOD BLANK: 2444840 | Matrix: Air
Associated Lab Samples: 10368895001, 10368895002, 10368895003, 10368895004, 10368895005, 10368895006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Helium	%	ND	3.6	11/15/16 08:30	

LABORATORY CONTROL SAMPLE & LCSD: 2444841 2444842

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Helium	%	18	21.4	21.9	119	122	70-130	2	30	

SAMPLE DUPLICATE: 2444843

Parameter	Units	10368895001 Result	Dup Result	RPD	Max RPD	Qualifiers
Helium	%	12.8	12.5	2	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Helena Solvent Site
Pace Project No.: 10368895

QC Batch: 446784 | Analysis Method: TO-15
QC Batch Method: TO-15 | Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 10368895001, 10368895002, 10368895003, 10368895004, 10368895005, 10368895006

METHOD BLANK: 2442693 | Matrix: Air
Associated Lab Samples: 10368895001, 10368895002, 10368895003, 10368895004, 10368895005, 10368895006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	3.5	11/13/16 13:23	
cis-1,2-Dichloroethene	ug/m3	ND	0.81	11/13/16 13:23	
Tetrachloroethene	ug/m3	ND	0.69	11/13/16 13:23	
trans-1,2-Dichloroethene	ug/m3	ND	0.81	11/13/16 13:23	
Trichloroethene	ug/m3	ND	0.55	11/13/16 13:23	
Vinyl chloride	ug/m3	ND	0.26	11/13/16 13:23	

LABORATORY CONTROL SAMPLE: 2442694

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	74.7	74.4	100	49-150	
cis-1,2-Dichloroethene	ug/m3	43.9	39.7	90	65-139	
Tetrachloroethene	ug/m3	72.4	68.1	94	60-142	
trans-1,2-Dichloroethene	ug/m3	41.9	40.7	97	67-137	
Trichloroethene	ug/m3	57.9	52.8	91	60-144	
Vinyl chloride	ug/m3	27	25.4	94	63-135	

SAMPLE DUPLICATE: 2443091

Parameter	Units	60231990002 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
cis-1,2-Dichloroethene	ug/m3		ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3		ND		25	
Trichloroethene	ug/m3	ND	ND		25	
Vinyl chloride	ug/m3	ND	ND		25	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: Helena Solvent Site
Pace Project No.: 10368895

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

A3	The sample was analyzed by serial dilution.
C0	Result confirmed by second analysis.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Helena Solvent Site
Pace Project No.: 10368895

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10368895001	**Z3-SS-110116**	Method 3C Gases	447057		
10368895002	**Z4-SS-110116**	Method 3C Gases	447057		
10368895003	**Z6-SS-110116**	Method 3C Gases	447057		
10368895004	**VP5-110216**	Method 3C Gases	447057		
10368895005	**VP4-110216**	Method 3C Gases	447057		
10368895006	**VP2-110216**	Method 3C Gases	447057		
10368895001	**Z3-SS-110116**	TO-15	446784		
10368895002	**Z4-SS-110116**	TO-15	446784		
10368895003	**Z6-SS-110116**	TO-15	446784		
10368895004	**VP5-110216**	TO-15	446784		
10368895005	**VP4-110216**	TO-15	446784		
10368895006	**VP2-110216**	TO-15	446784		
10368895007	**Z3-SS-110116 CERT#2610**	TO-15	445838		
10368895008	**Z4-SS-110116 CERT#1019**	TO-15	445838		
10368895009	**Z6-SS-110116 CERT#1027**	TO-15	445838		
10368895010	**VP5-110216 CERT#2454**	TO-15	445838		
10368895011	**VP4-110216 CERT#1014**	TO-15	445838		
10368895012	**VP2-110216 CERT#2613**	TO-15	445838		

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10368895

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www.pacelabs.com

AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

22176

Page: 1 of 1

Section A Required Client Information:

Company: HYDROSOLUTIONS
Address: 303 Clarke St
Helena MT 59601
Email To: amanda@hydrosi.com
Phone: 406-465-8330 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Amanda Osborne
Copy To:
Purchase Order No.:
Project Name: Helena Solvent Site
Project Number:

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference: 00032220
Pace Project Manager/Sales Rep. Carolynne Trout
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other____

Location of Sampling by State: MT

Reporting Units: ug/m³ X mg/m³ ___ PPBV ___ PPMV ___ Other ___

Report Level II.___ III.___ IV.___ Other_____

Method: PM10, 3C- Fixed Gas (%), TO-3, TO-3M (Methane), TO-4 (PCBs), TO-13 (PAH), TO-14, TO-15, TO15 Short List*

Valid Media Codes: Tedlar Bag TB; 1 Liter Summa Can 1LC; 6 Liter Summa Can 6LC; Low Volume Puff LVP; High Volume Puff HVP; Other PM10

ITEM #	Section D Required Client Information AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	PID Reading (Client only)	COLLECTED COMPOSITE START END/GRAB DATE	TIME	COMPOSITE - DATE	TIME	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	TO-15	Pace Lab ID
1	Z3-SS-110116	1LC		11/01/16	1047	11/01/16	1147	-27	-4	2610	FC0081	X	001 002
2	Z4-SS-110116	1LC		11/01/16	1234	11/01/16	1334	-26.5	-4	1019	FC0224	X	002 008
3	Z6-SS-110116	1LC		11/01/16	1417	11/01/16	1517	-24.5	-6	1027	FC0262	X	003 009
4	VP5-110216	1LC		11/02/16	0907	11/02/16	1039	-25	-7	2454	FC0215	X	004 010
5	~~VP4-110216~~ VP4-110216	1LC		11/02/16	1123	11/02/16	1225	-26	-4.5	1014	FC0249	X	005 011
6	VP2-110216	1LC		11/02/16	1413	11/02/16	1313	-27	-5	2613	FC0078	X	006 012
7													
8													
9													
10													
11													
12													

Comments :

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE / HSI	11/3/16	0918	[signature]	11/7/16	0920

SAMPLE CONDITIONS

Temp in °C	Received on Ice Y/N	Custody Sealed Cooler Y/N	Samples Intact Y/N
AMB	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: AMANDA OSBORNE

SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY): 11/02/16

ORIGINAL

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro Solutions

Project #: WO#: 10368895

10368895

Courier: ☑ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 6637 5039 8804

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ Foam ☐ None ☐ Tin Can ☐ Other: **Temp Blank rec:** ☐ Yes ☒ No

Temp. (TO17 and TO13 samples only) (°C): 0 **Corrected Temp (°C):** 0 **Thermom. Used:** ☐ B88A912167504 ☐ B88A0143310098 ☐ 151401163 ☐ 151401164

Temp should be above freezing to 6°C **Correction Factor:** 0 **Date & Initials of Person Examining Contents:** 11/7/16

Type of ice Received ☐ Blue ☐ Wet ☒ None

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Media: Air Can Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12.

Samples Received:

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Amanda Osborne Date/Time: 11/8/16

Comments/Resolution:

Add Helium by method 3C

Project Manager Review: Carolyne Trout **Date:** 11/7/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Pilot Testing and Investigation Soil Vapor Sampling by 8260 (Tedlar Bag)
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, DEQ Vapor Intrusion Guide (2011), standard procedures for tedlar bag sampling
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/3/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	11/9/2016 M/D/YY
12. Sample collection end date	11/9/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s): SW 8260B

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H16110209		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	Yes ●	No ○	Comments
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	Yes ●	No ○	Comments
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	Yes ○	No ●	Comments N/A

If no, explain

Lab matrix spikes and matrix spike duplicates are not a component of SW8260B tedlar bag air samples.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

22. Is the total number of laboratory control samples at least 5% of the total number of samples?	Yes ●	No ○	Comments

Consultant/Validator Questions

23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	Yes ●	No ○	Comments
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	Yes ●	No ○	Comments
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	Yes ●	No ○	Comments
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	Yes ●	No ○	Comments
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	Yes ○	No ●	Comments Field blanks were not collected. All analytes detected in teh samples are assumed to be attributable to the site. Blanks are not typically collected as part of tedlar bag sampling. No field duplicates were collected, which does not affect the interpretation of the results.

If no, explain

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ●	Comments: See above.
28a. Were all blank samples free of analyte contamination?	Yes ●	No ○	Comments: Laboratory blanks were all ND.
28b. Were field duplicates collected as required?	Yes ○	No ●	Comments: Duplicates were not collected. See above.
28c. Are field duplicate relative percent differences within data validation quality control limits?	Yes ○	No ●	Comments: N/A, see above.

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)?	100		Comments:
31. Was the completeness goal met?	Yes ●	No ○	Comments:

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples?	Yes ○	No ●	Comments:

Print Form

Save As

Open Instructions

Hide Instructions

ANALYTICAL SUMMARY REPORT

November 17, 2016

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H16110209

Project Name: Helena Solvent Site

Energy Laboratories Inc Helena MT received the following 2 samples for HydroSolutions on 11/9/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H16110209-001	SVE-3-1	11/09/16 9:59	11/09/16	Air	8260-Volatile Organic Compounds - Short List
H16110209-002	SVE-3-2	11/09/16 13:00	11/09/16	Air	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: Helena Solvent Site
Work Order: H16110209

Report Date: 11/17/16

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16110209-001
Client Sample ID: SVE-3-1

Report Date: 11/17/16
Collection Date: 11/09/16 09:59
DateReceived: 11/09/16
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	11/10/16 15:15 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Tetrachloroethene	86	mg/m3		10		SW8260B	11/11/16 15:50 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16110209-001
Client Sample ID: SVE-3-1

Report Date: 11/17/16
Collection Date: 11/09/16 09:59
DateReceived: 11/09/16
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	11/10/16 15:15 / eli-b
Surr: 1,2-Dichloroethane-d4	106	%REC		70-130		SW8260B	11/10/16 15:15 / eli-b
Surr: Dibromofluoromethane	106	%REC		77-126		SW8260B	11/10/16 15:15 / eli-b
Surr: p-Bromofluorobenzene	104	%REC		76-127		SW8260B	11/10/16 15:15 / eli-b
Surr: Toluene-d8	89.0	%REC		79-122		SW8260B	11/10/16 15:15 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16110209-002
Client Sample ID: SVE-3-2

Report Date: 11/17/16
Collection Date: 11/09/16 13:00
DateReceived: 11/09/16
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1,1-Trichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1,2,2-Tetrachloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1,2-Trichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1-Dichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,1-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,2,3-Trichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,2-Dibromoethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,2-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,2-Dichloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
1,4-Dichlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
2,2-Dichloropropane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
2-Chlorotoluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
4-Chlorotoluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Benzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Bromobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Bromochloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Bromodichloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Bromoform	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Bromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Carbon tetrachloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Chlorobenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Chlorodibromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Chloroethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Chloroform	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Chloromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
cis-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
cis-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Dibromomethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Dichlorodifluoromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Ethylbenzene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
m+p-Xylenes	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Methyl ethyl ketone	ND	mg/m3		10		SW8260B	11/10/16 15:50 / eli-b
Methylene chloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
o-Xylene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Styrene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Tetrachloroethene	158	mg/m3		10		SW8260B	11/11/16 16:21 / eli-b
Toluene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
trans-1,2-Dichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
trans-1,3-Dichloropropene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Trichloroethene	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: Helena Solvent Site
Lab ID: H16110209-002
Client Sample ID: SVE-3-2

Report Date: 11/17/16
Collection Date: 11/09/16 13:00
DateReceived: 11/09/16
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Vinyl chloride	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Xylenes, Total	ND	mg/m3		0.50		SW8260B	11/10/16 15:50 / eli-b
Surr: 1,2-Dichloroethane-d4	104	%REC		70-130		SW8260B	11/10/16 15:50 / eli-b
Surr: Dibromofluoromethane	108	%REC		77-126		SW8260B	11/10/16 15:50 / eli-b
Surr: p-Bromofluorobenzene	104	%REC		76-127		SW8260B	11/10/16 15:50 / eli-b
Surr: Toluene-d8	89.0	%REC		79-122		SW8260B	11/10/16 15:50 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 11/17/16

Project: Helena Solvent Site **Work Order:** H16110209

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R270232	
Lab ID: CCV111016_	Continuing Calibration Verification Standard							11/10/16 11:27	
Benzene	4.84	mg/m3	0.50	97	70	130			
Bromobenzene	4.80	mg/m3	0.50	96	70	130			
Bromochloromethane	4.40	mg/m3	0.50	88	70	130			
Bromodichloromethane	4.84	mg/m3	0.50	97	70	130			
Bromoform	4.28	mg/m3	0.50	86	70	130			
Bromomethane	4.64	mg/m3	0.50	93	70	130			
Carbon tetrachloride	4.60	mg/m3	0.50	92	70	130			
Chlorobenzene	4.60	mg/m3	0.50	92	70	130			
Chlorodibromomethane	4.32	mg/m3	0.50	86	70	130			
Chloroethane	4.80	mg/m3	0.50	96	70	130			
Chloroform	4.92	mg/m3	0.50	98	80	120			
Chloromethane	5.52	mg/m3	0.50	110	70	130			
1,2-Dibromoethane	3.88	mg/m3	0.50	78	70	130			
2-Chlorotoluene	5.04	mg/m3	0.50	101	70	130			
Dibromomethane	4.56	mg/m3	0.50	91	70	130			
1,2-Dichlorobenzene	4.52	mg/m3	0.50	90	70	130			
4-Chlorotoluene	5.24	mg/m3	0.50	105	70	130			
1,4-Dichlorobenzene	4.60	mg/m3	0.50	92	70	130			
Dichlorodifluoromethane	5.24	mg/m3	0.50	105	70	130			
1,1-Dichloroethane	4.76	mg/m3	0.50	95	70	130			
1,2-Dichloroethane	4.68	mg/m3	0.50	94	70	130			
1,1-Dichloroethene	4.92	mg/m3	0.50	98	80	120			
cis-1,2-Dichloroethene	4.16	mg/m3	0.50	83	70	130			
trans-1,2-Dichloroethene	4.80	mg/m3	0.50	96	70	130			
1,2-Dichloropropane	4.68	mg/m3	0.50	94	80	120			
2,2-Dichloropropane	2.84	mg/m3	0.50	57	70	130			S
1,1-Dichloropropene	4.96	mg/m3	0.50	99	70	130			
cis-1,3-Dichloropropene	4.28	mg/m3	0.50	86	70	130			
trans-1,3-Dichloropropene	4.08	mg/m3	0.50	82	70	130			
Ethylbenzene	4.68	mg/m3	0.50	94	80	120			
Methyl tert-butyl ether (MTBE)	3.62	mg/m3	0.50	72	70	130			
Methyl ethyl ketone	37.0	mg/m3	10	74	70	130			
Methylene chloride	4.56	mg/m3	0.50	91	70	130			
Styrene	4.56	mg/m3	0.50	91	70	130			
1,1,1,2-Tetrachloroethane	4.36	mg/m3	0.50	87	70	130			
1,1,2,2-Tetrachloroethane	5.12	mg/m3	0.50	102	70	130			
Toluene	5.32	mg/m3	0.50	106	80	120			
1,1,1-Trichloroethane	4.64	mg/m3	0.50	93	70	130			
1,1,2-Trichloroethane	4.84	mg/m3	0.50	97	70	130			
Trichloroethene	4.96	mg/m3	0.50	99	70	130			
Trichlorofluoromethane	4.92	mg/m3	0.50	98	70	130			
1,2,3-Trichloropropane	4.56	mg/m3	0.50	91	70	130			
Vinyl chloride	5.04	mg/m3	0.50	101	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 11/17/16

Project: Helena Solvent Site **Work Order:** H16110209

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: B_R270232	
Lab ID: CCV111016_	Continuing Calibration Verification Standard							11/10/16 11:27	
m+p-Xylenes	9.96	mg/m3	0.50	100	70	130			
o-Xylene	4.52	mg/m3	0.50	90	70	130			
Xylenes, Total	14.5	mg/m3	0.50	97	70	130			
Surr: 1,2-Dichloroethane-d4			0.50	97	75	125			
Surr: Dibromofluoromethane			0.50	100	85	119			
Surr: p-Bromofluorobenzene			0.50	100	85	122			
Surr: Toluene-d8			0.50	107	89	119			
Method: SW8260B								Batch: B_R270232	
Lab ID: AIRLCS111016_	Laboratory Control Sample				Run: SUB-B270232			11/10/16 12:25	
Benzene	4.84	mg/m3	0.50	97	65	131			
Bromobenzene	4.88	mg/m3	0.50	98	78	133			
Bromochloromethane	4.72	mg/m3	0.50	94	68	131			
Bromodichloromethane	5.04	mg/m3	0.50	101	67	138			
Bromoform	4.40	mg/m3	0.50	88	64	136			
Bromomethane	4.04	mg/m3	0.50	81	60	138			
Carbon tetrachloride	4.72	mg/m3	0.50	94	61	144			
Chlorobenzene	4.64	mg/m3	0.50	93	78	136			
Chlorodibromomethane	4.84	mg/m3	0.50	97	72	136			
Chloroethane	4.88	mg/m3	0.50	98	64	136			
Chloroform	4.92	mg/m3	0.50	98	69	133			
Chloromethane	4.84	mg/m3	0.50	97	63	149			
1,2-Dibromoethane	4.04	mg/m3	0.50	81	75	131			
2-Chlorotoluene	4.96	mg/m3	0.50	99	74	135			
Dibromomethane	4.52	mg/m3	0.50	90	72	133			
1,2-Dichlorobenzene	4.72	mg/m3	0.50	94	78	129			
4-Chlorotoluene	5.08	mg/m3	0.50	102	79	135			
1,4-Dichlorobenzene	4.76	mg/m3	0.50	95	78	131			
Dichlorodifluoromethane	4.76	mg/m3	0.50	95	55	141			
1,1-Dichloroethane	5.12	mg/m3	0.50	102	72	130			
1,2-Dichloroethane	4.68	mg/m3	0.50	94	57	146			
1,1-Dichloroethene	5.24	mg/m3	0.50	105	66	142			
cis-1,2-Dichloroethene	4.96	mg/m3	0.50	99	74	133			
trans-1,2-Dichloroethene	5.16	mg/m3	0.50	103	76	138			
1,2-Dichloropropane	4.76	mg/m3	0.50	95	72	135			
2,2-Dichloropropane	4.84	mg/m3	0.50	97	42	167			
1,1-Dichloropropene	4.96	mg/m3	0.50	99	72	140			
cis-1,3-Dichloropropene	4.48	mg/m3	0.50	90	75	132			
trans-1,3-Dichloropropene	4.96	mg/m3	0.50	99	77	145			
Ethylbenzene	4.40	mg/m3	0.50	88	63	133			
Methyl tert-butyl ether (MTBE)	3.97	mg/m3	0.50	79	46	136			
Methyl ethyl ketone	37.0	mg/m3	10	74	38	132			
Methylene chloride	5.20	mg/m3	0.50	104	73	126			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 11/17/16

Project: Helena Solvent Site **Work Order:** H16110209

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R270232
Lab ID: AIRLCS111016_	Laboratory Control Sample				Run: SUB-B270232				11/10/16 12:25
Styrene	4.68	mg/m3	0.50	94	76	134			
1,1,1,2-Tetrachloroethane	4.64	mg/m3	0.50	93	75	135			
1,1,2,2-Tetrachloroethane	4.56	mg/m3	0.50	91	72	132			
Toluene	5.04	mg/m3	0.50	101	66	132			
1,1,1-Trichloroethane	4.60	mg/m3	0.50	92	64	141			
1,1,2-Trichloroethane	4.76	mg/m3	0.50	95	72	133			
Trichloroethene	4.40	mg/m3	0.50	88	75	138			
Trichlorofluoromethane	4.72	mg/m3	0.50	94	58	139			
1,2,3-Trichloropropane	4.04	mg/m3	0.50	81	67	133			
Vinyl chloride	5.12	mg/m3	0.50	102	53	146			
m+p-Xylenes	9.60	mg/m3	0.50	96	64	134			
o-Xylene	4.52	mg/m3	0.50	90	61	132			
Xylenes, Total	14.1	mg/m3	0.50	94	72	128			
Surr: 1,2-Dichloroethane-d4			0.50	96	75	125			
Surr: Dibromofluoromethane			0.50	98	85	119			
Surr: p-Bromofluorobenzene			0.50	96	85	122			
Surr: Toluene-d8			0.50	104	89	119			
Lab ID: AIRBLK111016_	Method Blank				Run: SUB-B270232				11/10/16 13:23
Benzene	ND	mg/m3	0.50						
Bromobenzene	ND	mg/m3	0.50						
Bromochloromethane	ND	mg/m3	0.50						
Bromodichloromethane	ND	mg/m3	0.50						
Bromoform	ND	mg/m3	0.50						
Bromomethane	ND	mg/m3	0.50						
Carbon tetrachloride	ND	mg/m3	0.50						
Chlorobenzene	ND	mg/m3	0.50						
Chlorodibromomethane	ND	mg/m3	0.50						
Chloroethane	ND	mg/m3	0.50						
Chloroform	ND	mg/m3	0.50						
Chloromethane	ND	mg/m3	0.50						
1,2-Dibromoethane	ND	mg/m3	0.50						
2-Chlorotoluene	ND	mg/m3	0.50						
Dibromomethane	ND	mg/m3	0.50						
1,2-Dichlorobenzene	ND	mg/m3	0.50						
4-Chlorotoluene	ND	mg/m3	0.50						
1,4-Dichlorobenzene	ND	mg/m3	0.50						
Dichlorodifluoromethane	ND	mg/m3	0.50						
1,1-Dichloroethane	ND	mg/m3	0.50						
1,2-Dichloroethane	ND	mg/m3	0.50						
1,1-Dichloroethene	ND	mg/m3	0.50						
cis-1,2-Dichloroethene	ND	mg/m3	0.50						
trans-1,2-Dichloroethene	ND	mg/m3	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 11/17/16

Project: Helena Solvent Site **Work Order:** H16110209

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R270232
Lab ID: AIRBLK111016_	Method Blank				Run: SUB-B270232				11/10/16 13:23
1,2-Dichloropropane	ND	mg/m3	0.50						
2,2-Dichloropropane	ND	mg/m3	0.50						
1,1-Dichloropropene	ND	mg/m3	0.50						
cis-1,3-Dichloropropene	ND	mg/m3	0.50						
trans-1,3-Dichloropropene	ND	mg/m3	0.50						
Ethylbenzene	ND	mg/m3	0.50						
Methyl tert-butyl ether (MTBE)	ND	mg/m3	0.50						
Methyl ethyl ketone	ND	mg/m3	10						
Methylene chloride	ND	mg/m3	0.50						
Styrene	ND	mg/m3	0.50						
1,1,1,2-Tetrachloroethane	ND	mg/m3	0.50						
1,1,2,2-Tetrachloroethane	ND	mg/m3	0.50						
Toluene	ND	mg/m3	0.50						
1,1,1-Trichloroethane	ND	mg/m3	0.50						
1,1,2-Trichloroethane	ND	mg/m3	0.50						
Trichloroethene	ND	mg/m3	0.50						
Trichlorofluoromethane	ND	mg/m3	0.50						
1,2,3-Trichloropropane	ND	mg/m3	0.50						
Vinyl chloride	ND	mg/m3	0.50						
m+p-Xylenes	ND	mg/m3	0.50						
o-Xylene	ND	mg/m3	0.50						
Xylenes, Total	ND	mg/m3	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	89	75	125			
Surr: Dibromofluoromethane			0.50	94	85	119			
Surr: p-Bromofluorobenzene			0.50	100	85	122			
Surr: Toluene-d8			0.50	115	89	119			
Method: SW8260B									Analytical Run: B_R270328
Lab ID: CCV111616_	Continuing Calibration Verification Standard								11/11/16 13:32
Tetrachloroethene	4.76	mg/m3	0.50	95	70	130			
Method: SW8260B									Batch: B_R270328
Lab ID: AIRBLK111616_	Method Blank				Run: SUB-B270328				11/11/16 15:21
Tetrachloroethene	ND	mg/m3	10						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H16110209

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\rwilliams

Reviewed Date: 11/16/2016

Date Received: 11/9/2016

Received by: bjs

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	21.7°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	Not Applicable ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: HydroSolutions

Project Name, PWS, Permit, Etc.: HSS

Sample Origin State: MT

EPA/State Compliance: Yes ☐ No ☒

Report Mail Address (Required):

Contact Name: Rye Svingen

Phone/Fax: 406 443-6169

Cell:

Sampler: (Please Print) Rye Svingen

☒ No Hard Copy Email: ryes@hydrosi.com

Invoice Contact & Phone: Mandy ~~Garcia~~ Garcia 406 655 9555

Purchase Order:

Quote/Bottle Order:

Invoice Address (Required):

☒ No Hard Copy Email: mandyg@hydrosi.com

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
☐ EDD/EDT (Electronic Data)
Format: _____
☐ LEVEL IV
☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	VOC short 8260								SEE ATTACHED	Standard Turnaround (TAT)
1 SVE-3-1	11/9/16	0959	A	X									X
2 SVE-3-2	11/9/16	1300	A	X									X
3													
4													
5													
6													
7													
8													
9													
10													

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: hand del

Cooler ID(s): 324

Receipt Temp 21.7 °C

On Ice: Y (N)

Custody Seal
On Bottle Y (N)
On Cooler Y (N)

Intact Y N

Signature Match Y N

LABORATORY USE ONLY H16110209

Custody Record MUST be Signed

Relinquished by (print): Rye Svingen Date/Time: 11/9/16 1326 Signature: [signature]

Relinquished by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by Laboratory: B. Seher Date/Time: 11/9/16 13:28 Signature: Brandy Seher

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.

Data Validation Report – Additional Project Baseline Soil Vapor Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8; May 2011 Hustad LLC Property Source Area Investigation
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10374782
Sample Matrix	Air
Sample Start and End Dates	12/28/2016
Parameters Included	VOCs by EPA Method TO-15, Helium by Method 3C Gases
Date Validated	3/15/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Three air samples were collected by HydroSolutions on December 28, 2016 to provide supplemental project baseline soil vapor conditions at the Hustad Center prior to soil vapor extraction (SVE) system installation. The three samples were collected at soil vapor monitoring probes, installed at a depth of 10 feet. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on December 29, 2016. Samples were received by Pace on January 3, 2017 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. The air samples were also analyzed for Helium, which was used as a tracer gas. The samples were analyzed according to EPA Method TO-15, and Method 3C Gases on January 12 and 13, 2017.

Table 1 presents an inventory of the samples collected and analyzed as part of this baseline soil vapor sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
Vapor Point 5	10374782001	VP5-122816
Vapor Point 4	10374782002	VP4-122816
Vapor Point 2	10374782003	VP2-122816

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ –

Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required the collection of baseline subslab samples to document soil vapor condition prior to the installation of the SVE system. Historic subslab vapor sampling data exists for some of the office spaces at the Hustad Center. Some of these previously used sampling locations are no longer accessible due to building remodeling and upgrades. During this sampling event, soil vapor was sampled from newly installed vapor point wells. These wells were previously sampled and results indicated high levels of PCE and TCE contamination. The purpose of this second baseline sampling event was to substantiate these results through duplication of sampling method and location.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs that are identified as contaminants of concern based on historic analytical results. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The careful selection of sampling locations (consistent with previous collection events), adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. The soil vapor point samples were collected and analyzed in accordance with quality control objectives. Helium was used as a tracer gas as a means to detect leaks in the sample wells. No helium was detected in any of the samples. No criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. No field duplicate was collected for this sampling event. As a result, field precision cannot be assessed by analyzing relative percent differences (RPDs) for original and duplicate field samples. No other criteria are identified that affect the field precision of this data.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, EPA Method TO-15, and Method 3C Gases, a method blank, laboratory control sample, laboratory control sample duplicate, and sample duplicate were prepared and analyzed in two separate laboratory quality control (QC) batches. One batch was associated with the Helium analysis and the second was associated with the analysis of VOCs. These laboratory quality control samples are used to

assess laboratory and method accuracy. There were no qualifiers associated with any of the QC samples. Method blanks were free of analyte contamination, analyte recovery in laboratory control samples were within target recovery thresholds, and RPDs for sample duplicates are within target ranges. As a result, this data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15 and Montana DEQ's Vapor Intrusion Guide (MDEQ 2011). Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

Data usability qualifiers are summarized in Table 2. All of the PCE results and one TCE result were qualified with an "A3" due to the high concentration of PCE detected in the samples. These high concentrations required serial dilution in order to be analyzed. Additionally, the reported concentrations of PCE and TCE were further qualified with an "E" in the sample from Vapor Point #5 because the high concentrations exceed the calibration range of the equipment and method. Therefore, the result is estimated. These reported qualifiers do not introduce bias to the results.

Table 2. Laboratory Qualified Data Summary

Sample ID	Lab ID	Analyte	Result (ug/m^3)	Qualifier	Reason for Qualification
VP5-122816	10374782001	PCE	730,000	A3, E	A3 - The sample was analyzed by serial dilution.
		TCE	422	E	
VP4-122816	10374782002	PCE	1,450,000	A3	E - Analyte concentration exceeded the calibration range. The reported result is estimated.
VP2-122816	10374782003	PCE	1,760,000	A3	
		TCE	< 5,690	A3	

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

—. 2011. "Montana Vapor Intrusion Guide." April 22. http://deq.mt.gov/Land/statesuperfund/viguide.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Additional Project Baseline Soil Vapor Monitoring
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation, DEQ Vapor Intrusion Guide (2011), laboratory-specific sampling instructions
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/15/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	12/28/2016 M/D/YY
12. Sample collection end date	12/28/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s) TO15 Analysis of Volatile Organic Compounds (Vocs) In Air

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC Minneapolis, MN		
15. Laboratory project ID	10374782		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	Matrix spikes and matrix spike duplicates are not a requirement for EPA Method TO-15.

If no, explain

Lab matrix spikes and matrix spike duplicates are not a requirement of EPA Method TO-15.

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	Due to high concentrations of PCE and TCE, reporting limits are higher than usual, but appropriate for this event.
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	Blanks and duplicates were not collected in this sampling event. All analytes detected in the samples are assumed to be attributable to the site. No duplicates were collected, which does not affect the interpretation of the results.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	N/A, see above

	Yes	No	Comments
28a. Were all blank samples free of analyte contamination?	●	○	Lab blanks were all ND
28b. Were field duplicates collected as required?	○	●	No field duplicates were collected. See above.

If no, explain

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	N/A

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

		Comments
30. What is the percent completeness (samples planned versus valid samples collected)?	100	

	Yes	No	Comments
31. Was the completeness goal met?	●	○	

32. Other general comments or observations?

Split Samples

	Yes	No	Comments
33. Did DEQ collect split samples?	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

January 17, 2017

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on January 03, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
Alaska Certification UST-107
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10374782001	**VP5-122816**	Air	12/28/16 09:30	01/03/17 08:40
10374782002	**VP4-122816**	Air	12/28/16 11:12	01/03/17 08:40
10374782003	**VP2-122816**	Air	12/28/16 13:04	01/03/17 08:40

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SAMPLE ANALYTE COUNT

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10374782001	**VP5-122816**	Method 3C Gases	NCK	1
		TO-15	NCK	6
10374782002	**VP4-122816**	Method 3C Gases	NCK	1
		TO-15	NCK	6
10374782003	**VP2-122816**	Method 3C Gases	NCK	1
		TO-15	NCK	6

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ANALYTICAL RESULTS

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Sample: VP5-122816 **Lab ID: 10374782001** Collected: 12/28/16 09:30 Received: 01/03/17 08:40 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		01/12/17 11:38	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		01/12/17 17:41	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		01/12/17 17:41	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.1		01/12/17 17:41	79-34-5	
Tetrachloroethene	**730000**	ug/m3	1850	2688		01/13/17 12:23	127-18-4	A3,E
Trichloroethene	**422**	ug/m3	1.2	2.1		01/12/17 17:41	79-01-6	E
Vinyl chloride	ND	ug/m3	0.55	2.1		01/12/17 17:41	75-01-4	

Sample: VP4-122816 **Lab ID: 10374782002** Collected: 12/28/16 11:12 Received: 01/03/17 08:40 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		01/12/17 12:02	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		01/12/17 18:14	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		01/12/17 18:14	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.1		01/12/17 18:14	79-34-5	
Tetrachloroethene	**1450000**	ug/m3	7410	10752		01/13/17 11:26	127-18-4	A3
Trichloroethene	**360**	ug/m3	1.2	2.1		01/12/17 18:14	79-01-6	
Vinyl chloride	ND	ug/m3	0.55	2.1		01/12/17 18:14	75-01-4	

Sample: VP2-122816 **Lab ID: 10374782003** Collected: 12/28/16 13:04 Received: 01/03/17 08:40 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		01/12/17 12:12	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		01/12/17 18:45	156-59-2	
trans-1,2-Dichloroethene	**7.1**	ug/m3	1.7	2.1		01/12/17 18:45	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.1		01/12/17 18:45	79-34-5	
Tetrachloroethene	**1760000**	ug/m3	7130	10342.4		01/13/17 11:54	127-18-4	A3
Trichloroethene	ND	ug/m3	5690	10342.4		01/13/17 11:54	79-01-6	A3
Vinyl chloride	ND	ug/m3	0.55	2.1		01/12/17 18:45	75-01-4	

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QUALITY CONTROL DATA

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

QC Batch: 455474 | Analysis Method: Method 3C Gases
QC Batch Method: Method 3C Gases | Analysis Description: METHOD 3C AIR - FIXED GASES
Associated Lab Samples: 10374782001, 10374782002, 10374782003

METHOD BLANK: 2492720 | Matrix: Air
Associated Lab Samples: 10374782001, 10374782002, 10374782003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Helium	%	ND	3.6	01/12/17 11:28	

LABORATORY CONTROL SAMPLE & LCSD: 2492721 2492722

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Helium	%	18	16.2	17.6	90	98	70-130	9	30	

SAMPLE DUPLICATE: 2492723

Parameter	Units	10374782001 Result	Dup Result	RPD	Max RPD	Qualifiers
Helium	%	ND	.89J		30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

QC Batch: 455588 | Analysis Method: TO-15
QC Batch Method: TO-15 | Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 10374782001, 10374782002, 10374782003

METHOD BLANK: 2493379 | Matrix: Air
Associated Lab Samples: 10374782001, 10374782002, 10374782003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.70	01/12/17 15:19	
cis-1,2-Dichloroethene	ug/m3	ND	0.81	01/12/17 15:19	
Tetrachloroethene	ug/m3	ND	0.69	01/12/17 15:19	
trans-1,2-Dichloroethene	ug/m3	ND	0.81	01/12/17 15:19	
Trichloroethene	ug/m3	ND	0.55	01/12/17 15:19	
Vinyl chloride	ug/m3	ND	0.26	01/12/17 15:19	

LABORATORY CONTROL SAMPLE: 2493380

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	74.7	75.2	101	49-150	
cis-1,2-Dichloroethene	ug/m3	43.9	38.4	87	65-139	
Tetrachloroethene	ug/m3	72.4	66.4	92	60-142	
trans-1,2-Dichloroethene	ug/m3	41.9	39.5	94	67-137	
Trichloroethene	ug/m3	57.9	49.3	85	60-144	
Vinyl chloride	ug/m3	27	23.2	86	63-135	

SAMPLE DUPLICATE: 2493382

Parameter	Units	10375659001 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
cis-1,2-Dichloroethene	ug/m3	ND	ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3	ND	ND		25	
Trichloroethene	ug/m3	ND	ND		25	
Vinyl chloride	ug/m3	ND	ND		25	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

A3	The sample was analyzed by serial dilution.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: DEQ08 Helena Solvent Site
Pace Project No.: 10374782

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10374782001	**VP5-122816**	Method 3C Gases	455474		
10374782002	**VP4-122816**	Method 3C Gases	455474		
10374782003	**VP2-122816**	Method 3C Gases	455474		
10374782001	**VP5-122816**	TO-15	455588		
10374782002	**VP4-122816**	TO-15	455588		
10374782003	**VP2-122816**	TO-15	455588		

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10374782

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

22656

Page: 1 of 1

Section A Required Client Information:
Company: HYDROSOLUTIONS
Address: 303 CLARKE ST
HELENA MT 59601
Email To: amandao@hydrosi.com
Phone: 406-465-8330 Fax:
Requested Due Date/TAT:

Section B Required Project Information:
Report To: Amanda Osborne
Copy To:
Purchase Order No.:
Project Name: Helena Solvent Site
Project Number: DEQ08

Section C Invoice Information:
Attention:
Company Name:
Address:
Pace Quote Reference: Media Order # 10326300
Pace Project Manager/Sales Rep: Carolynne Trout
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other

Location of Sampling by State: MT

Reporting Units: ug/m³ X mg/m³ PPBV PPMV Other

Report Level II. III. IV. Other

ITEM #	Section D Required Client Information: AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	P/D Reading (Client only)	COLLECTED Composite Start Date	Composite Start Time	Composite End Date	Composite End Time	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	PM10	3C: Fixed Gas (%) He	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	VP5-122816	1LC		12/28/16	0829	12/28/16	0930	-25	-4	1157	FC0023	X							X		001
2	VP4-122816	1LC		12/28/16	1012	12/28/16	1112	-26	-4.5	2537	FC0119	X							X		002
3	VP2-122816	1LC		12/28/16	1203	12/28/16	1304	-27	-4	2253	FC0224	X							X		003
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Valid Media Codes

MEDIA	CODE
Tedlar Bag	TB
1 Liter Summa Can	1LC
6 Liter Summa Can	6LC
Low Volume Puff	LVP
High Volume Puff	HVP
Other	PM10

Comments :

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE / HSI	12-28-16	1500	[signature]	13:17	0840

SAMPLE CONDITIONS

Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
AMB	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: AMANDA OSBORNE
SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY): 12/28/16

ORIGINAL

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414 Air Technical Phone: 612.607.6386

FC046Rev.01, 03Feb2010

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro Solutions

Project #: WO#: 10374782

10374782

Courier: ☑ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 6637 5040 7618

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ Foam ☐ None ☐ Tin Can ☐ Other: **Temp Blank rec:** ☐ Yes ☒ No

Temp. (TO17 and TO13 samples only) (°C): 0 **Corrected Temp (°C):** 0 **Thermom. Used:** ☐ B88A912167504 ☐ B88A0143310098 ☐ 151401163 ☐ 151401164

Temp should be above freezing to 6°C **Correction Factor:** 0 **Date & Initials of Person Examining Contents:** 1/3/17

Type of ice Received ☐ Blue ☐ Wet ☒ None

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Media: Air Can Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12.

Samples Received:

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Amanda Osborne Date/Time: 1/3/17

Comments/Resolution:

Same analyte list as historical. Report Helium by 3C

Project Manager Review: Carolyne Hart **Date:** 1/3/17

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Data Validation Report – Post-SVE Soil Vapor Sampling

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Document	DEQ Contract No. 414026 Task Order No. 8 May 2011 Hustad LLC Property Source Area Investigation
Laboratory Name	Pace Analytical Services, LLC
Laboratory Project ID	10382930
Sample Matrix	Air
Sample Start and End Dates	03/21/17, 03/22/17
Parameters Included	VOCs using EPA Method TO-15, Helium by Method 3C Gases
Date Validated	4/26/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six soil vapor samples and one duplicate were collected by HydroSolutions on March 21 and March 22, 201 to evaluate the soil vapor conditions at the Hustad Center after the installation of the soil vapor extraction (SVE) system installation. Three samples were collected from the subslab area and three samples (and one duplicate) were collected at soil vapor monitoring probes, installed at a depth of 10 feet. Samples were shipped to Pace Analytical Services, LLC (Pace) laboratory in Minneapolis, MN on March 23, 2017. Samples were received by Pace on March 24, 2017 and subsequently analyzed for the following six volatile organic compounds (VOCs): 1,1,2,2-tetrachloroethane, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), trans-1,2-dichloroethene, and vinyl chloride. The air samples were also analyzed for helium, which was used as a tracer gas. The samples were analyzed according to Method 3C Gases on March 31, 2017 an EPA Method TO-15 on April 6 and April 7, 2017.

Table 1 presents an inventory of the samples collected and analyzed as part of this soil vapor sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
Mr. Wise Mitigation System Point Z-3	10382930001	Z3-032117
Mr. Wise Mitigation System Point Z-4	10382930002	Z4-032116
Mr. Wise Mitigation System Point Z-4 (duplicate)	10382930003	Z4D-032116
DermaWerx Mitigation System Point Z-6	10382930004	Z6-032217
Vapor Point 5	10382930005	VP5-032217
Vapor Point 4	10382930006	VP4-032217
Vapor Point 2	10382930007	VP2-032217

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required the collection of baseline and post-remediation subslab samples to document soil vapor condition prior to and after the installation of the SVE system. Historic subslab vapor sampling data exists for some of the office spaces at the Hustad Center. Some of these previously used sampling locations are no longer accessible due to building remodeling and upgrades. For this and other reasons, subslab soil vapor was sampled from the extraction points associated with the indoor air mitigation system. These locations are comparable to historic sampling locations. Newly installed vapor point wells were used to collect the three vapor point samples at a depth of 10 feet, near to the estimated areas of contamination. The sample locations used for this event are the same as those used to establish project baseline conditions prior to the installation of the SVE system.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the chain-of-custody (CoC) form, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The air samples were analyzed for VOCs that are identified as contaminants of concern based on historic analytical results. Samples were properly handled and shipped to the laboratory with no discrepancies noted on the chain of custody form. The careful selection of air sampling locations, adherence to proper collection and handling of samples, and application of established field and laboratory procedures in accordance with EPA Method TO-15 contribute to the representativeness of this data.

Helium was used as a tracer gas as a means to detect leaks in the sample wells. Helium was reported in the sample collected at Z-6 (DermaWerx). This finding indicates that air surrounding the sample train was leaking into the sample during collection. This will bias the results low for that sample, but does not render the result unusable.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Three subslab samples, three deep vapor point samples, and one duplicate soil vapor sample were collected and analyzed in accordance with quality control objectives. No additional criteria are identified which affect the usability of this data. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. MDEQ validation guidelines establish a relative percent difference (RPD) target of 0-25% (MDEQ 2010). Professional judgement and industry standard was used to determine

that this RPD target applies when the result is at least five times the reporting limit. A comparison of the field duplicate result with the original sample result was used to assess the field precision of the results. When an analyte was not detected above the reporting limit in either the original or duplicate sample, an RPD was not calculated. The analytical results of this sampling event meet the established RPD target as shown in Table 2. In this way the data is considered precise.

Table 2. Field Precision

Contaminant of Concern	Natural Sample	Result (ug/m^3)	Duplicate Sample	Result (ug/m^3)	RPD (%)
1,1,2,2-tetrachloroethane	Z4-032117	< 1.6	Z4D-032117	< 1.6	-
cis-1,2-dichloroethene	Z4-032117	< 1.9	Z4D-032117	< 1.9	-
tetrachloroethene (PCE)	Z4-032117	1600	Z4D-032117	1590	0.6
trichloroethene (TCE)	Z4-032117	4.3	Z4D-032117	4.4	2.3
trans-1,2-Dichloroethene	Z4-032117	< 1.9	Z4D-032117	< 1.9	-
vinyl chloride	Z4-032117	< 0.6	Z4D-032117	< 0.6	-

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. In accordance with laboratory protocols, EPA Method TO-15, and Method 3C Gases, a method blank, laboratory control sample, laboratory control sample duplicate, and two sample duplicates were prepared and analyzed as part of the laboratory quality control (QC) process. These laboratory quality control samples are used to assess laboratory and method accuracy. There were no qualifiers associated with any of the QC samples. Method blanks were free of analyte contamination, analyte recovery in laboratory control samples were within target recovery thresholds, and RPDs for laboratory sample duplicates are within target ranges. As a result, this data is considered accurate.

Comparability

The collection and sampling methods used during this event followed the standard field and laboratory procedures of EPA Method TO-15 and Montana DEQ's Vapor Intrusion Guide (MDEQ 2011). Standard measurement units were used for reporting the analytical data. For these reasons, the data from this sampling event can be considered comparable to other data sets.

Qualified Data Summary

Data usability qualifiers are summarized in Table 3. The PCE results from the samples at Z-3, VP-5, VP-4 and VP-2 were qualified with an "A3" due to the high concentration of PCE detected in the samples which required serial dilution in order to be analyzed. PCE results from the same samples were also qualified by the laboratory with an "IS" which means that the internal standard recovery associated with the result exceeds the lower control limit. Therefore, the result should be considered an estimated value. The reported qualifiers do not indicate that the results are biased high or low.

The presence of helium in the sample collected at Z-6 biases the reported results low. In other words, contaminants in the soil vapor at that location may have been present in greater concentrations than were reported in the laboratory results. However, due to the high analyte concentrations detected, neither this bias, nor the above qualifiers affect the usability of these results for decision-making purposes in this project.

Table 3. Laboratory-Qualified Data Summary

Sample ID	Lab ID	Analyte	Result (ug/m^3)	Qualifier	Reason for Qualification
Z3-032117	10382930001	PCE	41,000	A3, IS	A3 - The sample was analyzed by serial dilution. IS – The internal standard recovery associated with this result exceeds the lower control limit. The reported results should be considered an estimated value.
VP5-032217	10382930005		55,500		
VP4-032217	10382930006		570,000		
VP2-032217	10382930007		802,000		

References

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

—. 2011. "Montana Vapor Intrusion Guide." April 22. http://deq.mt.gov/Land/statesuperfund/viguide.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site, Hustad Center
2. Site code or facility ID (if applicable)	Post SVE Installation Soil Vapor Monitoring
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8, May 2011 Hustad LLC Property Source Area Investigation, laboratory-specific sampling instructions
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/26/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☐ Groundwater ☐ Tap water ☒ Air (including soil gas) ☐ Other
11. Sample collection start date	3/21/2017 M/D/YY
12. Sample collection end date	3/22/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Analytical Method(s)
	Delete Method / TO15 Analysis of Volatile Organic Compounds (Vocs) In Air
	Delete Method / Method 3C Gases

Laboratory-related Questions

14. Laboratory name and location	Pace Analytical Services, LLC Minneapolis, MN		
15. Laboratory project ID	10382930		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	○	●	Matrix spikes and matrix spike duplicates are not a requirement for EPA Method TO-15.

If no, explain

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	○	●	For PCE in several samples, the Lab internal standard recovery exceeded the lower limit, and the lab indicated that these values should be considered estimated. The results would be biased low.

If no, explain

	Yes	No	Comments
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	Field blanks were not collected, and all analyte detections are assumed to be attributable to the site. Blanks are not typically collected with summa canisters. One duplicate set was collected.

If no, explain

28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ○	No ●	Comments: see above.
28a. Were all blank samples free of analyte contamination?	Yes ●	No ○	Comments: Laboratory blanks were all ND. The lab certified the canisters as clean.
28b. Were field duplicates collected as required?	Yes ●	No ○	Comments:
28c. Are field duplicate relative percent differences within data validation quality control limits?	Yes ●	No ○	Comments: RPD values for detected analytes were 2.3% or less, which is well within limits.

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample	10382930001	Z3-032117	J-	PCE 41,000 ug/m3
Delete Sample	10382930005	VP5-032217	J-	PCE 55,500 ug.m3
Delete Sample	10382930006	VP4-032217	J-	PCE 570,000 ug/m3
Delete Sample	10382930007	VP2-032217	J-	PCE 802,000 ug/m3

30. What is the percent completeness (samples planned versus valid samples collected)?	100		Comments:
31. Was the completeness goal met?	Yes ●	No ○	Comments:

32. Other general comments or observations?

Because of the high PCE concentrations in the samples, the lab used serial dilutions in the analysis process. The dilution process and the high PCE concentrations like affected the ability of the lab to detect

concentrations of internal standards/spikes. This is expected when analytes concentrations are present in samples at concentrations higher than the calibration range of the instruments. The overall interpretation of the data is not affected.

Split Samples

	Yes	No	Comments
33. Did DEQ collect split samples?	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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(612)607-1700

April 10, 2017

Amanda Osborne
Hydro Solutions
303 Clarke St.
Helena, MT 59601

RE: Project: DEQ08
Pace Project No.: 10382930

Dear Amanda Osborne:
Enclosed are the analytical results for sample(s) received by the laboratory on March 24, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout
carolynne.trout@pacelabs.com
1(612)607-6351
Project Manager

Enclosures

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CERTIFICATIONS

Project: DEQ08
Pace Project No.: 10382930

Minnesota Certification IDs

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: UST-078
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas Certification #: 88-0680
California Certification #: MN00064
CNMI Saipan Certification #:MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia WW Certification #: 382
Wisconsin Certification #: 999407970
Wyoming via EPA Region 8 Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: DEQ08
Pace Project No.: 10382930

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10382930001	**Z3-032117**	Air	03/21/17 11:12	03/24/17 09:45
10382930002	**Z4-032117**	Air	03/21/17 12:28	03/24/17 09:45
10382930003	**Z4D-032117**	Air	03/21/17 12:28	03/24/17 09:45
10382930004	**Z6-032117**	Air	03/21/17 14:43	03/24/17 09:45
10382930005	**VP5-032217**	Air	03/22/17 09:37	03/24/17 09:45
10382930006	**VP4-032217**	Air	03/22/17 11:15	03/24/17 09:45
10382930007	**VP2-032217**	Air	03/22/17 12:52	03/24/17 09:45

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SAMPLE ANALYTE COUNT

Project: DEQ08
Pace Project No.: 10382930

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10382930001	**Z3-032117**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930002	**Z4-032117**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930003	**Z4D-032117**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930004	**Z6-032117**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930005	**VP5-032217**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930006	**VP4-032217**	Method 3C Gases	NCK	1
		TO-15	CH1	6
10382930007	**VP2-032217**	Method 3C Gases	NCK	1
		TO-15	CH1	6

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ANALYTICAL RESULTS

Project: DEQ08
Pace Project No.: 10382930

Sample: Z3-032117 **Lab ID: 10382930001** Collected: 03/21/17 11:12 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 11:06	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.8	2.19		04/06/17 23:40	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.8	2.19		04/06/17 23:40	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.19		04/06/17 23:40	79-34-5	
Tetrachloroethene	**41000**	ug/m3	483	700.8		04/07/17 14:15	127-18-4	A3,IS
Trichloroethene	**22.3**	ug/m3	1.2	2.19		04/06/17 23:40	79-01-6	
Vinyl chloride	ND	ug/m3	0.57	2.19		04/06/17 23:40	75-01-4	

Sample: Z4-032117 **Lab ID: 10382930002** Collected: 03/21/17 12:28 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 11:17	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		04/07/17 00:11	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		04/07/17 00:11	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.6	2.29		04/07/17 00:11	79-34-5	
Tetrachloroethene	**1600**	ug/m3	106	153.88		04/07/17 13:22	127-18-4	
Trichloroethene	**4.3**	ug/m3	1.3	2.29		04/07/17 00:11	79-01-6	
Vinyl chloride	ND	ug/m3	0.60	2.29		04/07/17 00:11	75-01-4	

Sample: Z4D-032117 **Lab ID: 10382930003** Collected: 03/21/17 12:28 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 11:28	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		04/07/17 00:42	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.9	2.29		04/07/17 00:42	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.6	2.29		04/07/17 00:42	79-34-5	
Tetrachloroethene	**1590**	ug/m3	106	153.88		04/07/17 13:48	127-18-4	
Trichloroethene	**4.4**	ug/m3	1.3	2.29		04/07/17 00:42	79-01-6	
Vinyl chloride	ND	ug/m3	0.60	2.29		04/07/17 00:42	75-01-4	

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ANALYTICAL RESULTS

Project: DEQ08
Pace Project No.: 10382930

Sample: Z6-032117 **Lab ID: 10382930004** Collected: 03/21/17 14:43 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	**9.2**	%	3.6	1		03/31/17 11:38	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		04/07/17 01:14	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	1.7	2.1		04/07/17 01:14	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	1.5	2.1		04/07/17 01:14	79-34-5	
Tetrachloroethene	**925**	ug/m3	50.4	73.08		04/07/17 12:56	127-18-4	
Trichloroethene	**1.7**	ug/m3	1.2	2.1		04/07/17 01:14	79-01-6	
Vinyl chloride	ND	ug/m3	0.55	2.1		04/07/17 01:14	75-01-4	

Sample: VP5-032217 **Lab ID: 10382930005** Collected: 03/22/17 09:37 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 11:48	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	74.2	91.6		04/07/17 01:41	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	74.2	91.6		04/07/17 01:41	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	63.9	91.6		04/07/17 01:41	79-34-5	
Tetrachloroethene	**55500**	ug/m3	1010	1465.6		04/07/17 14:42	127-18-4	A3,IS
Trichloroethene	ND	ug/m3	50.4	91.6		04/07/17 01:41	79-01-6	
Vinyl chloride	ND	ug/m3	23.8	91.6		04/07/17 01:41	75-01-4	

Sample: VP4-032217 **Lab ID: 10382930006** Collected: 03/22/17 11:15 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 11:58	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	68.0	84		04/07/17 02:07	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	68.0	84		04/07/17 02:07	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	58.6	84		04/07/17 02:07	79-34-5	
Tetrachloroethene	**570000**	ug/m3	3700	5376		04/07/17 15:08	127-18-4	A3,IS
Trichloroethene	**104**	ug/m3	46.2	84		04/07/17 02:07	79-01-6	
Vinyl chloride	ND	ug/m3	21.8	84		04/07/17 02:07	75-01-4	

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ANALYTICAL RESULTS

Project: DEQ08
Pace Project No.: 10382930

Sample: VP2-032217 **Lab ID: 10382930007** Collected: 03/22/17 12:52 Received: 03/24/17 09:45 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Method 3C AIR - Fixed Gases	Analytical Method: Method 3C Gases							
Helium	ND	%	3.6	1		03/31/17 12:09	7440-59-7	
TO15 MSV AIR	Analytical Method: TO-15							
cis-1,2-Dichloroethene	ND	ug/m3	68.0	84		04/07/17 02:33	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	68.0	84		04/07/17 02:33	156-60-5	
1,1,2,2-Tetrachloroethane	ND	ug/m3	58.6	84		04/07/17 02:33	79-34-5	
Tetrachloroethene	**802000**	ug/m3	7410	10752		04/07/17 15:35	127-18-4	A3,IS
Trichloroethene	**471**	ug/m3	46.2	84		04/07/17 02:33	79-01-6	
Vinyl chloride	ND	ug/m3	21.8	84		04/07/17 02:33	75-01-4	

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QUALITY CONTROL DATA

Project: DEQ08
Pace Project No.: 10382930

QC Batch: 466499 | Analysis Method: Method 3C Gases
QC Batch Method: Method 3C Gases | Analysis Description: METHOD 3C AIR - FIXED GASES
Associated Lab Samples: 10382930001, 10382930002, 10382930003, 10382930004, 10382930005, 10382930006, 10382930007

METHOD BLANK: 2549395 | Matrix: Air
Associated Lab Samples: 10382930001, 10382930002, 10382930003, 10382930004, 10382930005, 10382930006, 10382930007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Helium	%	ND	3.6	03/31/17 10:30	

LABORATORY CONTROL SAMPLE & LCSD: 2549396 2549397

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Helium	%	18	18.1	18.9	101	105	70-130	4	30	

SAMPLE DUPLICATE: 2549398

Parameter	Units	10382771004 Result	Dup Result	RPD	Max RPD	Qualifiers
Helium	%	<0.72	ND		30	

SAMPLE DUPLICATE: 2549926

Parameter	Units	10382838001 Result	Dup Result	RPD	Max RPD	Qualifiers
Helium	%		ND		30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: DEQ08
Pace Project No.: 10382930

QC Batch: 467391 | Analysis Method: TO-15
QC Batch Method: TO-15 | Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 10382930001, 10382930002, 10382930003, 10382930004, 10382930005, 10382930006, 10382930007

METHOD BLANK: 2553505 | Matrix: Air
Associated Lab Samples: 10382930001, 10382930002, 10382930003, 10382930004, 10382930005, 10382930006, 10382930007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	0.70	04/06/17 18:59	
cis-1,2-Dichloroethene	ug/m3	ND	0.81	04/06/17 18:59	
Tetrachloroethene	ug/m3	ND	0.69	04/06/17 18:59	
trans-1,2-Dichloroethene	ug/m3	ND	0.81	04/06/17 18:59	
Trichloroethene	ug/m3	ND	0.55	04/06/17 18:59	
Vinyl chloride	ug/m3	ND	0.26	04/06/17 18:59	

LABORATORY CONTROL SAMPLE: 2553506

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	74.7	74.3	100	70-130	
cis-1,2-Dichloroethene	ug/m3	43.9	44.0	100	70-133	
Tetrachloroethene	ug/m3	72.4	69.3	96	70-130	
trans-1,2-Dichloroethene	ug/m3	41.9	39.3	94	70-131	
Trichloroethene	ug/m3	57.9	58.6	101	70-130	
Vinyl chloride	ug/m3	27	26.8	99	70-130	

SAMPLE DUPLICATE: 2554566

Parameter	Units	10383659005 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND		25	
cis-1,2-Dichloroethene	ug/m3	ND	ND		25	
Tetrachloroethene	ug/m3	ND	ND		25	
trans-1,2-Dichloroethene	ug/m3	ND	ND		25	
Trichloroethene	ug/m3	ND	ND		25	
Vinyl chloride	ug/m3	ND	ND		25	

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QUALIFIERS

Project: DEQ08
Pace Project No.: 10382930

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

A3	The sample was analyzed by serial dilution.
IS	The internal standard recovery associated with this result exceeds the lower control limit. The reported result should be considered an estimated value.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: DEQ08
Pace Project No.: 10382930

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10382930001	**Z3-032117**	Method 3C Gases	466499		
10382930002	**Z4-032117**	Method 3C Gases	466499		
10382930003	**Z4D-032117**	Method 3C Gases	466499		
10382930004	**Z6-032117**	Method 3C Gases	466499		
10382930005	**VP5-032217**	Method 3C Gases	466499		
10382930006	**VP4-032217**	Method 3C Gases	466499		
10382930007	**VP2-032217**	Method 3C Gases	466499		
10382930001	**Z3-032117**	TO-15	467391		
10382930002	**Z4-032117**	TO-15	467391		
10382930003	**Z4D-032117**	TO-15	467391		
10382930004	**Z6-032117**	TO-15	467391		
10382930005	**VP5-032217**	TO-15	467391		
10382930006	**VP4-032217**	TO-15	467391		
10382930007	**VP2-032217**	TO-15	467391		

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~~10352390~~ DL 3/27
10352920

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

26101

Page: 1 of 1

Section A Required Client Information:

Company: HYDROSOLUTIONS
Address: 303 Clarke St
Helena MT 59601
Email To: amanda@hydrosi.com
Phone: 406-443-6169x106 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Amanda Osborne
Copy To:
Purchase Order No.:
Project Name: DE208
Project Number:

Section C Invoice Information:

Attention: Amanda Osborne
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager/Sales Rep. Carolynne Trait
Pace Profile #:

Program: ☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act ☐ Voluntary Clean Up ☒ Dry Clean ☐ RCRA ☐ Other____

Location of Sampling by State: MT

Reporting Units: ug/m³ ☒ mg/m³ ___ PPBV ___ PPMV ___ Other ___

Report Level II.___ III.___ IV.___ Other_____

Valid Media Codes: MEDIA / CODE — Tedlar Bag TB; 1 Liter Summa Can 1LC; 6 Liter Summa Can 6LC; Low Volume Puff LVP; High Volume Puff HVP; Other PM10

ITEM #	'Section D Required Client Information AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	PID Reading (Client only)	COLLECTED COMPOSITE START END/GRAB DATE	TIME	COMPOSITE - DATE	TIME	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	PM10	3C- Fixed Gas (%) He	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	Z3-032117	1LC		03/21/17	1012	03/21/17	1112	-27	-6	2216	FC0887		X						X		001
2	Z4-032117	1LC		03/21/17	1123	03/21/17	1228	-26.5	6.5	2947	FC0163		X						X		002
3	Z4D-032117	1LC		03/21/17	1123	03/21/17	1228	-26.5	6.5	2914	FC0163		X						X		003
4	Z6-032117	1LC		03/21/17	1341	03/21/17	1443	-24.5	4.5	1781	FC0249		X						X		004
5	VP5-032217	1LC		03/22/17	0821	03/22/17	0937	-26	-6	2861	FC0280		X						X		005
6	VP4-032217	1LC		03/22/17	1015	03/22/17	1115	-26.5	-3.5	2854	FC1015		X						X		006
7	VP2-032217	1LC		03/22/17	1151	03/22/17	1252	-27	-3.5	1308	FC1269		X						X		007
8																					
9																					
10																					
11																					
12																					

Comments :

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
AMANDA OSBORNE / HSI	3/22/17	1530	[illegible]	3-24-17	945

SAMPLE CONDITIONS

	Temp in °C	Received on Ice	Custody Sealed Cooler	Samples Intact
	—	Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N
		Y/N	Y/N	Y/N

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: AMANDA OSBORNE
SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY): 03/22/17

ORIGINAL

Pace Analytical	Document Name: Air Sample Condition Upon Receipt	Document Revised: 26APR2016 Page 1 of 1
	Document No.: F-MN-A-106-rev.11	Issuing Authority: Pace Minnesota Quality Office

Air Sample Condition Upon Receipt

Client Name: Hydro Solutions

Project #: WO# : 10382930

10382930

Courier: ☑ Fed Ex ☐ UPS ☐ Speedee ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 6637 5042 2651

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☑ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Tin Can ☐ Other: Temp Blank rec: ☐ Yes ☑ No

Temp. (TO17 and TO13 samples only) (°C): X Corrected Temp (°C): X Thermom. Used: ☐ B88A912167504 ☐ B88A0143310098 ☐ 151401163 ☐ 151401164

Temp should be above freezing to 6°C Correction Factor: X Date & Initials of Person Examining Contents: 3-27-17 AA

Type of ice Received ☐ Blue ☐ Wet ☑ None

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Media: (Air Can) Airbag Filter TDT Passive				11.
Sample Labels Match COC?	☐ Yes	☐ No	☐ N/A	12.

Samples Received: 1 T fitting rec'd, FFFT

Canisters			Canisters		
Sample Number	Can ID	Flow Controller ID	Sample Number	Can ID	Flow Controller ID

CLIENT NOTIFICATION/RESOLUTION Field Data Required? ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Carolyne Hart Date: 3/27/17

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Data Validation
Groundwater Analytical Results

HydroSolutions

Data Validation Report - Groundwater Analytical Results

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Documents	DEQ Contract No. 414026 Task Order No. 8 May 2011 Hustad LLC Property Source Area Investigation
Laboratory Name	Energy Laboratories, Inc.
Laboratory Project ID	H16120041
Sample Matrix	Aqueous
Sample Start and End Dates	11/30/16, 12/01/16
Parameters Included	8260 - VOCs Short List
Date Validated	3/7/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six groundwater samples, one equipment rinsate blank sample, and one trip blank were collected by HydroSolutions on November 30 and December 1, 2016 to establish baseline groundwater quality prior to soil vapor extraction (SVE) system installation at the Hustad Center. Samples were hand delivered to Energy Laboratories, Inc. (Energy Lab) in Helena, MT on December 2, 2016. The samples were analyzed by Energy Lab for volatile organic compounds (VOCs) according to EPA Method 8260B on December 6, 2016 and December 7, 2016.

One field duplicate sample was included in the sample set to meet a targeted duplicate collection frequency of 1 in 20 (5%). The duplicate sample was collected at monitoring well MW-3, and was identified as MW-3D. Table 1 presents an inventory of the samples collected and analyzed as part of the baseline groundwater quality sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
Monitoring Well 1	H16120041-001	MW-1
Monitoring Well 3	H16120041-002	MW-3
Monitoring Well 3	H16120041-003	MW-3D
Monitoring Well 5	H16120041-004	MW-5
Equipment Rinse Blank	H16120041-005	Rinse Blank
Monitoring Well 2	H16120041-006	MW-2
Monitoring Well 7	H16120041-007	MW-7
Trip Blank	H16120041-008	TB 6031

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The approved task order for this project directed the use of an existing approved groundwater sampling and analysis work plan within the May 2011 Hustad LLC Property Source Area Investigation Work Plan (HydroSolutions 2011). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required that pre-SVE system groundwater quality results be compared to post-SVE system groundwater quality results to evaluate the system's effectiveness. This task order objective was accomplished in part by this groundwater sampling activity, which established baseline groundwater quality conditions prior to the installation of the SVE system. Historic groundwater quality data exists for various monitoring wells throughout the Helena Solvent Site, including the area that surrounds the Hustad Center Complex. Groundwater samples collected during this baseline sampling event were obtained at locations that are consistent with historic sampling locations.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The groundwater samples were analyzed for VOCs, the contaminants of concern based on historic analytical results. Field protocols followed were consistent with previous groundwater sampling activities. The evaluation of field and laboratory blank samples for the presence of contaminants with none reported above laboratory reporting limits support the representativeness of the sample results. For all of these reasons, this data is considered representative.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Five groundwater samples, one duplicate groundwater sample, one equipment rinsate blank and one trip blank sample were collected, preserved with hydrochloric acid to pH<2, and analyzed. All samples were collected, prepared, handled, and analyzed in accordance with quality control objectives and no criteria are identified which affect the data's usability. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. A comparison of the field duplicate result with the original sample result was used to assess the field precision, which may depend on sample homogeneity, handling, storage, preparation, and analysis. MDEQ validation guidelines establish a relative percent difference (RPD) target of 0-25% for field duplicates (MDEQ 2010). Chloroform and tetrachloroethene

(PCE) were the only contaminants above the reporting limit in the original or duplicate sample. The analytical results of chloroform and PCE are compared in Table 2 and meet the established RPD target. In this way the data is considered precise.

Table 2. Field Precision

Contaminants Detected Above the Reporting Limit	Natural Sample	Result (ug/L)	Duplicate Sample	Result (ug/L)	RPD (%)
Chloroform	MW-3	7.8	MW-3D	7.8	0
Tetrachloroethene (PCE)	MW-3	5	MW-3D	5.5	10

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. As part of field sampling quality control and assurance, an equipment rinsate blank sample was prepared in the field by pouring deionized water through the cleaned sampling equipment and collecting and preserving it in sample containers. No VOCs were detected in the rinsate blank sample, which indicates that field sampling techniques and equipment did not bias sample results.

In accordance with EPA Method 8260 and laboratory protocol, laboratory control samples were prepared and analyzed by Energy Lab to assess laboratory and method accuracy. Laboratory equipment was calibrated on December 6, 2016 and December 7, 2016 prior to each analytical run. No calibration issues or qualifiers were identified in the laboratory report. The second analytical run, which occurred on December 7, 2016, was completed for chloroform and tetrachloroethene, which required dilution.

Energy Lab prepared and analyzed a laboratory control sample, method blank, sample matrix spike, and sample matrix spike duplicate for each analytical run accordingly. Both method blanks were free of analyte contamination and no qualifiers are noted for either laboratory control sample. The only reported qualifiers were for the sample matrix spike and sample matrix spike duplicate analyzed on December 6, 2016. These qualifiers are listed in Table 3.

Table 3. Summary of Qualifiers in Laboratory QA/QC Report

Sample ID	Analyte	Lab IDs	Qualifier	Reason for Qualification
12/6/2016 Sample Matrix Spike and Duplicate	Bromochloromethane	H16120041-005AMS H16120041-005AMSD	S	Spike recovery outside of advisory limits
12/6/2016 Sample Matrix Spike and Duplicate	Chloroethane	H16120041-005AMS H16120041-005AMSD	S	Spike recovery outside of advisory limits

Neither of the analytes associated with an S qualifier were detected in the groundwater samples above reporting limits. For this reason, the qualifier does not bias the results. All percent recoveries were within the percent recovery limits, and no additional qualifiers are reported in the laboratory QA/QC report. For these reasons, the data is considered accurate.

Comparability

The collection and sampling methods employed for this event followed the standard field and laboratory procedures for groundwater sampling and analysis by Method 8260 and the

analytical results are reported in standard measurement units. For these reasons, the data from this sampling event is considered comparable to other similar data collection events and results.

Qualified Data Summary

Data usability qualifiers are summarized in Table 4. The J qualifier indicates that an analyte was detected, but at a level less than the reporting limit. Therefore, these reported results are estimated but did not introduce bias to the results.

Table 4. Qualified Data Summary

Sample ID	Analyte	Lab ID	Result (ug/L)	Qualifier	Reason for Qualification
MW-1	Bromodichloromethane	H16120041-001	0.93	J	Estimated value. The analyte was present but less than the reporting limit.
MW-1	Tetrachloroethene	H16120041-001	0.92	J	
MW-3	Bromodichloromethane	H16120041-002	0.73	J	
MW-3D	Bromodichloromethane	H16120041-003	0.69	J	
MW-5	Trichloroethene	H16120041-004	0.27	J	
MW-2	Trichloroethene	H16120041-006	0.63	J	
MW-7	Bromodichloromethane	H16120041-007	0.25	J	

A review of field sheets, sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes on this project.

References

HydroSolutions. 2011. "Hustad LLC Property Source Area Investigation Work Plan."

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Groundwater Monitoring
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8 and May 2011 Hustad LLC Property Source Area Investigation Work Plan
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	3/7/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☒ Groundwater ☐ Tap water ☐ Air (including soil gas) ☐ Other
11. Sample collection start date	11/30/2016 M/D/YY
12. Sample collection end date	12/1/2016 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s) "E8260B Volatile Organic Compounds By Gas Chromatography

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H16120041		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	S Qualifiers on MS/MDS results for bromochloromethane and chloroethane. These compounds were not detected in field samples, therefore no qualification of the data is necessary.
18a. Were all calibration verification results within acceptable limits?	●	○	
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	●	○	
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	●	○	
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	●	○	

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	

24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	Yes ●	No ○	Comments: reported units are ug/L
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	Yes ●	No ○	Comments:
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	Yes ●	No ○	Comments:
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	Yes ●	No ○	Comments:
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	Yes ●	No ○	Comments:

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)?	100		Comments:
31. Was the completeness goal met?	Yes ●	No ○	Comments:

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples?	Yes	No	Comments
	○	●	

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

December 09, 2016

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H16120041 Quote ID: H1252 - Contractor Confirmation Sampling

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 8 samples for HydroSolutions on 12/2/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H16120041-001	MW-1	11/30/16 12:00	12/02/16	Aqueous	8260-Volatile Organic Compounds-Short List
H16120041-002	MW-3	11/30/16 14:50	12/02/16	Aqueous	Same As Above
H16120041-003	MW-3D	11/30/16 14:55	12/02/16	Aqueous	Same As Above
H16120041-004	MW-5	12/01/16 11:50	12/02/16	Aqueous	Same As Above
H16120041-005	Rinse Blank	12/01/16 12:15	12/02/16	Aqueous	Same As Above
H16120041-006	MW-2	12/01/16 13:25	12/02/16	Aqueous	Same As Above
H16120041-007	MW-7	12/01/16 15:00	12/02/16	Aqueous	Same As Above
H16120041-008	TB 6031	11/30/16 12:00	12/02/16	Trip Blank	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-001
Client Sample ID: MW-1

Report Date: 12/09/16
Collection Date: 11/30/16 12:00
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Bromodichloromethane	0.93	ug/L	J	1.0		SW8260B	12/06/16 15:22 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Chloroform	35	ug/L		1.2		SW8260B	12/07/16 12:19 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 15:22 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Tetrachloroethene	0.92	ug/L	J	1.0		SW8260B	12/06/16 15:22 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Trichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-001
Client Sample ID: MW-1

Report Date: 12/09/16
Collection Date: 11/30/16 12:00
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 15:22 / kjw
Surr: Dibromofluoromethane	85.0	%REC		70-125		SW8260B	12/06/16 15:22 / kjw
Surr: 1,2-Dichloroethane-d4	83.0	%REC		69-131		SW8260B	12/06/16 15:22 / kjw
Surr: Toluene-d8	90.0	%REC		80-119		SW8260B	12/06/16 15:22 / kjw
Surr: p-Bromofluorobenzene	121	%REC		76-123		SW8260B	12/06/16 15:22 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-002
Client Sample ID: MW-3

Report Date: 12/09/16
Collection Date: 11/30/16 14:50
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Bromodichloromethane	0.73	ug/L	J	1.0		SW8260B	12/06/16 18:08 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Chloroform	7.8	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 18:08 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Tetrachloroethene	5.0	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Trichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw

Report Definitions:
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QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-002
Client Sample ID: MW-3

Report Date: 12/09/16
Collection Date: 11/30/16 14:50
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 18:08 / kjw
Surr: Dibromofluoromethane	88.0	%REC		70-125		SW8260B	12/06/16 18:08 / kjw
Surr: 1,2-Dichloroethane-d4	88.0	%REC		69-131		SW8260B	12/06/16 18:08 / kjw
Surr: Toluene-d8	96.0	%REC		80-119		SW8260B	12/06/16 18:08 / kjw
Surr: p-Bromofluorobenzene	117	%REC		76-123		SW8260B	12/06/16 18:08 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-003
Client Sample ID: MW-3D

Report Date: 12/09/16
Collection Date: 11/30/16 14:55
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Bromodichloromethane	0.69	ug/L	J	1.0		SW8260B	12/06/16 17:35 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Chloroform	7.8	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 17:35 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Tetrachloroethene	5.5	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Trichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-003
Client Sample ID: MW-3D

Report Date: 12/09/16
Collection Date: 11/30/16 14:55
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 17:35 / kjw
Surr: Dibromofluoromethane	85.0	%REC		70-125		SW8260B	12/06/16 17:35 / kjw
Surr: 1,2-Dichloroethane-d4	86.0	%REC		69-131		SW8260B	12/06/16 17:35 / kjw
Surr: Toluene-d8	93.0	%REC		80-119		SW8260B	12/06/16 17:35 / kjw
Surr: p-Bromofluorobenzene	117	%REC		76-123		SW8260B	12/06/16 17:35 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-004
Client Sample ID: MW-5

Report Date: 12/09/16
Collection Date: 12/01/16 11:50
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Bromodichloromethane	1.7	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Chloroform	34	ug/L		1.2		SW8260B	12/07/16 12:52 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 15:55 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Tetrachloroethene	72	ug/L		1.2		SW8260B	12/07/16 12:52 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Trichloroethene	0.27	ug/L	J	1.0		SW8260B	12/06/16 15:55 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-004
Client Sample ID: MW-5

Report Date: 12/09/16
Collection Date: 12/01/16 11:50
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 15:55 / kjw
Surr: Dibromofluoromethane	84.0	%REC		70-125		SW8260B	12/06/16 15:55 / kjw
Surr: 1,2-Dichloroethane-d4	86.0	%REC		69-131		SW8260B	12/06/16 15:55 / kjw
Surr: Toluene-d8	94.0	%REC		80-119		SW8260B	12/06/16 15:55 / kjw
Surr: p-Bromofluorobenzene	117	%REC		76-123		SW8260B	12/06/16 15:55 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-005
Client Sample ID: Rinse Blank

Report Date: 12/09/16
Collection Date: 12/01/16 12:15
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Bromodichloromethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Chloroform	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 12:31 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Tetrachloroethene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Trichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-005
Client Sample ID: Rinse Blank

Report Date: 12/09/16
Collection Date: 12/01/16 12:15
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 12:31 / kjw
Surr: Dibromofluoromethane	86.0	%REC		70-125		SW8260B	12/06/16 12:31 / kjw
Surr: 1,2-Dichloroethane-d4	92.0	%REC		69-131		SW8260B	12/06/16 12:31 / kjw
Surr: Toluene-d8	96.0	%REC		80-119		SW8260B	12/06/16 12:31 / kjw
Surr: p-Bromofluorobenzene	106	%REC		76-123		SW8260B	12/06/16 12:31 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-006
Client Sample ID: MW-2

Report Date: 12/09/16
Collection Date: 12/01/16 13:25
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Bromodichloromethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Chloroform	33	ug/L		2.5		SW8260B	12/07/16 13:25 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 16:28 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Tetrachloroethene	94	ug/L		2.5		SW8260B	12/07/16 13:25 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Trichloroethene	0.63	ug/L	J	1.0		SW8260B	12/06/16 16:28 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-006
Client Sample ID: MW-2

Report Date: 12/09/16
Collection Date: 12/01/16 13:25
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 16:28 / kjw
Surr: Dibromofluoromethane	85.0	%REC		70-125		SW8260B	12/06/16 16:28 / kjw
Surr: 1,2-Dichloroethane-d4	85.0	%REC		69-131		SW8260B	12/06/16 16:28 / kjw
Surr: Toluene-d8	96.0	%REC		80-119		SW8260B	12/06/16 16:28 / kjw
Surr: p-Bromofluorobenzene	115	%REC		76-123		SW8260B	12/06/16 16:28 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-007
Client Sample ID: MW-7

Report Date: 12/09/16
Collection Date: 12/01/16 15:00
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Bromodichloromethane	0.25	ug/L	J	1.0		SW8260B	12/06/16 17:02 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Chloroform	26	ug/L		2.5		SW8260B	12/07/16 13:59 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 17:02 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Tetrachloroethene	126	ug/L		2.5		SW8260B	12/07/16 13:59 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Trichloroethene	1.1	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-007
Client Sample ID: MW-7

Report Date: 12/09/16
Collection Date: 12/01/16 15:00
DateReceived: 12/02/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 17:02 / kjw
Surr: Dibromofluoromethane	87.0	%REC		70-125		SW8260B	12/06/16 17:02 / kjw
Surr: 1,2-Dichloroethane-d4	85.0	%REC		69-131		SW8260B	12/06/16 17:02 / kjw
Surr: Toluene-d8	97.0	%REC		80-119		SW8260B	12/06/16 17:02 / kjw
Surr: p-Bromofluorobenzene	120	%REC		76-123		SW8260B	12/06/16 17:02 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-008
Client Sample ID: TB 6031

Report Date: 12/09/16
Collection Date: 11/30/16 12:00
DateReceived: 12/02/16
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Bromodichloromethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Chloroform	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Methyl ethyl ketone	ND	ug/L		20		SW8260B	12/06/16 11:58 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Styrene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Tetrachloroethene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Toluene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Trichloroethene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H16120041-008
Client Sample ID: TB 6031

Report Date: 12/09/16
Collection Date: 11/30/16 12:00
DateReceived: 12/02/16
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	12/06/16 11:58 / kjw
Surr: Dibromofluoromethane	94.0	%REC		70-125		SW8260B	12/06/16 11:58 / kjw
Surr: 1,2-Dichloroethane-d4	83.0	%REC		69-131		SW8260B	12/06/16 11:58 / kjw
Surr: Toluene-d8	95.0	%REC		80-119		SW8260B	12/06/16 11:58 / kjw
Surr: p-Bromofluorobenzene	106	%REC		76-123		SW8260B	12/06/16 11:58 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Analytical Run: R121097
Lab ID: 120616_CCV_2	53	Continuing Calibration Verification Standard								12/06/16 09:33
Benzene		4.84	ug/L	0.50	97	70	130			
Bromobenzene		4.84	ug/L	0.50	97	70	130			
Bromochloromethane		4.40	ug/L	0.50	88	70	130			
Bromodichloromethane		4.76	ug/L	0.50	95	70	130			
Bromoform		4.68	ug/L	0.50	94	70	130			
Bromomethane		5.28	ug/L	0.50	106	70	130			
Carbon tetrachloride		4.88	ug/L	0.50	98	70	130			
Chlorobenzene		4.96	ug/L	0.50	99	70	130			
Chlorodibromomethane		4.40	ug/L	0.50	88	70	130			
Chloroethane		4.12	ug/L	0.50	82	70	130			
Chloroform		5.00	ug/L	0.50	100	80	120			
Chloromethane		4.80	ug/L	0.50	96	70	130			
2-Chlorotoluene		5.04	ug/L	0.50	101	70	130			
4-Chlorotoluene		4.72	ug/L	0.50	94	70	130			
1,2-Dibromoethane		4.28	ug/L	0.50	86	70	130			
Dibromomethane		4.08	ug/L	0.50	82	70	130			
1,2-Dichlorobenzene		5.08	ug/L	0.50	102	70	130			
1,3-Dichlorobenzene		4.84	ug/L	0.50	97	70	130			
1,4-Dichlorobenzene		4.68	ug/L	0.50	94	70	130			
Dichlorodifluoromethane		4.40	ug/L	0.50	88	70	130			
1,1-Dichloroethane		5.04	ug/L	0.50	101	70	130			
1,2-Dichloroethane		4.24	ug/L	0.50	85	70	130			
1,1-Dichloroethene		5.00	ug/L	0.50	100	80	120			
cis-1,2-Dichloroethene		5.16	ug/L	0.50	103	70	130			
trans-1,2-Dichloroethene		5.40	ug/L	0.50	108	70	130			
1,2-Dichloropropane		4.84	ug/L	0.50	97	80	120			
1,3-Dichloropropane		4.32	ug/L	0.50	86	70	130			
2,2-Dichloropropane		4.96	ug/L	0.50	99	70	130			
1,1-Dichloropropene		4.84	ug/L	0.50	97	70	130			
cis-1,3-Dichloropropene		4.60	ug/L	0.50	92	70	130			
trans-1,3-Dichloropropene		5.00	ug/L	0.50	100	70	130			
Ethylbenzene		4.80	ug/L	0.50	96	80	120			
Methyl tert-butyl ether (MTBE)		4.40	ug/L	0.50	88	70	130			
Methyl ethyl ketone		38.9	ug/L	10	78	70	130			
Methylene chloride		4.68	ug/L	0.50	94	70	130			
Styrene		5.04	ug/L	0.50	101	70	130			
1,1,1,2-Tetrachloroethane		5.20	ug/L	0.50	104	70	130			
1,1,2,2-Tetrachloroethane		4.84	ug/L	0.50	97	70	130			
Tetrachloroethene		4.68	ug/L	0.50	94	70	130			
Toluene		4.84	ug/L	0.50	97	80	120			
1,1,1-Trichloroethane		5.20	ug/L	0.50	104	70	130			
1,1,2-Trichloroethane		4.60	ug/L	0.50	92	70	130			
Trichloroethene		5.12	ug/L	0.50	102	70	130			
Trichlorofluoromethane		4.80	ug/L	0.50	96	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R121097	
Lab ID: 120616_CCV_2	53	Continuing Calibration Verification Standard							12/06/16 09:33	
1,2,3-Trichloropropane		4.36	ug/L	0.50	87	70	130			
Vinyl chloride		4.84	ug/L	0.50	97	80	120			
m+p-Xylenes		9.88	ug/L	0.50	99	70	130			
o-Xylene		5.12	ug/L	0.50	102	70	130			
Xylenes, Total		15.0	ug/L	0.50	100	70	130			
Surr: 1,2-Dichloroethane-d4				1.0	86	69	131			
Surr: Dibromofluoromethane				1.0	86	70	125			
Surr: p-Bromofluorobenzene				1.0	91	76	123			
Surr: Toluene-d8				1.0	93	80	119			
Method: SW8260B									Batch: R121097	
Lab ID: 120616_LCS_3	53	Laboratory Control Sample				Run: 1SATURN_161206A			12/06/16 10:13	
Benzene		4.48	ug/L	0.50	90	69	129			
Bromobenzene		4.72	ug/L	0.50	94	79	120			
Bromochloromethane		3.70	ug/L	0.50	74	72	125			
Bromodichloromethane		4.64	ug/L	0.50	93	71	122			
Bromoform		4.44	ug/L	0.50	89	65	130			
Bromomethane		6.60	ug/L	0.50	132	60	136			
Carbon tetrachloride		4.76	ug/L	0.50	95	77	121			
Chlorobenzene		4.88	ug/L	0.50	98	78	120			
Chlorodibromomethane		4.04	ug/L	0.50	81	70	122			
Chloroethane		3.17	ug/L	0.50	63	62	135			
Chloroform		4.68	ug/L	0.50	94	71	121			
Chloromethane		5.00	ug/L	0.50	100	66	139			
2-Chlorotoluene		4.88	ug/L	0.50	98	78	125			
4-Chlorotoluene		4.64	ug/L	0.50	93	76	126			
1,2-Dibromoethane		3.87	ug/L	0.50	77	60	137			
Dibromomethane		3.97	ug/L	0.50	79	69	122			
1,2-Dichlorobenzene		4.76	ug/L	0.50	95	74	122			
1,3-Dichlorobenzene		4.68	ug/L	0.50	94	78	120			
1,4-Dichlorobenzene		4.64	ug/L	0.50	93	75	122			
Dichlorodifluoromethane		4.96	ug/L	0.50	99	57	144			
1,1-Dichloroethane		4.64	ug/L	0.50	93	76	125			
1,2-Dichloroethane		3.73	ug/L	0.50	75	69	131			
1,1-Dichloroethene		4.72	ug/L	0.50	94	67	129			
cis-1,2-Dichloroethene		5.00	ug/L	0.50	100	75	122			
trans-1,2-Dichloroethene		5.00	ug/L	0.50	100	75	124			
1,2-Dichloropropane		4.92	ug/L	0.50	98	75	127			
1,3-Dichloropropane		4.24	ug/L	0.50	85	70	122			
2,2-Dichloropropane		4.80	ug/L	0.50	96	78	132			
1,1-Dichloropropene		4.60	ug/L	0.50	92	69	127			
cis-1,3-Dichloropropene		4.48	ug/L	0.50	90	73	124			
trans-1,3-Dichloropropene		4.00	ug/L	0.50	80	72	127			
Ethylbenzene		4.56	ug/L	0.50	91	74	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: R121097
Lab ID: 120616_LCS_3	53	Laboratory Control Sample				Run: 1SATURN_161206A				12/06/16 10:13
Methyl tert-butyl ether (MTBE)		3.96	ug/L	0.50	79	62	128			
Methyl ethyl ketone		38.5	ug/L	10	77	56	141			
Methylene chloride		4.64	ug/L	0.50	93	61	125			
Styrene		4.68	ug/L	0.50	94	75	120			
1,1,1,2-Tetrachloroethane		4.92	ug/L	0.50	98	76	122			
1,1,2,2-Tetrachloroethane		4.28	ug/L	0.50	86	67	124			
Tetrachloroethene		4.52	ug/L	0.50	90	75	126			
Toluene		4.52	ug/L	0.50	90	73	122			
1,1,1-Trichloroethane		4.76	ug/L	0.50	95	76	124			
1,1,2-Trichloroethane		4.20	ug/L	0.50	84	72	125			
Trichloroethene		4.84	ug/L	0.50	97	72	126			
Trichlorofluoromethane		5.04	ug/L	0.50	101	73	131			
1,2,3-Trichloropropane		4.44	ug/L	0.50	89	58	142			
Vinyl chloride		5.56	ug/L	0.50	111	69	129			
m+p-Xylenes		9.00	ug/L	0.50	90	72	124			
o-Xylene		4.72	ug/L	0.50	94	74	123			
Xylenes, Total		13.7	ug/L	0.50	91	72	124			
Surr: 1,2-Dichloroethane-d4				1.0	90	69	131			
Surr: Dibromofluoromethane				1.0	88	70	125			
Surr: p-Bromofluorobenzene				1.0	96	76	123			
Surr: Toluene-d8				1.0	90	80	119			
Lab ID: 120616_MBLK_5	53	Method Blank				Run: 1SATURN_161206A				12/06/16 11:25
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromoethane		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R121097	
Lab ID: 120616_MBLK_5	53	Method Blank				Run: 1SATURN_161206A			12/06/16 11:25	
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
Vinyl chloride		ND	ug/L	0.50						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				1.0	83	69	131			
Surr: Dibromofluoromethane				1.0	90	70	125			
Surr: p-Bromofluorobenzene				1.0	110	76	123			
Surr: Toluene-d8				1.0	93	80	119			
Lab ID: H16120041-005AMS	53	Sample Matrix Spike				Run: 1SATURN_161206A			12/06/16 13:43	
Benzene		8.64	ug/L	1.0	86	69	129			
Bromobenzene		9.20	ug/L	1.0	92	79	120			
Bromochloromethane		6.34	ug/L	1.0	63	72	125			S
Bromodichloromethane		9.44	ug/L	1.0	94	71	122			
Bromoform		8.64	ug/L	1.0	86	65	130			
Bromomethane		11.2	ug/L	1.0	112	60	136			
Carbon tetrachloride		8.96	ug/L	1.0	90	77	121			
Chlorobenzene		10.0	ug/L	1.0	100	78	120			
Chlorodibromomethane		8.96	ug/L	1.0	90	70	122			
Chloroethane		5.71	ug/L	1.0	57	62	135			S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: R121097
Lab ID: H16120041-005AMS	53	Sample Matrix Spike				Run: 1SATURN_161206A				12/06/16 13:43
Chloroform		9.12	ug/L	1.0	91	71	121			
Chloromethane		9.84	ug/L	1.0	98	66	139			
2-Chlorotoluene		9.76	ug/L	1.0	98	78	125			
4-Chlorotoluene		9.44	ug/L	1.0	94	76	126			
1,2-Dibromoethane		8.72	ug/L	1.0	87	60	137			
Dibromomethane		8.32	ug/L	1.0	83	69	122			
1,2-Dichlorobenzene		9.60	ug/L	1.0	96	74	122			
1,3-Dichlorobenzene		9.60	ug/L	1.0	96	78	120			
1,4-Dichlorobenzene		8.96	ug/L	1.0	90	75	122			
Dichlorodifluoromethane		8.72	ug/L	1.0	87	57	144			
1,1-Dichloroethane		8.56	ug/L	1.0	86	76	125			
1,2-Dichloroethane		8.48	ug/L	1.0	85	69	131			
1,1-Dichloroethene		8.80	ug/L	1.0	88	67	129			
cis-1,2-Dichloroethene		9.20	ug/L	1.0	92	75	122			
trans-1,2-Dichloroethene		9.52	ug/L	1.0	95	75	124			
1,2-Dichloropropane		9.92	ug/L	1.0	99	75	127			
1,3-Dichloropropane		9.36	ug/L	1.0	94	70	122			
2,2-Dichloropropane		8.80	ug/L	1.0	88	78	132			
1,1-Dichloropropene		9.12	ug/L	1.0	91	69	127			
cis-1,3-Dichloropropene		10.0	ug/L	1.0	100	73	124			
trans-1,3-Dichloropropene		9.60	ug/L	1.0	96	72	127			
Ethylbenzene		9.68	ug/L	1.0	97	74	125			
Methyl tert-butyl ether (MTBE)		8.08	ug/L	1.0	81	62	128			
Methyl ethyl ketone		78.6	ug/L	20	79	56	141			
Methylene chloride		8.32	ug/L	1.0	83	61	125			
Styrene		9.12	ug/L	1.0	91	75	120			
1,1,1,2-Tetrachloroethane		9.52	ug/L	1.0	95	76	122			
1,1,2,2-Tetrachloroethane		8.96	ug/L	1.0	90	67	124			
Tetrachloroethene		9.44	ug/L	1.0	94	75	126			
Toluene		9.92	ug/L	1.0	99	73	122			
1,1,1-Trichloroethane		9.04	ug/L	1.0	90	76	124			
1,1,2-Trichloroethane		9.20	ug/L	1.0	92	72	125			
Trichloroethene		10.0	ug/L	1.0	100	72	126			
Trichlorofluoromethane		8.96	ug/L	1.0	90	73	131			
1,2,3-Trichloropropane		8.40	ug/L	1.0	84	58	142			
Vinyl chloride		10.1	ug/L	1.0	101	69	129			
m+p-Xylenes		18.5	ug/L	1.0	92	72	124			
o-Xylene		9.52	ug/L	1.0	95	74	123			
Xylenes, Total		28.0	ug/L	1.0	93	72	124			
Surr: 1,2-Dichloroethane-d4				2.0	90	69	131			
Surr: Dibromofluoromethane				2.0	82	70	125			
Surr: p-Bromofluorobenzene				2.0	97	76	123			
Surr: Toluene-d8				2.0	92	80	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R121097	
Lab ID: H16120041-005AMSD	53	Sample Matrix Spike Duplicate				Run: 1SATURN_161206A			12/06/16 14:16	
Benzene		9.28	ug/L	1.0	93	69	129	7.1	20	
Bromobenzene		8.88	ug/L	1.0	89	79	120	3.5	20	
Bromochloromethane		6.61	ug/L	1.0	66	72	125	4.2	20	S
Bromodichloromethane		9.04	ug/L	1.0	90	71	122	4.3	20	
Bromoform		8.24	ug/L	1.0	82	65	130	4.7	20	
Bromomethane		12.4	ug/L	1.0	124	60	136	10	20	
Carbon tetrachloride		8.96	ug/L	1.0	90	77	121	0.0	20	
Chlorobenzene		9.92	ug/L	1.0	99	78	120	0.8	20	
Chlorodibromomethane		8.80	ug/L	1.0	88	70	122	1.8	20	
Chloroethane		5.29	ug/L	1.0	53	62	135	7.7	20	S
Chloroform		9.28	ug/L	1.0	93	71	121	1.7	20	
Chloromethane		9.92	ug/L	1.0	99	66	139	0.8	20	
2-Chlorotoluene		9.04	ug/L	1.0	90	78	125	7.7	20	
4-Chlorotoluene		9.04	ug/L	1.0	90	76	126	4.3	20	
1,2-Dibromoethane		8.80	ug/L	1.0	88	60	137	0.9	20	
Dibromomethane		8.96	ug/L	1.0	90	69	122	7.4	20	
1,2-Dichlorobenzene		9.60	ug/L	1.0	96	74	122	0.0	20	
1,3-Dichlorobenzene		9.28	ug/L	1.0	93	78	120	3.4	20	
1,4-Dichlorobenzene		9.28	ug/L	1.0	93	75	122	3.5	20	
Dichlorodifluoromethane		8.80	ug/L	1.0	88	57	144	0.9	20	
1,1-Dichloroethane		8.80	ug/L	1.0	88	76	125	2.8	20	
1,2-Dichloroethane		8.48	ug/L	1.0	85	69	131	0.0	20	
1,1-Dichloroethene		9.04	ug/L	1.0	90	67	129	2.7	20	
cis-1,2-Dichloroethene		9.68	ug/L	1.0	97	75	122	5.1	20	
trans-1,2-Dichloroethene		9.92	ug/L	1.0	99	75	124	4.1	20	
1,2-Dichloropropane		10.0	ug/L	1.0	100	75	127	0.8	20	
1,3-Dichloropropane		9.12	ug/L	1.0	91	70	122	2.6	20	
2,2-Dichloropropane		9.04	ug/L	1.0	90	78	132	2.7	20	
1,1-Dichloropropene		8.88	ug/L	1.0	89	69	127	2.7	20	
cis-1,3-Dichloropropene		9.52	ug/L	1.0	95	73	124	4.9	20	
trans-1,3-Dichloropropene		9.52	ug/L	1.0	95	72	127	0.8	20	
Ethylbenzene		9.12	ug/L	1.0	91	74	125	6.0	20	
Methyl tert-butyl ether (MTBE)		8.96	ug/L	1.0	90	62	128	10	20	
Methyl ethyl ketone		85.6	ug/L	20	86	56	141	8.5	20	
Methylene chloride		9.28	ug/L	1.0	93	61	125	11	20	
Styrene		9.76	ug/L	1.0	98	75	120	6.8	20	
1,1,1,2-Tetrachloroethane		9.92	ug/L	1.0	99	76	122	4.1	20	
1,1,2,2-Tetrachloroethane		8.80	ug/L	1.0	88	67	124	1.8	20	
Tetrachloroethene		9.20	ug/L	1.0	92	75	126	2.6	20	
Toluene		9.20	ug/L	1.0	92	73	122	7.5	20	
1,1,1-Trichloroethane		9.52	ug/L	1.0	95	76	124	5.2	20	
1,1,2-Trichloroethane		8.88	ug/L	1.0	89	72	125	3.5	20	
Trichloroethene		9.44	ug/L	1.0	94	72	126	5.8	20	
Trichlorofluoromethane		9.52	ug/L	1.0	95	73	131	6.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 12/09/16

Project: DEQ 08 **Work Order:** H16120041

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: R121097
Lab ID: H16120041-005AMSD	53	Sample Matrix Spike Duplicate				Run: 1SATURN_161206A			12/06/16 14:16	
1,2,3-Trichloropropane		9.04	ug/L	1.0	90	58	142	7.3	20	
Vinyl chloride		10.3	ug/L	1.0	103	69	129	2.4	20	
m+p-Xylenes		19.1	ug/L	1.0	96	72	124	3.4	20	
o-Xylene		9.44	ug/L	1.0	94	74	123	0.8	20	
Xylenes, Total		28.6	ug/L	1.0	95	72	124	2.0	20	
Surr: 1,2-Dichloroethane-d4				2.0	85	69	131			
Surr: Dibromofluoromethane				2.0	83	70	125			
Surr: p-Bromofluorobenzene				2.0	92	76	123			
Surr: Toluene-d8				2.0	91	80	119			
Method: SW8260B										Analytical Run: R121132
Lab ID: 120716_CCV_2	2	Continuing Calibration Verification Standard							12/07/16 09:59	
Chloroform		4.64	ug/L	0.50	93	80	120			
Tetrachloroethene		4.88	ug/L	0.50	98	70	130			
Method: SW8260B										Batch: R121132
Lab ID: 120716_LCS_3	2	Laboratory Control Sample				Run: 1SATURN_161207A			12/07/16 10:37	
Chloroform		4.88	ug/L	0.50	98	71	121			
Tetrachloroethene		4.96	ug/L	0.50	99	75	126			
Lab ID: 120716_MBLK_5	2	Method Blank				Run: 1SATURN_161207A			12/07/16 11:46	
Chloroform		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Lab ID: H16120041-007AMS	2	Sample Matrix Spike				Run: 1SATURN_161207A			12/07/16 14:38	
Chloroform		72.8	ug/L	5.0	94	71	121			
Tetrachloroethene		165	ug/L	5.0	78	75	126			
Lab ID: H16120041-007AMSD	2	Sample Matrix Spike Duplicate				Run: 1SATURN_161207A			12/07/16 15:12	
Chloroform		85.2	ug/L	5.0	119	71	121	16	20	
Tetrachloroethene		168	ug/L	5.0	84	75	126	1.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H16120041

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\rwilliams

Reviewed Date: 12/7/2016

Date Received: 12/2/2016

Received by: TLL

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	4.7°C On Ice		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	Not Applicable ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: HYDRO SOLUTIONS

Project Name, PWS, Permit, Etc.: DEQ 08

Sample Origin State: MT

EPA/State Compliance: Yes ☐ No ☒

Report Mail Address (Required): 303 Clarke St Helena MT 59601

Contact Name: Rye Suingen

Phone/Fax: 406-443-6169

Cell:

Sampler: (Please Print) RYE SUINGEN

☒ No Hard Copy Email: ryes@hydrosi.com

Invoice Contact & Phone: Mandy Garaas 406-655-9555

Purchase Order:

Quote/Bottle Order:

Invoice Address (Required):

☒ No Hard Copy Email: mandyg@hydrosi.com

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

ANALYSIS REQUESTED

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: Hand

Cooler ID(s): 4

Receipt Temp 4.7 °C TB

On Ice: Y N

Custody Seal: On Bottle Y N; On Cooler Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O DW; Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water)	8260 SHORT LIST									SEE ATTACHED	Standard Turnaround (TAT)	RUSH
1 MW-1	11/30/16	1200	3W	X										X	
2 MW-3	11/30/16	1450	3W	X											
3 MW-3D	11/30/16	1455	3W	X											
4 MW-5	12/1/16	1150	3W	X											
5 Rinse Blank	12/1/16	1215	3W	X											
6 MW-2	12/1/16	1325	3W	X											
7 MW-7	12/1/16	1500	3W	X											
8															
9															
10															

LABORATORY USE ONLY H16120041

Custody Record MUST be Signed

Relinquished by (print): Rye Suingen Date/Time: 12/2/16 1645 Signature:

Relinquished by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by Laboratory: Tracy Cerak Date/Time: 12/2/16 16:45 Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.

Data Validation Report - Groundwater Analytical Results

Project Name	Helena Solvent Site - SVE System Installation
Name and Date of Guidance Documents	DEQ Contract No. 414026 Task Order No. 8 May 2011 Hustad LLC Property Source Area Investigation
Laboratory Name	Energy Laboratories, Inc.
Laboratory Project ID	H17030385, H17030396, H17030452
Sample Matrix	Aqueous
Sample Start and End Dates	03/22/17 – 03/28/17
Parameters Included	8260 - VOCs Short List
Date Validated	4/26/2017
Name of Validator	Amanda Osborne

Case Narrative and Summary

Six groundwater samples, one equipment rinsate blank sample, and two trip blanks were collected by HydroSolutions on March 22, 23, 24, and 28, 2017 to assess groundwater quality after the installation of the soil vapor extraction (SVE) system at the Hustad Center. Samples were hand delivered to Energy Laboratories, Inc. (Energy Lab) in Helena, MT in three separate events following sample collection. The samples were analyzed by Energy Lab for volatile organic compounds (VOCs) according to EPA Method 8260B. This report provides data validation for the results of the VOC laboratory analysis. Additional analyses were requested and completed for these samples for another purpose outside the scope of this project. The results of these additional analyses are not included in this data validation assessment report.

One field duplicate sample was included in the sample set to meet a targeted duplicate collection frequency of 1 in 20 (5%). The duplicate sample was collected at monitoring well MW-3 and was identified as MW-3D. Table 1 presents an inventory of the samples collected and analyzed as part of the baseline groundwater quality sampling event.

Table 1. Sample Inventory

Collection Location	Lab ID	Field Sample ID
Monitoring Well 1	H17030385-001	MW-1
Monitoring Well 3	H17030385-002	MW-3
Monitoring Well 3	H17030385-003	MW-3D
Monitoring Well 5	H17030452-001	MW-5
Equipment Rinse Blank	H17030396-001	Rinse Blank
Monitoring Well 2	H17030385-005	MW-2
Monitoring Well 7	H17030385-004	MW-7
Trip Blank	H17030385-006	TB 6270
Trip Blank	H17030396-002	TB 6281

Data Validation Criteria

The data validation criteria used for this validation assessment follow the Montana Department of Environmental Quality (MDEQ) data validation guidelines (MDEQ 2010). The approved task order for this project directed the use of an existing approved groundwater sampling and analysis work plan within the May 2011 Hustad LLC Property Source Area Investigation Work Plan (HydroSolutions 2011). The MDEQ – Remediation Division Data Validation Summary Form (Version 1.2, revised 11/4/16) for this data set is attached to this report.

Data Acceptability and Usability

The task order for this project required that pre-SVE system groundwater quality results be compared to post-SVE system groundwater quality results to evaluate the system's effectiveness. This task order objective was accomplished in part by this groundwater sampling activity, which documented post-SVE system installation groundwater quality conditions. Historic groundwater quality data exists for various monitoring wells throughout the Helena Solvent Site, including the area that surrounds the Hustad Center Complex. Groundwater samples collected during this baseline sampling event were obtained at locations that are consistent with historic sampling locations.

Representativeness

Representativeness expresses the degree to which sample data represents site conditions. Representativeness is evaluated by comparing actual analytical procedures to those described in the CoC, evaluating holding times, and examining laboratory blanks for contamination of samples during analysis.

The groundwater samples were analyzed for VOCs, the contaminants of concern based on historic analytical results. Field protocols followed were consistent with previous groundwater sampling activities. The evaluation of field and laboratory blank samples for the presence of contaminants with none reported above laboratory reporting limits support the representativeness of the sample results. For all of these reasons, this data is considered representative.

Completeness

Completeness was evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data. Five groundwater samples, one duplicate groundwater sample, one equipment rinsate blank and two trip blank sample were collected, preserved with hydrochloric acid to pH<2, and analyzed. All samples were collected, prepared, handled, and analyzed in accordance with quality control objectives and no criteria are identified which affect the data's usability. As a result, a completeness rate of 100% was achieved for this sampling event.

Precision

Field precision is determined by a comparison of the field duplicate result with the original sample result. A comparison of the field duplicate result with the original sample result was used to assess the field precision, which may depend on sample homogeneity, handling, storage, preparation, and analysis. MDEQ validation guidelines establish a relative percent difference (RPD) target of 0-25% for field duplicates (MDEQ 2010). Chloroform and tetrachloroethene (PCE) were the only contaminants reported above the reporting limit in the original or duplicate sample. The analytical results of chloroform and PCE are compared in Table 2 and meet the established RPD target. In this way the data is considered precise.

Table 2. Field Precision

Contaminants Detected Above the Reporting Limit	Natural Sample	Result (ug/L)	Duplicate Sample	Result (ug/L)	RPD (%)
Chloroform	MW-3	10	MW-3D	9.2	<1
Tetrachloroethene (PCE)	MW-3	4.6	MW-3D	5.1	<1

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. As part of field sampling quality control and assurance, an equipment rinsate blank sample was prepared in the field by pouring deionized water through the cleaned sampling equipment and collecting and preserving it in sample containers. No VOCs were detected in the rinsate blank sample, which indicates that field sampling techniques and equipment did not bias sample results.

In accordance with EPA Method 8260 and laboratory protocol, laboratory control samples were prepared and analyzed by Energy Lab to assess laboratory and method accuracy. Laboratory equipment was calibrated prior to each analytical run. No calibration issues or qualifiers were identified in the laboratory report that impact the contaminants of concern for this project. All method blanks were free of analyte contamination and no qualifiers are noted for contaminants of concern in any of the analyzed samples.

The laboratory matrix spike and laboratory matrix spike duplicate results associated with analysis of the MW-5 sample were qualified with an "S" for PCE by the laboratory for falling below the spike recovery advisory limit. Therefore, the PCE concentration reported for MW-5 has the potential to be biased low. All other qualifiers that are reported are not associated with the analytes that were detected in the samples. For this reason, those qualifiers do not bias the

results. Other spike percent recoveries for constituents of concern were within the laboratory advisory limits, and no additional qualifiers are reported in the laboratory QA/QC report that would bias the results. For these reasons, the data is considered accurate.

Comparability

The collection and sampling methods employed for this event followed the standard field and laboratory procedures for groundwater sampling and analysis by Method 8260 and the analytical results are reported in standard measurement units. For these reasons, the data from this sampling event is considered comparable to other similar data collection events and results.

Qualified Data Summary

Data usability qualifiers are summarized in Table 4. The J qualifier indicates that an analyte was detected, but at a level less than the reporting limit. Therefore, the reported results are estimated but no bias is associated with the results due to this qualifier.

Table 4. Laboratory-Qualified Data Summary

Sample ID	Analyte	Lab ID	Result (ug/L)	Qualifier	Reason for Qualification
TB6281	Choloroform	H17030396-002	0.36	J	Estimated value. The analyte was present but less than the reporting limit.
MW-1	Bromodichloromethane	H17030385-001	0.78	J	
MW-1	Tetrachloroethene	H17030385-001	0.41	J	
MW-3	Bromodichloromethane	H17030385-002	0.81	J	
MW-7	Trichloroethene	H17030385-004	0.55	J	
MW-5	Trichloroethene	H17030452-001	0.3	J	
MW-2	Trichloroethene	H17030385-005	0.85	J	

A review of field sheets, sampling log books, and laboratory data identified no QC issues for this data set. The data are usable for decision making purposes.

References

HydroSolutions. 2011. "Hustad LLC Property Source Area Investigation Work Plan."

MDEQ. 2010. "Montana Department of Environmental Quality Data Validation Guidelines for Evaluating Analytical Data." August 5. https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/DataValidationReport.pdf.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site Hustad Center
2. Site code or facility ID (if applicable)	Groundwater Monitoring - Post SVE System Installation
3. Release ID (if applicable)	N/A
4. Project name	Helena Solvent Site SVE System Design and Installation
5. Name of DEQ-approved sampling plan	DEQ Contract No. 414026 Task Order No. 8 and May 2011 Hustad LLC Property Source Area Investigation Work Plan
6. Date DEQ approved the sampling plan	6/15/2016 M/D/YY
7. Name of data validator	Amanda Osborne
8. Phone	406-443-6169 x106
9. Date validated	4/26/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☐ Soil ☐ Sediment ☐ Surface water ☒ Groundwater ☐ Tap water ☐ Air (including soil gas) ☐ Other
11. Sample collection start date	3/22/2017 M/D/YY
12. Sample collection end date	3/28/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Delete Method Analytical Method(s) "E8260B Volatile Organic Compounds By Gas Chromatography

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT		
15. Laboratory project ID	H17030385, H17030396, H17030452		
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ●	No ○	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	Yes ●	No ○	Comments

	Yes	No	Comments
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	○	●	Laboratory qualifiers applied to some QA/QC results, see below
18a. Were all calibration verification results within acceptable limits?	○	●	

If no, explain

H17030385: S qualifier for 2-Chloroethyl vinyl ether, Iodomethane, 1,2,3-Trichlorobenzene; H17030396: S qualifier for Iodomethane, H17030452: S qualifier for Iodomethane, 2-Chloroethyl vinyl ether. Does not bias results for contaminants of concern for this project because these compounds were not deteted in the field samples.

	Yes	No	Comments
18b. Were laboratory blank samples free of contamination?	●	○	
18c. Are the percent recoveries and relative percent differences of matrix spike and matrix spike duplicates within quality control limits?	○	●	

If no, explain

H17030385: numerous S qualifiers for exceeding high RDP limit and one for exceeding lower limit in sample matrix spike and sample matrix duplicate (Lab ID b17032041-001ams and b17032041-001amsd) but none for the contaminants of concern for this project. S qualifier for PCE in sample matrix spike and sample matrix spike duplicate for exceeding the lower RPD limit associated with the laboratory run completed for the MW-5 sample. May bias the results low for PCE in the sample from MW-5.

	Yes	No	Comments
18d. Are the control samples the same matrix as the samples, and prepared the same as associated samples?	●	○	
18e. Were laboratory control samples and laboratory control sample duplicate percent recoveries and relative percent differences within laboratory control limits?	○	●	

If no, explain

S qualifier for exceeding lower RPD for 2-Chloroethyl vinyl ether (Lab ID lcs040417), Iodomethane (Lab ID lcs040517), exceeding high RPD limit for Iodomethane (Lab ID lcs040617). Does not bias results for contaminants of concern for this project, because these compounds were not detected in the field samples.

	Yes	No	Comments
18f. Were surrogate recoveries within laboratory quality control limits?	●	○	
18g. Were the laboratory duplicate relative percent differences within data validation quality control limits?	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	

	Yes	No	Comments
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	●	○	

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	reported units are ug/L
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	●	○	
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	Trip blank TB6281 detected chloroform at 0.36 ug/L (estimated concentration below detection limit), but this does not affect the interpretation of the sample results because chloroform detections in the samples were at least 10x greater than the trip blank detection.
28a. Were all blank samples free of analyte contamination?	○	●	see above. The rinsate blanks were all ND, showing evidence of successful decontamination procedures.

If no, explain

	Yes	No	Comments
28b. Were field duplicates collected as required?	●	○	one field duplicate sample collected
28c. Are field duplicate relative percent differences within data validation quality control limits?	●	○	RPD for duplicates <25%, see attached table

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				

30. What is the percent completeness (samples planned versus valid samples collected)? 100 Comments

31. Was the completeness goal met? Yes ● No ○ Comments

32. Other general comments or observations?

Split Samples

33. Did DEQ collect split samples? Yes ○ No ● Comments

Print Form | Save As | Open Instructions | Hide Instructions

ANALYTICAL SUMMARY REPORT

April 13, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17030385 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 6 samples for HydroSolutions on 3/24/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17030385-001	MW-1	03/22/17 15:45	03/24/17	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Total Alkalinity Conductivity Carbon, Total Organic Methane Anions by Ion Chromatography Iron, Ferric Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate Metals Digestion by EPA 200.2 Sulfide, Iodine Titrimetric 8260-Volatile Organic Compounds-Extended List
H17030385-002	MW-3	03/23/17 11:50	03/24/17	Aqueous	Same As Above
H17030385-003	MW-3D	03/23/17 12:00	03/24/17	Aqueous	Same As Above
H17030385-004	MW-7	03/23/17 15:00	03/24/17	Aqueous	Same As Above
H17030385-005	MW-2	03/23/17 17:20	03/24/17	Aqueous	Same As Above
H17030385-006	TB 6270	03/22/17 15:45	03/24/17	Trip Blank	8260-Volatile Organic Compounds-Extended List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17030385

Report Date: 04/13/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

Sample MW-3, MW-3D and MW-7 were re-analyzed to verify total Iron. The samples labels were verified, and the samples were re-analyzed to confirm the Iron values. The results of the re-analysis confirmed. abc 4/13/17

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-001
Client Sample ID: MW-1

Report Date: 04/13/17
Collection Date: 03/22/17 15:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	555	umhos/cm		1		A2510 B	03/27/17 16:26 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	240	mg/L		4		A2320 B	03/27/17 12:05 / cmm
Chloride	13	mg/L		1.0		E300.0	03/28/17 12:34 / SRW
Sulfate	44	mg/L		1.0		E300.0	03/28/17 12:34 / SRW
Sulfide	2	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	1.3	mg/L		0.5		A5310 C	03/31/17 15:36 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	4.34	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	4.34	mg/L	D	0.05		E353.2	03/29/17 11:35 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 11:14 / cmm
METALS, DISSOLVED							
Arsenic	0.004	mg/L		0.001		E200.8	03/31/17 14:59 / dck
Iron	ND	mg/L		0.02		E200.7	03/27/17 14:00 / sld
Iron, Ferrous	ND	mg/L		0.02		E200.7	03/27/17 14:00 / sld
Manganese	0.003	mg/L		0.001		E200.8	03/31/17 14:59 / dck
METALS, TOTAL							
Iron	2.09	mg/L		0.02		E200.7	03/28/17 11:11 / sld
Iron, Ferric	2.09	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/04/17 13:35 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/04/17 13:35 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/04/17 12:36 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/04/17 12:36 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Bromodichloromethane	0.78	ug/L	J	1.0		SW8260B	04/04/17 13:35 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-001
Client Sample ID: MW-1

Report Date: 04/13/17
Collection Date: 03/22/17 15:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/04/17 12:36 / eli-b16
Chloroform	26	ug/L		5.0		SW8260B	04/05/17 14:50 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/04/17 13:35 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/04/17 13:35 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/04/17 13:35 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Tetrachloroethene	0.41	ug/L	J	1.0		SW8260B	04/04/17 13:35 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-001
Client Sample ID: MW-1

Report Date: 04/13/17
Collection Date: 03/22/17 15:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/04/17 13:35 / eli-b16
Surr: 1,2-Dichloroethane-d4	98.0	%REC		70-130		SW8260B	04/04/17 12:36 / eli-b16
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/04/17 13:35 / eli-b16
Surr: Dibromofluoromethane	95.0	%REC		77-126		SW8260B	04/04/17 12:36 / eli-b16
Surr: Dibromofluoromethane	99.0	%REC		77-126		SW8260B	04/04/17 13:35 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	04/04/17 12:36 / eli-b16
Surr: p-Bromofluorobenzene	102	%REC		76-127		SW8260B	04/04/17 13:35 / eli-b16
Surr: Toluene-d8	95.0	%REC		79-122		SW8260B	04/04/17 12:36 / eli-b16
Surr: Toluene-d8	97.0	%REC		79-122		SW8260B	04/04/17 13:35 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 12:02 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 12:02 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 12:02 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-002
Client Sample ID: MW-3

Report Date: 04/13/17
Collection Date: 03/23/17 11:50
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	1200	umhos/cm		1		A2510 B	03/27/17 16:29 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	380	mg/L		4		A2320 B	03/27/17 12:19 / cmm
Chloride	75	mg/L		1.0		E300.0	03/28/17 12:48 / SRW
Sulfate	150	mg/L		1.0		E300.0	03/28/17 12:48 / SRW
Sulfide	2	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	1.8	mg/L		0.5		A5310 C	03/31/17 15:47 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	16.5	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	16.5	mg/L	D	0.1		E353.2	03/27/17 12:48 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 11:17 / cmm
METALS, DISSOLVED							
Arsenic	0.002	mg/L		0.001		E200.8	03/31/17 15:01 / dck
Iron	ND	mg/L		0.02		E200.7	03/27/17 14:15 / sld
Iron, Ferrous	ND	mg/L		0.02		E200.7	03/27/17 14:15 / sld
Manganese	ND	mg/L		0.001		E200.8	03/31/17 15:01 / dck
METALS, TOTAL							
Iron	3.90	mg/L		0.02		E200.7	03/28/17 11:15 / sld
Iron, Ferric	3.90	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/04/17 14:34 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/04/17 14:34 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/04/17 14:04 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/04/17 14:04 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Bromodichloromethane	0.81	ug/L	J	1.0		SW8260B	04/04/17 14:34 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-002
Client Sample ID: MW-3

Report Date: 04/13/17
Collection Date: 03/23/17 11:50
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/04/17 14:04 / eli-b16
Chloroform	10	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/04/17 14:34 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/04/17 14:34 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/04/17 14:34 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Tetrachloroethene	4.6	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-002
Client Sample ID: MW-3

Report Date: 04/13/17
Collection Date: 03/23/17 11:50
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/04/17 14:34 / eli-b16
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/04/17 14:04 / eli-b16
Surr: 1,2-Dichloroethane-d4	98.0	%REC		70-130		SW8260B	04/04/17 14:34 / eli-b16
Surr: Dibromofluoromethane	99.0	%REC		77-126		SW8260B	04/04/17 14:04 / eli-b16
Surr: Dibromofluoromethane	100	%REC		77-126		SW8260B	04/04/17 14:34 / eli-b16
Surr: p-Bromofluorobenzene	103	%REC		76-127		SW8260B	04/04/17 14:04 / eli-b16
Surr: p-Bromofluorobenzene	104	%REC		76-127		SW8260B	04/04/17 14:34 / eli-b16
Surr: Toluene-d8	95.0	%REC		79-122		SW8260B	04/04/17 14:04 / eli-b16
Surr: Toluene-d8	94.0	%REC		79-122		SW8260B	04/04/17 14:34 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 12:10 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 12:10 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 12:10 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-003
Client Sample ID: MW-3D

Report Date: 04/13/17
Collection Date: 03/23/17 12:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	1200	umhos/cm		1		A2510 B	03/27/17 16:32 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	390	mg/L		4		A2320 B	03/27/17 12:28 / cmm
Chloride	74	mg/L		1.0		E300.0	03/28/17 13:01 / SRW
Sulfate	150	mg/L		1.0		E300.0	03/28/17 13:01 / SRW
Sulfide	2	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	1.7	mg/L		0.5		A5310 C	03/31/17 15:58 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	16.4	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	16.4	mg/L	D	0.1		E353.2	03/27/17 12:49 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 11:18 / cmm
METALS, DISSOLVED							
Arsenic	0.002	mg/L		0.001		E200.8	03/31/17 15:03 / dck
Iron	ND	mg/L		0.02		E200.7	03/27/17 14:19 / sld
Iron, Ferrous	ND	mg/L		0.02		E200.7	03/27/17 14:19 / sld
Manganese	0.002	mg/L		0.001		E200.8	03/31/17 15:03 / dck
METALS, TOTAL							
Iron	0.51	mg/L		0.02		E200.7	03/28/17 11:19 / sld
Iron, Ferric	0.51	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/05/17 13:47 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/05/17 13:47 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/05/17 17:08 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/05/17 17:08 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-003
Client Sample ID: MW-3D

Report Date: 04/13/17
Collection Date: 03/23/17 12:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/05/17 17:08 / eli-b16
Chloroform	9.2	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/05/17 13:47 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/05/17 13:47 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/05/17 13:47 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Tetrachloroethene	5.1	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-003
Client Sample ID: MW-3D

Report Date: 04/13/17
Collection Date: 03/23/17 12:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/05/17 13:47 / eli-b16
Surr: 1,2-Dichloroethane-d4	104	%REC		70-130		SW8260B	04/05/17 13:47 / eli-b16
Surr: 1,2-Dichloroethane-d4	101	%REC		70-130		SW8260B	04/05/17 17:08 / eli-b16
Surr: Dibromofluoromethane	110	%REC		77-126		SW8260B	04/05/17 13:47 / eli-b16
Surr: Dibromofluoromethane	100	%REC		77-126		SW8260B	04/05/17 17:08 / eli-b16
Surr: p-Bromofluorobenzene	104	%REC		76-127		SW8260B	04/05/17 13:47 / eli-b16
Surr: p-Bromofluorobenzene	103	%REC		76-127		SW8260B	04/05/17 17:08 / eli-b16
Surr: Toluene-d8	103	%REC		79-122		SW8260B	04/05/17 13:47 / eli-b16
Surr: Toluene-d8	97.0	%REC		79-122		SW8260B	04/05/17 17:08 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 12:19 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 12:19 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 12:19 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-004
Client Sample ID: MW-7

Report Date: 04/13/17
Collection Date: 03/23/17 15:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	710	umhos/cm		1		A2510 B	03/27/17 16:34 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	220	mg/L		4		A2320 B	03/27/17 12:38 / cmm
Chloride	74	mg/L		1.0		E300.0	03/28/17 13:15 / SRW
Sulfate	42	mg/L		1.0		E300.0	03/28/17 13:15 / SRW
Sulfide	2	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	1.2	mg/L		0.5		A5310 C	03/31/17 16:09 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	4.31	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	4.31	mg/L	D	0.05		E353.2	03/29/17 11:36 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 11:20 / cmm
METALS, DISSOLVED							
Arsenic	0.004	mg/L		0.001		E200.8	03/31/17 15:05 / dck
Iron	ND	mg/L		0.02		E200.7	03/27/17 14:23 / sld
Iron, Ferrous	ND	mg/L		0.02		E200.7	03/27/17 14:23 / sld
Manganese	ND	mg/L		0.001		E200.8	03/31/17 15:05 / dck
METALS, TOTAL							
Iron	0.52	mg/L		0.02		E200.7	03/28/17 11:23 / sld
Iron, Ferric	0.52	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/05/17 13:16 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/05/17 13:16 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/06/17 01:55 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/06/17 01:55 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-004
Client Sample ID: MW-7

Report Date: 04/13/17
Collection Date: 03/23/17 15:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/06/17 01:55 / eli-b16
Chloroform	24	ug/L		5.0		SW8260B	04/07/17 12:10 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/05/17 13:16 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/05/17 13:16 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/05/17 13:16 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Tetrachloroethene	53	ug/L		5.0		SW8260B	04/07/17 12:10 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-004
Client Sample ID: MW-7

Report Date: 04/13/17
Collection Date: 03/23/17 15:00
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Trichloroethene	0.55	ug/L	J	1.0		SW8260B	04/05/17 13:16 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/05/17 13:16 / eli-b16
Surr: 1,2-Dichloroethane-d4	94.0	%REC		70-130		SW8260B	04/05/17 13:16 / eli-b16
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/06/17 01:55 / eli-b16
Surr: Dibromofluoromethane	108	%REC		77-126		SW8260B	04/05/17 13:16 / eli-b16
Surr: Dibromofluoromethane	95.0	%REC		77-126		SW8260B	04/06/17 01:55 / eli-b16
Surr: p-Bromofluorobenzene	102	%REC		76-127		SW8260B	04/05/17 13:16 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	04/06/17 01:55 / eli-b16
Surr: Toluene-d8	104	%REC		79-122		SW8260B	04/05/17 13:16 / eli-b16
Surr: Toluene-d8	93.0	%REC		79-122		SW8260B	04/06/17 01:55 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 12:29 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 12:29 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 12:29 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-005
Client Sample ID: MW-2

Report Date: 04/13/17
Collection Date: 03/23/17 17:20
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	653	umhos/cm		1		A2510 B	03/27/17 16:37 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	03/27/17 12:46 / cmm
Chloride	55	mg/L		1.0		E300.0	03/28/17 13:28 / SRW
Sulfate	43	mg/L		1.0		E300.0	03/28/17 13:28 / SRW
Sulfide	ND	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	1.4	mg/L		0.5		A5310 C	03/31/17 16:20 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	4.67	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	4.67	mg/L	D	0.05		E353.2	03/29/17 11:37 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 11:21 / cmm
METALS, DISSOLVED							
Arsenic	0.005	mg/L		0.001		E200.8	03/31/17 15:07 / dck
Iron	0.03	mg/L		0.02		E200.7	03/27/17 15:07 / sld
Iron, Ferrous	0.03	mg/L		0.02		E200.7	03/27/17 15:07 / sld
Manganese	0.003	mg/L		0.001		E200.8	03/31/17 15:07 / dck
METALS, TOTAL							
Iron	0.92	mg/L		0.02		E200.7	03/28/17 11:26 / sld
Iron, Ferric	0.89	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/05/17 14:19 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/05/17 14:19 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/05/17 16:38 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/05/17 16:38 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-005
Client Sample ID: MW-2

Report Date: 04/13/17
Collection Date: 03/23/17 17:20
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/05/17 16:38 / eli-b16
Chloroform	29	ug/L		10		SW8260B	04/07/17 12:39 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/05/17 14:19 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/05/17 14:19 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/05/17 14:19 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Tetrachloroethene	138	ug/L		10		SW8260B	04/07/17 12:39 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-005
Client Sample ID: MW-2

Report Date: 04/13/17
Collection Date: 03/23/17 17:20
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Trichloroethene	0.85	ug/L	J	1.0		SW8260B	04/05/17 14:19 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/05/17 14:19 / eli-b16
Surr: 1,2-Dichloroethane-d4	108	%REC		70-130		SW8260B	04/05/17 14:19 / eli-b16
Surr: 1,2-Dichloroethane-d4	102	%REC		70-130		SW8260B	04/05/17 16:38 / eli-b16
Surr: Dibromofluoromethane	109	%REC		77-126		SW8260B	04/05/17 14:19 / eli-b16
Surr: Dibromofluoromethane	99.0	%REC		77-126		SW8260B	04/05/17 16:38 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	04/05/17 14:19 / eli-b16
Surr: p-Bromofluorobenzene	102	%REC		76-127		SW8260B	04/05/17 16:38 / eli-b16
Surr: Toluene-d8	101	%REC		79-122		SW8260B	04/05/17 14:19 / eli-b16
Surr: Toluene-d8	92.0	%REC		79-122		SW8260B	04/05/17 16:38 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 12:38 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 12:38 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 12:38 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-006
Client Sample ID: TB 6270

Report Date: 04/13/17
Collection Date: 03/22/17 15:45
DateReceived: 03/24/17
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/05/17 17:37 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Chloroform	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030385-006
Client Sample ID: TB 6270

Report Date: 04/13/17
Collection Date: 03/22/17 15:45
DateReceived: 03/24/17
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Hexanone	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/05/17 17:37 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Tetrachloroethene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/05/17 17:37 / eli-b16
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/05/17 17:37 / eli-b16
Surr: Dibromofluoromethane	98.0	%REC		77-126		SW8260B	04/05/17 17:37 / eli-b16
Surr: p-Bromofluorobenzene	103	%REC		76-127		SW8260B	04/05/17 17:37 / eli-b16
Surr: Toluene-d8	94.0	%REC		79-122		SW8260B	04/05/17 17:37 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R123682
Lab ID: MBLK	Method Blank					Run: PHSC_101-H_170327A			03/27/17 11:49	
Alkalinity, Total as CaCO3		ND	mg/L	0.7						
Lab ID: LCS	Laboratory Control Sample					Run: PHSC_101-H_170327A			03/27/17 11:54	
Alkalinity, Total as CaCO3		650	mg/L	4.0	108	90	110			
Lab ID: H17030385-001ADUP	Sample Duplicate					Run: PHSC_101-H_170327A			03/27/17 12:12	
Alkalinity, Total as CaCO3		250	mg/L	4.0				5.7	10	
Lab ID: H17030395-004ADUP	Sample Duplicate					Run: PHSC_101-H_170327A			03/27/17 13:35	
Alkalinity, Total as CaCO3		170	mg/L	4.0				5.1	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B										Batch: R123682
Lab ID: SC 150		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A				03/27/17 09:37
Conductivity @ 25 C		145	umhos/cm	1.0	97	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A				03/27/17 09:40
Conductivity @ 25 C		4630	umhos/cm	1.0	93	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A				03/27/17 09:42
Conductivity @ 25 C		18200	umhos/cm	1.0	91	90	110			
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_170327A				03/27/17 09:45
Conductivity @ 25 C		939	umhos/cm	1.0	94	90	110			
Lab ID: H17030401-001BDUP		Sample Duplicate				Run: PHSC_101-H_170327A				03/27/17 16:21
Conductivity @ 25 C		702	umhos/cm	1.0				0.6	10	
Lab ID: H17030395-004ADUP		Sample Duplicate				Run: PHSC_101-H_170327A				03/27/17 16:50
Conductivity @ 25 C		328	umhos/cm	1.0				1.9	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**A4500-S F**									Batch: B_ttrsulfide170328A	
Lab ID:	**MBLK**	Method Blank					Run: SUB-B277075			03/28/17 08:45	
Sulfide			ND	mg/L	0.3						
Lab ID:	**LCS**	Laboratory Control Sample					Run: SUB-B277075			03/28/17 08:45	
Sulfide			23.5	mg/L	1.0	100	90	110			
Lab ID:	**B17031980-004EMS**	Sample Matrix Spike					Run: SUB-B277075			03/28/17 08:45	
Sulfide			25.7	mg/L	1.0	100	70	130			
Lab ID:	**B17031980-004EMSD**	Sample Matrix Spike Duplicate					Run: SUB-B277075			03/28/17 08:45	
Sulfide			25.4	mg/L	1.0	99	70	130	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A5310 C									Analytical Run: SUB-C221443	
Lab ID: ICV-9269		Initial Calibration Verification Standard							03/31/17 12:17	
Organic Carbon, Total (TOC)		5.07	mg/L	0.50	101	90	110			
Method: A5310 C									Batch: C_R221443	
Lab ID: MBLK		Method Blank				Run: SUB-C221443			03/31/17 12:41	
Organic Carbon, Total (TOC)		0.02	mg/L	0.02						
Lab ID: LCS-9269		Laboratory Control Sample				Run: SUB-C221443			04/01/17 11:39	
Organic Carbon, Total (TOC)		5.31	mg/L	0.50	106	90	110			
Lab ID: C17030919-003DMS		Sample Matrix Spike				Run: SUB-C221443			04/01/17 12:23	
Organic Carbon, Total (TOC)		21.8	mg/L	2.0	104	85	115			
Lab ID: C17030919-003DMSD		Sample Matrix Spike Duplicate				Run: SUB-C221443			04/01/17 12:33	
Organic Carbon, Total (TOC)		21.7	mg/L	2.0	104	85	115	0.3	20	
Lab ID: C17030871-001DMS		Sample Matrix Spike				Run: SUB-C221443			03/31/17 13:21	
Organic Carbon, Total (TOC)		21.1	mg/L	2.0	104	85	115			
Lab ID: C17030871-001DMSD		Sample Matrix Spike Duplicate				Run: SUB-C221443			03/31/17 13:31	
Organic Carbon, Total (TOC)		21.1	mg/L	2.0	104	85	115	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_170327B	
Lab ID: ICV	2	Initial Calibration Verification Standard							03/27/17 10:37	
Iron		3.98	mg/L	0.020	100	95	105			
Iron, Ferrous		3.98	mg/L	0.020		0	0			
Lab ID: CCV-1	2	Continuing Calibration Verification Standard							03/27/17 10:41	
Iron		2.51	mg/L	0.020	100	95	105			
Iron, Ferrous		2.51	mg/L	0.020		0	0			
Lab ID: ICSA	2	Interference Check Sample A							03/27/17 10:52	
Iron		179	mg/L	0.020	89	80	120			
Iron, Ferrous		179	mg/L	0.020		0	0			
Lab ID: ICSAB	2	Interference Check Sample AB							03/27/17 10:56	
Iron		178	mg/L	0.020	89	80	120			
Iron, Ferrous		178	mg/L	0.020		0	0			
Lab ID: CCV	2	Continuing Calibration Verification Standard							03/27/17 13:41	
Iron		2.51	mg/L	0.020	101	90	110			
Iron, Ferrous		2.51	mg/L	0.020		0	0			
Lab ID: CCV	2	Continuing Calibration Verification Standard							03/27/17 14:53	
Iron		2.49	mg/L	0.020	100	90	110			
Iron, Ferrous		2.49	mg/L	0.020		0	0			
Method: E200.7									Batch: R123718	
Lab ID: MB	2	Method Blank				Run: ICP2-HE_170327B			03/27/17 11:04	
Iron		0.004	mg/L	0.002						
Iron, Ferrous		0.004	mg/L	0.002						
Lab ID: LFB		Laboratory Fortified Blank				Run: ICP2-HE_170327B			03/27/17 11:08	
Iron		4.91	mg/L	0.020	98	85	115			
Lab ID: H17030385-001CMS2	2	Sample Matrix Spike				Run: ICP2-HE_170327B			03/27/17 14:08	
Iron		4.87	mg/L	0.020	97	70	130			
Iron, Ferrous		4.87	mg/L	0.020	97	70	130			
Lab ID: H17030385-001CMSD	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_170327B			03/27/17 14:11	
Iron		4.89	mg/L	0.020	98	70	130	0.2	20	
Iron, Ferrous		4.89	mg/L	0.020	98	70	130	0.2	20	
Lab ID: H17030395-005BMS2	2	Sample Matrix Spike				Run: ICP2-HE_170327B			03/27/17 15:37	
Iron		4.88	mg/L	0.020	97	70	130			
Iron, Ferrous		4.88	mg/L	0.020	97	70	130			
Lab ID: H17030395-005BMSD	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_170327B			03/27/17 15:48	
Iron		4.94	mg/L	0.020	98	70	130	1.1	20	
Iron, Ferrous		4.94	mg/L	0.020	98	70	130	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Analytical Run: ICP2-HE_170328A	
Lab ID:	**ICV**	Initial Calibration Verification Standard								03/28/17 09:11	
Iron			3.96	mg/L	0.020	99	95	105			
Lab ID:	**CCV-1**	Continuing Calibration Verification Standard								03/28/17 09:15	
Iron			2.49	mg/L	0.020	100	95	105			
Lab ID:	**ICSA**	Interference Check Sample A								03/28/17 09:26	
Iron			178	mg/L	0.020	89	80	120			
Lab ID:	**ICSAB**	Interference Check Sample AB								03/28/17 09:30	
Iron			181	mg/L	0.020	91	80	120			
Lab ID:	**CCV**	Continuing Calibration Verification Standard								03/28/17 10:45	
Iron			2.58	mg/L	0.020	103	90	110			
Method:	**E200.7**									Batch: 36649	
Lab ID:	**MB-36649**	Method Blank					Run: ICP2-HE_170328A			03/28/17 10:12	
Iron			0.003	mg/L	0.003						
Lab ID:	**LCS-36649**	Laboratory Control Sample					Run: ICP2-HE_170328A			03/28/17 10:15	
Iron			2.54	mg/L	0.020	102	85	115			
Lab ID:	**H17030265-002CDIL**	Serial Dilution					Run: ICP2-HE_170328A			03/28/17 10:57	
Iron			ND	mg/L	0.15		0	0		10	
Lab ID:	**H17030265-002CMS3**	Sample Matrix Spike					Run: ICP2-HE_170328A			03/28/17 11:04	
Iron			25.9	mg/L	0.029	103	70	130			
Lab ID:	**H17030265-002CMSD**	Sample Matrix Spike Duplicate					Run: ICP2-HE_170328A			03/28/17 11:08	
Iron			25.4	mg/L	0.029	101	70	130	2.0	20	
Lab ID:	**H17030392-002ADIL**	Serial Dilution					Run: ICP2-HE_170328A			03/28/17 11:41	
Iron			ND	mg/L	0.020		0	0		10	
Lab ID:	**H17030392-002AMS3**	Sample Matrix Spike					Run: ICP2-HE_170328A			03/28/17 11:49	
Iron			2.55	mg/L	0.020	102	70	130			
Lab ID:	**H17030392-002AMSD**	Sample Matrix Spike Duplicate					Run: ICP2-HE_170328A			03/28/17 11:52	
Iron			2.55	mg/L	0.020	102	70	130	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.8**								Analytical Run: ICPMS205-H_170330A		
Lab ID:	**ICV**	2	Initial Calibration Verification Standard							03/30/17 13:45	
Arsenic			0.0609	mg/L	0.0050	101	90	110			
Manganese			0.302	mg/L	0.010	101	90	110			
Lab ID:	**ICSA**	2	Interference Check Sample A							03/30/17 13:47	
Arsenic			3.12E-06	mg/L	0.0050						
Manganese			1.38E-05	mg/L	0.010						
Lab ID:	**ICSAB**	2	Interference Check Sample AB							03/30/17 13:49	
Arsenic			0.0103	mg/L	0.0050	103	70	130			
Manganese			0.0207	mg/L	0.010	103	70	130			
Lab ID:	**ICSA**	2	Interference Check Sample A							03/31/17 10:43	
Arsenic			6.39E-06	mg/L	0.0050						
Manganese			8.00E-05	mg/L	0.010						
Lab ID:	**ICSAB**	2	Interference Check Sample AB							03/31/17 10:44	
Arsenic			0.0102	mg/L	0.0050	102	70	130			
Manganese			0.0208	mg/L	0.010	104	70	130			
Lab ID:	**ICV**	2	Initial Calibration Verification Standard							03/31/17 12:35	
Arsenic			0.0590	mg/L	0.0050	98	90	110			
Manganese			0.300	mg/L	0.010	100	90	110			
Method:	**E200.8**										Batch: R123787
Lab ID:	**LRB**	2	Method Blank				Run: ICPMS205-H_170330A			03/31/17 12:56	
Arsenic			ND	mg/L	1E-05						
Manganese			6E-05	mg/L	2E-05						
Lab ID:	**LFB**	2	Laboratory Fortified Blank				Run: ICPMS205-H_170330A			03/31/17 12:58	
Arsenic			0.0503	mg/L	0.0050	101	85	115			
Manganese			0.0515	mg/L	0.010	103	85	115			
Lab ID:	**H17030385-005CMS**	2	Sample Matrix Spike				Run: ICPMS205-H_170330A			03/31/17 15:09	
Arsenic			0.0603	mg/L	0.0010	110	70	130			
Manganese			0.0538	mg/L	0.0010	101	70	130			
Lab ID:	**H17030385-005CMSD**	2	Sample Matrix Spike Duplicate				Run: ICPMS205-H_170330A			03/31/17 15:11	
Arsenic			0.0602	mg/L	0.0010	110	70	130	0.2	20	
Manganese			0.0541	mg/L	0.0010	101	70	130	0.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**							Analytical Run: IC METROHM_170328A			
Lab ID:	**ICV**	2	Initial Calibration Verification Standard							03/28/17 11:27	
Chloride			110	mg/L	1.0	109	90	110			
Sulfate			440	mg/L	1.0	109	90	110			
Lab ID:	**CCV**	2	Continuing Calibration Verification Standard							03/28/17 11:54	
Chloride			110	mg/L	1.0	109	90	110			
Sulfate			430	mg/L	1.0	109	90	110			
Method:	**E300.0**										Batch: R123773
Lab ID:	**ICB**	2	Method Blank				Run: IC METROHM_170328A			03/28/17 10:05	
Chloride			0.03	mg/L	0.008						
Sulfate			ND	mg/L	0.08						
Lab ID:	**LFB**	2	Laboratory Fortified Blank				Run: IC METROHM_170328A			03/28/17 11:40	
Chloride			52	mg/L	1.0	105	90	110			
Sulfate			210	mg/L	1.0	105	90	110			
Lab ID:	**H17030395-003AMS**	2	Sample Matrix Spike				Run: IC METROHM_170328A			03/28/17 14:23	
Chloride			56	mg/L	1.0	109	90	110			
Sulfate			460	mg/L	1.0	111	90	110			S
Lab ID:	**H17030395-003AMSD**	2	Sample Matrix Spike Duplicate				Run: IC METROHM_170328A			03/28/17 14:36	
Chloride			55	mg/L	1.0	107	90	110	1.8	20	
Sulfate			450	mg/L	1.0	107	90	110	1.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_170324B	
Lab ID: ICV		Initial Calibration Verification Standard							03/24/17 11:10	
Nitrogen, Nitrite as N		1.02	mg/L	0.010	102	90	110			
Method: E353.2									Batch: R123658	
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_170324B			03/24/17 11:11	
Nitrogen, Nitrite as N		1.01	mg/L	0.011	101	90	110			
Lab ID: MBLK		Method Blank				Run: FIA203-HE_170324B			03/24/17 11:12	
Nitrogen, Nitrite as N		ND	mg/L	0.002						
Lab ID: H17030385-001BMS		Sample Matrix Spike				Run: FIA203-HE_170324B			03/24/17 11:15	
Nitrogen, Nitrite as N		0.995	mg/L	0.011	100	90	110			
Lab ID: H17030385-001BMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_170324B			03/24/17 11:16	
Nitrogen, Nitrite as N		0.980	mg/L	0.011	98	90	110	1.5	20	
Method: E353.2									Analytical Run: FIA203-HE_170327A	
Lab ID: ICV		Initial Calibration Verification Standard							03/27/17 12:39	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.010	101	90	110			
Method: E353.2									Batch: R123699	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_170327A			03/27/17 12:40	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.008						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_170327A			03/27/17 12:42	
Nitrogen, Nitrate+Nitrite as N		1.08	mg/L	0.011	108	90	110			
Lab ID: H17030391-001Dms		Sample Matrix Spike				Run: FIA203-HE_170327A			03/27/17 12:54	
Nitrogen, Nitrate+Nitrite as N		1.30	mg/L	0.011	106	90	110			
Lab ID: H17030391-001Dmsd		Sample Matrix Spike Duplicate				Run: FIA203-HE_170327A			03/27/17 12:55	
Nitrogen, Nitrate+Nitrite as N		1.29	mg/L	0.011	105	90	110	0.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_170329B	
Lab ID: ICV		Initial Calibration Verification Standard							03/29/17 11:24	
Nitrogen, Nitrate+Nitrite as N		1.03	mg/L	0.010	103	90	110			
Method: E353.2									Batch: R123771	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_170329B			03/29/17 11:25	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.008						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_170329B			03/29/17 11:26	
Nitrogen, Nitrate+Nitrite as N		1.05	mg/L	0.011	105	90	110			
Lab ID: H17030313-001AMS		Sample Matrix Spike				Run: FIA203-HE_170329B			03/29/17 11:29	
Nitrogen, Nitrate+Nitrite as N		16.1	mg/L	0.11	98	90	110			
Lab ID: H17030313-001AMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_170329B			03/29/17 11:30	
Nitrogen, Nitrate+Nitrite as N		16.0	mg/L	0.11	98	90	110	0.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**SW8015M**									Analytical Run: B_R277249	
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							03/30/17 11:20	
Methane			511	ppm	2.0	102	85	115			
Ethane			509	ppm	2.0	102	85	115			
Ethene			511	ppm	2.0	102	85	115			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							03/30/17 13:34	
Methane			515	ppm	2.0	103	85	115			
Ethane			509	ppm	2.0	102	85	115			
Ethene			511	ppm	2.0	102	85	115			
Method:	**SW8015M**									Batch: B_R277249	
Lab ID:	**MBLK**	3	Method Blank				Run: SUB-B277249			03/30/17 08:37	
Methane			ND	mg/L	0.0010						
Ethane			ND	mg/L	0.0010						
Ethene			ND	mg/L	0.0010						
Lab ID:	**LCS**	3	Laboratory Control Sample				Run: SUB-B277249			03/30/17 11:28	
Methane			101	ppm	2.0	101	85	115			
Ethane			90.0	ppm	2.0	90	85	115			
Ethene			90.2	ppm	2.0	90	85	115			
Lab ID:	**B17031980-004FDUP**	3	Sample Duplicate				Run: SUB-B277249			03/30/17 12:51	
Methane			ND	mg/L	0.0010					20	
Ethane			ND	mg/L	0.0010					20	
Ethene			ND	mg/L	0.0010					20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277454	
Lab ID: ccv040417	76	Continuing Calibration Verification Standard							04/04/17 08:46	
Acetonitrile		58.8	ug/L	20	118	70	130			
Acetone		60.0	ug/L	10	120	70	130			
Acrolein		60.4	ug/L	20	121	70	130			
Acrylonitrile		52.8	ug/L	10	106	70	130			
Benzene		5.04	ug/L	0.50	101	70	130			
Bromobenzene		5.12	ug/L	0.50	102	70	130			
Bromochloromethane		5.00	ug/L	0.50	100	70	130			
Bromodichloromethane		4.76	ug/L	0.50	95	70	130			
Bromoform		4.96	ug/L	0.50	99	70	130			
Bromomethane		5.56	ug/L	0.50	111	70	130			
n-Butylbenzene		5.00	ug/L	0.50	100	70	130			
sec-Butylbenzene		4.76	ug/L	0.50	95	70	130			
tert-Butylbenzene		4.88	ug/L	0.50	98	70	130			
Carbon disulfide		5.20	ug/L	0.50	104	70	130			
Carbon tetrachloride		5.08	ug/L	0.50	102	70	130			
Chlorobenzene		4.68	ug/L	0.50	94	70	130			
Chlorodibromomethane		4.84	ug/L	0.50	97	70	130			
Chloroethane		4.80	ug/L	0.50	96	70	130			
2-Chloroethyl vinyl ether		2.70	ug/L	0.50	54	70	130			S
Chloroform		5.28	ug/L	0.50	106	80	120			
Chloromethane		3.66	ug/L	0.50	73	70	130			
2-Chlorotoluene		5.12	ug/L	0.50	102	70	130			
4-Chlorotoluene		5.32	ug/L	0.50	106	70	130			
1,2-Dibromo-3-chloropropane		4.56	ug/L	1.0	91	70	130			
1,2-Dibromoethane		4.68	ug/L	0.50	94	70	130			
Dibromomethane		5.00	ug/L	0.50	100	70	130			
1,2-Dichlorobenzene		4.96	ug/L	0.50	99	70	130			
1,3-Dichlorobenzene		5.04	ug/L	0.50	101	70	130			
1,4-Dichlorobenzene		4.84	ug/L	0.50	97	70	130			
Dichlorodifluoromethane		4.72	ug/L	0.50	94	70	130			
1,1-Dichloroethane		4.76	ug/L	0.50	95	70	130			
1,2-Dichloroethane		5.48	ug/L	0.50	110	70	130			
1,1-Dichloroethene		4.76	ug/L	0.50	95	80	120			
cis-1,2-Dichloroethene		4.72	ug/L	0.50	94	70	130			
trans-1,2-Dichloroethene		5.00	ug/L	0.50	100	70	130			
1,2-Dichloropropane		4.96	ug/L	0.50	99	80	120			
1,3-Dichloropropane		4.92	ug/L	0.50	98	70	130			
2,2-Dichloropropane		5.08	ug/L	0.50	102	70	130			
1,1-Dichloropropene		4.96	ug/L	0.50	99	70	130			
cis-1,3-Dichloropropene		4.80	ug/L	0.50	96	70	130			
trans-1,3-Dichloropropene		4.60	ug/L	0.50	92	70	130			
Ethylbenzene		4.84	ug/L	0.50	97	80	120			
Hexachlorobutadiene		4.40	ug/L	0.50	88	70	130			
2-Hexanone		52.4	ug/L	10	105	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277454	
Lab ID: ccv040417	76	Continuing Calibration Verification Standard							04/04/17 08:46	
Iodomethane		5.56	ug/L	1.0	111	70	130			
Isopropylbenzene		5.28	ug/L	0.50	106	70	130			
p-Isopropyltoluene		4.80	ug/L	0.50	96	70	130			
Methyl tert-butyl ether (MTBE)		5.00	ug/L	0.50	100	70	130			
Methyl ethyl ketone		54.4	ug/L	10	109	70	130			
Methyl isobutyl ketone		52.8	ug/L	10	106	70	130			
Methylene chloride		5.96	ug/L	0.50	119	70	130			
Naphthalene		4.72	ug/L	0.50	94	70	130			
n-Propylbenzene		5.24	ug/L	0.50	105	70	130			
Styrene		4.68	ug/L	0.50	94	70	130			
1,1,1,2-Tetrachloroethane		4.64	ug/L	0.50	93	70	130			
1,1,2,2-Tetrachloroethane		5.12	ug/L	0.50	102	70	130			
Tetrachloroethene		4.72	ug/L	0.50	94	70	130			
Toluene		4.96	ug/L	0.50	99	80	120			
1,2,3-Trichlorobenzene		3.70	ug/L	0.50	74	70	130			
1,2,4-Trichlorobenzene		4.56	ug/L	0.50	91	70	130			
1,1,1-Trichloroethane		5.08	ug/L	0.50	102	70	130			
1,1,2-Trichloroethane		4.80	ug/L	0.50	96	70	130			
Trichloroethene		5.00	ug/L	0.50	100	70	130			
Trichlorofluoromethane		4.48	ug/L	0.50	90	70	130			
1,2,3-Trichloropropane		5.16	ug/L	0.50	103	70	130			
1,2,4-Trimethylbenzene		5.00	ug/L	0.50	100	70	130			
1,3,5-Trimethylbenzene		5.08	ug/L	0.50	102	70	130			
Vinyl acetate		5.24	ug/L	1.0	105	70	130			
Vinyl chloride		4.60	ug/L	0.50	92	80	120			
m+p-Xylenes		9.40	ug/L	0.50	94	70	130			
o-Xylene		4.60	ug/L	0.50	92	70	130			
Xylenes, Total		14.0	ug/L	0.50	93	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	99	70	130			
Surr: Dibromofluoromethane				0.50	98	77	126			
Surr: p-Bromofluorobenzene				0.50	106	76	127			
Surr: Toluene-d8				0.50	97	79	122			
Method: SW8260B									Batch: B_R277454	
Lab ID: lcs040417	76	Laboratory Control Sample				Run: SUB-B277454			04/04/17 09:41	
Acetonitrile		54.4	ug/L	20	109	54	142			
Acetone		52.8	ug/L	10	106	62	130			
Acrolein		54.4	ug/L	20	109	22	203			
Acrylonitrile		45.6	ug/L	10	91	60	130			
Benzene		4.96	ug/L	0.50	99	71	133			
Bromobenzene		5.16	ug/L	0.50	103	78	133			
Bromochloromethane		4.80	ug/L	0.50	96	68	131			
Bromodichloromethane		5.20	ug/L	0.50	104	67	138			
Bromoform		5.20	ug/L	0.50	104	64	136			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277454	
Lab ID: lcs040417	76	Laboratory Control Sample				Run: SUB-B277454			04/04/17 09:41	
Bromomethane		5.60	ug/L	0.50	112	60	138			
n-Butylbenzene		5.00	ug/L	0.50	100	72	135			
sec-Butylbenzene		5.00	ug/L	0.50	100	73	135			
tert-Butylbenzene		4.92	ug/L	0.50	98	69	137			
Carbon disulfide		4.88	ug/L	0.50	98	46	145			
Carbon tetrachloride		5.12	ug/L	0.50	102	61	144			
Chlorobenzene		4.80	ug/L	0.50	96	78	136			
Chlorodibromomethane		5.24	ug/L	0.50	105	72	136			
Chloroethane		4.80	ug/L	0.50	96	64	136			
2-Chloroethyl vinyl ether		2.45	ug/L	0.50	49	64	132			S
Chloroform		5.28	ug/L	0.50	106	69	133			
Chloromethane		3.68	ug/L	0.50	74	63	149			
2-Chlorotoluene		5.28	ug/L	0.50	106	74	135			
4-Chlorotoluene		5.28	ug/L	0.50	106	79	135			
1,2-Dibromo-3-chloropropane		4.68	ug/L	1.0	94	63	125			
1,2-Dibromoethane		4.72	ug/L	0.50	94	75	131			
Dibromomethane		5.16	ug/L	0.50	103	72	133			
1,2-Dichlorobenzene		4.96	ug/L	0.50	99	78	129			
1,3-Dichlorobenzene		5.16	ug/L	0.50	103	79	132			
1,4-Dichlorobenzene		4.92	ug/L	0.50	98	78	131			
Dichlorodifluoromethane		4.88	ug/L	0.50	98	55	141			
1,1-Dichloroethane		4.84	ug/L	0.50	97	72	130			
1,2-Dichloroethane		5.16	ug/L	0.50	103	57	146			
1,1-Dichloroethene		5.00	ug/L	0.50	100	66	142			
cis-1,2-Dichloroethene		4.96	ug/L	0.50	99	74	133			
trans-1,2-Dichloroethene		5.24	ug/L	0.50	105	76	138			
1,2-Dichloropropane		4.76	ug/L	0.50	95	72	135			
1,3-Dichloropropane		4.60	ug/L	0.50	92	75	134			
2,2-Dichloropropane		5.28	ug/L	0.50	106	42	167			
1,1-Dichloropropene		4.68	ug/L	0.50	94	72	140			
cis-1,3-Dichloropropene		4.52	ug/L	0.50	90	75	132			
trans-1,3-Dichloropropene		4.68	ug/L	0.50	94	77	145			
Ethylbenzene		4.92	ug/L	0.50	98	78	131			
Hexachlorobutadiene		4.24	ug/L	0.50	85	65	141			
2-Hexanone		52.0	ug/L	10	104	72	131			
Iodomethane		5.92	ug/L	1.0	118	66	132			
Isopropylbenzene		5.36	ug/L	0.50	107	72	135			
p-Isopropyltoluene		4.84	ug/L	0.50	97	71	134			
Methyl tert-butyl ether (MTBE)		4.60	ug/L	0.50	92	58	151			
Methyl ethyl ketone		49.6	ug/L	10	99	55	145			
Methyl isobutyl ketone		50.0	ug/L	10	100	73	129			
Methylene chloride		5.84	ug/L	0.50	117	73	126			
Naphthalene		5.52	ug/L	0.50	110	55	139			
n-Propylbenzene		5.16	ug/L	0.50	103	70	139			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277454
Lab ID: lcs040417	76	Laboratory Control Sample				Run: SUB-B277454				04/04/17 09:41
Styrene		4.72	ug/L	0.50	94	76	134			
1,1,1,2-Tetrachloroethane		4.68	ug/L	0.50	94	75	135			
1,1,2,2-Tetrachloroethane		4.92	ug/L	0.50	98	72	132			
Tetrachloroethene		4.92	ug/L	0.50	98	78	137			
Toluene		5.00	ug/L	0.50	100	78	134			
1,2,3-Trichlorobenzene		4.44	ug/L	0.50	89	42	152			
1,2,4-Trichlorobenzene		4.80	ug/L	0.50	96	58	142			
1,1,1-Trichloroethane		4.88	ug/L	0.50	98	64	141			
1,1,2-Trichloroethane		4.64	ug/L	0.50	93	72	133			
Trichloroethene		4.92	ug/L	0.50	98	75	138			
Trichlorofluoromethane		4.24	ug/L	0.50	85	58	139			
1,2,3-Trichloropropane		4.84	ug/L	0.50	97	67	133			
1,2,4-Trimethylbenzene		4.88	ug/L	0.50	98	71	129			
1,3,5-Trimethylbenzene		5.08	ug/L	0.50	102	68	135			
Vinyl acetate		4.20	ug/L	1.0	84	31	124			
Vinyl chloride		4.72	ug/L	0.50	94	66	140			
m+p-Xylenes		9.68	ug/L	0.50	97	78	133			
o-Xylene		4.68	ug/L	0.50	94	79	136			
Xylenes, Total		14.4	ug/L	0.50	96	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	99	70	130			
Surr: Dibromofluoromethane				0.50	94	77	126			
Surr: p-Bromofluorobenzene				0.50	102	76	127			
Surr: Toluene-d8				0.50	98	79	122			
Lab ID: blk040417	76	Method Blank				Run: SUB-B277454				04/04/17 10:39
Acetonitrile		ND	ug/L	20						
Acetone		ND	ug/L	10						
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	3.0						
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon disulfide		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
2-Chloroethyl vinyl ether		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277454
Lab ID: blk040417	76	Method Blank				Run: SUB-B277454				04/04/17 10:39
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromo-3-chloropropane		ND	ug/L	1.0						
1,2-Dibromoethane		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.30						
trans-1,3-Dichloropropene		ND	ug/L	0.30						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
2-Hexanone		ND	ug/L	10						
Iodomethane		ND	ug/L	1.0						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methyl isobutyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277454	
Lab ID: blk040417	76	Method Blank				Run: SUB-B277454			04/04/17 10:39	
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl acetate		ND	ug/L	1.0						
Vinyl chloride		ND	ug/L	0.40						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	100	70	130			
Surr: Dibromofluoromethane				0.50	99	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	96	79	122			
Lab ID: b17032041-001ams	76	Sample Matrix Spike				Run: SUB-B277518			04/05/17 18:36	
Acetonitrile		812	ug/L	200	162	54	142			S
Acetone		1060	ug/L	100	150	62	130			S
Acrolein		816	ug/L	200	163	22	203			
Acrylonitrile		736	ug/L	100	147	60	130			S
Benzene		52.8	ug/L	5.0	106	71	133			
Bromobenzene		52.8	ug/L	5.0	106	78	133			
Bromochloromethane		63.6	ug/L	5.0	127	68	131			
Bromodichloromethane		60.0	ug/L	5.0	120	67	138			
Bromoform		71.2	ug/L	5.0	142	64	136			S
Bromomethane		57.6	ug/L	5.0	115	60	138			
n-Butylbenzene		46.4	ug/L	5.0	93	72	135			
sec-Butylbenzene		46.4	ug/L	5.0	93	73	135			
tert-Butylbenzene		46.0	ug/L	5.0	92	69	137			
Carbon disulfide		40.0	ug/L	5.0	80	46	145			
Carbon tetrachloride		46.4	ug/L	5.0	93	61	144			
Chlorobenzene		45.6	ug/L	5.0	91	78	136			
Chlorodibromomethane		63.2	ug/L	5.0	126	72	136			
Chloroethane		53.2	ug/L	5.0	106	64	136			
2-Chloroethyl vinyl ether		24.2	ug/L	5.0	48	64	132			S
Chloroform		61.6	ug/L	5.0	120	69	133			
Chloromethane		47.6	ug/L	5.0	95	63	149			
2-Chlorotoluene		50.0	ug/L	5.0	100	74	135			
4-Chlorotoluene		50.8	ug/L	5.0	102	79	135			
1,2-Dibromo-3-chloropropane		72.0	ug/L	10	144	63	125			S
1,2-Dibromoethane		60.8	ug/L	5.0	122	75	131			
Dibromomethane		68.0	ug/L	5.0	136	72	133			S
1,2-Dichlorobenzene		51.2	ug/L	5.0	102	78	129			
1,3-Dichlorobenzene		50.4	ug/L	5.0	101	79	132			
1,4-Dichlorobenzene		48.8	ug/L	5.0	98	78	131			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277454	
Lab ID: b17032041-001ams	76	Sample Matrix Spike				Run: SUB-B277518			04/05/17 18:36	
Dichlorodifluoromethane		42.4	ug/L	5.0	85	55	141			
1,1-Dichloroethane		52.4	ug/L	5.0	105	72	130			
1,2-Dichloroethane		66.4	ug/L	5.0	133	57	146			
1,1-Dichloroethene		45.6	ug/L	5.0	91	66	142			
cis-1,2-Dichloroethene		54.4	ug/L	5.0	109	74	133			
trans-1,2-Dichloroethene		51.2	ug/L	5.0	102	76	138			
1,2-Dichloropropane		58.0	ug/L	5.0	116	72	135			
1,3-Dichloropropane		59.2	ug/L	5.0	118	75	134			
2,2-Dichloropropane		26.2	ug/L	5.0	52	42	167			
1,1-Dichloropropene		43.2	ug/L	5.0	86	72	140			
cis-1,3-Dichloropropene		46.4	ug/L	5.0	93	75	132			
trans-1,3-Dichloropropene		50.0	ug/L	5.0	100	77	145			
Ethylbenzene		44.4	ug/L	5.0	89	78	131			
Hexachlorobutadiene		38.5	ug/L	5.0	77	65	141			
2-Hexanone		756	ug/L	100	151	72	131			S
Iodomethane		70.0	ug/L	10	140	66	132			S
Isopropylbenzene		48.8	ug/L	5.0	98	72	135			
p-Isopropyltoluene		48.8	ug/L	5.0	91	71	134			
Methyl tert-butyl ether (MTBE)		64.4	ug/L	5.0	129	58	151			
Methyl ethyl ketone		776	ug/L	100	147	55	145			S
Methyl isobutyl ketone		772	ug/L	100	154	73	129			S
Methylene chloride		79.2	ug/L	5.0	158	73	126			S
Naphthalene		64.0	ug/L	5.0	128	55	139			
n-Propylbenzene		47.6	ug/L	5.0	95	70	139			
Styrene		43.6	ug/L	5.0	87	76	134			
1,1,1,2-Tetrachloroethane		48.8	ug/L	5.0	98	75	135			
1,1,2,2-Tetrachloroethane		72.0	ug/L	5.0	144	72	132			S
Tetrachloroethene		43.2	ug/L	5.0	86	78	137			
Toluene		78.0	ug/L	5.0	90	78	134			
1,2,3-Trichlorobenzene		41.6	ug/L	5.0	83	42	152			
1,2,4-Trichlorobenzene		45.2	ug/L	5.0	90	58	142			
1,1,1-Trichloroethane		48.4	ug/L	5.0	97	64	141			
1,1,2-Trichloroethane		62.0	ug/L	5.0	124	72	133			
Trichloroethene		46.4	ug/L	5.0	93	75	138			
Trichlorofluoromethane		36.2	ug/L	5.0	72	58	139			
1,2,3-Trichloropropane		72.0	ug/L	5.0	144	67	133			S
1,2,4-Trimethylbenzene		48.4	ug/L	5.0	97	71	129			
1,3,5-Trimethylbenzene		47.6	ug/L	5.0	95	68	135			
Vinyl acetate		66.8	ug/L	10	134	31	124			S
Vinyl chloride		49.2	ug/L	5.0	98	66	140			
m+p-Xylenes		88.0	ug/L	5.0	88	78	133			
o-Xylene		45.2	ug/L	5.0	90	79	136			
Xylenes, Total		133	ug/L	5.0	89	78	136			
Surr: 1,2-Dichloroethane-d4				5.0	128	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277454	
Lab ID: b17032041-001ams	76	Sample Matrix Spike				Run: SUB-B277518			04/05/17 18:36	
Surr: Dibromofluoromethane				5.0	115	77	126			
Surr: p-Bromofluorobenzene				5.0	107	76	127			
Surr: Toluene-d8				5.0	96	79	122			
Lab ID: b17032041-001amsd	76	Sample Matrix Spike Duplicate				Run: SUB-B277518			04/05/17 19:34	
Acetonitrile		796	ug/L	200	159	54	142	2.0	20	S
Acetone		1110	ug/L	100	160	62	130	4.8	20	S
Acrolein		832	ug/L	200	166	22	203	1.9	20	
Acrylonitrile		760	ug/L	100	152	60	130	3.2	20	S
Benzene		52.0	ug/L	5.0	104	71	133	1.5	20	
Bromobenzene		56.4	ug/L	5.0	113	78	133	6.6	20	
Bromochloromethane		66.4	ug/L	5.0	133	68	131	4.3	20	S
Bromodichloromethane		63.2	ug/L	5.0	126	67	138	5.2	20	
Bromoform		74.8	ug/L	5.0	150	64	136	4.9	20	S
Bromomethane		57.2	ug/L	5.0	114	60	138	0.7	20	
n-Butylbenzene		47.6	ug/L	5.0	95	72	135	2.6	20	
sec-Butylbenzene		46.4	ug/L	5.0	93	73	135	0.0	20	
tert-Butylbenzene		48.4	ug/L	5.0	97	69	137	5.1	20	
Carbon disulfide		40.8	ug/L	5.0	82	46	145	2.0	20	
Carbon tetrachloride		46.0	ug/L	5.0	92	61	144	0.9	20	
Chlorobenzene		47.6	ug/L	5.0	95	78	136	4.3	20	
Chlorodibromomethane		67.2	ug/L	5.0	134	72	136	6.1	20	
Chloroethane		56.0	ug/L	5.0	112	64	136	5.1	20	
2-Chloroethyl vinyl ether		24.7	ug/L	5.0	49	64	132	2.0	20	S
Chloroform		62.0	ug/L	5.0	121	69	133	0.6	20	
Chloromethane		49.6	ug/L	5.0	99	63	149	4.1	20	
2-Chlorotoluene		52.0	ug/L	5.0	104	74	135	3.9	20	
4-Chlorotoluene		52.8	ug/L	5.0	106	79	135	3.9	20	
1,2-Dibromo-3-chloropropane		74.8	ug/L	10	150	63	125	3.8	20	S
1,2-Dibromoethane		61.2	ug/L	5.0	122	75	131	0.7	20	
Dibromomethane		70.8	ug/L	5.0	142	72	133	4.0	20	S
1,2-Dichlorobenzene		54.0	ug/L	5.0	108	78	129	5.3	20	
1,3-Dichlorobenzene		52.4	ug/L	5.0	105	79	132	3.9	20	
1,4-Dichlorobenzene		51.6	ug/L	5.0	103	78	131	5.6	20	
Dichlorodifluoromethane		38.3	ug/L	5.0	77	55	141	10	20	
1,1-Dichloroethane		54.4	ug/L	5.0	109	72	130	3.7	20	
1,2-Dichloroethane		66.0	ug/L	5.0	132	57	146	0.6	20	
1,1-Dichloroethene		46.4	ug/L	5.0	93	66	142	1.7	20	
cis-1,2-Dichloroethene		55.2	ug/L	5.0	110	74	133	1.5	20	
trans-1,2-Dichloroethene		51.6	ug/L	5.0	103	76	138	0.8	20	
1,2-Dichloropropane		60.4	ug/L	5.0	121	72	135	4.1	20	
1,3-Dichloropropane		60.8	ug/L	5.0	122	75	134	2.7	20	
2,2-Dichloropropane		25.1	ug/L	5.0	50	42	167	4.5	20	
1,1-Dichloropropene		41.6	ug/L	5.0	83	72	140	3.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277454	
Lab ID: b17032041-001amsd	76	Sample Matrix Spike Duplicate				Run: SUB-B277518			04/05/17 19:34	
cis-1,3-Dichloropropene		48.4	ug/L	5.0	97	75	132	4.2	20	
trans-1,3-Dichloropropene		51.6	ug/L	5.0	103	77	145	3.1	20	
Ethylbenzene		45.2	ug/L	5.0	90	78	131	1.8	20	
Hexachlorobutadiene		38.2	ug/L	5.0	76	65	141	0.8	20	
2-Hexanone		780	ug/L	100	156	72	131	3.1	20	S
Iodomethane		72.0	ug/L	10	144	66	132	2.8	20	S
Isopropylbenzene		50.0	ug/L	5.0	100	72	135	2.4	20	
p-Isopropyltoluene		50.4	ug/L	5.0	94	71	134	3.2	20	
Methyl tert-butyl ether (MTBE)		69.6	ug/L	5.0	139	58	151	7.8	20	
Methyl ethyl ketone		784	ug/L	100	149	55	145	1.0	20	S
Methyl isobutyl ketone		808	ug/L	100	162	73	129	4.6	20	S
Methylene chloride		83.2	ug/L	5.0	166	73	126	4.9	20	S
Naphthalene		67.6	ug/L	5.0	135	55	139	5.5	20	
n-Propylbenzene		49.2	ug/L	5.0	98	70	139	3.3	20	
Styrene		44.0	ug/L	5.0	88	76	134	0.9	20	
1,1,1,2-Tetrachloroethane		49.6	ug/L	5.0	99	75	135	1.6	20	
1,1,2,2-Tetrachloroethane		77.2	ug/L	5.0	154	72	132	7.0	20	S
Tetrachloroethene		42.8	ug/L	5.0	86	78	137	0.9	20	
Toluene		80.0	ug/L	5.0	94	78	134	2.5	20	
1,2,3-Trichlorobenzene		43.6	ug/L	5.0	87	42	152	4.7	20	
1,2,4-Trichlorobenzene		48.4	ug/L	5.0	97	58	142	6.8	20	
1,1,1-Trichloroethane		48.0	ug/L	5.0	96	64	141	0.8	20	
1,1,2-Trichloroethane		63.6	ug/L	5.0	127	72	133	2.5	20	
Trichloroethene		46.4	ug/L	5.0	93	75	138	0.0	20	
Trichlorofluoromethane		31.6	ug/L	5.0	63	58	139	14	20	
1,2,3-Trichloropropane		76.8	ug/L	5.0	154	67	133	6.5	20	S
1,2,4-Trimethylbenzene		50.8	ug/L	5.0	102	71	129	4.8	20	
1,3,5-Trimethylbenzene		49.6	ug/L	5.0	99	68	135	4.1	20	
Vinyl acetate		67.6	ug/L	10	135	31	124	1.2	20	S
Vinyl chloride		48.0	ug/L	5.0	96	66	140	2.5	20	
m+p-Xylenes		88.0	ug/L	5.0	88	78	133	0.0	20	
o-Xylene		44.8	ug/L	5.0	90	79	136	0.9	20	
Xylenes, Total		133	ug/L	5.0	89	78	136			
Surr: 1,2-Dichloroethane-d4				5.0	128	70	130			
Surr: Dibromofluoromethane				5.0	114	77	126			
Surr: p-Bromofluorobenzene				5.0	110	76	127			
Surr: Toluene-d8				5.0	95	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277515	
Lab ID: ccv040517	75	Continuing Calibration Verification Standard							04/05/17 09:56	
Acetonitrile		47.6	ug/L	20	95	70	130			
Acetone		41.2	ug/L	10	82	70	130			
Acrolein		53.6	ug/L	20	107	70	130			
Acrylonitrile		45.2	ug/L	10	90	70	130			
Benzene		5.20	ug/L	0.50	104	70	130			
Bromobenzene		5.16	ug/L	0.50	103	70	130			
Bromochloromethane		4.64	ug/L	0.50	93	70	130			
Bromodichloromethane		4.72	ug/L	0.50	94	70	130			
Bromoform		5.08	ug/L	0.50	102	70	130			
Bromomethane		3.83	ug/L	0.50	77	70	130			
n-Butylbenzene		4.84	ug/L	0.50	97	70	130			
sec-Butylbenzene		4.84	ug/L	0.50	97	70	130			
tert-Butylbenzene		5.04	ug/L	0.50	101	70	130			
Carbon disulfide		5.24	ug/L	0.50	105	70	130			
Carbon tetrachloride		5.16	ug/L	0.50	103	70	130			
Chlorobenzene		5.36	ug/L	0.50	107	70	130			
Chlorodibromomethane		5.12	ug/L	0.50	102	70	130			
Chloroethane		4.88	ug/L	0.50	98	70	130			
Chloroform		4.84	ug/L	0.50	97	80	120			
Chloromethane		3.92	ug/L	0.50	78	70	130			
2-Chlorotoluene		5.32	ug/L	0.50	106	70	130			
4-Chlorotoluene		5.32	ug/L	0.50	106	70	130			
1,2-Dibromo-3-chloropropane		5.64	ug/L	1.0	113	70	130			
1,2-Dibromoethane		6.28	ug/L	0.50	126	70	130			
Dibromomethane		5.24	ug/L	0.50	105	70	130			
1,2-Dichlorobenzene		5.04	ug/L	0.50	101	70	130			
1,3-Dichlorobenzene		5.28	ug/L	0.50	106	70	130			
1,4-Dichlorobenzene		5.24	ug/L	0.50	105	70	130			
Dichlorodifluoromethane		5.12	ug/L	0.50	102	70	130			
1,1-Dichloroethane		5.48	ug/L	0.50	110	70	130			
1,2-Dichloroethane		5.28	ug/L	0.50	106	70	130			
1,1-Dichloroethene		5.04	ug/L	0.50	101	80	120			
cis-1,2-Dichloroethene		5.48	ug/L	0.50	110	70	130			
trans-1,2-Dichloroethene		5.88	ug/L	0.50	118	70	130			
1,2-Dichloropropane		5.16	ug/L	0.50	103	80	120			
1,3-Dichloropropane		5.20	ug/L	0.50	104	70	130			
2,2-Dichloropropane		5.96	ug/L	0.50	119	70	130			
1,1-Dichloropropene		5.56	ug/L	0.50	111	70	130			
cis-1,3-Dichloropropene		5.44	ug/L	0.50	109	70	130			
trans-1,3-Dichloropropene		5.20	ug/L	0.50	104	70	130			
Ethylbenzene		5.32	ug/L	0.50	106	80	120			
Hexachlorobutadiene		4.40	ug/L	0.50	88	70	130			
2-Hexanone		44.0	ug/L	10	88	70	130			
Iodomethane		2.54	ug/L	1.0	51	70	130			S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277515	
Lab ID: ccv040517	75	Continuing Calibration Verification Standard							04/05/17 09:56	
Isopropylbenzene		5.12	ug/L	0.50	102	70	130			
p-Isopropyltoluene		4.96	ug/L	0.50	99	70	130			
Methyl tert-butyl ether (MTBE)		4.92	ug/L	0.50	98	70	130			
Methyl ethyl ketone		43.6	ug/L	10	87	70	130			
Methyl isobutyl ketone		43.2	ug/L	10	86	70	130			
Methylene chloride		5.92	ug/L	0.50	118	70	130			
Naphthalene		5.76	ug/L	0.50	115	70	130			
n-Propylbenzene		5.24	ug/L	0.50	105	70	130			
Styrene		5.44	ug/L	0.50	109	70	130			
1,1,1,2-Tetrachloroethane		5.20	ug/L	0.50	104	70	130			
1,1,2,2-Tetrachloroethane		5.16	ug/L	0.50	103	70	130			
Tetrachloroethene		5.40	ug/L	0.50	108	70	130			
Toluene		5.36	ug/L	0.50	107	80	120			
1,2,3-Trichlorobenzene		5.12	ug/L	0.50	102	70	130			
1,2,4-Trichlorobenzene		5.20	ug/L	0.50	104	70	130			
1,1,1-Trichloroethane		5.08	ug/L	0.50	102	70	130			
1,1,2-Trichloroethane		5.08	ug/L	0.50	102	70	130			
Trichloroethene		5.36	ug/L	0.50	107	70	130			
Trichlorofluoromethane		5.20	ug/L	0.50	104	70	130			
1,2,3-Trichloropropane		5.28	ug/L	0.50	106	70	130			
1,2,4-Trimethylbenzene		5.24	ug/L	0.50	105	70	130			
1,3,5-Trimethylbenzene		5.16	ug/L	0.50	103	70	130			
Vinyl acetate		4.28	ug/L	1.0	86	70	130			
Vinyl chloride		4.96	ug/L	0.50	99	80	120			
m+p-Xylenes		10.8	ug/L	0.50	108	70	130			
o-Xylene		5.32	ug/L	0.50	106	70	130			
Xylenes, Total		16.2	ug/L	0.50	108	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	98	70	130			
Surr: Dibromofluoromethane				0.50	111	77	126			
Surr: p-Bromofluorobenzene				0.50	98	76	127			
Surr: Toluene-d8				0.50	103	79	122			
Method: SW8260B									Batch: B_R277515	
Lab ID: lcs040517	75	Laboratory Control Sample				Run: SUB-B277515			04/05/17 10:41	
Acetonitrile		35.0	ug/L	20	70	54	142			
Acetone		49.6	ug/L	10	99	62	130			
Acrolein		44.4	ug/L	20	89	22	203			
Acrylonitrile		47.2	ug/L	10	94	60	130			
Benzene		4.92	ug/L	0.50	98	71	133			
Bromobenzene		5.00	ug/L	0.50	100	78	133			
Bromochloromethane		4.88	ug/L	0.50	98	68	131			
Bromodichloromethane		4.72	ug/L	0.50	94	67	138			
Bromoform		4.88	ug/L	0.50	98	64	136			
Bromomethane		3.77	ug/L	0.50	75	60	138			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277515	
Lab ID: lcs040517	75	Laboratory Control Sample				Run: SUB-B277515			04/05/17 10:41	
n-Butylbenzene		4.56	ug/L	0.50	91	72	135			
sec-Butylbenzene		4.52	ug/L	0.50	90	73	135			
tert-Butylbenzene		4.80	ug/L	0.50	96	69	137			
Carbon disulfide		5.28	ug/L	0.50	106	46	145			
Carbon tetrachloride		4.92	ug/L	0.50	98	61	144			
Chlorobenzene		5.20	ug/L	0.50	104	78	136			
Chlorodibromomethane		5.24	ug/L	0.50	105	72	136			
Chloroethane		4.48	ug/L	0.50	90	64	136			
Chloroform		4.48	ug/L	0.50	90	69	133			
Chloromethane		3.88	ug/L	0.50	78	63	149			
2-Chlorotoluene		5.16	ug/L	0.50	103	74	135			
4-Chlorotoluene		4.92	ug/L	0.50	98	79	135			
1,2-Dibromo-3-chloropropane		5.12	ug/L	1.0	102	63	125			
1,2-Dibromoethane		5.72	ug/L	0.50	114	75	131			
Dibromomethane		5.00	ug/L	0.50	100	72	133			
1,2-Dichlorobenzene		4.96	ug/L	0.50	99	78	129			
1,3-Dichlorobenzene		5.28	ug/L	0.50	106	79	132			
1,4-Dichlorobenzene		5.12	ug/L	0.50	102	78	131			
Dichlorodifluoromethane		4.72	ug/L	0.50	94	55	141			
1,1-Dichloroethane		5.36	ug/L	0.50	107	72	130			
1,2-Dichloroethane		4.64	ug/L	0.50	93	57	146			
1,1-Dichloroethene		5.60	ug/L	0.50	112	66	142			
cis-1,2-Dichloroethene		5.68	ug/L	0.50	114	74	133			
trans-1,2-Dichloroethene		5.40	ug/L	0.50	108	76	138			
1,2-Dichloropropane		4.72	ug/L	0.50	94	72	135			
1,3-Dichloropropane		4.72	ug/L	0.50	94	75	134			
2,2-Dichloropropane		5.76	ug/L	0.50	115	42	167			
1,1-Dichloropropene		4.92	ug/L	0.50	98	72	140			
cis-1,3-Dichloropropene		4.68	ug/L	0.50	94	75	132			
trans-1,3-Dichloropropene		4.92	ug/L	0.50	98	77	145			
Ethylbenzene		5.00	ug/L	0.50	100	78	131			
Hexachlorobutadiene		4.16	ug/L	0.50	83	65	141			
2-Hexanone		48.8	ug/L	10	98	72	131			
Iodomethane		2.88	ug/L	1.0	58	66	132			S
Isopropylbenzene		4.84	ug/L	0.50	97	72	135			
p-Isopropyltoluene		4.56	ug/L	0.50	91	71	134			
Methyl tert-butyl ether (MTBE)		4.92	ug/L	0.50	98	58	151			
Methyl ethyl ketone		47.2	ug/L	10	94	55	145			
Methyl isobutyl ketone		47.2	ug/L	10	94	73	129			
Methylene chloride		5.36	ug/L	0.50	107	73	126			
Naphthalene		5.88	ug/L	0.50	118	55	139			
n-Propylbenzene		4.80	ug/L	0.50	96	70	139			
Styrene		5.20	ug/L	0.50	104	76	134			
1,1,1,2-Tetrachloroethane		4.84	ug/L	0.50	97	75	135			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277515
Lab ID: lcs040517	75	Laboratory Control Sample				Run: SUB-B277515				04/05/17 10:41
1,1,2,2-Tetrachloroethane		4.84	ug/L	0.50	97	72	132			
Tetrachloroethene		5.16	ug/L	0.50	103	78	137			
Toluene		5.08	ug/L	0.50	102	78	134			
1,2,3-Trichlorobenzene		5.20	ug/L	0.50	104	42	152			
1,2,4-Trichlorobenzene		5.16	ug/L	0.50	103	58	142			
1,1,1-Trichloroethane		4.68	ug/L	0.50	94	64	141			
1,1,2-Trichloroethane		4.72	ug/L	0.50	94	72	133			
Trichloroethene		4.80	ug/L	0.50	96	75	138			
Trichlorofluoromethane		4.60	ug/L	0.50	92	58	139			
1,2,3-Trichloropropane		4.64	ug/L	0.50	93	67	133			
1,2,4-Trimethylbenzene		4.96	ug/L	0.50	99	71	129			
1,3,5-Trimethylbenzene		4.92	ug/L	0.50	98	68	135			
Vinyl acetate		3.81	ug/L	1.0	76	31	124			
Vinyl chloride		4.48	ug/L	0.50	90	66	140			
m+p-Xylenes		10.2	ug/L	0.50	102	78	133			
o-Xylene		5.04	ug/L	0.50	101	79	136			
Xylenes, Total		15.3	ug/L	0.50	102	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	102	70	130			
Surr: Dibromofluoromethane				0.50	111	77	126			
Surr: p-Bromofluorobenzene				0.50	99	76	127			
Surr: Toluene-d8				0.50	102	79	122			
Lab ID: blk040517	75	Method Blank				Run: SUB-B277515				04/05/17 11:43
Acetonitrile		ND	ug/L	20						
Acetone		ND	ug/L	10						
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	10						
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon disulfide		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277515
Lab ID: blk040517	75	Method Blank				Run: SUB-B277515				04/05/17 11:43
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromo-3-chloropropane		ND	ug/L	1.0						
1,2-Dibromoethane		ND	ug/L	0.30						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.30						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
2-Hexanone		ND	ug/L	10						
Iodomethane		ND	ug/L	1.0						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methyl isobutyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277515
Lab ID: blk040517	75	Method Blank				Run: SUB-B277515				04/05/17 11:43
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl acetate		ND	ug/L	1.0						
Vinyl chloride		ND	ug/L	0.40						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	90	70	130			
Surr: Dibromofluoromethane				0.50	107	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	104	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277518	
Lab ID: ccv040517	76	Continuing Calibration Verification Standard							04/05/17 09:30	
Acetonitrile		53.6	ug/L	20	107	70	130			
Acetone		57.6	ug/L	10	115	70	130			
Acrolein		59.2	ug/L	20	118	70	130			
Acrylonitrile		49.6	ug/L	10	99	70	130			
Benzene		4.88	ug/L	0.50	98	70	130			
Bromobenzene		4.72	ug/L	0.50	94	70	130			
Bromochloromethane		5.08	ug/L	0.50	102	70	130			
Bromodichloromethane		4.84	ug/L	0.50	97	70	130			
Bromoform		4.84	ug/L	0.50	97	70	130			
Bromomethane		4.68	ug/L	0.50	94	70	130			
n-Butylbenzene		4.92	ug/L	0.50	98	70	130			
sec-Butylbenzene		4.80	ug/L	0.50	96	70	130			
tert-Butylbenzene		4.64	ug/L	0.50	93	70	130			
Carbon disulfide		4.80	ug/L	0.50	96	70	130			
Carbon tetrachloride		5.60	ug/L	0.50	112	70	130			
Chlorobenzene		4.44	ug/L	0.50	89	70	130			
Chlorodibromomethane		4.76	ug/L	0.50	95	70	130			
Chloroethane		4.72	ug/L	0.50	94	70	130			
2-Chloroethyl vinyl ether		2.47	ug/L	0.50	49	70	130			S
Chloroform		5.56	ug/L	0.50	111	80	120			
Chloromethane		3.95	ug/L	0.50	79	70	130			
2-Chlorotoluene		4.72	ug/L	0.50	94	70	130			
4-Chlorotoluene		5.16	ug/L	0.50	103	70	130			
1,2-Dibromo-3-chloropropane		4.40	ug/L	1.0	88	70	130			
1,2-Dibromoethane		4.48	ug/L	0.50	90	70	130			
Dibromomethane		4.72	ug/L	0.50	94	70	130			
1,2-Dichlorobenzene		4.76	ug/L	0.50	95	70	130			
1,3-Dichlorobenzene		4.92	ug/L	0.50	98	70	130			
1,4-Dichlorobenzene		4.80	ug/L	0.50	96	70	130			
Dichlorodifluoromethane		5.00	ug/L	0.50	100	70	130			
1,1-Dichloroethane		4.76	ug/L	0.50	95	70	130			
1,2-Dichloroethane		6.00	ug/L	0.50	120	70	130			
1,1-Dichloroethene		4.96	ug/L	0.50	99	80	120			
cis-1,2-Dichloroethene		4.68	ug/L	0.50	94	70	130			
trans-1,2-Dichloroethene		4.84	ug/L	0.50	97	70	130			
1,2-Dichloropropane		4.64	ug/L	0.50	93	80	120			
1,3-Dichloropropane		4.68	ug/L	0.50	94	70	130			
2,2-Dichloropropane		5.52	ug/L	0.50	110	70	130			
1,1-Dichloropropene		5.16	ug/L	0.50	103	70	130			
cis-1,3-Dichloropropene		4.64	ug/L	0.50	93	70	130			
trans-1,3-Dichloropropene		4.64	ug/L	0.50	93	70	130			
Ethylbenzene		4.64	ug/L	0.50	93	80	120			
Hexachlorobutadiene		4.20	ug/L	0.50	84	70	130			
2-Hexanone		48.0	ug/L	10	96	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277518	
Lab ID: ccv040517	76	Continuing Calibration Verification Standard							04/05/17 09:30	
Iodomethane		6.48	ug/L	1.0	130	70	130			
Isopropylbenzene		4.92	ug/L	0.50	98	70	130			
p-Isopropyltoluene		4.76	ug/L	0.50	95	70	130			
Methyl tert-butyl ether (MTBE)		5.04	ug/L	0.50	101	70	130			
Methyl ethyl ketone		51.2	ug/L	10	102	70	130			
Methyl isobutyl ketone		47.2	ug/L	10	94	70	130			
Methylene chloride		5.76	ug/L	0.50	115	70	130			
Naphthalene		4.32	ug/L	0.50	86	70	130			
n-Propylbenzene		4.80	ug/L	0.50	96	70	130			
Styrene		4.40	ug/L	0.50	88	70	130			
1,1,1,2-Tetrachloroethane		4.56	ug/L	0.50	91	70	130			
1,1,2,2-Tetrachloroethane		4.84	ug/L	0.50	97	70	130			
Tetrachloroethene		4.40	ug/L	0.50	88	70	130			
Toluene		4.52	ug/L	0.50	90	80	120			
1,2,3-Trichlorobenzene		3.42	ug/L	0.50	68	70	130			S
1,2,4-Trichlorobenzene		4.40	ug/L	0.50	88	70	130			
1,1,1-Trichloroethane		5.56	ug/L	0.50	111	70	130			
1,1,2-Trichloroethane		4.52	ug/L	0.50	90	70	130			
Trichloroethene		4.72	ug/L	0.50	94	70	130			
Trichlorofluoromethane		4.72	ug/L	0.50	94	70	130			
1,2,3-Trichloropropane		4.80	ug/L	0.50	96	70	130			
1,2,4-Trimethylbenzene		4.80	ug/L	0.50	96	70	130			
1,3,5-Trimethylbenzene		4.76	ug/L	0.50	95	70	130			
Vinyl acetate		5.08	ug/L	1.0	102	70	130			
Vinyl chloride		4.68	ug/L	0.50	94	80	120			
m+p-Xylenes		8.60	ug/L	0.50	86	70	130			
o-Xylene		4.48	ug/L	0.50	90	70	130			
Xylenes, Total		13.1	ug/L	0.50	87	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	110	70	130			
Surr: Dibromofluoromethane				0.50	101	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	91	79	122			
Method: SW8260B									Batch: B_R277518	
Lab ID: lcs040517	76	Laboratory Control Sample				Run: SUB-B277518			04/05/17 15:40	
Acetonitrile		55.6	ug/L	20	111	54	142			
Acetone		52.8	ug/L	10	106	62	130			
Acrolein		58.4	ug/L	20	117	22	203			
Acrylonitrile		48.8	ug/L	10	98	60	130			
Benzene		4.64	ug/L	0.50	93	71	133			
Bromobenzene		4.92	ug/L	0.50	98	78	133			
Bromochloromethane		4.76	ug/L	0.50	95	68	131			
Bromodichloromethane		4.72	ug/L	0.50	94	67	138			
Bromoform		4.76	ug/L	0.50	95	64	136			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277518
Lab ID: lcs040517	76	Laboratory Control Sample				Run: SUB-B277518				04/05/17 15:40
Bromomethane		5.00	ug/L	0.50	100	60	138			
n-Butylbenzene		4.80	ug/L	0.50	96	72	135			
sec-Butylbenzene		4.56	ug/L	0.50	91	73	135			
tert-Butylbenzene		4.68	ug/L	0.50	94	69	137			
Carbon disulfide		4.72	ug/L	0.50	94	46	145			
Carbon tetrachloride		4.84	ug/L	0.50	97	61	144			
Chlorobenzene		4.36	ug/L	0.50	87	78	136			
Chlorodibromomethane		4.76	ug/L	0.50	95	72	136			
Chloroethane		4.40	ug/L	0.50	88	64	136			
2-Chloroethyl vinyl ether		3.27	ug/L	0.50	65	64	132			
Chloroform		5.00	ug/L	0.50	100	69	133			
Chloromethane		3.65	ug/L	0.50	73	63	149			
2-Chlorotoluene		4.88	ug/L	0.50	98	74	135			
4-Chlorotoluene		4.96	ug/L	0.50	99	79	135			
1,2-Dibromo-3-chloropropane		4.44	ug/L	1.0	89	63	125			
1,2-Dibromoethane		4.24	ug/L	0.50	85	75	131			
Dibromomethane		4.68	ug/L	0.50	94	72	133			
1,2-Dichlorobenzene		4.72	ug/L	0.50	94	78	129			
1,3-Dichlorobenzene		4.80	ug/L	0.50	96	79	132			
1,4-Dichlorobenzene		4.76	ug/L	0.50	95	78	131			
Dichlorodifluoromethane		4.76	ug/L	0.50	95	55	141			
1,1-Dichloroethane		4.32	ug/L	0.50	86	72	130			
1,2-Dichloroethane		4.88	ug/L	0.50	98	57	146			
1,1-Dichloroethene		4.48	ug/L	0.50	90	66	142			
cis-1,2-Dichloroethene		4.52	ug/L	0.50	90	74	133			
trans-1,2-Dichloroethene		4.76	ug/L	0.50	95	76	138			
1,2-Dichloropropane		4.52	ug/L	0.50	90	72	135			
1,3-Dichloropropane		4.24	ug/L	0.50	85	75	134			
2,2-Dichloropropane		4.88	ug/L	0.50	98	42	167			
1,1-Dichloropropene		4.48	ug/L	0.50	90	72	140			
cis-1,3-Dichloropropene		4.12	ug/L	0.50	82	75	132			
trans-1,3-Dichloropropene		4.32	ug/L	0.50	86	77	145			
Ethylbenzene		4.48	ug/L	0.50	90	78	131			
Hexachlorobutadiene		3.88	ug/L	0.50	78	65	141			
2-Hexanone		48.8	ug/L	10	98	72	131			
Iodomethane		6.44	ug/L	1.0	129	66	132			
Isopropylbenzene		4.88	ug/L	0.50	98	72	135			
p-Isopropyltoluene		4.44	ug/L	0.50	89	71	134			
Methyl tert-butyl ether (MTBE)		4.76	ug/L	0.50	95	58	151			
Methyl ethyl ketone		48.0	ug/L	10	96	55	145			
Methyl isobutyl ketone		48.0	ug/L	10	96	73	129			
Methylene chloride		5.52	ug/L	0.50	110	73	126			
Naphthalene		4.64	ug/L	0.50	93	55	139			
n-Propylbenzene		4.68	ug/L	0.50	94	70	139			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277518
Lab ID: lcs040517	76	Laboratory Control Sample				Run: SUB-B277518				04/05/17 15:40
Styrene		4.28	ug/L	0.50	86	76	134			
1,1,1,2-Tetrachloroethane		4.20	ug/L	0.50	84	75	135			
1,1,2,2-Tetrachloroethane		4.76	ug/L	0.50	95	72	132			
Tetrachloroethene		4.32	ug/L	0.50	86	78	137			
Toluene		4.48	ug/L	0.50	90	78	134			
1,2,3-Trichlorobenzene		3.67	ug/L	0.50	73	42	152			
1,2,4-Trichlorobenzene		4.40	ug/L	0.50	88	58	142			
1,1,1-Trichloroethane		4.64	ug/L	0.50	93	64	141			
1,1,2-Trichloroethane		4.36	ug/L	0.50	87	72	133			
Trichloroethene		4.48	ug/L	0.50	90	75	138			
Trichlorofluoromethane		3.97	ug/L	0.50	79	58	139			
1,2,3-Trichloropropane		4.76	ug/L	0.50	95	67	133			
1,2,4-Trimethylbenzene		4.68	ug/L	0.50	94	71	129			
1,3,5-Trimethylbenzene		4.64	ug/L	0.50	93	68	135			
Vinyl acetate		4.16	ug/L	1.0	83	31	124			
Vinyl chloride		4.36	ug/L	0.50	87	66	140			
m+p-Xylenes		8.64	ug/L	0.50	86	78	133			
o-Xylene		4.20	ug/L	0.50	84	79	136			
Xylenes, Total		12.8	ug/L	0.50	86	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	102	70	130			
Surr: Dibromofluoromethane				0.50	99	77	126			
Surr: p-Bromofluorobenzene				0.50	106	76	127			
Surr: Toluene-d8				0.50	94	79	122			
Lab ID: blk040517	76	Method Blank				Run: SUB-B277518				04/05/17 16:09
Acetonitrile		ND	ug/L	20						
Acetone		ND	ug/L	10						
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	3.0						
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon disulfide		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
2-Chloroethyl vinyl ether		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277518
Lab ID: blk040517	76	Method Blank				Run: SUB-B277518				04/05/17 16:09
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromo-3-chloropropane		ND	ug/L	1.0						
1,2-Dibromoethane		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.30						
trans-1,3-Dichloropropene		ND	ug/L	0.30						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
2-Hexanone		ND	ug/L	10						
Iodomethane		ND	ug/L	1.0						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methyl isobutyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277518	
Lab ID: blk040517	76	Method Blank				Run: SUB-B277518			04/05/17 16:09	
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl acetate		ND	ug/L	1.0						
Vinyl chloride		ND	ug/L	0.40						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	99	70	130			
Surr: Dibromofluoromethane				0.50	100	77	126			
Surr: p-Bromofluorobenzene				0.50	104	76	127			
Surr: Toluene-d8				0.50	94	79	122			
Lab ID: H17030385-001G	7	Sample Matrix Spike				Run: SUB-B277518			04/05/17 19:05	
Acrolein		17.6	ug/L	20	35	22	203			
Acrylonitrile		49.6	ug/L	10	99	60	130			
2-Chloroethyl vinyl ether		3.57	ug/L	0.50	71	64	132			
Surr: 1,2-Dichloroethane-d4				0.50	101	70	130			
Surr: Dibromofluoromethane				0.50	100	77	126			
Surr: p-Bromofluorobenzene				0.50	104	76	127			
Surr: Toluene-d8				0.50	96	79	122			
Lab ID: H17030385-001G	7	Sample Matrix Spike Duplicate				Run: SUB-B277518			04/05/17 20:03	
Acrolein		12.7	ug/L	20	25	22	203		20	
Acrylonitrile		52.4	ug/L	10	105	60	130	5.5	20	
2-Chloroethyl vinyl ether		3.59	ug/L	0.50	72	64	132	0.6	20	
Surr: 1,2-Dichloroethane-d4				0.50	102	70	130			
Surr: Dibromofluoromethane				0.50	100	77	126			
Surr: p-Bromofluorobenzene				0.50	104	76	127			
Surr: Toluene-d8				0.50	96	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030385

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277573	
Lab ID: lcsA040517	7	Laboratory Control Sample				Run: SUB-B277573			04/05/17 22:01	
Acrolein		58.8	ug/L	20	118	22	203			
Acrylonitrile		57.2	ug/L	10	114	60	130			
2-Chloroethyl vinyl ether		3.64	ug/L	0.50	73	64	132			
Surr: 1,2-Dichloroethane-d4				0.50	104	70	130			
Surr: Dibromofluoromethane				0.50	101	77	126			
Surr: p-Bromofluorobenzene				0.50	104	76	127			
Surr: Toluene-d8				0.50	96	79	122			
Lab ID: blkA040517	7	Method Blank				Run: SUB-B277573			04/05/17 22:59	
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	10						
2-Chloroethyl vinyl ether		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	115	70	130			
Surr: Dibromofluoromethane				0.50	111	77	126			
Surr: p-Bromofluorobenzene				0.50	112	76	127			
Surr: Toluene-d8				0.50	96	79	122			
Method: SW8260B									Analytical Run: B_R277674	
Lab ID: ccv040717	2	Continuing Calibration Verification Standard							04/07/17 08:16	
Chloroform		5.16	ug/L	0.50	103	80	120			
Tetrachloroethene		4.64	ug/L	0.50	93	70	130			
Method: SW8260B									Batch: B_R277674	
Lab ID: lcs040717	2	Laboratory Control Sample				Run: SUB-B277674			04/07/17 09:44	
Chloroform		5.44	ug/L	0.50	109	69	133			
Tetrachloroethene		4.64	ug/L	0.50	93	78	137			
Lab ID: blk040717	2	Method Blank				Run: SUB-B277674			04/07/17 11:41	
Chloroform		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17030385

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\rtooke

Reviewed Date: 3/28/2017

Date Received: 3/24/2017

Received by: TLL

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	0.2°C On Ice		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☑	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Total organic carbon samples MW-3, MW-7 and MW-2 - one vial and MW-3D - two vials were preserved with phosphoric acid upon receipt to pH <2 in the laboratory. tl 3/24/17

ENERGY LAB

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information (Billing information)

Company/Name	HydroSolutions
Contact	Rye Surrgen
Phone	406 443 6169 x 100
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	rye.s@hydrosi.com
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	1382
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	Rye Surrgen
Sampler Phone	406 671 2446
Sample Origin State	MT
EPA/State Compliance	☒Yes ☐ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	MW-1	3/22/17	1545		W	X		H17030385
2	MW-3	3/23/17	1150		W			
3	MW-3D	3/23/17	1200		W			
4	MW-7	3/23/17	1500		W			
5	MW-2	3/23/17	1720		W			
6								
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Rye Surrgen	3/24/17 0907				
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
					3/29/17 9:07	

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
Hand	4	Y (N) C B	Y N	0.2 °C	(Y) N	(Y) N	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

BOTTLE ORDER 23504

SHIPPED TO: MT DEQ Remediation Division

Contact: Laura Alvey
PO Box 200901
Helena MT 59620-0901
Phone:
Project: Helena Solvent site

Order Created by: Wanda Johnson
Shipped From: Helena, MT
Ship Date: 3/21/2017
VIA: Hand Del
Quote Used: 1382

Bottle Size/Type	Bottles Per Samp	Method	Tests	Critical Hold Time	Preservative	Notes	Num of Samp
Natural Attenuation (5 Sets)							
250 mL Plastic	1	E300.0	Anions by Ion Chromatography				1
		A2510 B	Conductivity				
		A2320 B	Alkalinity				
250 mL Plastic	1	E353.2	Nitrogen, Nitrite	48 hrs			1
250 mL Plastic	1	E200.7_8	Metals by ICP/ICPMS, Dissolved		■ HNO3		1
250 mL Plastic	1	E200.7_8	Metals by ICP/ICPMS, Total		■ HNO3		1
		Calculation	Iron, Ferric				
250 mL Plastic	1	A4500-S F	Sulfide, Iodine Titrimetric		■ ZnAc	Zero headspace	1
		A4500-S F	Sulfide, Iodine Titrimetric		■ NaOH		
40 mL Clear Glass VOA	2	SW8015M	Methane		□ H2SO4	Zero headspace	1
40 mL Amber Glass VOA	3	A5310 C	Carbon, Total Organic		□ H3PO4		1
250 mL Plastic	1	E353.2	Nitrogen, Nitrate + Nitrite		□ H2SO4		1
		E353.2	Nitrogen, Nitrate				
Trip Blank 8260 LONG							
40 mL Clear Glass VOA	1	SW8260B	8260-Volatile Organic Compounds-Extended List		■ HCL	Trip Blank. Do not open, return with cooler. Zero headspace	1

(8 Sets)							
40 mL Clear Glass VOA	6	SW8260B	8260-Volatile Organic Compounds-Extended List		■ HCL	3 Preserved & 3 Unpreserved Zero headspace	1

Comments

Quote for David Donohue w/Hydrosolutions

■ HNO3 - Nitric Acid	☐ H2SO4 - Sulfuric Acid	■ NaOH - Sodium Hydroxide	**We strongly suggest that the samples are shipped the same day as they are collected.**
■ ZnAc - Zinc Acetate	■ HCl - Hydrochloric Acid	☐ H3PO4 - Phosphoric Acid	

Material Safety Data Sheets(MSDS) Available @ EnergyLab.com ->Services -> MSDS Sheets

Corrosive Chemicals: Nitric, Sulfuric, Phosphoric, Hydrochloric Acids and Sodium Hydroxide. Zinc Acetate is a skin irritant.

Subcontracting of sample analyses to an outside laboratory may be required. If so, Energy Laboratories will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

ANALYTICAL SUMMARY REPORT

April 11, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17030396 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 2 samples for HydroSolutions on 3/24/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17030396-001	R-Blank	03/24/17 12:45	03/24/17	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Total Alkalinity Conductivity Carbon, Total Organic Methane Anions by Ion Chromatography Iron, Ferric Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Nitrogen, Nitrate Metals Digestion by EPA 200.2 Sulfide, Iodine Titrimetric 8260-Volatile Organic Compounds-Extended List
H17030396-002	TB6281	03/24/17 12:45	03/24/17	Trip Blank	8260-Volatile Organic Compounds-Extended List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17030396

Report Date: 04/11/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030396-001
Client Sample ID: R-Blank

Report Date: 04/11/17
Collection Date: 03/24/17 12:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity @ 25 C	6	umhos/cm		1		A2510 B	03/27/17 17:48 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	03/27/17 15:53 / cmm
Hydroxide as OH	ND	mg/L		4		A2320 B	03/27/17 15:53 / cmm
Chloride	ND	mg/L		1.0		E300.0	03/28/17 20:57 / SRW
Sulfate	ND	mg/L		1.0		E300.0	03/28/17 20:57 / SRW
Sulfide	ND	mg/L		1		A4500-S F	03/28/17 08:45 / eli-b
AGGREGATE ORGANICS							
Organic Carbon, Total (TOC)	ND	mg/L		0.5		A5310 C	03/31/17 15:25 / eli-ca
NUTRIENTS							
Nitrogen, Nitrate as N	ND	mg/L		0.01		E353.2	03/30/17 09:46 / abc
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.01		E353.2	03/27/17 13:38 / cmm
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	03/24/17 15:38 / cmm
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.001		E200.8	04/02/17 21:23 / dck
Iron	ND	mg/L		0.02		E200.8	04/02/17 21:23 / dck
Iron, Ferrous	ND	mg/L		0.02		E200.8	04/02/17 21:23 / dck
Manganese	ND	mg/L		0.001		E200.8	04/02/17 21:23 / dck
METALS, TOTAL							
Iron	ND	mg/L		0.02		E200.7	03/28/17 11:56 / sld
Iron, Ferric	ND	mg/L		0.03		Calculation	04/11/17 12:56 / abc
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/06/17 14:15 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/06/17 14:15 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/06/17 11:48 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/06/17 11:48 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030396-001
Client Sample ID: R-Blank

Report Date: 04/11/17
Collection Date: 03/24/17 12:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Chloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/06/17 11:48 / eli-b16
Chloroform	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
2-Hexanone	ND	ug/L		20		SW8260B	04/06/17 14:15 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/06/17 14:15 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/06/17 14:15 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Tetrachloroethene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030396-001
Client Sample ID: R-Blank

Report Date: 04/11/17
Collection Date: 03/24/17 12:45
DateReceived: 03/24/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/06/17 14:15 / eli-b16
Surr: 1,2-Dichloroethane-d4	100	%REC		70-130		SW8260B	04/06/17 11:48 / eli-b16
Surr: 1,2-Dichloroethane-d4	99.0	%REC		70-130		SW8260B	04/06/17 14:15 / eli-b16
Surr: Dibromofluoromethane	100	%REC		77-126		SW8260B	04/06/17 11:48 / eli-b16
Surr: Dibromofluoromethane	98.0	%REC		77-126		SW8260B	04/06/17 14:15 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	04/06/17 11:48 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	04/06/17 14:15 / eli-b16
Surr: Toluene-d8	92.0	%REC		79-122		SW8260B	04/06/17 11:48 / eli-b16
Surr: Toluene-d8	92.0	%REC		79-122		SW8260B	04/06/17 14:15 / eli-b16
ORGANIC CHARACTERISTICS							
Methane	ND	mg/L		0.001		SW8015M	03/30/17 13:13 / eli-b
Ethane	ND	mg/L		0.001		SW8015M	03/30/17 13:13 / eli-b
Ethene	ND	mg/L		0.001		SW8015M	03/30/17 13:13 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030396-002
Client Sample ID: TB6281

Report Date: 04/11/17
Collection Date: 03/24/17 12:45
DateReceived: 03/24/17
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/06/17 13:16 / eli-b16
Acetone	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Acrolein	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Bromobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Bromodichloromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Bromoform	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Bromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Chloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Chloroform	0.36	ug/L	J	1.0		SW8260B	04/06/17 13:16 / eli-b16
Chloromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Dibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030396-002
Client Sample ID: TB6281

Report Date: 04/11/17
Collection Date: 03/24/17 12:45
DateReceived: 03/24/17
Matrix: Trip Blank

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Hexanone	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Iodomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/06/17 13:16 / eli-b16
Methylene chloride	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Naphthalene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Styrene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Tetrachloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Toluene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Trichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
o-Xylene	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/06/17 13:16 / eli-b16
Surr: 1,2-Dichloroethane-d4	97.0	%REC		70-130		SW8260B	04/06/17 13:16 / eli-b16
Surr: Dibromofluoromethane	99.0	%REC		77-126		SW8260B	04/06/17 13:16 / eli-b16
Surr: p-Bromofluorobenzene	103	%REC		76-127		SW8260B	04/06/17 13:16 / eli-b16
Surr: Toluene-d8	93.0	%REC		79-122		SW8260B	04/06/17 13:16 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R123682
Lab ID: MBLK	Method Blank					Run: PHSC_101-H_170327A				03/27/17 14:37
Alkalinity, Total as CaCO3		2	mg/L	0.7						
Lab ID: LCS	Laboratory Control Sample					Run: PHSC_101-H_170327A				03/27/17 14:42
Alkalinity, Total as CaCO3		630	mg/L	4.0	105	90	110			
Lab ID: H17030395-014ADUP	Sample Duplicate					Run: PHSC_101-H_170327A				03/27/17 14:59
Alkalinity, Total as CaCO3		160	mg/L	4.0				0.2	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: PHSC_101-H_170327A		
Lab ID: CCV - SC 1413		Continuing Calibration Verification Standard							03/27/17 17:17	
Conductivity @ 25 C		1330	umhos/cm	1.0	94	90	110			
Method: A2510 B									Batch: R123682	
Lab ID: SC 150		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A			03/27/17 09:37	
Conductivity @ 25 C		145	umhos/cm	1.0	97	90	110			
Lab ID: SC 5000		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A			03/27/17 09:40	
Conductivity @ 25 C		4630	umhos/cm	1.0	93	90	110			
Lab ID: SC 20000		Initial Calibration Verification Standard				Run: PHSC_101-H_170327A			03/27/17 09:42	
Conductivity @ 25 C		18200	umhos/cm	1.0	91	90	110			
Lab ID: SC 1000		Laboratory Control Sample				Run: PHSC_101-H_170327A			03/27/17 09:45	
Conductivity @ 25 C		939	umhos/cm	1.0	94	90	110			
Lab ID: H17030395-014ADUP		Sample Duplicate				Run: PHSC_101-H_170327A			03/27/17 17:26	
Conductivity @ 25 C		308	umhos/cm	1.0				0.1	10	
Lab ID: H17030404-001ADUP		Sample Duplicate				Run: PHSC_101-H_170327A			03/27/17 17:54	
Conductivity @ 25 C		427	umhos/cm	1.0				0.5	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**A4500-S F**									Batch: B_ttrsulfide170328A	
Lab ID:	**MBLK**	Method Blank					Run: SUB-B277075			03/28/17 08:45	
Sulfide			ND	mg/L	0.3						
Lab ID:	**LCS**	Laboratory Control Sample					Run: SUB-B277075			03/28/17 08:45	
Sulfide			23.5	mg/L	1.0	100	90	110			
Lab ID:	**B17031980-004EMS**	Sample Matrix Spike					Run: SUB-B277075			03/28/17 08:45	
Sulfide			25.7	mg/L	1.0	100	70	130			
Lab ID:	**B17031980-004EMSD**	Sample Matrix Spike Duplicate					Run: SUB-B277075			03/28/17 08:45	
Sulfide			25.4	mg/L	1.0	99	70	130	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A5310 C									Analytical Run: SUB-C221443	
Lab ID: ICV-9269		Initial Calibration Verification Standard							03/31/17 12:17	
Organic Carbon, Total (TOC)		5.07	mg/L	0.50	101	90	110			
Method: A5310 C									Batch: C_R221443	
Lab ID: MBLK		Method Blank				Run: SUB-C221443			03/31/17 12:41	
Organic Carbon, Total (TOC)		0.02	mg/L	0.02						
Lab ID: LCS-9269		Laboratory Control Sample				Run: SUB-C221443			04/01/17 11:39	
Organic Carbon, Total (TOC)		5.31	mg/L	0.50	106	90	110			
Lab ID: C17030919-003DMS		Sample Matrix Spike				Run: SUB-C221443			04/01/17 12:23	
Organic Carbon, Total (TOC)		21.8	mg/L	2.0	104	85	115			
Lab ID: C17030919-003DMSD		Sample Matrix Spike Duplicate				Run: SUB-C221443			04/01/17 12:33	
Organic Carbon, Total (TOC)		21.7	mg/L	2.0	104	85	115	0.3	20	
Lab ID: C17030871-001DMS		Sample Matrix Spike				Run: SUB-C221443			03/31/17 13:21	
Organic Carbon, Total (TOC)		21.1	mg/L	2.0	104	85	115			
Lab ID: C17030871-001DMSD		Sample Matrix Spike Duplicate				Run: SUB-C221443			03/31/17 13:31	
Organic Carbon, Total (TOC)		21.1	mg/L	2.0	104	85	115	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.7**									Analytical Run: ICP2-HE_170328A	
Lab ID:	**ICV**	Initial Calibration Verification Standard								03/28/17 09:11	
Iron			3.96	mg/L	0.020	99	95	105			
Lab ID:	**CCV-1**	Continuing Calibration Verification Standard								03/28/17 09:15	
Iron			2.49	mg/L	0.020	100	95	105			
Lab ID:	**ICSA**	Interference Check Sample A								03/28/17 09:26	
Iron			178	mg/L	0.020	89	80	120			
Lab ID:	**ICSAB**	Interference Check Sample AB								03/28/17 09:30	
Iron			181	mg/L	0.020	91	80	120			
Lab ID:	**CCV**	Continuing Calibration Verification Standard								03/28/17 11:30	
Iron			2.62	mg/L	0.020	105	90	110			
Method:	**E200.7**									Batch: 36649	
Lab ID:	**MB-36649**	Method Blank					Run: ICP2-HE_170328A			03/28/17 10:12	
Iron			0.003	mg/L	0.003						
Lab ID:	**LCS-36649**	Laboratory Control Sample					Run: ICP2-HE_170328A			03/28/17 10:15	
Iron			2.54	mg/L	0.020	102	85	115			
Lab ID:	**H17030392-002ADIL**	Serial Dilution					Run: ICP2-HE_170328A			03/28/17 11:41	
Iron			ND	mg/L	0.020		0	0		10	
Lab ID:	**H17030392-002AMS3**	Sample Matrix Spike					Run: ICP2-HE_170328A			03/28/17 11:49	
Iron			2.55	mg/L	0.020	102	70	130			
Lab ID:	**H17030392-002AMSD**	Sample Matrix Spike Duplicate					Run: ICP2-HE_170328A			03/28/17 11:52	
Iron			2.55	mg/L	0.020	102	70	130	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E200.8**							Analytical Run: ICPMS205-H_170402A			
Lab ID:	**ICV**	3	Initial Calibration Verification Standard								04/02/17 13:36
Arsenic			0.0602	mg/L	0.0050	100	90	110			
Iron			0.300	mg/L	0.020	100	90	110			
Manganese			0.300	mg/L	0.010	100	90	110			
Lab ID:	**ICSA**	3	Interference Check Sample A								04/02/17 13:38
Arsenic			-9.59E-06	mg/L	0.0050						
Iron			101	mg/L	0.020	101	70	130			
Manganese			0.000230	mg/L	0.010						
Lab ID:	**ICSAB**	3	Interference Check Sample AB								04/02/17 13:40
Arsenic			0.0108	mg/L	0.0050	108	70	130			
Iron			103	mg/L	0.020	103	70	130			
Manganese			0.0213	mg/L	0.010	107	70	130			
Lab ID:	**ICSA**	3	Interference Check Sample A								04/03/17 06:38
Arsenic			2.18E-06	mg/L	0.0050						
Iron			101	mg/L	0.020	101	70	130			
Manganese			9.56E-05	mg/L	0.010						
Lab ID:	**ICSAB**	3	Interference Check Sample AB								04/03/17 06:40
Arsenic			0.0107	mg/L	0.0050	107	70	130			
Iron			101	mg/L	0.020	101	70	130			
Manganese			0.0212	mg/L	0.010	106	70	130			
Lab ID:	**ICV**	3	Initial Calibration Verification Standard								04/03/17 09:13
Arsenic			0.0568	mg/L	0.0050	95	90	110			
Iron			0.284	mg/L	0.020	95	90	110			
Manganese			0.285	mg/L	0.010	95	90	110			
Method:	**E200.8**										Batch: R123887
Lab ID:	**LRB**	3	Method Blank				Run: ICPMS205-H_170402A				04/02/17 14:24
Arsenic			ND	mg/L	1E-05						
Iron			ND	mg/L	0.0002						
Manganese			ND	mg/L	2E-05						
Lab ID:	**LFB**	3	Laboratory Fortified Blank				Run: ICPMS205-H_170402A				04/02/17 14:26
Arsenic			0.0514	mg/L	0.0050	103	85	115			
Iron			0.164	mg/L	0.020	110	85	115			
Manganese			0.0520	mg/L	0.010	104	85	115			
Lab ID:	**H17030395-019BMS**	3	Sample Matrix Spike				Run: ICPMS205-H_170402A				04/02/17 21:08
Arsenic			0.0522	mg/L	0.0010	103	70	130			
Iron			0.166	mg/L	0.020	109	70	130			
Manganese			0.0525	mg/L	0.0010	104	70	130			
Lab ID:	**H17030395-019BMSD**	3	Sample Matrix Spike Duplicate				Run: ICPMS205-H_170402A				04/02/17 21:09
Arsenic			0.0517	mg/L	0.0010	102	70	130	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R123887
Lab ID: H17030395-019BMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS205-H_170402A			04/02/17 21:09	
Iron		0.164	mg/L	0.020	108	70	130	0.8	20	
Manganese		0.0521	mg/L	0.0010	103	70	130	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**							Analytical Run: IC METROHM_170328A			
Lab ID:	**ICV**	2	Initial Calibration Verification Standard							03/28/17 11:27	
Chloride			110	mg/L	1.0	109	90	110			
Sulfate			440	mg/L	1.0	109	90	110			
Lab ID:	**CCV**	2	Continuing Calibration Verification Standard							03/28/17 18:14	
Chloride			110	mg/L	1.0	108	90	110			
Sulfate			430	mg/L	1.0	107	90	110			
Method:	**E300.0**									Batch: R123773	
Lab ID:	**ICB**	2	Method Blank				Run: IC METROHM_170328A			03/28/17 10:05	
Chloride			0.03	mg/L	0.008						
Sulfate			ND	mg/L	0.08						
Lab ID:	**LFB**	2	Laboratory Fortified Blank				Run: IC METROHM_170328A			03/28/17 11:40	
Chloride			52	mg/L	1.0	105	90	110			
Sulfate			210	mg/L	1.0	105	90	110			
Lab ID:	**H17030396-001AMS**	2	Sample Matrix Spike				Run: IC METROHM_170328A			03/28/17 21:11	
Chloride			52	mg/L	1.0	105	90	110			
Sulfate			210	mg/L	1.0	104	90	110			
Lab ID:	**H17030396-001AMSD**	2	Sample Matrix Spike Duplicate				Run: IC METROHM_170328A			03/28/17 21:24	
Chloride			52	mg/L	1.0	105	90	110	0.1	20	
Sulfate			210	mg/L	1.0	104	90	110	0.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_170324D	
Lab ID: ICV		Initial Calibration Verification Standard							03/24/17 15:33	
Nitrogen, Nitrite as N		1.02	mg/L	0.010	102	90	110			
Method: E353.2									Batch: R123670	
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_170324D			03/24/17 15:35	
Nitrogen, Nitrite as N		1.02	mg/L	0.011	102	90	110			
Lab ID: MBLK		Method Blank				Run: FIA203-HE_170324D			03/24/17 15:36	
Nitrogen, Nitrite as N		ND	mg/L	0.002						
Lab ID: H17030396-001AMS		Sample Matrix Spike				Run: FIA203-HE_170324D			03/24/17 15:39	
Nitrogen, Nitrite as N		1.01	mg/L	0.011	101	90	110			
Lab ID: H17030396-001AMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_170324D			03/24/17 15:41	
Nitrogen, Nitrite as N		1.03	mg/L	0.011	103	90	110	1.8	20	
Method: E353.2									Analytical Run: FIA203-HE_170327A	
Lab ID: ICV		Initial Calibration Verification Standard							03/27/17 12:39	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.010	101	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard							03/27/17 13:32	
Nitrogen, Nitrate+Nitrite as N		0.501	mg/L	0.010	100	90	110			
Method: E353.2									Batch: R123699	
Lab ID: MBLK		Method Blank				Run: FIA203-HE_170327A			03/27/17 12:40	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.008						
Lab ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_170327A			03/27/17 12:42	
Nitrogen, Nitrate+Nitrite as N		1.08	mg/L	0.011	108	90	110			
Lab ID: H17030395-021CMS		Sample Matrix Spike				Run: FIA203-HE_170327A			03/27/17 13:34	
Nitrogen, Nitrate+Nitrite as N		1.07	mg/L	0.011	107	90	110			
Lab ID: H17030395-021CMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_170327A			03/27/17 13:36	
Nitrogen, Nitrate+Nitrite as N		1.05	mg/L	0.011	105	90	110	1.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**SW8015M**									Analytical Run: B_R277249	
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							03/30/17 11:20	
Methane			511	ppm	2.0	102	85	115			
Ethane			509	ppm	2.0	102	85	115			
Ethene			511	ppm	2.0	102	85	115			
Lab ID:	**CCV**	3	Continuing Calibration Verification Standard							03/30/17 13:34	
Methane			515	ppm	2.0	103	85	115			
Ethane			509	ppm	2.0	102	85	115			
Ethene			511	ppm	2.0	102	85	115			
Method:	**SW8015M**									Batch: B_R277249	
Lab ID:	**MBLK**	3	Method Blank				Run: SUB-B277249			03/30/17 08:37	
Methane			ND	mg/L	0.0010						
Ethane			ND	mg/L	0.0010						
Ethene			ND	mg/L	0.0010						
Lab ID:	**LCS**	3	Laboratory Control Sample				Run: SUB-B277249			03/30/17 11:28	
Methane			101	ppm	2.0	101	85	115			
Ethane			90.0	ppm	2.0	90	85	115			
Ethene			90.2	ppm	2.0	90	85	115			
Lab ID:	**B17031980-004FDUP**	3	Sample Duplicate				Run: SUB-B277249			03/30/17 12:51	
Methane			ND	mg/L	0.0010					20	
Ethane			ND	mg/L	0.0010					20	
Ethene			ND	mg/L	0.0010					20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277630	
Lab ID: ccv040617	76	Continuing Calibration Verification Standard							04/06/17 08:41	
Acetonitrile		58.8	ug/L	20	118	70	130			
Acetone		57.2	ug/L	10	114	70	130			
Acrolein		60.0	ug/L	20	120	70	130			
Acrylonitrile		51.6	ug/L	10	103	70	130			
Benzene		5.00	ug/L	0.50	100	70	130			
Bromobenzene		5.16	ug/L	0.50	103	70	130			
Bromochloromethane		5.20	ug/L	0.50	104	70	130			
Bromodichloromethane		4.76	ug/L	0.50	95	70	130			
Bromoform		5.16	ug/L	0.50	103	70	130			
Bromomethane		4.88	ug/L	0.50	98	70	130			
n-Butylbenzene		5.08	ug/L	0.50	102	70	130			
sec-Butylbenzene		4.92	ug/L	0.50	98	70	130			
tert-Butylbenzene		5.08	ug/L	0.50	102	70	130			
Carbon disulfide		5.08	ug/L	0.50	102	70	130			
Carbon tetrachloride		5.20	ug/L	0.50	104	70	130			
Chlorobenzene		4.64	ug/L	0.50	93	70	130			
Chlorodibromomethane		4.96	ug/L	0.50	99	70	130			
Chloroethane		4.76	ug/L	0.50	95	70	130			
2-Chloroethyl vinyl ether		3.82	ug/L	0.50	76	70	130			
Chloroform		5.16	ug/L	0.50	103	80	120			
Chloromethane		3.99	ug/L	0.50	80	70	130			
2-Chlorotoluene		5.20	ug/L	0.50	104	70	130			
4-Chlorotoluene		5.28	ug/L	0.50	106	70	130			
1,2-Dibromo-3-chloropropane		5.04	ug/L	1.0	101	70	130			
1,2-Dibromoethane		4.68	ug/L	0.50	94	70	130			
Dibromomethane		5.00	ug/L	0.50	100	70	130			
1,2-Dichlorobenzene		5.16	ug/L	0.50	103	70	130			
1,3-Dichlorobenzene		5.24	ug/L	0.50	105	70	130			
1,4-Dichlorobenzene		5.08	ug/L	0.50	102	70	130			
Dichlorodifluoromethane		4.48	ug/L	0.50	90	70	130			
1,1-Dichloroethane		4.68	ug/L	0.50	94	70	130			
1,2-Dichloroethane		5.40	ug/L	0.50	108	70	130			
1,1-Dichloroethene		4.64	ug/L	0.50	93	80	120			
cis-1,2-Dichloroethene		4.76	ug/L	0.50	95	70	130			
trans-1,2-Dichloroethene		4.80	ug/L	0.50	96	70	130			
1,2-Dichloropropane		5.00	ug/L	0.50	100	80	120			
1,3-Dichloropropane		4.84	ug/L	0.50	97	70	130			
2,2-Dichloropropane		5.16	ug/L	0.50	103	70	130			
1,1-Dichloropropene		5.12	ug/L	0.50	102	70	130			
cis-1,3-Dichloropropene		4.80	ug/L	0.50	96	70	130			
trans-1,3-Dichloropropene		4.80	ug/L	0.50	96	70	130			
Ethylbenzene		4.88	ug/L	0.50	98	80	120			
Hexachlorobutadiene		4.36	ug/L	0.50	87	70	130			
2-Hexanone		52.4	ug/L	10	105	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277630	
Lab ID: ccv040617	76	Continuing Calibration Verification Standard							04/06/17 08:41	
Iodomethane		6.76	ug/L	1.0	135	70	130			S
Isopropylbenzene		5.16	ug/L	0.50	103	70	130			
p-Isopropyltoluene		5.00	ug/L	0.50	100	70	130			
Methyl tert-butyl ether (MTBE)		4.92	ug/L	0.50	98	70	130			
Methyl ethyl ketone		53.6	ug/L	10	107	70	130			
Methyl isobutyl ketone		51.2	ug/L	10	102	70	130			
Methylene chloride		5.72	ug/L	0.50	114	70	130			
Naphthalene		5.56	ug/L	0.50	111	70	130			
n-Propylbenzene		5.16	ug/L	0.50	103	70	130			
Styrene		4.68	ug/L	0.50	94	70	130			
1,1,1,2-Tetrachloroethane		4.68	ug/L	0.50	94	70	130			
1,1,2,2-Tetrachloroethane		5.28	ug/L	0.50	106	70	130			
Tetrachloroethene		4.56	ug/L	0.50	91	70	130			
Toluene		4.76	ug/L	0.50	95	80	120			
1,2,3-Trichlorobenzene		4.24	ug/L	0.50	85	70	130			
1,2,4-Trichlorobenzene		5.04	ug/L	0.50	101	70	130			
1,1,1-Trichloroethane		5.08	ug/L	0.50	102	70	130			
1,1,2-Trichloroethane		4.80	ug/L	0.50	96	70	130			
Trichloroethene		4.84	ug/L	0.50	97	70	130			
Trichlorofluoromethane		4.28	ug/L	0.50	86	70	130			
1,2,3-Trichloropropane		5.24	ug/L	0.50	105	70	130			
1,2,4-Trimethylbenzene		5.00	ug/L	0.50	100	70	130			
1,3,5-Trimethylbenzene		4.92	ug/L	0.50	98	70	130			
Vinyl acetate		5.08	ug/L	1.0	102	70	130			
Vinyl chloride		4.68	ug/L	0.50	94	80	120			
m+p-Xylenes		9.32	ug/L	0.50	93	70	130			
o-Xylene		4.68	ug/L	0.50	94	70	130			
Xylenes, Total		14.0	ug/L	0.50	93	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	101	70	130			
Surr: Dibromofluoromethane				0.50	94	77	126			
Surr: p-Bromofluorobenzene				0.50	103	76	127			
Surr: Toluene-d8				0.50	94	79	122			
Method: SW8260B									Batch: B_R277630	
Lab ID: lcs040617	76	Laboratory Control Sample				Run: SUB-B277630			04/06/17 09:22	
Acetonitrile		63.2	ug/L	20	126	54	142			
Acetone		56.8	ug/L	10	114	62	130			
Acrolein		58.4	ug/L	20	117	22	203			
Acrylonitrile		50.0	ug/L	10	100	60	130			
Benzene		5.28	ug/L	0.50	106	71	133			
Bromobenzene		5.44	ug/L	0.50	109	78	133			
Bromochloromethane		5.36	ug/L	0.50	107	68	131			
Bromodichloromethane		5.36	ug/L	0.50	107	67	138			
Bromoform		5.60	ug/L	0.50	112	64	136			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277630	
Lab ID: lcs040617	76	Laboratory Control Sample				Run: SUB-B277630			04/06/17 09:22	
Bromomethane		5.64	ug/L	0.50	113	60	138			
n-Butylbenzene		5.48	ug/L	0.50	110	72	135			
sec-Butylbenzene		5.16	ug/L	0.50	103	73	135			
tert-Butylbenzene		5.12	ug/L	0.50	102	69	137			
Carbon disulfide		5.16	ug/L	0.50	103	46	145			
Carbon tetrachloride		5.44	ug/L	0.50	109	61	144			
Chlorobenzene		4.92	ug/L	0.50	98	78	136			
Chlorodibromomethane		5.56	ug/L	0.50	111	72	136			
Chloroethane		5.16	ug/L	0.50	103	64	136			
2-Chloroethyl vinyl ether		3.69	ug/L	0.50	74	64	132			
Chloroform		5.52	ug/L	0.50	110	69	133			
Chloromethane		4.08	ug/L	0.50	82	63	149			
2-Chlorotoluene		5.52	ug/L	0.50	110	74	135			
4-Chlorotoluene		5.76	ug/L	0.50	115	79	135			
1,2-Dibromo-3-chloropropane		4.88	ug/L	1.0	98	63	125			
1,2-Dibromoethane		4.84	ug/L	0.50	97	75	131			
Dibromomethane		5.40	ug/L	0.50	108	72	133			
1,2-Dichlorobenzene		5.44	ug/L	0.50	109	78	129			
1,3-Dichlorobenzene		5.68	ug/L	0.50	114	79	132			
1,4-Dichlorobenzene		5.44	ug/L	0.50	109	78	131			
Dichlorodifluoromethane		5.16	ug/L	0.50	103	55	141			
1,1-Dichloroethane		4.72	ug/L	0.50	94	72	130			
1,2-Dichloroethane		5.52	ug/L	0.50	110	57	146			
1,1-Dichloroethene		4.96	ug/L	0.50	99	66	142			
cis-1,2-Dichloroethene		5.04	ug/L	0.50	101	74	133			
trans-1,2-Dichloroethene		5.24	ug/L	0.50	105	76	138			
1,2-Dichloropropane		5.08	ug/L	0.50	102	72	135			
1,3-Dichloropropane		4.76	ug/L	0.50	95	75	134			
2,2-Dichloropropane		5.56	ug/L	0.50	111	42	167			
1,1-Dichloropropene		5.04	ug/L	0.50	101	72	140			
cis-1,3-Dichloropropene		4.72	ug/L	0.50	94	75	132			
trans-1,3-Dichloropropene		4.96	ug/L	0.50	99	77	145			
Ethylbenzene		5.20	ug/L	0.50	104	78	131			
Hexachlorobutadiene		4.76	ug/L	0.50	95	65	141			
2-Hexanone		53.6	ug/L	10	107	72	131			
Iodomethane		7.64	ug/L	1.0	153	66	132			S
Isopropylbenzene		5.56	ug/L	0.50	111	72	135			
p-Isopropyltoluene		5.12	ug/L	0.50	102	71	134			
Methyl tert-butyl ether (MTBE)		4.96	ug/L	0.50	99	58	151			
Methyl ethyl ketone		51.6	ug/L	10	103	55	145			
Methyl isobutyl ketone		53.6	ug/L	10	107	73	129			
Methylene chloride		6.28	ug/L	0.50	126	73	126			
Naphthalene		6.32	ug/L	0.50	126	55	139			
n-Propylbenzene		5.40	ug/L	0.50	108	70	139			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277630
Lab ID: lcs040617	76	Laboratory Control Sample				Run: SUB-B277630				04/06/17 09:22
Styrene		4.88	ug/L	0.50	98	76	134			
1,1,1,2-Tetrachloroethane		4.92	ug/L	0.50	98	75	135			
1,1,2,2-Tetrachloroethane		5.28	ug/L	0.50	106	72	132			
Tetrachloroethene		4.88	ug/L	0.50	98	78	137			
Toluene		5.04	ug/L	0.50	101	78	134			
1,2,3-Trichlorobenzene		5.24	ug/L	0.50	105	42	152			
1,2,4-Trichlorobenzene		5.40	ug/L	0.50	108	58	142			
1,1,1-Trichloroethane		5.20	ug/L	0.50	104	64	141			
1,1,2-Trichloroethane		5.00	ug/L	0.50	100	72	133			
Trichloroethene		5.04	ug/L	0.50	101	75	138			
Trichlorofluoromethane		4.12	ug/L	0.50	82	58	139			
1,2,3-Trichloropropane		5.40	ug/L	0.50	108	67	133			
1,2,4-Trimethylbenzene		5.32	ug/L	0.50	106	71	129			
1,3,5-Trimethylbenzene		5.40	ug/L	0.50	108	68	135			
Vinyl acetate		4.96	ug/L	1.0	99	31	124			
Vinyl chloride		4.88	ug/L	0.50	98	66	140			
m+p-Xylenes		9.80	ug/L	0.50	98	78	133			
o-Xylene		4.96	ug/L	0.50	99	79	136			
Xylenes, Total		14.8	ug/L	0.50	98	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	98	70	130			
Surr: Dibromofluoromethane				0.50	92	77	126			
Surr: p-Bromofluorobenzene				0.50	104	76	127			
Surr: Toluene-d8				0.50	93	79	122			
Lab ID: blk040617	76	Method Blank				Run: SUB-B277630				04/06/17 10:20
Acetonitrile		ND	ug/L	20						
Acetone		ND	ug/L	10						
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	10						
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon disulfide		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
2-Chloroethyl vinyl ether		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277630
Lab ID: blk040617	76	Method Blank				Run: SUB-B277630				04/06/17 10:20
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromo-3-chloropropane		ND	ug/L	1.0						
1,2-Dibromoethane		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
2-Hexanone		ND	ug/L	10						
Iodomethane		ND	ug/L	1.0						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methyl isobutyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277630
Lab ID: blk040617	76	Method Blank				Run: SUB-B277630				04/06/17 10:20
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl acetate		ND	ug/L	1.0						
Vinyl chloride		ND	ug/L	0.50						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	100	70	130			
Surr: Dibromofluoromethane				0.50	101	77	126			
Surr: p-Bromofluorobenzene				0.50	103	76	127			
Surr: Toluene-d8				0.50	93	79	122			
Lab ID: H17030396-001G	7	Sample Matrix Spike				Run: SUB-B277630				04/06/17 15:18
Acrolein		61.2	ug/L	20	122	22	203			
Acrylonitrile		52.0	ug/L	10	104	60	130			
2-Chloroethyl vinyl ether		3.46	ug/L	0.50	69	64	132			
Surr: 1,2-Dichloroethane-d4				0.50	98	70	130			
Surr: Dibromofluoromethane				0.50	99	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	97	79	122			
Lab ID: H17030396-001G	7	Sample Matrix Spike Duplicate				Run: SUB-B277630				04/06/17 16:17
Acrolein		72.0	ug/L	20	144	22	203	16	20	
Acrylonitrile		60.4	ug/L	10	121	60	130	15	20	
2-Chloroethyl vinyl ether		3.84	ug/L	0.50	77	64	132	11	20	
Surr: 1,2-Dichloroethane-d4				0.50	95	70	130			
Surr: Dibromofluoromethane				0.50	99	77	126			
Surr: p-Bromofluorobenzene				0.50	101	76	127			
Surr: Toluene-d8				0.50	94	79	122			
Lab ID: H17030396-001G	75	Sample Matrix Spike				Run: SUB-B277630				04/06/17 15:47
Acetonitrile		59.2	ug/L	20	118	54	142			
Acetone		48.0	ug/L	10	96	62	130			
Acrolein		58.4	ug/L	20	117	22	203			
Acrylonitrile		48.8	ug/L	10	98	60	130			
Benzene		5.12	ug/L	0.50	102	71	133			
Bromobenzene		4.96	ug/L	0.50	99	78	133			
Bromochloromethane		5.12	ug/L	0.50	102	68	131			
Bromodichloromethane		5.04	ug/L	0.50	101	67	138			
Bromoform		5.04	ug/L	0.50	101	64	136			
Bromomethane		5.08	ug/L	0.50	102	60	138			
n-Butylbenzene		5.28	ug/L	0.50	106	72	135			
sec-Butylbenzene		4.92	ug/L	0.50	98	73	135			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277630	
Lab ID: H17030396-001G	75	Sample Matrix Spike				Run: SUB-B277630			04/06/17 15:47	
tert-Butylbenzene		4.84	ug/L	0.50	97	69	137			
Carbon disulfide		4.80	ug/L	0.50	96	46	145			
Carbon tetrachloride		5.12	ug/L	0.50	102	61	144			
Chlorobenzene		4.72	ug/L	0.50	94	78	136			
Chlorodibromomethane		5.08	ug/L	0.50	102	72	136			
Chloroethane		4.92	ug/L	0.50	98	64	136			
Chloroform		5.56	ug/L	0.50	111	69	133			
Chloromethane		4.44	ug/L	0.50	89	63	149			
2-Chlorotoluene		5.12	ug/L	0.50	102	74	135			
4-Chlorotoluene		5.32	ug/L	0.50	106	79	135			
1,2-Dibromo-3-chloropropane		4.44	ug/L	1.0	89	63	125			
1,2-Dibromoethane		4.48	ug/L	0.50	90	75	131			
Dibromomethane		5.04	ug/L	0.50	101	72	133			
1,2-Dichlorobenzene		4.96	ug/L	0.50	99	78	129			
1,3-Dichlorobenzene		5.12	ug/L	0.50	102	79	132			
1,4-Dichlorobenzene		5.00	ug/L	0.50	100	78	131			
Dichlorodifluoromethane		4.80	ug/L	0.50	96	55	141			
1,1-Dichloroethane		4.52	ug/L	0.50	90	72	130			
1,2-Dichloroethane		5.16	ug/L	0.50	103	57	146			
1,1-Dichloroethene		4.88	ug/L	0.50	98	66	142			
cis-1,2-Dichloroethene		4.88	ug/L	0.50	98	74	133			
trans-1,2-Dichloroethene		5.12	ug/L	0.50	102	76	138			
1,2-Dichloropropane		4.88	ug/L	0.50	98	72	135			
1,3-Dichloropropane		4.56	ug/L	0.50	91	75	134			
2,2-Dichloropropane		5.32	ug/L	0.50	106	42	167			
1,1-Dichloropropene		4.96	ug/L	0.50	99	72	140			
cis-1,3-Dichloropropene		4.40	ug/L	0.50	88	75	132			
trans-1,3-Dichloropropene		4.60	ug/L	0.50	92	77	145			
Ethylbenzene		4.96	ug/L	0.50	99	78	131			
Hexachlorobutadiene		4.20	ug/L	0.50	84	65	141			
2-Hexanone		46.8	ug/L	10	94	72	131			
Iodomethane		6.84	ug/L	1.0	137	66	132			S
Isopropylbenzene		5.04	ug/L	0.50	101	72	135			
p-Isopropyltoluene		4.80	ug/L	0.50	96	71	134			
Methyl tert-butyl ether (MTBE)		4.48	ug/L	0.50	90	58	151			
Methyl ethyl ketone		47.6	ug/L	10	95	55	145			
Methyl isobutyl ketone		46.8	ug/L	10	94	73	129			
Methylene chloride		6.08	ug/L	0.50	122	73	126			
Naphthalene		4.88	ug/L	0.50	98	55	139			
n-Propylbenzene		5.08	ug/L	0.50	102	70	139			
Styrene		4.64	ug/L	0.50	93	76	134			
1,1,1,2-Tetrachloroethane		4.56	ug/L	0.50	91	75	135			
1,1,2,2-Tetrachloroethane		4.80	ug/L	0.50	96	72	132			
Tetrachloroethene		4.72	ug/L	0.50	94	78	137			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277630	
Lab ID: H17030396-001G	75	Sample Matrix Spike				Run: SUB-B277630			04/06/17 15:47	
Toluene		4.96	ug/L	0.50	99	78	134			
1,2,3-Trichlorobenzene		4.08	ug/L	0.50	82	42	152			
1,2,4-Trichlorobenzene		4.72	ug/L	0.50	94	58	142			
1,1,1-Trichloroethane		4.96	ug/L	0.50	99	64	141			
1,1,2-Trichloroethane		4.56	ug/L	0.50	91	72	133			
Trichloroethene		4.80	ug/L	0.50	96	75	138			
Trichlorofluoromethane		4.00	ug/L	0.50	80	58	139			
1,2,3-Trichloropropane		4.76	ug/L	0.50	95	67	133			
1,2,4-Trimethylbenzene		4.92	ug/L	0.50	98	71	129			
1,3,5-Trimethylbenzene		5.00	ug/L	0.50	100	68	135			
Vinyl acetate		4.12	ug/L	1.0	82	31	124			
Vinyl chloride		4.76	ug/L	0.50	95	66	140			
m+p-Xylenes		9.44	ug/L	0.50	94	78	133			
o-Xylene		4.84	ug/L	0.50	97	79	136			
Xylenes, Total		14.3	ug/L	0.50	95	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	98	70	130			
Surr: Dibromofluoromethane				0.50	97	77	126			
Surr: p-Bromofluorobenzene				0.50	102	76	127			
Surr: Toluene-d8				0.50	95	79	122			
Lab ID: H17030396-001G	75	Sample Matrix Spike Duplicate				Run: SUB-B277630			04/06/17 16:46	
Acetonitrile		58.0	ug/L	20	116	54	142	2.0	20	
Acetone		48.4	ug/L	10	97	62	130	0.8	20	
Acrolein		62.0	ug/L	20	124	22	203	6.0	20	
Acrylonitrile		52.8	ug/L	10	106	60	130	7.9	20	
Benzene		5.04	ug/L	0.50	101	71	133	1.6	20	
Bromobenzene		5.04	ug/L	0.50	101	78	133	1.6	20	
Bromochloromethane		5.04	ug/L	0.50	101	68	131	1.6	20	
Bromodichloromethane		5.04	ug/L	0.50	101	67	138	0.0	20	
Bromoform		5.16	ug/L	0.50	103	64	136	2.4	20	
Bromomethane		4.88	ug/L	0.50	98	60	138	4.0	20	
n-Butylbenzene		5.04	ug/L	0.50	101	72	135	4.7	20	
sec-Butylbenzene		4.84	ug/L	0.50	97	73	135	1.6	20	
tert-Butylbenzene		4.84	ug/L	0.50	97	69	137	0.0	20	
Carbon disulfide		4.68	ug/L	0.50	94	46	145	2.5	20	
Carbon tetrachloride		5.16	ug/L	0.50	103	61	144	0.8	20	
Chlorobenzene		4.72	ug/L	0.50	94	78	136	0.0	20	
Chlorodibromomethane		5.12	ug/L	0.50	102	72	136	0.8	20	
Chloroethane		4.48	ug/L	0.50	90	64	136	9.4	20	
Chloroform		5.36	ug/L	0.50	107	69	133	3.7	20	
Chloromethane		4.16	ug/L	0.50	83	63	149	6.5	20	
2-Chlorotoluene		5.12	ug/L	0.50	102	74	135	0.0	20	
4-Chlorotoluene		5.28	ug/L	0.50	106	79	135	0.8	20	
1,2-Dibromo-3-chloropropane		4.32	ug/L	1.0	86	63	125	2.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277630	
Lab ID: H17030396-001G	75	Sample Matrix Spike Duplicate				Run: SUB-B277630			04/06/17 16:46	
1,2-Dibromoethane		4.56	ug/L	0.50	91	75	131	1.8	20	
Dibromomethane		4.96	ug/L	0.50	99	72	133	1.6	20	
1,2-Dichlorobenzene		5.04	ug/L	0.50	101	78	129	1.6	20	
1,3-Dichlorobenzene		5.16	ug/L	0.50	103	79	132	0.8	20	
1,4-Dichlorobenzene		5.04	ug/L	0.50	101	78	131	0.8	20	
Dichlorodifluoromethane		4.52	ug/L	0.50	90	55	141	6.0	20	
1,1-Dichloroethane		4.44	ug/L	0.50	89	72	130	1.8	20	
1,2-Dichloroethane		5.08	ug/L	0.50	102	57	146	1.6	20	
1,1-Dichloroethene		4.64	ug/L	0.50	93	66	142	5.0	20	
cis-1,2-Dichloroethene		4.76	ug/L	0.50	95	74	133	2.5	20	
trans-1,2-Dichloroethene		4.88	ug/L	0.50	98	76	138	4.8	20	
1,2-Dichloropropane		4.80	ug/L	0.50	96	72	135	1.7	20	
1,3-Dichloropropane		4.52	ug/L	0.50	90	75	134	0.9	20	
2,2-Dichloropropane		5.08	ug/L	0.50	102	42	167	4.6	20	
1,1-Dichloropropene		4.80	ug/L	0.50	96	72	140	3.3	20	
cis-1,3-Dichloropropene		4.36	ug/L	0.50	87	75	132	0.9	20	
trans-1,3-Dichloropropene		4.64	ug/L	0.50	93	77	145	0.9	20	
Ethylbenzene		4.92	ug/L	0.50	98	78	131	0.8	20	
Hexachlorobutadiene		4.16	ug/L	0.50	83	65	141	1.0	20	
2-Hexanone		49.2	ug/L	10	98	72	131	5.0	20	
Iodomethane		6.56	ug/L	1.0	131	66	132	4.2	20	
Isopropylbenzene		5.16	ug/L	0.50	103	72	135	2.4	20	
p-Isopropyltoluene		4.68	ug/L	0.50	94	71	134	2.5	20	
Methyl tert-butyl ether (MTBE)		4.64	ug/L	0.50	93	58	151	3.5	20	
Methyl ethyl ketone		49.6	ug/L	10	99	55	145	4.1	20	
Methyl isobutyl ketone		49.2	ug/L	10	98	73	129	5.0	20	
Methylene chloride		5.84	ug/L	0.50	117	73	126	4.0	20	
Naphthalene		5.12	ug/L	0.50	102	55	139	4.8	20	
n-Propylbenzene		4.96	ug/L	0.50	99	70	139	2.4	20	
Styrene		4.44	ug/L	0.50	89	76	134	4.4	20	
1,1,1,2-Tetrachloroethane		4.48	ug/L	0.50	90	75	135	1.8	20	
1,1,2,2-Tetrachloroethane		4.96	ug/L	0.50	99	72	132	3.3	20	
Tetrachloroethene		4.64	ug/L	0.50	93	78	137	1.7	20	
Toluene		4.84	ug/L	0.50	97	78	134	2.4	20	
1,2,3-Trichlorobenzene		4.04	ug/L	0.50	81	42	152	1.0	20	
1,2,4-Trichlorobenzene		4.60	ug/L	0.50	92	58	142	2.6	20	
1,1,1-Trichloroethane		4.96	ug/L	0.50	99	64	141	0.0	20	
1,1,2-Trichloroethane		4.68	ug/L	0.50	94	72	133	2.6	20	
Trichloroethene		4.72	ug/L	0.50	94	75	138	1.7	20	
Trichlorofluoromethane		3.68	ug/L	0.50	74	58	139	8.3	20	
1,2,3-Trichloropropane		4.72	ug/L	0.50	94	67	133	0.8	20	
1,2,4-Trimethylbenzene		4.88	ug/L	0.50	98	71	129	0.8	20	
1,3,5-Trimethylbenzene		5.00	ug/L	0.50	100	68	135	0.0	20	
Vinyl acetate		4.76	ug/L	1.0	95	31	124	14	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/11/17

Project: DEQ 08 **Work Order:** H17030396

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277630
Lab ID: H17030396-001G	75	Sample Matrix Spike Duplicate				Run: SUB-B277630			04/06/17 16:46	
Vinyl chloride		4.40	ug/L	0.50	88	66	140	7.9	20	
m+p-Xylenes		9.44	ug/L	0.50	94	78	133	0.0	20	
o-Xylene		4.52	ug/L	0.50	90	79	136	6.8	20	
Xylenes, Total		14.0	ug/L	0.50	93	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	97	70	130			
Surr: Dibromofluoromethane				0.50	92	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	92	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17030396

Login completed by: Wanda Johnson

Date Received: 3/24/2017

Reviewed by: BL2000\rtooke

Received by: wjj

Reviewed Date: 3/28/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	4.5°C From Field-On Ice		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Used bottle order/quote for analysis. wj 3/24/17

Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information (Billing information)

Company/Name	HydroSolutions
Contact	Rye Sumgen
Phone	406 443 6169 x 100
Mailing Address	303 Clarke St
City, State, Zip	Helena MT 59601
Email	rys@hydros.com
Receive Invoice	☐ Hard Copy ☒ Email
Receive Report	☐ Hard Copy ☒ Email
Purchase Order	
Quote	1382
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐ Hard Copy ☐ Email
Special Report/Formats:	☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other _____

Comments

Project Information

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	Rye Sumgen
Sampler Phone	406 671 2446
Sample Origin State	MT
EPA/State Compliance	☒ Yes ☐ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	R-Blank	3/29/17	1245		W			H17030396
2								
3								
4								
5								
6								
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Rye Sumgen	3/29/17 1430	Rye Sumgen			
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print) Wanda John	Date/Time 3-29-17 14	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
handdel	Y	Y N C B	Y N	4.5 °C	Y N	Y N	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

ANALYTICAL SUMMARY REPORT

April 13, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17030452 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 3/28/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17030452-001	MW-5	03/28/17 12:45	03/28/17	Aqueous	8260-Volatile Organic Compounds-Extended List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17030452

Report Date: 04/13/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030452-001
Client Sample ID: MW-5

Report Date: 04/13/17
Collection Date: 03/28/17 12:45
DateReceived: 03/28/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Acetonitrile	ND	ug/L		10		SW8260B	04/06/17 13:40 / eli-b
Acetone	ND	ug/L		20		SW8260B	04/06/17 13:40 / eli-b
Acrolein	ND	ug/L		20		SW8260B	04/07/17 17:05 / eli-b16
Acrylonitrile	ND	ug/L		20		SW8260B	04/07/17 17:05 / eli-b16
Benzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Bromobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Bromochloromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Bromodichloromethane	1.5	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Bromoform	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Bromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
n-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
sec-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
tert-Butylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Carbon disulfide	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Chlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Chloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
2-Chloroethyl vinyl ether	ND	ug/L		1.0		SW8260B	04/07/17 17:05 / eli-b16
Chloroform	28	ug/L		5.0		SW8260B	04/06/17 15:03 / eli-b
Chloromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2-Dibromo-3-chloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Dibromomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Ethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Hexachlorobutadiene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17030452-001
Client Sample ID: MW-5

Report Date: 04/13/17
Collection Date: 03/28/17 12:45
DateReceived: 03/28/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
2-Hexanone	ND	ug/L		20		SW8260B	04/06/17 13:40 / eli-b
Iodomethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Isopropylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
p-Isopropyltoluene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Methyl ethyl ketone	ND	ug/L		20		SW8260B	04/06/17 13:40 / eli-b
Methyl isobutyl ketone	ND	ug/L		20		SW8260B	04/06/17 13:40 / eli-b
Methylene chloride	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Naphthalene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
n-Propylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Styrene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Tetrachloroethene	99	ug/L		5.0		SW8260B	04/06/17 15:03 / eli-b
Toluene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2,3-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2,4-Trichlorobenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Trichloroethene	0.30	ug/L	J	1.0		SW8260B	04/06/17 13:40 / eli-b
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,2,4-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
1,3,5-Trimethylbenzene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Vinyl acetate	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Vinyl chloride	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
m+p-Xylenes	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
o-Xylene	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Xylenes, Total	ND	ug/L		1.0		SW8260B	04/06/17 13:40 / eli-b
Surr: 1,2-Dichloroethane-d4	104	%REC		70-130		SW8260B	04/06/17 13:40 / eli-b
Surr: 1,2-Dichloroethane-d4	109	%REC		70-130		SW8260B	04/07/17 17:05 / eli-b16
Surr: Dibromofluoromethane	110	%REC		77-126		SW8260B	04/06/17 13:40 / eli-b
Surr: Dibromofluoromethane	99.0	%REC		77-126		SW8260B	04/07/17 17:05 / eli-b16
Surr: p-Bromofluorobenzene	100	%REC		76-127		SW8260B	04/06/17 13:40 / eli-b
Surr: p-Bromofluorobenzene	106	%REC		76-127		SW8260B	04/07/17 17:05 / eli-b16
Surr: Toluene-d8	102	%REC		79-122		SW8260B	04/06/17 13:40 / eli-b
Surr: Toluene-d8	90.0	%REC		79-122		SW8260B	04/07/17 17:05 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277651	
Lab ID: CCV040617	73	Continuing Calibration Verification Standard							04/06/17 10:18	
Acetonitrile		51.2	ug/L	20	102	70	130			
Acetone		42.8	ug/L	10	86	70	130			
Benzene		4.80	ug/L	0.50	96	70	130			
Bromobenzene		4.88	ug/L	0.50	98	70	130			
Bromochloromethane		4.60	ug/L	0.50	92	70	130			
Bromodichloromethane		4.40	ug/L	0.50	88	70	130			
Bromoform		4.68	ug/L	0.50	94	70	130			
Bromomethane		3.62	ug/L	0.50	72	70	130			
n-Butylbenzene		4.76	ug/L	0.50	95	70	130			
sec-Butylbenzene		4.72	ug/L	0.50	94	70	130			
tert-Butylbenzene		4.88	ug/L	0.50	98	70	130			
Carbon disulfide		5.84	ug/L	0.50	117	70	130			
Carbon tetrachloride		4.88	ug/L	0.50	98	70	130			
Chlorobenzene		5.04	ug/L	0.50	101	70	130			
Chlorodibromomethane		4.76	ug/L	0.50	95	70	130			
Chloroethane		4.32	ug/L	0.50	86	70	130			
Chloroform		4.36	ug/L	0.50	87	80	120			
Chloromethane		4.48	ug/L	0.50	90	70	130			
2-Chlorotoluene		5.00	ug/L	0.50	100	70	130			
4-Chlorotoluene		4.88	ug/L	0.50	98	70	130			
1,2-Dibromo-3-chloropropane		4.80	ug/L	1.0	96	70	130			
1,2-Dibromoethane		5.52	ug/L	0.50	110	70	130			
Dibromomethane		5.12	ug/L	0.50	102	70	130			
1,2-Dichlorobenzene		4.84	ug/L	0.50	97	70	130			
1,3-Dichlorobenzene		5.12	ug/L	0.50	102	70	130			
1,4-Dichlorobenzene		4.96	ug/L	0.50	99	70	130			
Dichlorodifluoromethane		4.84	ug/L	0.50	97	70	130			
1,1-Dichloroethane		4.68	ug/L	0.50	94	70	130			
1,2-Dichloroethane		4.68	ug/L	0.50	94	70	130			
1,1-Dichloroethene		4.92	ug/L	0.50	98	80	120			
cis-1,2-Dichloroethene		5.28	ug/L	0.50	106	70	130			
trans-1,2-Dichloroethene		4.92	ug/L	0.50	98	70	130			
1,2-Dichloropropane		4.68	ug/L	0.50	94	80	120			
1,3-Dichloropropane		4.84	ug/L	0.50	97	70	130			
2,2-Dichloropropane		5.20	ug/L	0.50	104	70	130			
1,1-Dichloropropene		5.12	ug/L	0.50	102	70	130			
cis-1,3-Dichloropropene		4.80	ug/L	0.50	96	70	130			
trans-1,3-Dichloropropene		4.72	ug/L	0.50	94	70	130			
Ethylbenzene		4.88	ug/L	0.50	98	80	120			
Hexachlorobutadiene		4.84	ug/L	0.50	97	70	130			
2-Hexanone		48.0	ug/L	10	96	70	130			
Iodomethane		3.25	ug/L	1.0	65	70	130			S
Isopropylbenzene		4.72	ug/L	0.50	94	70	130			
p-Isopropyltoluene		4.80	ug/L	0.50	96	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277651	
Lab ID: CCV040617	73	Continuing Calibration Verification Standard							04/06/17 10:18	
Methyl tert-butyl ether (MTBE)		4.56	ug/L	0.50	91	70	130			
Methyl ethyl ketone		48.8	ug/L	10	98	70	130			
Methyl isobutyl ketone		48.0	ug/L	10	96	70	130			
Methylene chloride		5.20	ug/L	0.50	104	70	130			
Naphthalene		5.76	ug/L	0.50	115	70	130			
n-Propylbenzene		4.72	ug/L	0.50	94	70	130			
Styrene		4.84	ug/L	0.50	97	70	130			
1,1,1,2-Tetrachloroethane		4.72	ug/L	0.50	94	70	130			
1,1,2,2-Tetrachloroethane		4.88	ug/L	0.50	98	70	130			
Tetrachloroethene		4.92	ug/L	0.50	98	70	130			
Toluene		4.80	ug/L	0.50	96	80	120			
1,2,3-Trichlorobenzene		5.56	ug/L	0.50	111	70	130			
1,2,4-Trichlorobenzene		5.60	ug/L	0.50	112	70	130			
1,1,1-Trichloroethane		4.96	ug/L	0.50	99	70	130			
1,1,2-Trichloroethane		4.76	ug/L	0.50	95	70	130			
Trichloroethene		4.88	ug/L	0.50	98	70	130			
Trichlorofluoromethane		4.72	ug/L	0.50	94	70	130			
1,2,3-Trichloropropane		5.12	ug/L	0.50	102	70	130			
1,2,4-Trimethylbenzene		4.96	ug/L	0.50	99	70	130			
1,3,5-Trimethylbenzene		5.00	ug/L	0.50	100	70	130			
Vinyl acetate		5.00	ug/L	1.0	100	70	130			
Vinyl chloride		4.88	ug/L	0.50	98	80	120			
m+p-Xylenes		9.92	ug/L	0.50	99	70	130			
o-Xylene		4.96	ug/L	0.50	99	70	130			
Xylenes, Total		14.9	ug/L	0.50	99	70	130			
Surr: 1,2-Dichloroethane-d4				0.50	106	70	130			
Surr: Dibromofluoromethane				0.50	113	77	126			
Surr: p-Bromofluorobenzene				0.50	98	76	127			
Surr: Toluene-d8				0.50	102	79	122			
Method: SW8260B									Batch: B_R277651	
Lab ID: LCS040617	73	Laboratory Control Sample				Run: SUB-B277651			04/06/17 11:41	
Acetonitrile		52.8	ug/L	20	106	54	142			
Acetone		48.0	ug/L	10	96	62	130			
Benzene		4.80	ug/L	0.50	96	71	133			
Bromobenzene		4.96	ug/L	0.50	99	78	133			
Bromochloromethane		4.60	ug/L	0.50	92	68	131			
Bromodichloromethane		4.76	ug/L	0.50	95	67	138			
Bromoform		4.72	ug/L	0.50	94	64	136			
Bromomethane		3.94	ug/L	0.50	79	60	138			
n-Butylbenzene		5.08	ug/L	0.50	102	72	135			
sec-Butylbenzene		4.96	ug/L	0.50	99	73	135			
tert-Butylbenzene		5.12	ug/L	0.50	102	69	137			
Carbon disulfide		6.24	ug/L	0.50	125	46	145			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277651	
Lab ID: LCS040617	73	Laboratory Control Sample				Run: SUB-B277651			04/06/17 11:41	
Carbon tetrachloride		4.96	ug/L	0.50	99	61	144			
Chlorobenzene		5.08	ug/L	0.50	102	78	136			
Chlorodibromomethane		5.12	ug/L	0.50	102	72	136			
Chloroethane		4.56	ug/L	0.50	91	64	136			
Chloroform		4.72	ug/L	0.50	94	69	133			
Chloromethane		4.28	ug/L	0.50	86	63	149			
2-Chlorotoluene		5.12	ug/L	0.50	102	74	135			
4-Chlorotoluene		4.88	ug/L	0.50	98	79	135			
1,2-Dibromo-3-chloropropane		4.80	ug/L	1.0	96	63	125			
1,2-Dibromoethane		5.48	ug/L	0.50	110	75	131			
Dibromomethane		5.28	ug/L	0.50	106	72	133			
1,2-Dichlorobenzene		5.04	ug/L	0.50	101	78	129			
1,3-Dichlorobenzene		5.28	ug/L	0.50	106	79	132			
1,4-Dichlorobenzene		5.08	ug/L	0.50	102	78	131			
Dichlorodifluoromethane		4.88	ug/L	0.50	98	55	141			
1,1-Dichloroethane		4.92	ug/L	0.50	98	72	130			
1,2-Dichloroethane		5.04	ug/L	0.50	101	57	146			
1,1-Dichloroethene		5.08	ug/L	0.50	102	66	142			
cis-1,2-Dichloroethene		5.20	ug/L	0.50	104	74	133			
trans-1,2-Dichloroethene		5.24	ug/L	0.50	105	76	138			
1,2-Dichloropropane		4.68	ug/L	0.50	94	72	135			
1,3-Dichloropropane		4.52	ug/L	0.50	90	75	134			
2,2-Dichloropropane		4.96	ug/L	0.50	99	42	167			
1,1-Dichloropropene		4.80	ug/L	0.50	96	72	140			
cis-1,3-Dichloropropene		4.48	ug/L	0.50	90	75	132			
trans-1,3-Dichloropropene		4.56	ug/L	0.50	91	77	145			
Ethylbenzene		4.96	ug/L	0.50	99	78	131			
Hexachlorobutadiene		5.16	ug/L	0.50	103	65	141			
2-Hexanone		49.2	ug/L	10	98	72	131			
Iodomethane		3.51	ug/L	1.0	70	66	132			
Isopropylbenzene		4.96	ug/L	0.50	99	72	135			
p-Isopropyltoluene		4.92	ug/L	0.50	98	71	134			
Methyl tert-butyl ether (MTBE)		4.40	ug/L	0.50	88	58	151			
Methyl ethyl ketone		47.2	ug/L	10	94	55	145			
Methyl isobutyl ketone		47.6	ug/L	10	95	73	129			
Methylene chloride		5.28	ug/L	0.50	106	73	126			
Naphthalene		5.96	ug/L	0.50	119	55	139			
n-Propylbenzene		4.92	ug/L	0.50	98	70	139			
Styrene		5.00	ug/L	0.50	100	76	134			
1,1,1,2-Tetrachloroethane		4.68	ug/L	0.50	94	75	135			
1,1,2,2-Tetrachloroethane		4.64	ug/L	0.50	93	72	132			
Tetrachloroethene		5.04	ug/L	0.50	101	78	137			
Toluene		5.04	ug/L	0.50	101	78	134			
1,2,3-Trichlorobenzene		5.92	ug/L	0.50	118	42	152			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277651
Lab ID: LCS040617	73	Laboratory Control Sample				Run: SUB-B277651				04/06/17 11:41
1,2,4-Trichlorobenzene		5.72	ug/L	0.50	114	58	142			
1,1,1-Trichloroethane		4.68	ug/L	0.50	94	64	141			
1,1,2-Trichloroethane		4.56	ug/L	0.50	91	72	133			
Trichloroethene		4.76	ug/L	0.50	95	75	138			
Trichlorofluoromethane		4.64	ug/L	0.50	93	58	139			
1,2,3-Trichloropropane		4.72	ug/L	0.50	94	67	133			
1,2,4-Trimethylbenzene		5.08	ug/L	0.50	102	71	129			
1,3,5-Trimethylbenzene		5.08	ug/L	0.50	102	68	135			
Vinyl acetate		4.32	ug/L	1.0	86	31	124			
Vinyl chloride		4.84	ug/L	0.50	97	66	140			
m+p-Xylenes		10.1	ug/L	0.50	101	78	133			
o-Xylene		4.96	ug/L	0.50	99	79	136			
Xylenes, Total		15.1	ug/L	0.50	101	78	136			
Surr: 1,2-Dichloroethane-d4				0.50	108	70	130			
Surr: Dibromofluoromethane				0.50	106	77	126			
Surr: p-Bromofluorobenzene				0.50	97	76	127			
Surr: Toluene-d8				0.50	103	79	122			
Lab ID: BLK040617	73	Method Blank				Run: SUB-B277651				04/06/17 12:45
Acetonitrile		ND	ug/L	20						
Acetone		ND	ug/L	10						
Benzene		ND	ug/L	0.50						
Bromobenzene		ND	ug/L	0.50						
Bromochloromethane		ND	ug/L	0.50						
Bromodichloromethane		ND	ug/L	0.50						
Bromoform		ND	ug/L	0.50						
Bromomethane		ND	ug/L	0.50						
n-Butylbenzene		ND	ug/L	0.50						
sec-Butylbenzene		ND	ug/L	0.50						
tert-Butylbenzene		ND	ug/L	0.50						
Carbon disulfide		ND	ug/L	0.50						
Carbon tetrachloride		ND	ug/L	0.50						
Chlorobenzene		ND	ug/L	0.50						
Chlorodibromomethane		ND	ug/L	0.50						
Chloroethane		ND	ug/L	0.50						
Chloroform		ND	ug/L	0.50						
Chloromethane		ND	ug/L	0.50						
2-Chlorotoluene		ND	ug/L	0.50						
4-Chlorotoluene		ND	ug/L	0.50						
1,2-Dibromo-3-chloropropane		ND	ug/L	1.0						
1,2-Dibromoethane		ND	ug/L	0.50						
Dibromomethane		ND	ug/L	0.50						
1,2-Dichlorobenzene		ND	ug/L	0.50						
1,3-Dichlorobenzene		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B										Batch: B_R277651
Lab ID: BLK040617	73	Method Blank				Run: SUB-B277651				04/06/17 12:45
1,4-Dichlorobenzene		ND	ug/L	0.50						
Dichlorodifluoromethane		ND	ug/L	0.50						
1,1-Dichloroethane		ND	ug/L	0.50						
1,2-Dichloroethane		ND	ug/L	0.50						
1,1-Dichloroethene		ND	ug/L	0.50						
cis-1,2-Dichloroethene		ND	ug/L	0.50						
trans-1,2-Dichloroethene		ND	ug/L	0.50						
1,2-Dichloropropane		ND	ug/L	0.50						
1,3-Dichloropropane		ND	ug/L	0.50						
2,2-Dichloropropane		ND	ug/L	0.50						
1,1-Dichloropropene		ND	ug/L	0.50						
cis-1,3-Dichloropropene		ND	ug/L	0.50						
trans-1,3-Dichloropropene		ND	ug/L	0.50						
Ethylbenzene		ND	ug/L	0.50						
Hexachlorobutadiene		ND	ug/L	0.50						
2-Hexanone		ND	ug/L	10						
Iodomethane		ND	ug/L	1.0						
Isopropylbenzene		ND	ug/L	0.50						
p-Isopropyltoluene		ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)		ND	ug/L	0.50						
Methyl ethyl ketone		ND	ug/L	10						
Methyl isobutyl ketone		ND	ug/L	10						
Methylene chloride		ND	ug/L	0.50						
Naphthalene		ND	ug/L	0.50						
n-Propylbenzene		ND	ug/L	0.50						
Styrene		ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane		ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane		ND	ug/L	0.50						
Tetrachloroethene		ND	ug/L	0.50						
Toluene		ND	ug/L	0.50						
1,2,3-Trichlorobenzene		ND	ug/L	0.50						
1,2,4-Trichlorobenzene		ND	ug/L	0.50						
1,1,1-Trichloroethane		ND	ug/L	0.50						
1,1,2-Trichloroethane		ND	ug/L	0.50						
Trichloroethene		ND	ug/L	0.50						
Trichlorofluoromethane		ND	ug/L	0.50						
1,2,3-Trichloropropane		ND	ug/L	0.50						
1,2,4-Trimethylbenzene		ND	ug/L	0.50						
1,3,5-Trimethylbenzene		ND	ug/L	0.50						
Vinyl acetate		ND	ug/L	1.0						
Vinyl chloride		ND	ug/L	0.50						
m+p-Xylenes		ND	ug/L	0.50						
o-Xylene		ND	ug/L	0.50						
Xylenes, Total		ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277651	
Lab ID: BLK040617	73	Method Blank				Run: SUB-B277651			04/06/17 12:45	
Surr: 1,2-Dichloroethane-d4				0.50	105	70	130			
Surr: Dibromofluoromethane				0.50	110	77	126			
Surr: p-Bromofluorobenzene				0.50	102	76	127			
Surr: Toluene-d8				0.50	105	79	122			
Lab ID: B17040265-001AMS	73	Sample Matrix Spike				Run: SUB-B277651			04/06/17 15:36	
Acetonitrile		468	ug/L	200	94	54	142			
Acetone		476	ug/L	100	95	62	130			
Benzene		49.2	ug/L	5.0	98	71	133			
Bromobenzene		50.4	ug/L	5.0	101	78	133			
Bromochloromethane		50.8	ug/L	5.0	102	68	131			
Bromodichloromethane		49.2	ug/L	5.0	98	67	138			
Bromoform		48.0	ug/L	5.0	96	64	136			
Bromomethane		41.2	ug/L	5.0	82	60	138			
n-Butylbenzene		46.4	ug/L	5.0	93	72	135			
sec-Butylbenzene		47.2	ug/L	5.0	94	73	135			
tert-Butylbenzene		49.6	ug/L	5.0	99	69	137			
Carbon disulfide		53.2	ug/L	5.0	106	46	145			
Carbon tetrachloride		50.4	ug/L	5.0	101	61	144			
Chlorobenzene		50.4	ug/L	5.0	101	78	136			
Chlorodibromomethane		52.0	ug/L	5.0	104	72	136			
Chloroethane		46.0	ug/L	5.0	92	64	136			
Chloroform		75.2	ug/L	5.0	95	69	133			
Chloromethane		39.9	ug/L	5.0	80	63	149			
2-Chlorotoluene		52.0	ug/L	5.0	104	74	135			
4-Chlorotoluene		49.6	ug/L	5.0	99	79	135			
1,2-Dibromo-3-chloropropane		50.8	ug/L	10	102	63	125			
1,2-Dibromoethane		55.2	ug/L	5.0	110	75	131			
Dibromomethane		54.0	ug/L	5.0	108	72	133			
1,2-Dichlorobenzene		50.4	ug/L	5.0	101	78	129			
1,3-Dichlorobenzene		52.0	ug/L	5.0	104	79	132			
1,4-Dichlorobenzene		50.8	ug/L	5.0	102	78	131			
Dichlorodifluoromethane		56.0	ug/L	5.0	112	55	141			
1,1-Dichloroethane		50.8	ug/L	5.0	102	72	130			
1,2-Dichloroethane		52.0	ug/L	5.0	104	57	146			
1,1-Dichloroethene		53.6	ug/L	5.0	107	66	142			
cis-1,2-Dichloroethene		53.6	ug/L	5.0	107	74	133			
trans-1,2-Dichloroethene		55.6	ug/L	5.0	111	76	138			
1,2-Dichloropropane		44.8	ug/L	5.0	90	72	135			
1,3-Dichloropropane		45.2	ug/L	5.0	90	75	134			
2,2-Dichloropropane		54.0	ug/L	5.0	108	42	167			
1,1-Dichloropropene		48.0	ug/L	5.0	96	72	140			
cis-1,3-Dichloropropene		45.2	ug/L	5.0	90	75	132			
trans-1,3-Dichloropropene		46.8	ug/L	5.0	94	77	145			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277651	
Lab ID: B17040265-001AMS	73	Sample Matrix Spike				Run: SUB-B277651			04/06/17 15:36	
Ethylbenzene		48.8	ug/L	5.0	98	78	131			
Hexachlorobutadiene		44.0	ug/L	5.0	88	65	141			
2-Hexanone		472	ug/L	100	94	72	131			
Iodomethane		30.5	ug/L	10	61	66	132			S
Isopropylbenzene		49.6	ug/L	5.0	99	72	135			
p-Isopropyltoluene		47.2	ug/L	5.0	94	71	134			
Methyl tert-butyl ether (MTBE)		47.2	ug/L	5.0	94	58	151			
Methyl ethyl ketone		456	ug/L	100	91	55	145			
Methyl isobutyl ketone		456	ug/L	100	91	73	129			
Methylene chloride		54.8	ug/L	5.0	110	73	126			
Naphthalene		52.4	ug/L	5.0	105	55	139			
n-Propylbenzene		48.0	ug/L	5.0	96	70	139			
Styrene		48.4	ug/L	5.0	97	76	134			
1,1,1,2-Tetrachloroethane		46.8	ug/L	5.0	94	75	135			
1,1,2,2-Tetrachloroethane		48.4	ug/L	5.0	97	72	132			
Tetrachloroethene		137	ug/L	5.0	75	78	137			S
Toluene		49.2	ug/L	5.0	98	78	134			
1,2,3-Trichlorobenzene		54.4	ug/L	5.0	109	42	152			
1,2,4-Trichlorobenzene		53.2	ug/L	5.0	106	58	142			
1,1,1-Trichloroethane		50.8	ug/L	5.0	102	64	141			
1,1,2-Trichloroethane		46.4	ug/L	5.0	93	72	133			
Trichloroethene		46.8	ug/L	5.0	94	75	138			
Trichlorofluoromethane		51.2	ug/L	5.0	102	58	139			
1,2,3-Trichloropropane		50.0	ug/L	5.0	100	67	133			
1,2,4-Trimethylbenzene		51.6	ug/L	5.0	103	71	129			
1,3,5-Trimethylbenzene		51.2	ug/L	5.0	102	68	135			
Vinyl acetate		43.2	ug/L	10	86	31	124			
Vinyl chloride		50.4	ug/L	5.0	101	66	140			
m+p-Xylenes		97.6	ug/L	5.0	98	78	133			
o-Xylene		49.2	ug/L	5.0	98	79	136			
Xylenes, Total		147	ug/L	5.0	98	78	136			
Surr: 1,2-Dichloroethane-d4				5.0	102	70	130			
Surr: Dibromofluoromethane				5.0	115	77	126			
Surr: p-Bromofluorobenzene				5.0	99	76	127			
Surr: Toluene-d8				5.0	100	79	122			
Lab ID: B17040265-001AMSD	73	Sample Matrix Spike Duplicate				Run: SUB-B277651			04/06/17 16:07	
Acetonitrile		472	ug/L	200	94	54	142	0.9	20	
Acetone		420	ug/L	100	84	62	130	12	20	
Benzene		48.0	ug/L	5.0	96	71	133	2.5	20	
Bromobenzene		48.8	ug/L	5.0	98	78	133	3.2	20	
Bromochloromethane		49.6	ug/L	5.0	99	68	131	2.4	20	
Bromodichloromethane		49.6	ug/L	5.0	99	67	138	0.8	20	
Bromoform		47.2	ug/L	5.0	94	64	136	1.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277651	
Lab ID: B17040265-001AMSD	73	Sample Matrix Spike Duplicate				Run: SUB-B277651			04/06/17 16:07	
Bromomethane		41.2	ug/L	5.0	82	60	138	0.0	20	
n-Butylbenzene		45.6	ug/L	5.0	91	72	135	1.7	20	
sec-Butylbenzene		44.8	ug/L	5.0	90	73	135	5.2	20	
tert-Butylbenzene		45.6	ug/L	5.0	91	69	137	8.4	20	
Carbon disulfide		52.4	ug/L	5.0	105	46	145	1.5	20	
Carbon tetrachloride		49.6	ug/L	5.0	99	61	144	1.6	20	
Chlorobenzene		50.4	ug/L	5.0	101	78	136	0.0	20	
Chlorodibromomethane		52.4	ug/L	5.0	105	72	136	0.8	20	
Chloroethane		55.2	ug/L	5.0	110	64	136	18	20	
Chloroform		73.6	ug/L	5.0	91	69	133	2.2	20	
Chloromethane		40.0	ug/L	5.0	80	63	149	0.2	20	
2-Chlorotoluene		48.4	ug/L	5.0	97	74	135	7.2	20	
4-Chlorotoluene		46.4	ug/L	5.0	93	79	135	6.7	20	
1,2-Dibromo-3-chloropropane		46.0	ug/L	10	92	63	125	9.9	20	
1,2-Dibromoethane		55.6	ug/L	5.0	111	75	131	0.7	20	
Dibromomethane		55.6	ug/L	5.0	111	72	133	2.9	20	
1,2-Dichlorobenzene		49.2	ug/L	5.0	98	78	129	2.4	20	
1,3-Dichlorobenzene		50.0	ug/L	5.0	100	79	132	3.9	20	
1,4-Dichlorobenzene		49.6	ug/L	5.0	99	78	131	2.4	20	
Dichlorodifluoromethane		53.2	ug/L	5.0	106	55	141	5.1	20	
1,1-Dichloroethane		47.2	ug/L	5.0	94	72	130	7.3	20	
1,2-Dichloroethane		48.0	ug/L	5.0	96	57	146	8.0	20	
1,1-Dichloroethene		48.4	ug/L	5.0	97	66	142	10	20	
cis-1,2-Dichloroethene		52.8	ug/L	5.0	106	74	133	1.5	20	
trans-1,2-Dichloroethene		54.4	ug/L	5.0	109	76	138	2.2	20	
1,2-Dichloropropane		46.0	ug/L	5.0	92	72	135	2.6	20	
1,3-Dichloropropane		46.4	ug/L	5.0	93	75	134	2.6	20	
2,2-Dichloropropane		52.0	ug/L	5.0	104	42	167	3.8	20	
1,1-Dichloropropene		47.6	ug/L	5.0	95	72	140	0.8	20	
cis-1,3-Dichloropropene		45.2	ug/L	5.0	90	75	132	0.0	20	
trans-1,3-Dichloropropene		46.8	ug/L	5.0	94	77	145	0.0	20	
Ethylbenzene		48.0	ug/L	5.0	96	78	131	1.7	20	
Hexachlorobutadiene		44.4	ug/L	5.0	89	65	141	0.9	20	
2-Hexanone		484	ug/L	100	97	72	131	2.5	20	
Iodomethane		33.2	ug/L	10	66	66	132	8.5	20	
Isopropylbenzene		46.0	ug/L	5.0	92	72	135	7.5	20	
p-Isopropyltoluene		44.0	ug/L	5.0	88	71	134	7.0	20	
Methyl tert-butyl ether (MTBE)		45.6	ug/L	5.0	91	58	151	3.4	20	
Methyl ethyl ketone		444	ug/L	100	89	55	145	2.7	20	
Methyl isobutyl ketone		476	ug/L	100	95	73	129	4.3	20	
Methylene chloride		52.4	ug/L	5.0	105	73	126	4.5	20	
Naphthalene		56.0	ug/L	5.0	112	55	139	6.6	20	
n-Propylbenzene		44.4	ug/L	5.0	89	70	139	7.8	20	
Styrene		49.2	ug/L	5.0	98	76	134	1.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_R277651	
Lab ID: B17040265-001AMSD	73	Sample Matrix Spike Duplicate				Run: SUB-B277651			04/06/17 16:07	
1,1,1,2-Tetrachloroethane		46.4	ug/L	5.0	93	75	135	0.9	20	
1,1,2,2-Tetrachloroethane		47.2	ug/L	5.0	94	72	132	2.5	20	
Tetrachloroethene		137	ug/L	5.0	76	78	137	0.3	20	S
Toluene		48.4	ug/L	5.0	97	78	134	1.6	20	
1,2,3-Trichlorobenzene		58.0	ug/L	5.0	116	42	152	6.4	20	
1,2,4-Trichlorobenzene		53.6	ug/L	5.0	107	58	142	0.7	20	
1,1,1-Trichloroethane		48.0	ug/L	5.0	96	64	141	5.7	20	
1,1,2-Trichloroethane		47.2	ug/L	5.0	94	72	133	1.7	20	
Trichloroethene		47.2	ug/L	5.0	94	75	138	0.9	20	
Trichlorofluoromethane		47.2	ug/L	5.0	94	58	139	8.1	20	
1,2,3-Trichloropropane		47.6	ug/L	5.0	95	67	133	4.9	20	
1,2,4-Trimethylbenzene		48.8	ug/L	5.0	98	71	129	5.6	20	
1,3,5-Trimethylbenzene		47.6	ug/L	5.0	95	68	135	7.3	20	
Vinyl acetate		41.6	ug/L	10	83	31	124	3.8	20	
Vinyl chloride		50.4	ug/L	5.0	101	66	140	0.0	20	
m+p-Xylenes		98.0	ug/L	5.0	98	78	133	0.4	20	
o-Xylene		49.2	ug/L	5.0	98	79	136	0.0	20	
Xylenes, Total		147	ug/L	5.0	98	78	136			
Surr: 1,2-Dichloroethane-d4				5.0	102	70	130			
Surr: Dibromofluoromethane				5.0	110	77	126			
Surr: p-Bromofluorobenzene				5.0	94	76	127			
Surr: Toluene-d8				5.0	101	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 04/13/17

Project: DEQ 08 **Work Order:** H17030452

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: B_R277674	
Lab ID: ccv040717	7	Continuing Calibration Verification Standard							04/07/17 08:16	
Acrolein		59.6	ug/L	20	119	70	130			
Acrylonitrile		49.6	ug/L	10	99	70	130			
2-Chloroethyl vinyl ether		3.46	ug/L	0.50	69	70	130			S
Surr: 1,2-Dichloroethane-d4				0.50	103	70	130			
Surr: Dibromofluoromethane				0.50	94	77	126			
Surr: p-Bromofluorobenzene				0.50	102	76	127			
Surr: Toluene-d8				0.50	95	79	122			
Method: SW8260B									Batch: B_R277674	
Lab ID: lcs040717	7	Laboratory Control Sample				Run: SUB-B277674			04/07/17 09:44	
Acrolein		58.0	ug/L	20	116	22	203			
Acrylonitrile		51.6	ug/L	10	103	60	130			
2-Chloroethyl vinyl ether		3.56	ug/L	0.50	71	64	132			
Surr: 1,2-Dichloroethane-d4				0.50	107	70	130			
Surr: Dibromofluoromethane				0.50	97	77	126			
Surr: p-Bromofluorobenzene				0.50	100	76	127			
Surr: Toluene-d8				0.50	92	79	122			
Lab ID: blk040717	7	Method Blank				Run: SUB-B277674			04/07/17 11:41	
Acrolein		ND	ug/L	20						
Acrylonitrile		ND	ug/L	10						
2-Chloroethyl vinyl ether		ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4				0.50	107	70	130			
Surr: Dibromofluoromethane				0.50	101	77	126			
Surr: p-Bromofluorobenzene				0.50	106	76	127			
Surr: Toluene-d8				0.50	92	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

Work Order Receipt Checklist

HydroSolutions

H17030452

Login completed by: Tracy L. Lorash

Date Received: 3/28/2017

Reviewed by: BL2000\rtooke

Received by: TLL

Reviewed Date: 3/30/2017

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	4.6°C On Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Dashes inconsistent between sample ID on COC and vials. Logged in with ID from COC. tl 3/29/17

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Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information (Billing information)

Company/Name	HydroSolutions
Contact	Rye Svingen
Phone	406-443-6169 x100
Mailing Address	303 Clarke St.
City, State, Zip	Helena, MT 59601
Email	ryes@hydrosi.com
Receive Invoice	☐Hard Copy ☑Email
Receive Report	☐Hard Copy ☐Email
Purchase Order	
Quote	1382 *
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☐ EDD/EDT (contact laboratory) ☐ Other_____

Comments

Project Information

*8260 Long List only

Project Name, PWSID, Permit, etc.	DEQ08
Sampler Name	D. Donohue
Sampler Phone	406-443-6169 x103
Sample Origin State	MT
EPA/State Compliance	☑ Yes ☐ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	*8260 Long List only										See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1	MW-5	3/28/17	1245	6	W	x												H17030452
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Dave Donohue	3/28/17 4:27		Tracy Lovato	3/28/17 16:27	
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
Hand		Y (N) C B	Y N	4.6 °C	(Y) N	(Y) N	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Appendix C
Final Report - Cascade MIHPT

Final Data Package for Membrane Interface Probe – Hydraulic Profiling Tool Services

Site Location: 1118 Helena Avenue, Helena, Montana 59601

Project Number: 303168644

Report Date: October 13, 2016

Prepared for:
HydroSolutions, Inc.
David Donohue
303 Clark Street
Helena, Montana 59601
Tel. / 406.443.6169
E-Mail /davidd@hydrosi.com

Prepared by:
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E-Mail /DCaputo@cascade-env.com

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Project Narrative

Cascade Technical Services, LLC (Cascade) is pleased to present this data report to HydroSolutions, Inc. for the membrane interface-hydraulic profiling tool (MIHPT) services that were provided between the dates of September 20th and September 23rd, 2016 at the site located at 1118 Helena Avenue in Helena, Montana.

The results associated with the data and plots presented in this report were generated in accordance to Cascade's and Geoprobe's Standard Operating Procedures (SOPs) for MIHPT services.

All field work and data management were completed by trained, scientific professionals and all quality assurance/quality control (QA/QC) measurements associated with these data were found to be within the tolerances set forth in the SOPs for these services. Response tests conducted previous to, and subsequent to the MIHPT borings were found to be within the tolerances set forth for this MIHPT survey and therefore the data are deemed acceptable for use. Exception/deviations regarding these response tests and the related data are noted on the MIP and HPT summary tables that is part of this report.

This report contains two sets of plots for each of the MIHPT locations; one set is scaled to show the lower level responses based on the responses in each individual boring and the second set is scaled to show the higher level detector responses.

I certify that the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Signature: _____

Geoffrey Hardaway, High-Resolution Site Characterization Specialist

Project Site Map and MIHPT Locations

Approximate boring locations are provided below. Field staff estimated boring locations using reference points observed on site in relation to the same reference points visible in Google Earth map software.

Membrane Interface Probe Data Summary Table

Provided below is a summary of MIP information, including response test acceptability and any deviations from the standard operating procedure that occurred during the field activities.

MIP Location	Total Depth (ft)	Response Test Results, ECD - (mV)			Response Test Results, PID - (mV)			Response Test Results, XSD - (mV)			Comments/Deviations
		Pre	Post	Acceptable*	Pre	Post	Acceptable*	Pre	Post	Acceptable*	
DPT-01	21.5	396.2	309.8	YES	9.7	3.5	YES	8.2	5.0	YES	
DPT-02	20	309.8	287.7	YES	3.5	2.5	YES	5.0	5.0	YES	
DPT-03	20	287.7	375.6	YES	2.5	4.0	YES	5.0	5.7	YES	
DPT-04	25.1	375.6	593.7	YES	4.0	5.5	YES	5.7	7.3	YES	
DPT-05	22.1	593.7	607.9	YES	5.5	7.1	YES	7.3	14.0	YES	
DPT-06	20.05	607.9	466.5	YES	7.1	3.6	YES	14.0	4.7	YES	
DPT-07	20.05	466.5	416.3	YES	3.6	7.7	YES	4.7	8.2	YES	
DPT-08	20.05	416.3	381.6	YES	7.7	3.2	YES	8.2	5.0	YES	
DPT-09	13.35	381.6	410.4	YES	3.2	3.2	YES	5.0	6.3	YES	
DPT-10	10.65	410.4	344.1	YES	3.2	1.5	NO	6.3	4.9	YES	
DPT-11	9.95	344.1	384.0	YES	1.5	4.1	NO	4.9	5.7	YES	
DPT-12	25	384.0	0.0	N/A	4.1	0.0	NO	5.7	0.0	N/A	No post-boring RT conducted.

*Acceptable values for ECD, PID, and XSD detectors are 50mV, 2mV, and 2mV, respectively.

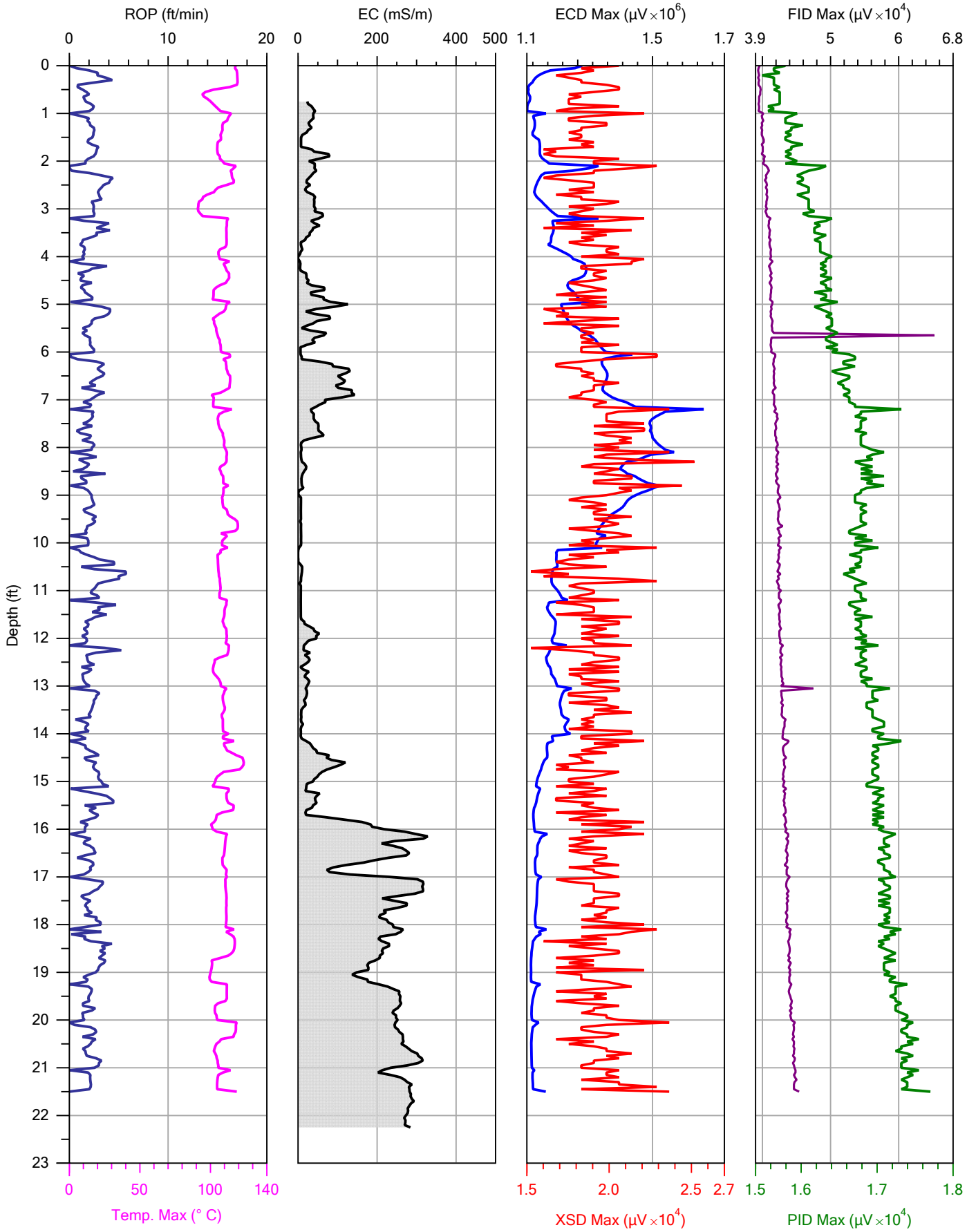
Hydraulic Profiling Tool Data Summary Table

Provided below is a summary of HPT information, including pre-boring pressure tests and any deviations from the standard operating procedure that occurred during the field activities.

HPT Location	Total Depth (ft)	Pre Boring HPT Pressure Tests (psi)				Successful Dissipation Test(s) Depths (ft)	Comments/Deviations
		Top w Q=0	Bottom w Q=0	Pressure Δ w Q=0	Pass/Fail*		
DPT-01	21.5	13.771	13.564	0.21	PASS	21.23	None
DPT-02	20	13.821	13.614	0.21	PASS	None	None
DPT-03	20	N/A	N/A	N/A	N/A	None	Pressure test not completed.
DPT-04	25.1	13.818	13.604	0.21	PASS	None	None
DPT-05	22.1	13.778	13.573	0.20	PASS	None	None
DPT-06	20.05	13.894	13.683	0.21	PASS	None	None
DPT-07	20.05	13.897	13.677	0.22	PASS	None	None
DPT-08	20.05	13.638	13.436	0.20	PASS	15.63	None
DPT-09	13.35	13.598	13.383	0.21	PASS	None	None
DPT-10	10.65	13.621	13.419	0.20	PASS	None	None
DPT-11	9.95	13.615	13.402	0.21	PASS	None	None
DPT-12	25	13.624	13.403	0.22	PASS	17.23	None

*Pass/Fail criteria is 0.22 psi ± 10%.

Membrane Interface – Hydraulic Profiling Tool Data Plots – Low Range Scales



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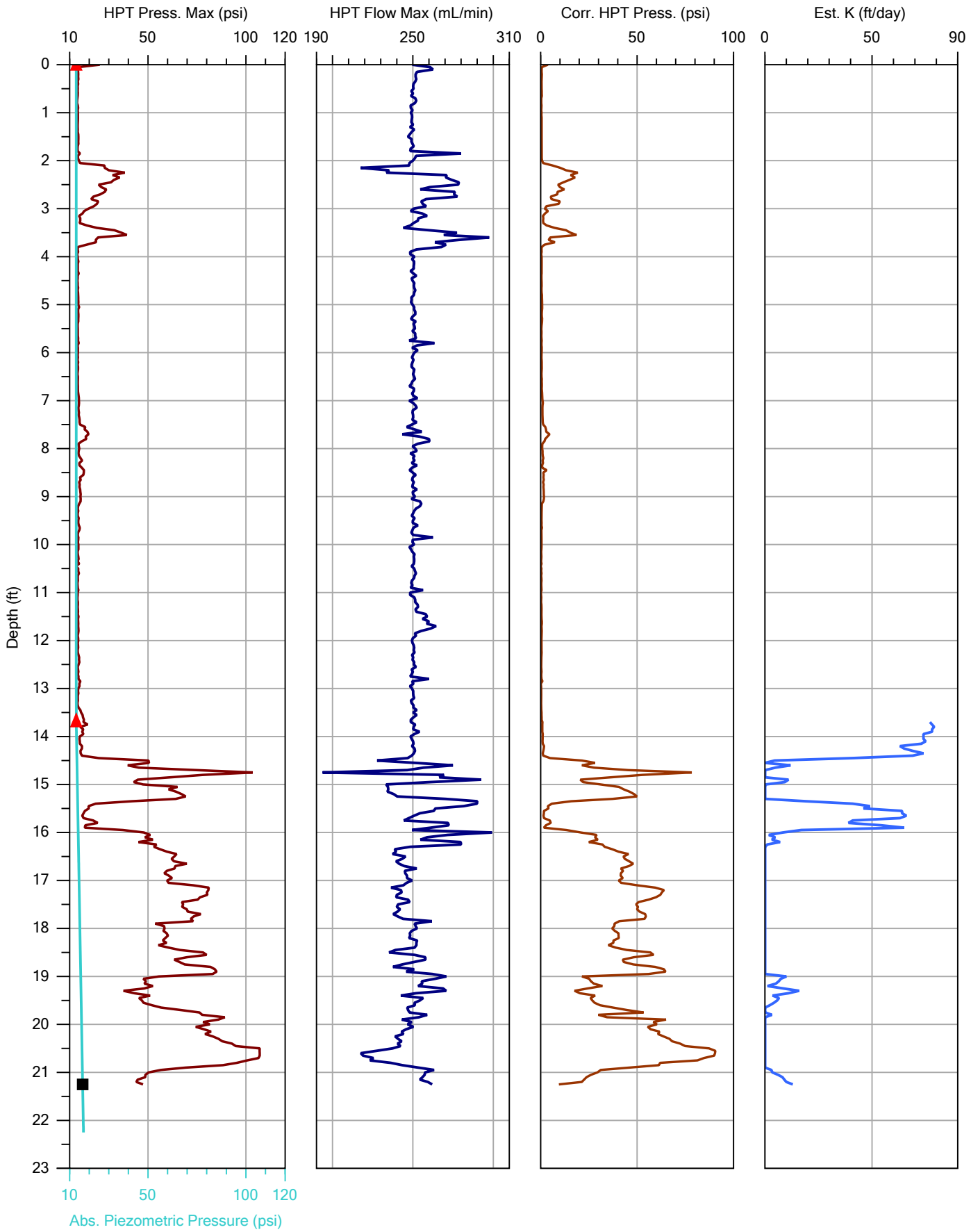

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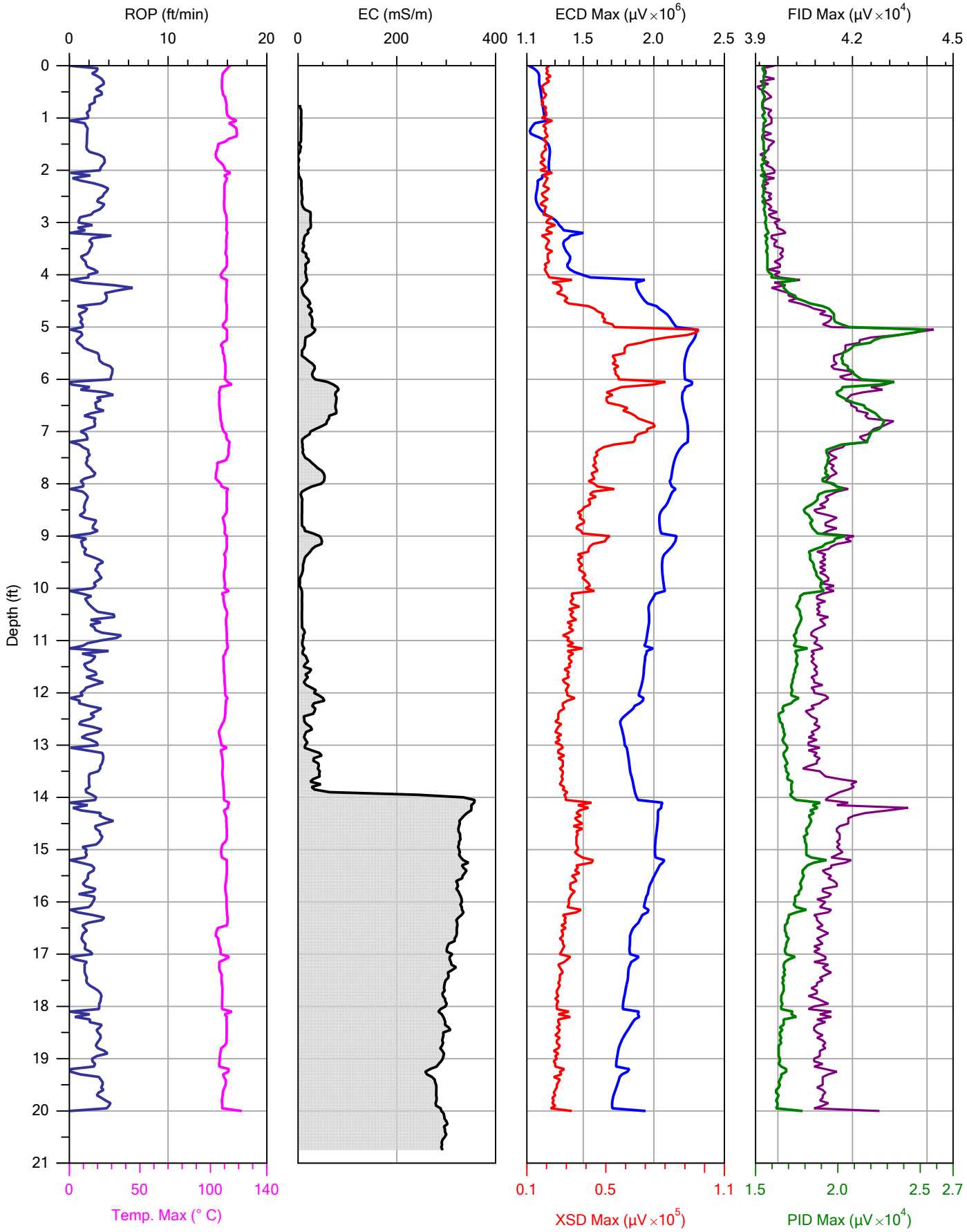

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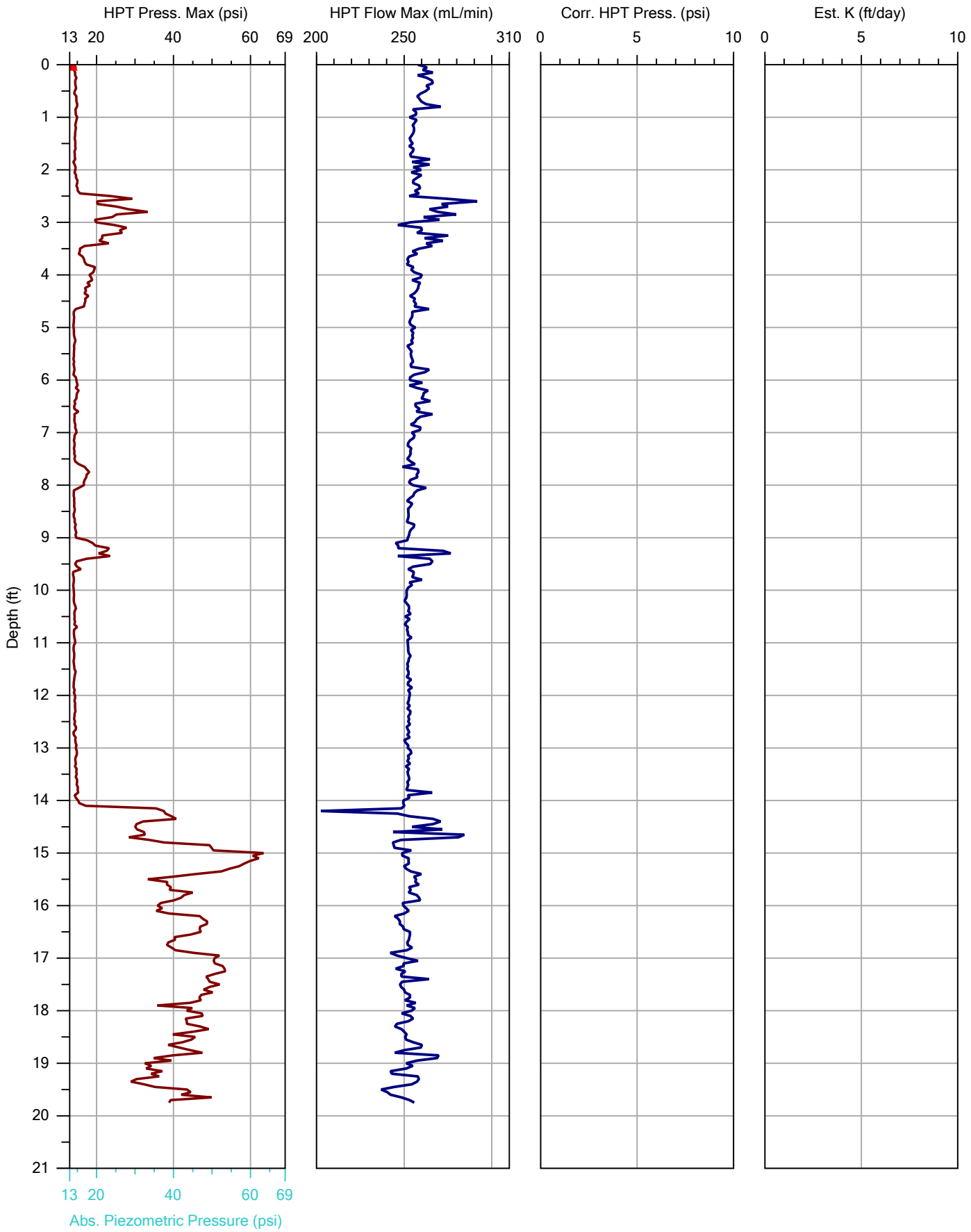
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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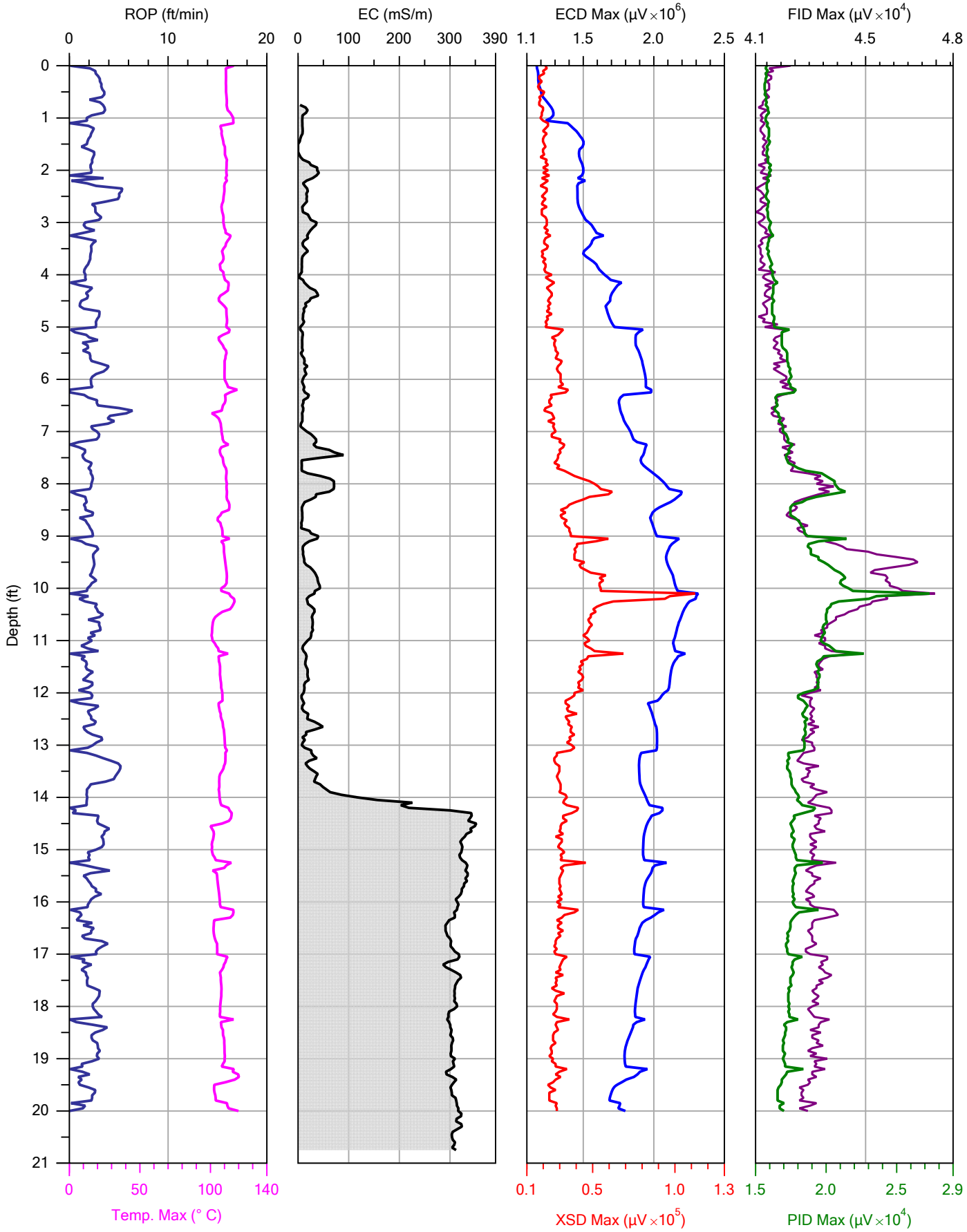
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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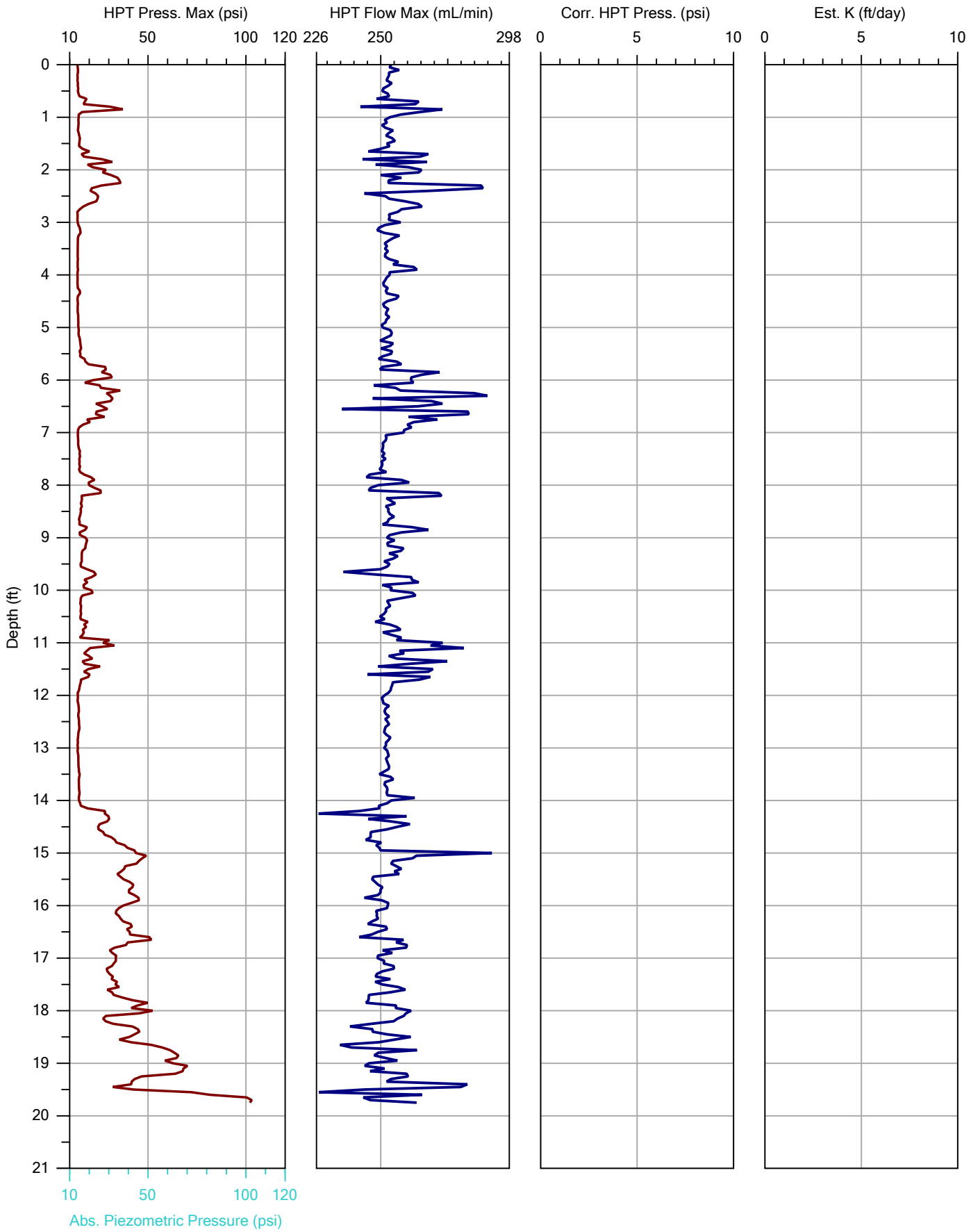
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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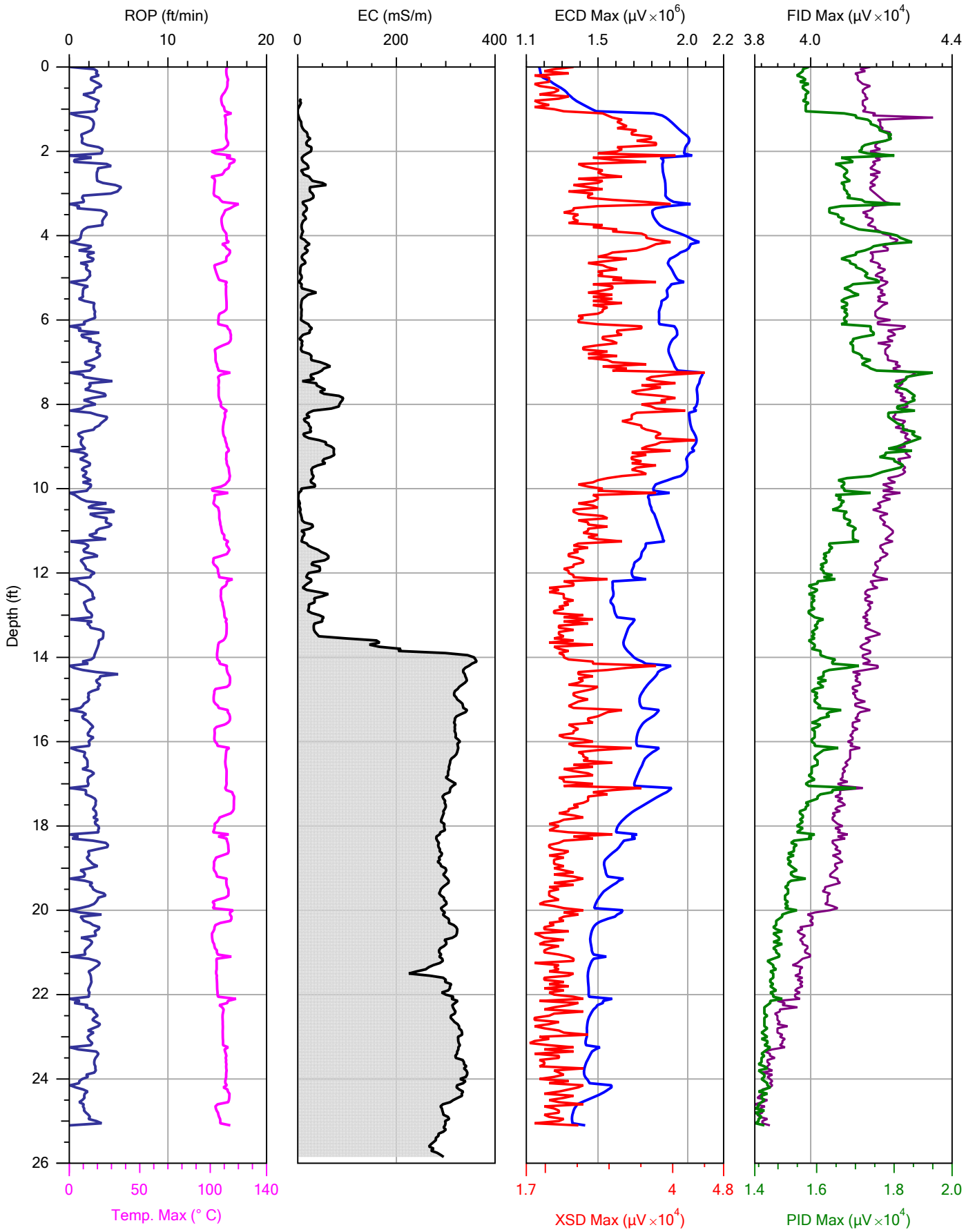
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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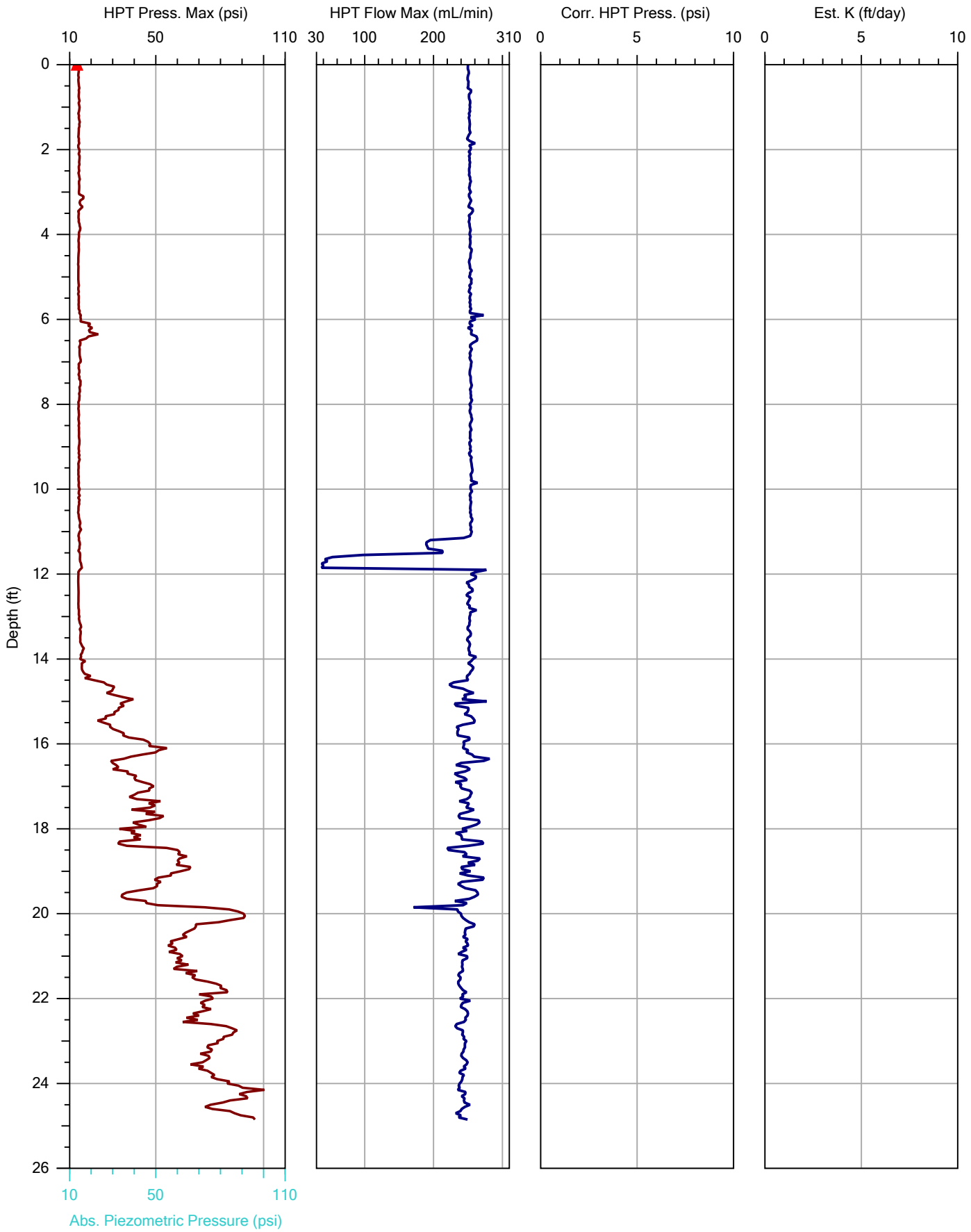
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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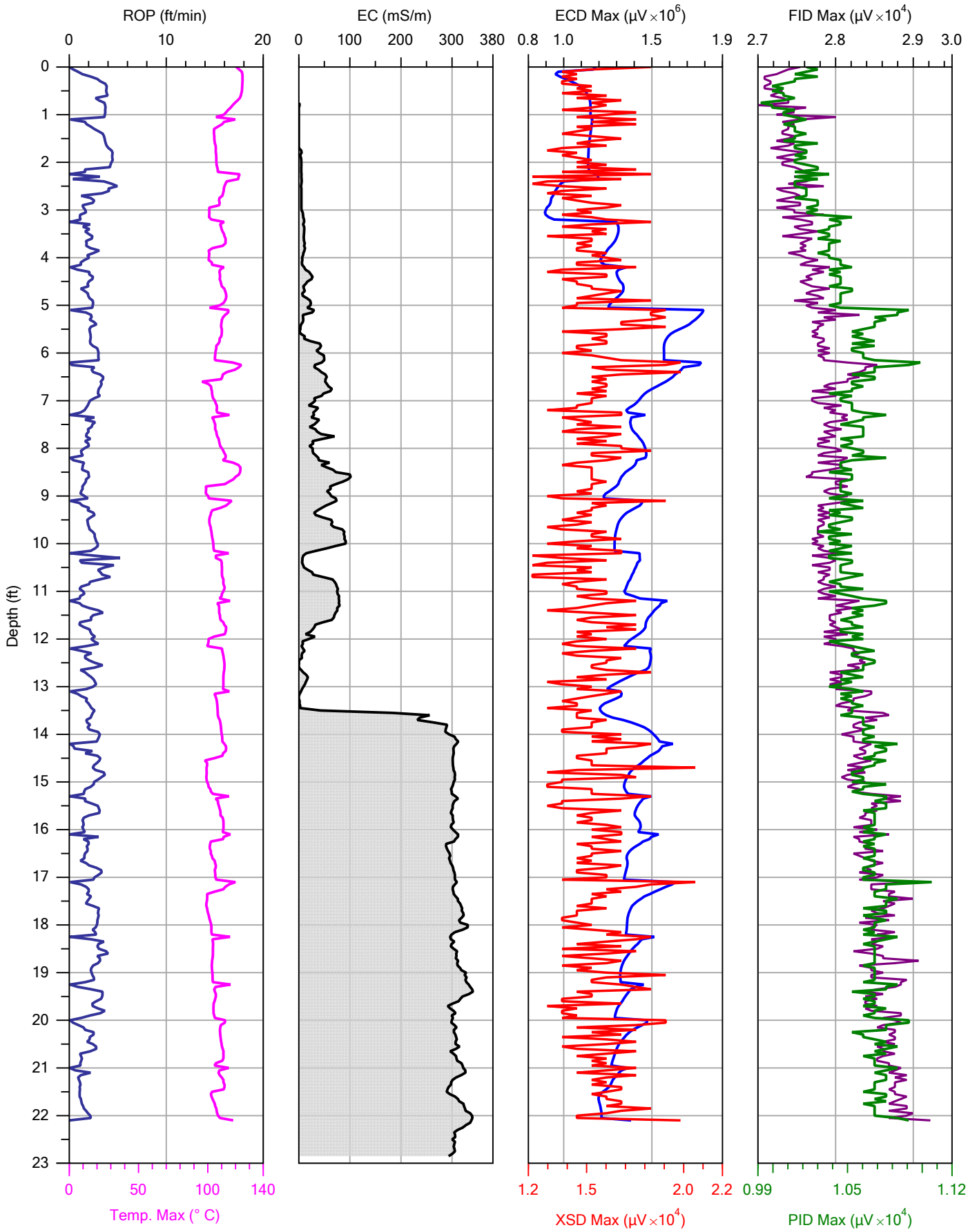
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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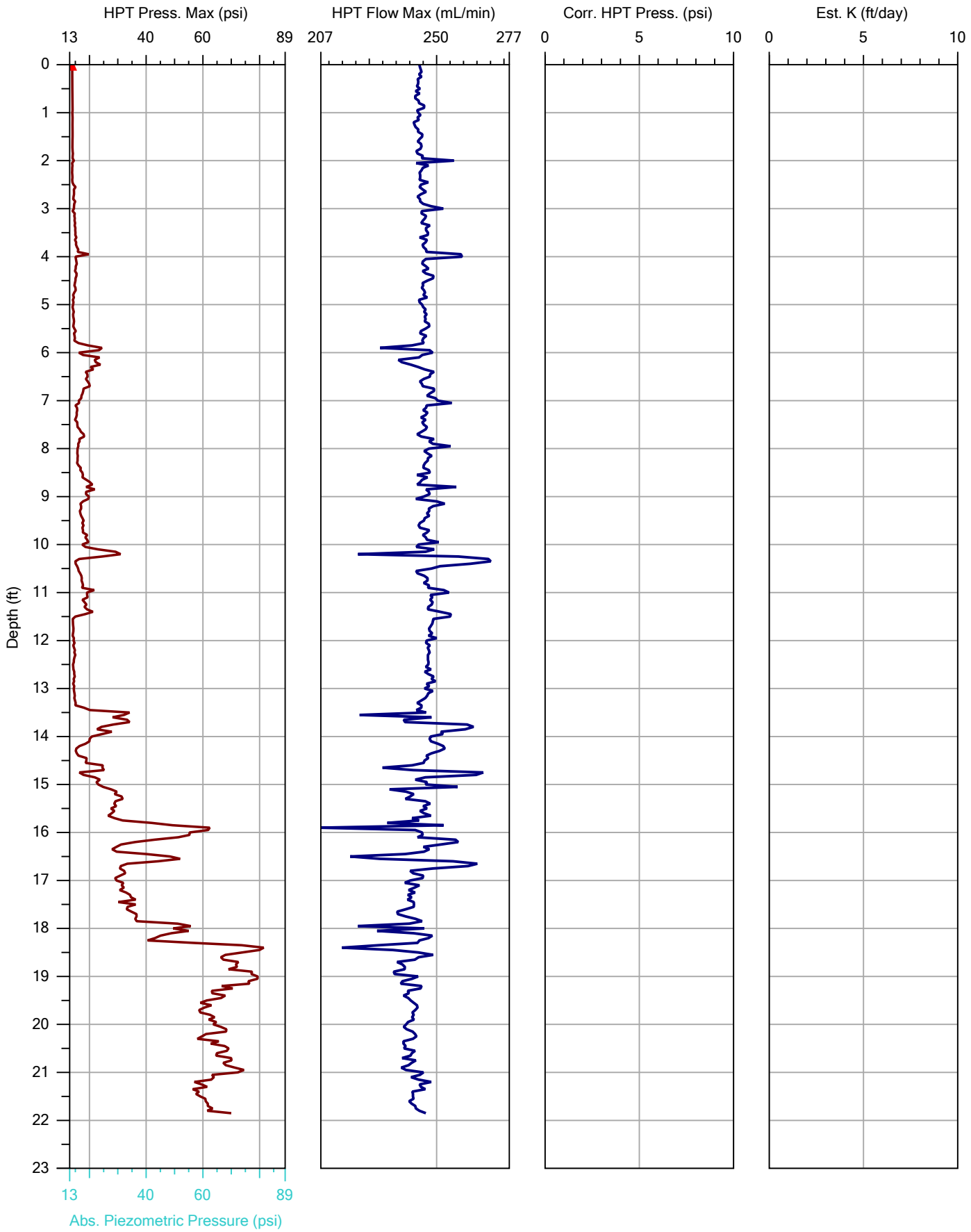
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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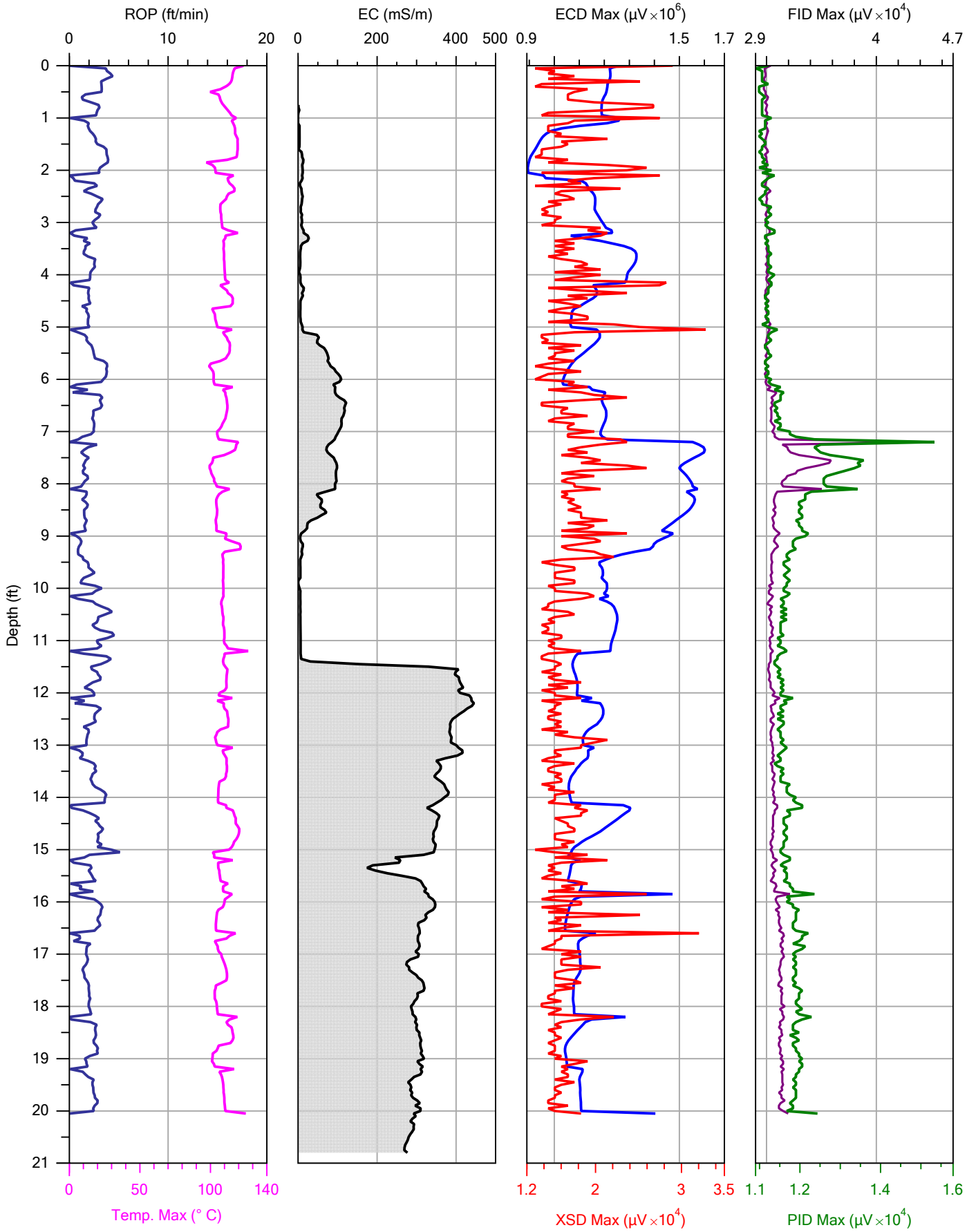
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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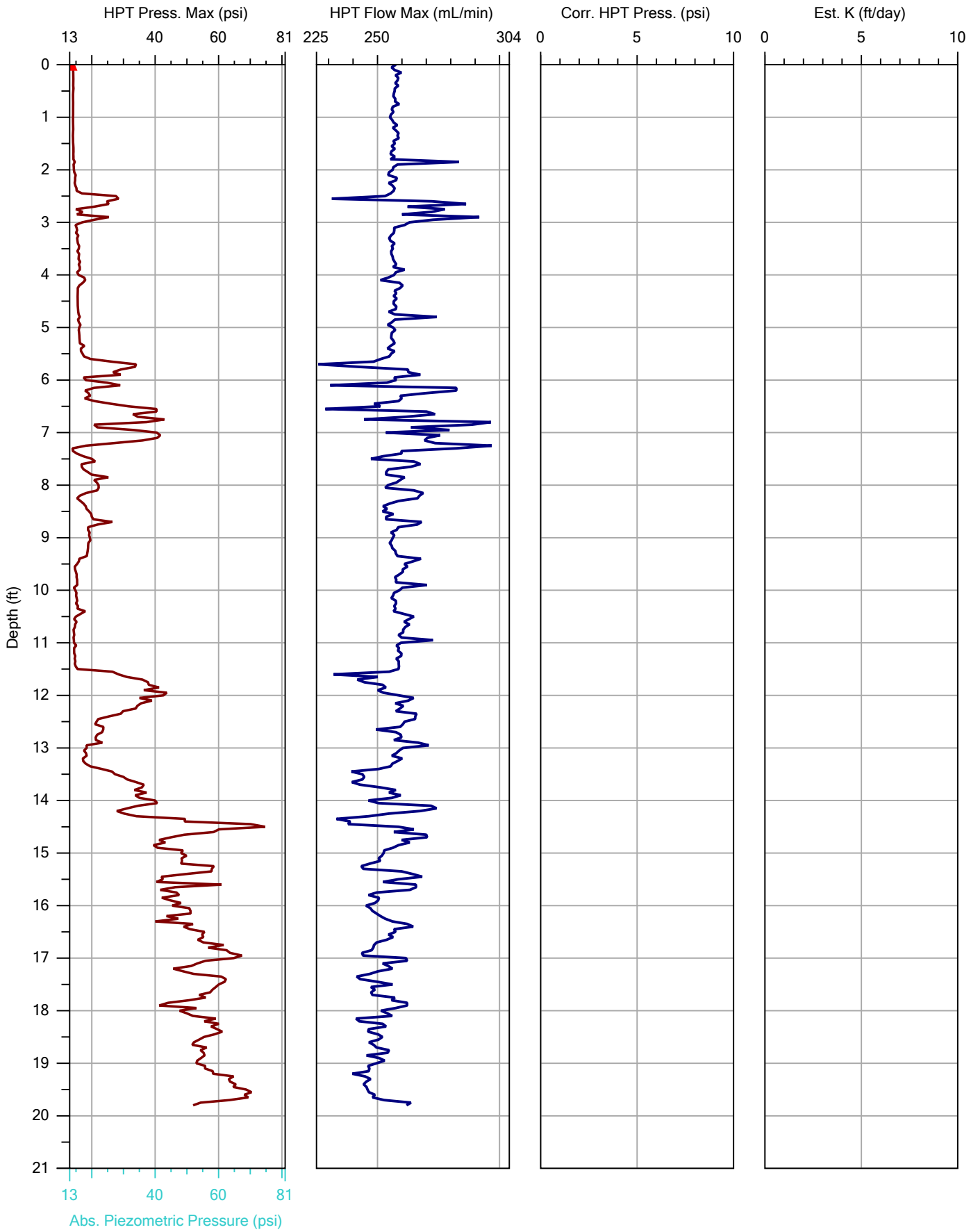
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/21/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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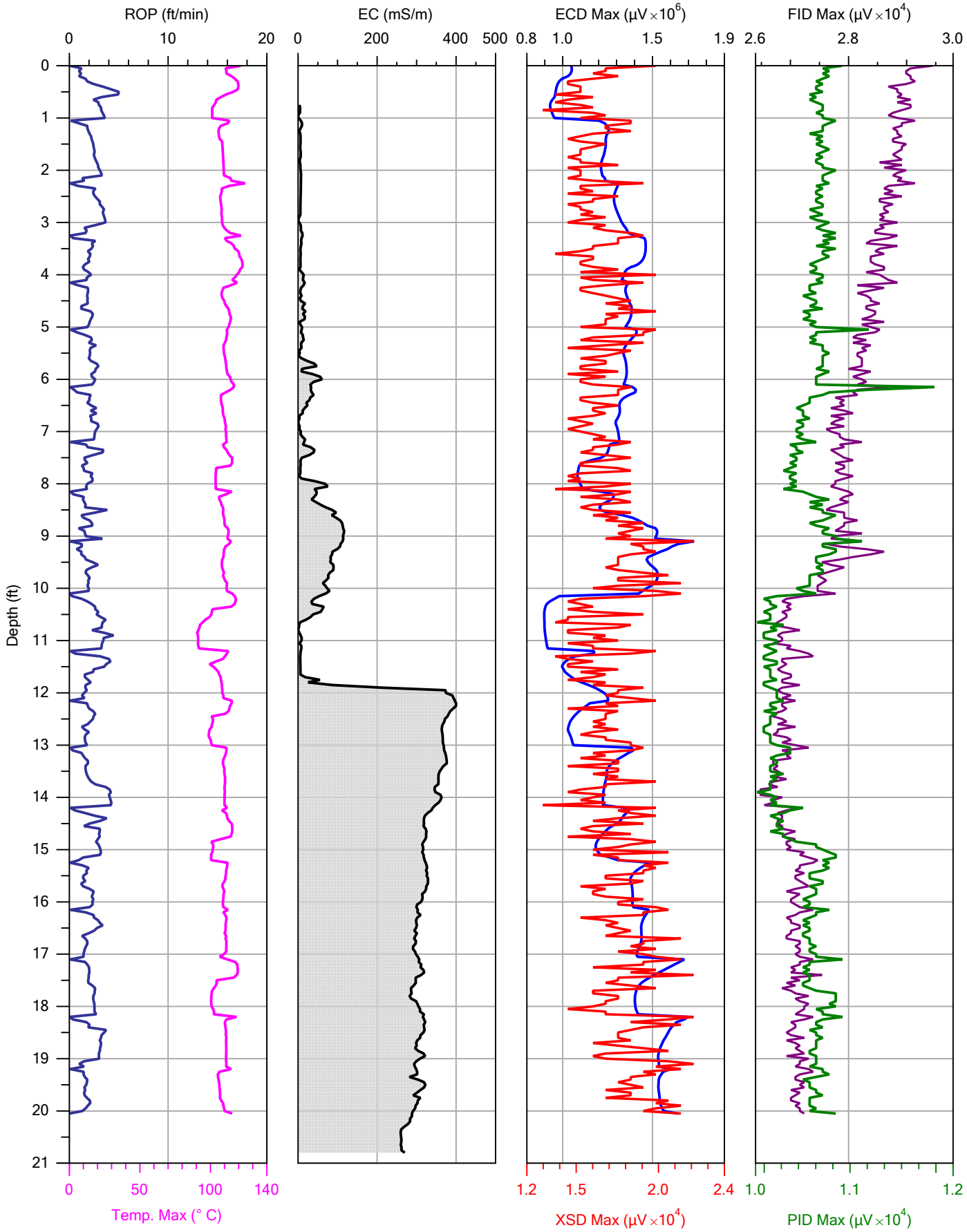
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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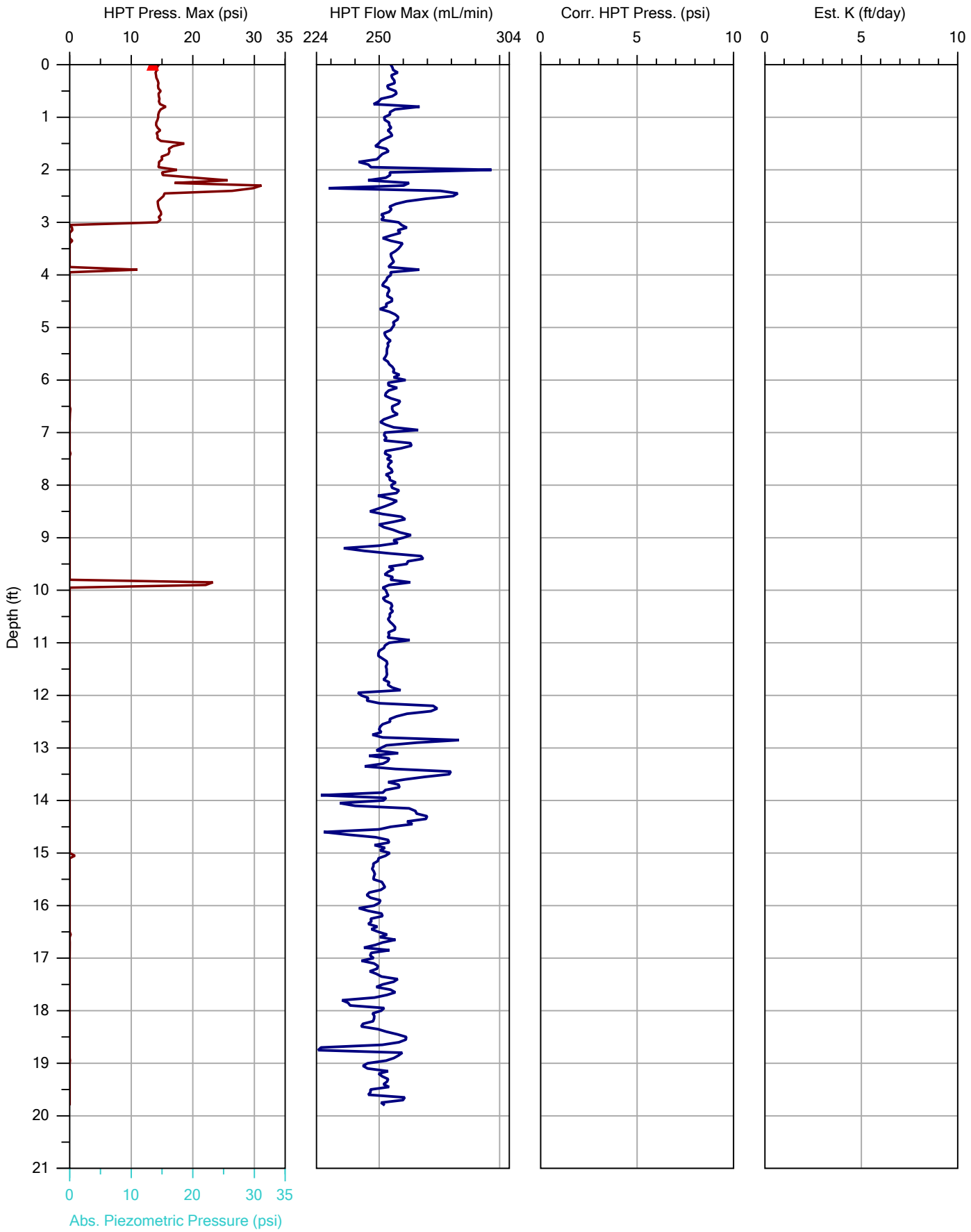
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/21/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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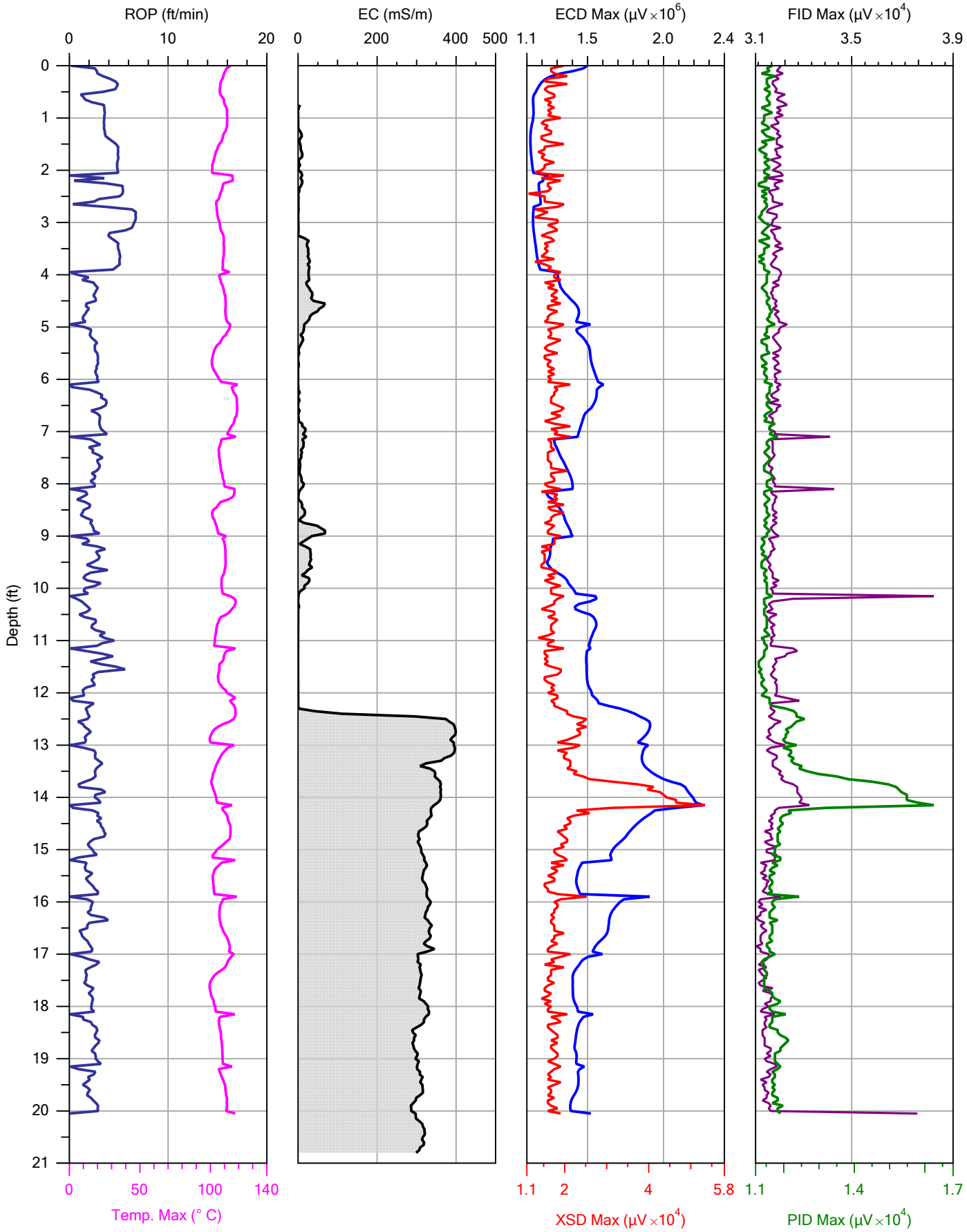
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/21/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



CASCADE
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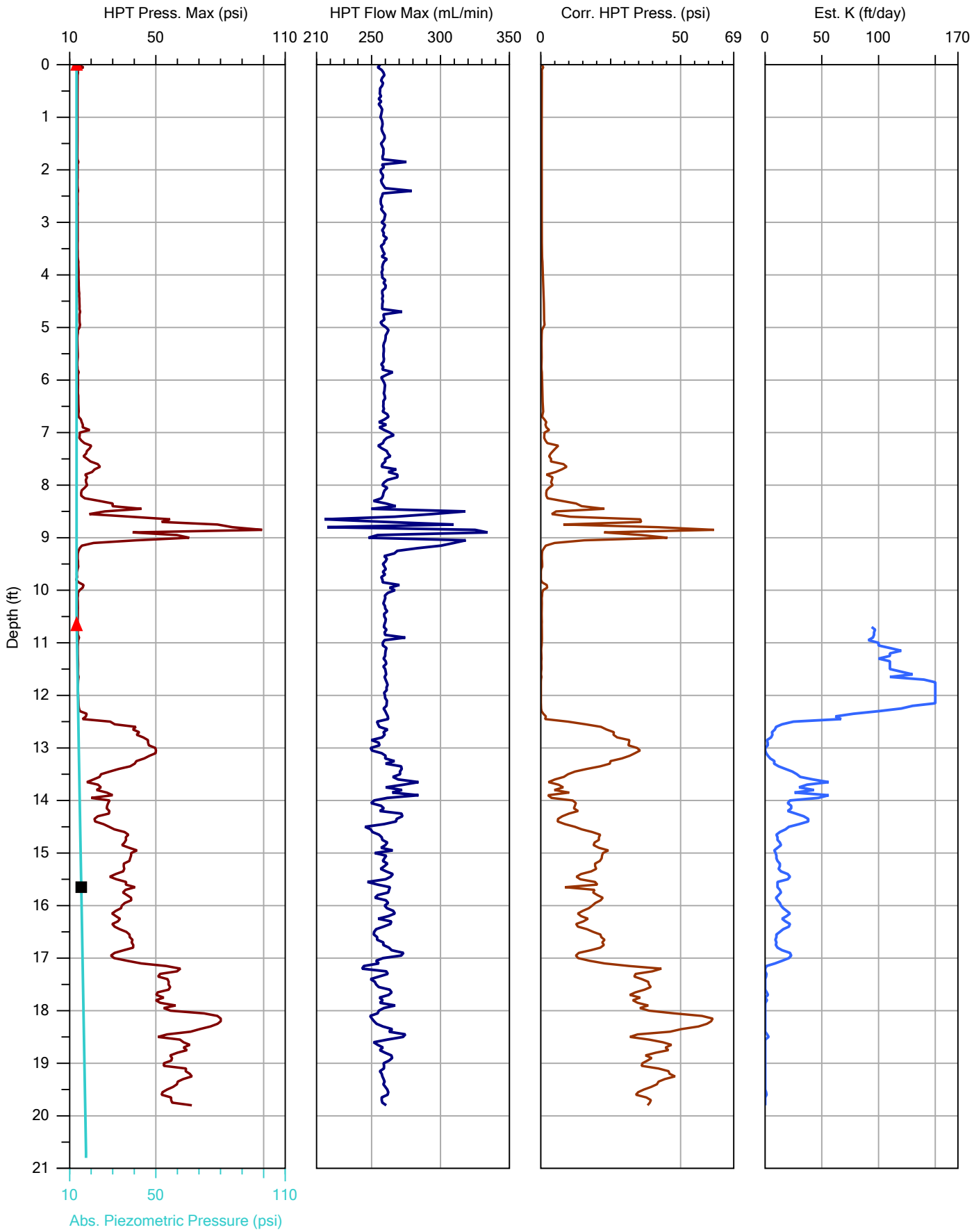
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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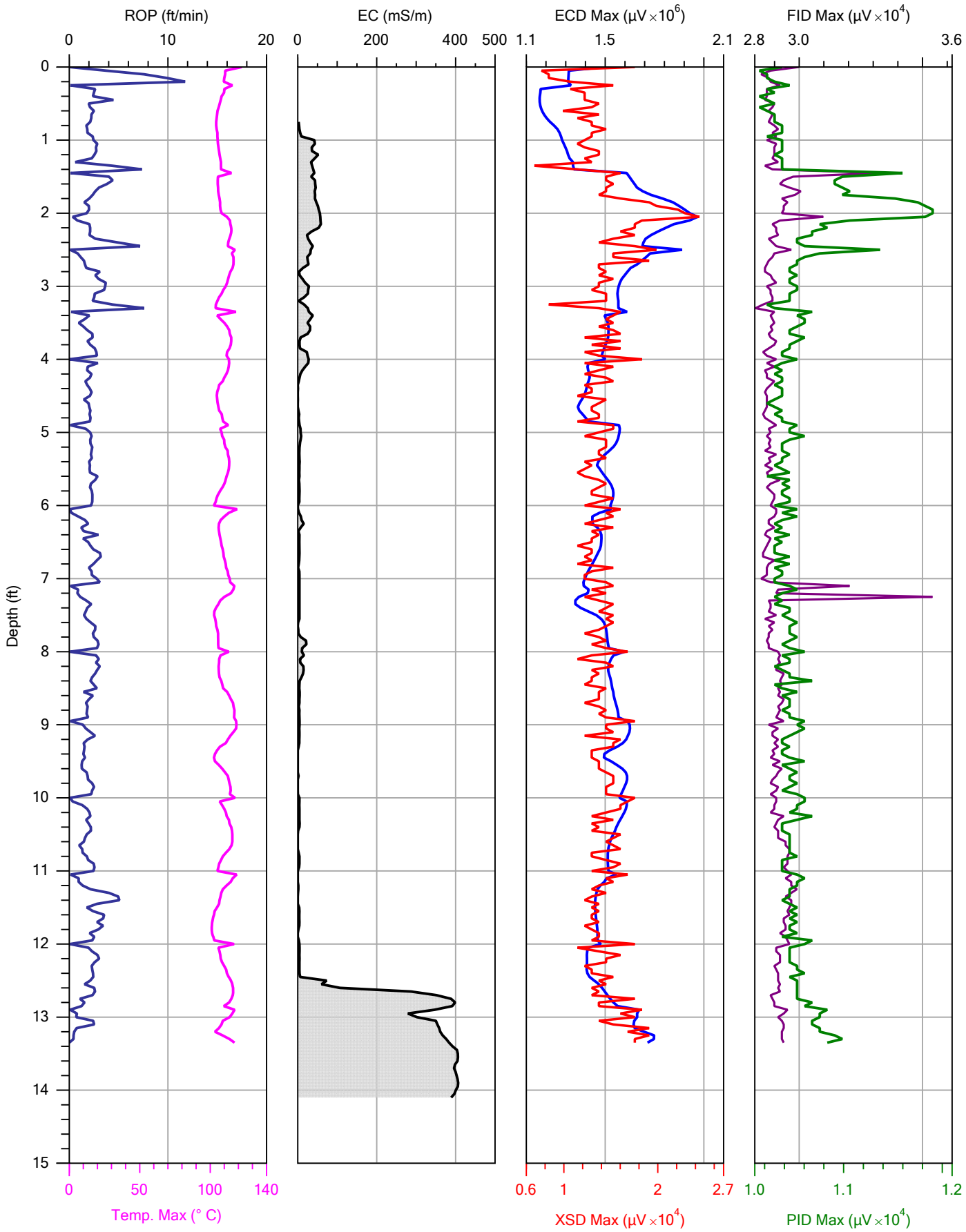
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/23/2016
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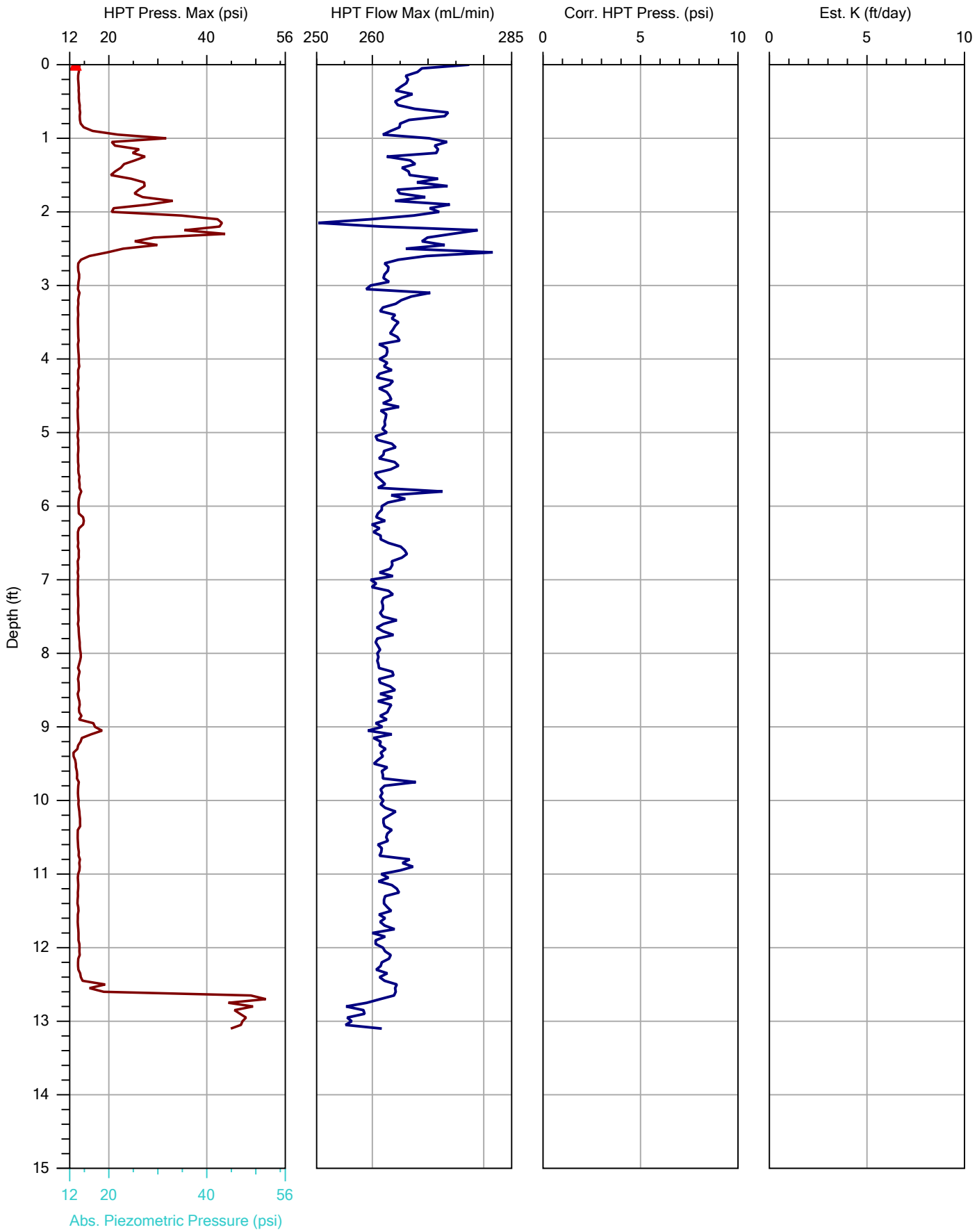

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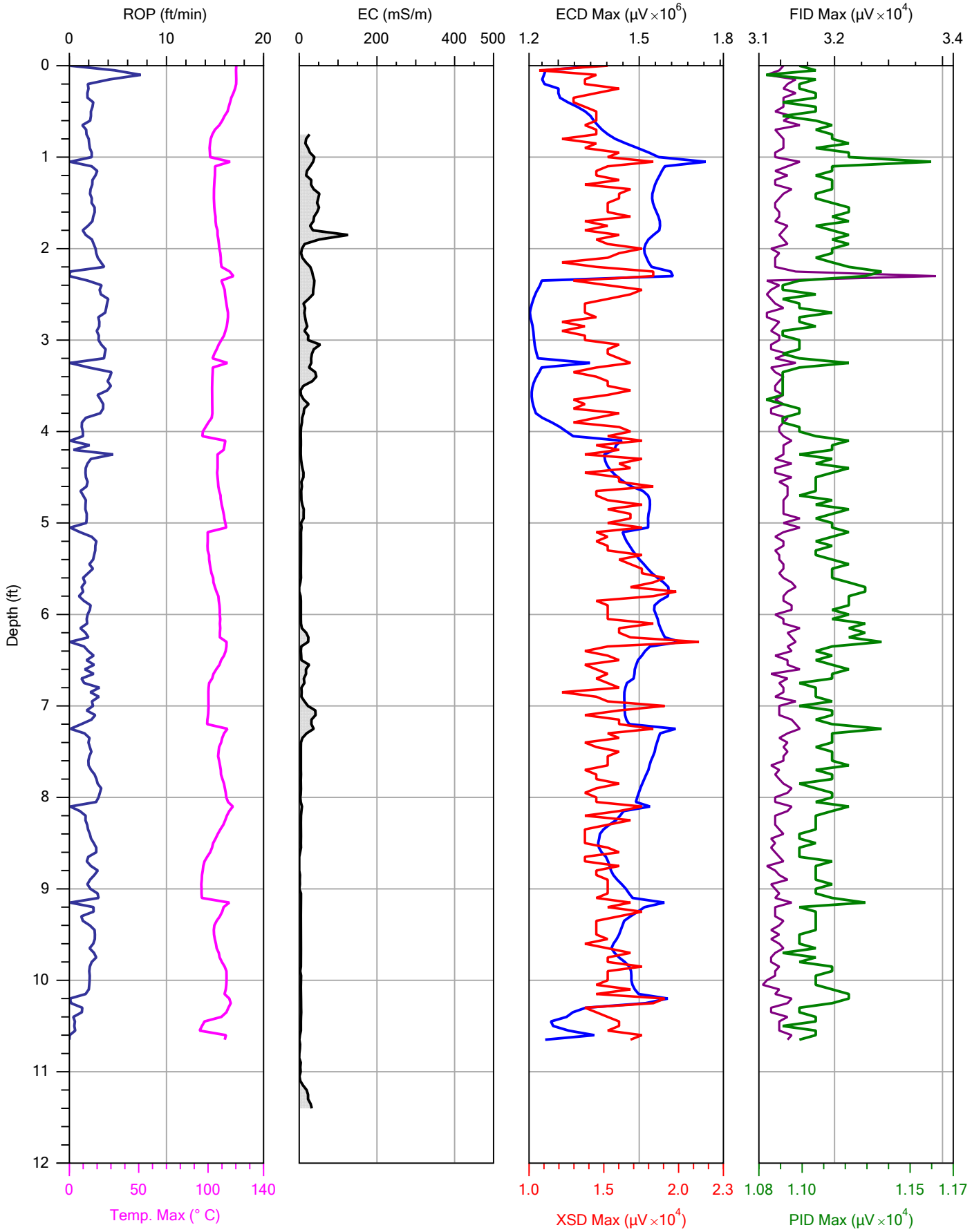

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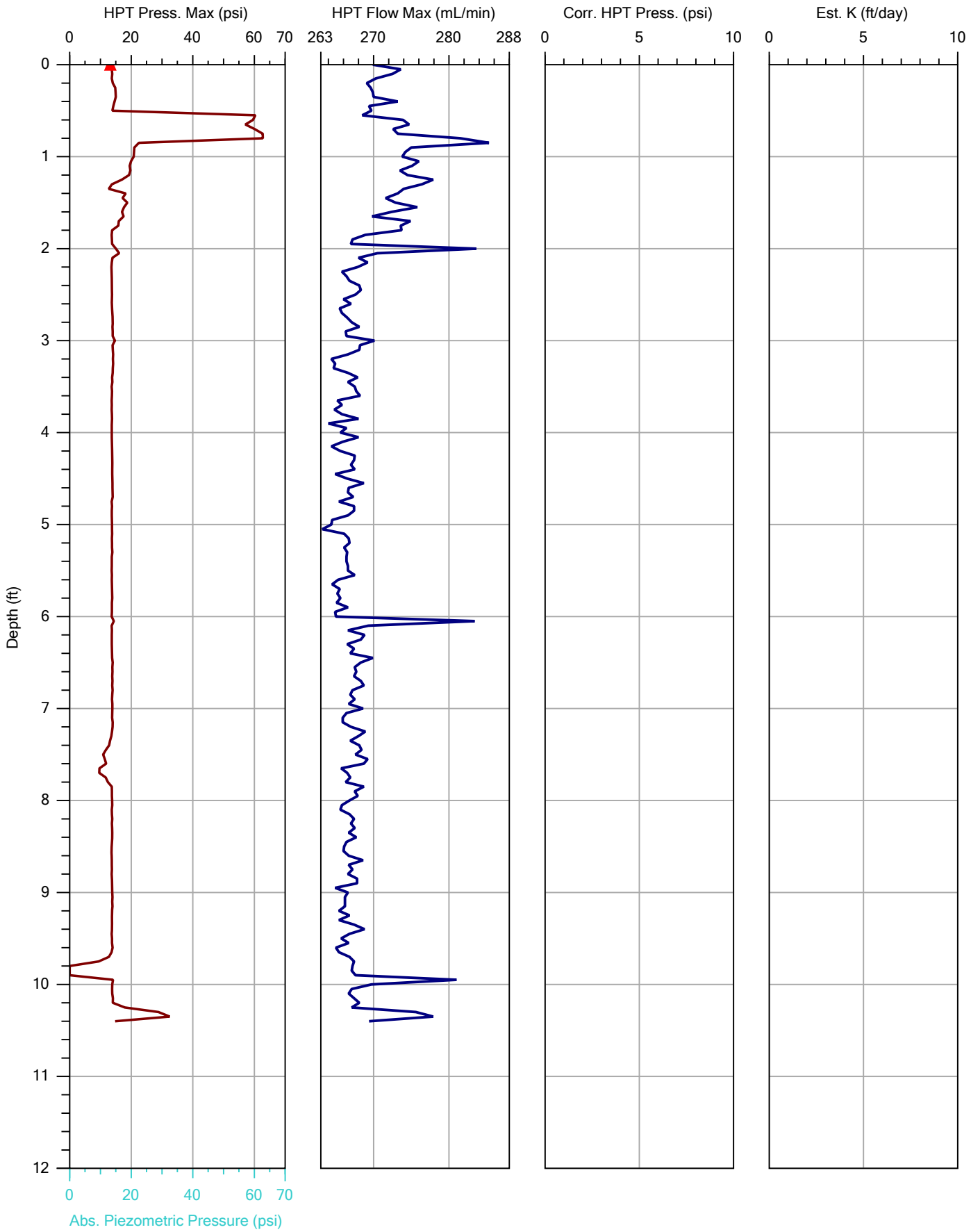
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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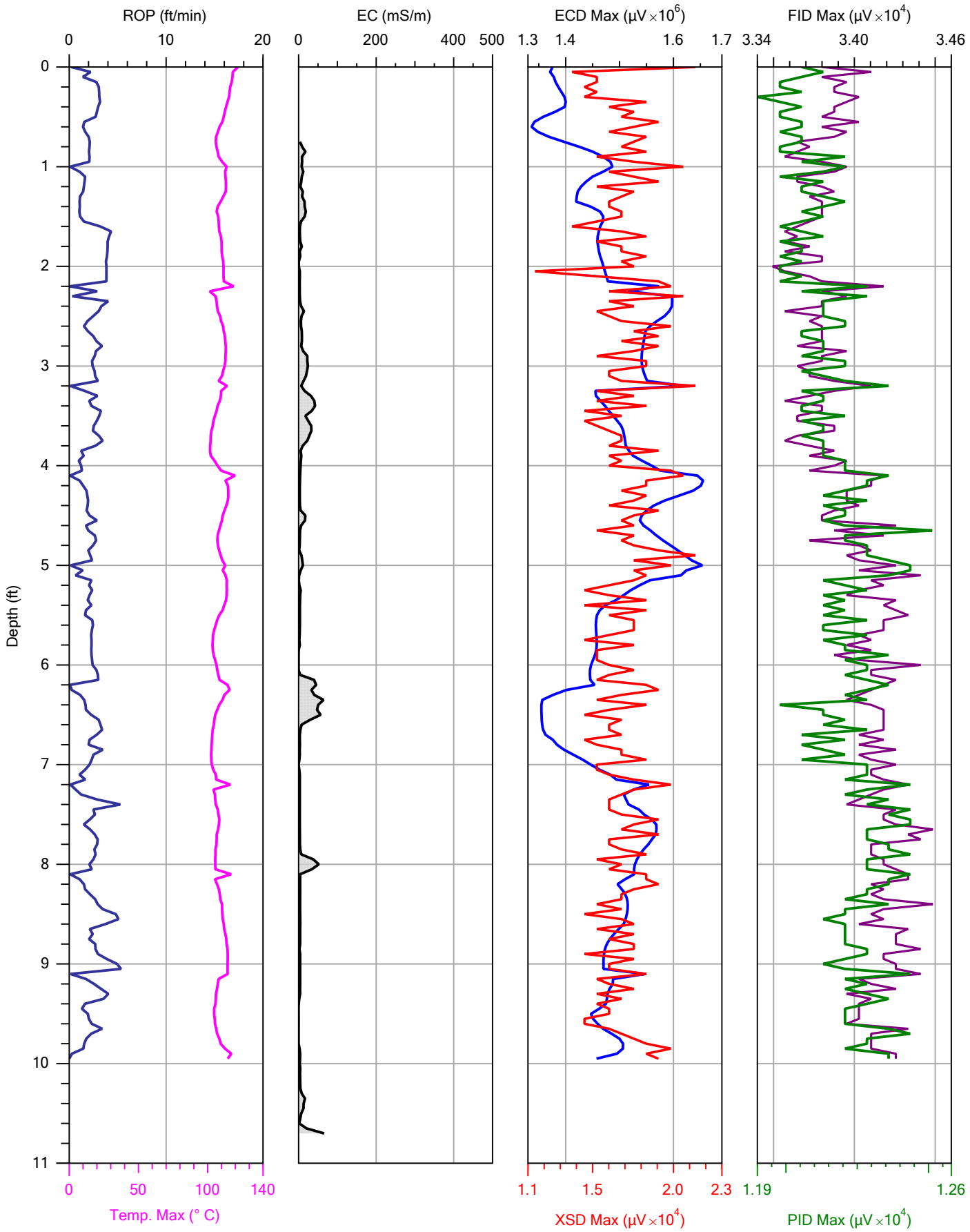

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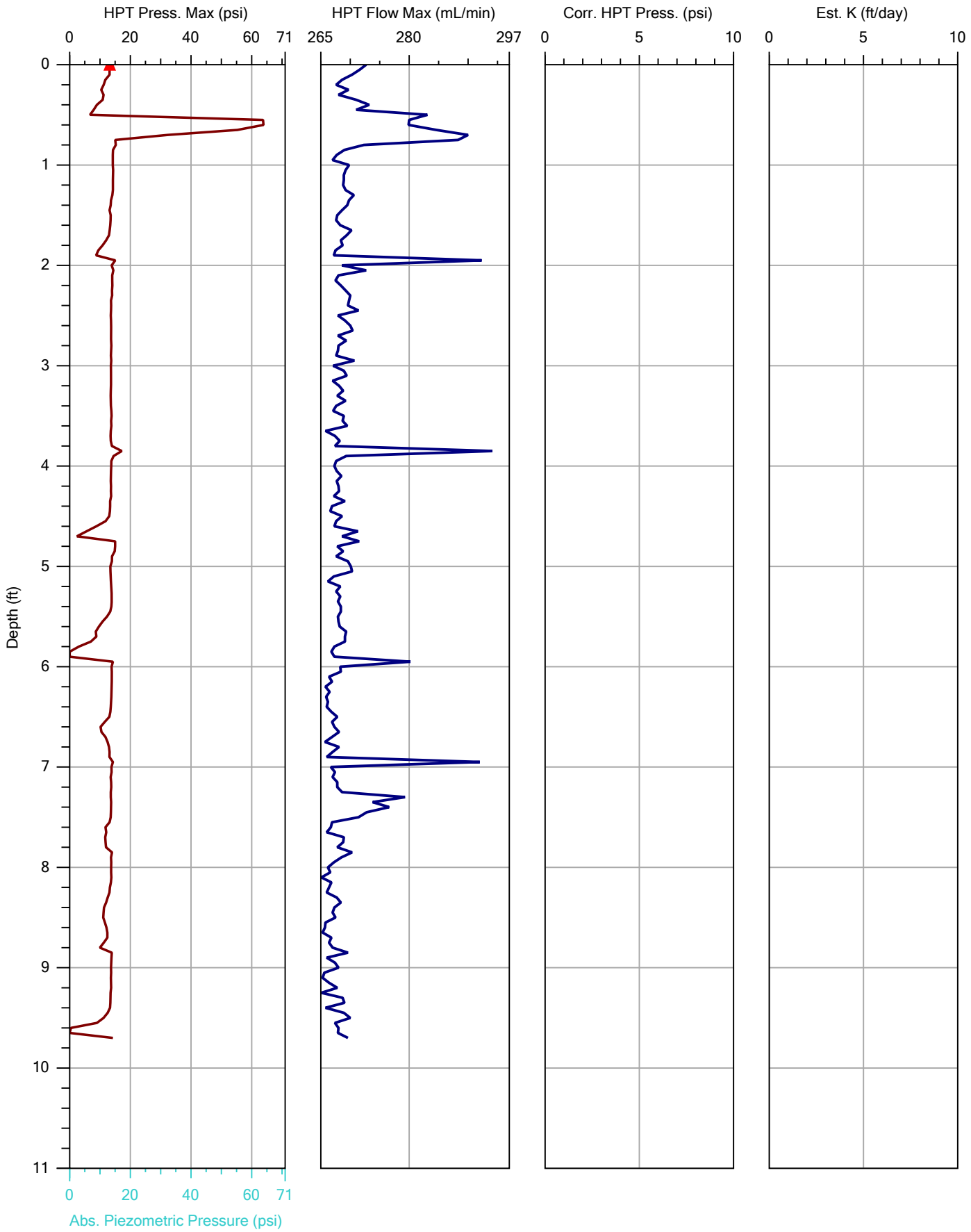
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/23/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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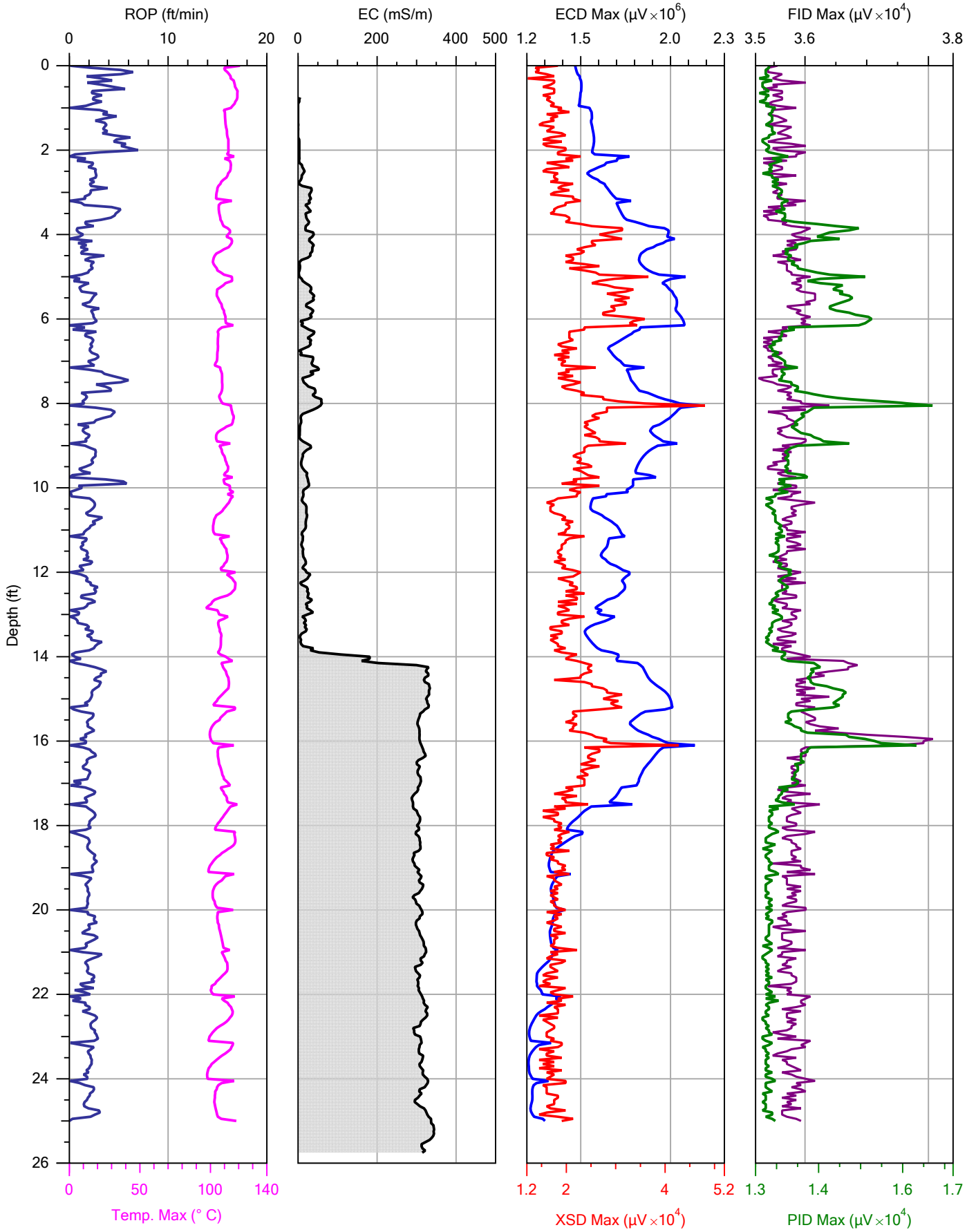
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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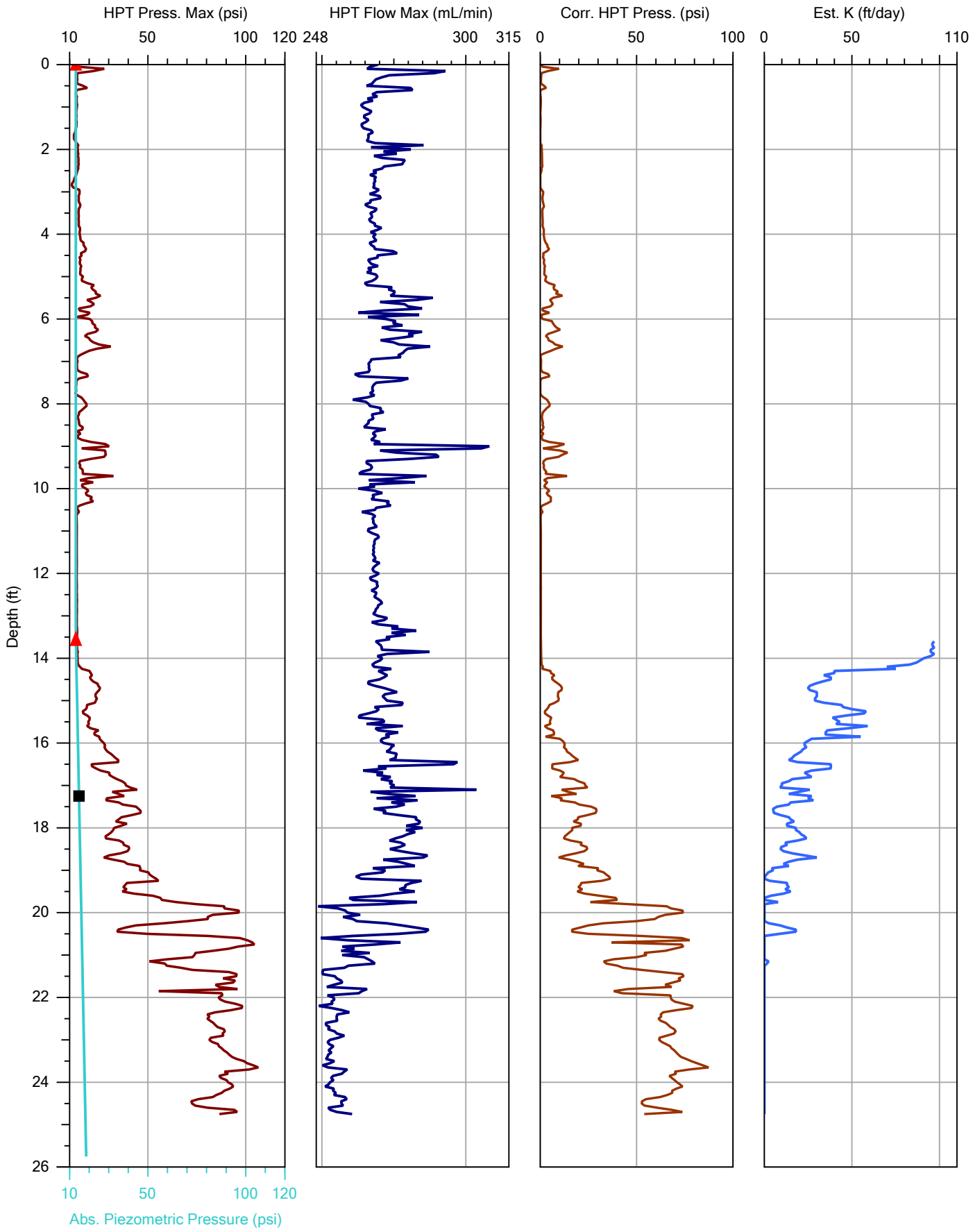
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/23/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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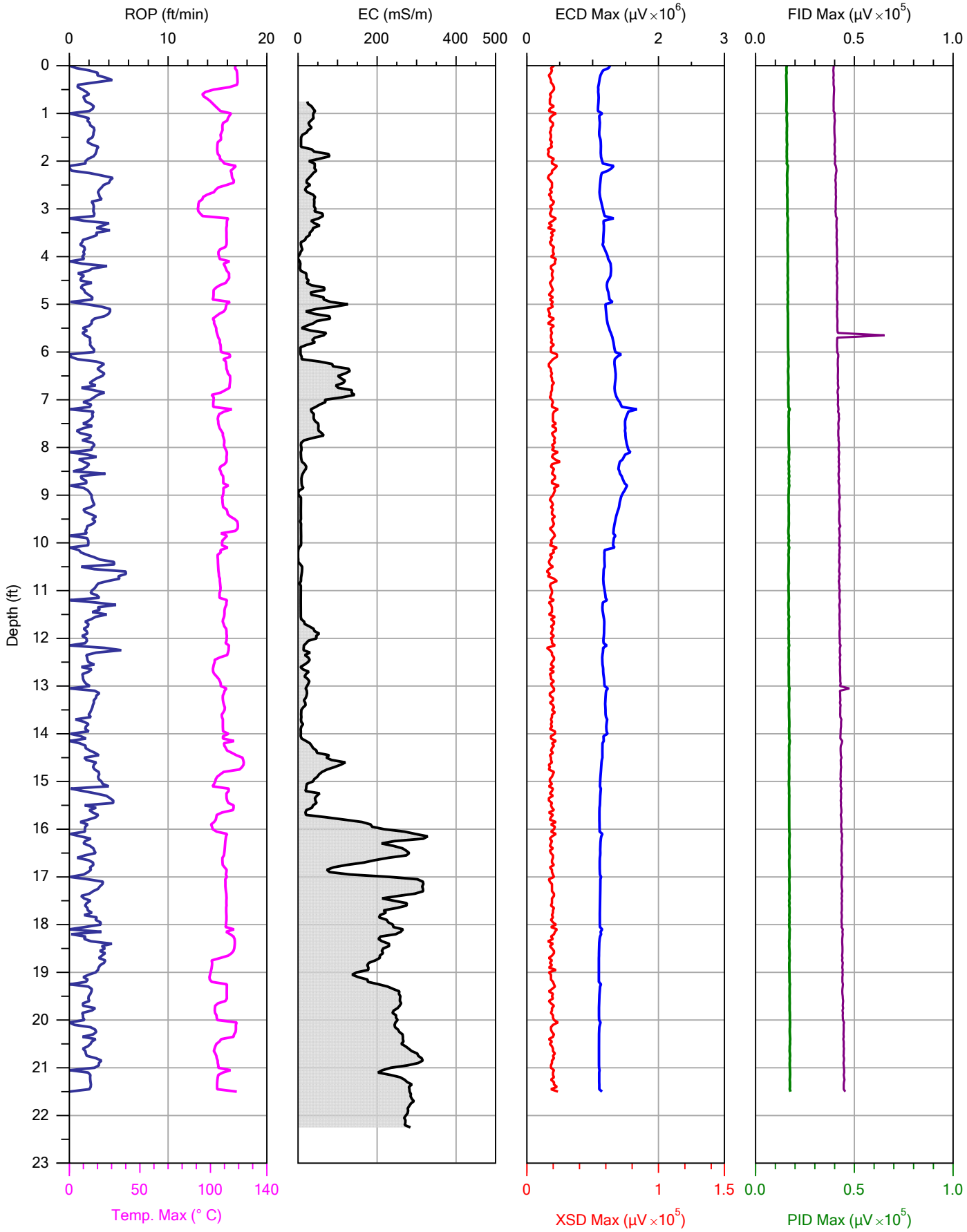
		File: DPT-12.MHP
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/23/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:

Membrane Interface – Hydraulic Profiling Tool Data Plots – High Range Scales



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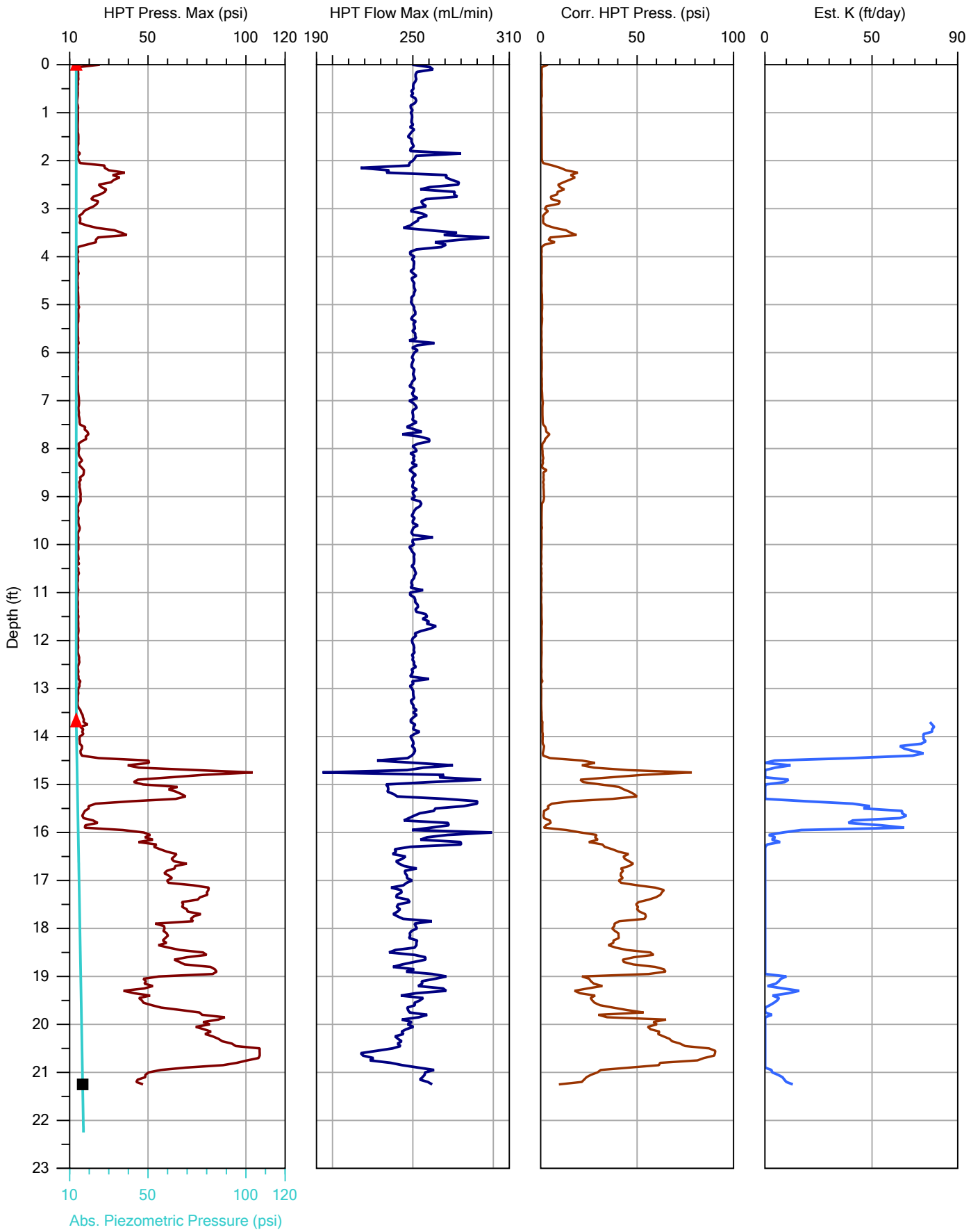
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/20/2016
Project ID: HSS	Client: Hydrosolutions	Location:



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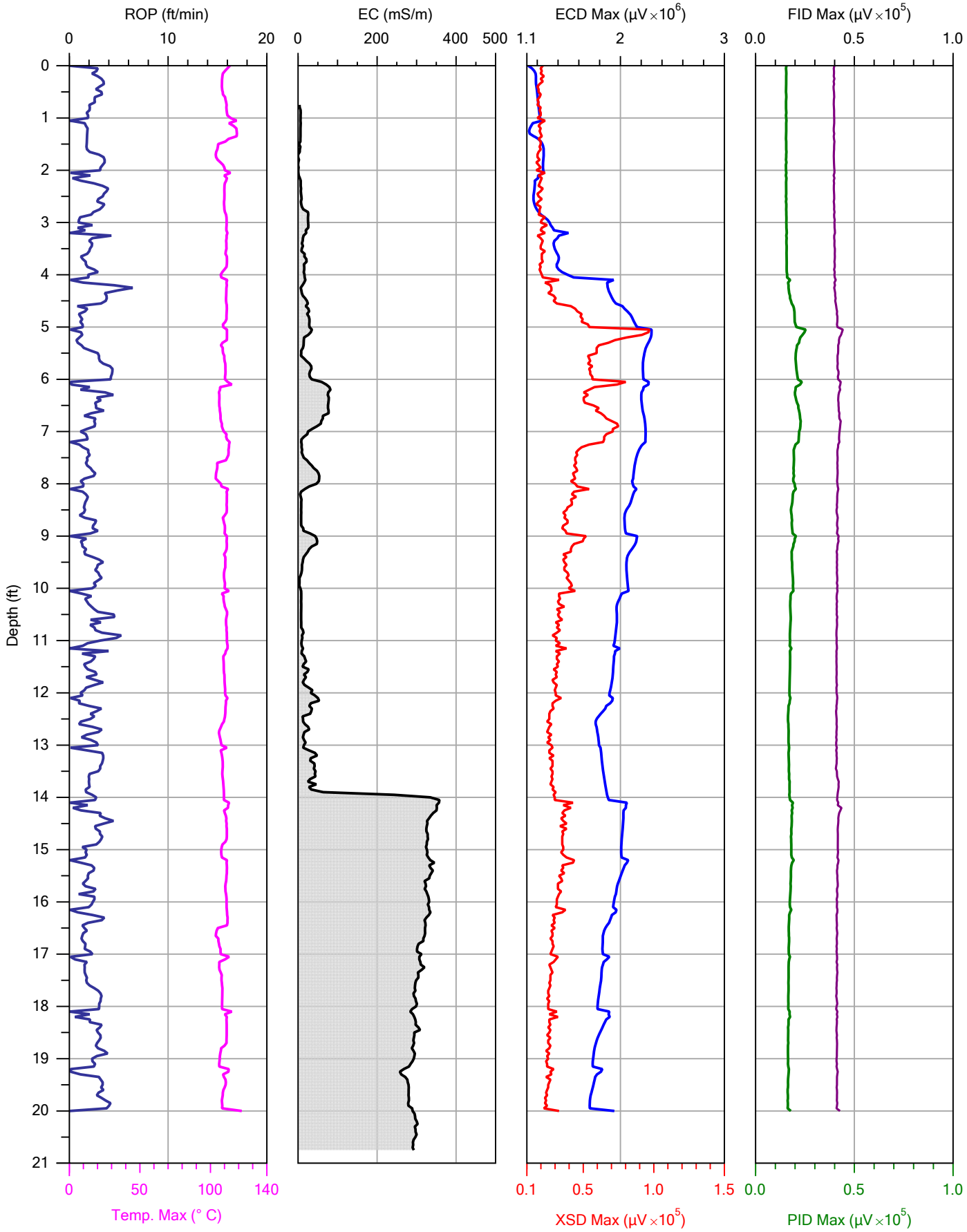
Project ID: HSS	Client: Hydrosolutions	Location:



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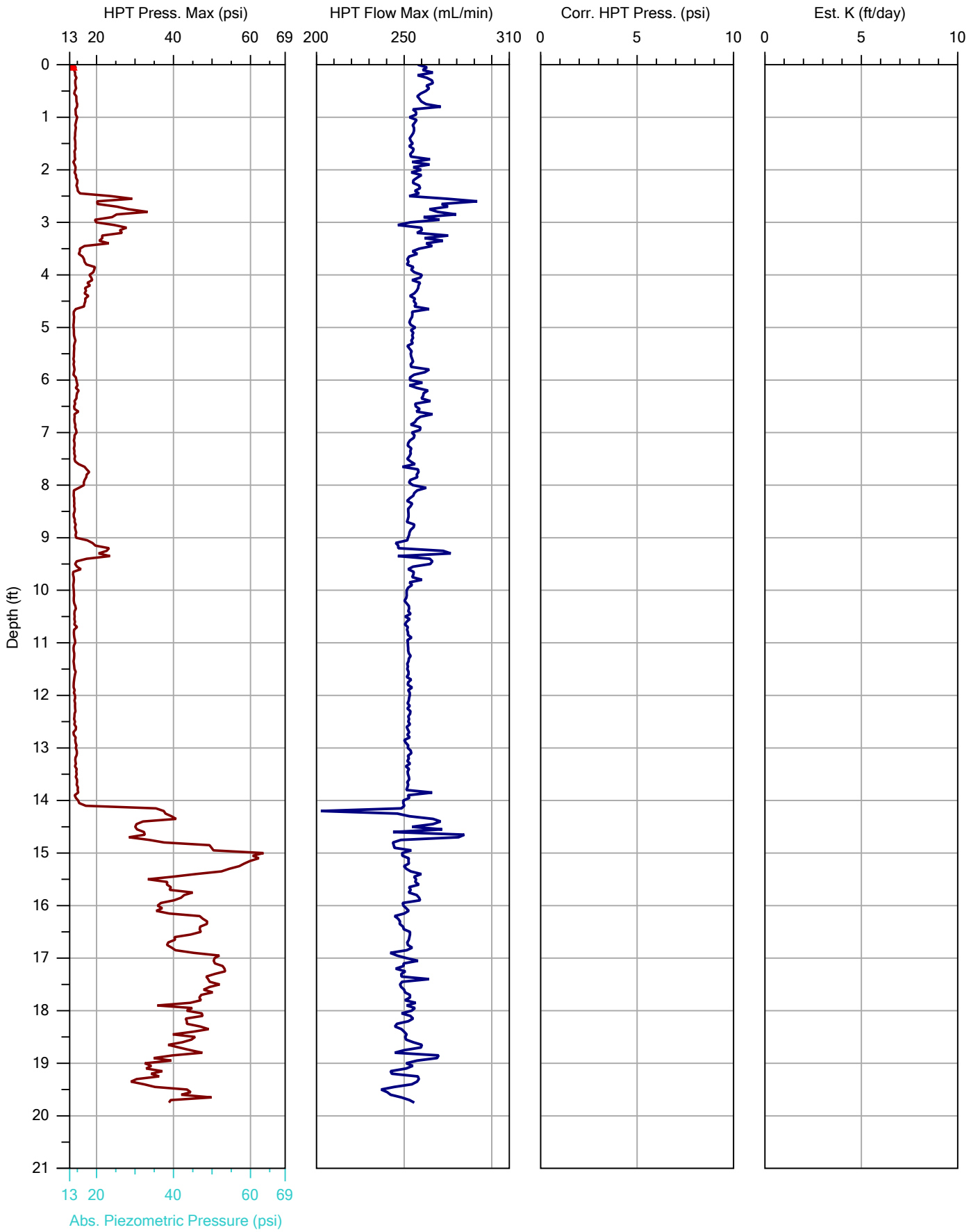
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/20/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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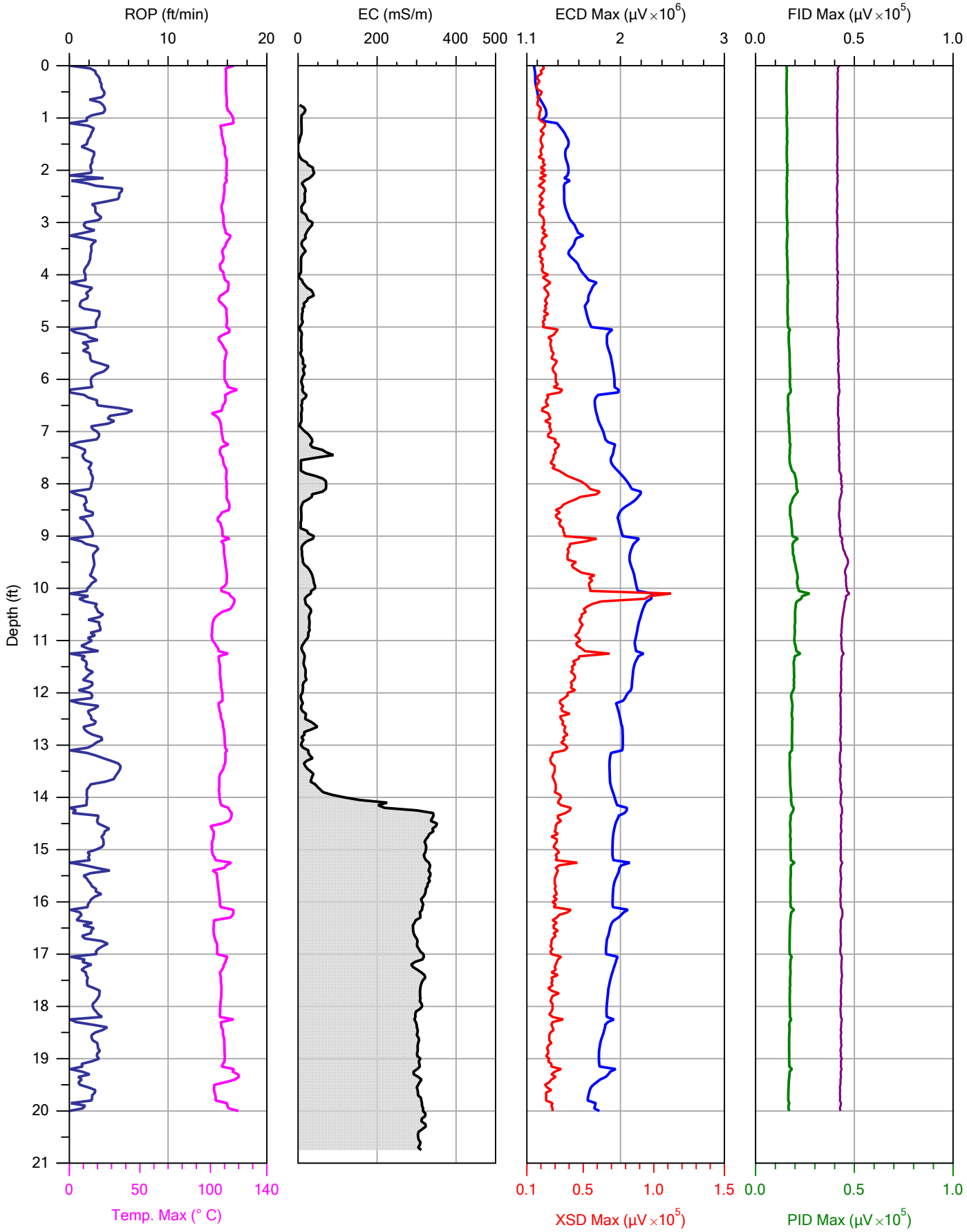

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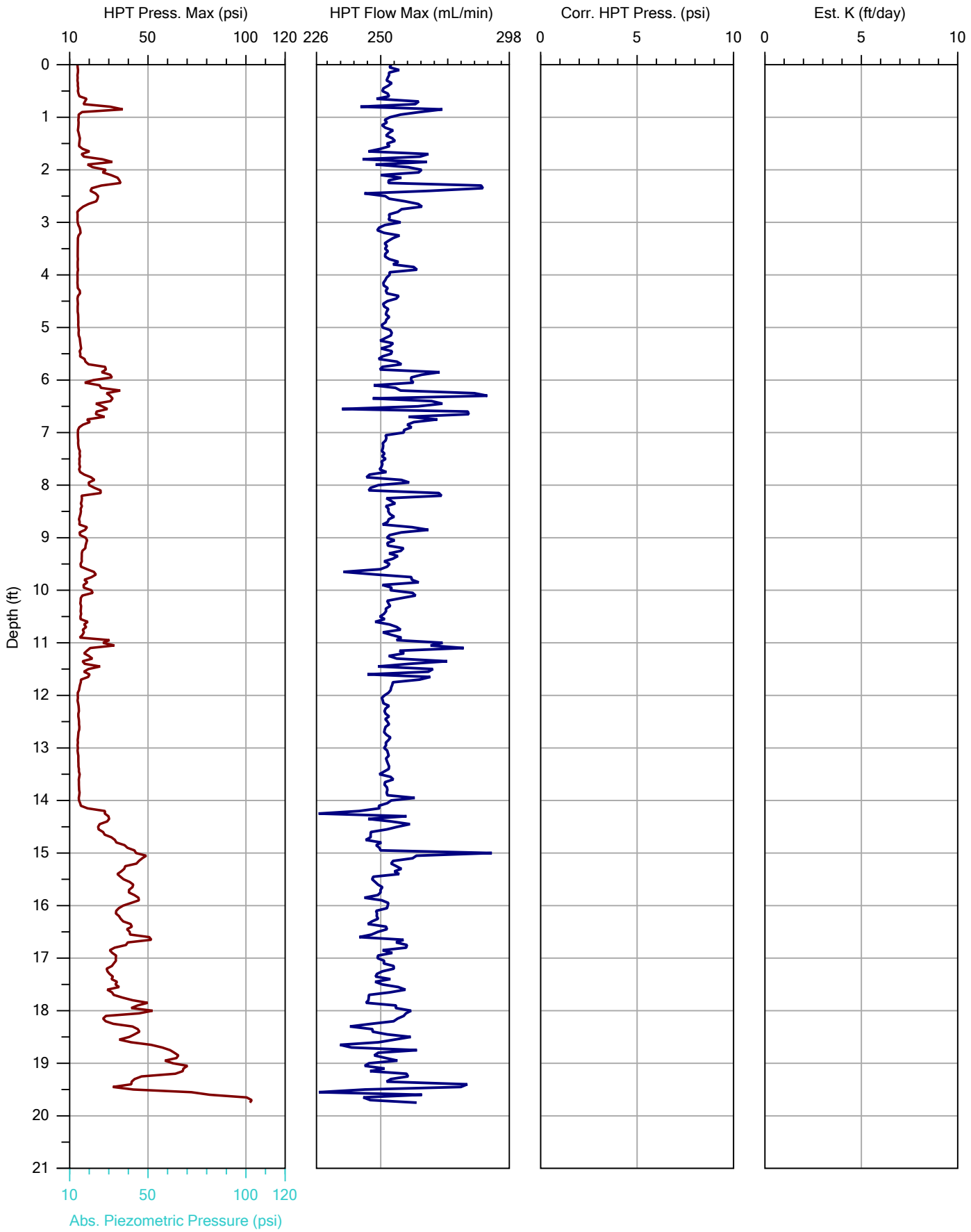
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/20/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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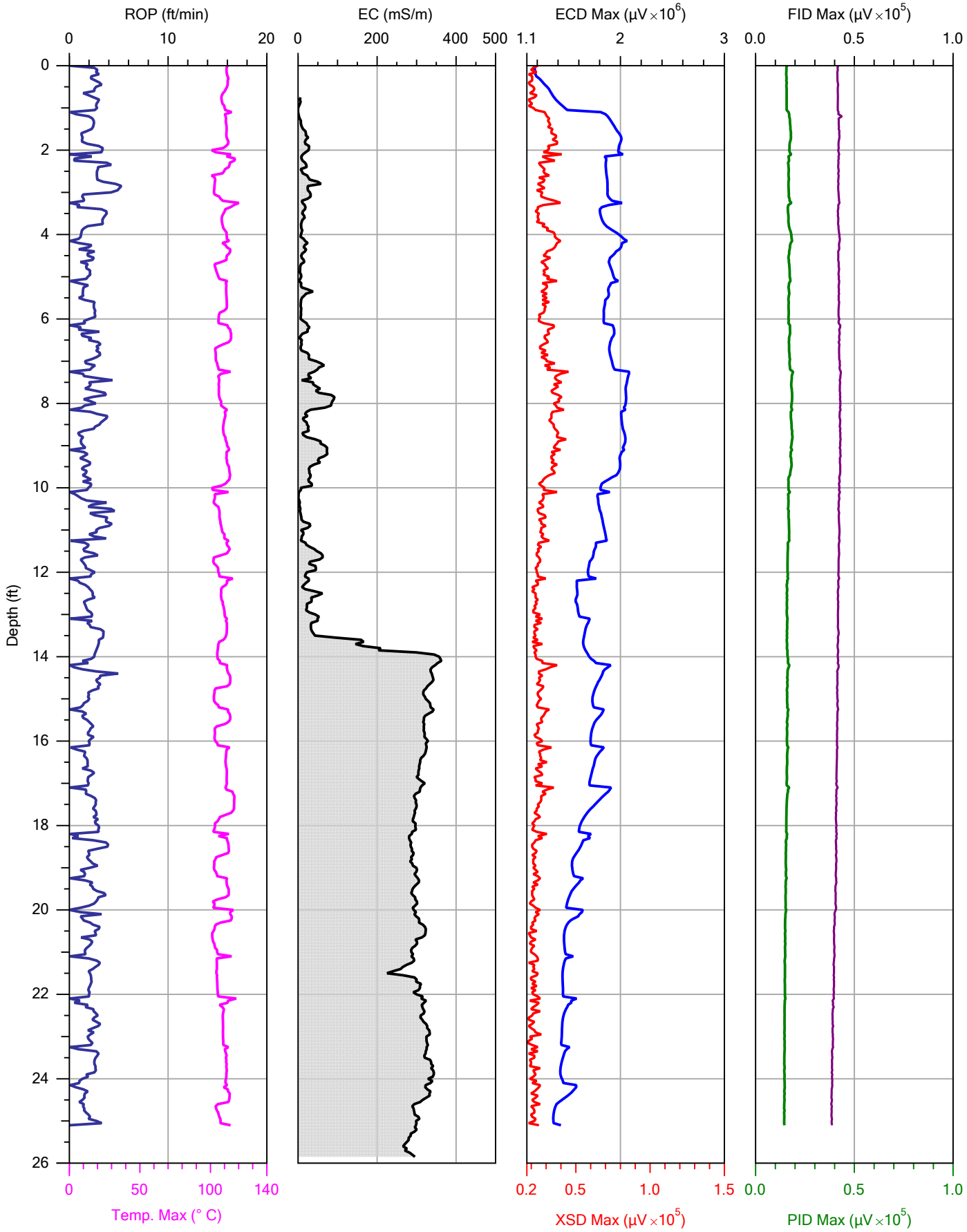

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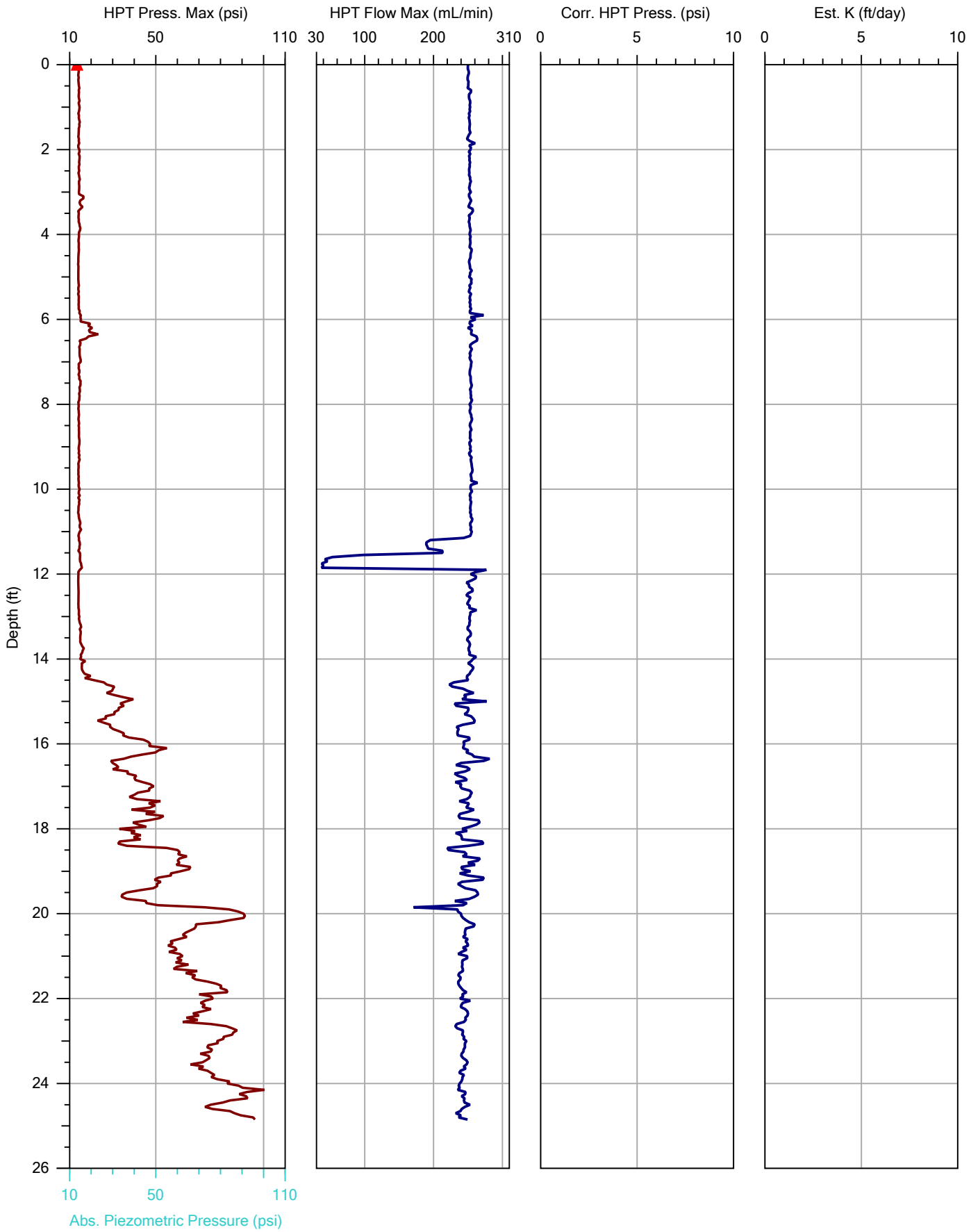
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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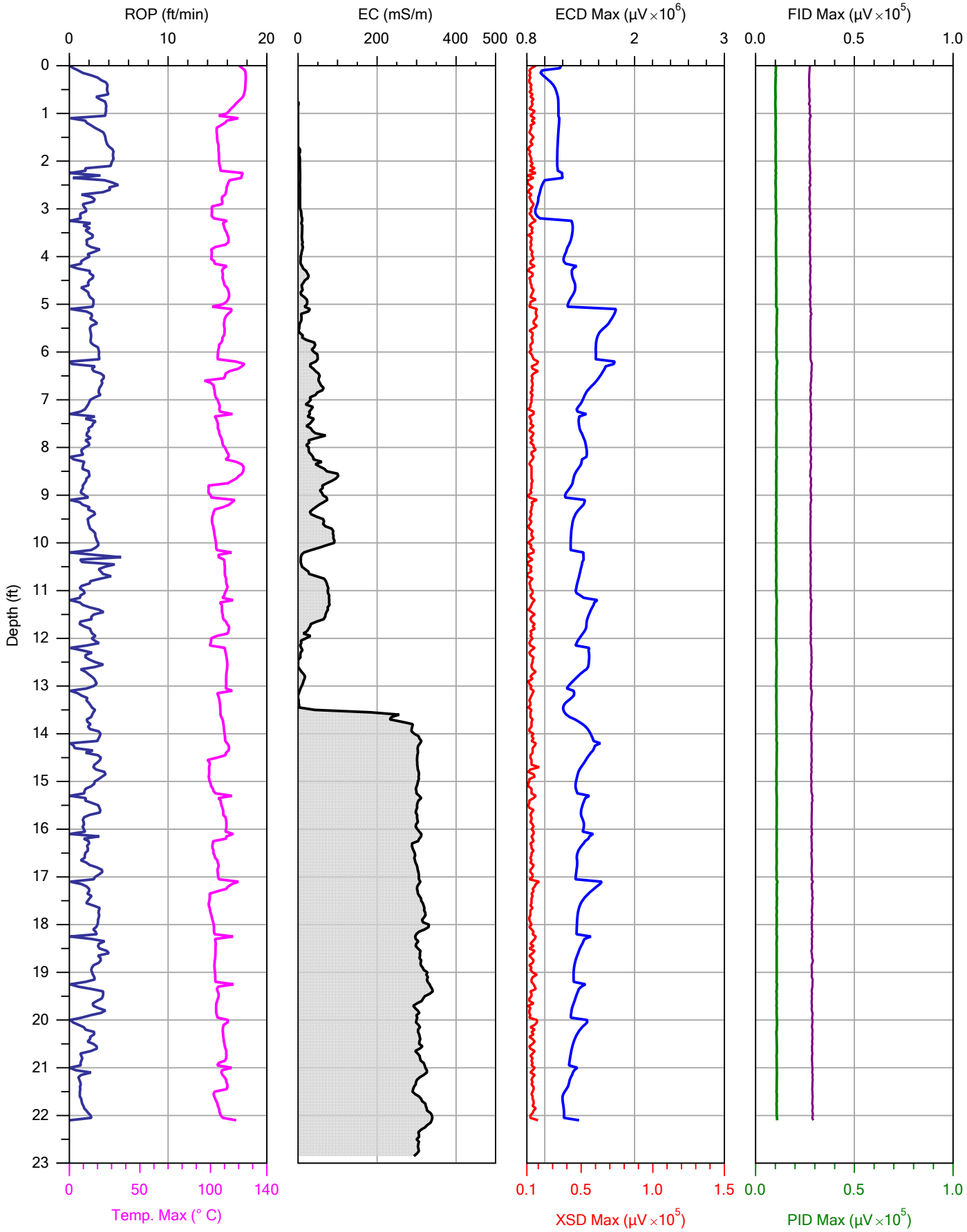
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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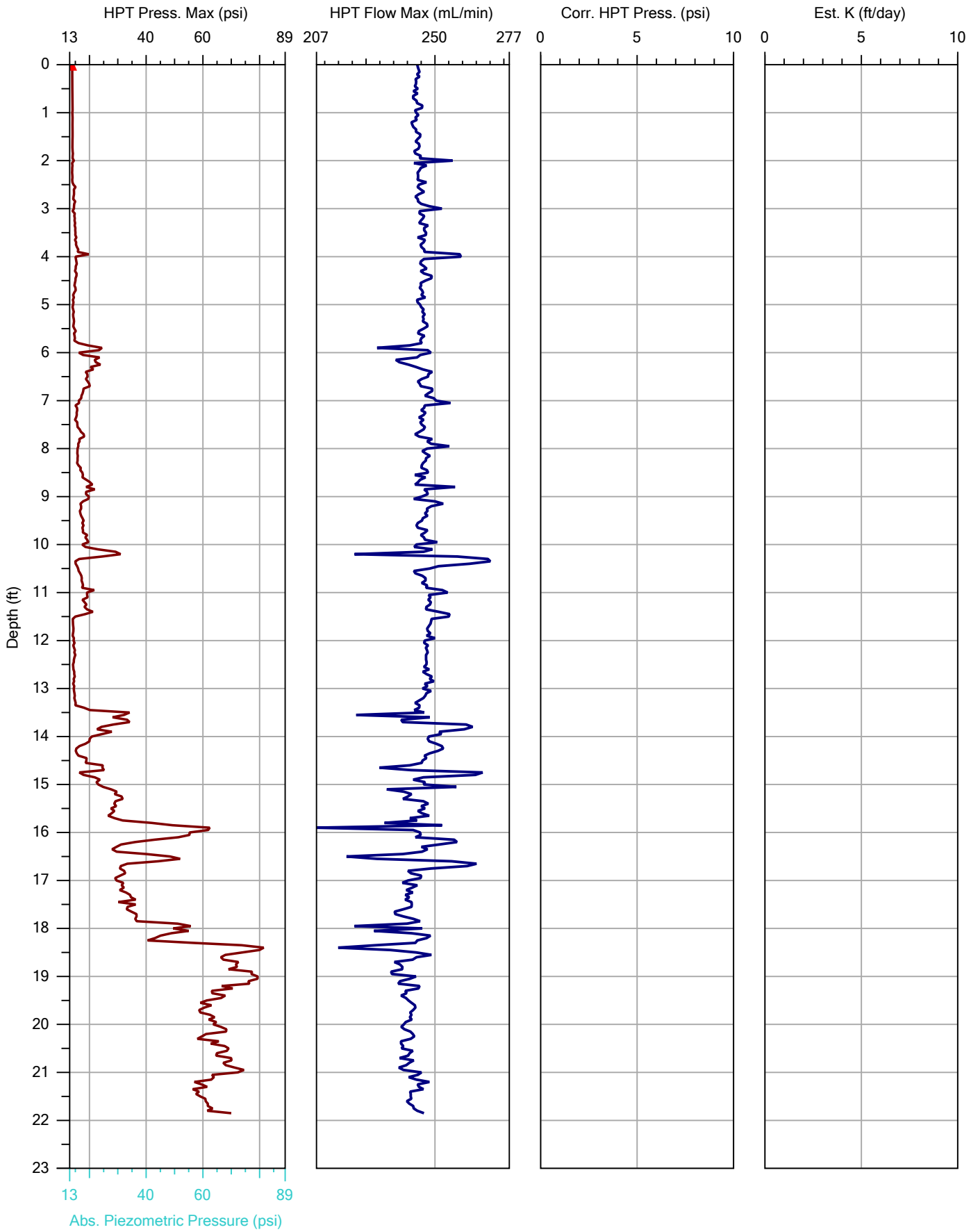

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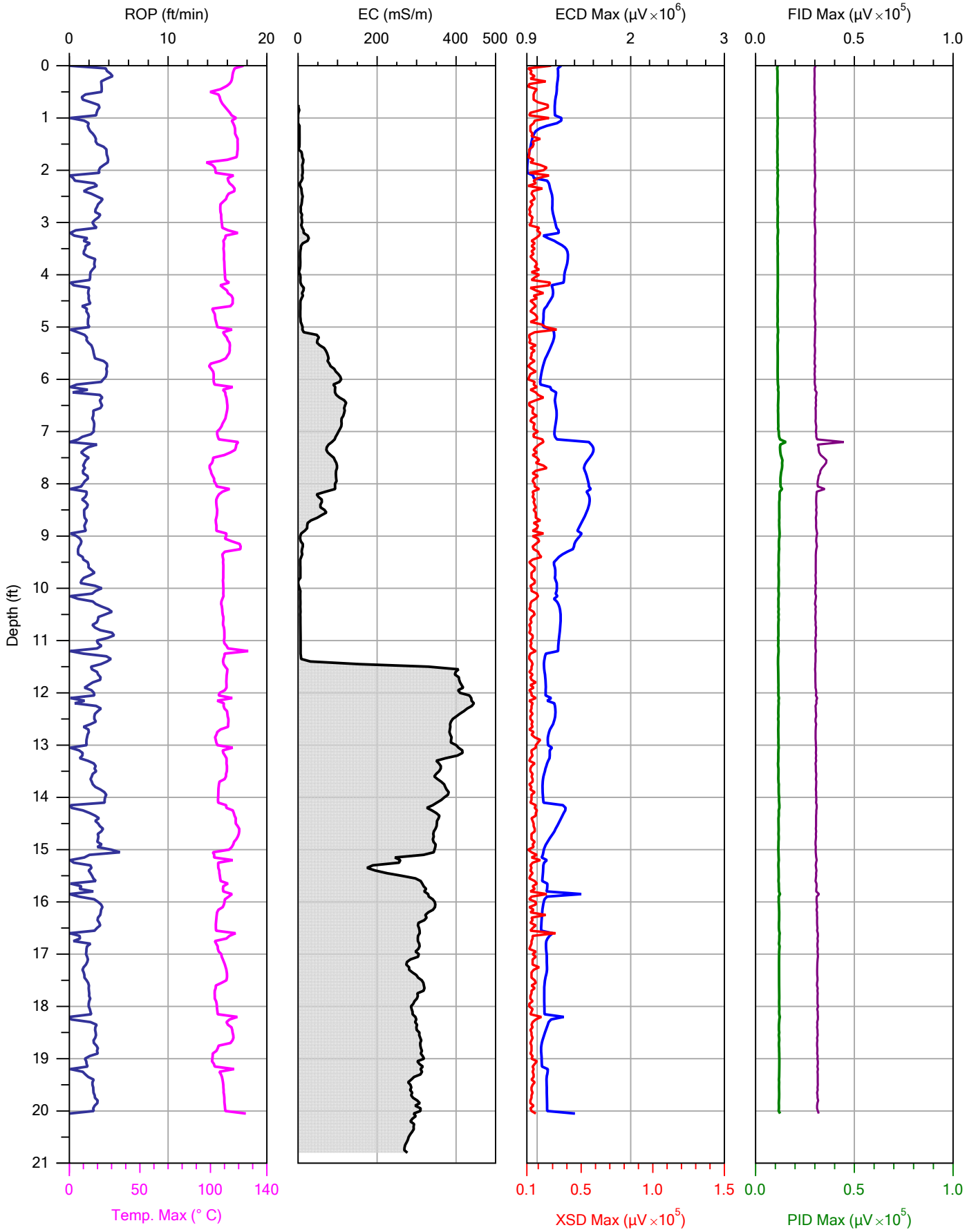

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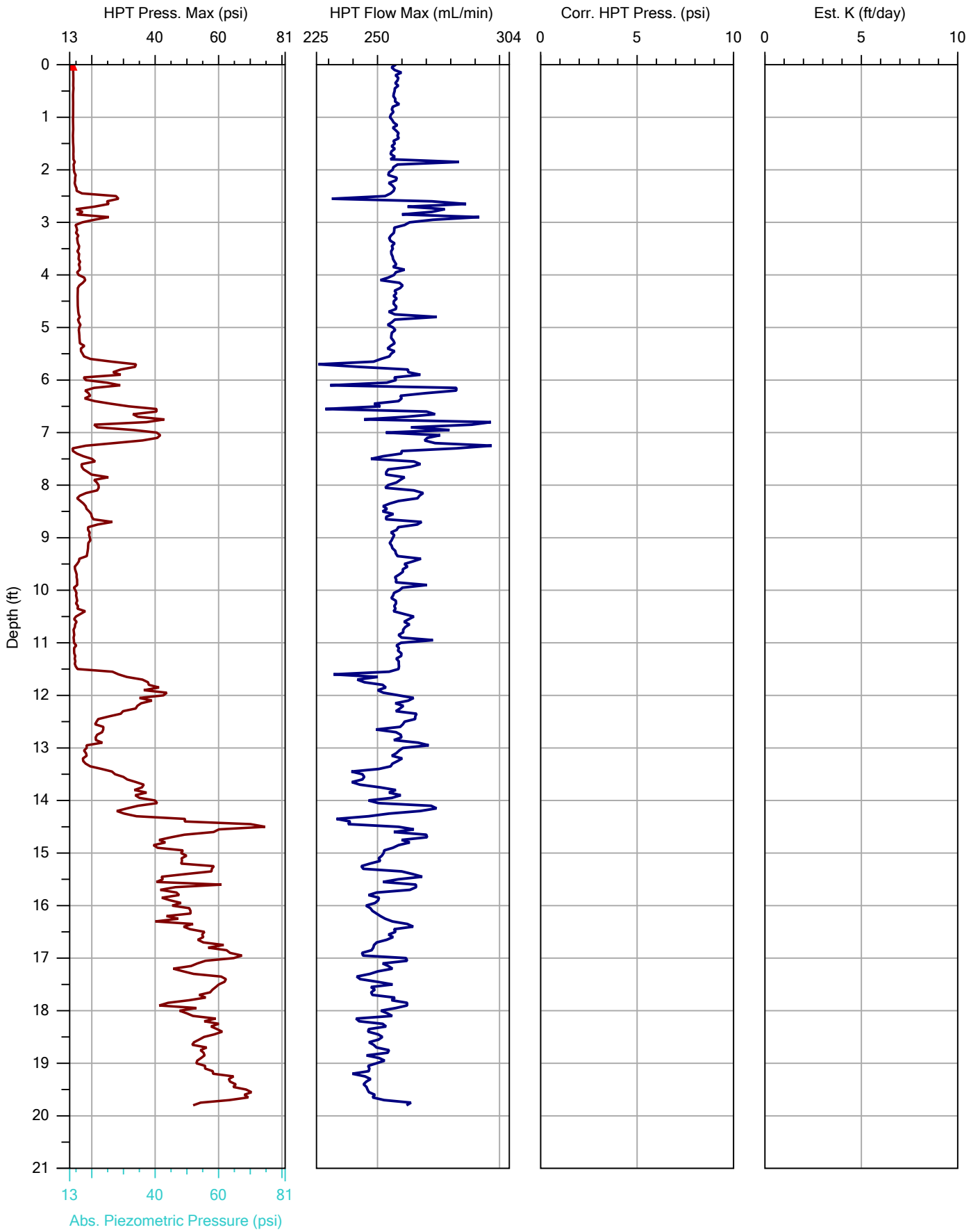

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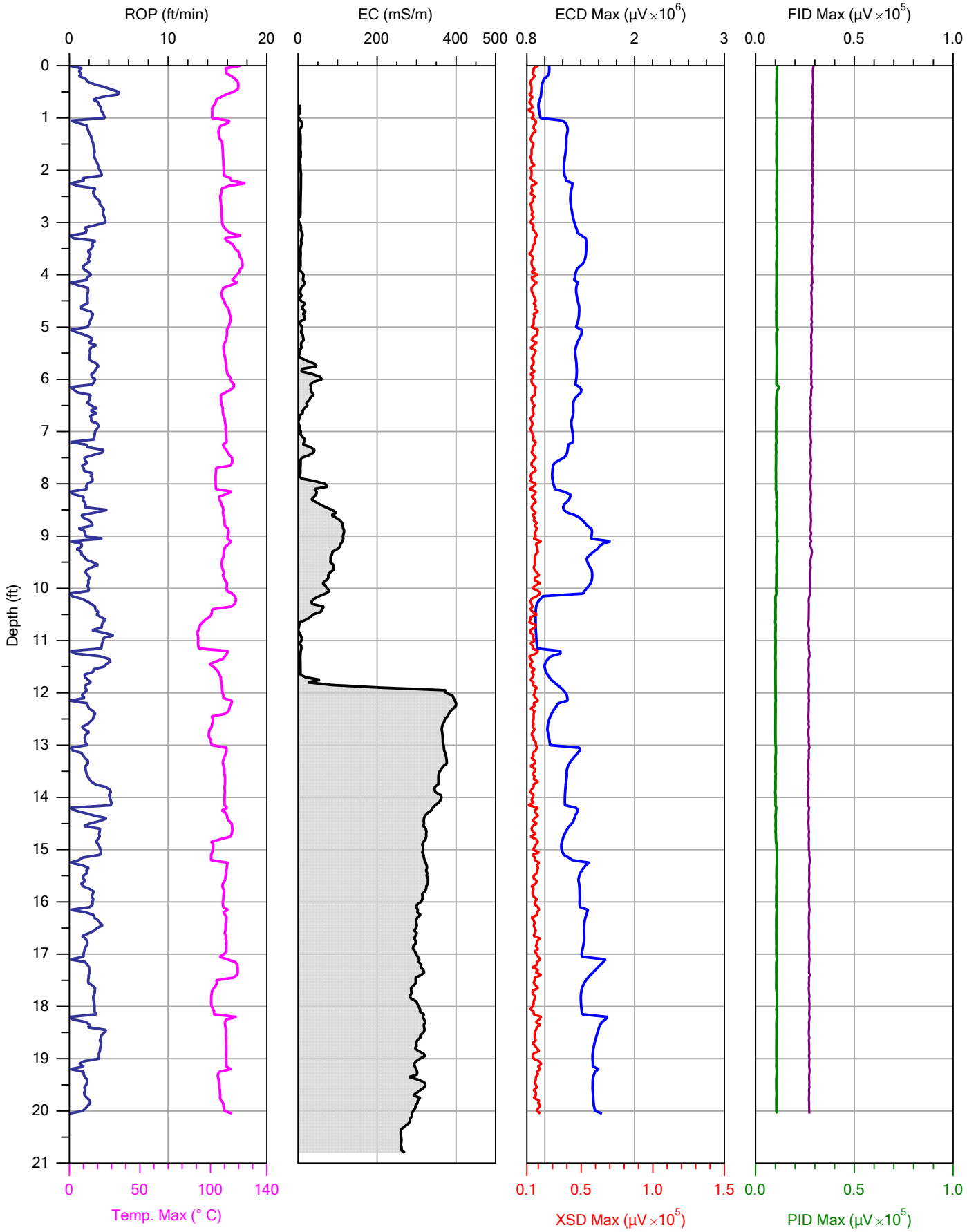

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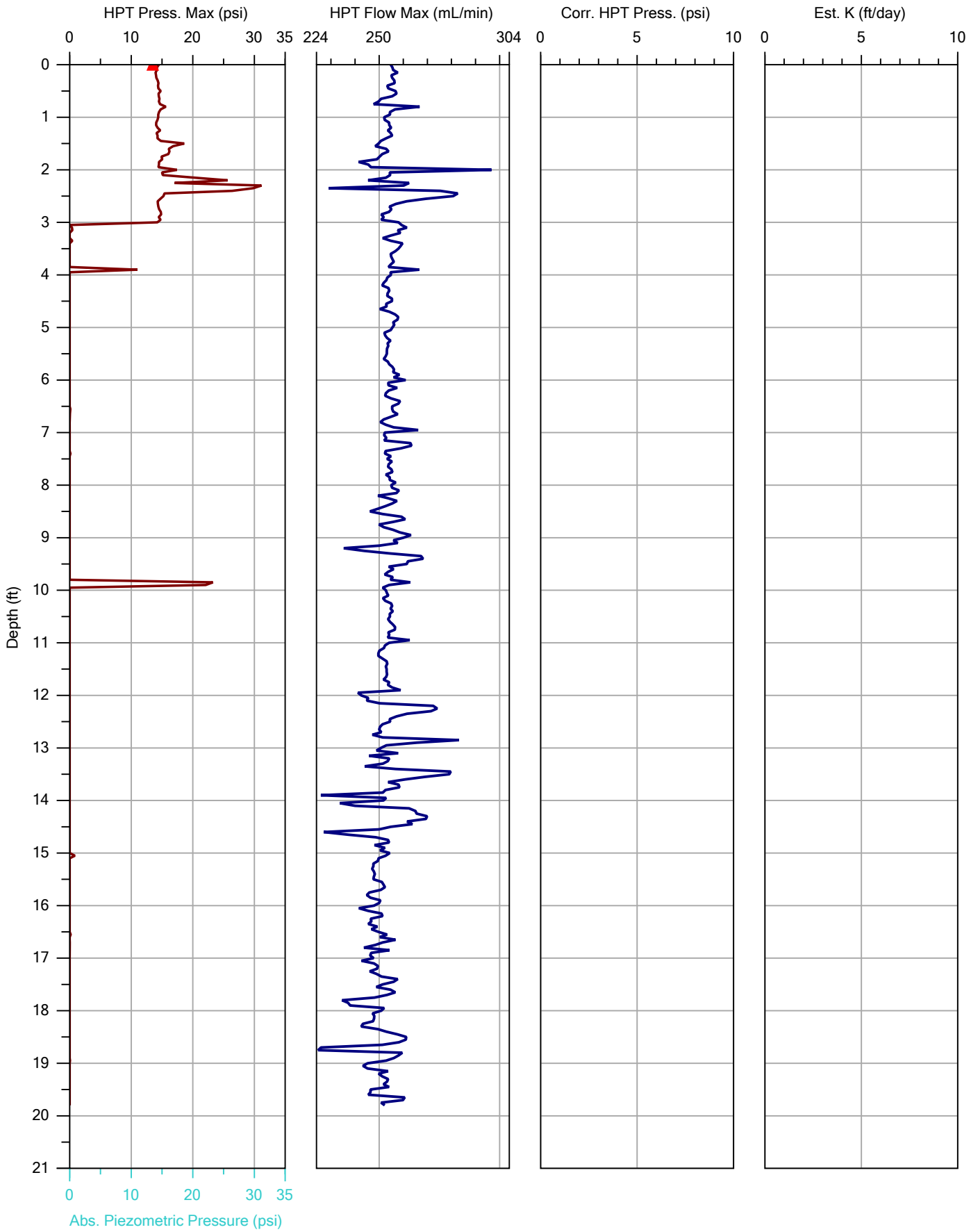

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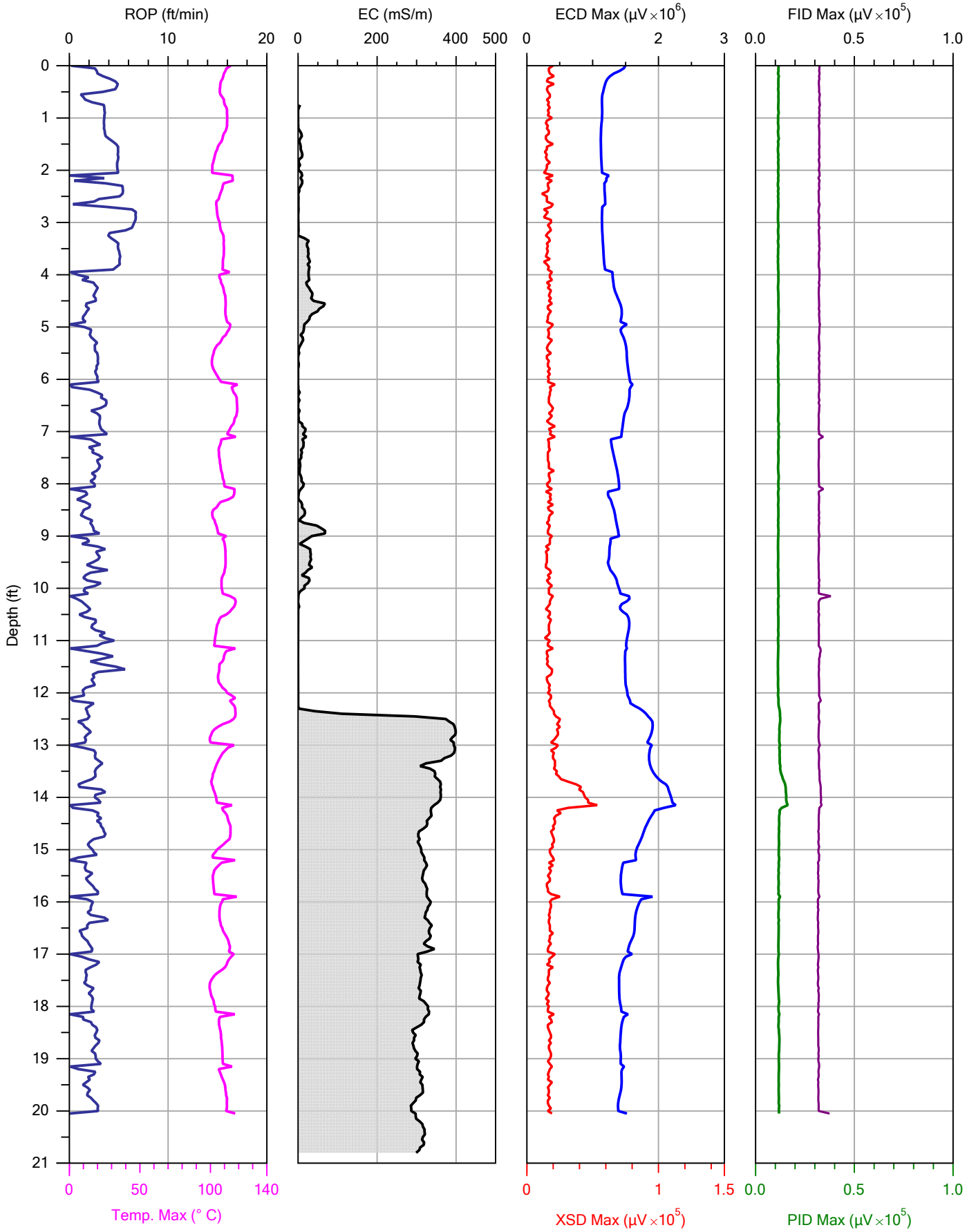

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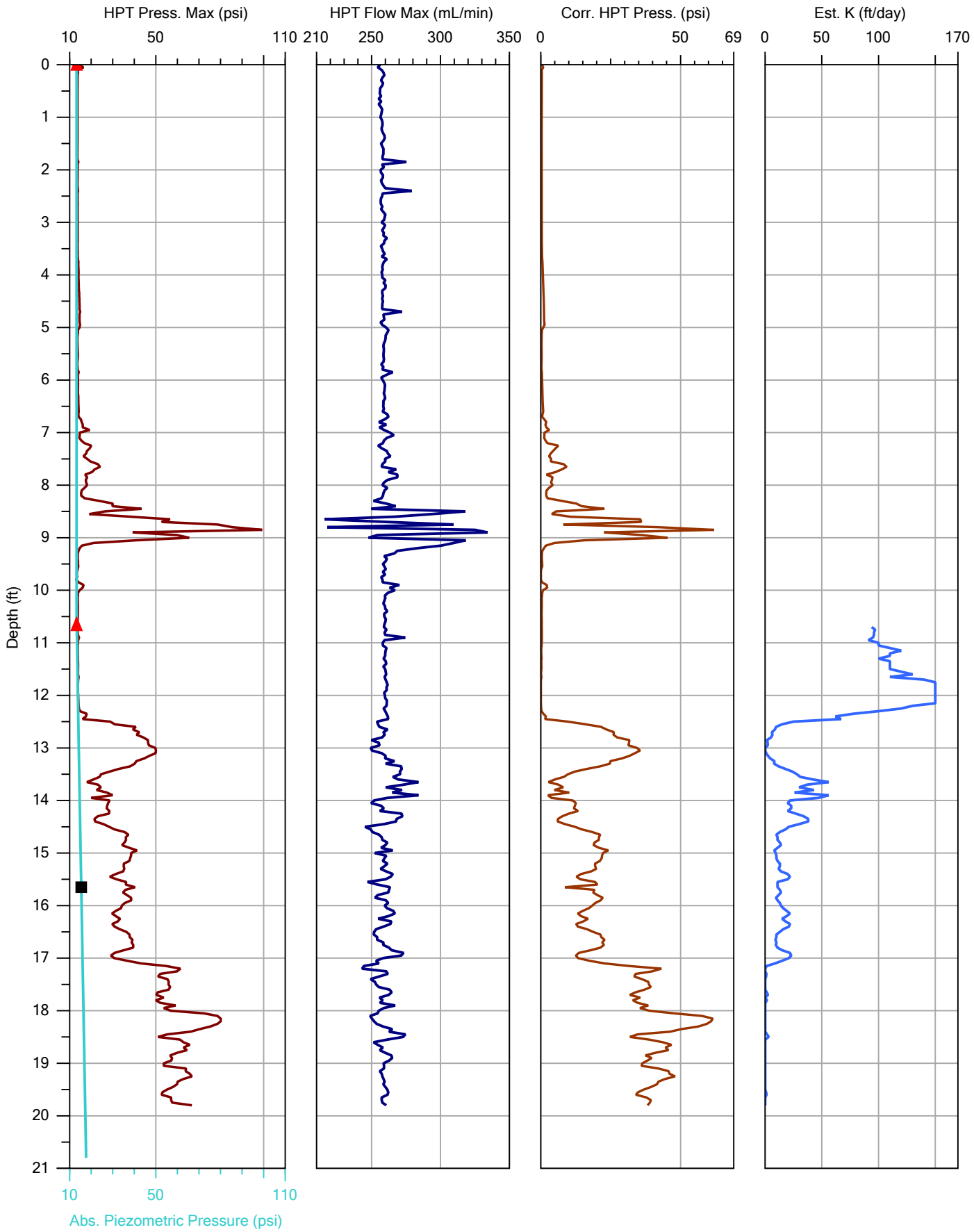

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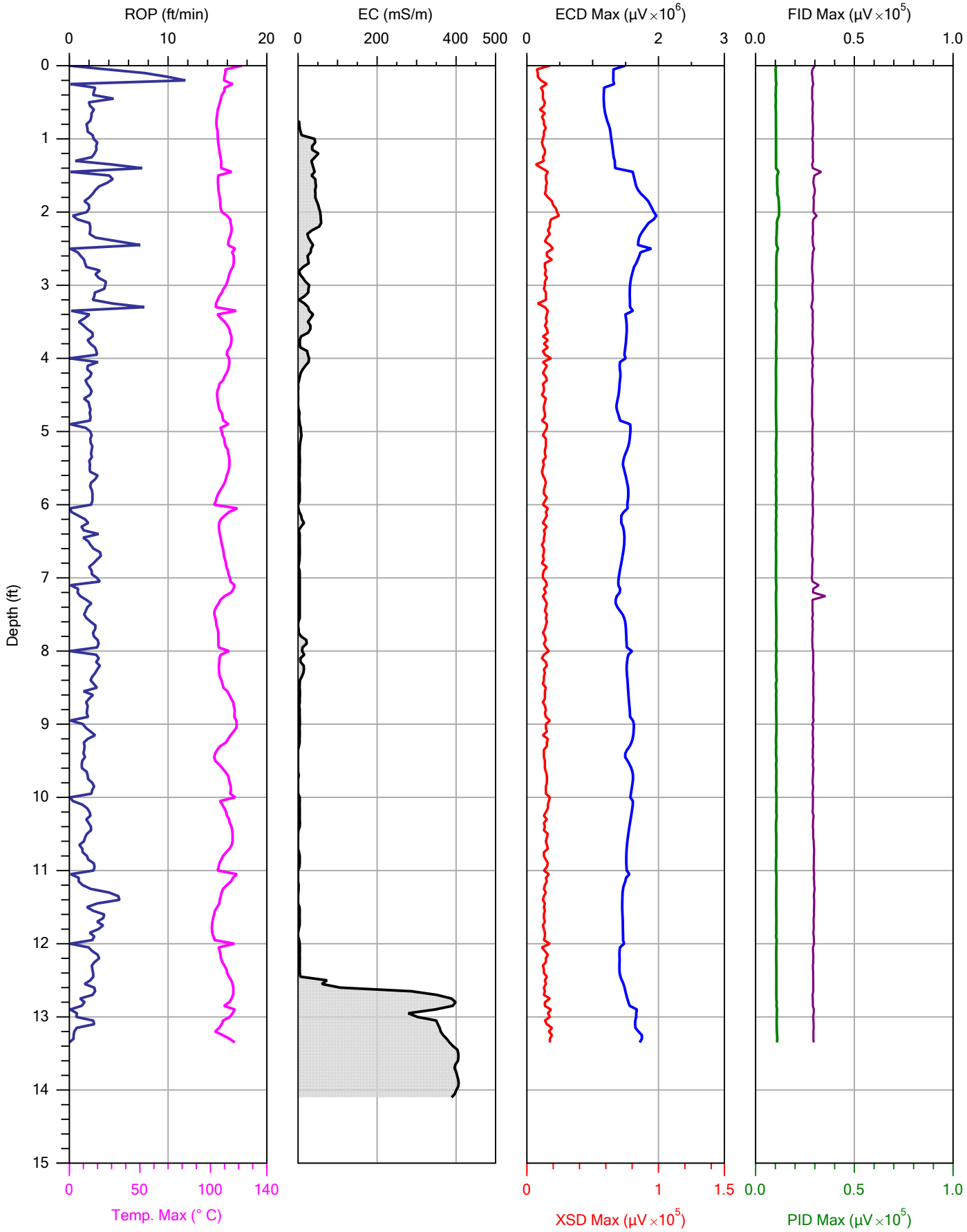

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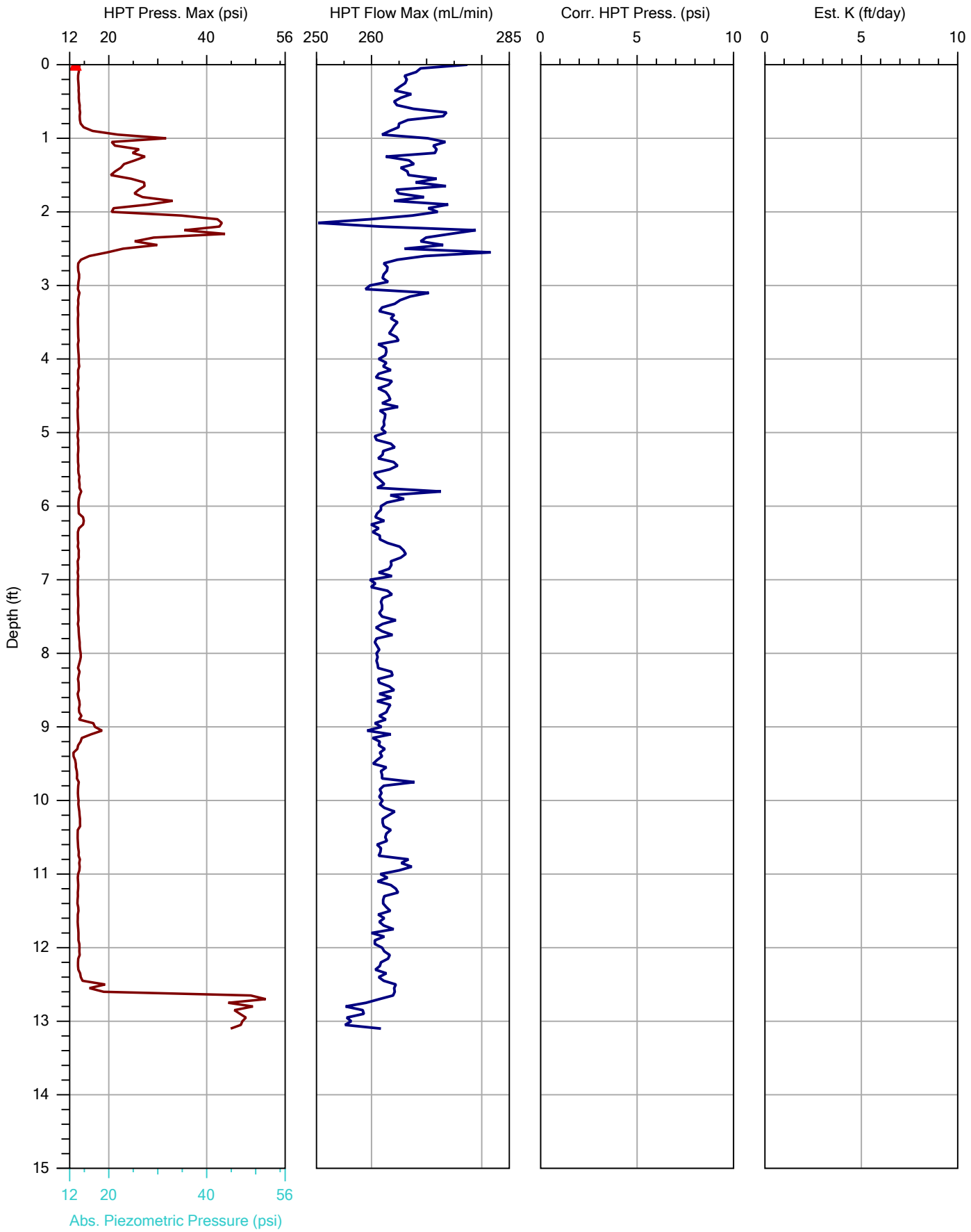

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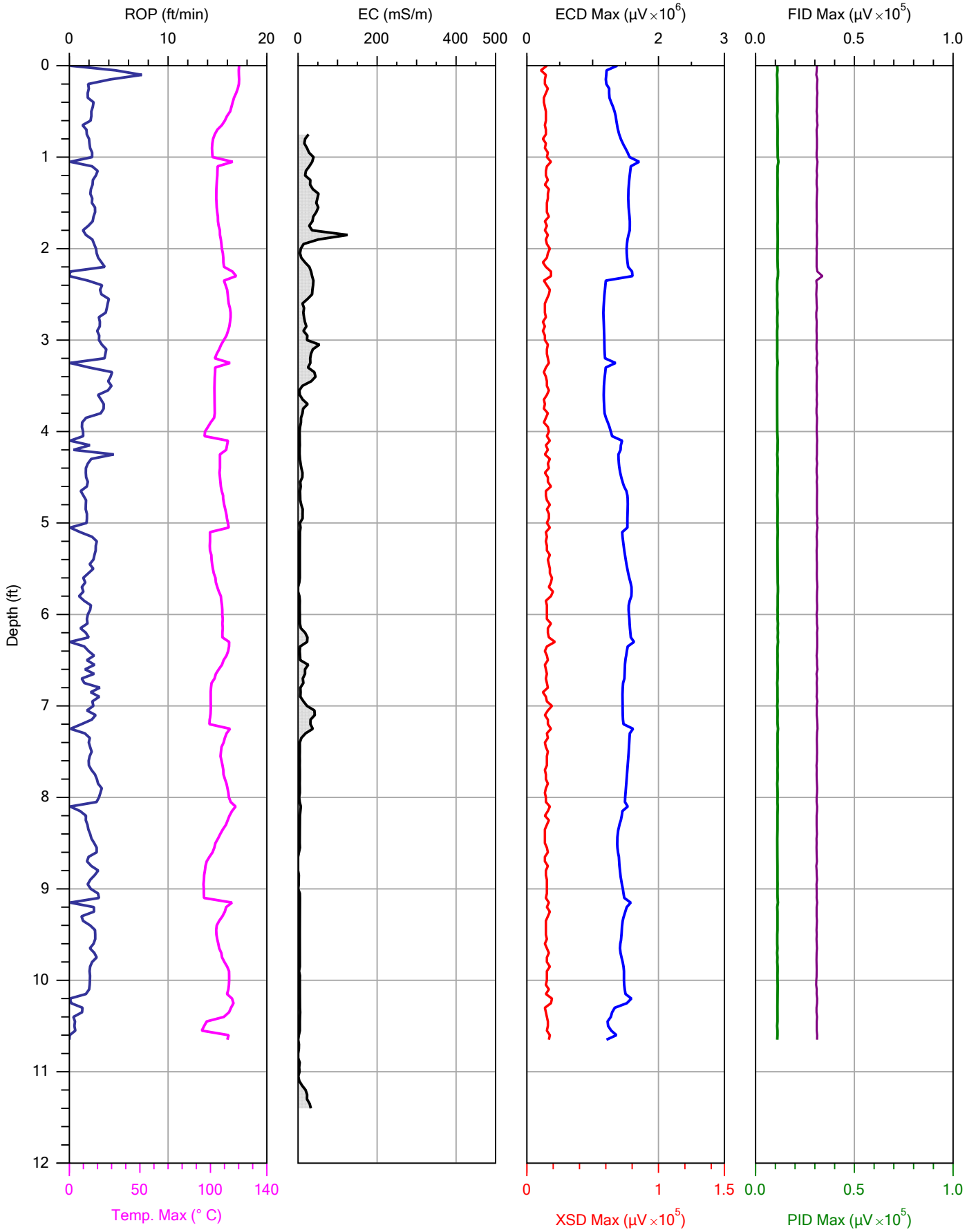

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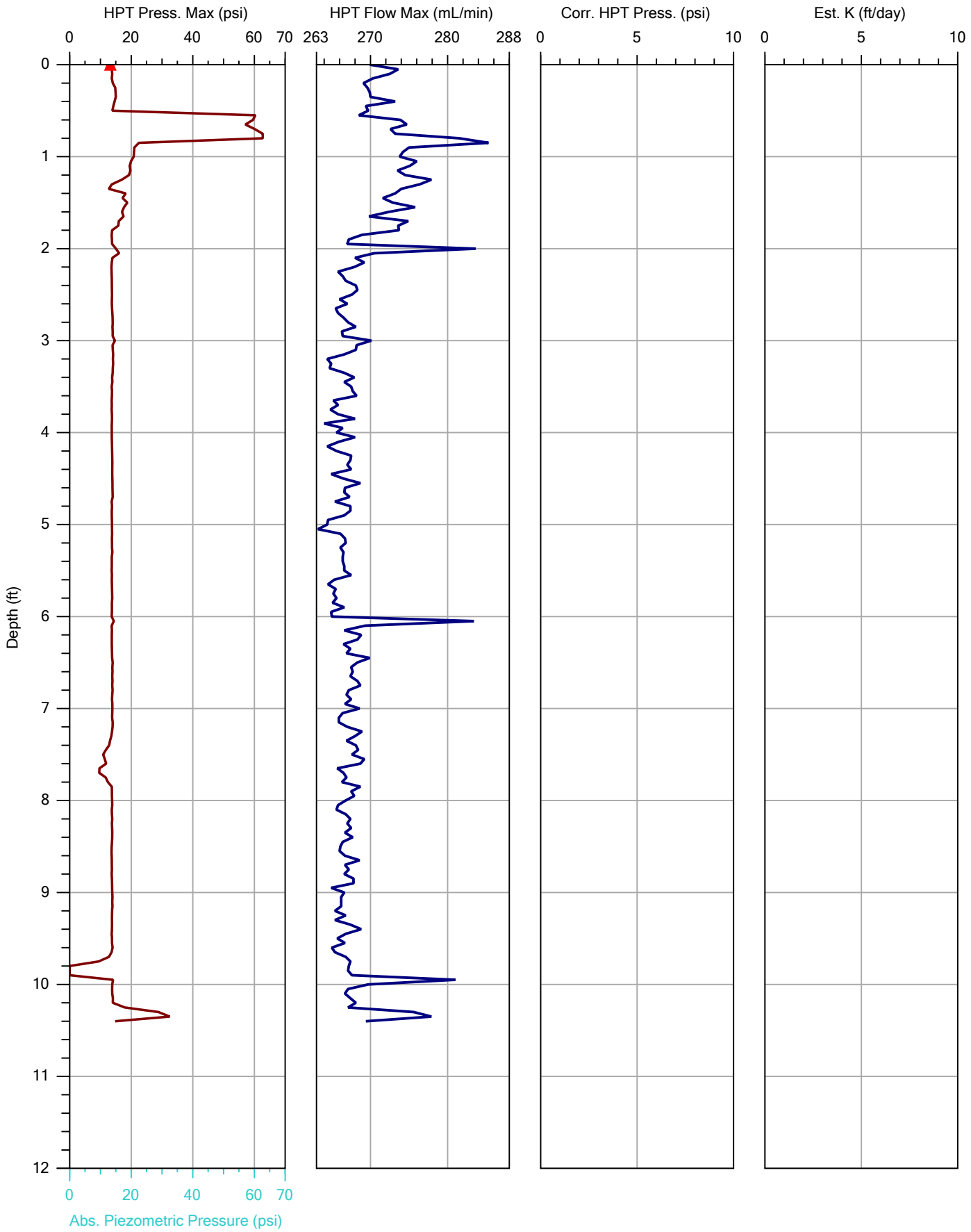

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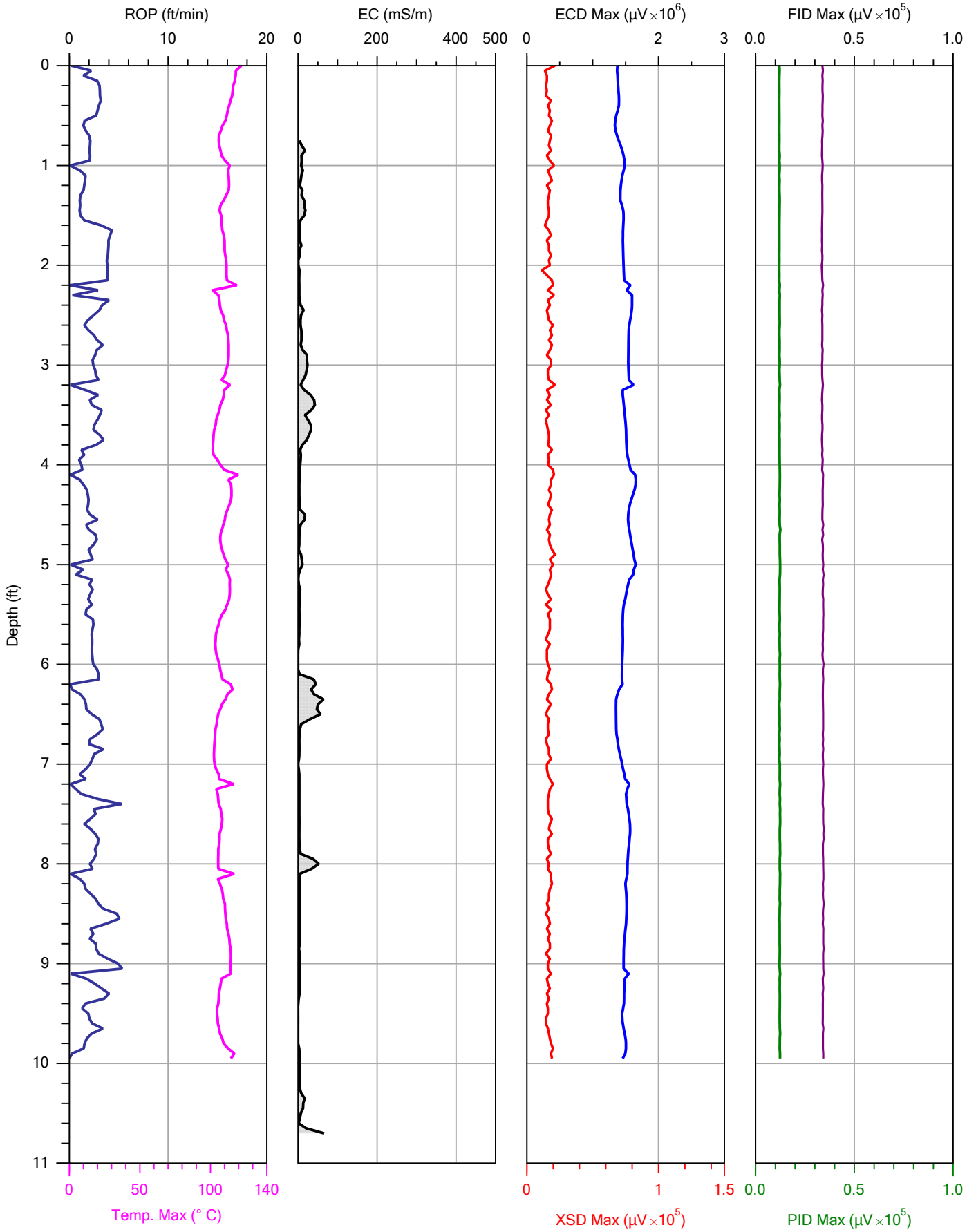

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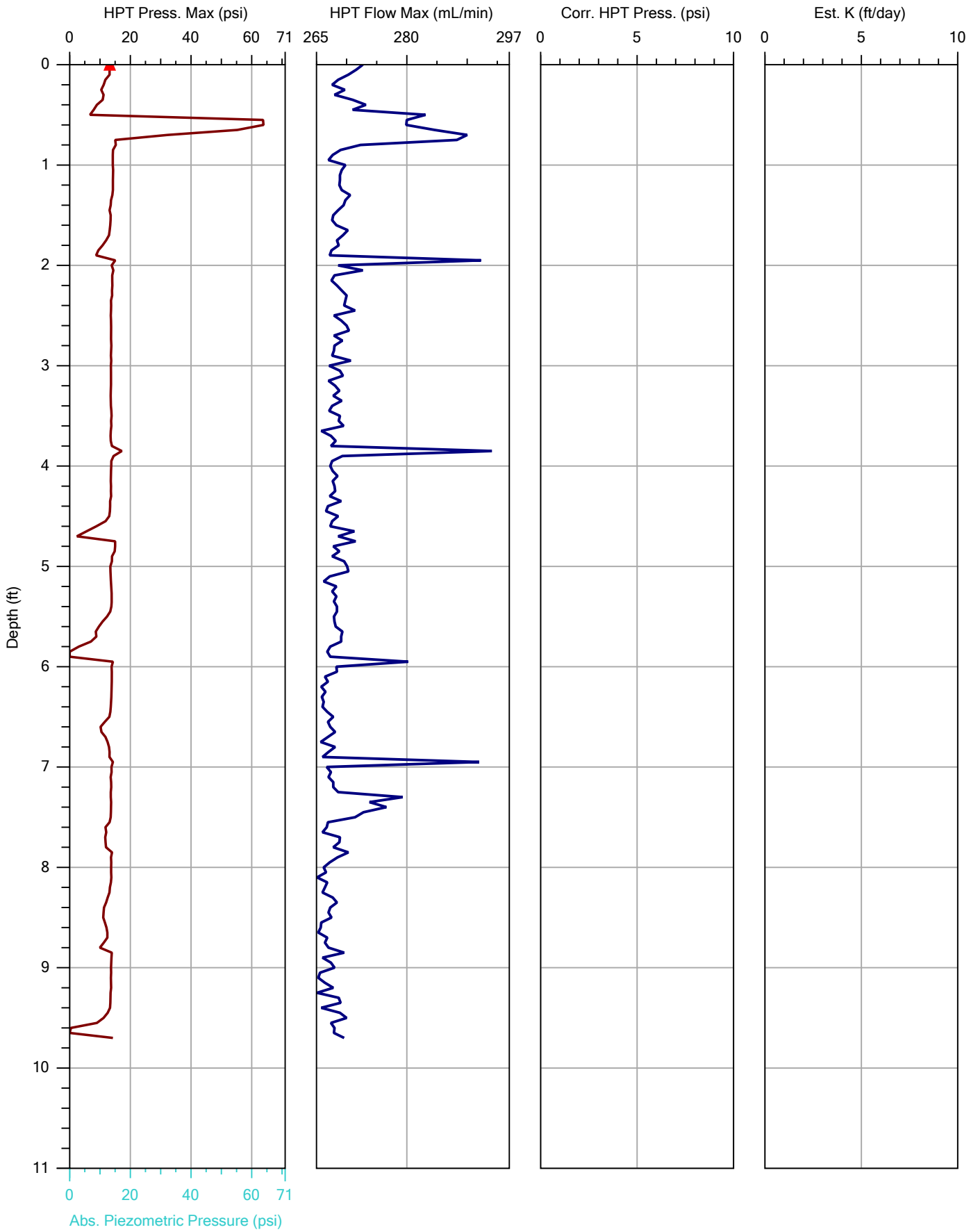
Project ID: HSS	Client: Hydrosolutions Inc.	Location:



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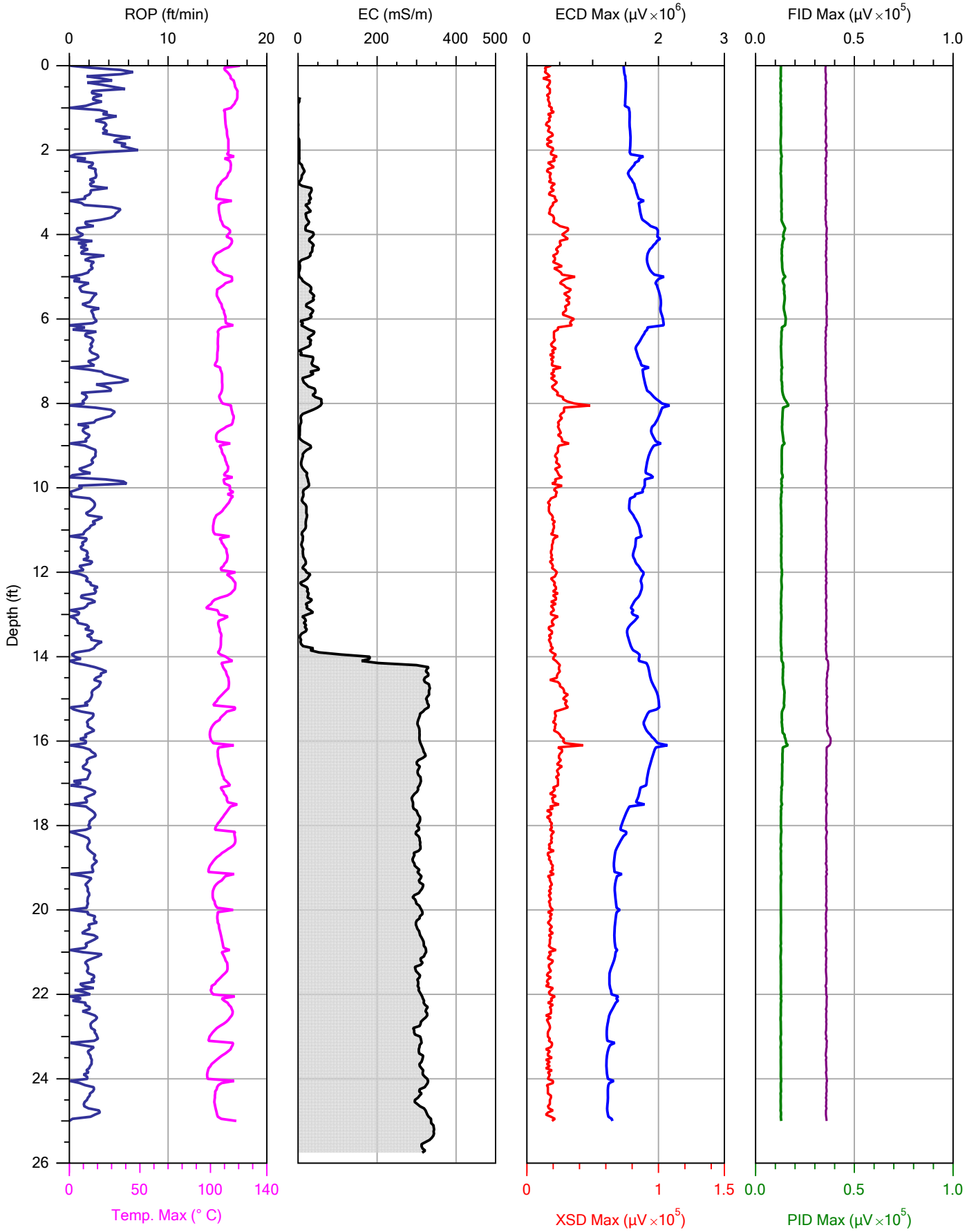

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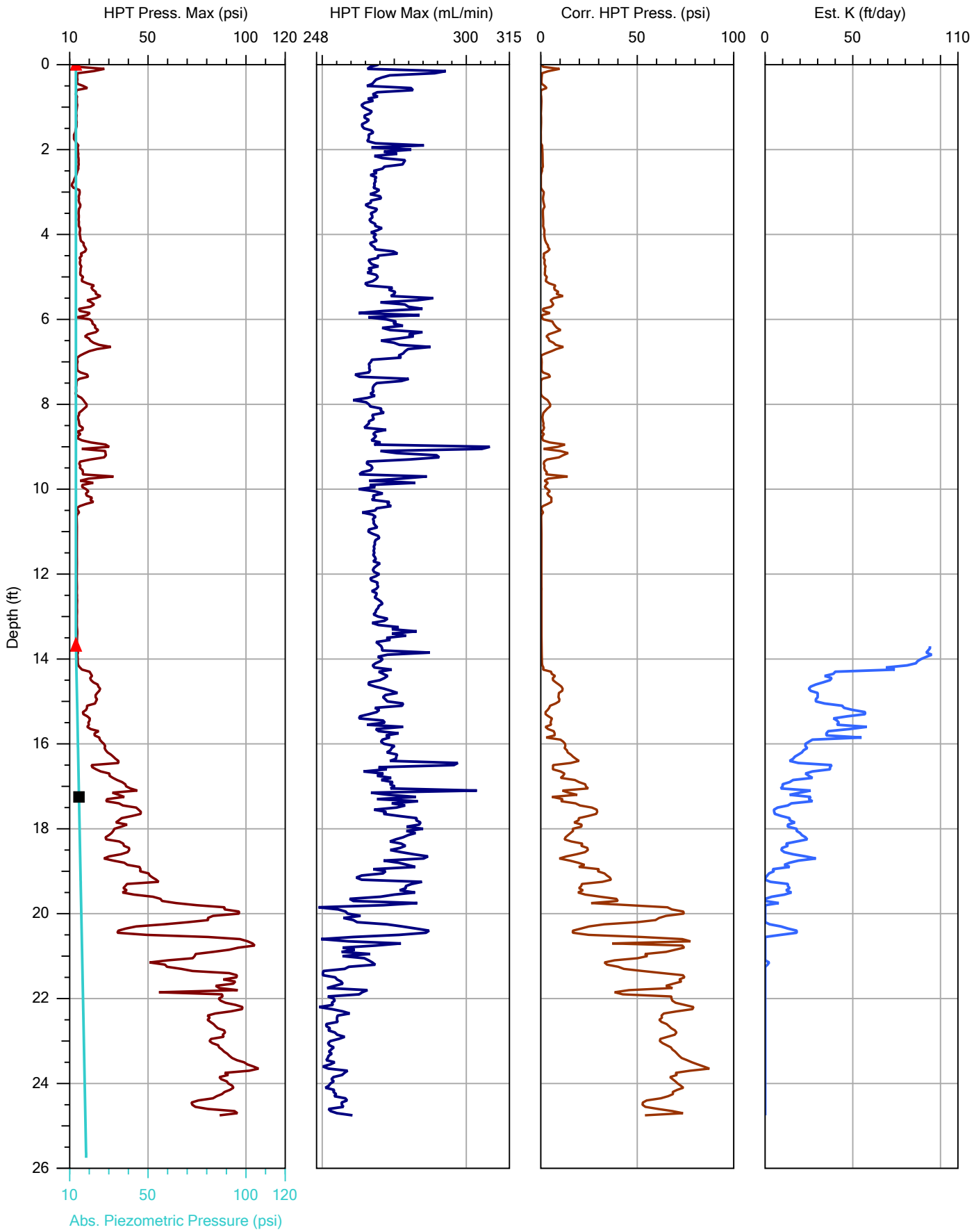

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		File: DPT-12.MHP
Company: Cascade Technical Services, LLC	Operator: Jamie Hoffman	Date: 9/23/2016
Project ID: HSS	Client: Hydrosolutions Inc.	Location:

Reference Material

The sections below provide information regarding the Cascade Personnel present at the site during the field activities, the specific equipment used during field activities, and background information on the MIP and HPT systems.

Cascade Personnel

The following personnel were present during field activities at the Site:

- Mr. Jamie Hoffman, Cascade Technical Services (HRSC Specialist)
- Randall Darnell, Cascade Technical Services (Technician)
- Travis Ratliff, Cascade Technical Services (Technician)

Equipment

The following equipment was utilized during field activities at the Site:

- Geoprobe 7822 Series Direct Push Drill Rig
- MIP Controller (Nitrogen Flow and Heater)
- Geoprobe FI 6000 Computer
- SRI Model 310 GC Gas Chromatograph K6300 HPT Controller
- Electrical Conductivity
- ECD (Electron Capture Detector)
- XSD (Halogen Specific Detector)
- PID (Photo Ionization Detector) 10.2 eV Lamp
- FID (Flame Ionization Detector)
- 150' MIP/HPT Trunkline
- 1.75" O.D. MIHPT Probe
- 1.75" O.D. Drive Rods
- Ultra-High Purity Nitrogen
- Ultra-High Purity Hydrogen

MIP System Overview

The MIP is commonly used for quickly determining the locations of volatile organic compound (VOC) source zones and plumes. The MIP is most valuable in terms of its ability to provide "spatial correspondence", meaning that where the MIP detector response show peaks, there is likely to be elevated soil and groundwater concentrations. The MIP can also be used to provide extremely valuable data to streamline subsequent investigative tasks and improve the overall efficiency and accuracy of the site investigation. Vertical profiles, cross sectional views and 3D images of contaminant distribution can all be produced from the electronic data generated by the MIP logs. The unique capability of providing reliable, real-time information allows for informed and timely decision making in the field. The MIP works by heating the soils and groundwater adjacent to the probe to 120 degrees C. This volatilizes the VOCs and allows the VOCs to transfer through a Teflon membrane via a combination of concentration and pressure gradients. These VOCs are then swept into a nitrogen gas loop that carries these vapors to a series of detectors housed at the surface. Continuous chemical profiles are generated from each hole. Electrical conductivity of the soil is also measured and these logs can be compared to the chemical logs to better understand the relationship between the lithology and the contaminant distribution. The MIP technology is only appropriate for VOCs. The following section discusses the various detection systems that are commonly used with the MIP system.

Detector Overview

- ECD – Electron Capture Detector uses a radioactive Beta emitter (electrons) to ionize some of the carrier gas and produce a current between a biased pair of electrodes. When organic molecules contain electronegative functional groups, such as halogens, phosphorous, and nitro groups pass by the detector, they capture some of the electrons and reduce the current measured between the electrodes.
- XSD – The Halogen Specific Detector converts compounds containing halogens to their oxidation products and free halogen atoms by oxidative pyrolysis. These halogen atoms are adsorbed onto the activated platinum surface of the detector probe assembly resulting in an increase thermionic emission. This emission current provides a corresponding voltage that is measured via an electrometer circuit in the detector controller.
- PID – Photo Ionization Detector sample stream flows through the detector's reaction chamber where it is continuously irradiated with high energy ultraviolet light. When compounds are present that have a lower ionization potential than that of the irradiation energy (10.2 electron volts with standard lamp) they are ionized. The ions formed are collected in an electrical field, producing an ion current that is proportional to compound concentration. The ion current is amplified and output by the gas chromatograph's electrometer.
- FID – Flame Ionization Detector consists of a hydrogen / air flame and a collector plate. The effluent from the GC (trunkline) passes through the flame, which breaks down organic molecules and produces ions. The ions are collected on a biased electrode and produce an electric signal.

MIP Data Collection

- Depth - Data is collected every 0.05 feet, or twenty points per foot.
- Electrical Conductivity - Electrical Conductivity data is measured/collected in milli-siemens per Meter (ms/M). The conductivity of soils is different for each type of media. Finer grained sediments, such as silts or clays, will typically have a higher EC signal. While coarser grained sediments, sands and gravel, will typically have a lower EC signal.

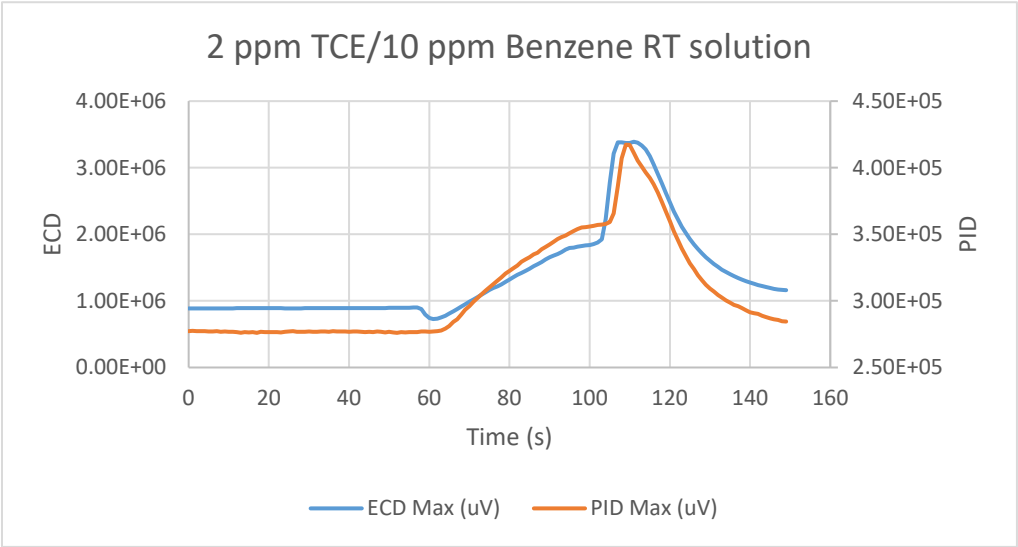
- Rate of Penetration - Rate of penetration (ROP) is measured/collected in feet per minute (ft/min). Speed is an indication of the advancement rate of the MIP probe. In order to allow for adequate heating of the MIP tooling, the MIP's ROP should not exceed one foot per minute.
- Temperature - Temperature data is measured/collected in Degrees Celsius. Temperature is an indication of the physical temperature of the MIP block. Minimum and Maximum temperature is collected at each vertical interval. Cascade's temperature protocol indicates that the MIP probe temperature shall maintain a minimum temperature of 90 Degrees Celsius.
- Pressure - Pressure data is measured/collected in PSI. The pressure readings represent the pressure being delivered to the MIP's nitrogen gas line. Deviations greater than of 1.5 PSI outside of the starting pressure indicate a system leak or obstruction is present.
- Detector (XSD, ECD, PID, FID) - Detector responses are measured/collected in micro Volts (uV). Detector responses are an indication of relative contaminant responses. Minimum and Maximum detector responses are collected at each vertical interval.

Response Testing

Response testing (RT) is an integral part of ensuring the quality of data from the MIP system. Response testing is conducted before and after each log. This ensures the validity of the data and the integrity of the system. The RT provides a traceable indication that the MIP system detectors are adequately responding and allows the carrier gas trip time to be calculated on the physical components of the system.

Cascade uses acceptance criteria to evaluate the RTs. The acceptable criteria for an RT is defined for specified concentrations of RT solution and a specified N2 trunkline flow rate. Documenting the RTs will provide a level of quality assurance for each MIP project and will also allow operators and data reviewers to identify systems in need of maintenance.

The trip time is measured by recording the time between the moment when the VOA is placed over the membrane and the response of the detectors, as viewed on the MIP data acquisition unit. The baseline and peak response value are also recorded for comparison with other MIP response tests. The trip time is entered manually into the data acquisition system account for the time it takes for compounds in the subsurface to travel the length of the trunkline during the MIP boring.



HPT System Overview

The HPT system is designed to evaluate the hydraulic behavior of unconsolidated materials. As the probe is pushed or hammered at 2cm/s, clean water is injected through a screen on the side of the HPT probe at a flow rate usually less than 300 mL/min. The injection pressure, which is monitored and plotted with depth, is an indication of the hydraulic properties of the soil. A relatively low pressure response indicates a relatively large grain size, and the ability to easily transmit water. However, a relatively high pressure response indicates a relatively small grain size, which correlates with the inability to transmit water.

HPT Data Collection

The HPT system collects depth, electrical conductivity, advancement rate, hydraulic pressure, and flow information. Additional detail regarding each of these parameters is provided below.

- Depth - Data is collected every 0.05 feet, or twenty points per foot.
- Electrical Conductivity - Electrical Conductivity (EC) data is collected in milli-siemens per meter (ms/M). The conductivity of soils is different for each type of media. Finer grained sediments, such as silts or clays, will typically have a higher EC signal. While coarser grained sediments, sands and gravel, will typically have a lower EC signal. Rate of penetration (ROP) – ROP is collected in units of feet per minute (ft/min). ROP of the HPT probe can vary due to operator advancement and soil types encountered.
- Pressure - Pressure data is collected in pounds per square inch (PSI). Pressure is an indication of hydraulic pressure applied to the subsurface by the HPT system. The system collects both the minimum and maximum pressures over each vertical interval.
- Flow - Flow data is collected in milliliters per minute (mL/min). Flow is an indication of the rate water that is pumped out of the membrane at the HPT probe. The system collects both the minimum and maximum flow over each vertical interval.
- Estimated Hydraulic Conductivity (est. K) – Hydraulic conductivity, symbolically represented as K, is an in-situ property that describes the ease with which water can move through pore spaces or fractures. It is dependent on the intrinsic permeability of the material and on the degree of saturation. With respect to the HPT system, the estimated K values are only applicable to the saturated portion of the formation. The estimated K value is calculated using the HPT pressure and flow data. It is also necessary to collect HPT response test data before and after each boring. Additionally, it is necessary to conduct at least one pressure dissipation test during the logging operation, below the static water table level.

HPT Reference Testing and Dissipation Tests

Reference testing is done to ensure that the HPT pressure transducer is working correctly and to evaluate the condition of the HPT injection screen. The HPT reference test also calculates atmospheric pressure which is required to obtain static water level readings and to determine the estimated K values for the log. HPT reference test utilizes a test tube to specifications such that a valve is located 6 inches above the HPT injection screen and the top of the tube is 6 inches above the valve. When the tube is filled completely with water, the 12 inches of water will supply and additional 0.433 psi of pressure on the injection screen (in addition to atmospheric pressure). When the valve (located 6 inches from the top of the tube and 6 inches from the injection screen) is opened, only 0.217 psi of additional pressure is applied to the HPT

injection screen. Therefore, the accuracy of the pressure transducer can be assessed by comparing the pressure reading when the tube is filled and when the tube is filled to the valve. There should be a 0.217 psi difference, this value is check with and without flow. A tolerance of ±10% is applied for a passing test.

Dissipation tests are conducted to determine the additional static pressure added to the HPT pressure values from water in the formation. To conduct a dissipation test, advancement of the tooling is stopped, the HPT pump is stopped, and flow drops to zero. The pressure applied to the HPT pressure transducer by the injection of water into the formation begins to dissipate. This pressure should dissipate to a value equal to atmospheric pressure plus the static water pressure applied by water in the formation. In post-processing of the HPT log, the dissipation value and the atmospheric pressure determined during HPT reference testing can be used to remove the influence of atmospheric pressure and formational static water pressure from the HPT pressure values. Thereby correcting the HPT pressure to values that only indicates the hydraulic properties of the subsurface material.

Appendix D
SVE System Wells, Vapor Points, and Monitoring Well Logs

HydroSolutions

Well / Boring Number: MW-7
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59789
Longitude: -112.02242
GL Elevation: 3987.01
TOSC Elevation: 3986.82
Datum used GPS
LogPlot by: R.S.
2016-12-12

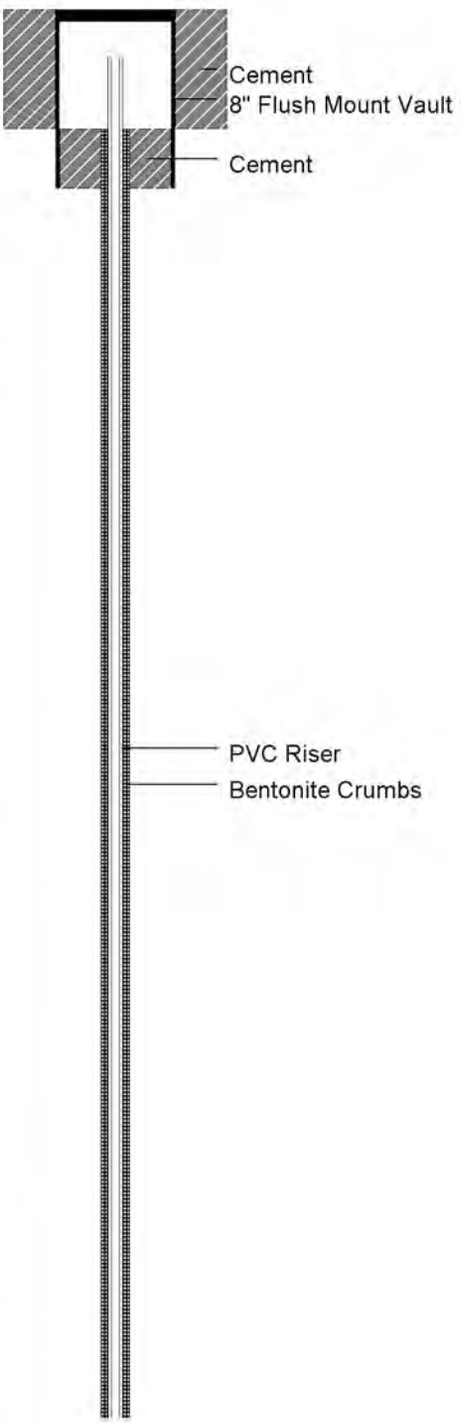
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis Ratliff
Drilling Rig: GeoProbe 7720DT
Logged By: RS

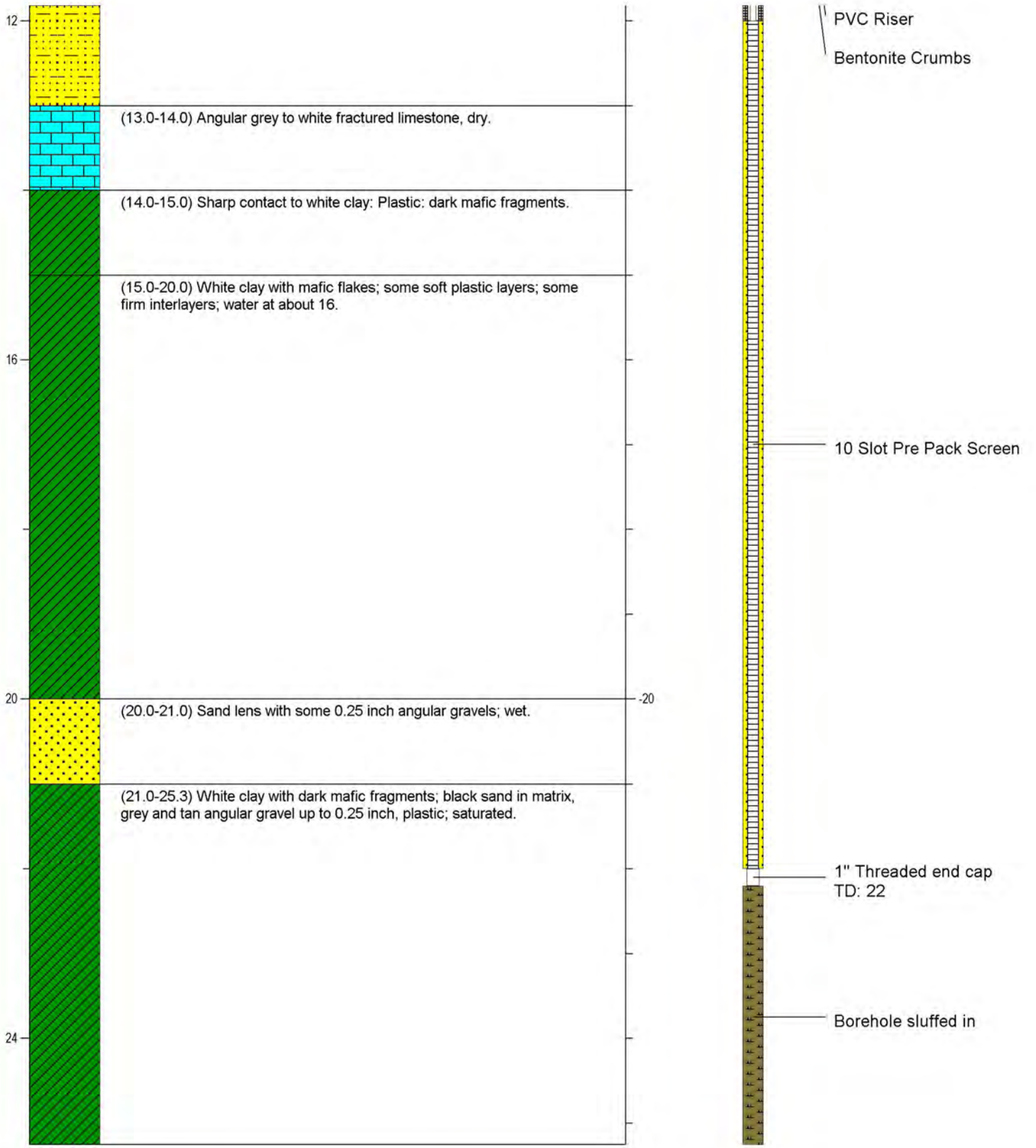
	Date/Time:				
Start Drilling:	9/23/16				
Bore Diam (1):(2 in)	9/23/16 15:30	0 ft	to	25 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/23/16			25	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-1.5) 14 inch diameter core through asphalt approx. 2" thick. Fill gravel and sand.	0
		(1.5-3.0) Tan sandy silty clay. Some angular gravel fragments, wood and brick fragments.	
4		(3.0-7.0) No return.	
		(7.0-7.5) Sandy silty clay.	
8		(7.5-8.5) Large grained sand and silt, some angular gravels.	
		(8.5-8.8) Clay lens, moist, no PID response.	
		(8.8-9.5) Tan sandy clays 0.25 inch gravels.	
		(9.5-10.0) Silty clays with sandy interbeds.	
		(10.0-13.0) Light brown silty sand.	-10

Well Construction
Well Diameter: 1 in



Additional Notes



Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	12	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:	Enviroplug		7	ft	Size: crumbs
Filter Sand:		Silica Sand	10	ft	Grade: Pre Pack
Well Screen:	1	Sch 40	NA		10 slot
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	12/1/16 13:35	13.84
	NA	NA

Comments

Groundwater monitoring well
Located in Bullmans Pizza parking lot, eastside of Mr. Wise Cleaners

MW-7

HydroSolutions

Well / Boring Number: SVE-1
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59793
Longitude: -112.02266
GL Elevation:
TOSC Elevation: 3987.57
Datum used GPS

LogPlot by: R.S.
2016-11-15

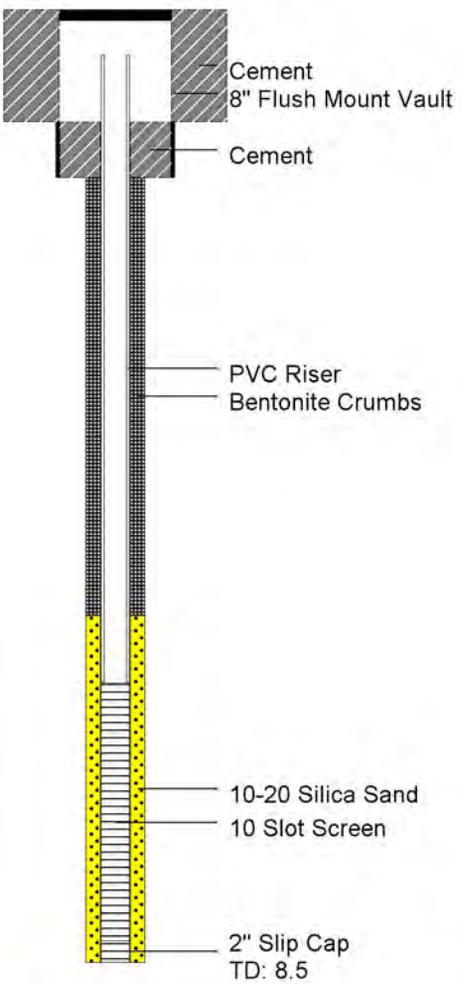
Drilling Information

Drilling Company: HydroSolutions
Drilling Method: Hand Auger
Driller: RS LO
Drilling Rig: NA
Logged By: RS

	Date/Time:				
Start Drilling:	8/18/16				
Bore Diam (1):(3.5 in)		0	ft	to	8.5 ft
Bore Diam (2):(NA in)	NA	NA	ft	to	NA ft
Finish Drilling:	8/16/16			8.5	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-2.0) 1-2 inch gravel and sand (fill).	0
		(2.0-3.5) Brick, decomposed, easily broken, no odor, no PID response.	
		(3.5-4.0) Medium grained sand with 0.5 inch gravel.	
4		(4.0-6.0) Brown sandy gravel.	
		(6.0-8.3) Brown silty clay, moist, no gravel.	
8		(8.3-8.5) Bluish grey sand, dry, small gravel 0.5 inch. Auger refusal.	

Well Construction
Well Diameter: 2 in



Additional Notes

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	8" vault	NA	NA	ft	
Riser Pipe:	2	Sch 40	5.75	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:		Enviroplug Crumbs	3.8	ft	Size: crumbs
Filter Sand:		Silica Sand	3.1	ft	Grade: 10-20
Well Screen:	2	Sch 40	NA		10 Slot
Centralizer:		NA	NA		NA
Endcap:	2	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil Vapor Extraction Well.
Boring completed with hand auger.

SVE-1

HydroSolutions

Well / Boring Number: SVE-2
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59791
Longitude: -112.02258
GL Elevation:
TOSC Elevation: 3988.42
Datum used GPS

LogPlot by: R.S.
2016-11-15

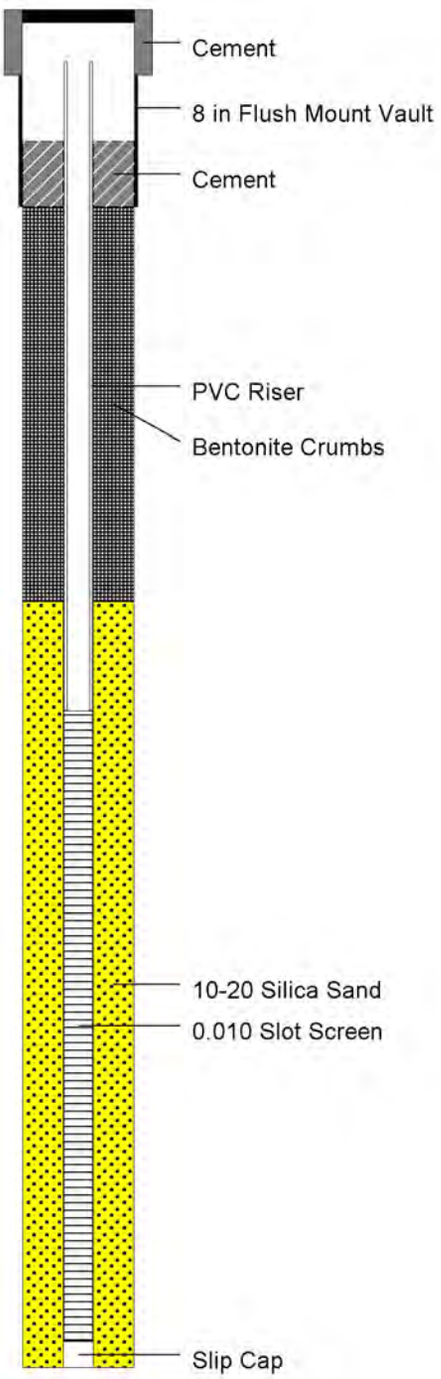
Drilling Information

Drilling Company: 406 Underground
Drilling Method: Hydro-Excavation
Driller: Justin
Drilling Rig: Ditch Witch Vac
Logged By: RS

	Date/Time:			
Start Drilling:	11/2/2016			
Bore Diam (1):(8 in)		0 ft	to	10 ft
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft
Finish Drilling:	11/2/2016		10	TD
Well Development	NA		NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-0.5) Cement (sidewalk).	0
		(0.5-1.5) Washed gravel fill.	
		(1.5-5.0) Large angular cobbles with sandy silt (fill).	
4			
		(5.0-10.0) Light tan sltly sand with some 2-3 inch angular gravels; dry.	
8			
			-10

Well Construction
Well Diameter: 2 in



Additional Notes

Well Construction Information

	Dia. inches	Material	Specifications

Water Levels | Date/Time: | SWL ft

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	8" vault	NA	NA	ft	
Riser Pipe:	2	Sch 40	4.93	ft	
Surface Seal:		Concrete	1	ft	NA
Annular Seal:		Enviroplug Crumbs	3	ft	Size: crumbs
Filter Sand:		Silica Sand	5.5	ft	Grade: 10-20
Well Screen:	2	Sch 40	NA		10 Slot
Centralizer:		NA	NA		NA
Endcap:	2	Sch 40	0.4 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil Vapor Extraction Well.
Boring completed with high pressure water and a vacuum truck.

SVE-2

HydroSolutions

Well / Boring Number: SVE-3
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59892
Longitude: -112.02256
GL Elevation:
TOSC Elevation: 3988.42
Datum used GPS

LogPlot by: R.S.
2016-11-15

Drilling Information

Drilling Company: 406 Underground
Drilling Method: Hydro-Excavation
Driller: Justin
Drilling Rig: Ditch Witch Vac
Logged By: RS

	Date/Time:			
Start Drilling:	11/2/2016			
Bore Diam (1):(8 in)		0 ft	to	10 ft
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft
Finish Drilling:	11/2/2016		10	TD
Well Development	NA		NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation	Well Construction (Well Diameter: 2 in)	Additional Notes
0		(0.0-0.5) Cement (sidewalk).	0	Cement	
		(0.5-1.5) Washed gravel fill.		8" Flush Mount Vault Cement	
		(1.5-5.0) Large angular cobbles with sandy silt (fill).		PVC Riser Bentonite Crumbs	
4					
		(5.0-10.5) Light tan sltly sand with some 2-3 inch angular gravels; dry.		10-20 Sand 0.10 Slot Screen	
8					
			-10	2" Slip Cap TD: 10	

Well Construction Information

Dia. inches	Material	Specifications

Water Levels	Date/Time:	SWL ft

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	8 in vault	NA	NA	ft	
Riser Pipe:	2	Sch 40	4.96	ft	
Surface Seal:		Concrete	1	ft	
Annular Seal:	Enviroplug Crumbs		3	ft	Size: crumbs
Filter Sand:		Silica Sand	5.7	ft	Grade: 10-20
Well Screen:	2	Sch 40	NA		10 Slot
Centralizer:		NA	NA		NA
Endcap:	2	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil Vapor Extraction Well.
Boring completed with high pressure water and a vacuum truck.

SVE-3

HydroSolutions

Well / Boring Number: VP-1
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59795
Longitude: -112.02251
GL Elevation: 3986.91
TOSC Elevation: 3986.62
Datum used GPS

LogPlot by: R.S.
2016-12-12

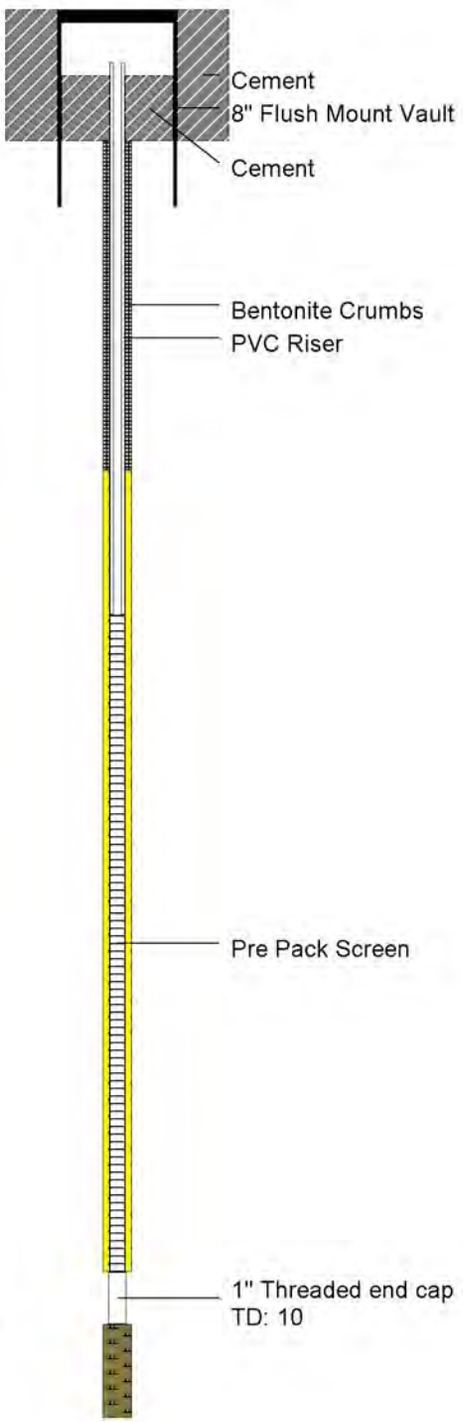
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis Ratliff
Drilling Rig: GeoProbe 7720DT
Logged By: RS

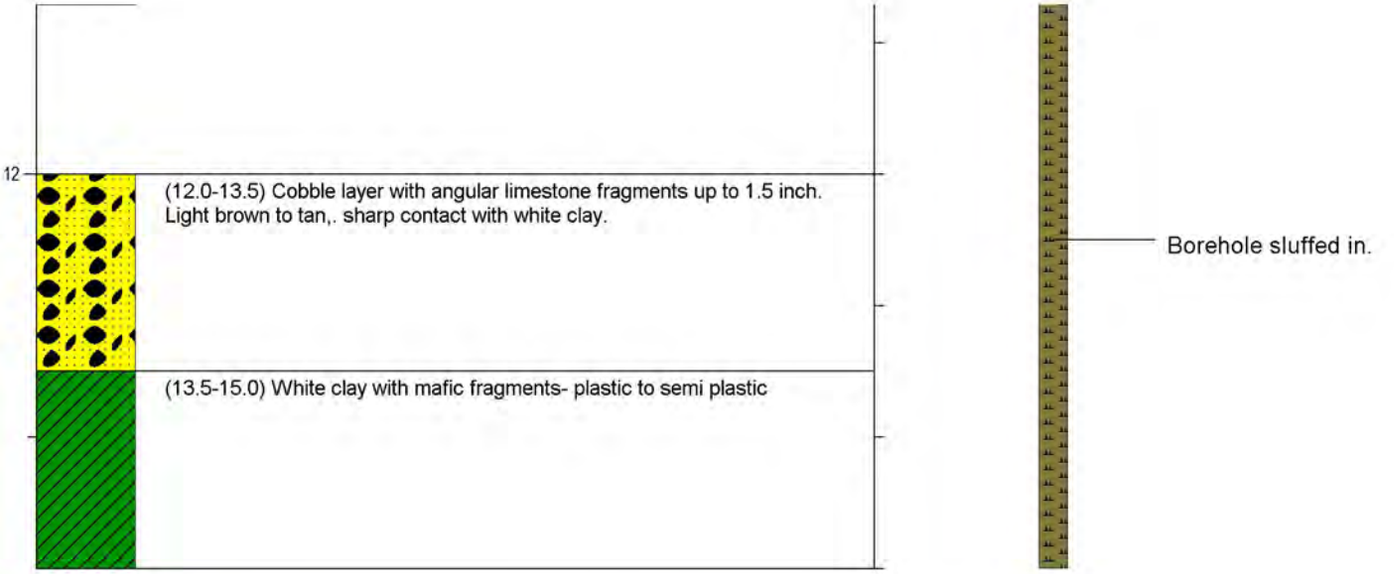
	Date/Time:				
Start Drilling:	9/22/16				
Bore Diam (1):(2 in)	9/22/16 08:35	0 ft	to	15 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/22/16			15	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-2.0) Asphalt approx. 2 inch thick. Light tan-brown sandy silty clay with limestone fragments 0.5-1.5 inch.	0
		(2.0-3.0) Red brick layer.	
		(3.0-3.3) Dark black semi glossy layer, with wood fragments, PID 1 ppm.	
		(3.3-10.0) Most of sample sluffed out, mixture of grey to tan silty sand with limestone fragments some fragments up to 1.5inch poor recovery- minor light brown silty plastic clay.	
4			
8			
		(10.0-12.0) Poor loose recovery.	-10

Well Construction
Well Diameter: 1 in



Additional Notes



Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	4.6	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:		Enviroplug Crumbs	3.5	ft	Size: crumbs
Filter Sand:		Silica Sand	6	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot Pre Pack Screen
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil vapor monitoring well

VP-1

HydroSolutions

Well / Boring Number: VP-2
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59786
Longitude: -112.02248
GL Elevation: 3987.01
TOSC Elevation: 3987.14
Datum used GPS

LogPlot by: R.S.
2016-12-12

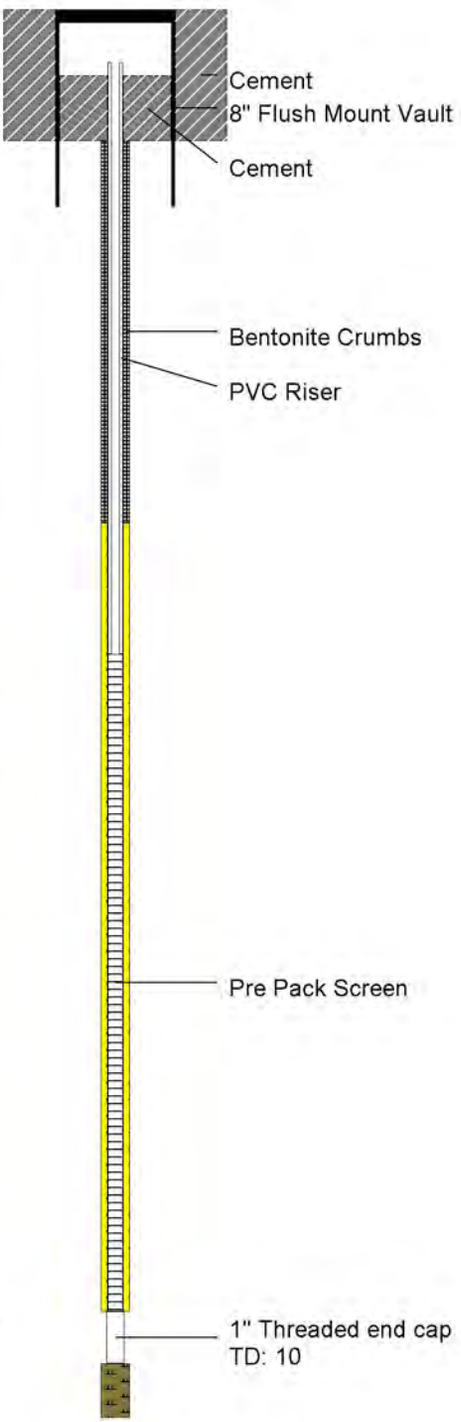
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis
Drilling Rig: GeoProbe 7720DT
Logged By: RS

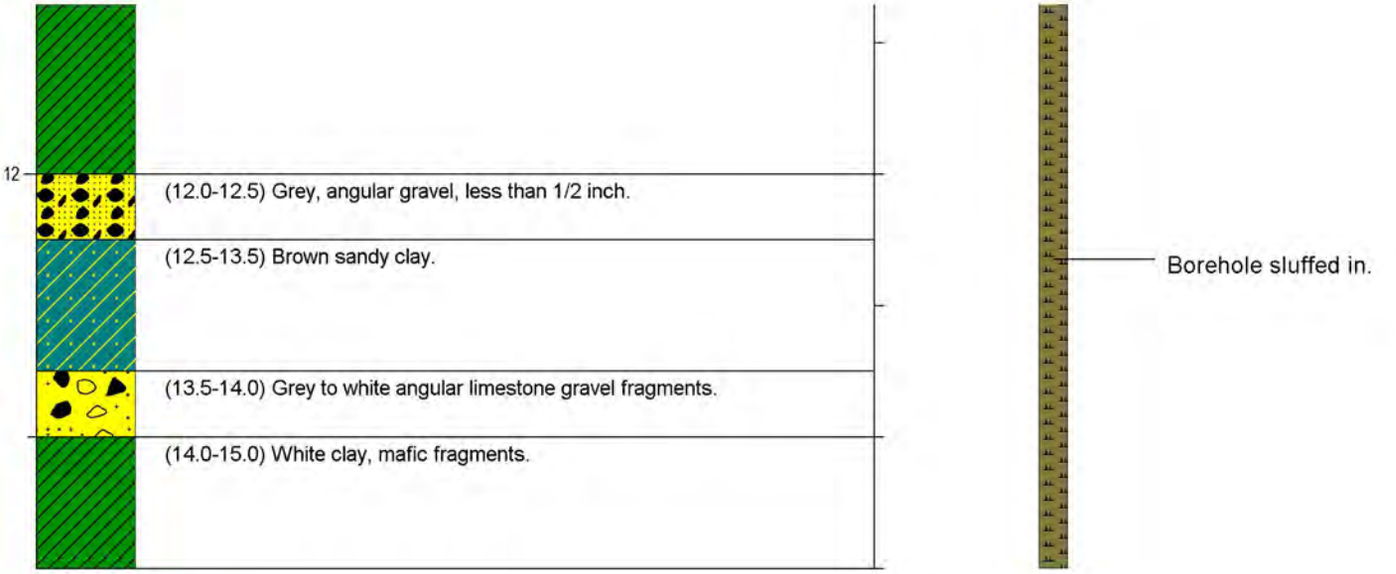
	Date/Time:				
Start Drilling:	9/22/16				
Bore Diam (1):(2 in)	9/22/16 12:55	0 ft	to	15 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/22/16			15	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-2.0) Asphalt cored approx. 2 inch thick. sandy gravel fill.	0
		(2.0-2.5) White angular gravel fragments less than 0.5 inch.	
		(2.5-4.5) Grey brown sandy silty clay.	
4			
		(4.5-5.0) Black layer, sandy texture.	
		(5.0-6.0) Grey brown semi-plastic silty clay, some less than 0.25 inch gravel fragments.	
		(6.0-7.0) Black sandy texture, organic, some wood.	
		(7.0-8.0) Grey brown sandy silty clay, plastic.	
8		(8.0-10.0) Brown sand, some angular gravel.	
		(10.0-12.0) Sandy brown clay.	-10

Well Construction
Well Diameter: 1 in



Additional Notes



Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	4.8	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:		Enviroplug Crumbs	3.5	ft	Size: crumbs
Filter Sand:		Silica Sand	6	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot Pre Pack Screen
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil vapor monitoring well
Located directly out side roll up door

VP-2

HydroSolutions

Well / Boring Number: VP-3
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59790
Longitude: -112.02266
GL Elevation: 3988.24
TOSC Elevation: 3987.73
Datum used GPS

LogPlot by: R.S.
2016-12-12

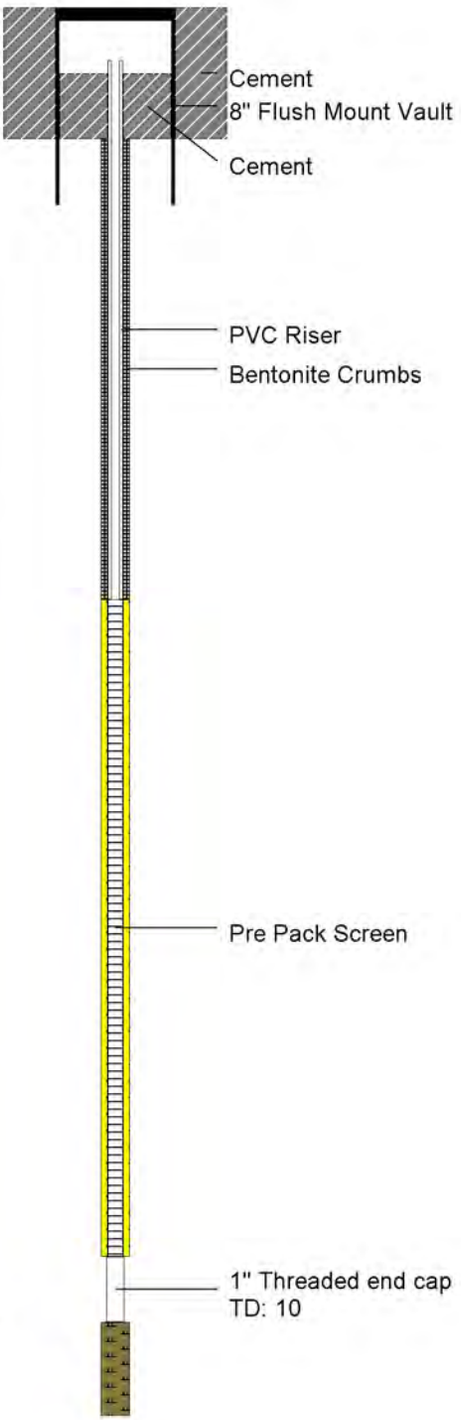
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis Ratliff
Drilling Rig: GeoProbe 7720DT
Logged By: RS

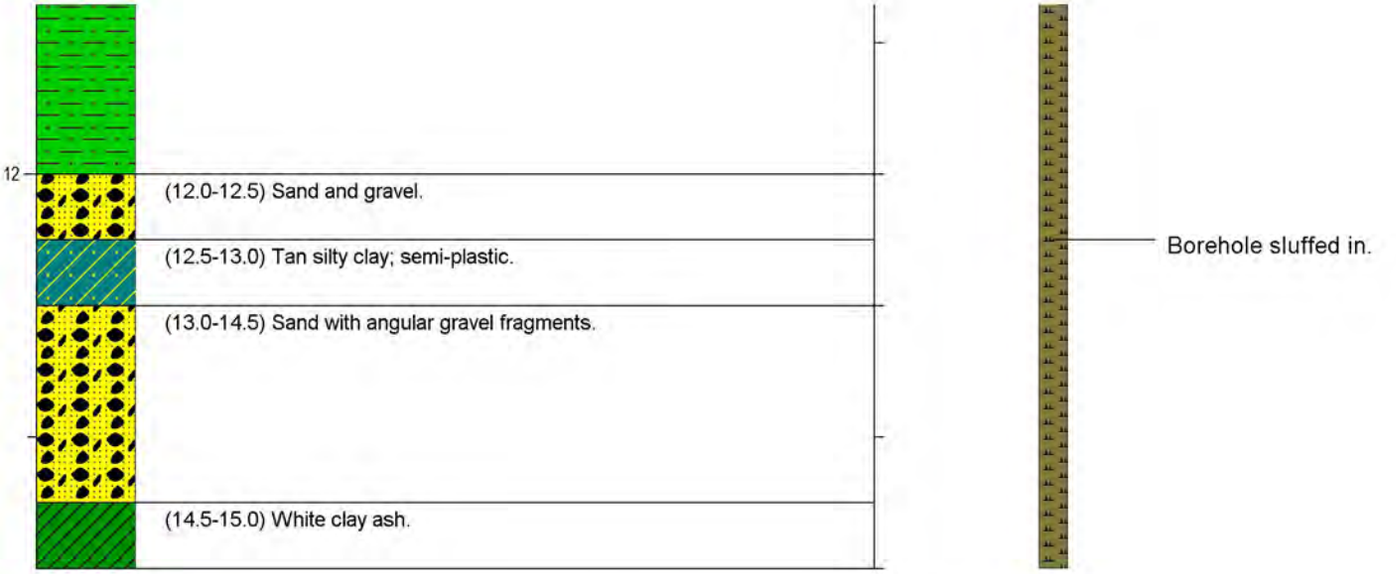
	Date/Time:				
Start Drilling:	9/21/16				
Bore Diam (1):(2 in)	9/21/16 15:15	0 ft	to	15 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/21/16			15	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-2.0) Sand and gravel fill.	0
		(2.0-3.5) Red bricks.	
		(3.5-8.0) Tannish brown sandy silty clay: minor agular gravel up to 1.0 inch.	
4			
8		(8.0-10.0) Tannish brown silty sandy clay, moist; no gravels.	
		(10.0-12.0) Same as above.	-10

Well Construction
Well Diameter: 1 in



Additional Notes



Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	4.8	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:		Enviroplug Crumbs	4.5	ft	Size: crumbs
Filter Sand:		Silica Sand	5	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot Pre Pack Screen
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil vapor monitoring well
Located in directly out side roll up door

VP-3

HydroSolutions

Well / Boring Number: VP-4
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59791
Longitude: -112.02255
GL Elevation: 3988.9
TOSC Elevation: 3988.61
Datum used GPS
LogPlot by: R.S.
2016-12-12

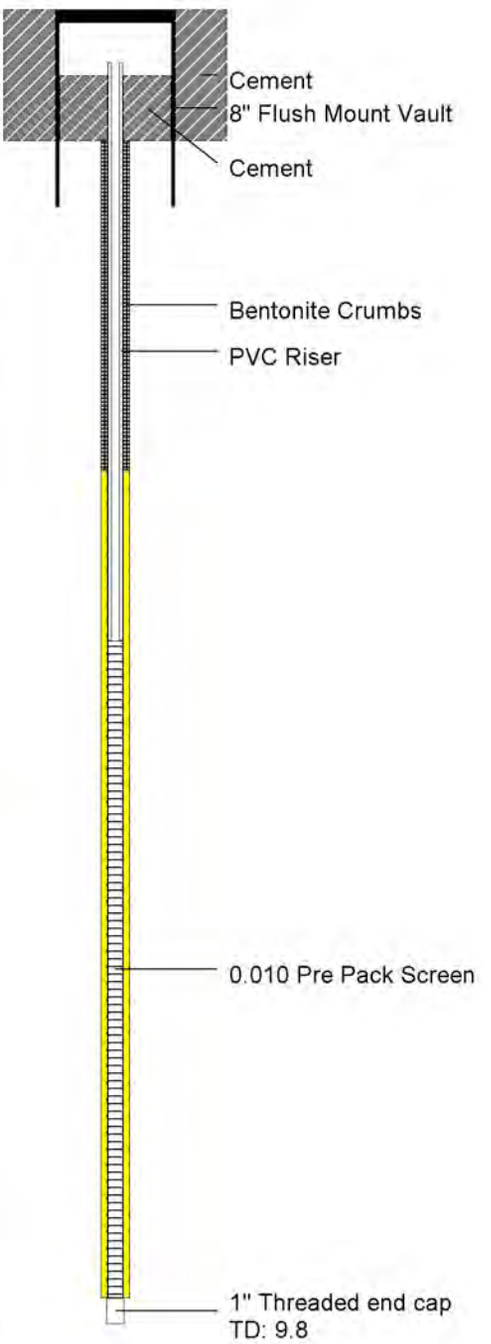
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis Ratliff
Drilling Rig: GeoProbe 420M
Logged By: RS

	Date/Time:				
Start Drilling:	9/22/16				
Bore Diam (1):(2 in)	9/22/16 16:20	0 ft	to	10 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/22/16			10	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-0.5) Concrete cored; 14 inch diameter, 4-6 inches thick.	0
		(0.5-1.5) Sand and gravel fill.	
		(1.5-2.5) Tan sand with angular gravel up to 1.5 inch 15.9; ppm max PID reading.	
		(2.5-3.0) Tan sand with angular gravel; some semi-plastic clay lenses.	
		(3.0-4.0) Light grey silty sand with some angular gravel.	
4		(4.0-5.5) Dark sandy silty clay, wood fragments, peaty, 50 ppm PID reading.	
		(5.5-6.0) Light tan silty clay, semi-plastic; some angular limestone gravel, dry.	
		(6.0-8.5) Sand lenses with gravel in a dark organic like matrix. (7.0-7.5) Layer of angular limestone gravels; 11ppm PID reading.	
8		(8.5-9.0) Light tan silty to fine grained sandy clay.	
		(9.0-10.0) Dark black with burnt layer, brown oxidized fragments and angualr limestone gravels; same plastic clays; overall dry; probe refusall at 10 ft.	-10

Well Construction
Well Diameter: 1 in



Additional Notes

Well Construction Information

Dia. inches	Material	Specifications	Water Levels	Date/Time:	SWL ft

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	4.8	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:	Enviroplug	Crumbs	3.3	ft	Size: crumbs
Filter Sand:		Silica Sand	6	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot Pre Pack Screen
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil vapor monitoring well
Inside Mr. Wise Cleaners.
East Corner.

VP-4

HydroSolutions

Well / Boring Number: VP-5
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59789
Longitude: -112.02258
GL Elevation: 3988.9
TOSC Elevation: 3988.66
Datum used GPS
LogPlot by: R.S.
2016-12-12

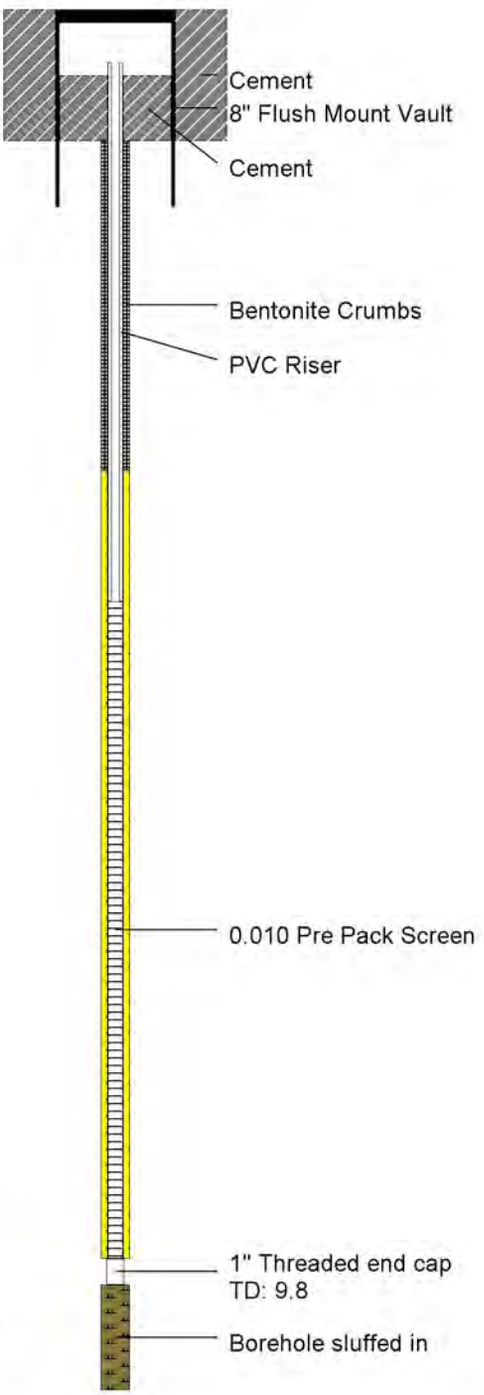
Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis
Drilling Rig: GeoProbe 420M
Logged By: RS

	Date/Time:			
Start Drilling:	9/22/16			
Bore Diam (1):(2 in)	9/22/16 17:20	0 ft	to	10.5 ft
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft
Finish Drilling:	9/22/16			10.5 TD
Well Development	NA			NA hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-0.5) Concrete cored 14 inch diameter, 4-6 inches thick.	0
		(0.5-2.0) Sand and gravel fill. White styrofoam chunks at 2 feet.	
		(2.0-3.0) Sand with angular gravels minor semi -plastic clays; reddish brown flakes.	
		(3.0-4.5) Brown sand with small angular gravel.	
4		(4.5-5.5) Dark black layer with sandy clay; 16 ppm PID reading.	
		(5.5-6.0) Very dark semi- glassy layer, some angular gravel, 21 ppm PID reading.	
		(6.0-6.5) Sand with angular gravel up to 1.5 inch.	
		(6.5-7.5) Light brown silty sand with some angular limestone gravel.	
		(7.5-8.0) Tan semi-plastic clay, 29 ppm PID reading.	
8		(8.0-9.0) Fine grained sand and silt with angular limestone gravel up to 1 inch with minor oxidation, no solvent odor.	
		(9.0-10.0) Dark, silty sand with gravel up to 1.5 inches, no clay; dry.	
		(10.0-10.5) Tan semi-plastic silty clay; probe refusal at 10.5.	-10

Well Construction
Well Diameter: 1 in



Additional Notes

Well Construction Information

Dia. inches	Material	Specifications	Water Levels	Date/Time:	SWL ft

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	8" vault	NA	ft	
Riser Pipe:	1	Sch 40	4.5	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:	Enviroplug	Crumbs	3.5	ft	Size: crumbs
Filter Sand:		Silica Sand	6	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot Pre Pack Screen
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil vapor monitoring well
Inside Mr. Wise Cleaners.
Along north wall.
West well.

VP-5

HydroSolutions

Well / Boring Number: VP-6
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

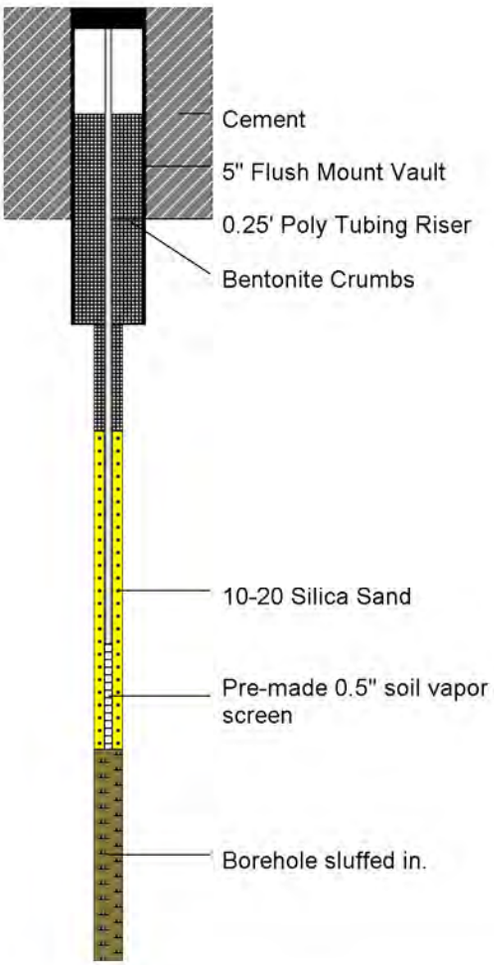
Latitude: -112.022536
Longitude: 46.597833
GL Elevation: 3989.69
TOSC Elevation:
Datum used GPS
LogPlot by: R.S.
2016-12-12

Drilling Information

Drilling Company: Cascade Drilling
Drilling Method: Direct Push
Driller: Travis Ratliff
Drilling Rig: GeoProbe 420M
Logged By: DD

	Date/Time:				
Start Drilling:	9/23/16				
Bore Diam (1):(2 in)	9/23/16 08:00	0 ft	to	4.5 ft	
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft	
Finish Drilling:	9/23/16			4.5	TD
Well Development	NA			NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation	Well Construction (Well Diameter: 0.25 in)	Additional Notes
0		(0.0-0.5) Concrete core.	0		
		(0.5-1.0) Gravel fill top 6-8 inches (1.5 ft recovery in sleeve).			
		(1.0-2.0) Dark brown to blackish sandy silt with solvent odor.			
		(2.0-3.0) Poor recovery gravels up to 2 inch angular fragments. Bottom 2 light brown sandy clay;dry.			
		(3.0-4.0) Mostly angular limestone rock up to 2 inches.			
4		(4.0-4.5) Dark brown to black silty sand, moist and slightly oily solvent odor. Refusal at 4.5			



Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	NA	5" vault	NA	ft	
Riser Pipe:	0.25	Poly Tubing	3	ft	
Surface Seal:		Concrete	.5	ft	Quickcrete
Annular Seal:	Crumbs		1.5	ft	Size: crumbs
Filter Sand:		Silica Sand	1	ft	Grade: 10-20
Well Screen:	0.5	soil vapor screen	NA		10 Slot
Centralizer:		NA	NA		NA
Endcap:	NA	NA	Built into screen		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Soil Vapor Monitoring Point
Boring to 4.5 sluffed back to 3.5.
Located near site of overhead PCE spill.

HydroSolutions

Well / Boring Number: VP-7
Client: Montana DEQ
Project Name: Helena Solvent Site

Township: 10N
Section: 30
Lewis and Clark County

Range: 2W
Qtr Qtr: Block 25
State: MT

Latitude: 46.59793
Longitude: -112.02268
GL Elevation:
TOSC Elevation: 3987.65
Datum used GPS

LogPlot by: R.S.
2016-12-12

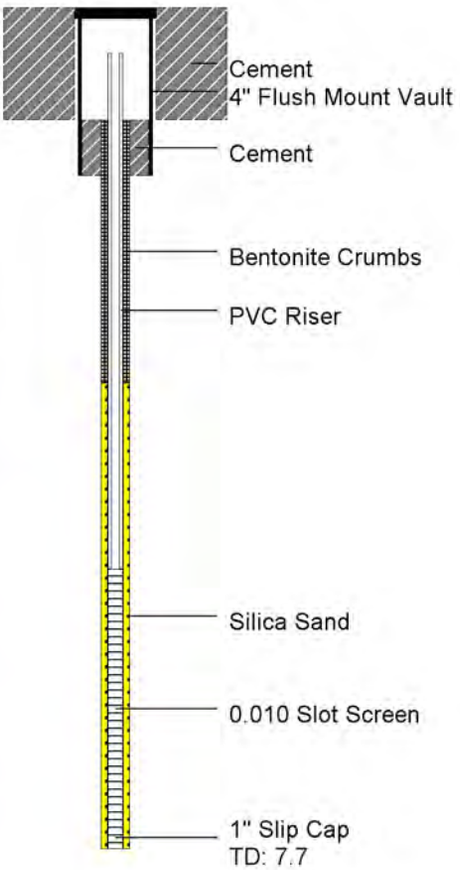
Drilling Information

Drilling Company: HydroSolutions
Drilling Method: Hand Auger
Driller: RS LO
Drilling Rig: NA
Logged By: RS

	Date/Time:			
Start Drilling:	8/18/16			
Bore Diam (1):(2 in)		NA ft	to	NA ft
Bore Diam (2):(NA in)	NA	NA ft	to	NA ft
Finish Drilling:	8/19/16		7.7	TD
Well Development	NA		NA	hours

Depth (ft)	Lithology Sketch	Soil / Rock Description	Elevation
0		(0.0-1.5) Tan sandy silt with 1-2 inch gravels	0
		(1.5-3.0) Red brick; decomposed; easily broken.	
4		(3.0-4.3) Silty clay, no solvent odor, no PID reading.	
		(4.3-5.2) Light brown sand with minor small gravels.	
		(5.2-7.7) Silty clay, brown, no odor, auger refusal at 7.7.	

Well Construction
Well Diameter: 1 in



Additional Notes

Well Construction Information

	Dia. inches	Material			Specifications
Protective Casing:	4" vault	NA	NA	ft	
Riser Pipe:	1	Sch 40	5.05	ft	
Surface Seal:		Concrete	1	ft	Quickcrete
Annular Seal:	Crumbs		2.35	ft	Size: crumbs
Filter Sand:		Silica Sand	3.35	ft	Grade: 10-20
Well Screen:	1	Sch 40	NA		10 Slot
Centralizer:		NA	NA		NA
Endcap:	1	Sch 40	0.2 ft		

Water Levels	Date/Time:	SWL ft
	NA	NA
	NA	NA

Comments

Vapor Monitoring Point
Boring completed with hand auger.

Appendix E
Field Sheets, Field Log Book, and Sampling Standard Operating Procedure

Field Notebook

HydroSolutions

Projects (continued).

Printed in China

6/28/16

1500

site visit DD LD SB RS

Sight property lines

Discuss electrical needs.

Very tight clearances around building

Russ would like indoor air pump off M, W, Sa electrical says approx $250/month

doesn't want tree removed

1530 leave site

~~7/2~~ 7/20/16 15:00 RS LD
Pat with Northwestern Energy

load of uncertain duration

2 gang meter base

cost is completely on us
including NW energy portion
- booked out until september

easiest
only problem is what
code updates will it
require ??
talk with Eagle Elec

survey of H and R block blg

measure mark from power pole
to outside wall 16ft
exact width of alley ~~[illegible] in city~~

measure from pole to eastern
property line approx 27 ft
looks like eastern most edge of
blg is on property line

Side walk on North edge
of building is in city
right of way
5 ft wide

1530 leave

Pat Samson
406 443 8935

2016.07.25 1345 HRS

- LD - met Bill from Eagle Elec.
Bill on site - adding drop - 100 Amp
service - Attach to Canine Capital
service box. Bill needs to drive
grounds Rods - I told him to wait
until One-Call is complete.

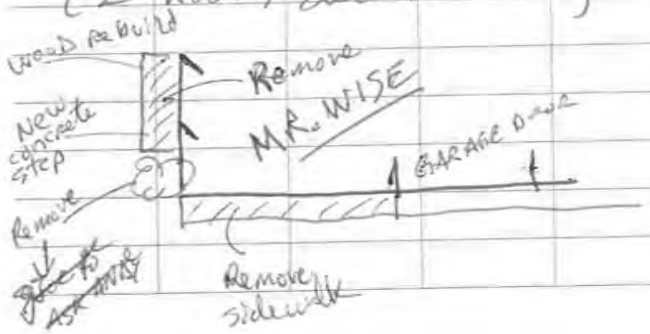
- Canine Cap. - not open called & left
msg re: planning power outage
She is closed Fridays @ 1230. Plan for
outage tu. on Fri. Afternoon.

Met Joe onsite
- Talk to Russ Gowan re: closure of Alley. HATCO.
- Talked to Joe re: taking out side walk (up to garage entrance)
- Removing tree
- Back steps
- Andy wants certain items

* Ryan Robinette - HARDROCK Construction
439-1380 (mob/h) 458-6472 (w)
wife is Val "boss girl"
- CAU Re: step/sidewalk removal

Slab + carpentry

TROY - may take down service at Mr. Wise too
(2 hours down or so)



Joe has talked to Andy.
- ok to Remove Tree
- Back sidewalk - can pull out up to Buckeye Door - check integrity as go
- Back steps - Remove - Rebuild concrete step to door, wooden steps to - Gas Pipe door
(*) Every Contractor must be licensed + insured.
* Summarize work with msg to Andy.
- Trench box and Excavation Trench.

7/29/10 0900

Spoke w/ Karen and Russ

inform them of project plans including electrical service and geo probe plans inside and outside. Tree Removal and step removal

Pat with city of Helena discuss 48" storm Drain at the site

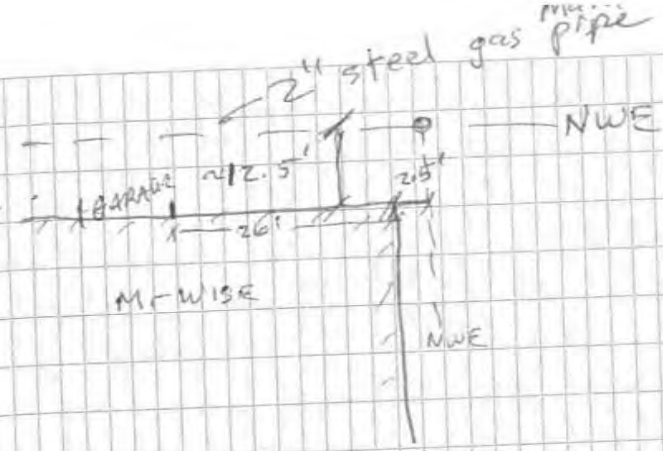
7/26/16
Storm drain most likly runs from storm inlet on Helena Ave to storm inlet on Lyndale

9:35 leave site

2016.07.28 - on site HSS LJO 0930
Met ELM utility locate
- Mike Lopez (Great Falls)
- Mike Hankins (Helena)
ELM Recommended we call Century Link about their locate - to verify their placement (if they felt comfortable digging there)
ELM to MARK WITH paint and flags

* lateral gas line to Bldg run Right under tree - ELM Recommend having NWE on site during tree removal

AMO on site to look at VI mitigation sys.



AMO - labeled VI mit. sys legs w/ temp. tape, outdoor temp 72°F

PID READINGS

time	desc.	ppm
1038	boiler room	0.0
1041	pre-treatment air	15.0
1047	outdoor air	0.0
1048	post GAC	0.0

Done 1100 HRS LJO

2016.08.09 1630
LD met Jeff Rawling - Concrete
contractor onsite.

Cost to rebuild - form, set, pour
$8.50/SF on back side walk
~ $3500 for rebuild of back steps
~ $6,800 for whole job.
Jeff -
Suggested contacting Mike Worth
in Wolf Creek as restoration
contractor - for removal
and trenching

• NEED to decide if we need to
Remove sidewalk + steps.

— Done 1650 —
LJO

1650 2016.08.09
LD talked to Jennifer @ Sanville Cap.
power change over was seamless.
Everything seems to be working.

1655 Done - LJO

8/12/16 10:15 AM
onsite w/ Rye Swingen
Dave Donohue
review area for HSA well for use in
SVE pilot test

overhead & underground lines restrict
placement
alternatives
① call geoprobe see they complete
2" in vadose zone
② try hand auger on Monday
③ HSA

off site 10:35 pm

8/15/16 1500

- meet with Jerry Davis NW Energy
Discuss ~~pla~~ placement of Pilot SVE well
gave the OK on spot

- also discuss ~~gas~~ gas line safety
phone #s in case Emergency
- We will be in touch with Jerry
before any addition drilling/digging
- No mechanical digging within
18 inches of marked gas line

- LO/RS onsite - dig test
hole for SVE well
~5' E of Well #6

Top 0-1.5' gravel/fill
1.5-3.0 Red Brick Fill rubble
3.0-4.3 Darker fine grained
~~4.3'~~ silty clay
no smell no PID readin
4.3' - 5.2' smaller gravels/sand
no smell / No PID
5.2' - 7.5 Brown silty Clay - no smell
7.5 rejected rock

place 1½ in PVC to hold
hole open
orange cones and cutting barrel
left on site

1650 leave site RS

8/16/16

#1 Borehol.
refusal
7.7ft

1245
spoke with SB
- ~~Pla~~ Plan to build 1in well
in #1 borehole
2.5 ft of slotted screen
5 ft of riser
Start new hole 5ft east
of #1 borehole

1420
#2 Bore hole

0-2ft ~~ov~~ Fill 1-2" gravel and sand

2-3.5 Brick rotten easily Broken no smell NoPID

3.5-4.0 1/2 gravel and sand

4.0-6.0 Brown sandy gravel

6.5-8.3 Brown silty clay moist no gravel

8.3-8.5 Bluish grey sand dry small gravels 1/2 in refusal of auger

1525 leave site

1530 meet LA at DEQ
Borrow 3 in auger
will attempt to build 2in SVE well in 3in borehole

8/17/16 1400
RS AO

AO maintaining indoor air system

Begin AO widen 2in hole to 3in
made it through approx 1ft of cobble stone in to clay

1500 leave site will return to complete wells tomorrow RS

8/18/16
1415
after getting supplies arrive on site

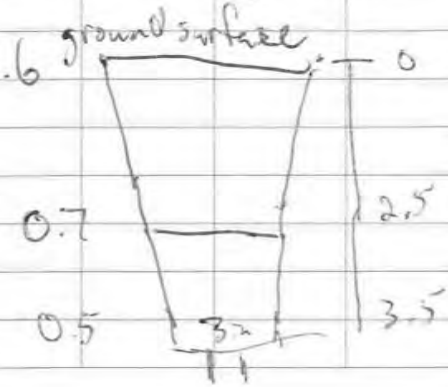
spoke with Jerry Davis he stopped by

re enter 2 in hole
with 3 in auger
lithology is the same
as before
8.5 gravel and sand
|- 4 in cobbles
refusal larger gravels

SUE Well completion
2" PVC slip cap no glue 0.15 ft
2" PVC 0.010 slot screen 2.5 ft
2" PVC well casing 5.75 ft

3.1 ft of sand 10/12? silica
tremie in 1st 1.5 ft
Then pour a scoop at a time

borehole 1.6



1545
Bentonite
tremie in approx 1 ft
of bentonite crumbs
Hydrate with approx 1 gal
of distilled water

let hydrate while constructing
1st well

3.8 ft bentonite

1.6 ~~~~ Fill

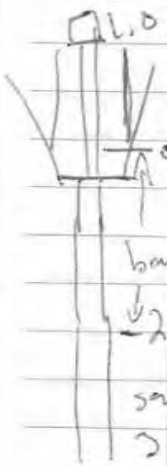
~~to~~ both SUE and UMP
need Flush mount vaults
and concrete

1 inch Vapor monitoring well

~~to~~ 1 in PVC cap 0.1 ft
1 in PVC 0.020 screen 2.55
1 in PVC screen 5.05

~~3.45~~ 3.35 ft of 1020 sand
tremie in 2 ft then
pour

2.35 bentonite mix
2 in boring
hydrated with Distilled
water
0.25 ft bentonite in
bottom of hole



1645 leave site

2016.08.23 HSS 0800 55°F breezy

- Meeting with Greg Hampton - owner Bullmans
Dave D, Luke O., Rye S.
- Discussed site/remediation plan with
Greg. Provided map.
- Greg was very agreeable to allow
DEQ access to property for remedial
activities. MIPs & trenching.
Told him we'd communicate.
He asked we put it back to how
it was or better.
Met with Russ at Mr. Wise - briefed
him on plan - including plan to
do push probe investigation inside Mr. Wise.

Met with Karen & looked inside Mr. Wise
for possible MIPs locations for the
PDI. Took photos
Done 0830

~~8~~ 9/14/16
1430

- Spoke with Russ of Mr Wise regarding drilling indoor locations and timing

- Spoke with Joe Muller regarding ~~on~~ up coming work

- decide not to remove sidewalk at this time

- ~~Run~~ Set up pilot test equipment
- test ~~up~~ run set up

1700 Leave site

RS

9/15/16
0910

- meet with Tyrell from Northwestern Energy on-site regarding overhead line shielding set for monday 9/19 or 9/20 noon

0950
- SWL
  MW-6 14.04
  MW-5 13.03

- Set to run pilot test data on field sheet

Summit Utility located on-site
marked phone
18 inch clearance required

- complete Pilot test

1745 leave site

RS

2016.09.16 1000 HRS.

LD MET WITH Michael Carothers / LENK LOCATORS of MONTANA

Michael here to locate inside utilities prior to drilling

His initial potential concern was with electrical that may be run in the slab.

RS/DD Also onsite

1330

- michael has some unknown electrical lines
- we think almost everything runs toward bathroom from e-panel
- the deepest a electrical line is 12 inches
  once past 12in we are good
- I had michael mark sewer line as wel

1330 spoke to michael they are off site and headed home

RS on-site took photos of marks

1335 RS leave

9/20/16

0915

expect Cascade around 0930

meet with NW energy regarding line shielding

Dustin 406-438-5759

Service lines are insulated w/o could literal trench without problem

- They will shield some lines

1030

Cascade on-site

Safety meetings

APT 1 complete plus soil sample @ 5' w/HPT

DPT 2-3

DPT 4 w/HPT - failed.

5:55 complete for day

18:16 leaves off site after cleanup

9/21/16 overcast. cool
0700 onsite Rye Svingen
Dave Donohue

Cascade: Jamie & ~~Kyle~~ Jewis onsite
Randy not here

Discuss H&S - ~~with~~ same safety concerns as yesterday

DPT-5 hand cleared to 5' - brick layer is a problem

9/22/16 rain 46° F

Donohue - onsite at 6:45 and plan VI point construction

plan DPT-8
drill to 15'. sample collect at 14.5 to 13.5
build well 0-10'. screen 10-5'. grout 5-0
complete surface

Cascade shows at 0705. Discuss JSS & tailgate - Same issues as previous day except working inside

- locate wells inside & discuss hazards - dust, noise, electrical markings/locate

0800 Russ shows & we move stuff away from wall/wallwall.

11:20 Hit a Electrical conduit on second concrete core inside

Cascade was called by Drillers They have filled out the appropriate incident reports

220V wire was cut
Mr. Wise cleaners Dryer
stopped working

- called eagle electric
Troy responed about 12:15
pulled wires and will
re route the wire on wall

- will continue work out side

- Eagle Elec repaired cut e-line
by re routing onto wall

- MIP would not work on
Dolly drill rig
- ~~drill~~ cored down approx 10ft
used PID and logged and
sampled in to ~~the~~ spots
on north edge
- Cut concrete ~~on~~ 3rd site

Cascade Travis, Randy, Jamie
HSI RS and DM
1840 leave site

9/23/16

7[am] onsite - meet Jamie, Travis, Randy
complete tailgate JSS
8[am] prep & stand VRC
refusal at ~~7'~~ ~4' bgs - slugfed
back to 3.5'
- will complete w/ 1/4" VP & tubing

8:20 - 8:45 build well & begin completing
manholes inside

9:20 set up for DPT 9

9:30 Lana, Erica & Mike from DEQ
onsite
9:35 start DPT9 after calibration

10:45 refusal at 13.35' - rock -
move after ft north

1115 headspace PID - gt baggie

location	depth	ppm
VP-4	1.5-2.5	219
VP-4	4-5.5	151
VP-4	7-7.5	107
VP6	1-2	21.2
VP6	4-4.5	296

3 MIP borings were refused at approx 10ft

1 MIP near back door to 25ft

MW-7 completed to approx 22ft near back door on Hampton property

clean up inside cap walls
clean up out side cap walls

1745 sign drilling permit work leave site

9/26/16

0930 Calibrate PID

1100 PID MR WISE Ambient = 0.0
PID VAPOR POINT (MR WISE South) = 14.4-20.6 ppm
PID @ VAPOR MONITORING SYST LINES
Z-1 (1116) = 0.3-3.3 ppm
Amb GAC$_{IN}$ = 9.4 ppm
Z-2 (1118a) = 0.3-1.2 ppm
Z-3 (1118b) = 3.3-13.8 ppm
Z-4 (1118c) = 0.3-6.8 - stabilized later
Z-5 (1120) = 0.0-0.3 ppm
Z-6 (1124) = 0.0-1.5 ppm
GAC$_{IN}$ = 8.7 ppm

turn off Z-6 psi ↑ 14.6
PID Z-3 = 2.5-12.5 ppm
turn off Z-3
GAC$_{IN}$ = 7.3 ppm
turn off Z-3 + Z-4 vaccum = 17-20 psi
GAC$_{IN}$ = 3.6

Weather 54°F sunny

9/30/16 1345

GPS MTP Borings

DPT-1	46.59760	112.02280	
DPT-2	46.#59790	112.02248	
DPT-3	46.59790	112.02247	
DPT-4	46.59790	112.02249	
DPT-5	46.59791	112.02263	
DPT-6	46.59800	112.02261	
DPT-7	46.59800	112.02255	
DPT-8	46.59793	112.02252	
DPT-9	46.59798	112.02244	S
DPT-10	46.59799	112.02242	N
DPT-11	46.59798	112.02246	
DPT-12	46.59787	112.02248	
VP-1	46.59799	112.02254	
VP-2	46.59796	112.02250	
VP-3	46.59795	112.02264	
MW-7	46.59789	112.02243	
SVE-1	46.59797	112.02265	
HSI VP-7	46.59796	112.02270	

1420 Leave site

10/6/16 1000 RS CO

meet Rich and Sams From 406 Underground

discuss horizontal Boring under building

can build 2in slotted SVE
would pull 4in build 2in inside
also have utility location ability
and minier trenching ability

1050 leave site

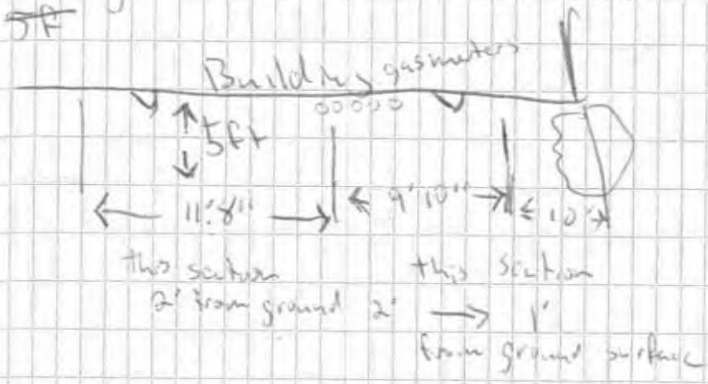
10/6/16 1400

GPS Borings

DPT-1	46.59758	112.02279
DPT-2	46.59786	112.02245
DPT-3	46.59789	112.02247
DPT-4	46.59791	112.02247
DPT-5	46.59790	112.02262
DPT-6	46.59796	112.02259
DPT-7	46.59800	112.02255
DPT-8	46.59793	112.02252
DPT-9	46.59789	112.02243
DPT-10	46.59799	112.02244
DPT-11	46.59797	112.02248
DPT-12	46.59787	112.02246
VP-1 13	46.59794	112.02250
VP-2 14	46.59786	112.02249
VP-3 15	46.59791	112.02268
MW-7 18	46.59796	112.02265
SVE1 16	46.59794	112.02266
HSI VP-7 17	46.59789	112.02240

loading Dock area measurments

~~5ft~~



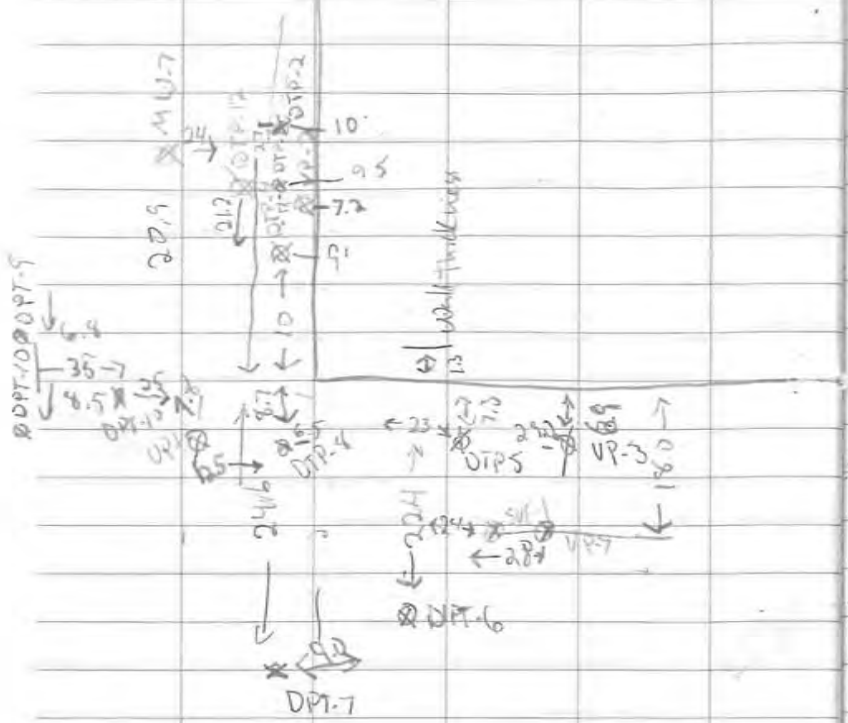
10/11/16 1455

measurments in side

mr Wise and Derma works

10/17/16

1445



	TD N side of casing
VP-3	9'8"
VP-1	9'7"
VP-2	9'11"
MW-7	22'8"
VP-7	7' 8"
SVE-1	8' 5"
VP-5	9' 5.5"
VP-4	9' 9.5"

level survey using Zip level

	level
MW-~~X~~5	0.0
SVE-1	+1.86
VP-7	+1.94
MW-~~X~~6	+1.49
VP-3	+2.02
VP-1	+0.91
MW-7	+1.11
VP-2	+1.43
Ground S end Trench	+1.66
Ground N end Trench	+1.53
Ground near VP-1	+1.20
Sidewalk E end	+3.07
Sid Walk middle west of Roll up Door	+3.25

DPT-2, 3, 4, and 12

	level
corner near low landing back door	+2.66
loading dock	+3.82
back door Floor	+3.08
VP-4	+2.50
Floor near dyer	+3.19
VP-5	+2.95
VP-6 top of vault	+3.98
SS-point in upper room	+3.97
VP-6 bottom vault	+3.49
MW-~~1~~5	+0.03
VP-1 ground	+1.20
MW-7 ground	+1.30
VP-2 ground	+1.68
VP-3 ground	+2.53
DTP-11	+0.58
DTP-10	+0.10
DTP-9	+0.18
DTP-7	+0.20
DTP-8	+0.29
DTP-6	+0.57
DTP-5	~~+0.~~ 2.44

north Vault rim

NE Corner of Building

	N	S	E	W
DPT-2		27	10	
DPT-3		17	9.5	
DPT 4		10	9	
DPT 5	7.9			23
DPT 6	22.9			9.5
DPT 7	24.6		9	
DPT 8	8.7		6.5	
DPT 9	6.8		3.5	
DPT 10	8.5		3.5	
DPT 11	8.5		2.5	
DPT 12		21.2	14	
VP-1	7.8		12.5	
VP 2		22.5	7.2	
VP 3	6.9			29
VP-7	18			28
SVE-1	18			~~28~~ 24
MW-7		20.9	24	

Feet

1650 leave site

10/24/16
1030

Test indoor air system
7.9 ppm on exit side of blower

Z-3 ~~6.9 - 8.7~~ 3 - 11.5
Z-2 0.0
Z-1 0 - 1.1
Z-4 7 - 21.4
Z-5 0.0
Z-6 0.0

shut off all other zones
increase vacuum to around 30 in H_2O

PID Vapor Points
VP-6 18 - 20 ppm
VP-5 0 ppm
VP-4 10 - 271 spike

exhaust side of GAC
0.0 ppm

VP-2 max 36 dropped to 0

2016.10.27
0800 - LD met A-CORE @ HSS
Nick - from Missoula office
A-CORE CORED 4 - 12" Holes
into the Mr WISE sidewalk
ON NORTH SIDE
1400 on site to Auger wells (x2)
CONCRETE - 4 - 5"
clean GRAVELS (1-2") - 5" - 1.5' PAD
Sandy gravel - 1.9' FILL
CARBON/BACK layer 1.9
sandy gravel/kingdom

1630 - Refusal w/ Auger

2016.10.28

1330 on site with hand auger
and a brand new sand Bar

0700 - 1930
Amo on site conducting Indoor
Air Sampling - see field
Sheet for details AMO

RS - boring

1.0ft core through concrete
0 - 0.35 cement side walk
0.35 - 1.6 1-2" Washed gravel Fill ~~and~~
1.6 - 3.0 Sandy with angular gravel
some upto 6" Fill
3.0 - 3.5 Silty sand
refusal at this point

LO boring

Same as above
refusal at 4.5 for now

11/1/16

0830 Calibrate PID & Change filter Amo

1000 Set up for Subslab sampling @ Z-3 outside temp = 42°F Baro press = 30 in Hg

1047 Begin Sample @ Z-3

1234 Begin sample @ Z-4

1417 Begin sample @ Z-6
see field sheets for details

11/2/16
0830 On Site for Vapor point Sampling Amo

0907 Begin Sampling @ VP-5

1123 Begin Sampling VP-4
40' Underground onsite to install additional VP for pilot test

1330 Leak check @ VP6 failed

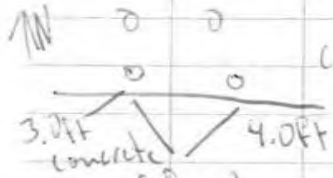
1400 Begin Sampling @ VP2

See field sheet for sampling details

Amo
11/2/16

11/9/16

406 underground
Justin and Carl
Vac truck
using water and Vac
to pot hole



concrete cores in side

refusal possible building footer

SVE-2 is west
SVE-3 is east

SVE-2

Borehole approx 6 in diameter

0-5.0 Fill large angular cobbles
5-10 soft clay

SVE-2 West
Well construction
0.2 ft end slip cap
5.0 ft 10 slot screen
4.93 ft riser
TD 9.55 Borehole 6-10 inches

Sand 10 20 silica
4.5-10

Bentonite crumbs #8
1.5-4.5

Eastwall N. Wall
8.75 2.45

SVE-3 East
Well construction
0.2ft end slip cap
5.0ft 10 slot screen
4.96 riser
TD 9.8

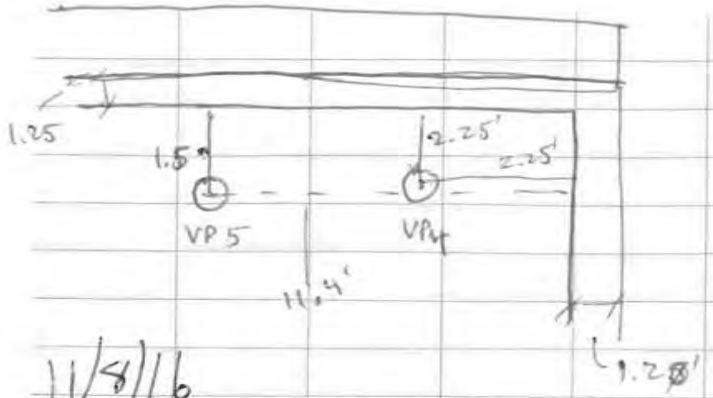
Eastwall N. Wall
3.9 2.65

Sand 10 20 silica
4.3-10

Bentonite
1.3-4.3

4.9ft SVE2-SVE3

1.25 wall Thickness



11/8/16

	PID
SVE 2	24
SVE 3	29.7
SVE 1	1.5

MW-5	0.0
SVE-3	2.71
SVE-2	2.75

LO, DP, SB, RS
meet with 406 underground
to discuss H-well Bid

1700 leave site

~~11/3/16~~
11/9/16 0930

Arrive at site
well complete pilot test
on SVE-3

RS SB

Complete pilot test
1320 leave site

11/11/16

complete the SVE well tops
with concrete and flush
mount vaults

SVE-1
SVE-2
SVE-3
VP-7

12/6/16

1500
on-site DD LO RS
mark approx locations for
trench and H-wells
spoke w/ →
Jennifer @ Cabine Capital
Someone @ Ballmans
Staff
Russ @ Mr. Use
Kyle @ Dermaworks

info on Drilling next week

2016.12.19 10:00 HS

ONSITE @ HSS 25th overcast
w. TM LO, RS John James
40L Underground, 3 J ex.
also met with Mike Hampton
to Review Plan Bo

DISC. SAFETY PLAN + JSA
w. TM All
MOVED DUMPSTER
11:50 CUT Asphalt and
began excavating South
end of Trench

- ELM onsite ~Noon
- Summit Utility Service LLC
  for cable locate

low PID readings (<1.0 ppm in) to
2' of excavated trench on S. end

1415 HRS PID ~ 4-7 ppm @ ~4' bgs

0-4" Ashalt
-2' cobbly/dry/Angular fill
2.-3.'-3.5 sandy/silty material
3' Black layer
3.5-4.5' moiste clay-water
coming w/ feet pressure
- wood chunks found in
excavation. No obvious
layer
PID Readings low
as high a 12 ppm

Laura Alvey + Heather - DEQ onsite ~1Hr
1515 Roped/fenced off excavation
12'L x4.5' Deep x 5' wide

1530 SET ANCHOR IN Mr. Wise
parking lot to west.
wet clay material @ 3'
easily formed a ball - lots
of moisture ~100' west
of Building

1630 - 406 UG - left site

12/20/10

0830 LS SB on site
0915 406 on site

0950 Drill head in the ground

1045 Drilling tools Daylight
in bottom of trench
approx 4ft bellow ground
surface

10 50 continue to pull back
trench
PID getting max of 3.5 ppm
Black matrix
looks to be fill until at least
4.5 ft below ground at trench

4.5 od diameter conduct Pipe
2in OD screen
4in OD screen

SVE ~~4H~~ H-4 4ft below ground surface

76 - 80" under building

8" reamer

1300 begin reaming ~~30~~ ft 35 ft

1320 finish reaming

1330 begin pulling pipe

DP in trench

PID - 11

34

43 max Dark layer @

4.5 below Ground Surface

1415 SVE H-4

well construction

2in sch 40 0.20 slot screen

glue on 2in slip cap

40 ft screen

1615 out of hole with

4.5 casing

had a break down

aprox 45 min

Drilling method

50ft 4.5 in casing

installed 40ft screen into 4.5 casing

before pulling leaving screen

in place

One bag bentonite powder

with water in west hole

1640 leave site

10/21/16

0810 RS SB
and 400 underground
on site

0850 Breaking asphalt to
start second Boring

0900 PT for second boring B
in the ground

1015 Boring through to
trench
78-82 in below floor in
side

1050 pot hole gas line
that goes in to meters
last off back door landing
Depth 2'10" marked
correctly

1115 driver head threads need
replaced

Black charcoal in Place in
trench directly outside of
gas meters
wood and burnt wood
Starting @ 2.5 ft below gs

1230 Beam 40 ft 8 in

strong smell of VOC
coming from Bore hole
SVE1t-3

1245 Dig down Test Pit
in trench Very Black
charcoal
2.5 - 5.5
4.5 max PID
still in Fill found concrete
in bottom of hole 5.5 down

7.5 Black charcoal sandy
beginning to see clays
metal Bricks

9.5 TD Test Pit
DS-1

9.5' deep pit - exploratory in pit

Ground
9 — asphalt 0-.5
7.5 — gravel fill
7 — brn tan
3 — black material w/ some tan pea rock / brick & other material
Trench Bottom 0 — light brn + tan finer grained silty sand

Pull soil sample 9.5-7
Backfill with same soil removed

SVEH-3
40ft 020 screen 78-82"
2in slip cap glued on
constructed in same method as yesterday
one bag hydrated bentonite powder in open hole on west side of building

1400 begin 3rd boring

out of boring problems
1515 back into boring #3

into trench
1605 3rd boring ~~out of~~

Under Day groomer
88" under slab
under mr. Wise 84-88"

1715 Pull 4.5 casing to Daylight Did not pre ream

1720 off site

12/22/16

0815 406, RS, SB
all on-site

Pull 4.5 casing ~~of~~ out SVEH-2
0830 one bag of hydrated bentonight

0845 pull back asphalt on last H-boring

0939 - ready to drill last boring

SVE#-2
40ft 020 screen
2in slip cap glued on
84.88' below building
one bag of hydrated Bentonite on west side of building

1010 pull drill string back out of boring
Bit getting too hot

1030 Back in hole

1130 through into trench
had to let bit cool under building

hauled approx 4 yds³ of over burden away
screen each bucket with PID only 2 scoops were reported max of 2.5 PID

1255 begin to pre ream with 6 inch reamer, 50ft back into hole

SVE#-1
insert 40ft 020 screen without 4.5 casing
[illegible] bentonite in west end hole
glue on 2in slip cap

1430 clean up site
Drill is going off site
plan to return tomorrow to complete plumbing in trench and back fill

1445 clean up west parking lot
placed washed pea gravel in to holes used after drilling

1520 leave site for [illegible]

12/23/16

0815 RS
and John w/ excavator
onsite

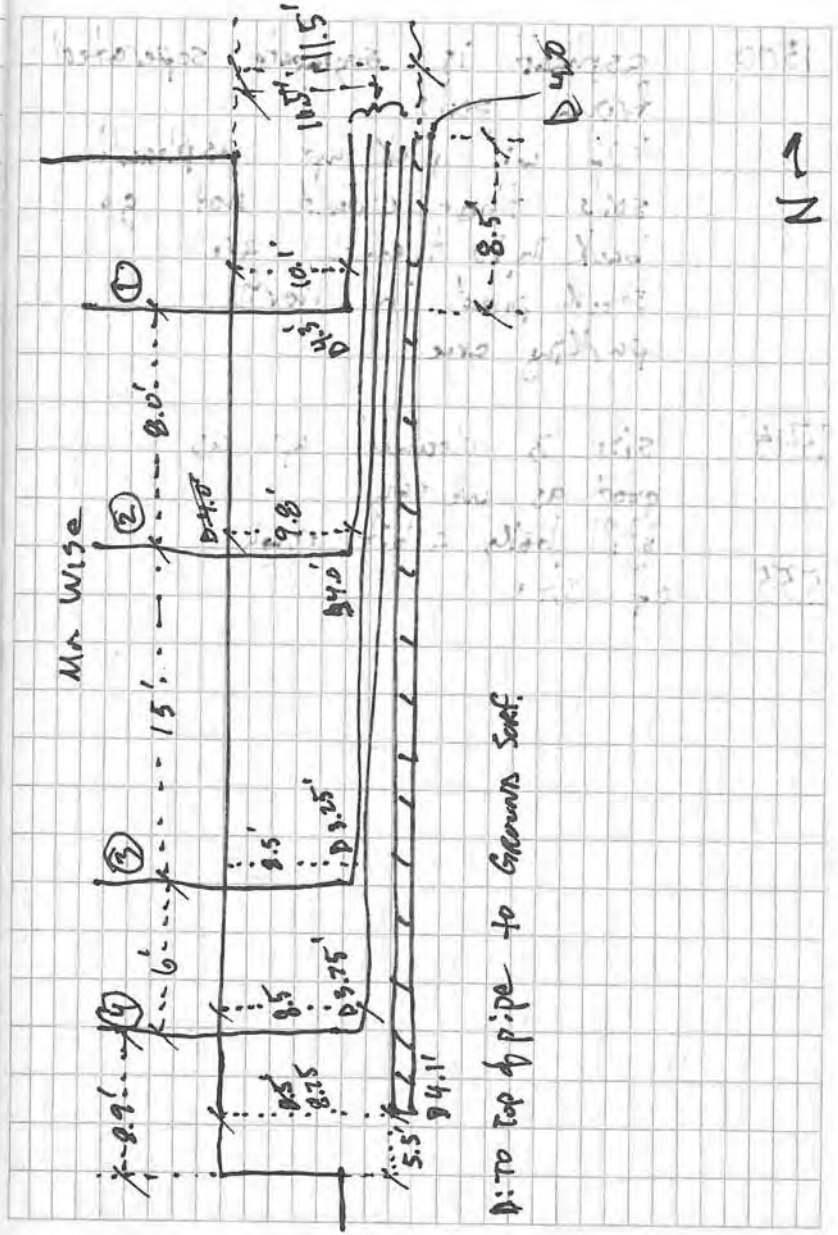
0900 run for plumbing supplies

0945 Place yellow trace wire
in to each H. boring
aprox 10 ft
out side of pipe

1200 Washed pea gravel backfill
around all pipes
approx 3 yrds

Backfill and compact
trench

before filling trench installed
30 ft of heat tape on bottom
18" of ~~#~~ 2" stand pipes



1500 asphalt is ~~segregate~~ seperated from soils
406 will pick up asphalt!
- soils that would not go back into trench are stock piled in north parking area

1545 site is cleaned up as good as we can
still looks a bit rough
1555 off site

12/27/16

1530
meet with Mike Songer
discuss shed construction
will start this week

spoke with Jamie at Thrive Js ex
will level shed site and haul asphalt away
1600 off-site

12/27/16

0915 Turn off Blower to mitigation Sys @ MR Wise

12/28/16

0745 Arrive @ MR Wise to Sample VP-4, VP-5, VP-2
See field notes for Sampling details ↳ sheets

Check PID Readings on H-wells
1245

Well	PID (ppm)
1	10.2 - 15.3
2	2.0 - 4.0
3	2150 ↑
4	262

1/9/16
065 - 067
1100
· Fedex Freight Drop off
3 · carbon barrels
put in side of shed

2/2/17 Tic:

SVEH-4

All out ~~#~~ open
3120 ~~-7~~ ppm

Ambient
-1F

T-1 22F
S-1 381.1 ppm
VG-1 70" wc
S-2 0.0 ppm
P-1 33" wc
P2 17" wc

SVEH-1 open
10" wc at line
VG-1 28" wc
S-1 43 ppm

SVEH-2 open
15" wc at line
VG-1 32" wc
49.4 ppm

SVEH-3 open
17.5" wc at line
VG-1 30" wc
25.6 ppm

SVEH-5 open
0.5" wc
VG-1 - 06" wc
40.6 ppm

2/2/17 ROI

VP 5 -
West SVE-2? 0.2 slight

2/3/17

0835 start system
SVEH 1, 2, 3, and 5 open

1400 return to sample HV
Turn SVEH4 on
write results in log

Sample
pre and post carbon
1- tedlar sack
1- Summa can sack

2/6/17 1100
system check
shed very warm
#1 carbon drum warm

indoor air mitigation PID
1.9 ppm

2/13/17

1500 arrive a SVE shed
still running ☺!

check PID in effluent
Check Knock out tank for
fluid - None

SVE-2 west 0
-0.19
1615 -0.32 in H_2O

SVE-3 east -0.12 in H_2O

indoor air mitigation
PID 2.9 ppm

VP-5 - 0.32 in H_2O
VP-4 - 0.28 in H_2O

could not find VP-2 ice

Some Subsidence in trench
1700 leave

2/15/17 1430

check system

	PID	PID sys
SVEH-1	6.0	44.5-47.0
SVEH-2	152	133
SVEH-3	~~12.0~~ 20	40.5-52.0
SVEH-4	5.6	74.9-40.4
SVEH-5	12.0	0.0-7.5-18.8

install flow measurement
Pitot tube 150 cfm

PID on new carbon barrell 1.0 ppm
may be dust

2/21/17
0915 Calibrate PID / mobilize
0945 Pick up tedlar bag from Energy
1020 Arrive on site for bi-weekly
perf. monitoring/sampling
see field sheet
1105 drop of Sample @ Energy Lab

3/7/17

1000 Calibrate PID + change
Filter
Pick up Tedlar Bag @
Energy Lab for bi-weekly
SVE Perf. monitoring
1045 Arrive on site for
SVE perf. monitoring
and indoor air system
monthly O+M
1130 drop off Samples @ Energy
Labs
1200 Demobilize

3/8/17 1500 Hrs RS/LO

Change out GAC #1

	PID ppm
S-3	0.4
S-2	34.5
S-1	46.2

~~RO~~

3/13/17 1330 Arrive onsite for weekly performance monitoring with PID.
City Building Inspector on site with questions about permitting electrical.
Skip Gee.

1400 Shut Down & Indoor Air Mitigation System in preparation for Indoor Air Sampling.

3/15/17 0845 Arrive onsite for Indoor Air Sampling.
See field Sheets for details.

1645 Arrive onsite to stop air Samples

1745 Indoor Air Mitigation System turned Back on & ops check good.
1815 Samples boxed for Fed Ex Shipment

3/20/17 ~~Co~~
1430 Collect Tedlar Bag Sample @ S1 & perf. monitoring parameters

1445 - Shut down SVE System for Sub Slab & VP sampling

3/21/17 Calibrate PID, filter ✓
0845 Mobilize for Sub slab Sampling
Sample @ 23, 24, 26 See field sheets for details

03/22/17
0730 Arrive Air Wise, calibrate PID, collect soil vapor samples @ VP4, VP5, VP6. See field sheet for details

1300 Soil Vapor Sampling Complete
1310 Indoor Mitigation Sys ON
1315 SVE Sys ON
ops check good

3/22/17 RS
1300
cal YSI meter reads → cal to

pH 4.0	4.14	4.0
7.0	6.96	6.98
10.0	9.87	9.99
SC 1413	1398	1414
ORP 220	217.1	220
DO%	654.2 mm Hg	

Sample ground water MW-1
SVE System was off turned on before Sampl
Sampling plan

	VOC long	MNA	
MW-1	x	x	
MW-2	x	x	
MW-3	x	x	Duplicate
MW-5	x		
MW-7	x	x	
rinse Blank	x	x	

3/23/17 RS
0900 SVE system running
Sample ground water

3/24/17
1200
Small pump for MW-5
didn't arrive
DD will sample next week

Rinse Blank taken
on-site
R-Blank
3/24/17 1245

new Distilled water
pumped through new Bladder
and tubing
new filter as well
2in decomed Bladder Pump

3/28/17

weather: ~40°F
Partly sunny: breezy

onsite at HSS, Mr. Wise Cleaners
about 10:45 AM

- set up to Sample MW-5 for 8260 long list
- modifying teflon tubing to fit on small 0.075" Bladder pump

measure SWL & PID

- start ~~sta~~ purging well at 11:40 AM

~ 1245 parameters stable & sufficient water purged

collect sample, clean up and leave site at 1:30 pm

3:30 pack pump for return shipping
- transport samples to Energy lab

return to office @ 5:00 pm & complete sampling event

3/28/17 5:05 pm

4/3/17

1400 Calibrate PID

1430 Arrive at Hustad center for biweekly perf. monitoring and collection of Tedlar Bag samples @ S1 + S3. PID readings @ S1 Abnormally high. Will take PID home to troubleshoot and get new readings.

4/6/17 calibrate PID

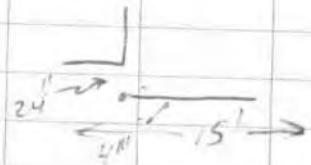
1400 arrive onsite for RO1 check + perf monitoring

VP5 - 0.3" H_2O
VP4 - 0.27" H_2O
VP2 - 0.38" H_2O
VP6 - 0.02" H_2O
VP3 - 0.16" H_2O
SVE-3 - 0.1" H_2O (closest to shed)
SVE-2 0.16" H_2O

SVE System perf. monitoring ok.

4/10/17

8^{00} a onsite to meet Greg Hampton to discuss fence restoration
Zach Hampton showed up too
I noticed SVE system is off & ~~need~~ call Rye he will be here in a few



6'
Privacy Fence
- 6' high
- 15 foot long w/ a 4' gate
- Doug Fir or chainlink w/ latte

fence crafters
Lynch Fencing

2' ~~lattice~~
Doug Fir ~~w/ latte~~

SVE - relay was popped & system off.
started back up

8^{43} off site

4/10/17

Mark Fitzwater COH WWTP
457-8558

spoke w/ Mark Fitzwater - will send over form & likely able to dispose of Purge water.

4/12/17 onsite w/ James from 406
11^{30} Pat Sampson 406-438-5781 - Proj mgt

Scott onsite with NW energy

- NW energy is running new gas main & service line off to buildings.
- gas service entrance will cross about 18" deep - across our SVE trench
- will wait to asphalt until end of next week after NW Energy is done
- meet w/ Joe M. updated

4/12/17

off 12^{30}

4/17/17 Fence Contractors

Chris Lynch Fencing 461-2892
Fence crafters 449-4302
Grizzly Fence 443-6460

Privacy Fence
6' high
~15 feet long w/ 4' gate
Doug Fir or chainlink? w/ slats
1" gap

10:30 AM
Chris Lynch - left msg - cell 871-3381 Travis
Fence crafters - " "
Grizzly Fence - no answer

11 AM met Travis from Chrislynch Fencing on site
he uses metal posts
will give me a bid

4/17/17 Fence Crafters
10 AM Matt 17' - will use cedar & metal posts

Field Sheets
Groundwater Sampling

HydroSolutions

Groundwater Sampling Data

Project / Personnel Information:

Project Name: DEQ 08

Project Number:

Property Owner: Hustad

Technician(s): Ryan Swingen Amanda Osborne

Date: 11/30/16

Arrival: 1015 Departure: 1215

Weather: 30°F Sunny

Well / Sampling Information:

Monitoring Well Identification: MW-1

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 23.2 SWL: 13.24

Outside Diameter: 2 in PVC Inside Dameter

Casing: Flush/ Stickup Locked? Y N Pad? Y N

Screened Interval - Top: Bottom:

Measuring Point (MP): TOC

MP Stickup:

Equipment Information:

Pump Make / Model: GeoTech Bladder - Serial # C46 GeoMicro / PRO

Tubing: New Poly

Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Y 11/29/16
	DO 11/30/16

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1053	Pump	Start	1302/min								
2	1058	Pump adjust		602/min								
3	1105			10.62	6.71	367.7	566	368	4.3	38.3		turbid no sheen
4	1115			11.01	6.79	343.8	569	370	2.58	23.4		or odor
5	1125			10.96	6.80	331.3	570	370	2.53	22.9		
6	1135			10.87	6.88	320.5	571	371	2.64	23.9		
7	1145			10.78	6.85	316.7	570	371	2.65	24.3		
8	1155			10.83	6.89	311.2	570	371	2.76	25.6		
9	1204	pump	stop									
10												
11												
12	Final	SWL	= 13.48									
13												
14												
15												

Notes:

Well Volume Calculation: $D^2_{[in]}*(TD-SWL_{[ft]})*0.0408$

Height of Static Water Column = 9.96 feet

Calculated Well Volume = 1.6 gallons

X 3 = 4.9 gallons

Total Volume Pumped: 4.5 gallons

Field Filtered? N

Receiving Lab: Energy

Sample Containers: 3 VOA

Sample Identification: MW-1

Sample Date / Time: 11/30/16 1200

Decontamination: Organic Inorganic

Sampling Method: Low-Flow Bladder Pump New Bladder + Tubing

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6105

Revised 2015-11-04

Groundwater Sampling Data

Project / Personnel Information:

Project Name: DEQ08 - Hrustad Center
Project Number:
Property Owner: Hrustad LLC
Technician(s): Rye Svingen / Amanda Osborne
Date: 11/30/16
Arrival: 1315 Departure: 1500
Weather: cloudy, lt snow, 24°F

Well / Sampling Information:

Monitoring Well Identification: MW-3
Well Location (QQ-S-T-R):
Well Location (lat/long dd):
Ground Elevation:
Well TD Below MP: 23 SWL: 13.02'
Outside Diameter: 6" vault Inside Dameter 2" PVC
Casing: Flush/ Stickup Locked? Y N Pad? Y N
Screened Interval - Top: Bottom:
Measuring Point (MP): top PVC
MP Stickup:

Equipment Information:

Pump Make / Model: Geotech Bladder Serial# 0446
Geo Control Pro
Tubing: New Poly
Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Y 11/29/16
	DO 11/30/16

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1335	Pump Start		9.0 L/min								
2	1345			11.64	6.22	311.2	1364	887	4.21	38.9		turbid, no sheen
3	1355			12.3	6.34	299.3	1370	890	4.33	40.7		or odor
4	1405			12.28	6.52	291.8	1348	876	4.22	40.3		
5	1415			12.37	6.56	285.1	1337	869	4.22	39.2		
6	1425			12.38	6.58	281.8	1319	857	3.93	36.8		
7	1435			12.46	6.63	278.2	1300	845	4.22	39.6		
8	1445			12.4	6.68	275.6	1293	840	4.21	39.0		
9	1455	pump stop		SWL=	13.12							
10												
11												
12												
13												
14												
15												

Notes: PID = 0.8 @ well
Sample, dup, blanks taken @ 1455

Well Volume Calculation: $D^2_{(in)}*(TD-SWL_{(ft)})*0.0408$
Height of Static Water Column = 9.98 feet
Calculated Well Volume = 1.63 gallons
X 3 = 4.89 gallons
Total Volume Pumped: 7 gallons

Field Filtered? N
Receiving Lab: Energy
Sample Containers: 3 VOA
3 VOA duplicates

Decontamination: Organic Inorganic
Sampling Method: Low-Flow
Bladder Pump
New Bladder + Tubing

Sample Identification: MW-3
Sample Date / Time: 11/30/16 ~~1400~~ 1450

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6160

Revised 2015-11-04

Groundwater Sampling Data

Project / Personnel Information:

Project Name: Hustad Center
Project Number: DEQ08
Property Owner: Hustad LLC
Technician(s): Page Swingen / Amanda Calone
Date: 12/1/16
Arrival: 1335 Departure:
Weather: windy, low overcast 36°F

Well / Sampling Information:

Monitoring Well Identification: MW-7
Well Location (QQ-S-T-R):
Well Location (lat/long dd):
Ground Elevation:
Well TD Below MP: 22.0 SWL: 13.84
Outside Diameter: 1" Inside Dameter
Casing: Flush/ Stickup Locked? Y/N Pad? Y/N
Screened Interval - Top: Bottom:
Measuring Point (MP): top PVC
MP Stickup:

Equipment Information:

Pump Make / Model: 1" Bladder Pump (new Bladder) GeoController Pro
Tubing: New Poly
Pump Depth: NEAR TD

Instruments:	Calibrated?
YSI 556	y 11/29/16
	DO on 11/30/16

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1345	500 ml/min	13.84	pump start								
2	1400			10.76	6.81	222.6	707	459	2.5	22.5		water cloudy + brown
3	1410			11.08	6.92	217.6	625	406	2.45	22.4		no sheen or odor
4	1420			11.20	6.91	218.5	616	401	2.44	22.2		
5	1430			11.10	6.94	216.8	612	398	2.33	21.2		
6	1440			10.98	6.96	215.7	613	398	2.38	21.6		
7	1450			11.04	7.00	213.5	612	398	2.27	20.6		
8	1505	pump stop		SWL	= 14.1							
9												
10												
11												
12												
13												
14												
15												

Notes: DTD = 1.2

Well Volume Calculation: $D^2_{(in)}*(TD-SWL_{(ft)})*0.0408$

Height of Static Water Column = 8.16 feet
Calculated Well Volume = 0.333 gallons
X 3 = 1 gallons
Total Volume Pumped: 2 gallons

Field Filtered? N
Receiving Lab: Energy
Sample Containers: 3 VOA

Decontamination: Organic Inorganic
Sampling Method: Low-Flow Bladder Pump New Bladder + Tubing

Sample Identification: MW-7
Sample Date / Time: 12/1/16 1500

HydroSolutions

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6169

Revised 2015-11-04

Groundwater Sampling Data

Project / Personnel Information:

Project Name: Husted Center
Project Number: DEQ 08
Property Owner: Husted LLC
Technician(s): Pye Soingen / Amanda Osborne
Date: 12/1/16
Arrival: 1200 Departure: 1330
Weather: Cloudy, Breezy 36°F

Well / Sampling Information:

Monitoring Well Identification: MW-2
Well Location (QQ-S-T-R):
Well Location (lat/long dd):
Ground Elevation:
Well TD Below MP: 23.1 SWL: 12.1
Outside Diameter: 2" PVC Inside Dameter
Casing: Flush/Stickup Locked? Y(N) Pad? Y(N)
Screened Interval - Top: Bottom:
Measuring Point (MP): Top PVC
MP Stickup:

Equipment Information:

Pump Make / Model: 2" Bladder Pump (new Bladder) Reo Controller Pro
Tubing: New Poly
Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Y 11/29/16
	DO 11/30/16

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1209	600z/min	12.1 pump start									
2	1230			12.15	6.80	240.1	624	406	3.42	31.8		water cloudy, no
3	1240			12.24	6.86	236.5	626	407	3.15	29.3		sheen or odor
4	1250			12.22	6.90	233.4	629	409	3.00	28.1		
5	1300			12.26	6.87	233.4	631	410	3.19	29.9		
6	1310			12.25	6.87	231.8	632	411	3.08	28.8		
7	1320			12.24	6.89	230.0	634	412	3.10	29.6		
8	1323		pump	off	SWL	fixed	= 13.4					
9												
10												
11												
12												
13												
14												
15												

Notes: Sample Rinse Blank prepared ~~before~~ 1215 with small pump 12/1/16 - Distilled Water wash
PID = 1.4

Well Volume Calculation: $D^2_{(in)}*(TD-SWL_{(ft)})*0.0408$

Height of Static Water Column = 11 feet
Calculated Well Volume = 1.8 gallons
X 3 = 5.4 gallons
Total Volume Pumped: 5.5 gallons

Field Filtered? N
Receiving Lab: Energy
Sample Containers: 3 VOA

Decontamination: Organic Inorganic
Sampling Method: Low Flow Bladder Pump Purge & Sample

Sample Identification: MW-2
Sample Date / Time: 12/1/16 1325

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6169

Groundwater Sampling Data

Project / Personnel Information:

Project Name: Husted Center - DEQ08
Project Number:
Property Owner: Husted LLC.
Technician(s): RVE Swingen / Amanda Osborne
Date: 12/1/16
Arrival: 1000 Departure: 1150
Weather: Cloudy, 36°F

Well / Sampling Information:

Monitoring Well Identification: MW-5
Well Location (QQ-S-T-R):
Well Location (lat/long dd):
Ground Elevation:
Well TD Below MP: 23.8 SWL: 13.0
Outside Diameter: Inside Dameter 1" PVC
Casing: Flush/ Stickup Locked? Y(N) Pad? (Y) N
Screened Interval - Top: Bottom:
Measuring Point (MP): Top of PVC
MP Stickup:

Equipment Information:

Pump Make / Model: Geotech Bladder Geo Control Pro
Tubing: New Poly
Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Y 11/29/16
	DO 11/30/16

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1020	pump start		6 oz/min								water turbid, no
2	1035			11.38	6.46	282.6	718	487	4.54	41.8		sheen, no odor
3	1045			11.48	6.67	273.4	751	487	3.40	31.2		
4	1055			10.52	6.66	269.8	777	505	3.48	31.3		
5	1105			10.27	6.69	266.8	778	506	3.79	33.9		
6	1115			10.35	6.72	263.2	778	506	4.18	37.8		
7	1125			10.06	6.78	257	779	507	4.24	37.7		meter turned off
8	1135			10.00	6.78	256.9	779	507	4.25	37.8		DO stabilizing
9	1145	pump shut down				SWL = 13.91						
10												
11												
12												
13												
14												
15												

Notes: PID = 0.1
~~Equipment Blank + Rinse Blank~~

Well Volume Calculation: $D^2_{(in)}*(TD-SWL_{(ft)})*0.0408$

Height of Static Water Column = 10.8 feet
Calculated Well Volume = 0.44 gallons
X 3 = 1.32 gallons
Total Volume Pumped: 3 gallons

Field Filtered? N
Receiving Lab: Energy
Sample Containers: 3 VOA

Decontamination: (Organic) Inorganic
Sampling Method: Low-Flow Bladder Pump New Bladder + Tubing

Sample Identification: MW-5
Sample Date / Time: 12/1/16 1150

HydroSolutions

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6169

Groundwater Sampling Data

Project / Personnel Information:

Project Name: HSS

Project Number:

Property Owner: Husted

Technician(s): Kyle Swinger

Date: 3/22/17

Arrival: 1300 Departure: 1620

Weather: 50°F Drizzling

Well / Sampling Information:

Monitoring Well Identification: MW-1

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 23.2 SWL: 13.08

Outside Diameter: 3.5 in (Nom) Inside Dameter 2 in

Casing: Flush/ Stickup Locked? Y N Pad? Y N

Screened Interval - Top: Bottom:

Measuring Point (MP): TOC PVC

MP Stickup:

Equipment Information:

Pump Make / Model: 2" GeoPump w/ Geo Controller Tef Bladder

Tubing: Bonded Tef Lined

Pump Depth:

Instruments:		Calibrated?
	YSI 556	Y 3/22/17

Reading Number	Clock Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1340	150 ml/min										
2	1350			11.82	7.03	184.7	~~50~~ 596	387	6.18	56.7		
3	1400			11.39	6.87	187.2	593	386	3.50	34.7		
4	1410			11.01	6.93	181.1	593	386	3.63	33.0		
5	1420			10.96	6.96	178.3	596	387	3.54	32.1		
6	1430			10.85	7.01	174.7	600	390	3.37	30.5		
7	1440			10.84	7	YSI turned off						No Smell or Sheen
8	1450			10.80	7.10	176.5	605	394				
9	1500			10.74	7.10	175.1	606	394	2.86	26.0		
10	1510			10.64	7.11	175.0	608	395	2.62	23.8		
11	1520			10.67	7.11	176.3	608	395	3.60	32.5		
12	1530			10.50	7.10	174.8	609	396	3.67	32.8		
13	1540	150 ml/min		10.44	7.11	167.5	609	396	3.50	31.01		
14												
15												

Notes: SWL - 13.5 after Sampling

Well Volume Calculation: $D^2_{[in]}*(TD-SWL_{[ft]})*0.0408$

Height of Static Water Column = 9.4 feet

Calculated Well Volume = 1.53 gallons

X 3 = 4.6 gallons

Total Volume Pumped: 2.75 gallons

Field Filtered? Yes

Receiving Lab: Energy

Sample Containers: MNA

Sample Identification: MW-1

Sample Date / Time: 3/22/17 1545

Decontamination: Organic Inorganic

Sampling Method: low flow

HydroSolutions

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Helena Office: 353 Clarke St, Helena, MT 59601, Phone: (406) 443-6260

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Groundwater Sampling Data

Project / Personnel Information:

Project Name: HSS

Project Number:

Property Owner: ~~Hoots~~ Hampton

Technician(s): [illegible]

Date: 3/23/17

Arrival: 1310 Departure: 1530

Weather: 40°F Sunny Breezy

Well / Sampling Information:

Monitoring Well Identification: MW-7

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 22.0 SWL: 13.65

Outside Diameter: Vault Inside Dameter 2

Casing: Flush/ Stickup Locked? Y (N) Pad? Y (N)

Screened Interval - Top: Bottom:

Measuring Point (MP): TOC PVC

MP Stickup:

Equipment Information:

Pump Make / Model: 12v GeoPump Teflon Bladder (Low Controller)

Tubing: Teflon lined Bonded Poly

Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Yes 3/22/17

Reading Number	Time (Min)	Pumping Rate ml/min (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1315	200/min										
2	1320			10.06	7.67	130.6	701	450				
3	1330			10.25	7.15	137.7	358	493	5.85	87.9		
4	1340			10.47	7.08	146.4	742	509	5.21	45.3		
5	1350			10.54	7.11	135.2	785	510	6.14	55.1		
6	1400			10.57	7.12	136.5	785	510	5.60	50.1		
7	1410			10.14	7.04	~~75~~ 134.4	787	508	5.49	49.0		
8	1420			10.45	7.11	121.0	785	510	5.04	45.3		
9	1430			10.45	7.12	118.4	785	510	5.30	47.6		
10	1440			10.33	7.13	117.1	785	510	6.53	58.5		
11	1450			10.35	7.12	117.4	785	510	6.82	60.1		
12	1500			10.33	7.12	118.2	785	510	6.92	62.0		
13												
14												
15												

Notes: SWL after purge 14.05

Well Volume Calculation: $D^2_{(in)}*(TD-SWL_{(in)})*0.0408$

Height of Static Water Column = 8.35 feet

Calculated Well Volume = 0.34 gallons

X 3 = 1 gallons

Total Volume Pumped: 5.5 gallons

Field Filtered? Yes

Receiving Lab: Emson

Sample Containers: Many MNA

Sample Identification:

Sample Date / Time: 1500 3/23/17

MW-7

Decontamination: Organic Inorganic

Sampling Method: Low flow

HydroSolutions

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6105

Revised 2015-11-04

1-800-333-7958

Groundwater Sampling Data

Project / Personnel Information:

Project Name: HS - DEQ04

Project Number:

Property Owner: Hosted

Technician(s): Rye Sumner

Date: 3/23/17

Arrival: 1535 Departure: 18:00

Weather:

Well / Sampling Information:

Monitoring Well Identification: MW-2

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 23.1 SWL: 12.05

Outside Diameter: Inside Dameter 2 in PVC

Casing: (Flush/ Stickup) Locked? Y N Pad? Y N

Screened Interval - Top: Bottom:

Measuring Point (MP):

MP Stickup:

Equipment Information:

Pump Make / Model: 2 in GeoPump / GeoController Jet Bladder

Tubing: Bonded Jet Lined

Pump Depth:

Instruments:	Calibrated?
YSI 556	Y 3/22/17

Reading Number	Time (Min)	Pumping Rate ml/min ~~(gpm)~~	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1550	250 ml/min										
2	1600			10.85	7.07	165.5	714	464	6.96	62.3		
3	1610			10.77	6.96	172.8	698	454	5.20	46.7		
4	1620			10.76	7.01	169.2	707	459	4.78	43.2		
5	1630			10.74	7.03	164.8	713	464	4.57	41.3		
6	1640			10.70	7.03	164.1	720	468	4.56	41.7		
7	1650			10.67	7.04	161.8	724	471	4.98	44.4		
8	1700			10.64	7.07	151.1	727	473	4.45	40.2		
9	1710			10.62	7.04	146.0	729	474	4.62	41.7		
10	1720			10.64	7.04	140.0	731	475	4.45	40.1		
11												
12												
13												
14												
15												

Notes: SWL after purge: 12.12

Well Volume Calculation: $D^2_{[in]}*(TD-SWL_{[ft]})*0.0408$

Height of Static Water Column = 11.07 feet

Calculated Well Volume = 1.8 gallons

X 3 = 5.4 gallons

Total Volume Pumped: 5.9 gallons

Field Filtered? Yes

Receiving Lab: Energy - Helena

Sample Containers: 1 oz VOA

Decontamination: Organic Inorganic

Sampling Method: Low Flow

Sample Identification: MW-2

Sample Date / Time: 3/23/17 1720

HydroSolutions

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Helena Office: 303 Clarke St, Helena, MT 59601, Phone: (406) 443-6169

Revised 2015-11-04

Groundwater Sampling Data

Project / Personnel Information:

Project Name: HSD DE004

Project Number:

Property Owner: Hartford

Technician(s): Rye Swagen

Date: 3/23/17

Arrival: 0930 Departure: 1240

Weather: 50°F Sunny

Well / Sampling Information:

Monitoring Well Identification: MW-3

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 23.0 SWL: 12.45

Outside Diameter: Inside Dameter 2

Casing: Flush/ Stickup Locked? Y N Pad? Y N

Screened Interval - Top: Bottom:

Measuring Point (MP): TOC PVC

MP Stickup:

Equipment Information:

Pump Make / Model: 2in Bladder Geo Pump Geo Controller Tot Bladder

Tubing: Tot Lined Tubing

Pump Depth: Near TD

Instruments:	Calibrated?
YSI 556	Y 3/23/17

Reading Number	Time (Min)	Pumping Rate (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	0950	250 mL/min		11.03	7.07	180.2	1355	881	—	—		
2	1000											
3	1010			11.13	6.64	157.3	1370	890	12.71	165.8		
4	1020			11.23	6.71	181.7	1369	890	8.18	14.3		
5	1030			11.28	6.77	170.5	1359	883	7.84	7.80		
6	1040			11.30	6.80	161.6	1346	875	7.04	64.5		
7	1050			11.38	6.84	156.0	1331	865	6.98	63.9		
8	1100			11.60	6.90	144.9	1328	863	6.50	63.8		
9	1110			12.00	6.90	149.4	1329	864	6.71 6.58	65.1		
10	1120			11.36	6.82	133.6	1317	856	6.87	63.6		
11	1130			11.38	6.85	128.3	1314	854	6.72	63.5		
12	1140			11.40	6.88	124.1	1317	856	6.71	61.5		
13												
14												
15												

Notes: PID in Well 0.8 ppm
SWL 12.85 after Purge Duplicate Sample taken

Well Volume Calculation: $D^2_{[in]}*(TD-SWL_{[ft]})*0.0408$

Height of Static Water Column = 10.55 feet

Calculated Well Volume = 1.72 gallons

X 3 = 5.2 gallons

Total Volume Pumped: 8.6 gallons

Field Filtered? Y/N

Receiving Lab: In-lab

Sample Containers: Many MNA

Decontamination: Organic Inorganic

Sampling Method: Low Flow

Sample Identification: MW-3

Sample Date / Time: 3/23/17 1150

MW-30
3/23/17 1200 - Duplicate

HydroSolutions

Billings Office: 1500 Poly Dr Suite 100, PO Box 90660, Billings, MT 59100, Phone: (406) 655-9555

Helena Office: 303 Geode St, Helena, MT 59601, Phone: (406) 443-6169

Groundwater Sampling Data

Project / Personnel Information:

Project Name: HSS

Project Number: DEQ 08

Property Owner:

Technician(s): D Donohue

Date: 3/28/17

Arrival: 1045 Departure: 1350

Weather: partly sunny, slight breeze 28°

Well / Sampling Information:

Monitoring Well Identification: MW-5

Well Location (QQ-S-T-R):

Well Location (lat/long dd):

Ground Elevation:

Well TD Below MP: 23.8 SWL: 12.81

Outside Diameter: 1" Inside Dameter

Casing: Flush/ Stickup Locked? Y N Pad? Y N

Screened Interval - Top: Bottom:

Measuring Point (MP): TOC PVC

MP Stickup:

Equipment Information:

Pump Make / Model: Geopump w/ Geo controller Teflon Bladder

Tubing: Braided Teflon lined

Pump Depth:

Instruments:	Calibrated?
YSI 556	Y 3/27

Reading Number	Time (Min)	Pumping Rate ml (gpm)	Depth to Water (ft)	Temperature (°C)	pH	Oxidation - Reduction Potential (mV)	Conductivity (µS/cm)	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen (%)	Turbidity (NTU)	Comments and Observations: (pump operation / rate changes, purge water color / odor, sediment load, etc.)
0	0:00	0.0										
1	1140	100/min		11.46	6.89	118.6	739	481	11.16	102		
2	1150			11.13	7.01	103.7	736	478	8.84	87.1		
3	1200	145/min		11.51	7.25	~~11.6~~ 92	385	249	16.55	151.9		ignore - flow thru got disconnected
4	1215			11.69	7.07	100.9	769	500	5.74	53		
5	1220	140/min		11.44	7.09	97	772	502	6.85	63.4		
6	1230			11.55	7.66	103.9	776	505	6.35	58.4		
7												
8	1245			11.61	7.08	109.6	779	506	5.92	55		collect 6 VOAs
9												
10												
11												
12												
13												
14												
15												

Notes: PID reading in well 1.1 ppm ~~SWL~~ WL at end of purge 16.6'

Well Volume Calculation: $D^2_{[in]}*(TD-SWL_{[ft]})*0.0408$

Height of Static Water Column = 10.99 feet

Calculated Well Volume = .45 gallons

X 3 = 1.4 gallons

Total Volume Pumped: ~ 2.0 gallons

Field Filtered? No

Receiving Lab: Energy

Sample Containers: 6 VOC Long

Decontamination: Organic Inorganic

Sampling Method: low flow

Sample Identification: MW5

Sample Date / Time: 3/28/17 1245

HydroSolutions

Billings Office: 1500 Poly Dr Suite 103, PO Box 80865, Billings, MT 59108, Phone: (406) 655-9555

Helena Office: 203 Clarke St, Helena, MT 59601, Phone: (406) 443-6160

Revised 2015-11-04

6 VOAs
3 preserv. w/ HCL 5-10 drops
3 unpres.

5-10

Field Sheets

Indoor Air Mitigation System O&M

HydroSolutions

HUSTAD CENTER VAPOR INTRUSION MITIGATION SYSTEM

Monthly Performance Monitoring Field Sheet

Date	8/17/16	9/21/16	10/24/16	11/3/16	12/28/16	1/30/17
Time	1145	1032	1039	1135	1345	1335
Sampler	Amo	Amo	Amo	Amo	Amo	Amo
Other Personnel	–	–	Rye	–	–	–
PID Calibration Date	8/17/16	9/20/16	10/24/16	11/1/16	12/27	1/30/17
Filter Replacement Date	8/17/16	9/20/16	10/24/16	11/1/16	12/27	1/30/17
Visual Integrity Check	ok	ok	ok	ok	ok	ok
Gage Pressure (psi)						
Z-1 1116	12	12	12	12	12	12
Z-2 1118a	10	10	10	10	10	10
Z-3 1118b	10	10	10	10	10	10
Z-4 1118c	10	10	9	10	11	10
Z-5 1120	10	9.5	10	10	10	10
Z-6 1124	8	8	8	~~12~~ 8	8	8
Temperature (deg F)						
Outside ambient	58°F	50°F	41°F	42°F	31°F	44°F
GAC inlet (pre-treatment)	112°F	83°F	81°F	–	–	109°F
GAC outlet (post-treatment)	96°F	74°F	71°F	–	–	63°F
Velocity (ft/min)						
GAC inlet (pre-treatment)	–	–	–	–		
GAC outlet (post-treatment)	–	–	–	–		
PID Reading (ppm)						
Boiler room air	0.0	0	0	0.0	0.0	0.0
GAC inlet (pre-treatment)	10.6	9.8	7.9	7.6	17.1	8.6
GAC outlet (post-treatment)	0.0	0.0	0.0	0.0	0.0	0.0
Outdoor air	0.0	0.0	0.0	0.0		
PCE Concentration* (ppm)						
Boiler room air	0	0.0	0	0	0	
GAC inlet (pre-treatment)	5.3	4.9	4.0	~~3.8~~	8.6	
GAC outlet (post-treatment)	0	0	0	0	0	
Outdoor air	0	0	0	0	0	

Notes: Mitigation System Shut down 10/28/16 @ 1950, powered on 11/2/16 @ 1530

9/26/16 GAC$_{IN}$ = 8.7
Z1 = 0.3 - 3.3 ppm
Z2 = 0.3 - 1.2 ppm
Z3 = 3.3 - 13.8 ppm
Z4 = 0.3 - 6.8 ppm
Z5 = 0.0 - 0.3 ppm
Z6 = 0.0 - 1.5 ppm

10/24 GAC$_{IN}$ = 7.9
Z1 = 0 - 1.1
Z2 = 0
Z3 = 3 - 11.5
Z4 = 7 - 21.4
Z5 = 0
Z6 = 0

11/3/16
Z1 = 0
Z2 = 0
Z3 = 1.7 - 9.2
Z4 = 0.6 - 7.2
Z5 = 0
Z6 = 0

* A 0.5 response factor for PCE is applied to the 2020 Pro reading, based on a 100-ppm isobutylene calibration

12/28 — SVE system was off 24 hrs for VI sampling on 12/27

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HUSTAD CENTER VAPOR INTRUSION MITIGATION SYSTEM

Monthly Performance Monitoring Field Sheet

Date	07/28/16	2/3/17	2/21/17	3/7/17	4/19/17	
Sampler	Amo	Amo	Amo	Amo	Amo	
Other Personnel	LJO			—		
PID Calibration Date	7/28/16		2/21/17	3/7/17	4/19/17	
Filter Replacement Date	7/28/16		2/21/17	3/7/17	4/19/17	
Visual Integrity Check	good		✓	✓	✓	
Gage Pressure (psi)						
Z-1 1116	✓	12	12	12	12	
Z-2 1118a	✓	10	10	10	10	
Z-3 1118b	✓	10	10	10	10	
Z-4 1118c	✓	10	10	10	10	
Z-5 1120	✓	10	10	10	10	
Z-6 1124	✓	8	8	8	8	
Temperature (deg F)						
Outside ambient	72		45	34°F	45°F	
GAC inlet (pre-treatment)				—	—	
GAC outlet (post-treatment)				—	—	
Velocity (ft/min)						
GAC inlet (pre-treatment)				—	—	
GAC outlet (post-treatment)				—	—	
PID Reading (ppm)				—	—	
Boiler room air	0.0	0.0	0.0	0.0	Ø	
GAC inlet (pre-treatment)	15.0	1.3	0.8	0.0	Ø	
GAC outlet (post-treatment)	0.0	0.0	0.0	0.0	Ø	
Outdoor air	0.0	0.0	0.0	0.0	Ø	
PCE Concentration* (ppm)						
Boiler room air	0	Ø	0	Ø	Ø	
GAC inlet (pre-treatment)	7.5	0.65	0.4	Ø	Ø	
GAC outlet (post-treatment)	0	Ø	Ø	Ø	Ø	
Outdoor air	0	Ø	Ø	Ø	Ø	

Notes: 7/28/16 - temp and velocity not measured, gages labeled and checked OK.
3/7/17 - all lines Z-1 thru Z-6 read 0.0 on PID

* A 0.5 response factor for PCE is applied to the 2020 Pro reading, based on a 100-ppm isobutylene calibration

HydroSolutions

Field Sheets
Indoor Air Sampling

HydroSolutions

Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:		Start Weather:	Clear, W wind approx 5 mph
		Start Outdoor Air Temp:	50°F
Project Name:	Husted Center DEQ08	Start Atmospheric Pressure:	29.9 in Hg, 30 in Hg @ 1130
Sample Location:	Husted Center Indoor Air		
Date:	10/28/16	End Weather:	partly Cloudy, west wind
Field Personnel:	Amanda Osborne	End Outdoor Air Temp:	55°F
Recorded by:	A OSBORNE	End Atmospheric Pressure:	29.9 in Hg @ 1521

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
10/28	0727	10/28	1517	1116-IA-102816	2657	FC1036		25	15	70	70
10/28	0715	10/28	1524	1118-IAD-102816	1260	FC0049		25	4	72	72
10/28	0715	10/28	1524	1118-IA-102816	1272	FC0049		25	4	72	72
10/28	0736	10/28	1535	AA-102816	1242	FC0258		23	2.5	OUT 50	OUT 55
10/28	1134	10/28	1737	1120-IA-102816	2806	FC0016		25.5	2	~~68~~ 69	68
10/28	1141	10/28	1928	1124-IA-102816	2165	FC0394		24.5	2.5	75	73

Comments:

1116 - Canine Capital behind desk near printer, 0941 pressure = 22
1118 + dup - back of shop on table 0943, press = 18
AA - Front door MR WISE (upwind), 0942 press = 19, 1128 press = 14
1120 - front seating area
1124 - Dermawerx by business cards

Indoor Air Sampling Field Data Sheet

Description of Sample Locations (s):

1116 - Canine Capital - top of canister box between printer and file cabinet behind desk approx 4' from floor

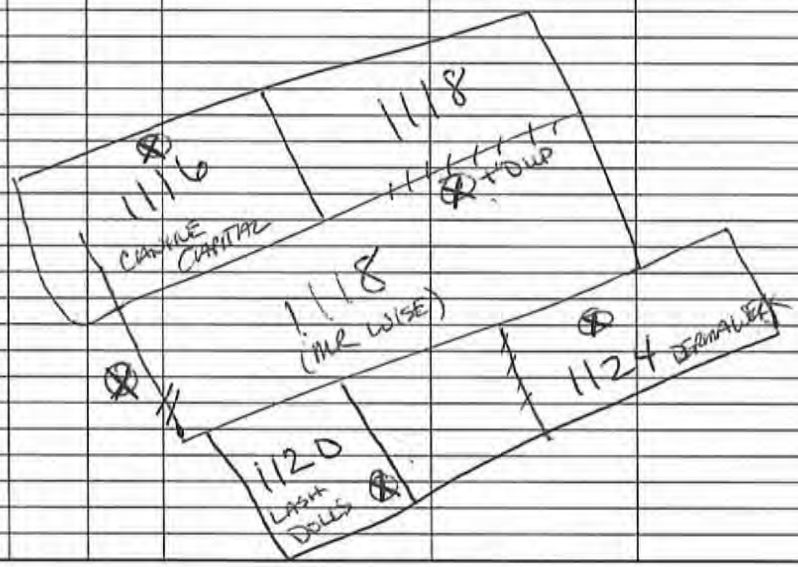
1118 - Along N/S wall partition in Eastern portion of bldg on table approx 5' from floor
* duplicate

AA - outside front door on bar stool, approx 5', just N of front door

1120 - Immediately Rt of entry door on end table approx 4' from floor

1124 - on shelf in middle of room next to business cards

Location Sketch:



Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	MR WISE 1118	Start Weather:	Partly Cloudy Wind W SW 7 MPH
		Start Outdoor Air Temp:	51° F
Project Name:	Helena Solvent Site	Start Atmospheric Pressure:	29.98
Sample Location:	Inside MR Wise-NE Bldg		
Date:	3/15/17	End Weather:	
Field Personnel:	A OSBORNE	End Outdoor Air Temp:	
Recorded by:	A OSBORNE	End Atmospheric Pressure:	

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
3/15/17	0905	3/15/17	1654	1118-IA-031517	0944	FC0091	—	-26.5	-4	≈70	≈76

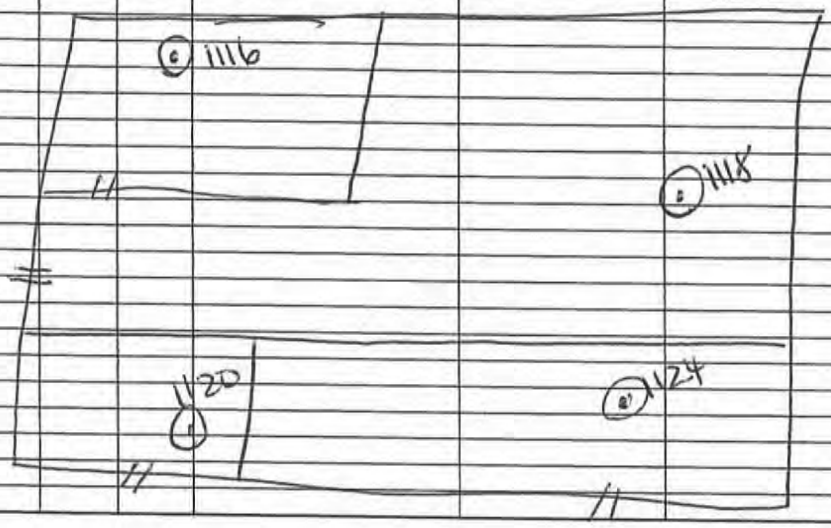
Comments:

Indoor Air Sampling Field Data Sheet

Description of Sample Locations (s):

1118 outside - N of front door on Stool
1118 - MR WISE top of table
1116 - Canine - on stool next to printer in front office
1120 - Near entry door on table
1124 - On desk by snake tank next to Business cards

Location Sketch:



Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	1120 Lush Dolls	Start Weather:	Ptly Cloudy
		Start Outdoor Air Temp:	51°F
Project Name:	HSS	Start Atmospheric Pressure:	29.98
Sample Location:	on table near front door		
Date:	3/15/17	End Weather:	Sunny
Field Personnel:	Amo	End Outdoor Air Temp:	64
Recorded by:	Amo	End Atmospheric Pressure:	29.8

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
3/15/17	0925	3/15/17	1738	1120-IA-031517	1687	FC0752		-27.5	-2	65	69

Comments:

Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	1124 DermaWerx	Start Weather:	Partly Cloudy w/ Wind WSW @ 7mph
		Start Outdoor Air Temp:	51°F
Project Name:	HSS	Start Atmospheric Pressure:	29.98
Sample Location:	Derma-Business Cards		
Date:	3/15/17	End Weather:	Sunny
Field Personnel:		End Outdoor Air Temp:	64
Recorded by:		End Atmospheric Pressure:	29.8

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp °F	Post-Sample Indoor Air Temp
3/15/17	0946	3/15/17	1731	1124-IA-031517	1737	FC1092	—	-27.5	-3.5	72	72

Comments:

Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	1116 Canine Capitol	Start Weather:	Ptly Cloudy wind WSW 7 mph
		Start Outdoor Air Temp:	51°F
Project Name:	HSD	Start Atmospheric Pressure:	29.98
Sample Location:	Pro stroll next to printer		
Date:	3/15/17	End Weather:	Sunny, Windy 10 mph
Field Personnel:	AMO	End Outdoor Air Temp:	64
Recorded by:	AMO	End Atmospheric Pressure:	29.8

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
3/15/17	0920	3/15/17	1723	1116-IA-031517	2698	0286	—	-28.5	-5	64	65

Comments:

Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	Outside air - Mr Wise Front door	Start Weather:	Ptly Cloudy wind WSW 7 mph
		Start Outdoor Air Temp:	51°F
Project Name:	HSS	Start Atmospheric Pressure:	29.98
Sample Location:	Outside front door		
Date:	3/15/17	End Weather:	Sunny wind 10 mph W
Field Personnel:	Amw	End Outdoor Air Temp:	64
Recorded by:	Amo	End Atmospheric Pressure:	29.8

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
3/15/17	0915	3/15/17	1700	AA-031517	567	FC0052	—	-27.5	-3.5	51	64

Comments:

Duplicate

Indoor Air Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	MR WISE (dup) 1118	Start Weather:	Ptly Cloudy Wind WSW 7 mph
		Start Outdoor Air Temp:	51°F
Project Name:	HSS	Start Atmospheric Pressure:	29.98
Sample Location:	Mr Wise Inside - NE Bldg		
Date:	3/15/17	End Weather:	
Field Personnel:	A Osborne	End Outdoor Air Temp:	
Recorded by:	Amo	End Atmospheric Pressure:	

Canister and Sample Information

Start Date	Start Time	End Date	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum	Pre-Sample Indoor Air Temp	Post-Sample Indoor Air Temp
3/15/17	0905	3/15/17	1654	1118-IAD-031517	2111	FC0091	-	-26.5	-4	≈70	≈76

Comments:

Field Sheets

Soil Vapor Sampling

HydroSolutions

Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: VP2 - 110216

Project Name: Helena Solvent Site VI sampling
Sample location: MR WISE VAPOR POINT 2
Date: 11/2/16
Field Personnel: AMO RS
Recorded by: Amanda Osborne

PID (made/model/serial #): Photovac 2020
Helium Detector (model/serial #): Dielectric MGD 2002 #10680
Weather: Clear, calm
Air Temp: 52°F
Atmospheric Pressure: 30.2" Hg

Slab Data

Surface/slab Type: Concrete / Asphalt
Surface/slab Thickness (inches):
Slab/subsurface substrate comments: driveway, E of MR WISE RAMP
Length of probe (feet): Vapor Point + 4' Teflon tubing

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft = 420mL

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID (ppm)	Helium Beneath Shroud during sample collection (%) (note min and max)		
11/2/16	1408	420	62.3%		Ø	46.5	1428	93.1%	-22 in Hg
11/2/16	1410	420	71.4%		Ø		1439	74.8%	-18 in Hg
							1500	81.6%	-10.5 in Hg
			Leak Check good						

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Sample ID	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/2/16	1413	1513	2613	F00078		-27 in Hg	-5" Hg

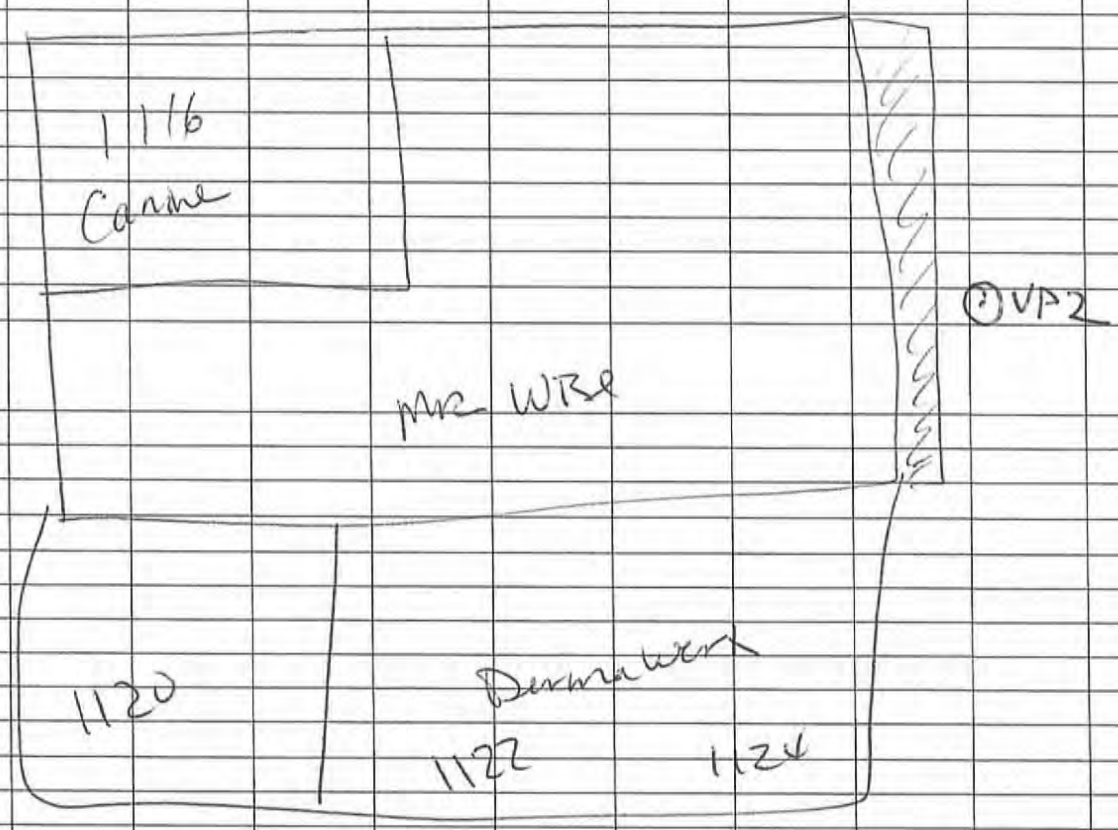
Comments:

Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling	Sample Location/ ID: VP2-110216
Date: 11/02/16	Vapor Point 2

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: VP4 - 110216

Project Name: Helena Solvent Site VI sampling
Sample location: Vapor Point 4 - Mr Wise
Date: 11/2/16
Field Personnel: A Osborne, RME Swingen
Recorded by: R A Osborne

PID (made/model/serial #): PhotoVac 2020
Helium Detector (model/serial #): Dielectric MGD 2000
Weather: clear, calm
Air Temp: 42°F out 75 in
Atmospheric Pressure: 30.3" Hg - 30.2" Hg

Slab Data

Surface/slab Type: Concrete finished
Surface/slab Thickness (inches): 4-6"
Slab/subsurface substrate comments: Inside Mr Wise
Length of probe (feet): 4 ft Teflon tubing + 10' well (1")

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft =
7 x 60cc = 420mL

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID	Helium Beneath Shroud during sample collection (%) (note min and max)		
11/2/16	1109	420	72.6	78.9	0	332-276			
							1138	95.8%	-21.5 psig
							1204	96.8%	-12 psig
			leak check good						

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	~~Sample ID~~ time	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum			
11/2/16	1123	1225	1014	FC0249		~~24.5~~ -26psi	-4.5 psi ~~95.8% -21.5psig~~			

Comments:

Sampling @ VAPOR POINT #4 WITH SEALED WELL FITTING CONNECTED TO TEFLON TUBING

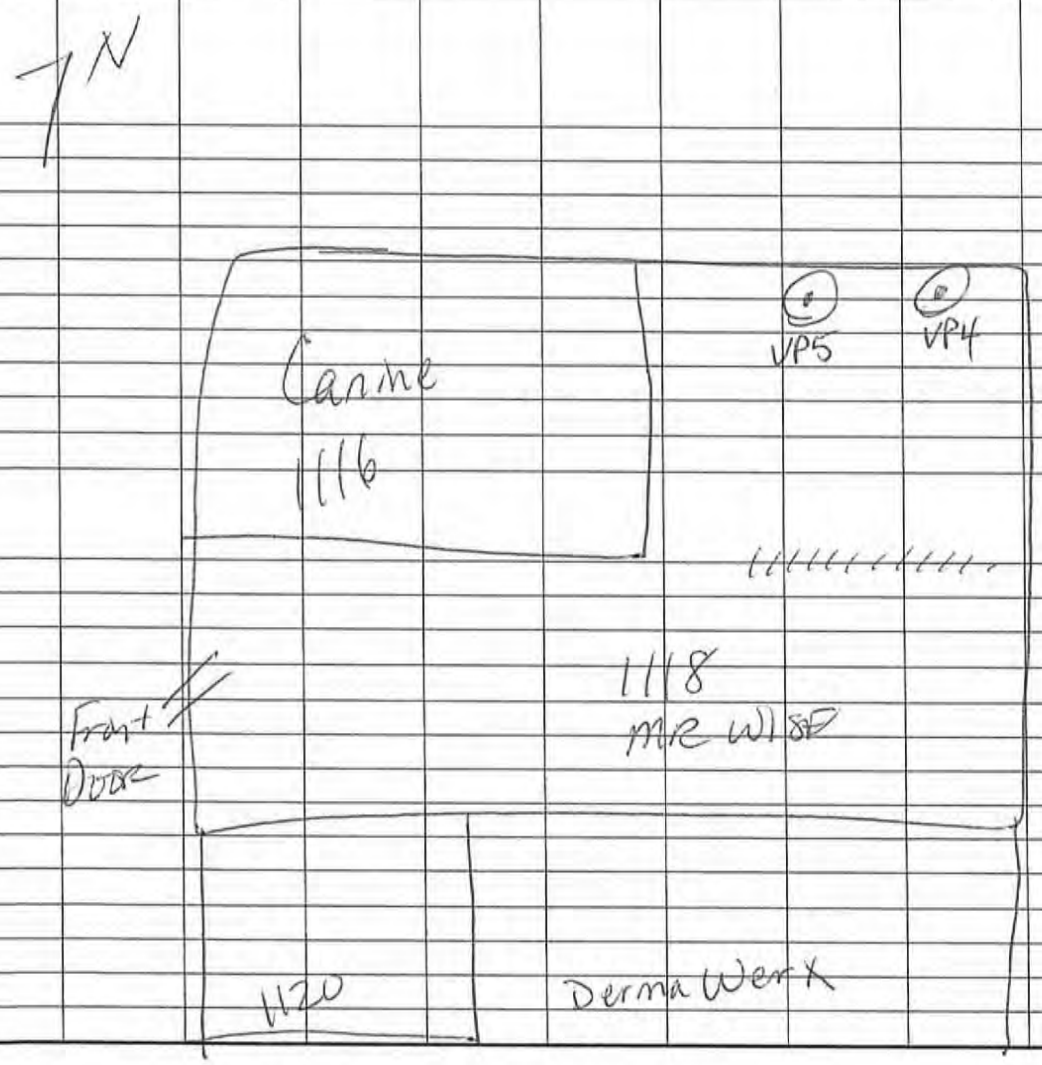
Four - 0 · six underground drilling outside on other side of this fence to install vapor pt for pilot test - approx 5' from VP4

Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling	Sample Location/ ID: MR WISE VAPOR PT 4
Date: 11/2/16	VP4-110216

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: VP5-110216

Project Name: Helena Solvent Site VI sampling
Sample location: Vapor Point 5 - Mr Wise
Date: 11/2/16
Field Personnel: Rye Swingen, Amanda Osborne
Recorded by: Amanda Osborne

PID (made/model/serial #): Photolite 2020
Helium Detector (model/serial #): Dielectric MGD 2002 #10680
Weather: 41°F (out)
Air Temp: 75°F (in) clear, calm
Atmospheric Pressure: 30.3" Hg

Slab Data

Surface/slab Type: Finished Concrete floor
Surface/slab Thickness (inches): 4-6"
Slab/subsurface substrate comments: Inside Building
Length of probe (feet): 10' deep Vapor point - 1", + 4' Teflon tubing

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft = 6x60 cc = 360 mL + 100 mL = 460

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID (ppm)	Helium Beneath Shroud during sample collection (%) (note min and max)				
11/2/16	0900	420	62.4	62.9	0	153	0916	83.6%	- 84.6%,	-25 ~~Hg~~ psi	
11/2/16	0904	420	64.2	68.1	0	153	0923	86.8%	- 86.9%	-24 ~~Hg~~ psi	
							0938	71.4%		21 ~~Hg~~ psi	
			Leak Check Good				1001	79.9%	-15 ~~Hg~~	psi	
							1029	25.1%	-9" psi		

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Sample ID	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/2/16	0907	VP5-110216	2454	FC0215		-25	-7
	1039						-7

Comments:

Sampling @ the Vapor Point #5 with sealed well fitting connected to Teflon Tubing

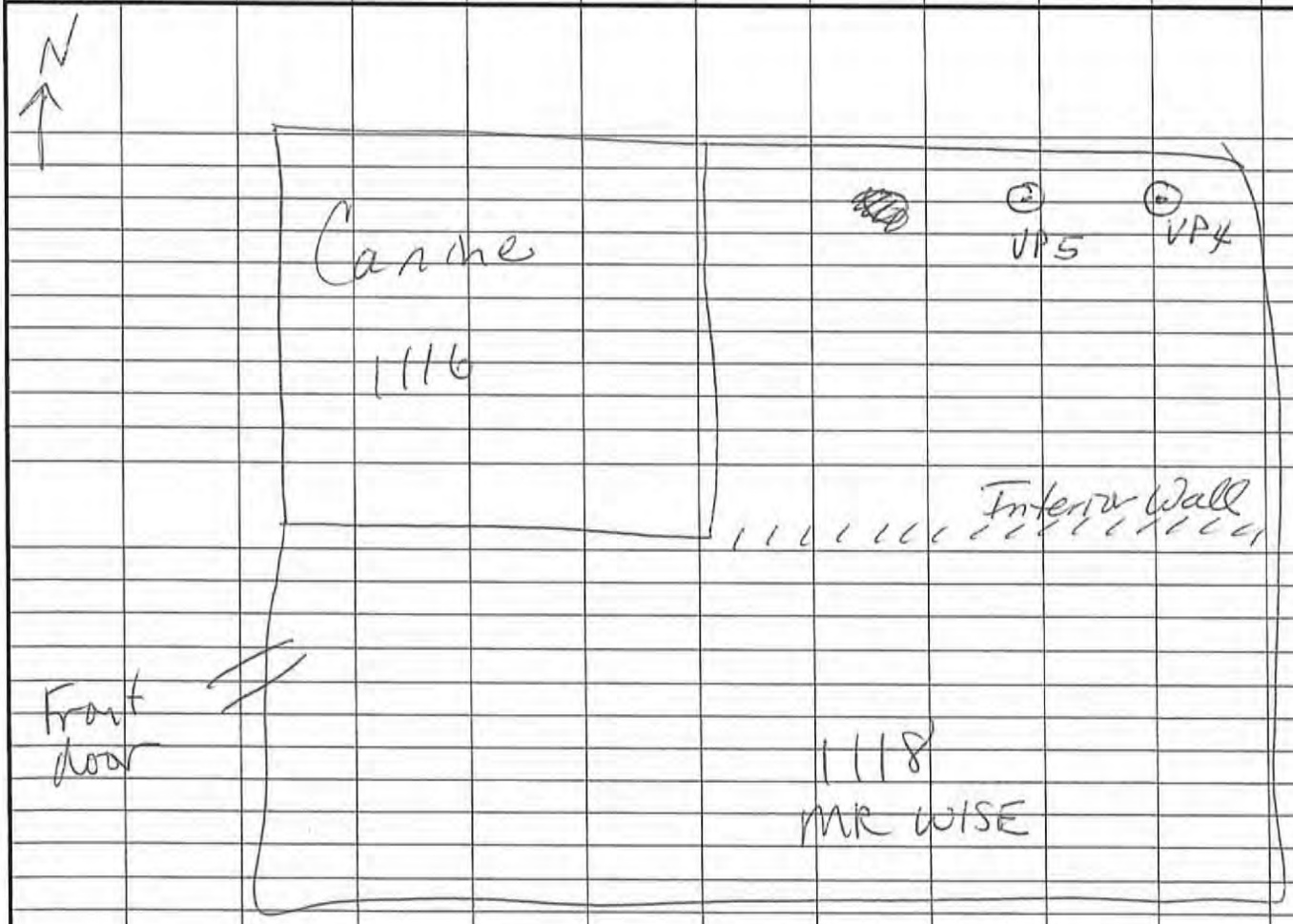
* Ran this test longer than 1 hour, due to 7 10 psi vacuum pressure left in canister

Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling		Sample Location/ ID:	Mr. Wise Vapor Point #5
Date: 11/2/16			VP5-110216

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: Z6-SS-110116

Project Name: Helena Solvent Site VI sampling
Sample location: Dermaworx Z6
Date: 11/1/16
Field Personnel: A OSBORNE + B SVINGEN
Recorded by: Amanda Osborne

PID (made/model/serial #): Photovac 2020
Helium Detector (model/serial #): Dielectric MGD-2002 #10680
Weather: clear/sunny
Air Temp: 53°F
Atmospheric Pressure: 29.9" Hg

Slab Data

Surface/slab Type: Concrete w/ pergo finished floor
Surface/slab Thickness (inches): estimate 4-6"
Slab/subsurface substrate comments: vapor extraction pt V6 for mitigation system
Length of probe (feet): 4' (purged extra)

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft =
3 x 60 mL = 180 + 60 mL = 240 mL

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID ppm	Helium Beneath Shroud during sample collection (%) (note min and max)		
11/01/16	1407	240	92%	94%	0.0	0.0	1422	40%	-24 ~~"Hg~~ psi
							1430	59%	-22 ~~"Hg~~ psi
							1513	41%	-7 ~~"Hg~~ psi
				leak checks	good				

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Time ~~Sample ID~~	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/01/16	1417	1517	1027	FC0262		24.5	-6

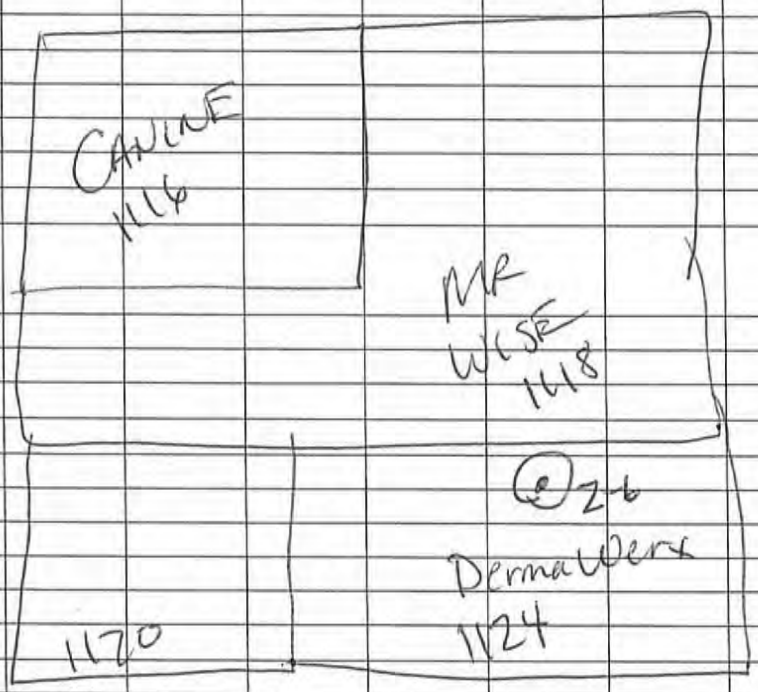
Comments:

Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling	Sample Location/ ID: Dermawerx Z-6
Date: Nov 1, 2016	

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: Z4-SS-110116

Project Name: Helena Solvent Site VI sampling
Sample location: Mr Wise Z4
Date: 11/1/16
Field Personnel: Amanda Osborne, Rye Swingen
Recorded by: Amanda Osborne

PID (made/model/serial #): Photovac 2020
Helium Detector (model/serial #): Dielectric MGD-2002 #10680
Weather: Clear/sunny
Air Temp: 50°F
Atmospheric Pressure: 29.9" Hg

Slab Data

Surface/slab Type: Concrete + linoleum + carpet
Surface/slab Thickness (inches): 4"-6" estimate
Slab/subsurface substrate comments: Z-4 vapor extraction point for mitigation system
Length of probe (feet): 4'

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft =
180mL + 60mL = 240mL (extra)

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID ppm	Helium Beneath Shroud during sample collection (%) (note min and max)				
11/1/16	1213	~~180~~ 240	99.9%	99.9%	2700		1235	82.1			
	1217	240			1900	37.8	1242	95.9			
							1255	96.8	-19.5 ~~"Hg~~ psi		
							1310	96.7	-13 ~~"Hg~~ psi		
			Leak check good				1321	96.6	-8 ~~"Hg~~ psi		

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Sample ID	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/1/16	1234	Z4-SS-110116	1019	FC0224	-	-26.5	-4
	1334						

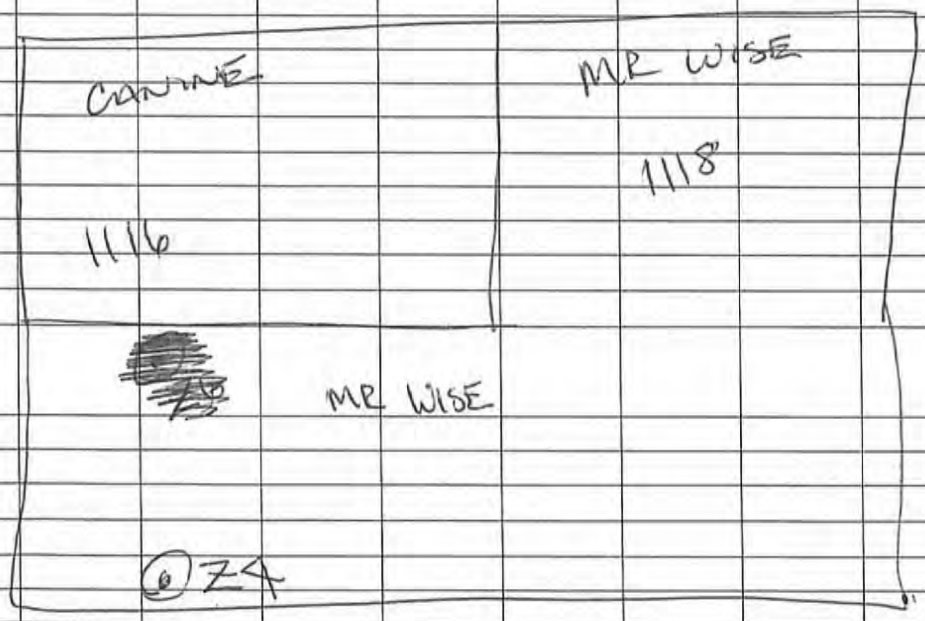
Comments:

Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling	Sample Location/ ID: Mr Wise Z4
Date: Nov 1, 2014	Z4-SS-110116

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID: Z3-SS-110116

Project Name: Helena Solvent Site VI sampling
Sample location: Mr Wise Z-3
Date: Nov 1, 2016
Field Personnel: Rye, Amanda
Recorded by: A OSBORNE

PID (made/model/serial #): Photovac 2020 Pro
Helium Detector (model/serial #): Dielectric MGD-2002 #10680
Weather: Clear
Air Temp: 42°F outside, 75°F inside
Atmospheric Pressure: 30" Hg

Slab Data

Surface/slab Type: Concrete + linoleum tile
Surface/slab Thickness (inches):
Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft = 4ft = 40mL x 3 = 120mL + 60mL = 180
Slab/subsurface substrate comments: @ Z-3 Vapor Extraction Pt - Gw mitigation system
Length of probe (feet): 4'

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID ppm	Helium Beneath Shroud during sample collection (%) (note min and max)
11/1/16	1032	180	100	100	1925 ppm	368	See comments
	1035	180	100	100	2600 ppm	368	
	1038	180	100	100	1926 ppm	368	
					Leak Check OK		

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Sample ID	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/1/16	1047	Z3-SS-110116	2610	FC0081		-27	
	1147	↓	↓	↓		-4	

Comments:
4ft teflon tubing attached to vapor extraction pt in floor of mr wise lab - supplied spacer nut / ferrule assembly not tight ??
1100 He = 100%, vacuum = -23 ~~in Hg~~ psi
1115 He = 99.7%, vacuum = -16 ~~in Hg~~ psi 44°F outside
1130 He = 99.5%, vacuum = -10 ~~in Hg~~ psi

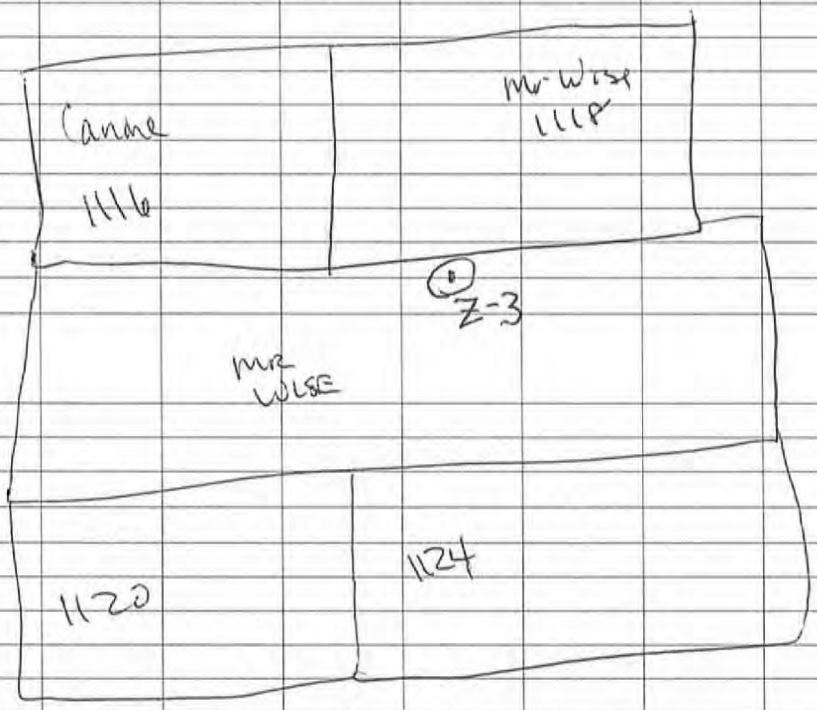
Sub Slab Air Sampling Field Form

Project Name: Helena Solvent Site VI sampling	Sample Location/ ID: MR WISE Z-3
Date: 11/01/16	Z3-SS-110116

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch

See Vapor mitigation sys vapor extraction pt Z-3



Sub Slab Air Sampling Field Form

Montana Department of Environmental Quality
Remediation Division, Site Response Section

Sample ID:	VPG - 11/02/16
Project Name:	Helena Solvent Site VI sampling
Sample location:	MR 1015e, VPG
Date:	
Field Personnel:	
Recorded by:	
PID (made/model/serial #):	Photovac 2020
Helium Detector (model/serial #):	Dielectric MGD 3002
Weather:	clear, sunny #10680
Air Temp:	
Atmospheric Pressure:	

Slab Data

Surface/slab Type:
Surface/slab Thickness (inches):
Slab/subsurface substrate comments:
Length of probe (feet): 3' Teflon tube + well length = 4'

Volume to purge (ml): 3 tubing volumes x 10 ml/ft x #ft =
12' x 10 mL/ft x 3 = 360 =

Helium Tracer Leak Test Field Data

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID ppm	Helium Beneath Shroud during sample collection (%) (note min and max)
11/2/16	1310	420	83.0%	89.4	8700 ppm	23.2-34.2	
	1325	420	95%	~~2.3%~~	2.3%		
	1332	420*	77.6%	43%			
	1338	420*	79.6		9.7%	FAILED LEAK CHECK	

Conversion: 1.0% = 100,000 ppm
At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Time	Sample ID	Cannister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
11/2/16			2613	FC0078			

Comments:
*3' teflon connector hose removed
FAILED LEAK CHECK

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	Mr Wise VP4-122816		
Project Name:	DEQ 08	PID (model/serial #):	PhotoVac 2020
Sample location:	Mr Wise	Helium Detector (model/serial #):	—
Date:	12/28/16	Weather:	30F, Windy, Clear
Field Personnel:	Amo	Air Temp:	30°F
Recorded by:	Amo	Atmospheric Pressure:	30.3" Hg

Slab Data

Surface/slab Type:	Concrete
Surface/slab Thickness (inches):	approx 4"
Slab/subsurface substrate comments:	finished indoor concrete floor
Depth of hole through the slab:	10' well 5' screen 1" D
Length of sampling train (feet):	3' teflon tubing
Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =	purged 420mL + PID pump 4/min

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe ~~(ppb)~~ ppm	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
12/28/16	1016	420mL + PID	inflated Shroud	-25" Hg				
	1035	inflated shroud		-20" Hg				
	1056	inflated shroud		-10" Hg				
	1108	inflated shroud		-6" Hg				

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
12/28/16	1012	1112	VP4-122816	2537	FC0119	Batch 13442	-26" Hg	-4.5" Hg

Comments:

no He meter used - fully inflated shroud maintained for duration of sample collection

Sub-Slab Soil Vapor Sampling Field Data Sheet

Project Name:	DEQ 08			Sample Location/ ID:	VP4-122816			
Date:	12/28/16							
Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.								
Location Sketch:								
	See VP5 field sheet							

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	VP5-122816		
Project Name:	Helena Solvent Site	PID (model/serial #):	PhotoVac 2020
Sample location:	MR WISE	Helium Detector (model/serial #):	—
Date:	12/28/16	Weather:	~~29~~ Windy, partly cloudy
Field Personnel:	A Osborne + RS	Air Temp:	29°F
Recorded by:	A Osborne	Atmospheric Pressure:	30.3" Hg

Slab Data

Surface/slab Type:	Concrete
Surface/slab Thickness (inches):	Approx 4"
Slab/subsurface substrate comments:	Finished concrete Floor
Depth of hole through the slab:	10'
Length of sampling train (feet):	10' well + 3' to floor tubing

Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft = 3' tubing = 30mL x 3 = 90mL + 1" well - 10' depth purge: 420 mL + PID pump 4 min

Helium Tracer Leak Test Field Data / **Sample Collection Data**

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb) ppm	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
12/28/16	0822	420mL	+ PID pump 4 min.			105-112		
	0838	-	inflated bag					
	0852		inflated bag		-14" Hg			
	0920		inflated bag		-9" Hg			

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
12/28/16	0829	0930	VP5-122816	1157	FC0023	Batch 13443	-25" Hg	-4" Hg
	~~0852~~							
	~~0920~~							

Comments:

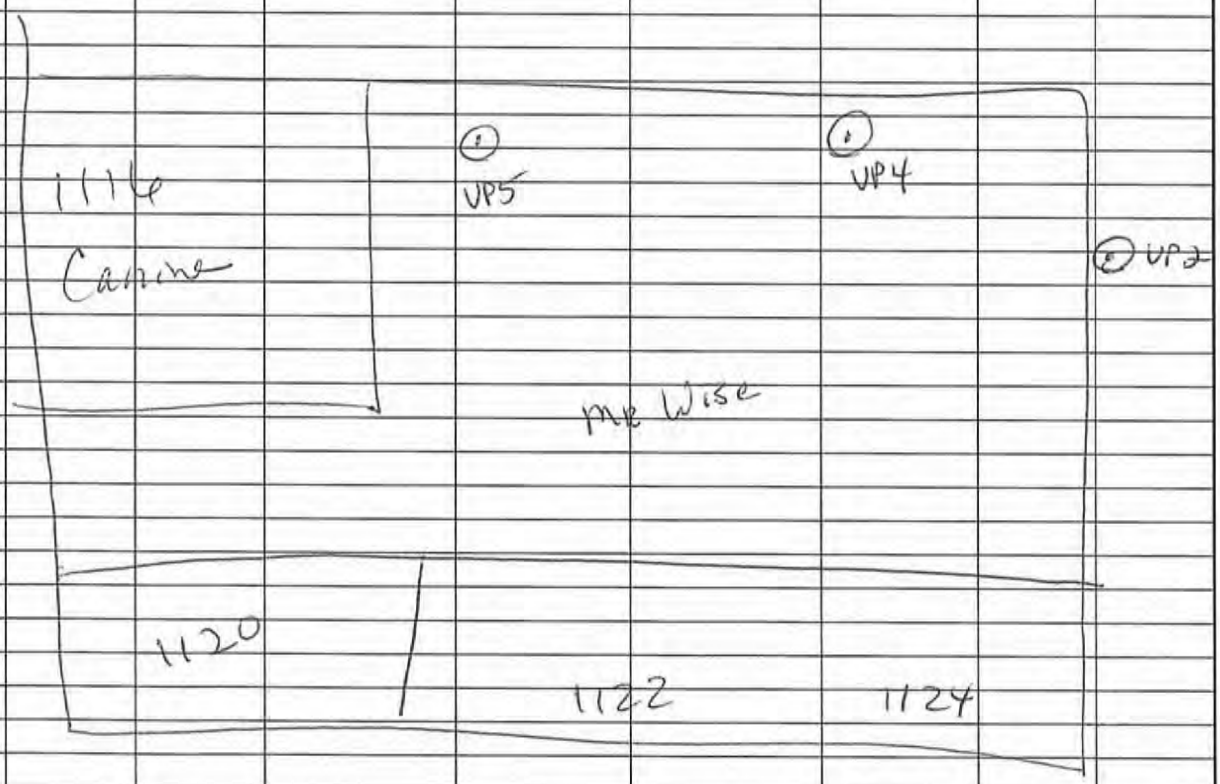
no He meter used - Inflated bag assumed ≈ 100% He in shroud

Sub-Slab Soil Vapor Sampling Field Data Sheet

Project Name: Helena Solvent Site OE80	Sample Location/ ID: VP5
Date: 12/28/16	

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch:



Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	VP2-122816		
Project Name:	Helena Solvent Site	PID (model/serial #):	PhotoVac 2020
Sample location:	VP-2	Helium Detector (model/serial #):	—
Date:	12/28/16	Weather:	Very Windy, Clear
Field Personnel:	Amo	Air Temp:	33°F
Recorded by:	Amo	Atmospheric Pressure:	30.3" Hg

Slab Data

Surface/slab Type:	asphalt / concrete
Surface/slab Thickness (inches):	6" (approx)
Slab/subsurface substrate comments:	recent french drain filled directly to EAST
Depth of hole through the slab:	10' well 1" D, 5' screen
Length of sampling train (feet):	3' teflon tubing
Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =	420mL + PID pump 5 min

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
12/28/16	1205	420 + PID pump	inflated	shroud				
	1240	inflated	shroud	15 psig				

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
12/28/16	1203	1304		2253	FC0224		-27" Hg	-4" Hg

Comments:

no He meter used - fully inflated shroud maintained for duration of sample collection

Sub-Slab Soil Vapor Sampling Field Data Sheet

Project Name: Helena Solvent Site				Sample Location/ ID: VP2-122816				
Date: 12/28/16								
Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.								
Location Sketch:								
See sketch on field sheet for VP5								

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	VP2-032214		
Project Name:	ASS	PID (model/serial #):	PhotoVac 2020/GIW E004
Sample location:	outside Mr Wize	Helium Detector (model/serial #):	N/A
Date:	3/22/17	Weather:	
Field Personnel:	Arno	Air Temp:	
Recorded by:	Arno	Atmospheric Pressure:	

Slab Data

Surface/slab Type:	Asphalt parking area/alley
Surface/slab Thickness (inches):	
Slab/subsurface substrate comments:	
Depth of hole through the slab:	
Length of sampling train (feet):	

Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft = 1545mL (1well)
15 x 100mL + PID purge until stabilization (5min)

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
	clear. check passed on permanent well - 2000						2026	
	He Shroud remained inflated + will be analyzed							
	for He in sample to verify absence of leaks.							

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	~~Vacuum Gauge #~~ PID	Initial Vacuum	Final Vacuum
3/22/17	1151	1252	VP2-032217	1308	FC1269	54.5-65.6	-27	-3.5
					Stab @	64.8		

Comments:

location is within 2' of trench used for SVE horizontal well installation

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	VP4-032217		
Project Name:	HSS	PID (model/serial #):	Photovac 2020 / 6FW0EOCF
Sample location:	Mr Wise, Vapor 144	Helium Detector (model/serial #):	NA
Date:	3/22/17	Weather:	Sunny + clear
Field Personnel:	Amo	Air Temp:	35°F out 68°F in
Recorded by:	Amo	Atmospheric Pressure:	29.9" Hg

Slab Data

Surface/slab Type:	concrete slab	Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =	1545 mL (1 well, 001)
Surface/slab Thickness (inches):	4"		
Slab/subsurface substrate comments:	finished (painted) indoor concrete floor	15 x 60 mL	+ PID
Depth of hole through the slab:	10 ft	until stabilization	
Length of sampling train (feet):	2.5 ft teflon		x 5 min

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
	Leak check good 11/2/16, permanent well/vapor sampling pt installed @ depth of 10'							

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	~~Vacuum Gauge #~~ PID	Initial Vacuum	Final Vacuum
3/22/17	1015	1115	VP4-032217	2854	FC1015	48 - 116	-26.5	-3.5
					Avg=	50.2 (stabilized)		

Comments:

?? well fitting attachment tight ?? may be slopping?

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	VP5-032217		
Project Name:	HSS	PID (model/serial #):	PhotoVac 2020 calibrated #GIWEC004 3/22/17
Sample location:	Mr Wise VP5	Helium Detector (model/serial #):	N/A
Date:	3/22/17	Weather:	35°F out, 67°F in
Field Personnel:	Amo	Air Temp:	mostly sunny
Recorded by:	Amo	Atmospheric Pressure:	29.91" Hg

Slab Data	Concrete		
Surface/slab Type:	finished concrete indoor flooring	Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =	1545 mL x 3
Surface/slab Thickness (inches):	4" (approx)		= 4635 mL (3 well volumes)
Slab/subsurface substrate comments:	painted concrete		15 x 60mL syringe + PID (5 min)
Depth of hole through the slab:	10"		until stabilization
Length of sampling train (feet):	2.5ft teflon tube		

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
	Leak check passed Nov 1, 2016, permanent VP well							

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information								
						PID		
Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	~~Vacuum Gauge #~~	Initial Vacuum	Final Vacuum
3/22/17	0821	0937	VP5-032217	2861	FC0280	8.8 - 9.1	-26	-6

Comments:

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	Z6-032117		
Project Name:	HSS	PID (model/serial #):	PhotoVac 2020
Sample location:	DermaWerx Z6	Helium Detector (model/serial #):	N/A
Date:	3/21/17	Weather:	
Field Personnel:	Amo	Air Temp:	41°F out 68°F in
Recorded by:	Amo	Atmospheric Pressure:	30.0" Hg

calibrated 3/21/17

Slab Data

Surface/slab Type:	concrete	Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =	
Surface/slab Thickness (inches):	4"		
Slab/subsurface substrate comments:	finished pergo-flooring	420mL purged w/ syringe + PID run for	
Depth of hole through the slab:	4", 3/4" pipe		
Length of sampling train (feet):	3'		

Helium Tracer Leak Test Field Data / **Sample Collection Data**

Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
03/21/17								
	Leak check ok on 10/28/16 - permanent well, He used for leak detection in samples.							

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum	Final Vacuum
3/21/17	1341	1443	Z6-032117	1781	FC0249	–	-24.5	-4.5

Comments:

Sampled @ Z-6 extraction pt @ DermaWerx SLE + Indoor mit sys off, difficulty w/ access point + called Luke to help loosen. Unsure of integrity of seal?

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	Z4-032117 + duplicate (Z4-032117)		
Project Name:	HSS	PID (model/serial #):	PhotoVac 2020
Sample location:	inr DUSE (Z4)	Helium Detector (model/serial #):	N/A
Date:	3/21/17	Weather:	38°F out 67°F in
Field Personnel:	AMO	Air Temp:	Cloudy
Recorded by:	AMO	Atmospheric Pressure:	30.3" Hg

Slab Data

Surface/slab Type:	Concrete		Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft =
Surface/slab Thickness (inches):	4"		
Slab/subsurface substrate comments:	Carpet finishing		420 mL purged + PID Pump for 8 min
Depth of hole through the slab:	4"		
Length of sampling train (feet):	3 ft		

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
	leak check passed on permanent well on 10/28/16							

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	~~Vacuum Gauge #~~ PID	Initial Vacuum	Final Vacuum
3/21/17	1123	1228	Z4-032117	2947	FC0163	0.0-1.3	-26.5	6.5
3/21/17	1123	1228	Z4D-032117	2914	FC0163	↓	-26.5	6.5

Comments:

Sampled @ extraction pt. for indoor air mitigation system. SVE & indoor mitigation system turned off.

Sub-Slab Soil Vapor Sampling Field Data Sheet

Prepared by the Montana Department of Environmental Quality

Site ID:	Z3-032117		
Project Name:	HSS	PID (model/serial #):	PhotoVac 7020
Sample location:	MR WISE (Z3)	Helium Detector (model/serial #):	— N/A -
Date:	3/21/17	Weather:	Cloudy
Field Personnel:	A OSBORNE	Air Temp:	38°F out, 66°F in
Recorded by:	A OSBORNE	Atmospheric Pressure:	30.2" Hg

Slab Data

Surface/slab Type:	Concrete w/ finished linoleum	Volume to purge (ml): 3 (tubing volumes) x 10 ml/ft x #ft = 3' x 10mL/' =
Surface/slab Thickness (inches):	4"	
Slab/subsurface substrate comments:	finished indoor flooring	30mL x 3 = 90mL
Depth of hole through the slab:	Mitigation ext. pt, 4", 3/4" W	7 x 60mL = 420mL purged +
Length of sampling train (feet):	3' teflon tubing	PID pump for 5 min

Helium Tracer Leak Test Field Data							Sample Collection Data	
Date	Time	Cumulative volume purged (ml)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max	Helium in Probe (ppm or %)	PID reading in probe (ppb)	Helium Beneath Shroud (%) min	Helium Beneath Shroud (%) max
Leak check passed 10/28/16, permanent well								

Conversion: 1.0% = 100,000 ppm

At 20% He, there should be no more than 2 % (200,000 ppm) He in sample train

Canister Information

Date	Start Time	End Time	Sample ID	Canister ID	Flow Controller #	~~Vacuum Gauge #~~ PID	Initial Vacuum	Final Vacuum
3/21/17	1012	1112	Z3-032117	2216	FC0887	6.0-8.0	-27"Hg	-6"Hg

Comments:

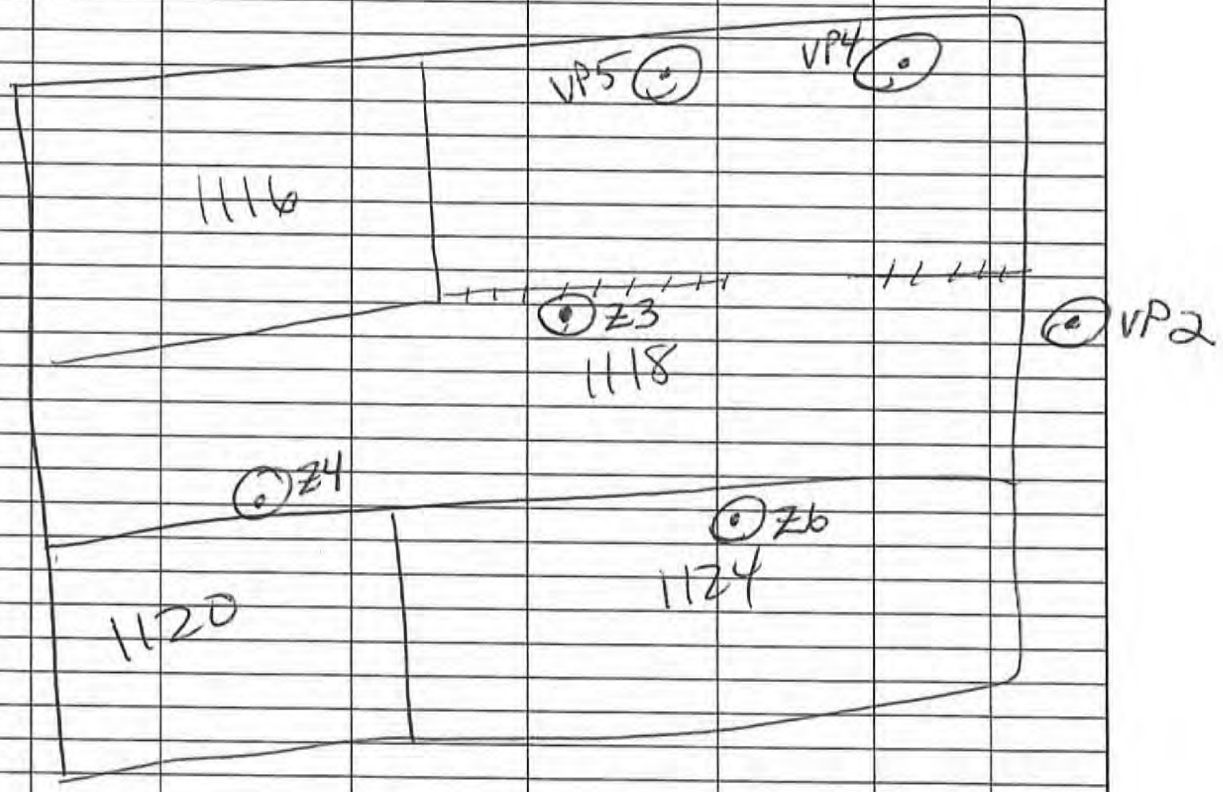
Sampled @ Z3 extraction point for indoor air mitigation sys
Indoor air mitigation sys + SUE system off.

Sub-Slab Soil Vapor Sampling Field Data Sheet

Project Name:				Sample Location/ ID: [redacted]				
Date:								

Location Description: Include floor type/construction, location of probe, fuel sources, sumps, stored chemicals, drains, etc.

Location Sketch:



Field Sheets

SVE Performance Monitoring

HydroSolutions

HydroSolutions Inc.
SVE System Field Monitoring Sheet

27-Jan-17

HydroSolutions

JOB DATA

Job Number: DEQ TO8 Subtask 5C
Job Name: Helena Solvent Site
Comments:

FIELD DATA

Date/Time	Inlet Vacuum (VG-1) Inches WC	Outlet Pressure (PG-1) Inches WC	Flow (FM-1) CFM	Temperature (TP-1) °F	Carbon Pressure (PG-2) Inches WC	Exhaust PID (ppmv) S-1	S-2	S-3	Tank Drain Y/N	Sample Y/N	
2/2/17 1435	16	36			19	32.6	0	0		Y	
2/6/17 1101	~~15~~ 20	32	~~3360~~	103	16.5	56.8	0.0	0.0	N	N	
2/13/17 1500	23	33		116	17.5	55.1	2.0	1.6	No	No	
2/15/17 1450							1.2	1.2			
2/15/17 1502	23	~~26~~ 33		120	17.5	56.6	0.0	0.9			
1510	Shut down						↓				
1615	Back on						Temp 113				
1620	23	32	150	113	17	59.7	0	0	N	N	
2/21/17 1030	22	32	150	118	17	57-53.2	0	0.1	N	Y	tedlar @ S-1
2/28/17 1415	24	32	150	112	17	49.9	0.7	0.7	N 1120	N	
3/7/17 1045	24	32	150	120	17	47.1	30.3	0.9	N	Y	Tedlar @ S1
3/8/17 1445	24	32	150	120	17	46.2	34.5	0.4	N	N	
3/8/17 1447	System	off	to change #1 GAC								
1500	System	on					0.0	0.0			
1515	1.35	150			17						

HydroSolutions Inc.
SVE System Field Monitoring Sheet

27-Jan-17

HydroSolutions

JOB DATA

Job Number: DEQ TO8 Subtask 5C
Job Name: Helena Solvent Site
Comments:

FIELD DATA

Date/Time	Inlet Vacuum (VG-1) Inches WC	Outlet Pressure (PG-1) Inches WC	Flow (FM-1) CFM	Temperature (TP-1) °F	Carbon Pressure (PG-2) Inches WC	Exhaust PID (ppmv) S-1	S-2	S-3	Tank Drain Y/N	Sample Y/N	
3/13/17 1300	26	30	150	127	16	41.5	Ø	Ø	N	N	
3/20/17 1430	26	30	150	123	16.5	22.3	Ø	Ø	N	Y	Tedlar
4/3/17 1430	27	30	150	128	16	3800-4100 [illegible]	Ø	Ø	N	Y	Tedlar x2
4/4/17 1110	27	30	150	124	16	34-36	0.7	4.7		N	
4/6/17	—	—	—	—	—	27.5-28.1	Ø	0.3	N	N	checked NaH_2i
4/12/17	27	30	150	130	16	34.3	0.8	0.0	N	N	
4/18/17 1330	28	29	150	134	16	44.4	9.3	2.4	N	No	
4/19/17 1000	28	30	150	130	16	43	11	2.3	N	N	- Bleed
4/21/17 1115	-24	32	150	112	17	32.0	16.5	0.6			w/Bleed
1130	-28	30	150	94	16	42.5	16.5	0.4			Bleed off

HydroSolutions Inc.
SVE System Field Monitoring Sheet

27-Jan-17

HydroSolutions

JOB DATA

Job Number: **DEQ TO8 Subtask 5C**
Job Name: **Helena Solvent Site**
Comments:

FIELD DATA

Date/Time	Inlet Vacuum (VG-1) Inches WC	Outlet Pressure (PG-1) Inches WC	Flow (FM-1) CFM	Temperature (TP-1) °F	Carbon Pressure (PG-2) Inches WC	Exhaust PID (ppmv) S-1	S-2	S-3	Tank Drain Y/N	Sample Y/N
4/25/16	28	29	150	130	16	40.0	31.0	1.2		
1130										
Shut Down Blower		11:42	Change GAC		Pot #2 into #1 spot #2 New GAC					
12:00	Back on 28	29	150	130	16	40.5	0.4	5.5	No H_2S in tank	N

Surface Water, Groundwater and Soil/Sediment Sampling Standard Operating Procedures

HydroSolutions Inc.
Billings, Montana, 59102
JULY 2004

A. Introduction

This Standard Operating Procedure (SOP) document details guidelines for surface, groundwater and soil/sediment sample collection. Data collected under these guidelines are intended to satisfy the requirements of field sampling associated with water quality and the protection of aquatic life and NPDES permits.

Sampling and testing methods discussed herein are accepted practices as referenced in the RCRA Groundwater Monitoring technical Enforcement Guidance Document (National Water Well Association, 1986); Test methods for Evaluating Solid Wastes-Physical/Chemical Methods (SW-846, 1986); Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020); and Standard Methods for the Examination of Water and Wastewater (17th Edition-1989).

Appropriate analytical parameters will be chosen prior to, and consistent with, governing permit conditions and the desired objectives of the specific sampling event.

B. Surface and Groundwater Sample Collection

B.1 Preparation and Mobilization

Equipment necessary to complete surface and groundwater sampling for organic and inorganic constituents is presented in Table 1.

B.2 Measurement of Static Groundwater Elevations

An electronic water level measurement probe will be utilized to obtain the depth to static groundwater level. This information will aid in establishing the aerial extent and flow direction of the groundwater.

Depth to water measurements should be taken in all monitoring wells to determine static groundwater elevations prior to sampling. Groundwater elevation data are necessary to establish both horizontal and vertical groundwater flow gradients in the aquifer. The electronic measurement probe (and cable) or measuring tape will be decontaminated prior to use at each well.

Depth to groundwater is determined by the interface probe making contact with the water surface. All measurements should be made to the nearest 1/100th of a foot and taken from the established point of reference on the well opening.

A record of previous depth to water measurements of each well should be checked to ensure the current measurement is reasonable. If not, a second measurement should be made to verify deviations from past sampling events. Depth to water measurements should be recorded in a weatherproof field notebook with other field parameter data. The water interface probe and utilized cable length should be washed with Liquinox[7] and thoroughly rinsed with distilled water after each measurement to prevent cross-contamination between wells. Solvents should not be used to clean the interface probe.

B.3 Well Evacuation

The goal of the groundwater sampling is collection of water samples from monitoring wells which are representative of groundwater contained within the aquifer. Standing water contained within the well casing and gravel pack undergoes physio-chemical changes which affect the validity of the sample. Stagnant casing water needs to be removed prior to sample collection.

Two accepted techniques are available to ensure that the groundwater sample collected represents formation waste and not stagnant casing water. These techniques include:

X Evacuate a prescribed number of well casing volumes; or

X Evacuate water from wells until field parameters (that is, pH, specific conductance and temperature) stabilize. At least 1 casing volume will be purged prior to measurement of field parameters.

Casing volume removal is described in Section B.3.a, and field parameter stabilization in Section B.3.b. The methods implemented for monitoring well evacuation sites are described in Sections B.3.c.

B.3.a Well Casing Volume Removal: To assure a representative groundwater sample is obtained for chemical analysis, standing water in the well casing is removed prior to sampling. The volume of standing water contained inside the well casing is referred to as a well casing volume.

The number of gallons per well casing volume must be calculated for each well to determine the volume of water to be evacuated prior to sampling. The number of gallons per well casing volume depends upon the casing diameter, depth of well, and the depth to water. The following formula is used to determine the volume of each well casing.

$$\mathbf{CV = \pi r^2 h 7.48}$$

where: CV = Volume of well casing (in gallons)
π = a constant; 3.14
r = radius of well (in feet)
h = column of water (feet) (depth of well -depth to water)

The rate of removal and volume to be removed is dependent upon the depth to water, the ability of the aquifer to transmit water, and the rate of recovery of the well. Evacuation of the casing volume should be at a rate which prevents groundwater from cascading into the well casing. Cascading water should be avoided due to potential changes in dissolved oxygen concentration caused by turbulent inflow into the well casing and potential aeration.

If, during the purging process, groundwater drops below the bottom of the pump, water flowing into the well will be considered representative of formation water. A sample can be collected upon water level recovery to 80 percent of the pre-purged static water level.

B.3.b Field Parameter Stabilization: Field parameter stabilization is an indicator of fresh formation water and is an accepted method for establishing adequate well evacuation. Stabilization is achieved when three consecutive specific conductance and temperature values are within one percent of each other and the pH readings have stabilized to within 0.1 unit of each other following a purge of at least one casing volume of water. The values must be stabile for at least 5 minutes.

Specific conductance, temperature and pH should be monitored and recorded on individual dedicated field data sheets during each well evacuation to assure stabilization of these parameters. In most cases, a minimum of two well casing volumes of water must be removed prior to sufficient stabilization of field parameters. A field instruments should be checked for calibration between sampling sites. Each instrument will be decontaminated prior to sampling at each well.

B.3.c Well Evacuation; Monitoring Wells: Site monitoring wells are evacuated using a bailer, peristaltic pump or a one or two stage submersible pump using or vinyl tubing.

B.4 Sample Withdrawal

B.4.a Monitoring Wells: A new clean acrylic bailer should be lowered slowly, not dropped, into the well as unnecessary agitation or aeration may alter the chemistry of the sample. Only single strand stainless steel wire, nylon filament, or polypropylene line may be used to lower the bailer in to the well. New line should be used for each well, the first three bails evacuated should be discarded to ensure removal of possible residues from the bailer and bailer decontamination. Sample will be obtained from a point before any water treatment and as close to the well as possible.

B.4.b Surface Water: Surface water may be obtained with the use of a new clean acrylic bailer, discrete interval sampler, a clean stainless steel container and transferred to the sample container. If a limited amount of sample containers or sample readings are required, sampling with the sample container itself may be easiest. All sampling should be performed in a manner safe for the sampler under the direction of the health and safety plan. The use of waders and safety line may be employed to position the sampler in an area where a representative sample may be obtained.

B.5 Sample Containers and Preservation

Surface and groundwater samples must be transferred in the field from the sampling equipment to a container specifically prepared for that given parameter. Consult the laboratory for recommended containers, preservatives, and holding times. The appropriate bottles and preservatives will be obtained from the contracted analytical laboratory.

Sample containers shall be labeled in indelible ink with the following information: date and time (military) of sample collection, sample location, sampler=s initials, preservative, and project number. Water levels should be marked on sample bottles which are only partially filled to assure the lab that no leakage or tampering has occurred.

Preservatives required for specific parameters should be supplied by the contracted laboratory in individual, color coded, or separately marked containers for identification. Preservatives should be added to the sample following collection, and indicated on the sample container.

B.6 Equipment Decontamination

All field meter probes, cabling, and sampling equipment shall be decontaminated prior to each individual well sampling event. The equipment shall be decontaminated in the following steps

X Wash with phosphate-free detergent solution(Liquinox[7]) and distilled water;

X Rinsed with distilled water;

X Final rinse with distilled water;

X Store in clean aluminum foil or dust-free environment until next use.

Clean disposable gloves shall be worn during sampling collection and handling, and replaced between each individual sample collection.

B.7 Measurement of Field Parameter

Specific conductance, temperature, pH, or eH or other parameters should be measured prior to sample collection. Meters should be calibrated at the beginning of each sampling day prior to well evacuation or surface sampling and using standard solutions. In addition, meters shall be calibrated between each individual sampling event. Enter comments about calibration checks into field log books. Also note any calibration discrepancies.

Calibration of the pH meter should be consistent with the instruction manual provided. A minimum of two pH standards within the expected range of field readings must be used for calibration. Sample readings shall be recorded to the nearest tenth in standard units (s.u.)

A minium of two calibration standards within the expected range of field reading should be used to calibrate the specific conductance meter. The specific conductance meters should be checked between use at each well both in the morning and at the end of the day to ensure consistency in measurement. Specific conductance readings shall be recorded in two significant figures in umhos/cm.

The temperature of the groundwater shall be taken in degrees Celsius using a thermometer covering a range of temperatures reasonable for groundwater. Field measurements shall be recorded to 0.1 degree in Celsius.

Other field parameter measurement devices should be prepared in a manner consistent with manufacturers recommendations.

When possible, the use of a flow through cell should be incorporated into the sampling procedure for measurement of field parameters.

Field parameters should be recorded every 0.5 minutes until the readings stabilize following the purging of at least a well casing volume. The final stabilized reading can be recorded as sample values. Field parameter probes should be thoroughly decontaminated as described in Section B.6 between each measurement.

An individual surface and groundwater field sample data sheet will be completed for each sample. Field observations and test results noted on the sheet will include:

X Names of individuals conducting sampling

X Date and time of sampling

X Weather conditions (such as cloud conditions, wind direction and speed, and temperature);

X Well number, well depth and elevation references (vertical datum) information or surface sample location;

X Water temperature, pH, specific conductivity, color odor, turbidity and apparent precipitation;

X chain-of-custody number.

In addition, field conditions and equipment operations which affect sampling methods and sample quality should be noted on the field data sheet.

B.8 Field Filtration Protocol

Field filtration of groundwater samples is required to obtain dissolved metals values as opposed to total metal values. Filtering should be performed on-site to ensure more accurate results and alleviate the need to rush samples to the laboratory within one hour of collection.

Of the several field filtering units available, the preferred filter apparatus is a positive pressure Ain-line@ nitrocellulose membrane filter, with a 0.45 micron pore size. These filters attach directly to the peristaltic pump are disposable, and are used once before discarding, In line filters are easy to use, do not require cleaning, and reduce the potential for cross contamination.

To use, the pumping rate should be reduced to less than 100 ml/min. 100 ml of water should be passed through filter and discarded before samples are collected.

B.9 Quality Assurance and Quality Control

Per EPA guidelines, a Quality Assurance/Quality Control (QA/QC) program must be implemented for collection of field data. Recognized QA/QC samples include:

X **Duplicate Sample:** A second sample collected from a well or borehole with no decontamination performed between collection. One duplicate sample should be collected for every ten samples.

X **Equipment Blank:** Distilled water that is transported to the site, opened in the field, and poured over or through the decontaminated sample collection device, collected in a sample container, and returned to the laboratory. This serves as a check on the sampling device cleanliness. One equipment blank should be analyzed with each analytical batch or every 20 samples, whichever is greater.

X **Field Blank:** Distilled water that is transferred from one vessel to another at the sampling site and preserved with the appropriate reagents. This serves as a check on reagent and environmental contamination. One field blank should be analyzed with each analytical batch or every 20 samples, whichever is greater.

X **Trip Blank:** Distilled water that is transported to the sampling site and returned to the laboratory without being opened. This serves as a check on sample contamination originating from the sample transport, shipping, and from site conditions. One trip blank should be analyzed with each analytical batch or every 20 samples, whichever is less.

QA/QC samples shall be prepared in a similar manner to natural samples, including preservation, filtering and labeling. Laboratory analysis will include the same parameters as natural samples. All QA/QC samples shall be entered into the sample blank as Ablind samples@ with appropriate sample identification designed to prevent laboratory bias.

B.10 Chain-of-custody
Chain-of-custody procedures are used for tracing possession and handling of samples from time of collection through laboratory and final disposition. A chain-of-custody form, should document all necessary information to trace the sample from the point of location to its ultimate disposal.

Chain-of-custody sheets are shipped with the samples to the laboratory and signed whenever the samples are relinquished. If the form is unsigned by the sampler, the samples shall be rejected.

A sample packing sheet identifying each bottle and it analysis should be included in each shipment container. Samples should be appropriately packaged to prevent breakage, packed on ice, and shipped for delivery to the laboratory within 24 hours of sampling.

C. Soil and Sediment Sample Collection

This section describes the protocol for conducting soil and sediment sampling. The goal of the soil/sediment sampling events is collection of representative soil/sediment samples from active and background area. Standard operating procedures should be followed to help assure that:

X Representative samples are recovered;

X Samples are adequately and correctly identified according to location, material and properties, and

X Samples are protected from damage

C.1 Soil/Sediment Collection and Preservation
Equipment necessary to conduct soil and sediment sampling is listed in Table 2.

Representative portions of each sample will be collected for laboratory testing using clean gloves and a

decontaminated stainless steel spatula. The sample will be place into individual glass jars with sealable lids. Soil/sediments will be placed into sample jars in a manner which minimizes headspace. Jars shall be cleaned in the laboratory for collection of organic and inorganic samples.

Sample container labels shall be marked in indelible ink with the following information: date, time, (military), sample depth, sample location, analysis, sampler=s initials, and project number.

C.3 Equipment Decontamination

Decontamination of equipment will be conducted at the site. Al sampling equipment will be decontaminated between soil/sediment sample collection. All equipment will be decontaminated in the following steps:

X Wash with phosphate-free detergent solution(Liquinox[7]) and distilled water;

X Rinsed with distilled water;

X Final rinse with distilled water;

X Store in clan aluminum foil or dust-free environment until next use.

Clean disposable gloves shall be worn during sampling collection and handling, and replaced between each individual sample collection. Decontaminated equipment will be handled only with clean, disposable gloves, or their equivalent.

Table 1
Surface Water and Groundwater Sampling Equipment Checklist

	Submersible Pump and Tubing
	Peristaltic pump and Tubing
	Disposable Bailers
	Probes/meters, spare batteries
	Calibration Fluids pH - 4, 7, 10 Specific Conductance - 1000, 2000, 10,000 umhos/cm
	Groundwater Probe
	0.45 micron in-line filters
	Stainless Steel Bowl
	Decontamination Materials Liquinox[7], Distilled Water Brushes, bowls, paper towels
	Engineer=s measuring tapes
	Field Notebook
	5 gallon measuring bucket
	Disposable gloves
	PPE
	Cooler with ice
	Sample Containers
	Preservative
	Field Data Sheets and Chain-of-custody
	Field Map

Table 2
Equipment for Soil/Sediment Sampling

	Site Safety Plan
	Stainless Steel Spatula
	Decontamination Material Liquinox[7], Distilled Water, Brushes, Bowls, Paper Towels
	Engineer=s Measuring Tape
	Waterproof Notebook
	Disposable Gloves
	PPE
	Cooler with Ice
	Sample Containers
	Preservative
	Field Data Sheets and Chain-of-custody
	Camera and Film
	Shovel

Appendix F
Photographic Log

Performance monitoring of indoor air mitigation system. Inside Mister Wise Cleaners. 7/28/2016

Hand augering of SVE-1well north side of Hustad Center. 8/19/2016

Initial SVE system pilot test of SVE-1. North side of Hustad Center. 9/15/2016

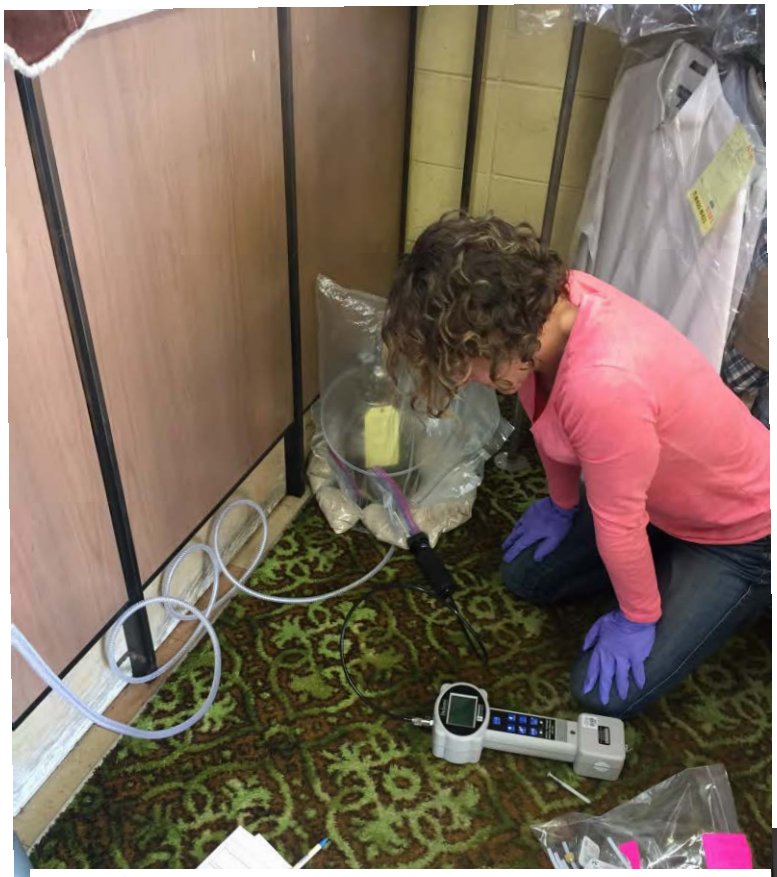
Cascade Drilling, DPT east side of building. Looking north. 9/21/2017

Cascade Drilling, DPT and MIHPT east side of building. Looking northeast. 9/21/2017

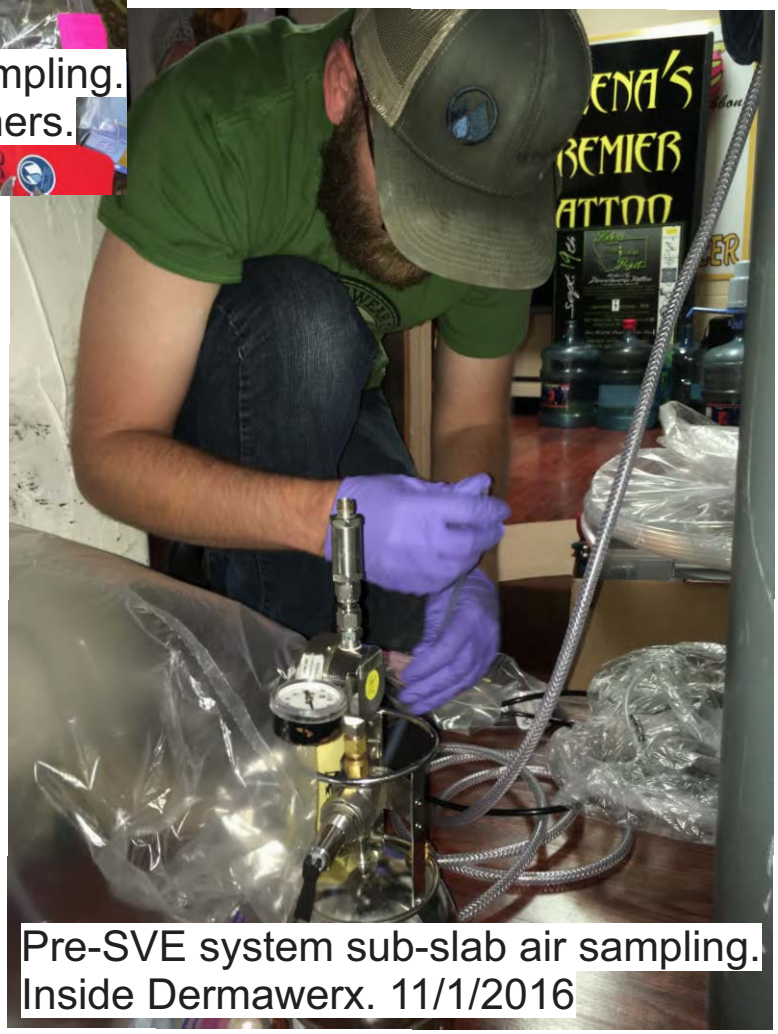
DPT investigation inside Mr. Wise Cleaners, northeast corner. 9/22/2017

Logging investigation cores. 9/23/2016

Vapor monitoring point completion inside Mr. Wise Cleaners. 9/23/2016



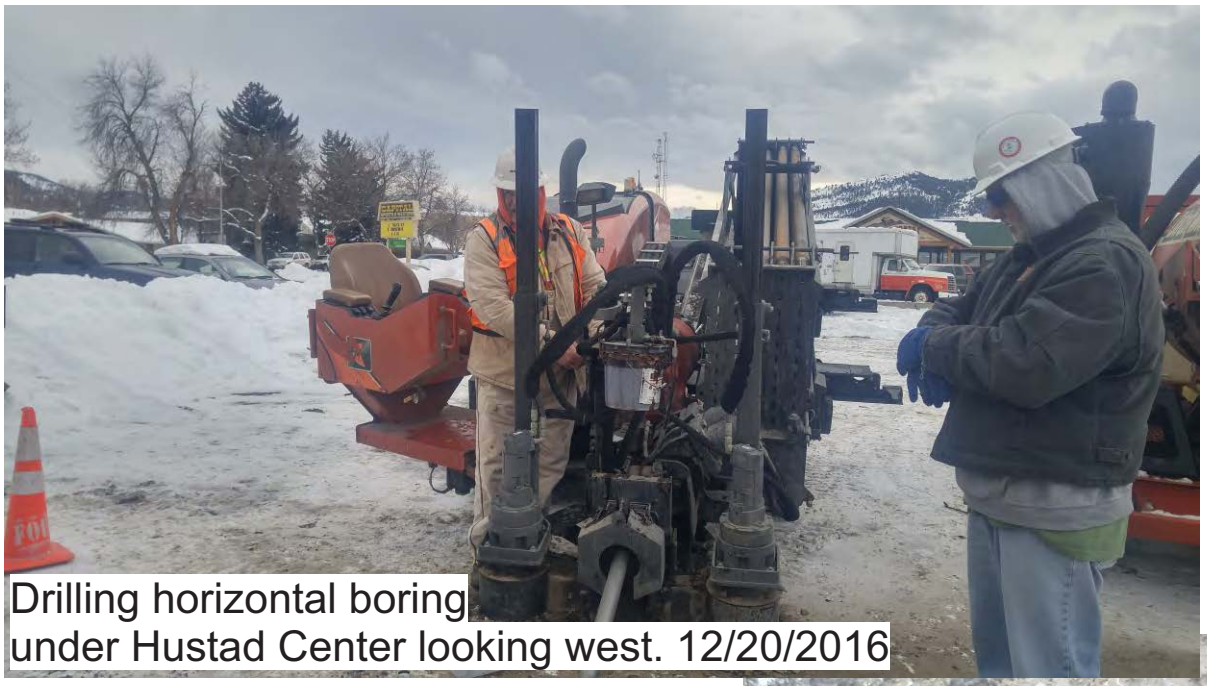
Pre-SVE system sub-slab air sampling. Lobby area of Mister Wise Cleaners. 11/1/2016



Pre-SVE system sub-slab air sampling. Inside Dermawerx. 11/1/2016

Drilling horizontal boring under west side of Hustad Center looking south. 12/20/2016

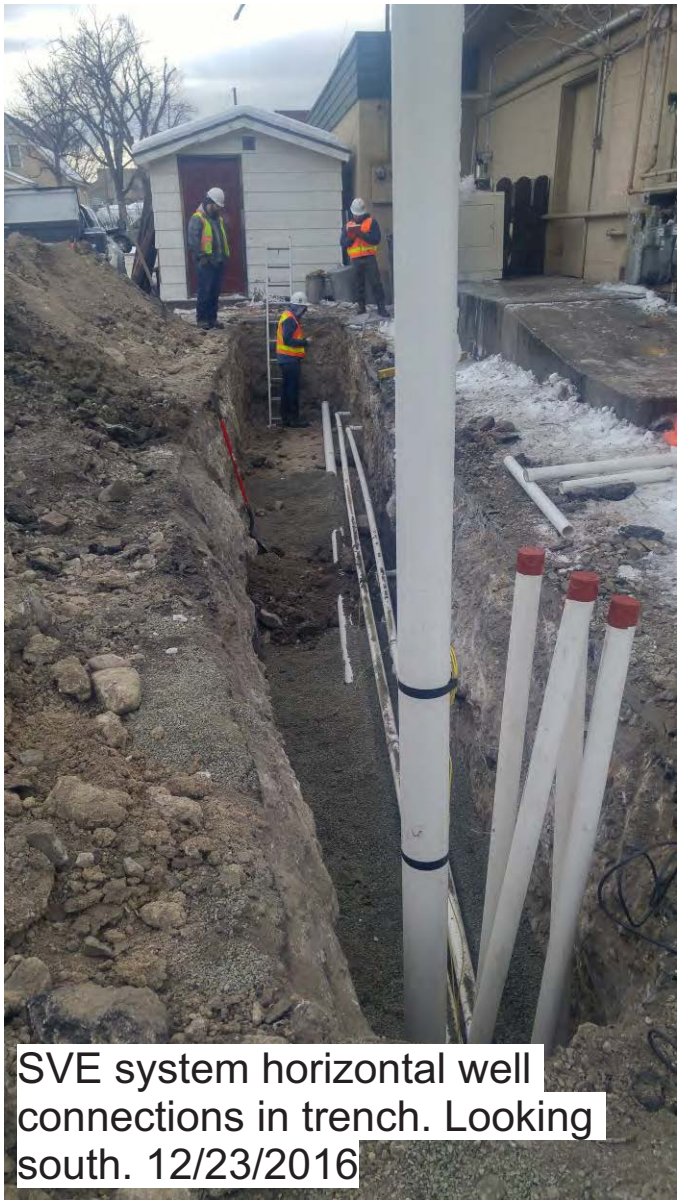
Drilling horizontal boring under west side of Hustad Center looking southwest. 12/20/2016



Drilling horizontal boring under Hustad Center looking west. 12/20/2016

"Burnt" material at north end of trench on east side of building. 12/21/2016

Horizontal SVE wells in placeon the east side of Hustad Center. Looking north. 12/22/2016



SVE system horizontal well connections in trench. Looking south. 12/23/2016

Gravel packing SVE trench. Looking north . 12/23/2016

SVE system shed, located outside the northwest corner of Hustad Center looking south. 01/19/2017

Inside SVE shed. Installing system. 02/02/2017

Inside SVE shed. SVE system installed. 02/02/2017

Fence replacement. East side of Hustad Center looking nw. 05/30/2017

Appendix G
Investigation–Derived Waste and Construction Waste Analytical Results

ANALYTICAL SUMMARY REPORT

May 18, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17050126 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 2 samples for HydroSolutions on 5/5/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17050126-001	IDW 050517	05/05/17 14:00	05/05/17	Aqueous	8260-Volatile Organic Compounds-Short List
H17050126-002	IDW Soil050517	05/05/17 14:10	05/05/17	Soil	TCLP Zero Headspace Extraction, Volatiles Volatile Organic Compounds, TCLP

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: HydroSolutions
Project: DEQ 08
Work Order: H17050126

Report Date: 05/18/17

CASE NARRATIVE

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17050126-001
Client Sample ID: IDW 050517

Report Date: 05/18/17
Collection Date: 05/05/17 14:00
DateReceived: 05/05/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Benzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Bromobenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Bromochloromethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Bromodichloromethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Bromoform	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Bromomethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Carbon tetrachloride	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Chlorobenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Chlorodibromomethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Chloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Chloroform	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Chloromethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,2-Dibromoethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
2-Chlorotoluene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
4-Chlorotoluene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Dibromomethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,2-Dichlorobenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,3-Dichlorobenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,4-Dichlorobenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Dichlorodifluoromethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1-Dichloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,2-Dichloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1-Dichloroethene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
cis-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
trans-1,2-Dichloroethene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,2-Dichloropropane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,3-Dichloropropane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
2,2-Dichloropropane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1-Dichloropropene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
cis-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
trans-1,3-Dichloropropene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Ethylbenzene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Methyl ethyl ketone	20	ug/L		20		SW8260B	05/13/17 13:26 / kjw
Methyl tert-butyl ether (MTBE)	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Methylene chloride	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Styrene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1,1,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1,2,2-Tetrachloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Tetrachloroethene	2.4	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Toluene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1,1-Trichloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,1,2-Trichloroethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Trichloroethene	0.42	ug/L	J	1.0		SW8260B	05/13/17 13:26 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17050126-001
Client Sample ID: IDW 050517

Report Date: 05/18/17
Collection Date: 05/05/17 14:00
DateReceived: 05/05/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Trichlorofluoromethane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
1,2,3-Trichloropropane	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Vinyl chloride	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
m+p-Xylenes	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
o-Xylene	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Xylenes, Total	ND	ug/L		1.0		SW8260B	05/13/17 13:26 / kjw
Surr: Dibromofluoromethane	102	%REC		70-125		SW8260B	05/13/17 13:26 / kjw
Surr: 1,2-Dichloroethane-d4	111	%REC		69-131		SW8260B	05/13/17 13:26 / kjw
Surr: Toluene-d8	98.0	%REC		80-119		SW8260B	05/13/17 13:26 / kjw
Surr: p-Bromofluorobenzene	104	%REC		76-123		SW8260B	05/13/17 13:26 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17050126-002
Client Sample ID: IDW Soil050517

Report Date: 05/18/17
Collection Date: 05/05/17 14:10
DateReceived: 05/05/17
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS, TCLP EXTRACTABLE							
Benzene	ND	mg/L		0.10	0.5	SW8260B	05/17/17 04:03 / eli-b16
Carbon tetrachloride	ND	mg/L		0.10	0.5	SW8260B	05/17/17 04:03 / eli-b16
Chlorobenzene	ND	mg/L		0.10	100	SW8260B	05/17/17 04:03 / eli-b16
Chloroform	ND	mg/L		0.10	6	SW8260B	05/17/17 04:03 / eli-b16
1,4-Dichlorobenzene	ND	mg/L		0.10	7.5	SW8260B	05/17/17 04:03 / eli-b16
1,2-Dichloroethane	ND	mg/L		0.10	0.5	SW8260B	05/17/17 04:03 / eli-b16
1,1-Dichloroethene	ND	mg/L		0.10	0.7	SW8260B	05/17/17 04:03 / eli-b16
Methyl ethyl ketone	ND	mg/L		2.0	200	SW8260B	05/17/17 04:03 / eli-b16
Tetrachloroethene	0.039	mg/L	J	0.10	0.7	SW8260B	05/17/17 04:03 / eli-b16
Trichloroethene	ND	mg/L		0.10	0.5	SW8260B	05/17/17 04:03 / eli-b16
Vinyl chloride	ND	mg/L		0.10	0.2	SW8260B	05/17/17 04:03 / eli-b16
Surr: 1,2-Dichloroethane-d4	89.0	%REC		70-130		SW8260B	05/17/17 04:03 / eli-b16
Surr: Dibromofluoromethane	89.0	%REC		77-126		SW8260B	05/17/17 04:03 / eli-b16
Surr: p-Bromofluorobenzene	101	%REC		76-127		SW8260B	05/17/17 04:03 / eli-b16
Surr: Toluene-d8	96.0	%REC		79-122		SW8260B	05/17/17 04:03 / eli-b16

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_109560
Lab ID: mb-109560	Method Blank				Run: SUB-B280033				05/16/17 23:10
Benzene	ND	mg/L	0.010						
Carbon tetrachloride	ND	mg/L	0.010						
Chlorobenzene	ND	mg/L	0.010						
Chloroform	ND	mg/L	0.010						
1,4-Dichlorobenzene	ND	mg/L	0.010						
1,2-Dichloroethane	ND	mg/L	0.010						
1,1-Dichloroethene	ND	mg/L	0.010						
Methyl ethyl ketone	ND	mg/L	0.20						
Tetrachloroethene	ND	mg/L	0.010						
Trichloroethene	ND	mg/L	0.010						
Vinyl chloride	ND	mg/L	0.010						
Surr: 1,2-Dichloroethane-d4			0.010	90	70	130			
Surr: Dibromofluoromethane			0.010	89	77	126			
Surr: p-Bromofluorobenzene			0.010	101	76	127			
Surr: Toluene-d8			0.010	95	79	122			
Lab ID: H17050126-002A	Sample Matrix Spike				Run: SUB-B280033				05/17/17 04:32
Benzene	0.508	mg/L	0.10	102	71	133			
Carbon tetrachloride	0.424	mg/L	0.10	85	61	144			
Chlorobenzene	0.480	mg/L	0.10	96	78	136			
Chloroform	0.480	mg/L	0.10	96	69	133			
1,4-Dichlorobenzene	0.480	mg/L	0.10	96	78	132			
1,2-Dichloroethane	0.444	mg/L	0.10	89	57	146			
1,1-Dichloroethene	0.436	mg/L	0.10	87	66	142			
Methyl ethyl ketone	4.92	mg/L	2.0	98	55	145			
Tetrachloroethene	0.496	mg/L	0.10	91	78	137			
Trichloroethene	0.480	mg/L	0.10	96	75	138			
Vinyl chloride	0.544	mg/L	0.10	109	66	140			
Surr: 1,2-Dichloroethane-d4			0.10	90	70	130			
Surr: Dibromofluoromethane			0.10	88	77	126			
Surr: p-Bromofluorobenzene			0.10	100	76	127			
Surr: Toluene-d8			0.10	99	79	122			
Lab ID: lcsA051617	Laboratory Control Sample				Run: SUB-B280033				05/16/17 22:40
Benzene	0.00488	mg/L	0.0010	98	71	133			
Carbon tetrachloride	0.00378	mg/L	0.0010	76	61	144			
Chlorobenzene	0.00436	mg/L	0.0010	87	78	136			
Chloroform	0.00476	mg/L	0.0010	95	69	133			
1,4-Dichlorobenzene	0.00468	mg/L	0.0010	94	78	132			
1,2-Dichloroethane	0.00452	mg/L	0.0010	90	57	146			
1,1-Dichloroethene	0.00416	mg/L	0.0010	83	66	142			
Methyl ethyl ketone	0.0544	mg/L	0.020	109	55	145			
Tetrachloroethene	0.00398	mg/L	0.0010	80	78	137			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Report Date: 05/18/17
Project: DEQ 08
Work Order: H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: B_109560
Lab ID: lcsA051617	Laboratory Control Sample				Run: SUB-B280033				05/16/17 22:40
Trichloroethene	0.00440	mg/L	0.0010	88	75	138			
Vinyl chloride	0.00520	mg/L	0.0010	104	66	140			
Surr: 1,2-Dichloroethane-d4			0.0010	96	70	130			
Surr: Dibromofluoromethane			0.0010	87	77	126			
Surr: p-Bromofluorobenzene			0.0010	102	76	127			
Surr: Toluene-d8			0.0010	96	79	122			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R125034
Lab ID: 051317_CCV_2	Continuing Calibration Verification Standard								05/13/17 10:56
Benzene	0.992	mg/kg	0.20	99	70	130			
Bromobenzene	0.888	mg/kg	0.20	89	70	130			
Bromochloromethane	0.864	mg/kg	0.20	86	70	130			
Bromodichloromethane	0.872	mg/kg	0.20	87	70	130			
Bromoform	0.744	mg/kg	0.20	74	70	130			
Bromomethane	0.808	mg/kg	0.20	81	70	130			
Carbon tetrachloride	0.936	mg/kg	0.20	94	70	130			
Chlorobenzene	1.14	mg/kg	0.20	114	70	130			
Chlorodibromomethane	0.968	mg/kg	0.20	97	70	130			
Chloroethane	1.13	mg/kg	0.20	113	70	130			
Chloroform	0.912	mg/kg	0.20	91	80	120			
Chloromethane	0.832	mg/kg	0.20	83	70	130			
2-Chlorotoluene	0.944	mg/kg	0.20	94	70	130			
4-Chlorotoluene	1.02	mg/kg	0.20	102	70	130			
1,2-Dibromoethane	0.944	mg/kg	0.20	94	70	130			
Dibromomethane	0.912	mg/kg	0.20	91	70	130			
1,2-Dichlorobenzene	0.944	mg/kg	0.20	94	70	130			
1,3-Dichlorobenzene	0.960	mg/kg	0.20	96	70	130			
1,4-Dichlorobenzene	0.888	mg/kg	0.20	89	70	130			
Dichlorodifluoromethane	0.904	mg/kg	0.20	90	70	130			
1,1-Dichloroethane	0.984	mg/kg	0.20	98	70	130			
1,2-Dichloroethane	0.928	mg/kg	0.20	93	70	130			
1,1-Dichloroethene	0.952	mg/kg	0.20	95	80	120			
cis-1,2-Dichloroethene	0.952	mg/kg	0.20	95	70	130			
trans-1,2-Dichloroethene	0.992	mg/kg	0.20	99	70	130			
1,2-Dichloropropane	0.880	mg/kg	0.20	88	80	120			
1,3-Dichloropropane	0.992	mg/kg	0.20	99	70	130			
2,2-Dichloropropane	1.07	mg/kg	0.20	107	70	130			
1,1-Dichloropropene	0.904	mg/kg	0.20	90	70	130			
cis-1,3-Dichloropropene	0.968	mg/kg	0.20	97	70	130			
trans-1,3-Dichloropropene	0.888	mg/kg	0.20	89	70	130			
Ethylbenzene	1.08	mg/kg	0.20	108	80	120			
Methyl tert-butyl ether (MTBE)	0.864	mg/kg	0.20	86	70	130			
Methyl ethyl ketone	7.78	mg/kg	4.0	78	70	130			
Methylene chloride	0.976	mg/kg	0.20	98	70	130			
Styrene	0.952	mg/kg	0.20	95	70	130			
1,1,1,2-Tetrachloroethane	1.13	mg/kg	0.20	113	70	130			
1,1,2,2-Tetrachloroethane	0.888	mg/kg	0.20	89	70	130			
Tetrachloroethene	1.04	mg/kg	0.20	104	70	130			
Toluene	0.968	mg/kg	0.20	97	80	120			
1,1,1-Trichloroethane	0.936	mg/kg	0.20	94	70	130			
1,1,2-Trichloroethane	0.912	mg/kg	0.20	91	70	130			
Trichloroethene	0.904	mg/kg	0.20	90	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R125034
Lab ID: 051317_CCV_2	Continuing Calibration Verification Standard								05/13/17 10:56
Trichlorofluoromethane	0.856	mg/kg	0.20	86	70	130			
1,2,3-Trichloropropane	0.896	mg/kg	0.20	90	70	130			
Vinyl chloride	0.960	mg/kg	0.20	96	80	120			
m+p-Xylenes	2.14	mg/kg	0.20	107	70	130			
o-Xylene	1.06	mg/kg	0.20	106	70	130			
Surr: 1,2-Dichloroethane-d4			0.20	105	70	130			
Surr: Dibromofluoromethane			0.20	100	70	130			
Surr: p-Bromofluorobenzene			0.20	94	70	130			
Surr: Toluene-d8			0.20	117	70	130			
Method: SW8260B									Batch: R125034
Lab ID: 051317_LCS_3	Laboratory Control Sample				Run: 1SATURN_170513A				05/13/17 11:27
Benzene	5.04	ug/L	0.50	101	69	129			
Bromobenzene	4.32	ug/L	0.50	86	79	120			
Bromochloromethane	4.76	ug/L	0.50	95	72	125			
Bromodichloromethane	4.48	ug/L	0.50	90	71	122			
Bromoform	3.72	ug/L	0.50	74	65	130			
Bromomethane	5.08	ug/L	0.50	102	60	136			
Carbon tetrachloride	5.00	ug/L	0.50	100	77	121			
Chlorobenzene	5.72	ug/L	0.50	114	78	120			
Chlorodibromomethane	4.80	ug/L	0.50	96	70	122			
Chloroethane	5.12	ug/L	0.50	102	62	135			
Chloroform	4.72	ug/L	0.50	94	71	121			
Chloromethane	5.32	ug/L	0.50	106	66	139			
2-Chlorotoluene	4.88	ug/L	0.50	98	78	125			
4-Chlorotoluene	5.28	ug/L	0.50	106	76	126			
1,2-Dibromoethane	4.56	ug/L	0.50	91	60	137			
Dibromomethane	4.68	ug/L	0.50	94	69	122			
1,2-Dichlorobenzene	4.72	ug/L	0.50	94	74	122			
1,3-Dichlorobenzene	4.80	ug/L	0.50	96	78	120			
1,4-Dichlorobenzene	4.80	ug/L	0.50	96	75	122			
Dichlorodifluoromethane	6.76	ug/L	0.50	135	57	144			
1,1-Dichloroethane	4.88	ug/L	0.50	98	76	125			
1,2-Dichloroethane	4.96	ug/L	0.50	99	69	131			
1,1-Dichloroethene	5.12	ug/L	0.50	102	67	129			
cis-1,2-Dichloroethene	5.12	ug/L	0.50	102	75	122			
trans-1,2-Dichloroethene	4.92	ug/L	0.50	98	75	124			
1,2-Dichloropropane	4.48	ug/L	0.50	90	75	127			
1,3-Dichloropropane	5.28	ug/L	0.50	106	70	122			
2,2-Dichloropropane	5.44	ug/L	0.50	109	78	132			
1,1-Dichloropropene	4.68	ug/L	0.50	94	69	127			
cis-1,3-Dichloropropene	5.44	ug/L	0.50	109	73	124			
trans-1,3-Dichloropropene	4.64	ug/L	0.50	93	72	127			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R125034
Lab ID: 051317_LCS_3	Laboratory Control Sample				Run: 1SATURN_170513A				05/13/17 11:27
Ethylbenzene	5.16	ug/L	0.50	103	74	125			
Methyl tert-butyl ether (MTBE)	4.84	ug/L	0.50	97	62	128			
Methyl ethyl ketone	44.0	ug/L	10	88	56	141			
Methylene chloride	5.28	ug/L	0.50	106	61	125			
Styrene	4.96	ug/L	0.50	99	75	120			
1,1,1,2-Tetrachloroethane	5.16	ug/L	0.50	103	76	122			
1,1,2,2-Tetrachloroethane	4.16	ug/L	0.50	83	67	124			
Tetrachloroethene	5.24	ug/L	0.50	105	75	126			
Toluene	5.20	ug/L	0.50	104	73	122			
1,1,1-Trichloroethane	5.00	ug/L	0.50	100	76	124			
1,1,2-Trichloroethane	4.88	ug/L	0.50	98	72	125			
Trichloroethene	4.64	ug/L	0.50	93	72	126			
Trichlorofluoromethane	5.28	ug/L	0.50	106	73	131			
1,2,3-Trichloropropane	5.04	ug/L	0.50	101	58	142			
Vinyl chloride	6.16	ug/L	0.50	123	69	129			
m+p-Xylenes	10.7	ug/L	0.50	107	72	124			
o-Xylene	5.68	ug/L	0.50	114	74	123			
Xylenes, Total	16.4	ug/L	0.50	109	72	124			
Surr: 1,2-Dichloroethane-d4			1.0	112	69	131			
Surr: Dibromofluoromethane			1.0	100	70	125			
Surr: p-Bromofluorobenzene			1.0	93	76	123			
Surr: Toluene-d8			1.0	120	80	119			S
Lab ID: 051317_MBLK_5	Method Blank				Run: 1SATURN_170513A				05/13/17 12:27
Benzene	ND	ug/L	0.50						
Bromobenzene	ND	ug/L	0.50						
Bromochloromethane	ND	ug/L	0.50						
Bromodichloromethane	ND	ug/L	0.50						
Bromoform	ND	ug/L	0.50						
Bromomethane	ND	ug/L	0.50						
Carbon tetrachloride	ND	ug/L	0.50						
Chlorobenzene	ND	ug/L	0.50						
Chlorodibromomethane	ND	ug/L	0.50						
Chloroethane	ND	ug/L	0.50						
Chloroform	ND	ug/L	0.50						
Chloromethane	ND	ug/L	0.50						
2-Chlorotoluene	ND	ug/L	0.50						
4-Chlorotoluene	ND	ug/L	0.50						
1,2-Dibromoethane	ND	ug/L	0.50						
Dibromomethane	ND	ug/L	0.50						
1,2-Dichlorobenzene	ND	ug/L	0.50						
1,3-Dichlorobenzene	ND	ug/L	0.50						
1,4-Dichlorobenzene	ND	ug/L	0.50						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R125034
Lab ID: 051317_MBLK_5	Method Blank				Run: 1SATURN_170513A				05/13/17 12:27
Dichlorodifluoromethane	ND	ug/L	0.50						
1,1-Dichloroethane	ND	ug/L	0.50						
1,2-Dichloroethane	ND	ug/L	0.50						
1,1-Dichloroethene	ND	ug/L	0.50						
cis-1,2-Dichloroethene	ND	ug/L	0.50						
trans-1,2-Dichloroethene	ND	ug/L	0.50						
1,2-Dichloropropane	ND	ug/L	0.50						
1,3-Dichloropropane	ND	ug/L	0.50						
2,2-Dichloropropane	ND	ug/L	0.50						
1,1-Dichloropropene	ND	ug/L	0.50						
cis-1,3-Dichloropropene	ND	ug/L	0.50						
trans-1,3-Dichloropropene	ND	ug/L	0.50						
Ethylbenzene	ND	ug/L	0.50						
Methyl tert-butyl ether (MTBE)	ND	ug/L	0.50						
Methyl ethyl ketone	ND	ug/L	10						
Methylene chloride	ND	ug/L	0.50						
Styrene	ND	ug/L	0.50						
1,1,1,2-Tetrachloroethane	ND	ug/L	0.50						
1,1,2,2-Tetrachloroethane	ND	ug/L	0.50						
Tetrachloroethene	ND	ug/L	0.50						
Toluene	ND	ug/L	0.50						
1,1,1-Trichloroethane	ND	ug/L	0.50						
1,1,2-Trichloroethane	ND	ug/L	0.50						
Trichloroethene	ND	ug/L	0.50						
Trichlorofluoromethane	ND	ug/L	0.50						
1,2,3-Trichloropropane	ND	ug/L	0.50						
Vinyl chloride	ND	ug/L	0.50						
m+p-Xylenes	ND	ug/L	0.50						
o-Xylene	ND	ug/L	0.50						
Xylenes, Total	ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4			1.0	112	69	131			
Surr: Dibromofluoromethane			1.0	102	70	125			
Surr: p-Bromofluorobenzene			1.0	102	76	123			
Surr: Toluene-d8			1.0	106	80	119			
Lab ID: H17050223-001EMS	Sample Matrix Spike				Run: 1SATURN_170513A				05/13/17 18:20
Benzene	10.2	ug/L	1.0	102	69	129			
Bromobenzene	8.32	ug/L	1.0	83	79	120			
Bromochloromethane	9.52	ug/L	1.0	95	72	125			
Bromodichloromethane	8.48	ug/L	1.0	85	71	122			
Bromoform	6.75	ug/L	1.0	68	65	130			
Bromomethane	10.3	ug/L	1.0	103	60	136			
Carbon tetrachloride	9.68	ug/L	1.0	97	77	121			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R125034
Lab ID: H17050223-001EMS	Sample Matrix Spike				Run: 1SATURN_170513A				05/13/17 18:20
Chlorobenzene	11.5	ug/L	1.0	115	78	120			
Chlorodibromomethane	8.96	ug/L	1.0	90	70	122			
Chloroethane	9.92	ug/L	1.0	99	62	135			
Chloroform	9.76	ug/L	1.0	98	71	121			
Chloromethane	11.7	ug/L	1.0	117	66	139			
2-Chlorotoluene	9.28	ug/L	1.0	93	78	125			
4-Chlorotoluene	10.1	ug/L	1.0	101	76	126			
1,2-Dibromoethane	9.12	ug/L	1.0	91	60	137			
Dibromomethane	9.12	ug/L	1.0	91	69	122			
1,2-Dichlorobenzene	9.20	ug/L	1.0	92	74	122			
1,3-Dichlorobenzene	9.20	ug/L	1.0	92	78	120			
1,4-Dichlorobenzene	9.20	ug/L	1.0	92	75	122			
Dichlorodifluoromethane	13.6	ug/L	1.0	136	57	144			
1,1-Dichloroethane	10.0	ug/L	1.0	100	76	125			
1,2-Dichloroethane	10.6	ug/L	1.0	106	69	131			
1,1-Dichloroethene	12.1	ug/L	1.0	121	67	129			
cis-1,2-Dichloroethene	10.5	ug/L	1.0	105	75	122			
trans-1,2-Dichloroethene	10.4	ug/L	1.0	104	75	124			
1,2-Dichloropropane	8.16	ug/L	1.0	82	75	127			
1,3-Dichloropropane	10.2	ug/L	1.0	102	70	122			
2,2-Dichloropropane	10.2	ug/L	1.0	102	78	132			
1,1-Dichloropropene	9.28	ug/L	1.0	93	69	127			
cis-1,3-Dichloropropene	9.92	ug/L	1.0	99	73	124			
trans-1,3-Dichloropropene	8.56	ug/L	1.0	86	72	127			
Ethylbenzene	10.0	ug/L	1.0	100	74	125			
Methyl tert-butyl ether (MTBE)	9.92	ug/L	1.0	99	62	128			
Methyl ethyl ketone	97.6	ug/L	20	98	56	141			
Methylene chloride	11.0	ug/L	1.0	110	61	125			
Styrene	9.52	ug/L	1.0	95	75	120			
1,1,1,2-Tetrachloroethane	9.92	ug/L	1.0	99	76	122			
1,1,2,2-Tetrachloroethane	8.32	ug/L	1.0	83	67	124			
Tetrachloroethene	9.52	ug/L	1.0	95	75	126			
Toluene	9.60	ug/L	1.0	96	73	122			
1,1,1-Trichloroethane	10.2	ug/L	1.0	102	76	124			
1,1,2-Trichloroethane	8.96	ug/L	1.0	90	72	125			
Trichloroethene	8.08	ug/L	1.0	81	72	126			
Trichlorofluoromethane	10.7	ug/L	1.0	107	73	131			
1,2,3-Trichloropropane	9.44	ug/L	1.0	94	58	142			
Vinyl chloride	12.9	ug/L	1.0	129	69	129			
m+p-Xylenes	21.4	ug/L	1.0	107	72	124			
o-Xylene	11.4	ug/L	1.0	114	74	123			
Xylenes, Total	32.8	ug/L	1.0	109	72	124			
Surr: 1,2-Dichloroethane-d4			2.0	111	69	131			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R125034
Lab ID: H17050223-001EMS	Sample Matrix Spike				Run: 1SATURN_170513A				05/13/17 18:20
Surr: Dibromofluoromethane			2.0	103	70	125			
Surr: p-Bromofluorobenzene			2.0	93	76	123			
Surr: Toluene-d8			2.0	111	80	119			
Lab ID: H17050223-001EMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_170513A				05/13/17 18:49
Benzene	10.0	ug/L	1.0	100	69	129	1.6	20	
Bromobenzene	8.88	ug/L	1.0	89	79	120	6.5	20	
Bromochloromethane	9.28	ug/L	1.0	93	72	125	2.6	20	
Bromodichloromethane	8.96	ug/L	1.0	90	71	122	5.5	20	
Bromoform	7.86	ug/L	1.0	79	65	130	15	20	
Bromomethane	10.4	ug/L	1.0	104	60	136	0.8	20	
Carbon tetrachloride	9.44	ug/L	1.0	94	77	121	2.5	20	
Chlorobenzene	11.6	ug/L	1.0	116	78	120	0.7	20	
Chlorodibromomethane	10.0	ug/L	1.0	100	70	122	11	20	
Chloroethane	9.68	ug/L	1.0	97	62	135	2.4	20	
Chloroform	9.44	ug/L	1.0	94	71	121	3.3	20	
Chloromethane	10.7	ug/L	1.0	107	66	139	8.6	20	
2-Chlorotoluene	9.44	ug/L	1.0	94	78	125	1.7	20	
4-Chlorotoluene	10.6	ug/L	1.0	106	76	126	4.7	20	
1,2-Dibromoethane	9.76	ug/L	1.0	98	60	137	6.8	20	
Dibromomethane	9.36	ug/L	1.0	94	69	122	2.6	20	
1,2-Dichlorobenzene	9.28	ug/L	1.0	93	74	122	0.9	20	
1,3-Dichlorobenzene	9.52	ug/L	1.0	95	78	120	3.4	20	
1,4-Dichlorobenzene	9.04	ug/L	1.0	90	75	122	1.8	20	
Dichlorodifluoromethane	13.0	ug/L	1.0	130	57	144	4.2	20	
1,1-Dichloroethane	9.68	ug/L	1.0	97	76	125	3.3	20	
1,2-Dichloroethane	9.60	ug/L	1.0	96	69	131	9.5	20	
1,1-Dichloroethene	11.5	ug/L	1.0	115	67	129	4.7	20	
cis-1,2-Dichloroethene	9.84	ug/L	1.0	98	75	122	6.3	20	
trans-1,2-Dichloroethene	10.1	ug/L	1.0	101	75	124	3.1	20	
1,2-Dichloropropane	8.80	ug/L	1.0	88	75	127	7.5	20	
1,3-Dichloropropane	10.6	ug/L	1.0	106	70	122	3.8	20	
2,2-Dichloropropane	9.60	ug/L	1.0	96	78	132	6.5	20	
1,1-Dichloropropene	8.96	ug/L	1.0	90	69	127	3.5	20	
cis-1,3-Dichloropropene	10.6	ug/L	1.0	106	73	124	6.2	20	
trans-1,3-Dichloropropene	8.96	ug/L	1.0	90	72	127	4.6	20	
Ethylbenzene	10.5	ug/L	1.0	105	74	125	4.7	20	
Methyl tert-butyl ether (MTBE)	9.68	ug/L	1.0	97	62	128	2.4	20	
Methyl ethyl ketone	92.8	ug/L	20	93	56	141	5.0	20	
Methylene chloride	10.4	ug/L	1.0	104	61	125	6.0	20	
Styrene	9.76	ug/L	1.0	98	75	120	2.5	20	
1,1,1,2-Tetrachloroethane	10.5	ug/L	1.0	105	76	122	5.5	20	
1,1,2,2-Tetrachloroethane	8.24	ug/L	1.0	82	67	124	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/18/17

Project: DEQ 08 **Work Order:** H17050126

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: R125034
Lab ID: H17050223-001EMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_170513A			05/13/17 18:49	
Tetrachloroethene	10.1	ug/L	1.0	101	75	126	5.7	20	
Toluene	10.1	ug/L	1.0	101	73	122	4.9	20	
1,1,1-Trichloroethane	10.2	ug/L	1.0	102	76	124	0.0	20	
1,1,2-Trichloroethane	9.68	ug/L	1.0	97	72	125	7.7	20	
Trichloroethene	8.72	ug/L	1.0	87	72	126	7.6	20	
Trichlorofluoromethane	10.4	ug/L	1.0	104	73	131	3.0	20	
1,2,3-Trichloropropane	10.1	ug/L	1.0	101	58	142	6.6	20	
Vinyl chloride	12.5	ug/L	1.0	125	69	129	3.2	20	
m+p-Xylenes	21.5	ug/L	1.0	108	72	124	0.4	20	
o-Xylene	11.6	ug/L	1.0	116	74	123	2.1	20	
Xylenes, Total	33.1	ug/L	1.0	110	72	124	1.0	20	
Surr: 1,2-Dichloroethane-d4			2.0	116	69	131			
Surr: Dibromofluoromethane			2.0	100	70	125			
Surr: p-Bromofluorobenzene			2.0	97	76	123			
Surr: Toluene-d8			2.0	118	80	119			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions H17050126

Login completed by: Brandy J. Seher
Reviewed by: BL2000\rtooke
Reviewed Date: 5/9/2017

Date Received: 5/5/2017
Received by: stp
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	18.3°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Two of 4 soil jars for IDW Soil050517 do not include id/date/time. Logged in with information from COC. BS 05/08/2017

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: Hydro Solutions Inc

Project Name, PWS, Permit, Etc.: HSS DEQ 08

Sample Origin State: MT

EPA/State Compliance: Yes ☐ No ☒

Report Mail Address (Required): 303 Clarke ST. Helena, MT 59601

Contact Name: David Donohue

Phone/Fax: 406-443-6169 x103

Cell: 406-465-2765

Sampler: (Please Print) Donohue

☒ No Hard Copy Email: davidd@hydrosi.com

Invoice Contact & Phone: Same

Purchase Order: —

Quote/Bottle Order: None DEQ Proj Discount

Invoice Address (Required): Same

☒ No Hard Copy Email: Same

Special Report/Formats:
- ☐ DW
- ☐ POTW/WWTP
- ☐ State: _____
- ☐ Other: _____
- ☒ EDD/EDT (Electronic Data) Format: xls
- ☐ LEVEL IV
- ☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: Hand

Cooler ID(s): ~~Hg~~ N/A

Receipt Temp: 18.3 °C

On Ice: Y (N)

Custody Seal: On Bottle Y N; On Cooler Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	8260c short list	TCLP										Comments
1	IDW 050517	5/5/17	2:00	Water	X											3 VOAs
2	~~IDW 050~~															
3	IDW Soil 050517	5/5/17	2:10	Soil	X	X										4 containers
4																
5																
6																
7																
8																
9																
10																

LABORATORY USE ONLY H17050126

Custody Record MUST be Signed

Relinquished by (print): David A Donohue Date/Time: 5/5/17 2:35pm Signature:

Relinquished by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by Laboratory: Skyler Roster Date/Time: 5/5/17 14:35p Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ANALYTICAL SUMMARY REPORT

May 23, 2017

HydroSolutions
303 Clarke St
Helena, MT 59601

Work Order: H17050286 Quote ID: H1382 - Helena Solvent site

Project Name: DEQ 08

Energy Laboratories Inc Helena MT received the following 1 sample for HydroSolutions on 5/15/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H17050286-001	IDW Soil 051517	05/15/17 16:00	05/15/17	Soil	Composite Fee Moisture Percent Moisture Soil Preparation Volatile Organics, Methanol Extraction 8260-Volatile Organic Compounds - Short List

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17050286-001
Client Sample ID: IDW Soil 051517

Report Date: 05/25/17
Collection Date: 05/15/17 16:00
DateReceived: 05/15/17
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	5.5	wt%		0.2		SW3550C	05/16/17 16:09 / kjw
VOLATILE ORGANIC COMPOUNDS							
Bromoform	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Benzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Bromobenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Bromochloromethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Bromodichloromethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Bromomethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Carbon tetrachloride	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Chlorobenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Chloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
2-Chloroethyl vinyl ether	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Chloroform	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Chloromethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
2-Chlorotoluene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
4-Chlorotoluene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Chlorodibromomethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,2-Dibromoethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Dibromomethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,2-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,3-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,4-Dichlorobenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Dichlorodifluoromethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1-Dichloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,2-Dichloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
cis-1,2-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
trans-1,2-Dichloroethene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,2-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,3-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
2,2-Dichloropropane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
cis-1,3-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
trans-1,3-Dichloropropene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Ethylbenzene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Methyl tert-butyl ether (MTBE)	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Methylene chloride	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Methyl ethyl ketone	ND	mg/kg-dry		4.0		SW8260B	05/17/17 11:46 / kjw
Styrene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1,1,2-Tetrachloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1,2,2-Tetrachloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Tetrachloroethene	34	mg/kg-dry		2.1		SW8260B	05/17/17 20:27 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08
Lab ID: H17050286-001
Client Sample ID: IDW Soil 051517

Report Date: 05/25/17
Collection Date: 05/15/17 16:00
DateReceived: 05/15/17
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Toluene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1,1-Trichloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,1,2-Trichloroethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Trichloroethene	0.083	mg/kg-dry	J	0.20		SW8260B	05/17/17 11:46 / kjw
Trichlorofluoromethane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
1,2,3-Trichloropropane	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Vinyl chloride	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
m+p-Xylenes	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
o-Xylene	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Xylenes, Total	ND	mg/kg-dry		0.20		SW8260B	05/17/17 11:46 / kjw
Surr: p-Bromofluorobenzene	91.0	%REC		60-143		SW8260B	05/17/17 11:46 / kjw
Surr: Dibromofluoromethane	100	%REC		71-135		SW8260B	05/17/17 11:46 / kjw
Surr: 1,2-Dichloroethane-d4	104	%REC		65-147		SW8260B	05/17/17 11:46 / kjw
Surr: Toluene-d8	93.0	%REC		76-133		SW8260B	05/17/17 11:46 / kjw

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08

Report Date: 05/23/17
Work Order: H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: D2974									Batch: R125149
Lab ID: H17050286-001ADUP	Sample Duplicate				Run: EXTRACT OV 2_170516A				05/16/17 16:09
Moisture	6.10	wt%	0.20				10	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Report Date: 05/23/17
Project: DEQ 08
Work Order: H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW3550C									Batch: R125149
Lab ID: H17050286-001ADUP	Sample Duplicate				Run: EXTRACT OV 2_170516A				05/16/17 16:09
Moisture	6.10	wt%	0.20				10	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: LCS-37186	Laboratory Control Sample				Run: 1SATURN_170511A				05/11/17 10:41
Benzene	1.30	mg/kg	0.20	130	71	119			S
Bromobenzene	1.27	mg/kg	0.20	127	77	134			
Bromochloromethane	1.26	mg/kg	0.20	126	61	129			
Bromodichloromethane	1.12	mg/kg	0.20	112	64	139			
Bromoform	1.04	mg/kg	0.20	104	52	141			
Bromomethane	1.17	mg/kg	0.20	117	40	121			
Carbon tetrachloride	1.27	mg/kg	0.20	127	65	131			
Chlorobenzene	1.52	mg/kg	0.20	152	74	131			S
Chlorodibromomethane	1.21	mg/kg	0.20	121	58	135			
Chloroethane	0.840	mg/kg	0.20	84	53	140			
2-Chloroethyl vinyl ether	1.18	mg/kg	0.20	118	67.2	113			S
Chloroform	1.26	mg/kg	0.20	126	65	126			
Chloromethane	0.976	mg/kg	0.20	98	46	144			
2-Chlorotoluene	1.36	mg/kg	0.20	136	72	137			
4-Chlorotoluene	1.43	mg/kg	0.20	143	70	133			S
1,2-Dibromoethane	1.19	mg/kg	0.20	119	54	131			
Dibromomethane	1.30	mg/kg	0.20	130	60	140			
1,2-Dichlorobenzene	1.26	mg/kg	0.20	126	61	137			
1,3-Dichlorobenzene	1.33	mg/kg	0.20	133	67	133			
1,4-Dichlorobenzene	1.22	mg/kg	0.20	122	62	137			
Dichlorodifluoromethane	0.808	mg/kg	0.20	81	38	132			
1,1-Dichloroethane	1.30	mg/kg	0.20	130	66	124			S
1,2-Dichloroethane	1.20	mg/kg	0.20	120	54	125			
1,1-Dichloroethene	1.29	mg/kg	0.20	129	64	113			S
cis-1,2-Dichloroethene	1.31	mg/kg	0.20	131	68	133			
trans-1,2-Dichloroethene	1.35	mg/kg	0.20	135	70	130			S
1,2-Dichloropropane	1.14	mg/kg	0.20	114	78	143			
1,3-Dichloropropane	1.44	mg/kg	0.20	144	63	140			S
2,2-Dichloropropane	1.46	mg/kg	0.20	146	71	137			S
1,1-Dichloropropene	1.18	mg/kg	0.20	118	66	136			
cis-1,3-Dichloropropene	1.31	mg/kg	0.20	131	75	137			
trans-1,3-Dichloropropene	1.22	mg/kg	0.20	122	70	107			S
Ethylbenzene	1.42	mg/kg	0.20	142	78	132			S
Methyl tert-butyl ether (MTBE)	1.30	mg/kg	0.20	130	57	132			
Methyl ethyl ketone	12.2	mg/kg	4.0	122	50	150			
Methylene chloride	1.42	mg/kg	0.20	142	62	125			S
Styrene	1.34	mg/kg	0.20	134	70	132			S
1,1,1,2-Tetrachloroethane	1.31	mg/kg	0.20	131	73	127			S
1,1,2,2-Tetrachloroethane	1.18	mg/kg	0.20	118	74	120			
Tetrachloroethene	1.33	mg/kg	0.20	133	84	108			S
Toluene	1.30	mg/kg	0.20	130	78	125			S
1,1,1-Trichloroethane	1.31	mg/kg	0.20	131	73	124			S
1,1,2-Trichloroethane	1.19	mg/kg	0.20	119	78	114			S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: LCS-37186	Laboratory Control Sample				Run: 1SATURN_170511A				05/11/17 10:41
Trichloroethene	1.18	mg/kg	0.20	118	70	144			
Trichlorofluoromethane	1.25	mg/kg	0.20	125	60	128			
1,2,3-Trichloropropane	1.37	mg/kg	0.20	137	63	148			
Vinyl chloride	1.28	mg/kg	0.20	128	64	124			S
m+p-Xylenes	2.73	mg/kg	0.20	136	74	136			
o-Xylene	1.42	mg/kg	0.20	142	70	134			S
Surr: 1,2-Dichloroethane-d4			0.20	103	65	147			
Surr: Dibromofluoromethane			0.20	103	71	135			
Surr: p-Bromofluorobenzene			0.20	100	60	143			
Surr: Toluene-d8			0.20	100	76	133			
Lab ID: MB-37186	Method Blank				Run: 1SATURN_170511A				05/11/17 12:11
Benzene	ND	mg/kg	0.20						
Bromobenzene	ND	mg/kg	0.20						
Bromochloromethane	ND	mg/kg	0.20						
Bromodichloromethane	ND	mg/kg	0.20						
Bromoform	ND	mg/kg	0.20						
Bromomethane	ND	mg/kg	0.20						
Carbon tetrachloride	ND	mg/kg	0.20						
Chlorobenzene	ND	mg/kg	0.20						
Chlorodibromomethane	ND	mg/kg	0.20						
Chloroethane	ND	mg/kg	0.20						
2-Chloroethyl vinyl ether	ND	mg/kg	0.20						
Chloroform	ND	mg/kg	0.20						
Chloromethane	ND	mg/kg	0.20						
2-Chlorotoluene	ND	mg/kg	0.20						
4-Chlorotoluene	ND	mg/kg	0.20						
1,2-Dibromoethane	ND	mg/kg	0.20						
Dibromomethane	ND	mg/kg	0.20						
1,2-Dichlorobenzene	ND	mg/kg	0.20						
1,3-Dichlorobenzene	ND	mg/kg	0.20						
1,4-Dichlorobenzene	ND	mg/kg	0.20						
Dichlorodifluoromethane	ND	mg/kg	0.20						
1,1-Dichloroethane	ND	mg/kg	0.20						
1,2-Dichloroethane	ND	mg/kg	0.20						
1,1-Dichloroethene	ND	mg/kg	0.20						
cis-1,2-Dichloroethene	ND	mg/kg	0.20						
trans-1,2-Dichloroethene	ND	mg/kg	0.20						
1,2-Dichloropropane	ND	mg/kg	0.20						
1,3-Dichloropropane	ND	mg/kg	0.20						
2,2-Dichloropropane	ND	mg/kg	0.20						
1,1-Dichloropropene	ND	mg/kg	0.20						
cis-1,3-Dichloropropene	ND	mg/kg	0.20						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: MB-37186	Method Blank				Run: 1SATURN_170511A				05/11/17 12:11
trans-1,3-Dichloropropene	ND	mg/kg	0.20						
Ethylbenzene	ND	mg/kg	0.20						
Methyl tert-butyl ether (MTBE)	ND	mg/kg	0.20						
Methyl ethyl ketone	ND	mg/kg	4.0						
Methylene chloride	ND	mg/kg	0.20						
Styrene	ND	mg/kg	0.20						
1,1,1,2-Tetrachloroethane	ND	mg/kg	0.20						
1,1,2,2-Tetrachloroethane	ND	mg/kg	0.20						
Tetrachloroethene	ND	mg/kg	0.20						
Toluene	ND	mg/kg	0.20						
1,1,1-Trichloroethane	ND	mg/kg	0.20						
1,1,2-Trichloroethane	ND	mg/kg	0.20						
Trichloroethene	ND	mg/kg	0.20						
Trichlorofluoromethane	ND	mg/kg	0.20						
1,2,3-Trichloropropane	ND	mg/kg	0.20						
Vinyl chloride	ND	mg/kg	0.20						
m+p-Xylenes	ND	mg/kg	0.20						
o-Xylene	ND	mg/kg	0.20						
Surr: 1,2-Dichloroethane-d4			0.20	112	65	147			
Surr: Dibromofluoromethane			0.20	112	71	135			
Surr: p-Bromofluorobenzene			0.20	113	60	143			
Surr: Toluene-d8			0.20	92	76	133			
Lab ID: H17050188-001AMS	Sample Matrix Spike				Run: 1SATURN_170513A				05/13/17 19:18
Benzene	1.33	mg/kg-dry	0.20	94	71	119			
Bromobenzene	1.15	mg/kg-dry	0.20	82	77	134			
Bromochloromethane	1.16	mg/kg-dry	0.20	82	61	129			
Bromodichloromethane	1.14	mg/kg-dry	0.20	81	64	139			
Bromoform	1.04	mg/kg-dry	0.20	74	52	141			
Bromomethane	1.29	mg/kg-dry	0.20	92	40	121			
Carbon tetrachloride	1.22	mg/kg-dry	0.20	86	65	131			
Chlorobenzene	1.45	mg/kg-dry	0.20	103	74	131			
Chlorodibromomethane	1.18	mg/kg-dry	0.20	84	58	135			
Chloroethane	0.849	mg/kg-dry	0.20	60	53	140			
2-Chloroethyl vinyl ether	1.10	mg/kg-dry	0.20	78	67.2	113			
Chloroform	1.23	mg/kg-dry	0.20	87	65	126			
Chloromethane	1.06	mg/kg-dry	0.20	75	46	144			
2-Chlorotoluene	1.28	mg/kg-dry	0.20	91	72	137			
4-Chlorotoluene	1.38	mg/kg-dry	0.20	98	70	133			
1,2-Dibromoethane	1.17	mg/kg-dry	0.20	83	54	131			
Dibromomethane	1.10	mg/kg-dry	0.20	78	60	140			
1,2-Dichlorobenzene	1.26	mg/kg-dry	0.20	90	61	137			
1,3-Dichlorobenzene	1.23	mg/kg-dry	0.20	87	67	133			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: H17050188-001AMS	Sample Matrix Spike				Run: 1SATURN_170513A				05/13/17 19:18
1,4-Dichlorobenzene	1.19	mg/kg-dry	0.20	85	62	137			
Dichlorodifluoromethane	1.07	mg/kg-dry	0.20	76	38	132			
1,1-Dichloroethane	1.24	mg/kg-dry	0.20	88	66	124			
1,2-Dichloroethane	1.20	mg/kg-dry	0.20	86	54	125			
1,1-Dichloroethene	1.40	mg/kg-dry	0.20	99	64	113			
cis-1,2-Dichloroethene	1.26	mg/kg-dry	0.20	90	68	133			
trans-1,2-Dichloroethene	1.23	mg/kg-dry	0.20	87	70	130			
1,2-Dichloropropane	1.09	mg/kg-dry	0.20	77	78	143			S
1,3-Dichloropropane	1.31	mg/kg-dry	0.20	93	63	140			
2,2-Dichloropropane	1.25	mg/kg-dry	0.20	89	71	137			
1,1-Dichloropropene	1.17	mg/kg-dry	0.20	83	66	136			
cis-1,3-Dichloropropene	1.35	mg/kg-dry	0.20	96	75	137			
trans-1,3-Dichloropropene	1.15	mg/kg-dry	0.20	82	70	107			
Ethylbenzene	1.32	mg/kg-dry	0.20	94	78	132			
Methyl tert-butyl ether (MTBE)	1.26	mg/kg-dry	0.20	90	57	132			
Methyl ethyl ketone	11.8	mg/kg-dry	4.0	84	50	150			
Methylene chloride	1.33	mg/kg-dry	0.20	94	62	125			
Styrene	1.33	mg/kg-dry	0.20	94	70	132			
1,1,1,2-Tetrachloroethane	1.29	mg/kg-dry	0.20	92	73	127			
1,1,2,2-Tetrachloroethane	1.15	mg/kg-dry	0.20	82	74	120			
Tetrachloroethene	1.24	mg/kg-dry	0.20	88	84	108			
Toluene	1.27	mg/kg-dry	0.20	90	78	125			
1,1,1-Trichloroethane	1.28	mg/kg-dry	0.20	91	73	124			
1,1,2-Trichloroethane	1.18	mg/kg-dry	0.20	84	78	114			
Trichloroethene	1.10	mg/kg-dry	0.20	78	70	144			
Trichlorofluoromethane	1.19	mg/kg-dry	0.20	85	60	128			
1,2,3-Trichloropropane	1.24	mg/kg-dry	0.20	88	63	148			
Vinyl chloride	1.43	mg/kg-dry	0.20	102	64	124			
m+p-Xylenes	2.78	mg/kg-dry	0.20	99	74	136			
o-Xylene	1.46	mg/kg-dry	0.20	104	70	134			
Surr: 1,2-Dichloroethane-d4			0.20	92	65	147			
Surr: Dibromofluoromethane			0.20	88	71	135			
Surr: p-Bromofluorobenzene			0.20	87	60	143			
Surr: Toluene-d8			0.20	100	76	133			
Lab ID: H17050188-001AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_170513A				05/13/17 19:48
Benzene	1.32	mg/kg-dry	0.20	96	71	119	0.9	20	
Bromobenzene	1.23	mg/kg-dry	0.20	90	77	134	6.8	20	
Bromochloromethane	1.10	mg/kg-dry	0.20	80	61	129	5.5	20	
Bromodichloromethane	1.22	mg/kg-dry	0.20	89	64	139	6.9	20	
Bromoform	1.01	mg/kg-dry	0.20	74	52	141	2.5	20	
Bromomethane	1.23	mg/kg-dry	0.20	90	40	121	5.2	20	
Carbon tetrachloride	1.18	mg/kg-dry	0.20	86	65	131	2.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: H17050188-001AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_170513A			05/13/17 19:48	
Chlorobenzene	1.60	mg/kg-dry	0.20	117	74	131	9.8	20	
Chlorodibromomethane	1.25	mg/kg-dry	0.20	91	58	135	5.7	20	
Chloroethane	0.815	mg/kg-dry	0.20	59	53	140	4.0	20	
2-Chloroethyl vinyl ether	1.18	mg/kg-dry	0.20	86	67.2	113	7.6	20	
Chloroform	1.18	mg/kg-dry	0.20	86	65	126	3.5	20	
Chloromethane	1.11	mg/kg-dry	0.20	81	46	144	4.4	20	
2-Chlorotoluene	1.35	mg/kg-dry	0.20	98	72	137	5.0	20	
4-Chlorotoluene	1.46	mg/kg-dry	0.20	106	70	133	5.3	20	
1,2-Dibromoethane	1.29	mg/kg-dry	0.20	94	54	131	10	20	
Dibromomethane	1.27	mg/kg-dry	0.20	93	60	140	15	20	
1,2-Dichlorobenzene	1.23	mg/kg-dry	0.20	90	61	137	2.6	20	
1,3-Dichlorobenzene	1.25	mg/kg-dry	0.20	91	67	133	1.9	20	
1,4-Dichlorobenzene	1.23	mg/kg-dry	0.20	90	62	137	2.9	20	
Dichlorodifluoromethane	1.08	mg/kg-dry	0.20	79	38	132	1.5	20	
1,1-Dichloroethane	1.27	mg/kg-dry	0.20	93	66	124	2.8	20	
1,2-Dichloroethane	1.26	mg/kg-dry	0.20	92	54	125	4.6	20	
1,1-Dichloroethene	1.36	mg/kg-dry	0.20	99	64	113	2.6	20	
cis-1,2-Dichloroethene	1.29	mg/kg-dry	0.20	94	68	133	2.7	20	
trans-1,2-Dichloroethene	1.21	mg/kg-dry	0.20	88	70	130	1.6	20	
1,2-Dichloropropane	1.21	mg/kg-dry	0.20	88	78	143	10	20	
1,3-Dichloropropane	1.36	mg/kg-dry	0.20	99	63	140	4.1	20	
2,2-Dichloropropane	1.21	mg/kg-dry	0.20	88	71	137	3.5	20	
1,1-Dichloropropene	1.18	mg/kg-dry	0.20	86	66	136	1.2	20	
cis-1,3-Dichloropropene	1.44	mg/kg-dry	0.20	105	75	137	6.2	20	
trans-1,3-Dichloropropene	1.21	mg/kg-dry	0.20	88	70	107	5.0	20	
Ethylbenzene	1.38	mg/kg-dry	0.20	101	78	132	4.9	20	
Methyl tert-butyl ether (MTBE)	1.23	mg/kg-dry	0.20	90	57	132	2.6	20	
Methyl ethyl ketone	12.0	mg/kg-dry	4.0	87	50	150	1.2	20	
Methylene chloride	1.25	mg/kg-dry	0.20	91	62	125	6.0	20	
Styrene	1.45	mg/kg-dry	0.20	106	70	132	8.6	20	
1,1,1,2-Tetrachloroethane	1.40	mg/kg-dry	0.20	102	73	127	8.1	20	
1,1,2,2-Tetrachloroethane	1.20	mg/kg-dry	0.20	87	74	120	4.1	20	
Tetrachloroethene	1.40	mg/kg-dry	0.20	102	84	108	13	20	
Toluene	1.36	mg/kg-dry	0.20	99	78	125	6.7	20	
1,1,1-Trichloroethane	1.23	mg/kg-dry	0.20	90	73	124	4.3	20	
1,1,2-Trichloroethane	1.34	mg/kg-dry	0.20	98	78	114	12	20	
Trichloroethene	1.25	mg/kg-dry	0.20	91	70	144	13	20	
Trichlorofluoromethane	1.18	mg/kg-dry	0.20	86	60	128	0.7	20	
1,2,3-Trichloropropane	1.28	mg/kg-dry	0.20	94	63	148	3.6	20	
Vinyl chloride	1.37	mg/kg-dry	0.20	100	64	124	4.1	20	
m+p-Xylenes	2.94	mg/kg-dry	0.20	107	74	136	5.6	20	
o-Xylene	1.62	mg/kg-dry	0.20	118	70	134	10	20	
Surr: 1,2-Dichloroethane-d4			0.20	96	65	147			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Report Date: 05/23/17
Project: DEQ 08
Work Order: H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 37186
Lab ID: H17050188-001AMSD	Sample Matrix Spike Duplicate				Run: 1SATURN_170513A				05/13/17 19:48
Surr: Dibromofluoromethane			0.20	90	71	135			
Surr: p-Bromofluorobenzene			0.20	95	60	143			
Surr: Toluene-d8			0.20	117	76	133			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions **Report Date:** 05/23/17

Project: DEQ 08 **Work Order:** H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R125140
Lab ID: 051717_CCV_2	Continuing Calibration Verification Standard								05/17/17 09:37
Benzene	1.01	mg/kg	0.20	101	70	130			
Bromobenzene	0.872	mg/kg	0.20	87	70	130			
Bromochloromethane	0.904	mg/kg	0.20	90	70	130			
Bromodichloromethane	0.888	mg/kg	0.20	89	70	130			
Bromoform	0.778	mg/kg	0.20	78	70	130			
Bromomethane	0.960	mg/kg	0.20	96	70	130			
Carbon tetrachloride	0.976	mg/kg	0.20	98	70	130			
Chlorobenzene	1.15	mg/kg	0.20	115	70	130			
Chlorodibromomethane	1.01	mg/kg	0.20	101	70	130			
Chloroethane	0.920	mg/kg	0.20	92	70	130			
2-Chloroethyl vinyl ether	0.832	mg/kg	0.20	83	70	130			
Chloroform	0.960	mg/kg	0.20	96	80	120			
Chloromethane	0.960	mg/kg	0.20	96	70	130			
2-Chlorotoluene	0.944	mg/kg	0.20	94	70	130			
4-Chlorotoluene	0.976	mg/kg	0.20	98	70	130			
1,2-Dibromoethane	0.952	mg/kg	0.20	95	70	130			
Dibromomethane	0.952	mg/kg	0.20	95	70	130			
1,2-Dichlorobenzene	0.944	mg/kg	0.20	94	70	130			
1,3-Dichlorobenzene	0.920	mg/kg	0.20	92	70	130			
1,4-Dichlorobenzene	0.896	mg/kg	0.20	90	70	130			
Dichlorodifluoromethane	0.960	mg/kg	0.20	96	70	130			
1,1-Dichloroethane	1.01	mg/kg	0.20	101	70	130			
1,2-Dichloroethane	0.928	mg/kg	0.20	93	70	130			
1,1-Dichloroethene	1.01	mg/kg	0.20	101	80	120			
cis-1,2-Dichloroethene	1.00	mg/kg	0.20	100	70	130			
trans-1,2-Dichloroethene	1.02	mg/kg	0.20	102	70	130			
1,2-Dichloropropane	0.856	mg/kg	0.20	86	80	120			
1,3-Dichloropropane	1.00	mg/kg	0.20	100	70	130			
2,2-Dichloropropane	1.09	mg/kg	0.20	109	70	130			
1,1-Dichloropropene	0.920	mg/kg	0.20	92	70	130			
cis-1,3-Dichloropropene	1.04	mg/kg	0.20	104	70	130			
trans-1,3-Dichloropropene	0.952	mg/kg	0.20	95	70	130			
Ethylbenzene	1.06	mg/kg	0.20	106	80	120			
Methyl tert-butyl ether (MTBE)	0.952	mg/kg	0.20	95	70	130			
Methyl ethyl ketone	10.2	mg/kg	4.0	102	70	130			
Methylene chloride	1.01	mg/kg	0.20	101	70	130			
Styrene	0.968	mg/kg	0.20	97	70	130			
1,1,1,2-Tetrachloroethane	1.14	mg/kg	0.20	114	70	130			
1,1,2,2-Tetrachloroethane	0.896	mg/kg	0.20	90	70	130			
Tetrachloroethene	1.06	mg/kg	0.20	106	70	130			
Toluene	0.968	mg/kg	0.20	97	80	120			
1,1,1-Trichloroethane	0.976	mg/kg	0.20	98	70	130			
1,1,2-Trichloroethane	0.984	mg/kg	0.20	98	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: HydroSolutions
Project: DEQ 08

Report Date: 05/23/17
Work Order: H17050286

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Analytical Run: R125140
Lab ID: 051717_CCV_2	Continuing Calibration Verification Standard								05/17/17 09:37
Trichloroethene	0.872	mg/kg	0.20	87	70	130			
Trichlorofluoromethane	0.920	mg/kg	0.20	92	70	130			
1,2,3-Trichloropropane	0.984	mg/kg	0.20	98	70	130			
Vinyl chloride	1.09	mg/kg	0.20	109	80	120			
m+p-Xylenes	2.24	mg/kg	0.20	112	70	130			
o-Xylene	1.08	mg/kg	0.20	108	70	130			
Surr: 1,2-Dichloroethane-d4			0.20	105	70	130			
Surr: Dibromofluoromethane			0.20	99	70	130			
Surr: p-Bromofluorobenzene			0.20	96	70	130			
Surr: Toluene-d8			0.20	115	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

HydroSolutions

H17050286

Login completed by: Tracy L. Lorash

Reviewed by: BL2000\rtooke

Reviewed Date: 5/16/2017

Date Received: 5/15/2017

Received by: wjj

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	20.8°C No Ice - From Field		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

ENERGY LAB
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Account Information (Billing information)

Company/Name	HydroSolutions Inc
Contact	David Donohue
Phone	406-443-6169 x103
Mailing Address	303 Clarke St
City, State, Zip	Helena, MT 59601
Email	dave657@hotmail.com
Receive Invoice	☐Hard Copy ☒Email
Receive Report	☐Hard Copy ☒Email
Purchase Order	
Quote	
Bottle Order	

Report Information (if different than Account Information)

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report	☐Hard Copy ☐Email

Special Report/Formats:
☐ LEVEL IV ☐ NELAC ☒ EDD/EDT (contact laboratory) ☐ Other_____

Comments

DEQ project

Project Information

Project Name, PWSID, Permit, etc.	HSS DEQ08
Sampler Name	Donohue
Sampler Phone	443-6169
Sample Origin State	MT
EPA/State Compliance	☐ Yes ☐ No

MINING CLIENTS, please indicate sample type.
*If ore has been processed or refined, call before sending.
☐ Byproduct 11 (e)2 material ☐ Unprocessed ore (NOT ground or refined)*

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	8260 (Short list)	See Attached	RUSH TAT	ELI LAB ID (Laboratory Use Only)
1 IDW soil 051517	5/15/17	4:00	5	Soil				5 contains/lab composite
2								H170502 86
3								
4								
5								
6								
7								
8								
9								
10								

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Dave Donohue	5/15/17 4:38	David A. Donohue			
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature
				Wanda Dias	5-15-17 16:23	

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
hand del	–	Y N C B	Y N	20.8°C	Y N	Y N	CC Cash Check_____	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Montana DEQ - Remediation Division

Data Validation Summary Form (Version 1.2, Revised 11/4/16)

Please fill out the information below, using one form for each lab batch (one form can be used for multiple analytical methods). The form will grow and adjust, based on your responses. Please include a discussion regarding the sampling event in the report that is sent to DEQ with this form. For additional instructions, please click the Open Complete Instructions button.

Open Complete Instructions

Basic Questions

1. Site/Facility name	Helena Solvent Site
2. Site code or facility ID (if applicable)	
3. Release ID (if applicable)	
4. Project name	Characterization of IDW purge water and waste soil
5. Name of DEQ-approved sampling plan	Work conducted under Task Order 13, Contract 414019 and conducted per HydroSolutions Standard Operating Procedures
6. Date DEQ approved the sampling plan	M/D/YY
7. Name of data validator	Laura Alvey
8. Phone	406-444-0212
9. Date validated	5/24/2017 M/D/YY

Field Collection Questions

10. Sample matrix	☒ Soil ☐ Sediment ☐ Surface water ☒ Groundwater ☐ Tap water ☐ Air (including soil gas) ☐ Other
11. Sample collection start date	5/5/2017 M/D/YY
12. Sample collection end date	5/5/2017 M/D/YY
13. Analytical methods used *Use Add Method button to list multiple methods. Enter any other methods in the field manually.*	Add Method / Analytical Method(s)
	Delete Method: 1311/8260B TCLP VOC
	Delete Method: "E8260B Volatile Organic Compounds By Gas Chromatography

Laboratory-related Questions

14. Laboratory name and location	Energy Laboratories, Helena, MT
15. Laboratory project ID	H1382-Helena Solvent Site, Work Order H17050126, Project name: DEQ 08
16. Does all data conform to analytical methods and data quality objectives specified for this project?	Yes ○ No ●

Comments

In the Laboratory Control Sample 051317_LCS_3, the surrogate recovery for tolune-d8 at 120% was slightly higher than the high QA limit of 119%. This would bias results for toluene slightly high. Toluene was not detected in the project samples, and no qualification is necessary.

If no, explain

	Yes	No	Comments
17. Were samples received in good condition and at appropriate temperature, chain-of-custody forms complete, and all samples analyzed within holding times?	○	●	The samples were collected at the site at 2:00 and 2:10 pm, and taken directly to Energy Labs where they were hand-delivered at 2:35 pm. The samples were received at the lab at 18.3 degrees C, which is higher than the specified limit of 6 C. It should be noted that the water sample was collected from a barrel of water stored in a warm shed, and the soil was collected from soil that was sitting outside in a roll-off bin that had been sitting in the sun, so the ambient temperatures of the samples were elevated prior to collection. The samples were delivered to the lab within 30 minutes of collection, which is well within the method holding time of 14 days. Upon delivery at the lab, the lab placed the samples under controlled, chilled conditions. No qualification of the data is necessary due to the 30 minutes that passed between sample collection and delivery to the lab. Additionally, the lab check-in sheet indicates that lables on two of four soil jars did not have id/date/time, but these samples were logged in with information from the COC. The quality of the data is not affected by the labling error.
17a. Were chain-of-custody forms complete?	●	○	
17b. Were samples received in good condition, preserved, and at appropriate temperature (VOA no headspace, appropriate pH, temperature 4° C +/- 2° for most samples)?	○	●	See above. Other than the sample temperature and labeling error, the samples were received in good condition (proper pH, no headspace, etc.)

If no, explain

	Yes	No	Comments
17c. Were the samples analyzed within method-specified or technical holding times?	●	○	
18. Were all laboratory quality control procedures complied with and is data validated without qualifiers? Note: non-QA/QC related U and J flags do not require additional qualification in this section.	●	○	
19. Were the total number of lab method blanks at least 5% of the total number of samples, or as required by the method?	●	○	
20. Were the total number of lab matrix spike samples prepared at least 5% of the total number of samples, or as required by the method?	●	○	

21. Please list any project samples used for matrix spike/matrix spike duplicates.

Add Sample	Lab ID	Field Sample ID	Comments
Delete Sample			no project samples were used for MSMSD

	Yes	No	Comments
22. Is the total number of laboratory control samples at least 5% of the total number of samples?	●	○	

Consultant/Validator Questions

	Yes	No	Comments
23. Are the detection limits appropriate for the project (i.e. at or below screening levels)?	●	○	
24. Are the reported units appropriate for the sample matrix (i.e. water results in ug/L, not mg/kg)?	●	○	
25. Do the analytical methods comply with project requirements (e.g. in the SAP, work plan, or QAPP)?	●	○	
26. Do the laboratory reports include all constituents requested to be analyzed on the chain-of-custody or under the sampling plan or other applicable document?	●	○	
27. Is the number of sample blanks (e.g. equipment, trip, or field blanks) equal to at least 10% of the total number of samples, or as otherwise required?	○	●	No blanks were collected for this soil sampling work. All detected contaminants in the samples are assumed to be attributable to contamination from to the site.

If no, explain

	Yes	No	Comments
28. Are field blanks free from contamination, duplicates collected as required, and field duplicate percent differences within data validation quality control limits?	○	●	Field blanks and duplicates were not collected for the samples in this data package. All detected contaminants are assumed to be related to the site.
28a. Were all blank samples free of analyte contamination?	●	○	Method blanks did not contain detectable contaminants.
28b. Were field duplicates collected as required?	○	●	Field duplicates were not collected or required for these samples.

If no, explain

	Yes	No	Comments
28c. Are field duplicate relative percent differences within data validation quality control limits?	○	●	Field duplicates were not collected as part of this sampling event. The usability of the results is not affected by this.

If no, explain

29. Please provide an Excel or CSV file to the DEQ project manager (via e-mail or CD) that lists all samples evaluated in this summary and lists any qualified data.
Please use the following format:

Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Example 48310-2.31E	Example GW-1	R	Sample dropped in lab and unrecoverable
Example 48310-2.32D	Example GW-2		

Please use the following format for qualifiers. See EPA's National Functional Guidelines for more information on qualifiers for unique samples such as dioxins.

Qualifier	Explanation
C	Pesticide and Arochlor results confirmed with GC/MS
J-	Estimated value, may be biased low
J	Analyte identified, but concentration is estimated
J+	Estimated value, may be biased high
NJ	Tentatively identified compound
R	Sample result rejected
U	Analyte analyzed for, but not detected above quantitation limit
UJ	Analyte not detected above CRQL, but CRQL may be inaccurate
X	Pesticide and Arochlor results attempted using GC/MS, but unsuccessful

If you wish to manually enter qualified sample results, please use the table below.

Add Sample	Lab ID	Field Sample ID	Qualifiers	Comments (indicate whether the issue biases the results high or low)
Delete Sample				no data were qualified in this report

		Comments
30. What is the percent completeness (samples planned versus valid samples collected)?	100	
31. Was the completeness goal met?	Yes ● No ○	

32. Other general comments or observations?

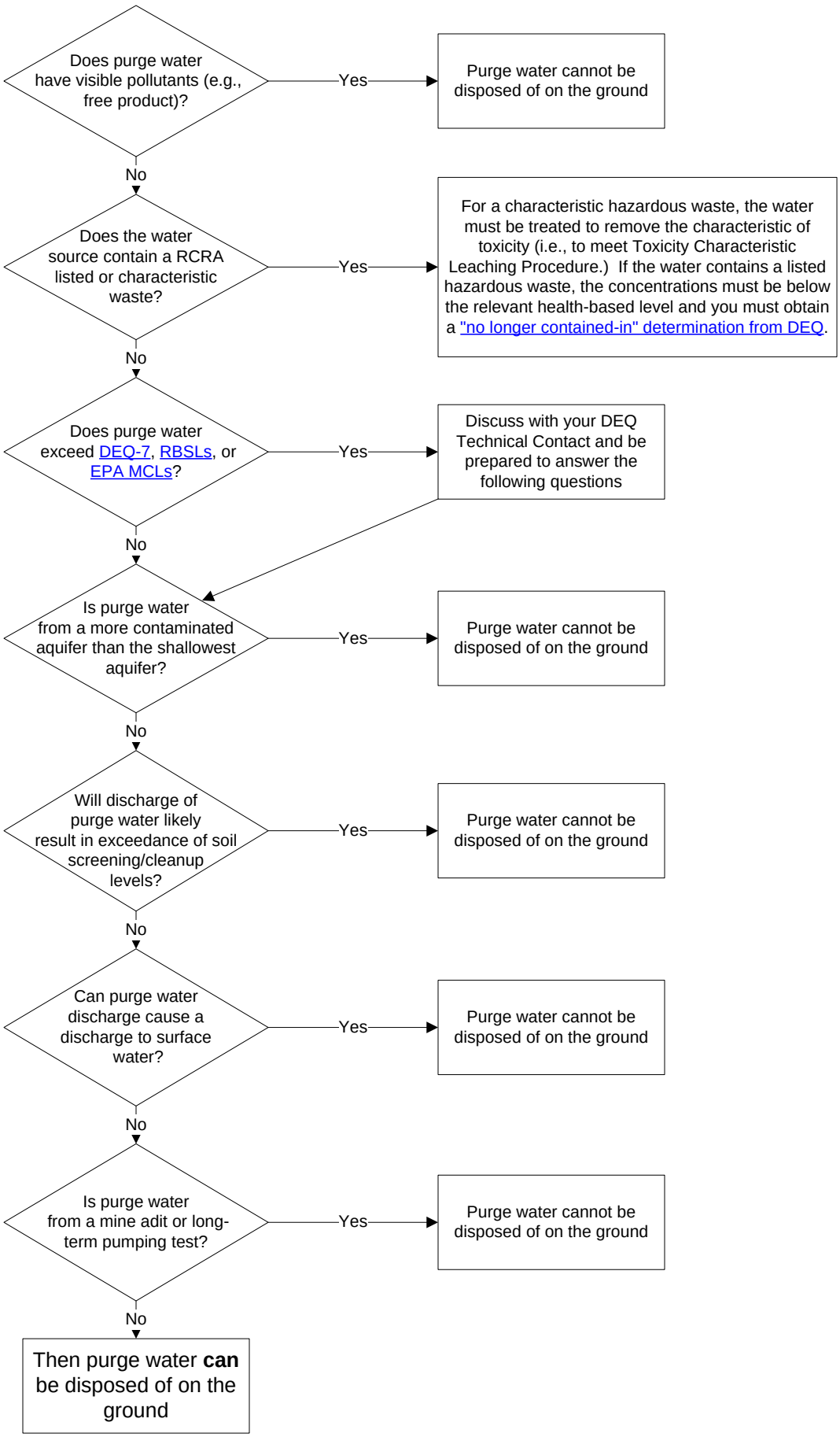
Split Samples

		Comments
33. Did DEQ collect split samples?	Yes ○ No ●	

Print Form | Save As | Open Instructions | Hide Instructions

DISPOSAL OF UNTREATED PURGE WATER FROM MONITORING WELLS

7/27/2015



DEQ
Montana Department of Environmental Quality

May 25, 2017

Mr. David Donohue
HydroSolutions, Inc.
303 Clarke Street
Helena, MT 59601

Subject: Helena Solvent Site, 1118 Helena Avenue, Helena Montana: Investigation Derived Waste Water (IDW water)

Dear Mr. Donohue:

The Montana Department of Environmental Quality (DEQ) received your email dated May 20, 2017, with the attached analytical results for approximately 20 gallons of IDW water. The IDW water was generated during recent investigation activities at the above-referenced facility due purging of monitoring wells for sampling. DEQ understands that the IDW water is containerized and temporarily stored in the locked project shed located at 1118 Helena Avenue. DEQ validated the sample results, and the validation report is attached to this letter. DEQ has determined that the data are of sufficient quality for the purpose of determining that this IDW water no longer contains a listed waste.

On May 5, 2017, HydroSolutions collected a sample of the IDW water and submitted the sample to Energy Laboratories for analysis of Method 8260B. The sample contained tetrachloroethene (PCE) at 2.4 micrograms per liter (ug/L), trichloroethene (TCE) at 0.42 ug/L (at an estimated concentration below the detection limit), and methyl ethyl ketone (MEK) at 20 ug/L. The PCE and TCE both have a Circular DEQ-7 Montana Numeric Water Quality Standard (DEQ-7 Standard) of 5 ug/L, and therefore the PCE and TCE in the IDW water does not exceed DEQ-7 Standards. There is no DEQ-7 Standard for MEK; however, the concentration of MEK in the sample does not exceed the EPA Regional Tapwater Screening Level of 560 ug/L. Furthermore, the IDW water does not exhibit a characteristic of a hazardous waste.

DEQ has made a decision that the IDW water no longer contains listed waste (a 'contained-in' decision) and can be discharged to the land-surface on the property at the 1118 Helena Avenue. However, please keep in mind that all of the criteria listed on DEQ's purge water disposal flowchart must be met: https://deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/PurgeWater7_27_15.pdf.

If you have questions, please contact me at 406-444-0212 or via email at lalvey@mt.gov.

Sincerely,

Laura Alvey

Laura Alvey
Groundwater Remediation Program

cc: Jon Morgan, DEQ Legal

Appendix H
Granulated Activated Carbon Waste Manifest

Mountain States Environmental Services, Inc.

P.O. Box 50445
Billings, MT 59105
Phone (406) 248-4777 Fax (406) 248-7333

WORK ORDER AUTHORIZATION

Generator: Montana DEQ
Attn: Dave Donohue
Physical:1118 Helena Ave.
Helena, MT 59601
Mail: P.O. Box 200901
Helena, MT 59620-0901
Phone: 406-443-6169

Work order# : 4190
EPA ID #: MTR 000 210 252

Manifest # : 15704001 JJK

Cust. P.O. # :

Bill to Customer: Hydro Solutions
Attn: Dave Donohue
Mail: 303 Clarke Street
Helena, MT 59601
Phone: 406-465-8330
Email:davidd@hydrosi.com

Site Contact: Luke Osborne
Phone:406-465-8330
Site Contact: Roy Svingen
Phone:406-465-3305

Pickup for Disposal

Quantity	Size/Type	Material	Disp. Site
2	~~55~~ 85/DM	GAC units with Perc(Tetrachloroethylene)	Systech

Equip./Materials:	Volume Of Waste:
Deliver:	2X85

The Undersigned hereby authorizes and requests Mountain States Environmental Services to perform the work specified above.

Laura J. Alvey
Name (Please Print)

MT DEQ Env. Sci. Spec. 5/24/2017
Signature / Title Date

5-24-17
MSES Representative Date

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: MTR000210252
2. Page 1 of 1
3. Emergency Response Phone: 800-884-2597 Smith Systems
4. Manifest Tracking Number: 015704001 JJK

5. Generator's Name and Mailing Address
Montana DEQ
P.O.Box 200901 Attn:Dave Donohue
Helena,MT 59620
Generator's Phone: 406 443-6169

Generator's Site Address (if different than mailing address)
1115 Helena Ave. Attn: Luke Osborne
Helena,MT 59601 (406)465 3305

6. Transporter 1 Company Name: SMITH SYSTEMS TRANSPORTATION
U.S. EPA ID Number: NED986382133

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address: SAMCO ENVIRONMENTAL CORPORATION
1420 SOUTH CEMENT ROAD
FREDONIA, KS 66736
Facility's Phone: 800-778-7224 107
U.S. EPA ID Number: KSD980633259

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. RQ, UN2811, Waste Toxic solids, organic, n.o.s., 6.1, PGIII (Spent carbon, Tetrachloroethylene/ D039, F002) (ERG#154)	2	DM	600	P	D039 F002
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1) CG1418497 Spent GAC carbon units w/Tetrachloroethylene 2x85

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Luke T. Osborne
Signature
Month 5 Day 24 Year 17

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Bryan Russell
Signature
Month 5 Day 24 Year 17
Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name
Signature
Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

U.S. EPA Form 8700-22

Read all instructions before completing this form.

1. This form has been designed for use on a 12-pitch (elite) typewriter which is also compatible with standard computer printers; a firm point pen may also be used—press down hard.
2. Federal regulations require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage, and disposal facilities to complete this form (EPA Form 8700–22) and, if necessary, the continuation sheet (EPA Form 8700–22A) for both inter- and intrastate transportation of hazardous waste.

Public reporting burden for this collection of information is estimated to average: 30 minutes for generators, 10 minutes for transporters, and 25 minutes for owners or operators of treatment, storage, and disposal facilities. This includes time for reviewing instructions, gathering data, completing, reviewing and transmitting the form. Any correspondence regarding the PRA burden statement for the manifest must be sent to the Director of the Collection Strategies Division in EPA's Office of Information Collection at the following address: U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW., Washington, DC 20460. Do not send the completed form to this address.

I. Instructions for Generators

Item 1. Generator's U.S. EPA Identification Number

Enter the generator's U.S. EPA twelve digit identification number, or the State generator identification number if the generator site does not have an EPA identification number.

Item 2. Page 1 of ___

Enter the total number of pages used to complete this Manifest (*i.e.*, the first page (EPA Form 8700-22) plus the number of Continuation Sheets (EPA Form 8700-22A), if any).

Item 3. Emergency Response Phone Number

Enter a phone number for which emergency response information can be obtained in the event of an incident during transportation. The emergency response phone number must:

1. Be the number of the generator or the number of an agency or organization who is capable of and accepts responsibility for providing detailed information about the shipment;
2. Reach a phone that is monitored 24 hours a day at all times the waste is in transportation (including transportation related storage); and
3. Reach someone who is either knowledgeable of the hazardous waste being shipped and has comprehensive emergency response and spill cleanup/incident mitigation information for the material being shipped or has immediate access to a person who has that knowledge and information about the shipment.

Note: Emergency Response phone number information should only be entered in Item 3 when there is one phone number that applies to all the waste materials described in Item 9b. If a situation (*e.g.*, consolidated shipments) arises where more than one Emergency Response phone number applies to the various wastes listed on the manifest, the phone numbers associated with each specific material should be entered after its description in Item 9b.

Item 4. Manifest Tracking Number

This unique tracking number must be pre-printed on the manifest by the forms printer.

Item 5. Generator's Mailing Address, Phone Number and Site Address

Enter the name of the generator, the mailing address to which the completed manifest signed by the designated facility should be mailed, and the generator's telephone number. Note, the telephone number (including area code) should be the normal business number for the generator, or the number where the generator or his authorized agent may be reached to provide instructions in the event the designated and/or alternate (if any) facility rejects some or all of the shipment. Also enter the physical site address from which the shipment originates only if this address is different than the mailing address.

Item 6. Transporter 1 Company Name, and U.S. EPA ID Number

Enter the company name and U.S. EPA ID number of the first transporter who will transport the waste. Vehicle or driver information may not be entered here.

Item 7. Transporter 2 Company Name and U.S. EPA ID Number

If applicable, enter the company name and U.S. EPA ID number of the second transporter who will transport the waste. Vehicle or driver information may not be entered here.

If more than two transporters are needed, use a Continuation Sheet(s) (EPA Form 8700-22A).

Item 8. Designated Facility Name, Site Address, and U.S. EPA ID Number

Enter the company name and site address of the facility designated to receive the waste listed on this manifest. Also enter the facility's phone number and the U.S. EPA twelve digit identification number of the facility.

Item 9. U.S. DOT Description (Including Proper Shipping Name, Hazard Class or Division, Identification Number, and Packing Group)

Item 9a. If the wastes identified in Item 9b consist of both hazardous and nonhazardous materials, then identify the hazardous materials by entering an "X" in this item next to the corresponding hazardous material identified in Item 9b.

Item 9b. Enter the U.S. DOT Proper Shipping Name, Hazard Class or Division, Identification Number (UN/NA) and Packing Group for each waste as identified in 49 CFR 172. Include technical name(s) and reportable quantity references, if applicable.

Note: If additional space is needed for waste descriptions, enter these additional descriptions in Item 27 on the Continuation Sheet (EPA Form 8700-22A). Also, if more than one Emergency Response phone number applies to the various wastes described in either Item 9b or Item 27, enter applicable Emergency Response phone numbers immediately following the shipping descriptions for those Items.

Item 10. Containers (Number and Type)

Enter the number of containers for each waste and the appropriate abbreviation from Table I (below) for the type of container.

TABLE I.–TYPES OF CONTAINERS

BA = Burlap, cloth, paper, or plastic bags.	DT = Dump truck.
CF = Fiber or plastic boxes, cartons, cases.	DW = Wooden drums, barrels, kegs.
CM = Metal boxes, cartons, cases (including roll-offs).	HG = Hopper or gondola cars.
CW = Wooden boxes, cartons, cases.	TC = Tank cars.
CY = Cylinders.	TP = Portable tanks.
DF = Fiberboard or plastic drums, barrels, kegs.	TT = Cargo tanks (tank trucks).
DM = Metal drums, barrels, kegs.	

Item 11. Total Quantity

Enter, in designated boxes, the total quantity of waste. Round partial units to the nearest whole unit, and *do not* enter decimals or fractions. To the extent practical, report quantities using appropriate units of measure that will allow you to report quantities with precision. Waste quantities entered should be based on actual measurements or reasonably accurate estimates of actual quantities shipped. Container capacities are not acceptable as estimates.

Item 12. Units of Measure (Weight/Volume)

Enter, in designated boxes, the appropriate abbreviation from Table II (below) for the unit of measure.

TABLE II.–UNITS OF MEASURE

G = Gallons (liquids only).	N = Cubic Meters.
K = Kilograms.	P = Pounds.
L = Liters (liquids only).	T = Tons (2000 Pounds).
M = Metric Tons (1000 kilograms).	Y = Cubic Yards.

Note: Tons, Metric Tons, Cubic Meters, and Cubic Yards should only be reported in connection with very large bulk shipments, such as rail cars, tank trucks, or barges.

Item 13. Waste Codes

Enter up to six federal and state waste codes to describe each waste stream identified in Item 9b. State waste codes that are not redundant with federal codes must be entered here, in addition to the federal waste codes which are most representative of the properties of the waste.

Item 14. Special Handling Instructions and Additional Information

1. Generators may enter any special handling or shipment-specific information necessary for the proper management or tracking of the materials under the generator's or other handler's business processes, such as waste profile numbers, container codes, bar codes, or response guide numbers. Generators also may use this space to enter additional descriptive information about their shipped materials, such as chemical names, constituent percentages, physical state, or specific gravity of wastes identified with volume units in Item 12.
2. This space may be used to record limited types of federally required information for which there is no specific space provided on the manifest, including any alternate facility designations; the manifest tracking number of the original manifest for rejected wastes and residues that are re-shipped under a second manifest; and the specification of PCB waste descriptions and PCB out-of-service dates required under 40 CFR 761.207. Generators, however, cannot be required to enter information in this space to meet state regulatory requirements.

Item 15. Generator's/Offeror's Certifications

1. The generator must read, sign, and date the waste minimization certification statement. In signing the waste minimization certification statement, those generators who have not been exempted by statute or regulation from the duty to make a waste minimization certification under section 3002(b) of RCRA are also certifying that they have complied with the waste minimization requirements. The Generator's Certification also contains the required attestation that the shipment has been properly prepared and is in proper condition for transportation (the shipper's certification). The content of the shipper's certification statement is as follows: "I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent." When a party other than the generator prepares the shipment for transportation, this party may also sign the shipper's certification statement as the offeror of the shipment.
2. Generator or Offeror personnel may preprint the words, "On behalf of" in the signature block or may hand write this statement in the signature block prior to signing the generator/offeror certification, to indicate that the individual signs as the employee or agent of the named principal.

Note: All of the above information except the handwritten signature required in Item 15 may be pre-printed.

Land Disposal Restrictions
Notification

One-time notification ☐ Yes ☑ No

Generator name: MONTANA DEQ **Manifest #:** 015704001JJK

1. EPA Hazardous Waste Codes

Manifest line Item	Profile number	Waste codes	Subcategory	Specified technology	WW/ NWW	F001–F005 solvents*	UHCs §268.9(a)**
1	CG1416497	D039,F002	TETRACHLORO-ETHYLENE		NWW	17	

***Use corresponding number in table above for F001–F005 solvents.**

1. Acetone	7. *o*-Cresol	13. *n*-Butyl alcohol	19. Carbon disulfide	25. Carbon tetrachloride
2. Chlorobenzene	8. *o*-Dichlorobenzene	14. *m*-Cresol	20. *p*-Cresol	26. Mixed cresols
3. Isobutyl alcohol	9. Methanol	15. Ethyl acetate	21. Ethylbenzene	27. Ethyl ether
4. Nitrobenzene	10. Pyridine	16. Methylene chloride	22. Methyl ethyl ketone	28. Methyl isobutyl ketone
5. 1,1,2-Trichloroethane	11. 1,1,2-Trichloro-1,2,2-Trifluoroethane	17. Tetrachloroethylene	23. Toluene	29. 1,1,1-Trichloroethane
6. Benzene	12. Cyclohexanone	18. Trichloroethylene	24. Trichloromono-fluoromethane	30. Mixed xylene

a. Is 2-nitropropane or 2-ethoxyethanol present? ☐ **Yes** ☑ **No (F005 Only)** ☐ **N/A**

b. Is your waste an F001–F005 solvent containing only one or more of the following: carbon disulfide, cyclohexanone, methanol? ☐ **Yes** ☑ **No** ☐ **N/A**

2. If your waste is an F039 listed waste, please list the applicable regulated constituents *(use an attachment if necessary):* _____

3. Is your waste subject to the alternate treatment standards for hazardous debris? ☐ **Yes** ☑ **No**
If yes, does the waste contain D001 or D003? ☐ **Yes** ☑ **No**

4. Is your waste subject to the alternate treatment standards for soil? ☐ **Yes** ☑ **No**
If yes, complete notification statement on next page.

**Use an attachment if necessary.

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Lakewood, Colorado

Land Disposal Restrictions Certification

☐ **Treatment facility to make determination.** This hazardous waste may or may not be subject to the LDR treatment standards. The treatment facility must make the determination.	Applies to manifest line items: _____ ☐ **Check** if applicable to all hazardous waste on this manifest.
☐ **Waste or soil meeting treatment standards at the point of generation.** I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR part 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(a)(3)(i)*
☐ **Treatment residues meeting treatment standards.** I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(b)(4)*
☐ **Contaminated soil that has been treated to meet treatment standards.** I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(b)(4)*
☐ **Organic wastes that have been treated to a concentration level in order to meet a treatment standard.** I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the nonwastewater organic constituents have been treated by combustion units as specified in 268.42, Table 1. I have been unable to detect the nonwastewater organic constituents, despite having used best good-faith efforts to analyze for such constituents. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(b)(4)(iii)*
☐ **Waste that has been treated to remove a characteristic but still contains UHCs.** I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(b)(4)(iv)*
☐ **Waste that has been treated to remove a characteristic and meets UHC standards.** I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic and that underlying hazardous constituents, as defined in § 268.2(i) have been treated on-site to meet the § 268.48 Universal Treatment Standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(b)(4)(v)*
☐ **Debris that has been treated to meet the alternative treatment standards for debris.** I certify under penalty of law that the debris has been treated in accordance with the requirements of 40 CFR 268.45. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.	Applies to manifest line items: _____ *Reference: §268.7(d)(3)(iii)*
☑ **Waste that requires treatment.** The waste(s) listed on this document require treatment as specified in 40 CFR 268.40 or 268.45 prior to disposal.	Applies to manifest line items: _____ ☑ **Check** if applicable to all hazardous waste on this manifest.
☐ **Soil notification statement.** This contaminated soil ☐ does/☐ does not contain listed hazardous waste and ☐ does/☐ does not exhibit a characteristic of hazazdous waste and ☐ is subject to / ☐ complies with the soil treatment standards as provided by §268.49(c) or the universal treatment standards.	Applies to manifest line items: _____ *Reference: §268.7(a)(4)*

Generator's signature	Printed/typed name & title	Date
[signature]	Laura J Alvey, MT DEQ Environmental Specialist	5/24/17

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Lakewood, Colorado

Mountain States Environmental Services, Inc. MSES

[✓] New [ ] Amended

NAME OF WASTE STREAM

GAC units with Perc

PROFILE #: CG1416497
MSES REP: Brad Fimrite

A. GENERATOR INFORMATION

Generator Name: Montana DEQ
Physical Address: 1118 Helena Ave.
City: Helena State: MT Zip: 59601
Mailing Address: P.O. Box 200901
City: Helena State: MT Zip: 59620-0901
USEPA ID #: MTR 000 210 252
State ID#:

Technical Contact: Luke Osborne or Roy Svingen
Phone: 406-465-8330 406-465-3305 or 406-443-6169 x 105 or 100
Fax:
Billing Name: Hydro Solutions
Billing Address: 303 Clarke Street
City: Helena State: MT Zip: 59601
Attention: Dave Donohue davidd@hydrosi.com
Telephone: 406-465-8330

B. DOT Shipping Name: RQ,UN2811,WASTE TOXIC SOLIDS, ORGANIC, N.O.S., 6.1, PGIII (SPENT CARBON, TETRACHLOROETHYLENE/ D039,F002) (ERG#154

UN/NA No.: UN2811 Packing Group: III Hazard Class: 6.1 RQ: F002/10LBS

C. RCRA Process Generating: Groundwater filtering

RCRA Waste? [✓] Yes [ ] No EPA Waste Codes: D039, F002
Exempt Waste?: [ ] Yes [✓] No
TSCA Waste?: [ ] Yes [✓] No
Universal Waste?: [ ] Yes [✓] No

D. REPORT CODES

SIC Code: 9511
Source Code: G44
Form Code: W310
Origin Code:
System Type:

E. OTHER COMPONENTS

	No	Yes	Total ppm
PCB's	[ ]	[ ]	
Cyanides	[ ]	[ ]	
Sulfides	[ ]	[ ]	
Pesticides	[ ]	[ ]	
Phenolics	[ ]	[ ]	
Dioxins	[ ]	[ ]	
Halogens	[ ]	[✓]	1-5%

F. PHYSICAL CHARACTERISTICS AT 70° F

1. Infectious or Biological Waste? [ ] Yes [✓] No
2. NCR Regulated Radioactivity? [ ] Yes [✓] No
3. Reactivity [✓] None [ ] Pyrophoric [ ] Cyanides [ ] Sulfides [ ] Water Reactive [ ] Shock Sensitive [ ] DOT Explosive [ ] Other

[ ] Gas (Cylinder) [✓] Solid
[ ] Aerosol [ ] Sludges
[ ] Lab-Pack [ ] Free Liquids
[ ] Loose-Pack 100%
[ ] Over-Pack

Layers: [✓] Single Layer [ ] Bi-layer [ ] Multi-layer

Viscosity: [ ] Low [ ] Medium [✓] High

Odor: [ ] None [✓] Mild [ ] Strong Describe: solvent

Color/Appearance: Black carbon granules

Weight
Density: ____ Lbs./Gal. <50 Lbs./Cu. Ft.
Dry Weight [ ] < 1.0% [ ] 5 - 20% [ ] 1 - 5% [✓] 20 - 100%

pH [ ] N/A [ ] 0-2 [✓] 4.1-10 [ ] ≥12.5 [ ] 2.1-4 [ ] 10.1-12.4 Exact:

Flash Point (liquid only)
[ ] <73°F (23°C)
[ ] 73-140°F (23-60°C)
[ ] 142-200°F (61-93°C)
[✓] >200°F (93°C)
[ ] N/A

Boiling Point
[ ] <95°F (35°C)
[✓] >95°F (35°C)
[ ] N/A

BTU/Lb.: >5,000

Dermal Toxicity LD_{50} (Mg/Kg)
[ ] ≤40 [ ] >200, ≤1000
[ ] >40, ≤200 [✓] >1000
Material poisonous by inhalation? [ ] Yes [✓] No

Oral Toxicity LD_{50} (Mg/Kg)
[✓] Solids [✓] Liquids
[ ] ≤5 [ ] >5, ≤50
[ ] >50, ≤200 [ ] >200
[ ] >50, ≤500 [✓] >500

	Yes	No
5. Is waste stored in vented drums?	[✓]	[ ]
6. Is waste pumpable?	[ ]	[✓]
7. Is waste polymerizable?	[ ]	[✓]
8. Is waste subject to the National Emission Standards for Benzene Waste Operations (40 CFR 61 SubpartFF)?	[ ]	[✓]
9. Is this waste regulated as an ozone depleting substance (40 CFR part 82)?	[ ]	[✓]
10. Does this waste contain scrap metal pieces greater than 2 inches in size?	[ ]	[✓]

G. METALS [✓] None
[ ] TCLP(mg/l) [ ] STLC(mg/l) [ ] Total(ppm)
[✓] Generator Knowledge

	Reg. Limit	Below	Above	Range
Arsenic	5 mg/L	[ ]	[ ]	
Barium	100 mg/L	[ ]	[ ]	
Cadmium	1 mg/L	[ ]	[ ]	
Chromium	5 mg/L	[ ]	[ ]	
Copper		[ ]	[ ]	
Lead	5 mg/L	[ ]	[ ]	
Mercury	0.2 mg/L	[ ]	[ ]	
Nickel	134 mg/L	[ ]	[ ]	
Selenium	1 mg/L	[ ]	[ ]	
Silver	5 mg/L	[ ]	[ ]	
Zinc		[ ]	[ ]	
Others:				

H. PHYSICAL/CHEMICAL CONSTITUENTS

Granulated Activated Carbon	80-90%
Water	5-20%
Perchloroethylene	1-10%
	100%

(Attach All MSDS, Sample Analysis and Additional Info.)

I. ANTICIPATED VOLUME

Qty.	Container	Qty.	Container
	5 gl. pail		Cubic Yard Box*
	14 gl. drum		Super Sack*
	30 gl. drum		Rolloff
2 x	55 gl. drum		Tanker*
	85 gl. drum		Other

Per [✓] 1 Time [ ] Week [ ] Month [ ] Year [ ] Other

(*) Is this waste regulated as a Marine Pollutant (49CFR 172.101) [ ] Yes [✓] No

Generator's Certification:

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge and ability to determine that no deliberate or willful omissions of composition properties exist and that all known or suspected hazards have been disclosed. I certify that the materials tested are representative of all materials described by this profile. I authorize Mountain States Environmental to make waste characterization decisions as per 40 CFR part 261 and land disposal restriction notification and certification as per 40 CFR part 268.

Generator's Authorized Signature: _____ Date: 5-24-17

Attachment 1
Operations and Maintenance (O&M) Manual

Operations & Maintenance Manual

Helena Solvent Site SVE System

DEQ-Contract No. 414026

PREPARED FOR:

Montana Department of Environmental Quality
Waste Management & Remediation Division
PO Box 200901
Helena, MT 59620-0901

May 31, 2017

PREPARED BY:

HydroSolutions®

303 Clarke Street | Helena, MT 59601 | 406.443.6169
www.hydrosi.com

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Figure 1 SVE System Layout As-Built
Figure 2 SVE System Surface Equipment As-Built

Tables

Table 1 SVE Monitoring Schedule

Appendices

Appendix A – Equipment Manufacturer's Manuals and Cut-Sheets
Appendix B – Health and Safety Plan

1.0 SVE SYSTEM OPERATIONAL PROCEDURES

Procedures have been outlined below to assist in the operation and maintenance of the Soil Vapor Extraction (SVE) system installed by HydroSolutions Inc at the Helena Solvent Site beneath the Hustad Center at 1118 Helena Avenue. System startup, ongoing operation with system checks, and temporary shutdown procedures generally address items to check and orders of operation so that safe and efficient operation is maintained. Other general operation and maintenance (O&M) requirements for long term operation and troubleshooting guides are outlined in each manufacturer's O&M manuals. SVE System As-Built and SVE System Surface Equipment As-Built for subsurface and surface equipment are included in Figures 1 and 2 in this manual. Manufacturers' manuals are also included in Appendix A of this manual.

1.1 SVE Equipment

Subsurface Equipment

- 4 – 2 inch diameter, horizontal 40 foot (0.010 slot) screens laid beneath the building [ID:SVEH1 though 4]
- 1- 4 inch diameter, horizontal 40 foot (0.020 slot) screen laid in a lateral trench on the east side of the building [ID:SVEH-5]

Surface Equipment

- 1-manifold for SVEH-1 through 5, each equipped with heat tape, a ball valve, and magnehelic vacuum gauges (0 to 80 inches water column (WC))
    - Vacuum Gauge Parts available from https://www.dwyer-inst.com/
- Blower Assembly (Parts and Service from http://www.tsdmontana.com/)
    - 30 Gallon Knockout Tank with Drain
    - High Level Float Shut-Off Switch
    - Inlet Vacuum Gauge (0 to 100 inches of WC) –[ID:VG-1]
    - Inlet Filter (*Gast Part No. AJ151G*)
    - Vacuum Relief Valve (*Gast Part No. AG252*)
    - 1 – SVE Blower (Model R6P155Q-5)
        - 5.5 Horsepower, 220 Volt, Explosion Proof Blower (Division 1 and 2, for Group D explosive atmosphere)
        - Maximum Air Flow of up to 280 standard cubic feet per minute
        - Single phase 230 volt
        - Maximum Vacuum 85 inches WC vacuum
        - Discharge Muffler (*Gast Part No. AJ121F*)
- Outlet Pressure Gauge on discharge pipe (0 to 100 inches WC) – [ID:PG-1]
- Pitot Tube and Gauge for flow measurement (0 to 300 cfm) – [ID:FM-1]
    - Parts available from https://www.dwyer-inst.com/
- Temperature Gauge (0 to 250° F) – [ID:TP-1]
- GAC #1 Outlet Pressure Gauge (0 to 60 inches WC) – [ID:PG-2]
- 2 – Granular activated carbon canisters (GAC-V-85)
    - 250 lbs. (8.9 ft^3) each

- Replacement GAC is available from http://www.geotechenv.com/pdf/vapor_phase_remediation/gac_vapor_phase_30_110.pdf.

1.2 System Startup

This procedure outlines startup activities for the SVE system after any temporary shutdown.

- ☐ Check Temperature in Shed (freezing potential is a concern for condensate in the blower/lines/carbon)
- ☐ If frozen conditions, place heater in shed and/or turn on heat tape located on inlet header pipes to ensure frozen condensation is thawed. Remove all electrical equipment and cords prior to startup.
- ☐ Check Drain Valve Closed on Knockout Drum
- ☐ Check Bleed Valve Closed on Knockout Drum
- ☐ Check Sample Ports (S-1, S-2, S-3) Closed
- ☐ Open all header valves (SVE Trench, SVE-1H, SVE-2H, SVE-3H, SVE-4H)
- ☐ Turn On Blower at Electrical Breaker Box (At Meter) Breaker 6b and 4
- ☐ Listen for Leaks, Abnormal Blower Noise, etc. Shut Down and Investigate as Necessary
- ☐ Check for Vacuum (VG-1), Flow (FM-1), Pressure (PG-1, PG-2), Temperature (TP-1)
- ☐ Balance System for optimal removal while maintaining less than 4 psig and 250 °F into the GAC treatment
- ☐ Perform Remediation Monitoring of System (Log Sheet) as Scheduled (See Section 2.0 below for specific details)
- ☐ Perform SVE Vapor Discharge Monitoring
    - Replace Carbon as per SVE Vapor Discharge Replacement Criteria
- ☐ Lock Shed

1.3 Ongoing Operation (Scheduled System Checks)

This procedure outlines the items to be performed during scheduled monitoring events such as SVE Remediation Monitoring and SVE Vapor Discharge Monitoring. The remediation monitoring is performed to assess the system operation and complete ongoing operational maintenance on the system. The SVE Vapor Discharge Monitoring is performed to assess the air treatment system for operational efficiency and break-through of contaminants which may require carbon replacement.

- ☐ Perform Remediation Monitoring of System (Log Sheet) as Scheduled (See Section 2.0 below for specific details)
- ☐ Perform SVE Vapor Discharge Monitoring as Scheduled
    - Replace Carbon in accordance with SVE Vapor Discharge Replacement Criteria
- ☐ Shut Down Blower at Electrical Breaker Box (At Meter) Breaker 4 and 6b
- ☐ Check Knockout Drum Level (drain if necessary by opening drain valve and bleed valve)
- ☐ Check Inline Filter, clean or replace if necessary
- ☐ Check Knockout Drum Drain and Bleed Valve Closed

- ☐ Turn Blower on at Electrical Breaker Box (At Meter) Breaker 4 and 6b
- ☐ Lock Shed

1.4 Temporary Shutdown

This procedure outlines a detailed preparation for temporary shutdown of the SVE system. A temporary shutdown is one where the system is put in an inoperable mode without an immediate startup. Special considerations should be made if the system will be shut down during periods of subfreezing weather to avoid line blockages or seized equipment.

- ☐ Perform Remediation Monitoring of System (Log Sheet) as Scheduled (See Section 2.0 below for specific details)
- ☐ Shut Down Blower at Electrical Breaker Box (At Meter) Breaker 4 and 6b
- ☐ Consider Disconnection of Temporary Electrical Connection at Service Entrance if Shutdown is Long-Term or Indefinite.
- ☐ Close All Header Valves (SVE Trench (SVEH-5), SVEH-1H, SVEH-2H, SVEH-3H, SVEH-4H)
- ☐ Open Bleed Valve on Knockout Drum
- ☐ Check Knockout Drum Level (drain if necessary by opening drain valve)
- ☐ If shutdown is short-term in subfreezing weather, consider auxiliary heat and activating heat tape on inlet pipes to prevent or thaw freezing condensation in blower/lines/carbon during shutdown or otherwise just prior to startup.
- ☐ Lock Shed

1.5 GAC Replacement

This procedure outlines the details for GAC replacement in the event that break-through has been established through monitoring measures.

- ☐ Perform Remediation Monitoring of System (Log Sheet) as Scheduled (See Section 2.0 below for specific details)
- ☐ Shut Down Blower at Electrical Breaker Box (At Meter) Breaker 4 and 6b
- ☐ Loosen Inlet/Outlet Union Fittings on both GAC #1 and GAC #2
- ☐ For GAC #1, Remove PVC Inlet/Outlet Fittings and Place Bungs on Drum Inlet/Outlet, Then Removed GAC #1 and Dispose GAC in Accordance with Regulatory Requirements
- ☐ Move GAC #2 in in place of GAC #1 by Orienting Drum Inlet with Union Joint, Connect Union Joints and Check for Seal
- ☐ Move Replacement GAC in to Former GAC #2 Position
- ☐ Make Sure GAC has settled in drum if it has been rolled and not upright and Remove Inlet/Outlet Bungs
- ☐ Install PVC Inlet/Outlet Fittings and Orient Inlet with PVC Union Joint, Connect Union Joints and Check for Seal.
- ☐ Turn Blower on at Electrical Breaker Box (At Meter) Breaker 4 and 6b
- ☐ Lock Shed

2.0 SVE MONITORING PROCEDURES

Monitoring of the SVE system should be performed on a regular basis as approved by the project manager. The system is set up to take readings of required parameters at letter/number identifications location corresponding to locations marked on Figure 2. Each parameter sample location is marked on the system piping with the corresponding identifier.

Parameters to be monitored each event include the following locations.

- ☐ System Vacuum – VG-1
- ☐ System Flow – FM-1
- ☐ Discharge Temperature – TP-1
- ☐ Discharge Pressure – PG-1
- ☐ GAC #1 Discharge Pressure – PG-2
- ☐ PID reading – Sample Ports S-1, S-2, S-3
- ☐ Analytical Sampling as Necessary at Sample Ports S-1, S-2 and/or S-3

The proposed monitoring schedule for the SVE system is detailed in Table 1, SVE Monitoring Schedule below. Any deviations to the proposed monitoring schedule should be discussed with DEQ prior to modification.

Table 1: SVE Monitoring Schedule

	Bi-weekly	Monthly	Quarterly	As Needed
SVE System Check	X			
SVE System Influent and Effluent PID Readings	X			
Analytical samples of GAC influent/effluent (Tedlar bags for 8260 for influent and TO15 SIM for effluent)			X	*note, if bi-weekly PID readings suggest breakthrough, then analytical sampling may need to occur prior to the scheduled quarterly event
SVE System ROI Measurement and System Optimization			X	
Performance updated for removal rates and GAC usage		X		
GAC Disposal and reorder				Approx. every 30 to 60 days

3.0 MAINTENANCE SCHEDULE

Maintenance will be performed in conjunction with system monitoring and any scheduled maintenance of the indoor mitigation system. Proper maintenance will ensure that the system is operating at its design performance to protect the environment, the health of the general public, and the health of personnel working at the HSS and by achieving the objective of reducing the contaminant source material and the potential for vapors to migrate upward and impact indoor air within the building.

If at any time, the SVE system described above is believed to be malfunctioning or operating at a sub-standard capacity, the system is to be shut-down until the problem can be isolated and remedied. All site personnel performing system monitoring will be familiar with the equipment and operation of the system and review the ongoing performance data to determine system functionality. In the event that the system is not performing to design standards, potential problems will be identified and remedied prior to affecting the site personnel, the general public, or the environment.

Primary maintenance would include the cleaning or replacement of the inline filter when dirty, replacement of GAC when breakthrough occurs, and draining of the knock-out drum when full. Any material deemed potentially hazardous such as knock-out drum contents or spent GAC will be handled and disposed in accordance with regulatory requirements. The water drained from the knock-out tanks will be analyzed for VOCs and disposed of per DEQ requirements.

4.0 EMERGENCY AND SAFETY

In the event of a site emergency, the following personnel should be notified directly:

Ms. Laura Alvey, Project Manager
Montana Department of Environmental Quality, Helena, Montana
406-444-0212

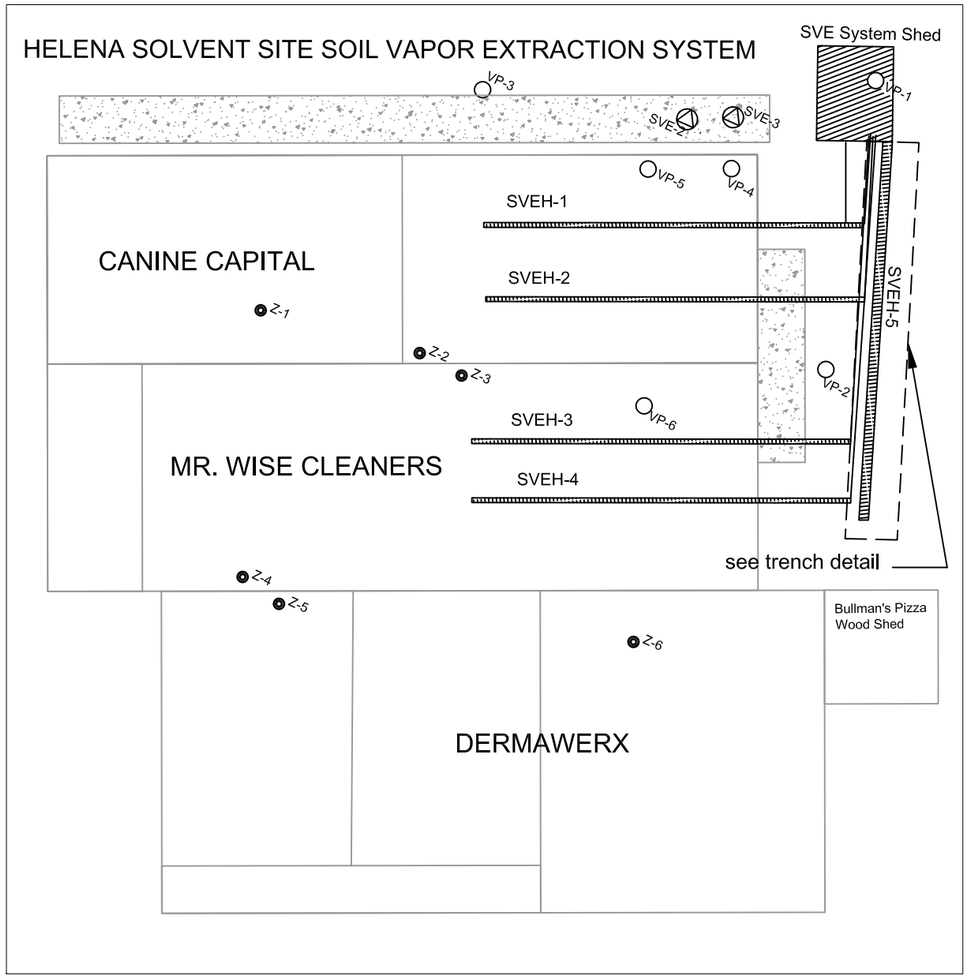
Mr. David Donohue, Project Manager
HydroSolutions Inc
406-443-6169

If the site emergency involves a threat to personal health and safety, or includes an injury, refer to the site-specific Health and Safety Plan (HASP). All other site emergencies not covered in the site-specific HASP should be referred to one of the listed personnel above or the proper emergency response agency, depending on the seriousness and nature of the emergency.

At all times, on-site personnel are referred to the HASP for procedures and personnel protective equipment requirements. Questions are to be referred to the personnel listed above or the site safety supervisor.

Figures—As-Built Diagrams

HELENA SOLVENT SITE SOIL VAPOR EXTRACTION SYSTEM



NOTES

1. Soil Vapor Extraction Horizontal Wells SVEH-1, SVEH-2, SVEH-3, and SVEH-4 are 2-inch diameter, Schedule 40 PVC Screens with 0.020-inch openings, 40-feet long each, with end caps. See Elevation Profile Sheet for depths of the SVE horizontal wells.
2. Soil Vapor Extraction Horizontal Well SVEH-5 is 4-inch diameter, Schedule 40 PVC Screen with 0.010-inch openings, 40-feet long, with end cap. SVEH-5 is set 4.0 feet below ground surface.
3. Soil Vapor Extraction Well SVEH-5 was constructed in a trench 5.0-feet wide by 4.5-feet deep, and backfilled with 3 cubic yards of pea gravel. Native fill was added to the trench and compacted to the surface. See trench detail and cross section.
4. Soil Vapor Extraction Horizontal Wells SVEH-1, SVEH-2, SVEH-3, SVEH-4, and SVEH-5 all manifold from separate connection pipes in the SVE System Shed. All riser pipes are wrapped with heat tape to 4-feet below ground surface. Details of the SVE System are shown on a separate schematic.
5. Utility Line Tracer Wire extends along SVEH-5 and 10 feet into SVEH-1, SVEH-2, SVEH-3, and SVEH-4.

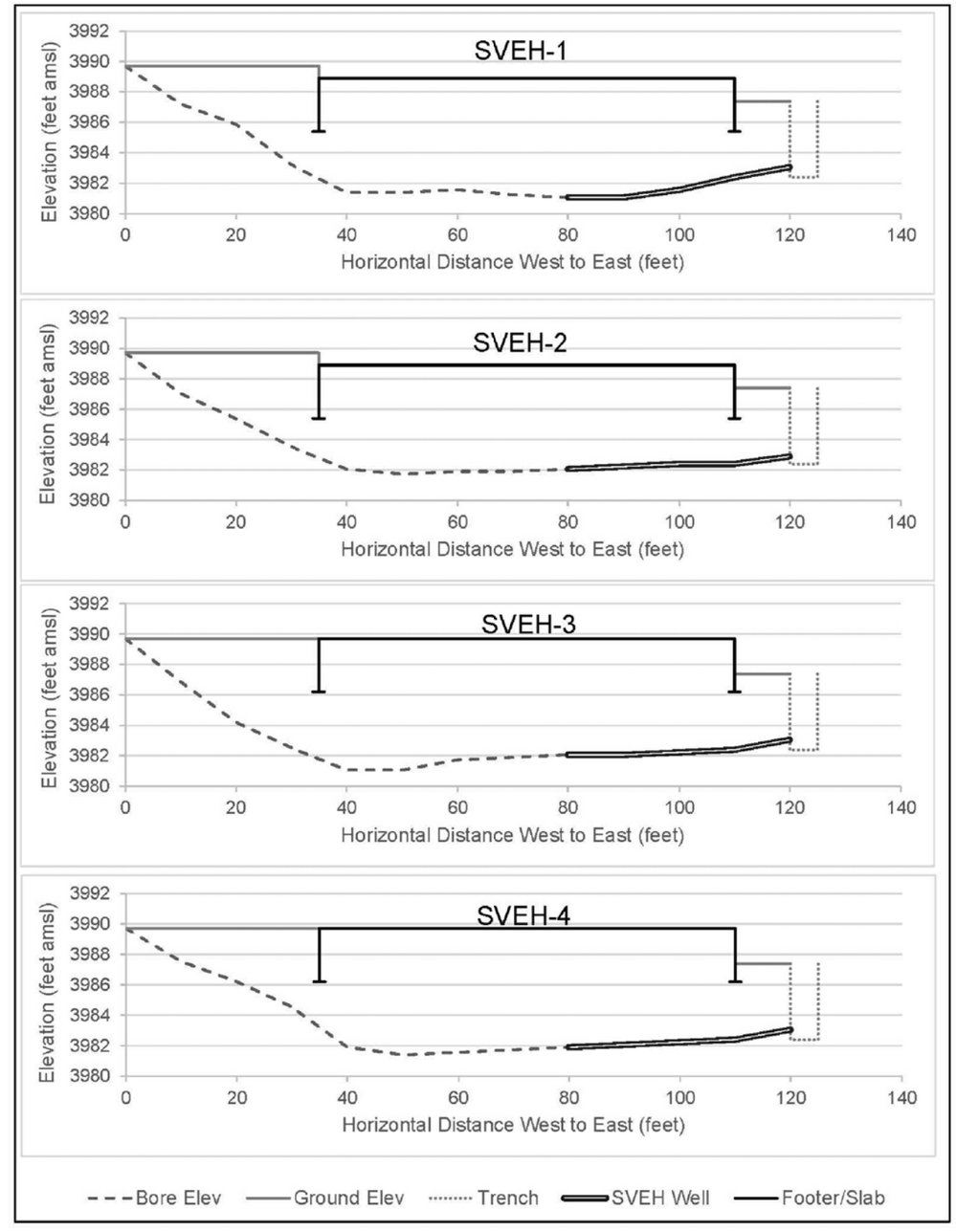
LEGEND

Vapor Point	VP-6
Groundwater Monitoring Well	MW-7
Soil Vapor Well	SVE-1
Sub-Slab Vapor Extraction Point	Z-3

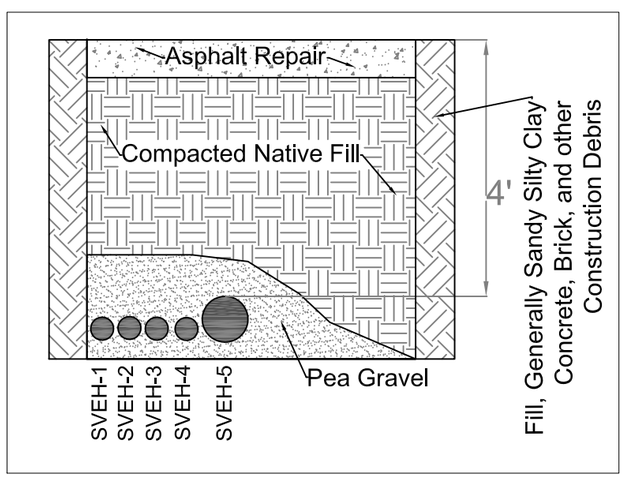
16 0 16

Scale in Feet

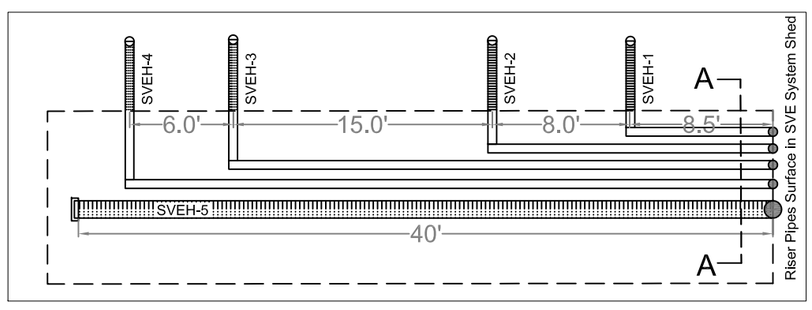
ELEVATION PROFILES OF SVE HORIZONTAL WELLS



SVEH-5 TRENCH CROSS SECTION A-A



SVEH-5 TRENCH DETAIL- PLAN VIEW

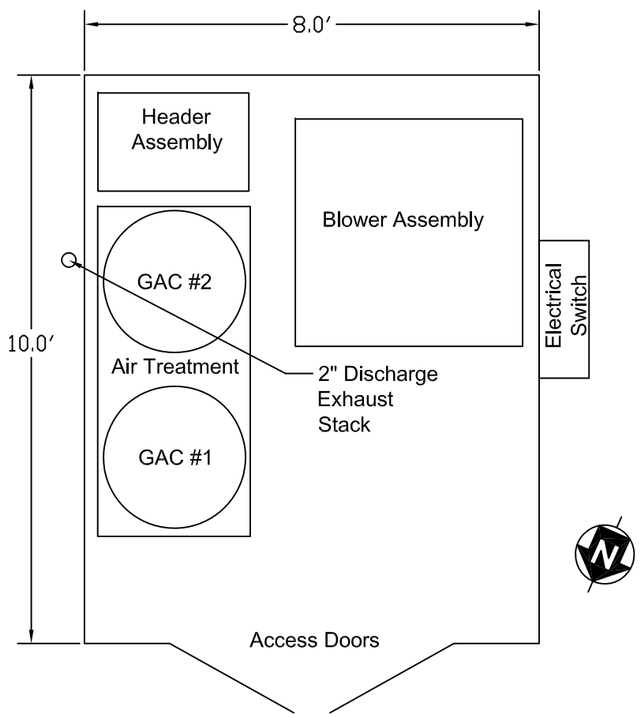


SOIL VAPOR EXTRACTION SYSTEM AS-BUILT HELENA SOLVENT SITE, 1118 HELENA AVENUE, HELENA, MONTANA	DEQ CONTRACT 414026 TASK ORDER 8	DRAWN BY: LJO	FIGURE
	DATE: 2017.04.05	APPROVED BY: DD	1

HydroSolutions
303 Clarke Street | Helena, MT 59601
406.443.6169
www.hydrosi.com

HELENA SOLVENT SITE SOIL VAPOR EXTRACTION (SVE) SYSTEM SHED AND SURFACE EQUIPMENT

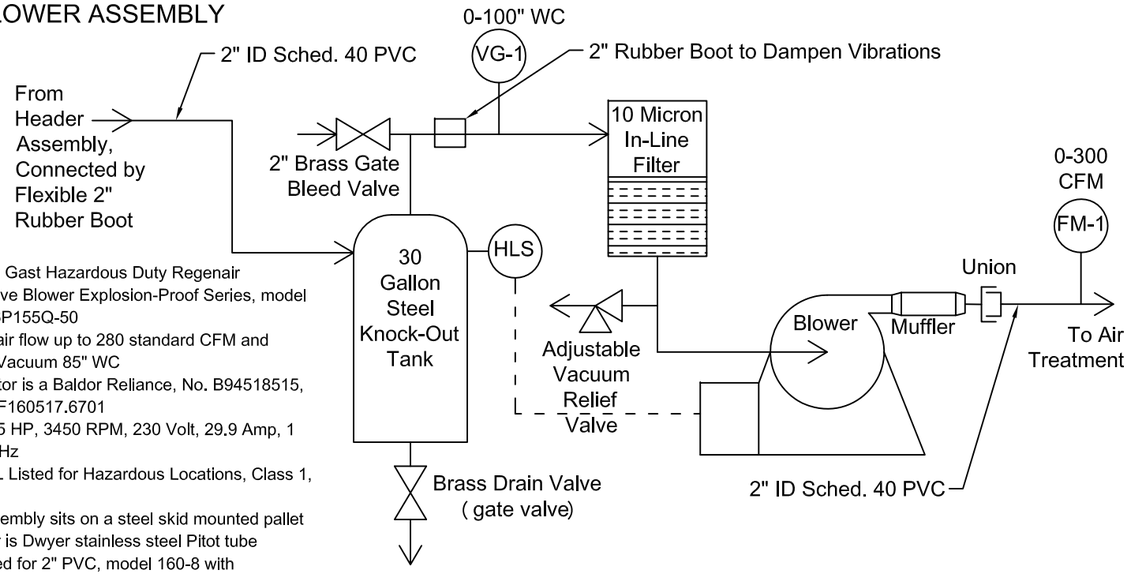
SVE SHED LAYOUT



LEGEND

VG	- Vacuum Gauge
PG	- Pressure Gauge
HLS	- High Level Switch
FM	- Flow Meter
TP	- Temperature Probe
WC	- Water Column
CFM	- Cubic feet per minute
GAC	- Granulated Activated Carbon
⋈	Valve
NTS	- Not to Scale

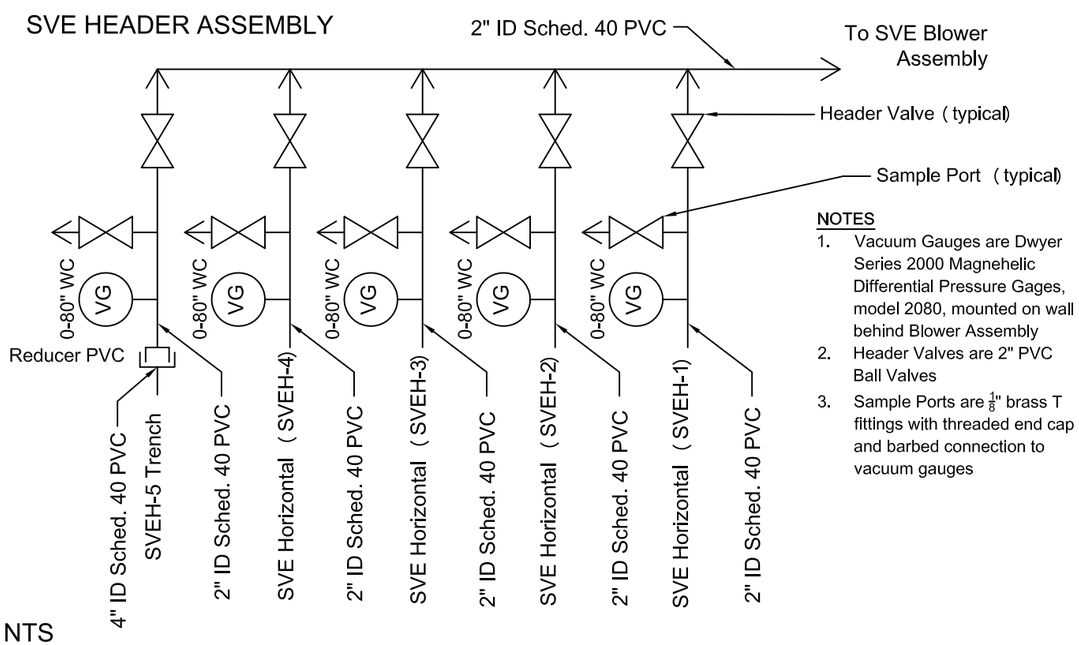
SVE BLOWER ASSEMBLY



NOTES
1. Blower is a Gast Hazardous Duty Regenair Regenerative Blower Explosion-Proof Series, model number R6P155Q-50
2. Maximum air flow up to 280 standard CFM and maximum Vacuum 85" WC
3. Blower Motor is a Baldor Reliance, No. B94518515, Serial No. F160517.6701
4. Motor is 5.5 HP, 3450 RPM, 230 Volt, 29.9 Amp, 1 Phase, 60 Hz
5. Motor is UL Listed for Hazardous Locations, Class 1, Group D
6. Blower assembly sits on a steel skid mounted pallet
7. Flow Meter is Dwyer stainless steel Pitot tube (customized for 2" PVC, model 160-8 with Magnehelic gauge in CFM
8. In-Line Filter is Gast part no. AJ151G
9. Muffler is Gast part no. AJ121F
10. Vacuum Relief Valve is Gast part no. AG252

NTS

SVE HEADER ASSEMBLY

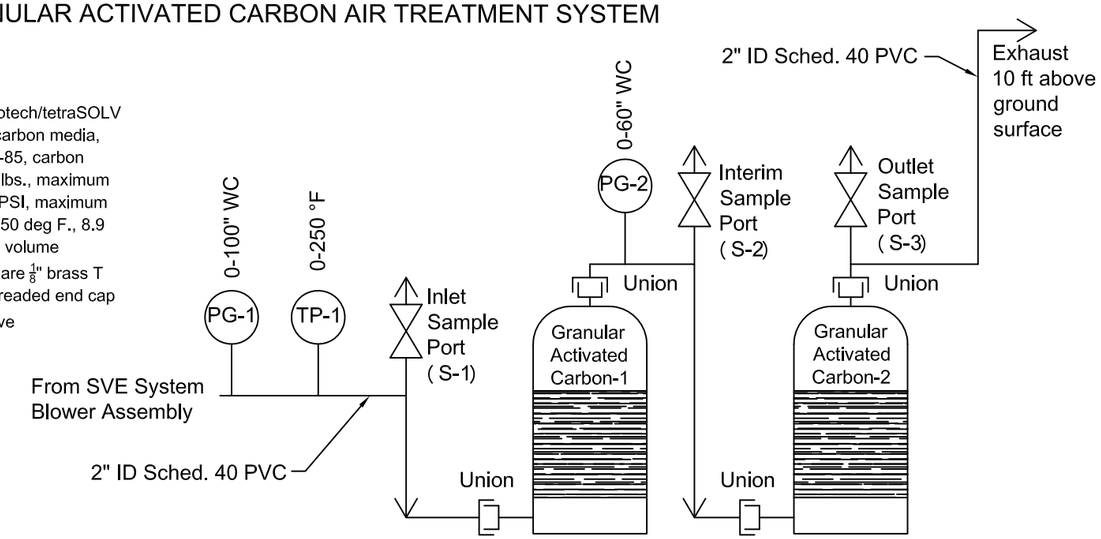


NOTES
1. Vacuum Gauges are Dwyer Series 2000 Magnehelic Differential Pressure Gages, model 2080, mounted on wall behind Blower Assembly
2. Header Valves are 2" PVC Ball Valves
3. Sample Ports are $\frac{1}{8}$" brass T fittings with threaded end cap and barbed connection to vacuum gauges

NTS

SVE GRANULAR ACTIVATED CARBON AIR TREATMENT SYSTEM

NOTES
1. GACs are Geotech/tetraSOLV vapor phase carbon media, model GAC-V-85, carbon weight of 250 lbs., maximum pressure of 4 PSI, maximum temperature 250 deg F., 8.9 cubic feet bed volume
2. Sample Ports are $\frac{1}{8}$" brass T fittings with threaded end cap and $\frac{1}{8}$" ball valve



NTS

SOIL VAPOR EXTRACTION SYSTEM SURFACE EQUIPMENT AS-BUILT	DEQ CONTRACT 414026 TASK ORDER 8	DRAWN BY: LJO	FIGURE
	DATE: 2017.04.05	APPROVED BY: DD	2
HELENA SOLVENT SITE, 1118 HELENA AVENUE, HELENA, MONTANA	HydroSolutions	303 Clarke Street | Helena, MT 59601 406.443.6169 www.hydrosi.com	

Appendix A - Equipment Manufacturer's Manuals and Cut-Sheets

WARNING: This motor is thermally protected and will automatically restart when protector resets. Always disconnect power supply before servicing.

, R6340R-50, R6P355R-50, and R7100R-50
s to any two leads.

WARNING: This motor is thermally protected and will automatically restart when protector resets. Always disconnect power supply before servicing.

50 and R4P115N-50

LINE
LINE

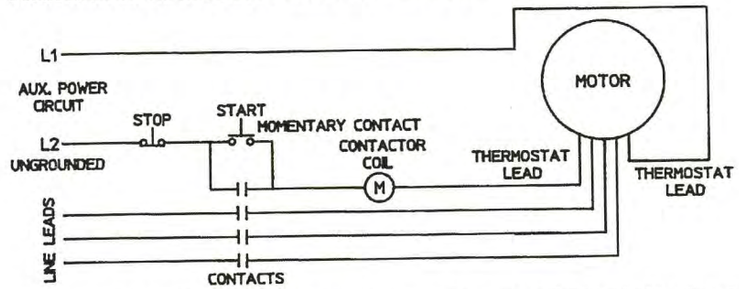
*R5125Q-50 Blowers produced after September 1992 (Serial No. 0992) do not have motor leads 5 and 8.

INSULATE

THERMOSTAT
THERMOSTAT
voltage

-50 and R6P155Q-50

Connection for Thermostat 3 Phase Motor Protection



Thermostats to be connected in series with control as shown. Motor furnished with automatic thermostats rated A.C. 115-600V. 720VA circuit shown is for 3 phase motor. Single phase motor has two line leads in the above circuit.

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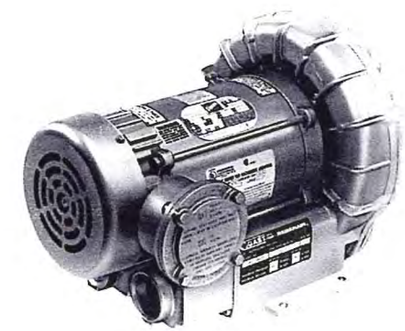
Gast Hazardous Duty Regenair® Blowers

Operation & Maintenance Manual



This instruction applies to the following models ONLY:
R3105N-50, R4310P-50, R4P115N-50, R5125Q-50, R5325R-50, R6130Q-50, R6P155Q-50, R6340R-50, R6P355R-50, and R7100R-50.

GAST
A UNIT OF IDEX CORPORATION
www.gastmfg.com
ISO 9001 CERTIFIED

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Dear Customer:

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational, and safety instructions, and you will receive years of trouble-free service.

WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS PRODUCT. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE PRODUCT.

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General Information....3
Installation....3
Plumbing....3
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Rotation....4
Operation....4
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Servicing....4
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Connection for Thermostat 3 Phase Motor Protection....6

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Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

CAUTION

Minor injury or property damage can occur if hazard is ignored.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

General Information

This instruction applies to the following models ONLY:
R3105N-50, R4310P-50, R4P115N-50, R5125Q-50, R5325R-50, R6130Q-50, R6P155Q-50, R6340R-50, R6P355R-50, and R7100R-50. These blowers are intended for use in Soil Vapor Extraction Systems. The blowers are sealed at the factory for very low leakage. They are powered with a U.L. listed electric motor Class 1 Div. 1 Group D for Hazardous Duty locations. Ambient temperature for normal full load operation should not exced 40°C (105°F).

Gast Manufacturing may offer general application guidance; however, suitability of the particular blower and/or accessories is ultimately the responsibility of the user, not the manufacturer of the blower.

INSTALLATION

DANGER: Models R5325R-50, R6130Q-50, R6340R-50, R5125Q-50, R6P155Q-50, R6P355R-50, and R7100R-50 use Pilot Duty Thermal Overload Protection. Connecting this protection to the proper control circuitry is mandated by UL674 and NEC501. Failure to do so could/may result in an EXPLOSION. See pages 5 and 6 for recommended wiring schematic for these models.

WARNING: Electric shock can result from improper wiring. A qualified person must install all wiring, conforming to all required safety codes. Grounding is necessary.

WARNING: This blower is intended for use on soil vapor extraction equipment. Any other use must be approved in writing by Gast Manufacturing, Inc.

Install this blower in any mounting position. Do not block the flow of cooling air over the blower and motor.

Plumbing

Use the threaded pipe ports for connection only. They will not support the plumbing. Be sure to use the same or larger size pipe to prevent air flow restriction and overheating of the blower. When installing fittings, be sure to use pipe thread sealant. This protects the threads in the blower housing and prevents leakage. Dirt and chips are often found in new plumbing. Do not allow them to enter the blower.

Noise

Mount the unit on a solid surface as this will reduce noise and vibration. We suggest the use of shock mounts or vibration isolation material for mounting.

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Rotation

The Gast Regenair® Blower should only rotate clockwise as viewed from the electric motor end. The casting has an arrow showing the correct direction of rotation. Confirm the proper rotation by checking air flow at the IN and OUT ports. If needed reverse rotation of three phase motors by changing the position of any two of the power line wires.

OPERATION

WARNING: Solid or liquid material exiting the blower or piping can cause eye damage or skin cuts. Keep away from air stream.

WARNING: Gast Manufacturing will not knowingly specify, design, or build any blower for installation in a hazardous, combustible, or explosive location without a motor conforming, to the proper NEMA or U.L. standards.

Blowers with standard TEFC motors should never be utilized for soil vapor extraction applications or where local, state, and or Federal codes specify the use of explosion-proof motors (as defined by the National Electric Code, Articles 100,500 c1990).

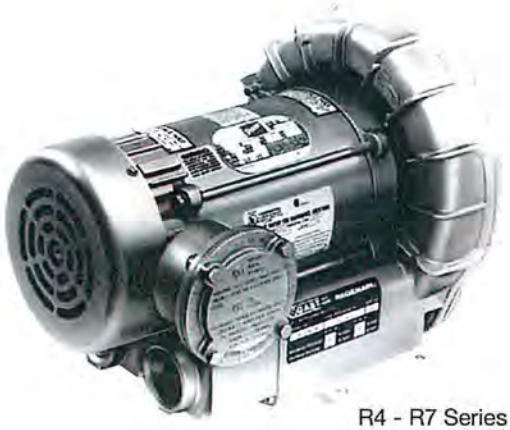
CAUTION: Attach blower to solid surface before starting to prevent injury or damage from unit movement.

Air containing solid particles or liquid must pass through a filter before entering the blower. Blowers must have filters, other accessories, and all piping attached before starting. Any foreign material passing through the blower may cause internal damage to the blower.

CAUTION: Outlet piping can burn skin. Guard or limit access. Mark "CAUTION Hot Surface. Can Cause Burns."

We reserve the ri

R3105N-50



R4 - R7 Series

Explosion Proof Motors

MODELS	Maximum Pressure (inH_2O) 60 Hz	Maximum Pressure (inH_2O) 50 Hz	Maximum Vacuum (inH_2O) 60 Hz	Maximum Vacuum (inH_2O) 50 Hz	Maximum Air Flow (CFM) 60 Hz	Maximum Air Flow (CFM) 50 Hz
R3105N-50	43	31	40	28	53	44
R4110N-50 R4310P-50	51	38	48	35	92	74
R4P115N-50	65	45	60	40	133	112
R5125Q-50	55	—	60	—	160	—
R5325R-50	65	50	65	47	160	133
R6130Q-50	60	75	70	65	215	180
R6340R-50	100	75	80	65	215	180
R6P155Q-50	95	80	85	65	280	235
R6P355R-50	100	80	85	65	280	232
R7100R-50	100	90	110	85	425	350

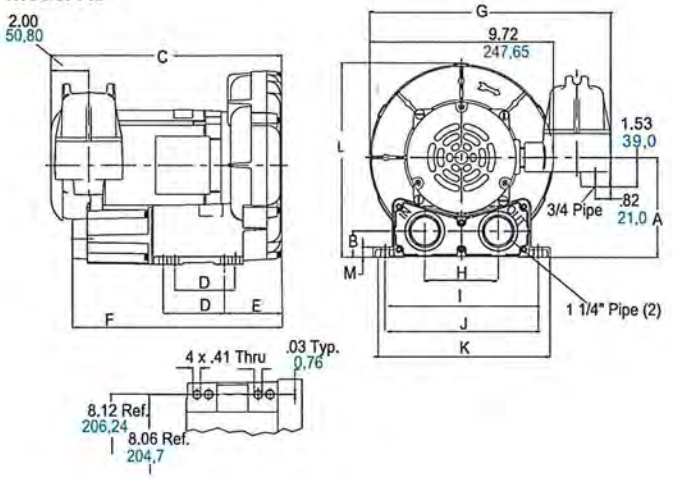
PRODUCT FEATURES

- Rugged design, maintenance free
- Quiet operation within OSHA standards
- Blowers and motors rated for continuous duty
- UL and CSA approved multi-voltage motors, incorporating approved thermal protection
- Motors classified as Explosion Proof Division 1 and 2, for Group D explosive atmospheres
- Motors carry full rated load at temperatures below Class B motor insulation limits
- Class F motor insulation used in motors larger than 1 HP
- Motors conform to NEMA frame sizes; motor enclosures conform to IP54 (suitable for outdoor use)
- Pilot duty thermal overload protection is standard on all 1 HP and larger motors
- Double sealed motor ball bearings with a B10 life exceeding 30,000 hours of continuous operation at the maximum rated continuous blower load
- Sealed air streams
- Aluminum impeller, housing, and cover; viton shaft seal
- Pressurized and leak-tested to less than 5 cc/minute

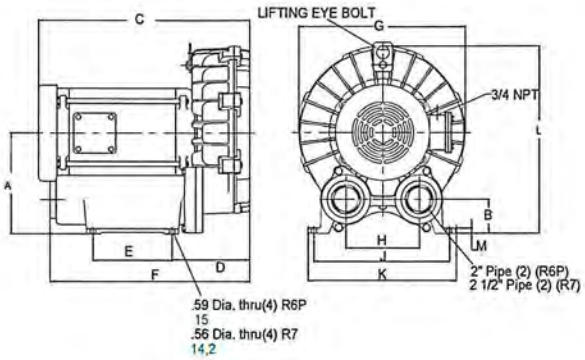
Recommended Accessories	R3 Series	R4 Series	R4P Series	R5 Series	R6 Series	R6P Series	R7 Series
Pressure Gauge	AJ496	AJ496	AE133	AE133	AE133	AE133	AE133
Vacuum Gauge	AJ497	AJ497	AE134	AE134	AE134	AE134	AE134
Pressure Filter	AJ126C	AJ126D	AJ126D	AJ126D	AJ126F	AJ126F	AJ126G
Vacuum Filter (Inline)	AJ151C	AJ151D	AJ151D	AJ151E	AJ151G	AJ151G	AJ151H

Product Dimensions (inches, mm)

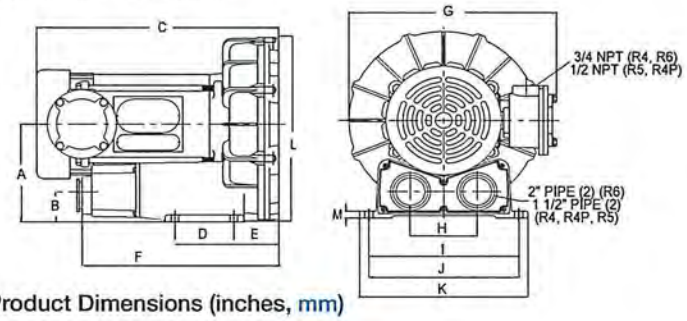
Model R3



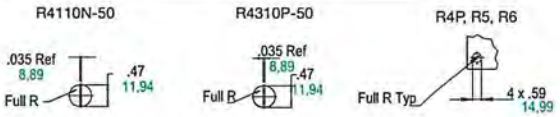
Models R6P, R7



Models R4, R4P, R5, R6



Mounting Hole Detail



Product Dimensions (inches, mm)

Model	A	B	C	D	E	F	G	H	I	J	K	L	M
R3105N-50	5.21	1.37	12.3	3.25	3.06	11.06	12.75	3.88	8.06	8.12	9.38	10.15	.53
	132	35	312	83	78	281	324	99	205	206	238	258	13
R4110N-50	6.18	1.68	15.34	3.75	2.85	12.44	12.34	3.96	8.86	8.93	10.00	11.80	.44
	157	43	390	95	72	316	313	101	225	227	254	300	11
R4310P-50	6.18	1.68	14.09	3.75	2.84	12.44	12.34	3.96	8.86	8.93	10.00	11.80	.44
	157	43	358	95	74	316	313	101	225	227	254	300	11
R4P115N-50	6.98	1.84	17.41	4.50	3.25	13.93	13.75	4.75	10.25	10.31	11.75	13.61	.60
	177	47	442	114	83	354	349	121	260	262	298	346	15
R5125Q-50	7.02	1.82	17.59	4.50	3.55	14.22	13.72	4.75	10.25	10.31	11.75	13.80	.59
	178	46	447	114	90	361	348	121	260	262	298	351	15
R5325R-50	7.02	1.82	16.75	4.50	3.55	14.22	13.56	4.75	10.25	10.31	11.75	13.80	.59
	178	46	1425	114	90	361	344	121	260	262	298	351	15
R6130Q-50	7.75	1.94	18.97	5.50	3.85	16.02	15.17	4.92	11.38	11.42	12.96	15.34	.52
	197	49	482	140	98	407	385	125	289	290	329	390	13
R6340R-50	7.75	1.94	18.82	5.50	3.85	15.89	15.17	4.92	11.38	11.42	12.96	15.34	.52
	197	49	478	140	98	404	385	125	298	290	329	390	13
R6P155Q-50	9.77	3.15	22.81	5.12	5.51	16.85	16.75	5.00	-	11.42	12.80	18.14	.50
	248	80	579	130	140	428	425	127	-	290	325	461	13
R6P355R-50	9.77	3.15	19.92	5.12	5.51	16.85	16.75	5.00	-	11.42	12.80	18.14	.50
	248	80	506	130	140	428	425	127	-	290	325	461	13
R7100R-50	10.79	3.64	22.77	8.36	8.50	21.50	18.00	7.90	-	14.76	16.14	20.03	.56
	274	92	578	212	216	546	457	201	-	375	410	509	14

Notice: Specifications subject to change without notice.

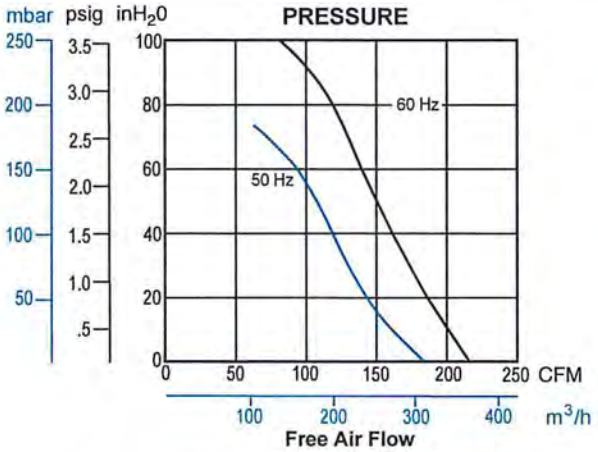
Product Specifications

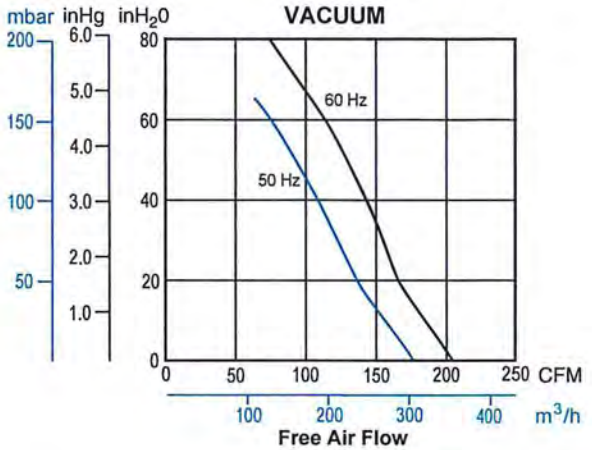
MODEL NUMBER		R3105N-50	R4110N-50	R4310P-50	R4P115N-50
Motor Enclosure		XPFC	XPFC	XPFC	XPFC
HP/kW	60 Hz	.50/0,37	1.0/0,75	1.0/0,75	1.5/1,1
	50 Hz	.33/0,25	.60/0,45	.60/0,45	1.0/0,75
Voltage	60 Hz	115/208-230-1	115/208-230-1	208-230/460-3	115/208-230-1
	50 Hz	110/220-240-1	110/220-240-1	220/380-3	110/220-240-1
Amps	60 Hz	5.2/2.9-2.6	11.4/6.2-5.6	3.4-3.3/1.6	20.3/11.2-10.6
	50 Hz	4.8/2.4-2.2	9.2/5.2-4.6	3.2/1.6	15.2/7.6-8
Starting Amps	60 Hz	12.5 @ 230V	36.5 @ 230V	19.7 @ 230V	60.6 @ 230V
	50 Hz	13 @ 220V	40.6 @ 240V	23.3 @ 220V	Consult Factory
Insulation Class		B	B	B	F
Recommended NEMA Starter Size		00/00	0/00	0/0	1/0
Net Weight (lbs/kg)		52/24	60/28	58/27	79/36

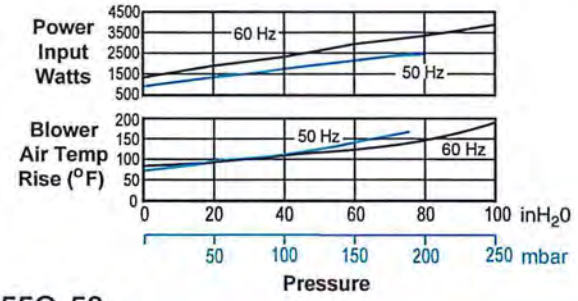
MODEL NUMBER		R5125Q-50	R5325R-50	R6130Q-50	R6340R-50
Motor Enclosure		XPFC	XPFC	XPFC	XPFC
HP/kW	60 Hz	2.0/1,5	2.0/1,5	3.0/2,2	4.0/3,0
	50 Hz	-	1.5/1,1	2.5/1,9	3.0/2,2
Voltage	60 Hz	115/230-1	208-230/460-3	230-1	208-230/460-3
	50 Hz	-	190-220/380-415-3	220-240-1	190-220/380-415-3
Amps	60 Hz	25/12.5	6.6-6.1/3.05	16.3	13-12/6
	50 Hz	-	5.0-4.4/2.5-2.6	14.7-13.5	14.4-13.4/7.2-6.8
Starting Amps	60 Hz	78 @ 230V	48 @ 230V	64 @ 230V	125 @ 230V
	50 Hz	-	Consult Factory	Consult Factory	Consult Factory
Insulation Class		F	F	F	F
Recommended NEMA Starter Size		1/0	0/0	1	1/0
Net Weight (lbs/kg)		77/35	75/34	129/59	112/51

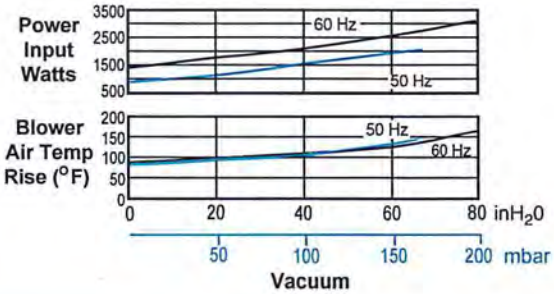
MODEL NUMBER		R6P155Q-50	R6P355R-50	R7100R-50
Motor Enclosure		XPFC	XPFC	XPFC
HP/kW	60 Hz	5.5/4,1	6.0/4,5	10/7,5
	50 Hz	4.0/3,0	4.5/3,4	8.0/6,0
Voltage	60 Hz	230-1	208-230/460-3	208-230/460-3
	50 Hz	220-240-1	190-220/380-415-3	190-220/380-415-3
Amps	60 Hz	29.9	20-18/9	26.5-24/12
	50 Hz	20.8-19.1	14.9-11/7.45-5.8	23.2-21.0/11.6-10.9
Starting Amps	60 Hz	198.4 @ 230V	59 @ 460V	105 @ 460V
	50 Hz	189 @ 240V	Consult Factory	Consult Factory
Insulation Class		F	F	F
Recommended NEMA Starter Size		0/2	1/0	2/1
Net Weight (lbs/kg)		243/110	233/105	297/134

R6340R-50

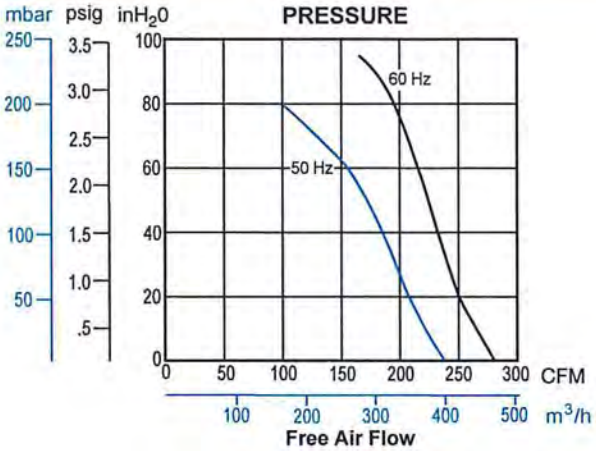


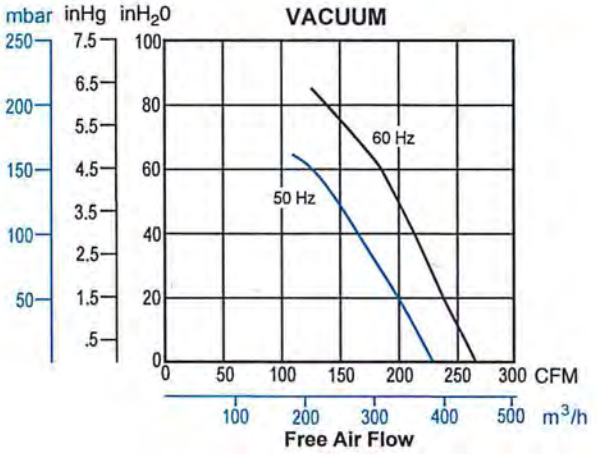


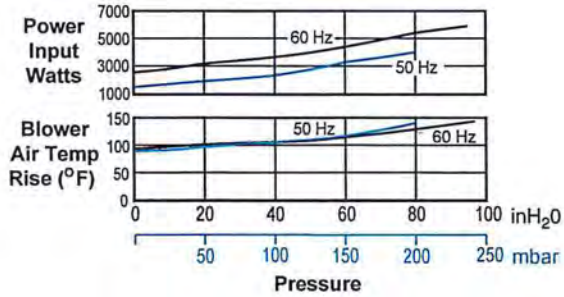


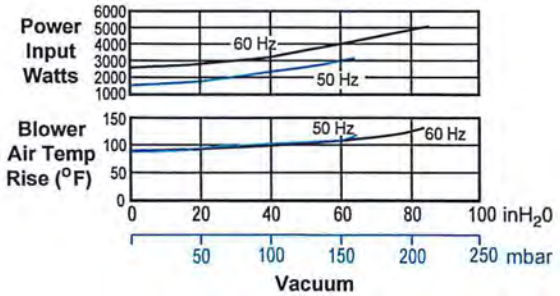


R6P155Q-50









Go To Geotech

Vapor Phase Carbon Media

geotech

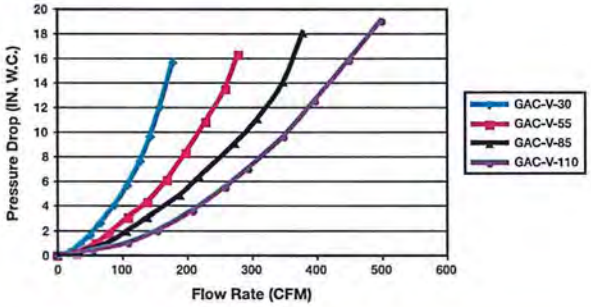
GAC-V Filter – 30-110 lb. (13.6-50 kg) Vessels

The GAC-V Filter is a media filter vessel designed to treat vapor streams. While the typical design application is activated carbon adsorbent unit, the filter vessel can easily accommodate a variety of media.

APPLICATIONS

- **Vapor phase organics removal (activated carbon)**
- **SVE off gas treatment**
- **Air stripper off gas treatment**
- **Odor off gas treatment**
- **Storage tank purge vapor treatment**
- **Pilot study**
- **Industrial process treatment**
- **Call Geotech for larger systems**

PRESSURE DROP VS. FLOW RATE



SPECIFICATIONS

Model	GAC-V-30	GAC-V-55	GAC-V-85	GAC-V-110
Overall Height	2'6" (.76m)	2'10" (.86m)	3'3" (1m)	3'7" (1.1m)
Diameter	18" (.46m)	23" (.58m)	28" (.71m)	32" (.81m)
Inlet/Outlet (FNPT)	2"	2"	2"	2"
Drain/Vent (FNPT)	OPT	OPT	OPT	OPT
GAC Fill (lbs.)	100 (45.4 kg)	175 (79.4 kg)	250 (113.4 kg)	350 (158.8 kg)
Shipping/Operational Weight	135/160 lbs. (61.2/72.6 kg)	225/300 lbs. (102/136 kg)	325/455 lbs.(147.4/206.4 kg)	450/600 lbs. (204.1/272.1 kg)
Vessel/Internal Piping	CS/CS (False Floor)	CS/CS (False Floor)	CS/CS (False Floor)	CS/CS (False Floor)
Internal Coating	Polyamide Epoxy Resin	Polyamide Epoxy Resin	Polyamide Epoxy Resin	Polyamide Epoxy Resin
External Coating	Urethane Enamel	Urethane Enamel	Urethane Enamel	Urethane Enamel
Maximum Pressure/Temperature	4 psig/250°F (.3 bar/121°C)	4 psig/250°F (.3 bar/121°C)	4 psig/250°F (.3 bar/121°C)	4 psig/250°F (.3 bar/121°C)
Cross Sectional Bed Area	2.8 ft.^{2} (.26m^2)	2.8 ft.^{2} (.26m^2)	3.7 ft.^{2} (.34m^2)	4.9 ft.^{2} (.45m^2)
Bed Depth/Volume	2.2 ft./6.3 ft.^{3} (.7m/.18m^3)	2.2 ft./6.3 ft.^{3} (.7m/.18m^3)	2.4 ft./8.9 ft.^{3} (.73m/.25m^3)	2.6 ft./12.5 ft.^{3} (.8m/.35m^3)

CALL GEOTECH TODAY (800) 833-7958

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(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

RECOMMENDED ACCESSORIES

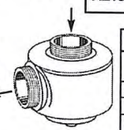
Pressure-Vacuum Gauge

To monitor the system performance so as not to exceed maximum duties. Using two (one on each side of the filter) is a great way to know when the in-line filter needs servicing. Use one AJ497 to monitor an inlet filter

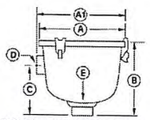
Pressure/Vacuum Gauges				
AJ496	2.50" Dia.	Pressure	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE133	2.50" Dia.	Pressure	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE133A	2.50" Dia.	Pressure	1/4" NPT	0-200 in. H_2O
AJ497	2.50" Dia.	Vacuum	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE134	2.50" Dia.	Vacuum	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE134F	3.50" Dia.	Vacuum	1/4" NPT	0-15 in. HG

Relief Valve

By setting a relief valve at a given pressure/vacuum, you can be assured that no harm will come to the blower or products in your application from excessive duties



Pressure/Vacuum Relief Valves		
AG258	1.50" NPT	Adjustable 30-200 in. H_2O; 200 cfm max
AJ121D		Silencer for AG258 Relief Valve
AG258F	2.50" NPT	Adjustable 25-200 in. H_2O; 560 cfm max
AJ121G		Silencer for AG258F Relief Valve

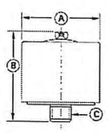


INLINE FILTERS (FOR VACUUM)

The impeller of a blower passes very closely to the housing. It is recommended to have an inlet or in-line filter to ensure a trouble-free service life.

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1	R2	R3	R4	SDR4, R4P, R4H, R5	SDR5, SDR6, R6, R6P, R7M	R6PP, SDR6P, R6PS, R7, R7S	R7S, R9, R9P, R9S
Part Number	AJ151A	AJ151B	AJ151C	AJ151D	AJ151E	AJ151G	AJ151H	AJ151M
Dimension (A)	5.88"	7.38"	7.38"	7.38	8.75	8.75"	14.00"	18.50"
Dimension (A1)	–	–	–	–	–	–	16.25"	20.75"
Dimension (B)	4.50"	6.81"	6.81"	6.81"	10.25"	10.50"	27.13"	28.13"
Dimension (C)	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	18.50"	19.50"
Dimension (D)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Dimension (E)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135H
Micron	10	10	10	10	10	10	10	10

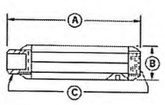


INLET FILTERS (FOR PRESSURE)

All filters are heavy duty for high-particulate service. Inlet filters for Regenair blowers are drip-proof when mounted as shown..

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1, R2	R3	R4, R4H, R4P SDR4, R5	SDR5, R6, SDR6, R5P, R6PP, R6PS	SDR6P, R7, R7P, R7S	R9, R9P, R9S
Part Number	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G	AJ126M
Dimension (A)	6.00"	6.00"	7.70"	10.62"	10.00"	16.00"
Dimension (B)	4.62"	7.12"	7.12"	4.81"	13.12"	14.62"
Dimension (C)	1.00" MPT	1.25" MPT	1.50" MPT	2.00" FPT	2.50" MPT	5" MPT
Replacement Element	AJ134B	AJ134C	AJ134E	AG340	AJ135A	AJ135H
Micron	10	10	10	10	10	10



MUFFLERS

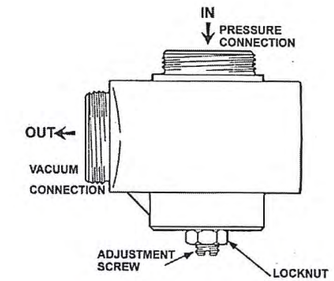
Designed to reduce noise by up to 5 dbA and remove high-frequency sound associated with all blowers.

Model Number	R1, R2	R3	R4, SDR4, R4P, R5	R4H, R6, R6P, R6PS SDR6P, SDR6	R7, R7S	R6PP, R9 Exhaust	R7P Exhaust
Part Number	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121H	AJ121M
Dimension (A)	7.46"	7.94"	12.75"	17.05"	17.44"	20.30"	33.60"
Dimension (B)	2.38"	2.62"	3.25"	3.63"	4.25"	4.75"	6.00"
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT	2.50" NPT	3" NPT	4"NPT

70-6300 F2-105 (REV-K)

BLOWER PRESSURE/VACUUM RELIEF VALVE

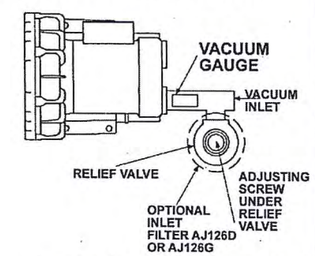
OPERATION & MAINTENANCE MANUAL



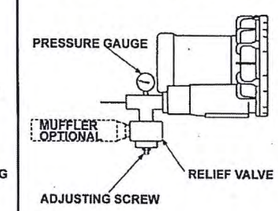
WARNING

PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS PRODUCT. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE PRODUCT

TOP VIEW - VACUUM SET-UP



SIDE VIEW - PRESSURE SET-UP



Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

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Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

GENERAL INFORMATION

By setting a relief valve at a given pressure or vacuum duty you can be assured that no harm will come to the blower or products in your application from excessive duties. The AG258 & AG258F blower relief valves can be adjusted to limit the pressure and/or vacuum level and maintain adequate air flow through the blower to prevent damage from excessive heat.

INSTALLATION

WARNING

Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

WARNING Operating Regenair Regenerative blowers with more than 1 HP motors, and insufficient air flow, can result in damage to the blower by excessive heating of the air within the blower.

CAUTION For units with air flows exceeding 200 CFM the AG258F relief valve should be used to provide proper air flow through the blower.

CAUTION Relief valve is heavy, dropping valve could cause bodily injury.

CAUTION Dusty environment can cause vacuum relief valve to become clogged and not function properly. Use inlet or in-line air filter to reduce cloging valve.

The valve is position sensitive. The recommended installation position is with the adjusting screw positioned vertically down. Fine adjustments to the limiting vacuum can be made by rotating the valve body up to 20 degrees from the vertical position.

OPERATION/ADJUSTMENT

The vacuum relief valve will have to be adjusted to limit the vacuum to the blower. The course adjustment of the relief valve is accomplished by loosening the lock nut on the adjusting screw and turning the adjusting screw with the blade of a screwdriver. Turning the adjusting screw clockwise will increase the relief valve setting, and counter clockwise will decrease the setting. Hold the screwdriver in place when retightening the lock nut.

The use of the Gast pressure gauge or vacuum gauge will provide an accurate setting.

MAINTENANCE

WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

Some motors are thermally protected and will automatically re-start when protector resets.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

If the product is supplied with an electric power chord, protect it from twisting, cuts and abrasion. When not in use, store in a clean dry place

All components of the valve are made of corrosion resistant metal. In normal operation the only maintenance required is cleaning the valve with Gast recommended solvent. Often the valve need not be disassembled to clean. Particular attention should be given to cleaning the small hole through the center of the piston. If this becomes clogged the valve will not function properly. A pin or small diameter wire may be used to clean the blocked hole.

Check that all external accessories such as relief valves and gauges are not damaged before re-operating product.

We have Gast Certified Service Centers throughout the world. For the most up-to-date listing, contact one of our sales offices below:

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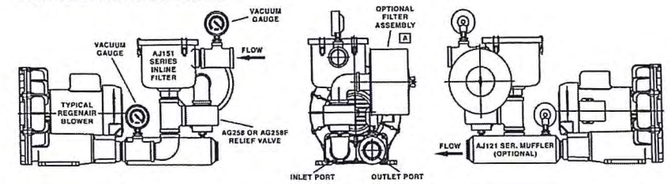
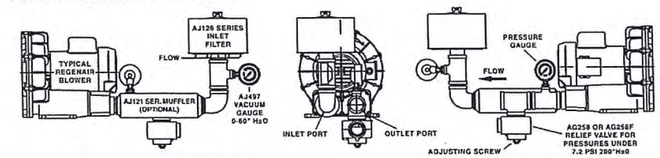
RECOMMENDED ACCESSORIES

The following diagrams are only suggested configurations for these accessories.
These accessory configurations may vary depending upon a particular unit's application.

VACUUM ACCESSORIES

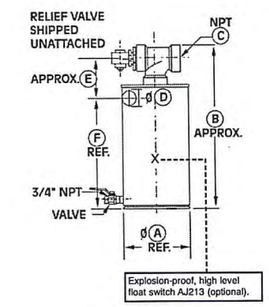


PRESSURE ACCESSORIES



MOISTURE SEPARATOR (FOR VACUUM)
This moisture separator removes liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and the build up of mineral deposits.

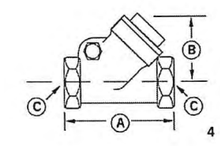
For Model Number	R3, R4, R5	R4, R4H, R4P, R5	R4H, R4M, R5, R6, R6P, R6PS,	R4M, R6, R6P, R6PP, R7, R7P, R7S, R9, R9S
Part Number	RMS160	RMS200	RMS300	RMS400
CFM capacity	160	200	300	400
Liquid capacity (gal.)	10	19	19	40
Diameter (A)	14.8"	19.7"	19.7"	24"
Dimension (B)	37.5"	35"	35"	44"
NPT outlet (C)	2"	2"	2.5"	3"
Inlet diameter (D)	2"	2"	2.5"	3"
Dimension (E)	7.5"	7.5"	7.5"	9.7"
Dimension (F)	26.6"	26.6"	26.6"	29"



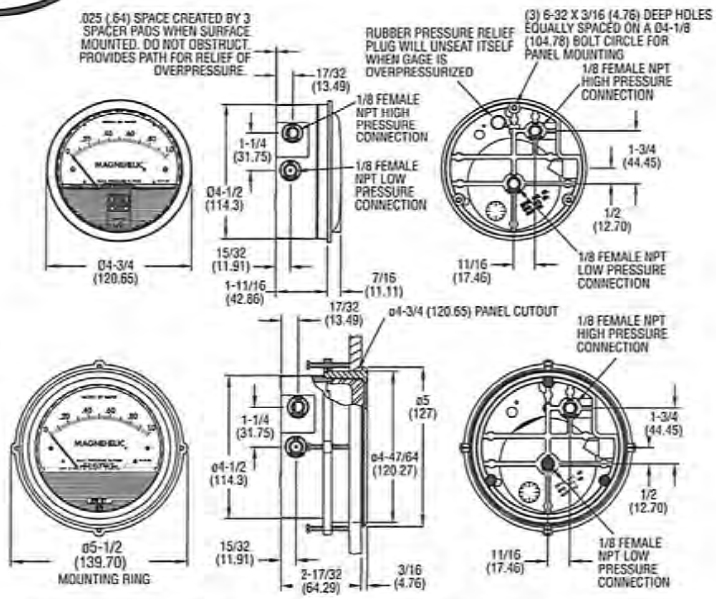
Maximum vacuum allowed: 22" Hg.

HORIZONTAL SWING TYPE CHECK VALVE
This check valve prevents backwash of fluids from entering the blower and air back-streaming. The check valve can be mounted to discharge or inlet either vertically or horizontally. The check valve will open with 3" of water pressure or vacuum.

Model Number	R1, R2	R3	R4, R5, SDR4, SDR4, R4P	R6, R6P, SDR6P, SDR6, R6PS
Part Number	AH326B	AH326C	AH326D	AH326F
Dimension (A)	3.57"	4.19"	4.50"	5.25"
Dimension (B)	2.32"	2.69"	2.94"	3.82"
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT



Magnehelic® Differential Pressure Gage



**The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.*

STANDARD GAGE ACCESSORIES: Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapters and three flush mounting adapters with screws.

MP AND HP GAGE ACCESSORIES: Mounting ring and snap ring retainer substituted for 3 adaptors, 1/4" compression fittings replace 1/8" pipe thread to rubber tubing adaptors.

OVERPRESSURE PROTECTION: Standard Magnehelic® Differential Pressure Gages are rated for a maximum pressure of 15 psig and should not be used where that limit could be exceeded. Models employ a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (excludes MP and HP models). To provide a free path for pressure relief, there are four spacer pads which maintain .023" clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. (MP model has polycarbonate cover).
Accuracy: ±2% of full scale (±3% on - 0, -100 Pa, -125 Pa, 10MM and ±4% on -00, - 00N, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20" Hg to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.
Temperature Limits: 20 to 140°F (-6.67 to 60°C). *Low temperature models available as special option.
Size: 4" (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Agency Approvals: RoHS.

†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options.

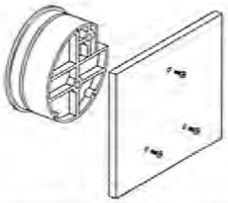
Note: May be used with hydrogen when ordering Buna-N diaphragm. Pressure must be less than 35 psi.

INSTALLATION

Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

All standard Magnehelic® Differential Pressure Gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range models of 0.5" w.c. plus 0.25" w.c. and metric equivalents must be used in the vertical position only.

SURFACE MOUNTING



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

FLUSH MOUNTING

Provide a 4-9/16" dia. (116 mm) opening in panel. Provide a 4-3/4" dia. (120 mm) opening for MP and HP models. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place.

PIPE MOUNTING

To mount gage on 1-1/4" - 2" pipe, order optional A-610 pipe mounting kit.

TO ZERO GAGE AFTER INSTALLATION

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

OPERATION

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.
Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.
Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.
When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with flexible rubber or vinyl tubing.
B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended.

MAINTENANCE

No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves should be used in permanent installations. The Series 2000 is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

WARNING

Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended.

TROUBLE SHOOTING TIPS

Gage won't indicate or is sluggish.

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F (-7°C), order gage with low temperature, (LT) option.

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Appendix B – Health and Safety Plan

SITE SAFETY & HEALTH PLAN

Project: DEQ Task Order 8 Helena Solvent Site

Plan Date:09/19/2016 Update:12/9/2016

Plan by: Rye Svingen

Site Safety Officer: Luke Osborne

Site Name: Helena Solvent Site (HSS)

Location: Helena, Montana

Dates of Work: June 2016- May 2017
(Review & update as needed)

Site Type: Active, Urban/Industrial

Description/Objectives of Work: Continue Operation and Maintenance of the Existing Indoor Air Mitigation System, SVE Pre-Design Investigation, Design and Install SVE System, SVE Performance Monitoring

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Personnel & Responsibilities

Name	Company	Site Responsibilities
David Donohue	HydroSolutions	Project Manager
Shane Bofto	HydroSolutions	Senior Engineer
Luke Osborne	HydroSolutions	Health & Safety Officer/Engineer
Rye Svingen	HydroSolutions	Field Team Leader/On-site Safety Manager
Scott Wheaton	HydroSolutions	Assistant Geologist
Amanda Osborne	HydroSolutions	Field Engineer

Other Project Policies

Project Documents: HydroSolutions Health and Safety Manual (incorporated by reference for HydroSolutions personnel)
Required Training: 24hr HAZWOPPER and Current 8hr Refresher.
On-Site Job Safety Analysis (JSA): as-directed by on-site safety manager.
Applicable SOPs:
Special Equipment: See Task Specific Standard Operating Procedure
Personnel Decon.: Wash hands well before eating or other hand to mouth contact.
Equipment Decon.: LiquiNox and Deionized(Distilled) Water, triple rinse. Use disposable if possible.
Subcontractors: Subcontractors will be responsible for adherence to their own H&SP at the direction of the Project Manager

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Waste Types and Description: *Are hazardous materials/wastes anticipated? Describe.*

Yes. Groundwater and soil within the HSS is contaminated with chlorinated solvents, namely tetrachloroethene (PCE) and trichloroethene (TCE). Vapor intrusion in indoor spaces is also

known to exist. Project personnel may encounter these contaminated soils, groundwater, and indoor air through the course of the project.

Hazard Identification/Description and Mitigation:

Check all that apply; list others not shown:

check	Hazard	Proposed Hazard Mitigation
x	Contaminated air/soils/water	Sample Handling SOP
x	Gases/Potential VOC release and exposure	On-site monitoring with PID, 4-gas meter
x	Petroleum products and wastes	Sample Handling SOP
	Toxic metals	
x	Sample handling and preservatives	Sample Handling SOP
x	Overhead Utilities, objects, tools	Review procedures in JSA, PPE
x	Ladders and stationary equipment	Review procedures in JSA
x	Mechanical equipment, blowers, drill rigs, moving parts	Review procedures in JSA
	Confined Space	
x	Trenches	Review procedures in JSA
	Heights	
x	Vehicular/Traffic	Review procedures in JSA
	Remote worksite	
	Working alone	
x	Power tools, hand tools	Review procedures in JSA
x	Buried utilities	Review procedures in JSA
x	Heavy Lifting	Review procedures in JSA
x	Pinch points	Review procedures in JSA
x	Climate/extreme weather	Maintain hydration; avoid exposed skin
	Dust	
x	Noise	PPE

Personal Protective Equipment (PPE):

PPE will be worn as directed by the on-site safety manager depending on the task at hand. PPE directives will be disseminated in the tailgate meeting.

Work Zone	Person &/or Job Function	PPE Level *
Outside/inside Commercial Building	Professionals	D3
Invasive Drilling/Mechanical	Professionals, contractors	D1/D2

* A, B, C or D. Standard (D1) = Hardhat, Safety glasses, work gloves, steel-toed boots (D2) = +Nitrile gloves, (D3) (as-directed by On-site Safety Manager): +Hi-vis safety vest, hearing protection as needed.

EMERGENCY CONTACT INFORMATION:

Emergency Medical Contacts: **Emergency 9-1-1**

St. Peters Hospital
2475 E Broadway St, Helena, MT 59601
(406) 442-248
Maps attached

Underground Utilities (Gas): **Emergency 9-1-1**
Northwestern Energy
888-467-2669

UMCI Jerry Davis
406-933-5300
406-475-2226

Overhead Utilities (Electricity): **Emergency 9-1-1**
Northwestern Energy
888-467-2669

Client Contact:
Laura Alvey - Montana DEQ
406-444-0212

Andy Hustad- Building Owner
512-574-0316

Joe Mueller-Building Manager/Owner Representative
406 431-3034
406 442-2077

Other Contractors:
Cascade Drilling
Andrew Punsoni
503-775-4118
925-768-8377

Eagle Electric
406-442-8685

4O6 Underground
Rich Williams 406-439-1493
Beau 406-521-0015

APPROVAL:

Signed: _____
HydroSolutions Inc Safety Manager

_____
HydroSolutions Inc Site Safety Officer

Field Copy: ____ File Copy: ___ Subcontractor Copy: ____

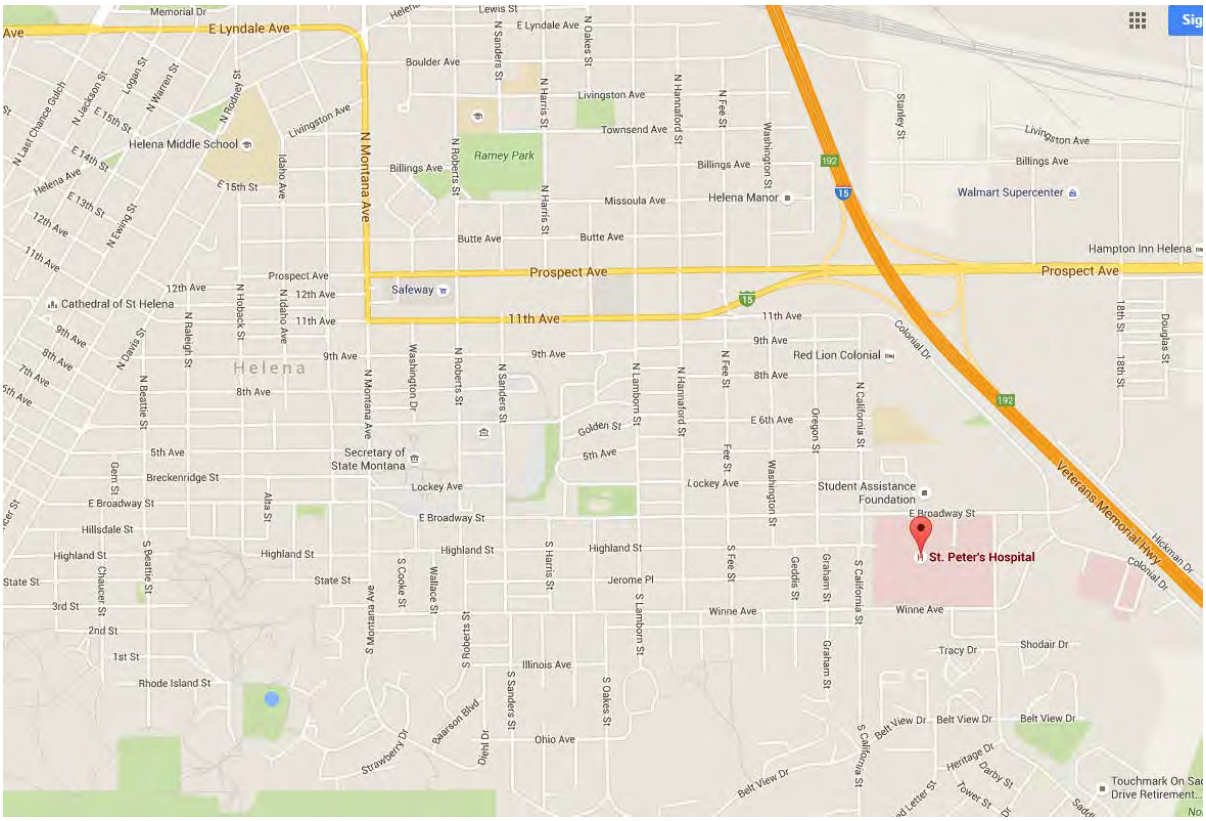
Attachments:

1. On-Site Contractors and Visitors
2. Map of Medical Facility
3. OHSA Permissible Exposure Limits

On-site Contractors and Visitors

I understand, and agree to comply with, the provisions of the above referenced H&SP for work activities on this project.

Print Name	Organization	Signature



Map of local medical facility.

Regulatory Limits						Recommended Limits	
OSHA PELs[b]					Cal/OSHA PEL[c] *(as of 4/26/13)*	NIOSH REL[d] *(as of 4/26/13)*	ACGIH® 2015 TLV®[e]
Substance	**8-hour Time Weighted Average (TWA)**	**Acceptable Ceiling Concentration**	**Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift**				
			Concentration	**Maximum Duration**	**8-hour TWA (ST) STEL (C) Ceiling**	**Up to 10-hour TWA (ST) STEL (C) Ceiling**	**8-hour TWA (ST) STEL (C) Ceiling**
Tetrachloroethylene	100 ppm	200 ppm	300 ppm	5 min in any 3 hr	25 ppm (ST) 100 ppm (C) 300 ppm	Ca See Appendix A	25 ppm (ST) 100 ppm

Abbreviations

- C = Ceiling limit
- Ca = Potential occupational carcinogens
- CAS No. = Chemical Abstract Service Number
- f/cm^3 = fibers/cubic centimeter
- f/cc = fibers/cubic centimeter
- hr = hour
- IHL = Inhalable
- IFV = Inhalable Fraction and Vapor
- m^3 = cubic meters
- min = Minute
- mg/m^3 = milligrams/meter cubed
- PAH = Polycyclic aromatic hydrocarbons
- PNOR = Particulates not otherwise regulated
- ppm = parts per million
- resp. = respirable
- ST = Short Term Exposure Limit
- Thor. = Thoracic fraction
- TLV® = Threshold Limit Value
- TWA – Time weighted average
- V = Vapor and aerosol