



February 13, 2025

Mr. Dave Douglas
Mountain View Co-Op
P.O. Box 1299
Great Falls, Montana 59403-1299

**Subject: Remedial Investigation Work Plan
Mountain View Co-Op – 219 Central Avenue, Fairfield, Montana
DEQ Facility ID 50-03596 (TID 28796); Releases 1469 & 4385; WPIDs 34963 & 34964
AWS Project 14064.9.6**

Dear Mr. Douglas,

Air Water Soil, LLC (AWS) is pleased to present this work plan to complete additional remedial investigation (RI) activities at the Mountain View Co-Op petroleum release site (hereafter, “the Site”). The Site is located at 219 Central Avenue in Fairfield, Montana (see Figure 1 provided in Appendix A).

AWS has prepared this work plan on behalf of Mountain View Co-Op in response to a November 5, 2024, *Additional Corrective Action Work Plan Request* letter issued by the Montana Department of Environmental Quality Petroleum Tank Cleanup Section (DEQ). As requested by DEQ, this work plan has been created to satisfy the requirements stipulated in the *Montana Remedial Investigation Guidance for Petroleum Releases* document, draft dated October 2017 (RI Guidance).

SITE DESCRIPTION

The Site is an active petroleum distribution facility that provides retail sale of gasoline and diesel fuel products. Fuel is stored in six underground storage tank (UST) systems and dispensed via retail dispenser islands at the south and northwest extents of the Site (See Figure 2 provided in Appendix A).

Previous investigations have resulted in the drilling and construction of numerous soil boreholes and monitoring wells across the Site. The drilling has identified sand, silt, and clay sediments from just below the pavement section to depths between 3 and 7 feet below ground surface (bgs). The fine-grained sediments are underlain by mixed sand and gravel sediments that extend to depths greater than 15 feet bgs.

Shallow groundwater is present, and saturated conditions exist at depths greater than 8 feet bgs. The saturated sand and gravel sediments comprise a productive aquifer system below the Site and below the Fairfield area. Production wells, including Fairfield’s municipal wells, yield tens to

Air Water Soil, LLC

1321 8th Avenue North, Suite 104, Great Falls, Montana, 59401 406.315.2201

hundreds of gallons per minute of groundwater. Near the Site, groundwater flow has historically been reported from west-southwest towards the east-northeast.

BACKGROUND

The following summary represents AWS's understanding of the Site's history as it pertains to the ongoing remedial investigation of two petroleum releases.

1990: A mixed gasoline and diesel fuel release was reported and confirmed at a location that is now under the northwest extents of the Site building. This release, assigned Release number 1469 by DEQ, is associated with former above ground storage tank (AST) systems in use at the location prior to construction of the expanded building.

1990 – 1996: Soil boreholes and monitoring wells were installed to evaluate the extent of soil and groundwater contamination. During this time, monitoring wells MW#1, MW#2, MW#2R, MW#3, MW#4, MW#5, MW#6, MW#7, MW#8, MW#9, MW#10, and MW#11 were installed and monitored. Investigations found that the petroleum contamination extended to the east of the former ASTs, beyond the Site building, and included free-product petroleum atop groundwater in wells MW-2 and MW-2R.

1996: An in-situ air sparging system (IAS) and soil vapor extraction system (SVE) were installed and operated to remove petroleum contaminants from the subsurface.

1996 – 1999: During this period, the IAS and SVE systems were in use and groundwater monitoring continued. As reported in May 1999, the IAS system and SVE systems had mechanical problems and were found to have little to no recovery of petroleum contaminants.

1999 – 2008: Groundwater monitoring continued during this period, with the IAS and SVE systems inoperable. In 2008, surface components of the IAS and SVE systems were removed from the Site.

2005: A gasoline release was caused by failed piping at the UST systems on the south side of the Site building. This release was assigned number 4385 by DEQ.

2013 – 2019: Remedial investigations continued to be implemented to investigate both Release 1469 and Release 4385. As of 2013, wells MW#3, MW#4, MW#5, MW#6, MW#7, and MW#8 were no longer being referenced and are presumed to have been lost. Soil boreholes were completed, and monitoring wells MW#12, MW#13, MW#14, MW#15, MW#16, MW#17, MW#18, and MW#19 were installed. The investigative work continued to find petroleum contaminated soil and groundwater resulting from both releases. However, the extents of contamination were limited to the areas of wells MW-2, MW-2R, and MW-14 for Release 1469, and well MW-15 for Release 4385.

2023: AWS completed additional groundwater monitoring and a petroleum vapor intrusion assessment. The groundwater monitoring confirmed that contaminants from the two releases are

proximate to the wells previously discussed. The vapor intrusion assessment found levels of air-phase petroleum hydrocarbons in the store, office, and basement of the Site building at concentrations above Environmental Protection Agency Regional Screening Levels (EPA RSLs).

OBJECTIVES

This work plan has been prepared to address the following objectives:

- Assess all existing Site monitoring wells to determine their condition for continued groundwater quality monitoring below the Site.
- Assess all existing former IAS and SVE wells to determine their ability to be reused for pilot-testing and groundwater monitoring.
- Assure that an adequate groundwater monitoring network is in place to define the extents and magnitude of groundwater impacts from Release 1469 and Release 4385.
- Define current soil petroleum contaminant concentrations below the northwest extents of the Site, associated with Release 1469, and compare them to Risk-Based Screening Level (RBSL) values provided in the most current version of Montana's *Risk-Based Corrective Action Guidance for Petroleum Releases* (RBCA Document).
- Define current groundwater petroleum contaminant concentrations below and beyond the extents of the Site, associated with Releases 1469 and 4385, and compare them to RBSL values provided in the most current version of the RBCA Document.
- Evaluate the efficacy of SVE technology to address residual petroleum contamination below the northwest extent of the Site building.
- Evaluate the Site building's mechanical systems to aid in evaluating petroleum vapor intrusion.
- Recommend strategies that will lead to closure of Release 1469 and Release 4385.

SCOPE OF WORK

In order to achieve the stated objectives, AWS has prepared the following scope of work to include the following 16 tasks: 1) Preliminary Research, Scoping, and Work Plan Preparation; 2) Project Administration; 3) Mobilization; 4) Per Diem; 5) Well Assessment; 6) Well Improvements; 7) Soil Investigation; 8) SVE Well Installation; 9) SVE Well Development; 10) SVE Well Survey; 11) SVE Pilot Testing; 12) Building Mechanical Systems Evaluation; 13) Groundwater Monitoring; 14) Laboratory Analyses; 15) Data Validation; 16) Release Closure Plan Updates; and 17) Report Preparation. AWS's proposed methods for these tasks are described in the following sections. Copies of referenced Standard Operating Procedure (SOP) documents are provided in Appendix E.

Task 1 – Preliminary Research, Scoping, and Work Plan Preparation

AWS gathered and researched available historic documents on file with DEQ to define past investigative and cleanup actions to address the releases. This resulted in identifying several data

gaps which were discussed with DEQ personnel during an online meeting. The online meeting guided development of the investigative objectives and scoping of the planned work with DEQ.

This work plan and cost estimate (provided in Appendix D) have been created to satisfy the requirements stipulated in the RI Guidance. Work plan preparation included designing the investigation, estimating costs to implement each task, creating figures, and preparing the specific RI tasks described in this document. Additionally, the work plan preparation included designing and cost estimating non-standard RI tasks to complete a SVE pilot test and an evaluation of the Site building's mechanical systems.

AWS anticipates that supplemental services will be needed to provide responses to agency questions after submittal of this work plan. These services are expected to include answering technical questions and providing clarifications to DEQ personnel; answering questions and providing clarifications to Petroleum Tank Release Compensation Board (PTRCB) personnel prior to their funding of the work; and possibly attending an online PTRCB meeting as required by that agency.

The preliminary work, the expanded work plan preparation, and the anticipated supplemental services are all efforts that were, or will be actual, reasonable, and necessary to the ongoing investigation and remediation of Releases 1469 and 4385.

Task 2 – Project Administration

Project management activities include correspondence with Mountain View Co-Op, DEQ staff, and PTRCB staff regarding the scope of work and project costs. Project management will also include coordinating site access; scheduling and coordination of subcontractors, field personnel and activities; procuring equipment and supplies, as necessary, to complete the scope of work; and budget tracking.

Task 3 – Mobilization

Mobilization includes labor and vehicle mileage costs for project travel necessary to complete the scope of work. This generally includes AWS personnel's travel to and from the site, as well as preparation time of up to 1 hour per mobilization event, as applicable, per PTRCB's standard reimbursement practice. Mobilization also includes costs for travel for delivery of samples to the analytical laboratory or shipping facility.

Field activities may be combined to reduce mobilization events and costs, where feasible. For the purpose of this work plan, the anticipated mobilization events necessary to complete the scope of work are summarized as follows:

- Well Assessment
 - 2 mobilization events
 - Tech II + Tech II

- Well Improvements
 - Unknown number of mobilizations (to be determined)
 - Unknown personnel (to be determined)
- Soil Investigation
 - 2 mobilization events
 - Staff Scientist
- SVE Well Installation
 - 1 mobilization event
 - Staff Scientist
- SVE Well Development and SVE Well Survey
 - 1 mobilization
 - Staff Scientist
 - Tech II
- SVE Pilot Testing
 - Field Day 1*
 - 1 mobilization event
 - Project Engineer + Tech II
 - Field Day 2*
 - 1 mobilization event
 - Project Engineer + Tech II
 - Field Day 3*
 - 1 mobilization event
 - Tech II
- Building Mechanical Systems Evaluation
 - 1 mobilization event
 - Industrial Hygienist
- Groundwater Monitoring
 - 3 mobilization events – groundwater sampling
 - 1 mobilization event – groundwater sample delivery to laboratory
 - Tech II

Task 4 – Per Diem

Per diem costs will be invoiced in accordance with PTRCB's daily meal rates, per employee. A summary of per diem, in accordance with the mobilization schedule discussed above, is as follows:

- Well Assessment
 - Meals: 2 people, 2 days

- Well Improvements
 - Meals: Unknown (to be determined)
- Soil Investigation
 - Meals: 1 person, 2 days
- SVE Well Installation
 - Meals: 1 person, 1 day
- SVE Well Development and SVE Well Survey
 - Meals: 2 people, 1 day
- SVE Pilot Testing
 - Field Day 1*
 - Meals: 2 people, 1 day
 - Field Day 2*
 - Meals: 2 people, 1 day
 - Field Day 3*
 - Meals: 1 person, 1 day
- Building Mechanical Systems Evaluation
 - Meals: 1 person, 1 day
- Groundwater Monitoring
 - Meals: 1 person, 3 days

Task 5 – Well Assessment

AWS's research for preparing this work plan identified 20 monitoring wells, 2 SVE wells, and 3 IAS wells that have been constructed at and around the Site. AWS personnel will investigate the previously reported locations of the 25 wells, determine which ones are still present, and evaluate which wells need to be replaced, repaired, or abandoned. The scope of this task will include:

- Determining the locations of wells, if buried below gravel surfacing or other thin cover material, using a magnetometer and exposing the wellhead with digging tools.
- Visually assessing each wellhead condition, especially the condition of the visible surface seal and flush-mount cover, and documenting conditions at each well with photographs.
- Measuring the depth to water (DTW), and if present the depth to free product petroleum (DTP) in each well, following the procedures outlined in *AWS SOP-04*.
- Measuring the total depth of each well and comparing the measurement to known well construction information to determine if blockages (e.g., collapsed screen) or obstructions (e.g., siltation) are present.

AWS will use all the gathered information to evaluate the current condition of each well and to formulate recommendations for repairs and replacements, as needed.

Task 6 – Well Improvements

After completion of the well assessment task, AWS will notify DEQ of the findings and will make recommendations for well improvements, as needed. The scope and fees associated with well improvement tasks will be presented to DEQ and PTRCB via *Corrective Action Modification, Form 8* documents.

Please note that the recommended improvements will likely include surveying the existing well casing elevations by a subcontracted licensed surveyor to establish a common reference datum.

Task 7 – Soil Investigation

The location of Release 1469 is below the northwest extent of the current Site building, as shown in Figure 2. There are no readily accessible records documenting usable soil investigation data for this area. Thus, the current extent and magnitude of petroleum soil contaminants need to be defined.

As discussed in the Site Description section, previous drilling has identified sand, silt, and clay soil to depths between 3 and 7 feet bgs. The soil is underlain by mixed sand and gravel sediments that extend to depths greater than 15 feet bgs. To further characterize petroleum impacted soil, AWS proposes using direct-push drilling to investigate subsurface soil contamination.

AWS solicited direct-push drilling proposals from Olympus Technical Services (Olympus) and Pioneer Technical Services (Pioneer). A third qualifying direct-push drilling contractor was not identified who did not have a conflict of interest with Mountain View Co-Op. Two responses were received and are provided in Appendix D. As shown, Pioneer submitted a ‘no bid’ response. Subsequently, Olympus’ proposed fee was selected.

Soil boreholes will be completed within the investigative area at the perimeter of the Site building as shown in Figure 2. Drilling provider proposals were requested to include total depths of 12 feet at 18 potential drilling locations (i.e., a total drilling depth of up to 216 feet). The boreholes will be located within 20 feet distance of the Site building exterior and actual boring locations will be based on interpretation of field data obtained during the drilling work. Additional boreholes may be advanced if deemed appropriate based on field data, although the total drilling depth of 216 feet will not be exceeded without prior coordination with DEQ and PTRCB, as feasible.

At least 2 full business days prior to initiating the subsurface investigation, AWS will submit a subsurface utility locate request through Montana811 (aka “Call Before You Dig” or “One-Call”). Montana811 will subsequently coordinate surface marking of public underground utilities at the Site. Note that public utility lines located on the service sides of meters, and any other privately owned underground utilities, are generally excluded and may not be surface marked through the Montana811 utility locate process. In the event Mountain View Co-Op is unable to surface mark or otherwise identify the locations of known private utilities within the project area, additional coordination may be required.

Olympus will advance the 18 soil borings using direct push drilling methods, allowing collection of continuous soil core samples (from surface to depth) using disposable sample sleeves. AWS will record observations of lithology and the presence or absence of visual and/or olfactory evidence of petroleum impacts on field forms during the work.

Soil samples will be collected following the procedures outlined in *AWS SOP-02 – Soil Sample Collection*, including collection of splits for field analysis and splits for potential laboratory analyses. Field splits will be analyzed following *AWS SOP-03 – Field Measurement of Total Volatile Organic Compounds (VOCs)*.

Laboratory samples will be containerized from the potential laboratory splits as summarized below. The actual number of samples to be collected will depend on observations and conditions at the time of sampling. For the purpose of this work plan, AWS anticipates the following samples will be collected:

- Worst-Case Total VOCs (18 grab samples): 1 grab sample will be collected from the interval exhibiting the highest total VOC concentration in each boring. This sample will not be collected for a given boring with no exceedances of 100 ppm total VOCs, and for which no visual evidence of impacts is observed. In that case, only a bottom of hole sample will be collected.
- Bottom of Hole (18 grab samples): 1 grab sample will be collected from the bottom of each borehole, if a worst-case sample is not collected.
- Duplicate Samples (1 grab sample): Duplicate samples will be collected at the rate of 1 for every 20 natural samples. Duplicate samples will consist of direct splits from the potential laboratory split samples for the respective natural samples they represent.

Laboratory samples will be containerized, preserved, and transported to the analytical laboratory following *AWS SOP-08*, and in accordance with the referenced analytical methods, using vessels and preservatives provided by the laboratory. AWS anticipates transporting all soil samples directly to the laboratory using a commercial courier service (e.g., FedEx). Laboratory analyses to be requested are discussed in Task 14 of this work plan.

Reusable downhole equipment will be decontaminated by the driller before initiating each soil boring, as appropriate. Decontamination may not be necessary following completion of boreholes which did not exhibit evidence of petroleum contamination. Reusable sampling equipment will be decontaminated following *AWS SOP-01*.

Drill cuttings left over after samples are collected will be placed back into the boreholes from which they were derived, as feasible. The remaining boring voids, if any, will be backfilled with chipped or granular bentonite. Cuttings which cannot be placed back into the soil borings will be handled following the procedures outlined in *AWS SOP-56*; however, characterization and disposal of drill cuttings is not expected to be necessary for this scope of work.

Boreholes completed through concrete and asphalt surfacing will be surface patched with concrete and asphalt cold patch, as appropriate. The patch material will be placed flush with the surrounding surface.

Task 8 – SVE Well Installation

To evaluate the efficacy of SVE technology to address residual petroleum contamination below the northwest extent of the Site building, an SVE pilot study will be completed. Two SVE wells will be drilled and completed to accommodate the planned testing.

The locations of the two SVE wells will be finalized after AWS has evaluated the soil investigation results. The wells will be located near the west exterior and north exterior of the Site building to promote vapor extraction from below the building footprint. Thus, approximate locations for the two SVE wells are shown in Figure 2.

The SVE wells will be drilled and constructed to intercept approximately 5 feet of the upper aquifer thickness. This will allow collection of groundwater samples from the new wells.

AWS solicited well construction proposals from Boland Drilling (Boland), Hansen Drilling (Hansen), and O’Keefe Drilling (O’Keefe) and documentation is provided in Appendix D. Hansen submitted a ‘no bid’ response. O’Keefe did not respond to the solicitation. Boland contacted AWS and said that the wells would need to be installed using air rotary methods given the cemented gravel layers below the Fairfield area. Thus, Boland submitted a quote using this method and their proposed fee was selected.

Prior to initiating the drilling, AWS will have subsurface utilities located via the Montana811 system.

AWS will subcontract Boland to drill the two SVE wells and to construct them in accordance with Administrative Rules of Montana (ARM) Rule 36.21.810. Boland will use air rotary drilling equipment to drill and construct each well.

Boland will construct each SVE well in accordance with the following parameters:

- Well Casing and Screen: New, 4-inch nominal diameter, PVC well casing and screen.
- Screen Placement: Screen will extend from 5 feet to 15 bgs in each well.
- Screen Parameters: Screen slot width shall be 0.020 inch
- Casing Placement: Casing will extend from 5 feet bgs to just below the ground surface and will be equipped with a locking end plug.
- Filter Pack and Placement: New, clean, silica sand that is sized to be compatible with the screen slot width and extends from 15 feet bgs to approximately 3 feet bgs.
- Surface Seal and Placement: Surface seal shall be new cement that extends from 3 feet bgs to the ground surface.

- **Wellhead Completion:** The well head for each SVE well shall be a flush mount cover set in concrete.

Soil cuttings will be drummed and left at the Site by Boland. A grab sample will be collected from each drum by AWS personnel following the procedures outlined in *AWS SOP-02 – Soil Sample Collection*. Laboratory samples will be containerized, preserved, and transported to the analytical laboratory following *AWS SOP-08*, and in accordance with the referenced analytical methods, using vessels and preservatives provided by the laboratory. AWS anticipates transporting all soil samples directly to the laboratory using a commercial courier service (e.g., FedEx). Laboratory analyses to be requested are discussed in Task 14 of this work plan.

After receipt of the drummed soil sample results, AWS will coordinate disposal of the drums at the Northern Montana Joint Refuse Disposal District facility (i.e., Valier Landfill). The drums will thereafter be hauled by Boland to the Valier Landfill for disposal.

Task 9 – SVE Well Development

The new SVE wells will be developed following *AWS SOP-05 Monitoring Well Development*. New, 4-inch nominal diameter disposable bailers will be used to develop each well.

Task 10 – SVE Well Survey

The north-edge casing elevations for the two new SVE wells will be surveyed by AWS personnel to tie the elevations into the datum established by the licensed surveyor as part of Task 6. This work will be completed in coordination with Task 8.

Task 11 – SVE Pilot Testing

AWS will complete SVE pilot tests to evaluate the efficacy of this technology to address residual petroleum hydrocarbons in the vadose zone below the northwest extents of the Site building. Testing will occur using each of the new SVE wells as an extraction point. Step tests will be completed to determine the radius of influence (ROI) imparted at surrounding well locations, and the concentration of extracted VOCs, under increasing negative pressure conditions.

Equipment

AWS will utilize the following rental and purchased equipment to assist with the testing:

- **Rental SVE System:** A 1.5 HP, 230V single-phase SVE test system will be rented from Geotech Environmental Equipment, Inc. (Geotech) of Denver, Colorado. Specifications for Geotech's rental system are provided in Appendix B. The rental SVE system will be shipped both ways to the Site by freight carrier. The specified rental system can provide up to 58 inches water vacuum pressure (inches H₂O) and a maximum flow of 115 cubic feet per minute (CFM).
- **Rental Power Source:** A 20-kilowatt, diesel-powered, towed generator system will be rented from a local vendor in Great Falls, Montana and used to supply power for the rental SVE

system. AWS personnel will tow the rental power source to and from the Site using an AWS vehicle.

- **Handheld Digital Manometer:** A model 475-2-FM handheld digital manometer, as manufactured by Dwyer Instruments Inc. (Dwyer) of Michigan City, Indiana, will be purchased for the work. Specifications for the Dwyer instrument are provided in Appendix B. As shown, the unit can measure pressures between 0 and 40.00 inches H₂O with a measurement accuracy of 0.20 inches H₂O at normal temperatures. The handheld digital manometer will be used to measure negative pressures at surrounding wells when the SVE system is in operation.

AWS will also use inventory equipment during the SVE testing. A photoionization detector (PID) will be used by AWS personnel to monitor vapor concentrations. An air velocity meter will be used to measure flow velocities and effluent temperatures in the extraction piping.

Setup

Separate step tests will be performed at each of the new SVE wells. The following description, therefore, will be repeated at each well to complete the work.

AWS will connect the rental SVE system to the new SVE well using piping and fittings purchased for the work. Additional piping and fittings will be purchased and used to create a discharge stack for the SVE system effluent. A port will be inserted in the stack to allow field measurements of the effluent. When all connections are complete, the SVE system will be connected to the rental power source and made ready for operation.

Pre-Test Measurements

Prior to test startup, AWS personnel will complete the following measurements at the new SVE well and surrounding monitoring wells. Note that the actual wells used for the measurements will be dependent on the findings of Task 4, and the improvements made as part of Task 5, of this work plan:

- Measuring the DTW following the procedures outlined in *AWS SOP-04*.
- Measuring static pressure using the handheld digital manometer. This will be accomplished by replacing the existing well plug with a ¾-inch, 2-inch or 4-inch diameter PVC well cap, equipped with a barbed fitting and several feet of plastic tubing; connecting the tubing end to the manometer measurement port; measuring the well's static pressure or vacuum in inches H₂O units; and recording the measurement in the field notes.

SVE Pilot Test #1

The SVE system will be started with the manual dilution air valve open (i.e., little to no vacuum pressure on the SVE well). Thereafter, the dilution valve will be slightly closed to impart a measured negative pressure between 5- and 10-inches H₂O at the SVE well. This first step of negative pressure will continue to be applied at the SVE well for approximately 30 to 45 minutes or until field measurements have stabilized.

During the extraction, the following measurements will be collected and recorded initially after SVE system startup and then at approximately 5-to-10-minute intervals:

- The imparted vacuum at the SVE well, as indicated by the system's inherent vacuum gauges.
- The volumetric flow of extracted vapors, as indicated by the system's inherent flow gauge, in units of cubic feet per minute (CFM).
- The concentration of extracted vapors, as measured at the discharge stack port, using a PID.
- The flow velocity and temperature of the effluent, as measured at the discharge stack port, using an air velocity meter.
- The static pressure at surrounding monitoring wells using the handheld digital manometer.

After completion of the first step, the dilution valve will be adjusted to increase the vacuum pressure sequentially for the following steps: between 10- and 20-inches H₂O; between 20- and 30-inches H₂O; and between 30- and 40-inches H₂O. Each of these steps will be applied for approximately 30 to 45 minutes or until field measurements stabilize. During each step, the above-listed field measurements will be collected and recorded.

SVE Pilot Test #2

The SVE system will be moved to allow testing at the second SVE well. Connections will be as described in the *Setup* section above. Thereafter, the tasks described in the *Pre-Test Measurements* and *SVE Pilot Test #1* sections above will be repeated.

Testing Schedule

AWS anticipates the following schedule for completion of the SVE Pilot Test:

- Pre-Test Coordination: AWS will coordinate Site access to complete the testing, will coordinate rental equipment with suppliers, and will purchase equipment and supplies.
- Field Day 1: AWS personnel (Project Engineer and Technician II) will travel to the Site; complete the SVE system Setup, Pre-Test Measurements, and SVE Pilot Test #1 at one of the new SVE wells; and then will return to Great Falls.
- Field Day 2: AWS personnel (Project Engineer and Technician II) will travel to the Site; complete the SVE system Setup, Pre-Test Measurements, and SVE Pilot Test #2 at the other new SVE well; and then will return to Great Falls.
- Field Day 3: AWS Technician II will travel to the Site; dismantle piping and connections; prepare the rental SVE system for shipping; and will return the rental power source to Great Falls.

Task 12 – Building Mechanical Systems Evaluation

A past vapor intrusion assessment found levels of air-phase petroleum hydrocarbons in the store, office, and basement of the Site building at concentrations above EPA RSLs. The Site building's

mechanical systems (i.e., heating, ventilation, air conditioning systems) may be affecting these results. Therefore, AWS will complete a building mechanical systems evaluation.

An AWS industrial hygienist will identify and photograph the mechanical systems inside the Site building. They will manually map the building interior and spatially locate the mechanical system elements on field diagrams. Final maps of the building interior and mechanical system elements will be created. Additionally, the industrial hygienist will evaluate the mechanical system components in relation to hydrocarbon vapor intrusion potential.

Task 13 – Groundwater Monitoring

Groundwater monitoring will occur after installation of the two new SVE wells. The actual number of wells to be monitored will depend on the findings of Task 4, and the improvements made as part of Task 5. For purposes of this work plan, AWS assumes that up to 27 wells (20 possible monitoring wells, 2 existing SVE wells, 2 new SVE wells, and 3 IAS wells) will be utilized for groundwater monitoring. However, the actual number of wells monitored may be less.

Groundwater monitoring will include groundwater sampling in accordance with *AWS SOP-06*. The monitoring work is intended to evaluate the current status of groundwater contamination below the Site and to measure water quality parameters so that remediation strategies can be evaluated. Specific analytical parameters to be evaluated for all the wells are summarized in the groundwater monitoring analytical plan presented in Appendix C.

DTW and DTP will be measured following the procedures outlined in *AWS SOP-04* and groundwater monitoring will be completed in accordance with *AWS SOP-06 – Groundwater Sampling*. AWS anticipates utilizing a peristaltic pump system to obtain samples for this project. Natural samples will be collected from each of the specified wells, along with up to 2 duplicate samples collected from 2 wells during the event.

Laboratory samples will be containerized, preserved, and transported to the analytical laboratory following the procedures outlined in *AWS SOP-08*, and in accordance with the referenced analytical methods, using vessels and preservatives provided by the analytical laboratory.

Note that each groundwater sample will be analyzed for several parameters as described in Task 14 below. The required number of laboratory vessels needed for the parameters are numerous, and a maximum of 3 sets of groundwater samples can reasonably fit in a shipping cooler. Thus, the anticipated sampling of 27 wells will result in at least 9 coolers needing to be transported to the laboratory. Shipping these coolers via common commercial courier service (e.g., FedEx) is not reasonable given the couriers' past performances of not getting all coolers to the laboratory together as a single shipment and within a reasonable amount of time before ice melts and the internal cooler temperature substantially rises. With that said, AWS personnel will be directly transporting all groundwater samples to the laboratory in Helena, Montana (see line item referenced under Task 3).

Reusable monitoring and sampling equipment will be decontaminated following *AWS SOP-01* prior to use in each monitoring well. Unused water evacuated from each well will be handled in accordance with *AWS SOP-56*.

Task 14 – Laboratory Analyses

Laboratory analyses of soil and groundwater samples will occur after completion of their associated task. Details for these analyses are as follows:

Soil Analyses

AWS will request that Energy Laboratories, Inc. (Energy) analyze soil samples for Volatile Petroleum Hydrocarbons (VPH) and Extractable Petroleum Hydrocarbon (EPH) Screen in accordance with the RBCA Document. Soil samples exhibiting EPH Screen concentrations greater than the DEQ screening criterion of 200 milligrams per kilogram (mg/kg) will be further analyzed for EPH fractions in accordance with the RBCA Document. A duplicate sample, collected for data validation purposes, will only be analyzed for VPH contaminants.

Groundwater Analyses

AWS will request that Energy analyze groundwater samples for the testing suite presented in Appendix C. Analyses will include determining concentrations of VPH and EPH contaminants. Supplemental analyses will also be completed to assess natural attenuation parameters and aquifer conditions. Duplicate samples, collected for data validation purposes, will only be analyzed for VPH contaminants.

Task 15 – Data Validation

Upon receipt of final laboratory analytical results for the soil and groundwater sampling events, AWS will complete data validation and prepare a separate DEQ *Data Validation Summary Form* for each set of laboratory results. Data will be validated to assess the precision, accuracy, repetitiveness, comparability, and completeness of the reported parameters.

Task 16 – Release Closure Plan Updates

Following completion of all field tasks and receipt of final analytical data, AWS will update the previous Release Closure Plans (RCPs) for Releases 1469 and 4385. This will include assessing all available data for the Site. Available data will be evaluated to help determine an appropriate remediation plan to address residual contamination from each petroleum release. The updated RCPs will also aid in identifying data gaps which will need to be addressed for Releases 1469 and 4385.

Task 17 – Report Preparation

Following completion of Tasks 2 through 16, including receipt and review of all final analytical data, AWS will prepare a summary report which will comply with the report format in the RI Guidance. The report will include a discussion of findings from the remedial activities completed

as part of this scope of work; a discussion of the data validation; a discussion of each updated RCP; and a discussion of conclusions and recommendations for future activities.

Data will be presented in tabular form and select information will be presented on a site diagram(s). The report will be submitted to Mountain View Co-Op and DEQ electronically, in Portable Document Format (PDF); a hard copy will not be prepared or provided.

SCHEDULE

AWS will initiate the scope of work following our receipt of Mountain View Co-Op's authorization to proceed, which shall follow our receipt of DEQ approval of this work plan. The actual project schedule will be contingent on various conditions which are indeterminable at the time of preparation of this document, including but not limited to approval from all listed parties, weather, and availability of AWS personnel. AWS will coordinate with Mountain View Co-Op, DEQ and other stakeholders as appropriate.

FEE

AWS's fee for completing the scope of work described in this work plan will be assessed on a time-and-materials basis, in accordance with the attached Cost Estimate (Appendix D). Our estimated total fee for completing the scope of work detailed in this work plan is approximately **\$99,506**. Our cost estimate has been prepared using AWS's current, PTRCB-approved 2025 labor and equipment rates and reimbursable costs. The services provided will be invoiced using rates approved by the PTRCB for the current billing period.

Actual costs may vary depending on a variety of factors, including but not limited to unforeseen delays or other necessary but unexpected changes to the scope of work. AWS will coordinate changes to the scope of work with Mountain View Co-Op and DEQ, as appropriate.

LIMITATIONS

The scope of work included in this work plan has been prepared for Mountain View Co-Op and includes only those services described above. This work plan does not include remedial or disposal services, or costs for such services, beyond those listed specifically in the scope of work.

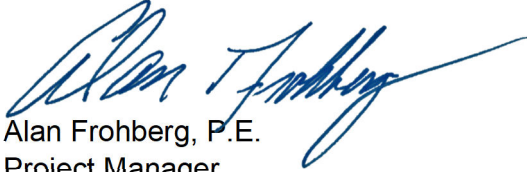
AWS cannot and does not warrant that the scope of services described in this work plan will be adequate to identify all potential environmental conditions or latent conditions at the Site. Our scope of work will be performed with a standard of care meeting or exceeding that of other environmental consultants performing similar work in the area.

ACCEPTANCE

A complete copy of this Work Plan will be submitted on behalf of Mountain View Co-Op to Mr. Christopher Herman with DEQ. After his review and approval, AWS will confirm your approval before proceeding to complete the scope of work presented herein.

Please contact me if you have any questions or concerns regarding this project. We appreciate your business and look forward to working with you on this project.

Respectfully Submitted,



Alan Frohberg, P.E.

Project Manager

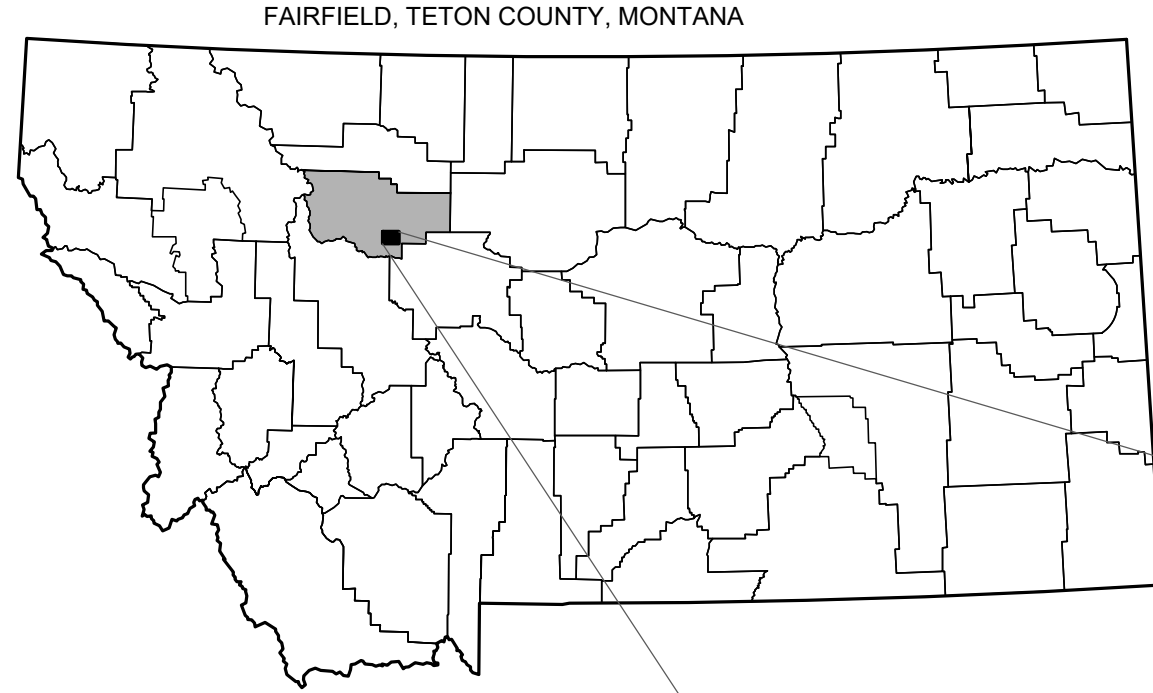
alan@airwatersoil.com

Appendices: A – Figures
B – SVE Pilot Test Equipment
C – Groundwater Monitoring Analytical Plan
D – Cost Estimate
E – Standard Operating Procedures

cc: Mr. Christopher Herman, Montana DEQ PTCS, P.O. Box 200901, Helena, MT 59620.
Transmitted via DEQ FTP server.



APPENDIX A
Figures



FAIRFIELD, TETON COUNTY, MONTANA

PROJECT SITE



1
FIG 1

SITE VICINITY MAP

DEQ FACILITY ID 50-03596 (TID 28796); RELEASE 1469 & 4385; WP ID 34963 & 34964

219 CENTRAL AVE., FAIRFIELD, MT 59436
FAIRFIELD FACILITY

REMEDIAL INVESTIGATION
MOUNTAIN VIEW CO-OP

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2.11.2025
14064.9.6

DRAWN BY
DRESCH
CHECKED BY
FROHBERG

SITE VICINITY
MAP

FIGURE
1



LEGEND	
	EXISTING MONITORING WELL
	UNKNOWN WELL
UW	
	ELECTRICAL UTILITY
	12-INCH SANITARY SEWER MAIN
	SEWER MANHOLE
	COMMUNICATION UTILITY
	NATURAL GAS
	6-INCH WATER MAIN
	WATER SERVICE LINE
	NEW SVE WELLS
	SOIL INVESTIGATION AREA



1
FIG 2

SITE MAP



DEQ FACILITY ID 50-03596 (TID 28796); RELEASE 1469 & 4385; WP ID 34963 & 34964

219 CENTRAL AVE., FAIRFIELD, MT 59436

FAIRFIELD FACILITY

REMEDIAL INVESTIGATION

MOUNTAIN VIEW CO-OP

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FROHBERG

SITE MAP

FIGURE
2



APPENDIX B
SVE Pilot Test Equipment

Soil Vapor Extraction Systems

Geotech SVE

The Geotech Soil Vapor Extraction system is designed to remove hazardous vapors from the subsurface by drawing air through contaminated soil, and volatilizing adsorbed phase pollutants. Geotech SVE systems are ideal for well point or trench type vapor barriers.

FEATURES

- **Compact, durable design**
- **Skid Mounted with moisture separator drum/mist eliminator**
 - 37 gallon (140 liters) liquid holding capacity
 - Hi Water level switch
 - Hi Vacuum switch
- **Continuous reliable operation**
- **Many blower types are available to meet your requirements:**
 - Regenerative
 - Rotary Claw
 - Positive Displacement (Rotary Lobe)
 - Rotary Vane
 - Centrifugal Fan
- **Thermal overload protection**
- **Influent dilution air valve**
- **Two vacuum gauges**
- **Optional NEC code available**
(Class 1, Div. 1, or Div. 2)
- **Non-explosive units are available**

OPERATION

The Geotech SVE system works by pulling air through soil that has been saturated with hydrocarbons or other volatile organic compounds, causing these compounds to volatilize. The vapors are then discharged to the atmosphere, through carbon polishing or vapor oxidation.

These systems are deployed with a moisture separator and mist eliminator filter to protect blower and end treatment from corrosion particulates and debris.

Every Geotech SVE system is factory assembled and fully tested for function, performance, and safety to meet the design conditions of each site application.



Regenerative Blower SVE inside optional hazmat enclosure



Regenerative Blower SVE

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.

2650 East 40th Avenue • Denver, Colorado 80205

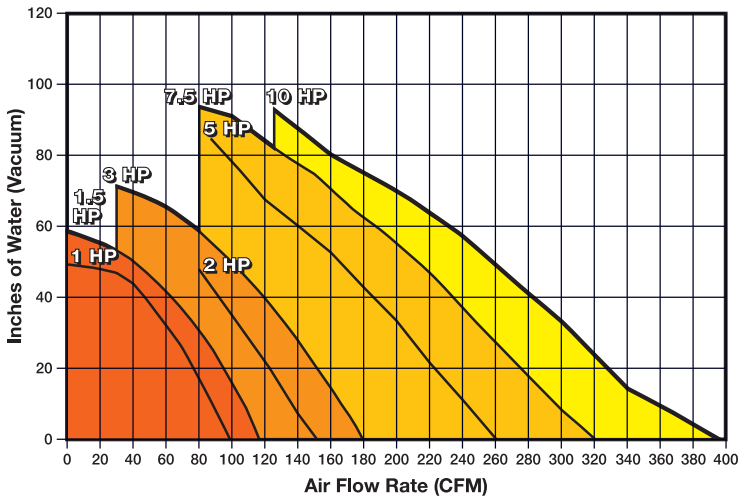
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242

email: sales@geotechenv.com website: www.geotechenv.com

Soil Vapor Extraction Systems



Geotech SVE



Regenerative Type Blower
Soil Vapor Extraction System
Selection Curve 1 through 10 HP

Note: Higher flow and vacuum versions are available.



Regenerative Blower SVE
with optional Geotech Environmental Control Module

SPECIFICATIONS

Applications: Well point or trench type vapor barriers

Product Recovery: Volatile Organic Compounds (VOCs)

Dimensions: 40" L x 48" W x 65" H
(101.6 cm L x 121.9 cm W x 165.1 cm)

Options: Geotech Environmental Control Module
Telemetry package
Influent or effluent silencer
Effluent sample port
Effluent temperature gauge
Local CFM display
Auto-Drain (this option features automatic water level control inside the moisture separator with an effluent transfer pump)

Power Requirements:

HP	Voltage	Phase	CFM/CMM	Inches H ₂ O Vacuum
1	115/230	1	0-95/0-2.7	50"
1.5	230	1	0-115/0-3.3	58"
2	230	1	80-145/2.3-4.1	55"
2	230	3	80-145/2.3-4.1	55"
3	230	1 or 3	30-185/8.5-5.2	72"
5	230	3	85-280/2.4-7.9	82"
7.5	230	3	80-325/2.3-9.2	93"
10	230	3	125-380/3.5-10.8	93"

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email: sales@geotechenv.com website: www.geotechenv.com



Series 475 Handheld Digital Manometer

Specifications - Installation and Operating Instructions



OPERATING INSTRUCTIONS

ON/OFF:

Press ON/OFF to turn the unit on. Press and hold ON/OFF for about 2 seconds to turn it off. Device will automatically shut off after 20 minutes if not in use.

ZERO:

Vent both pressure ports to atmosphere. Press ZERO button until the LCD displays "-----" then release it. The LCD reads 0 if the zero offset is less than 10% of FS.

UNITS:

To change units, press both ON/OFF and ZERO buttons simultaneously.

BATTERY:

Remove retaining screws on end cap at base of instrument to replace battery when LOW BAT is displayed. Use 9 V alkaline battery DURACELL® MN 1604, Energizer® 522, or Energizer® EN22.

WARNING Enclosure parts are constructed of plastic. When cleaning the exterior use a damp cloth to avoid electrostatic sparking. Enclosure parts are constructed of aluminum. Enclosure must be protected from mechanical friction and impact with iron/steel to prevent ignition capable sparks.

SPECIFICATIONS

Service: Air and compatible gases.
Wetted Materials: Consult factory.
Accuracy: ±0.5% FS, 60 to 78°F (15.6 to 25.6°C); 1.5% FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40°C).
Pressure Hysteresis: ±0.1% of FS.
Pressure Limits: See chart.
Temperature Limits: 0 to 140°F (-17.8 to 60°C).
Compensated Temperature Limits: 32 to 104°F (0 to 40°C).
Storage Temperature Limits: -4 to 176°F (-20 to 80°C).
Display: 4-digit LCD (.425 H x .234 W digits).
Power Requirements: 9 volt alkaline battery. Battery included but not connected.
Weight: 10.8 oz (306 g).
Process Connections: Two barbed connections for use with 1/8" or 3/16" I.D. tubing. Two compression fittings for use with 1/8" I.D. x 1/4" O.D. tubing (for 100 psi or higher pressure ranges).
Agency Approvals: CE.

Model	Pressure Range	Max. Pressure
475-000-FM	0 to 1.000 in w.c. (0 to .2491 kPa)	5 psi (34.5 kPa)
475-00-FM	0 to 4.000 in w.c. (0 to 0.996 kPa)	5 psi (34.5 kPa)
475-0-FM	0 to 10.00 in w.c. (0 to 2.491 kPa)	5 psi (34.5 kPa)
475-1-FM	0 to 20.00 in w.c. (0 to 4.982 kPa)	10 psi (68.9 kPa)
475-2-FM	0 to 40.00 in w.c. (0 to 9.96 kPa)	10 psi (68.9 kPa)
475-3-FM	0 to 200.0 in w.c. (0 to 49.82 kPa)	30 psi (207 kPa)
475-4-FM	0 to 10.00 psi (0 to .6895 bar)	30 psi (2.07 bar)
475-5-FM	0 to 20.00 psi (0 to 1.379 bar)	60 psi (4.14 bar)
475-6-FM	0 to 30.00 psi (0 to 2.069 bar)	60 psi (4.14 bar)
475-7-FM	0 to 100.0 psi (0 to 6.895 bar)	150 psi (10.3 bar)
475-8-FM	0 to 150.0 psi (0 to 10.34 bar)	200 psi (13.8 bar)

Duracell® is a registered trademark of The Gillette company. Energizer® is a registered trademark of ENERGIZER BRANDS, LLC LIMITED LIABILITY COMPANY



APPENDIX C

Groundwater Monitoring Analytical Plan

Wells	Depth to Water (DTW)	Volatile Petroleum Hydrocarbons (VPH) <i>(MT VPH Method)</i>	Extractable Petroleum Hydrocarbons (EPH) Screen <i>(MT EPH Method)</i>	EPH Fractions <i>(MT EPH Method)</i>	1,2-dichloroethane (DCA) <i>(Method 8260B)</i>	Ethylene Dibromide (EDB) <i>(Method 8011)</i>	Alkalinity <i>(Method A2320B)</i>	Dissolved Methane <i>(Method SW8015M)</i>	Sulfates <i>(Method E300.0)</i>	Sulfides <i>(Method A4500-SF)</i>	Nitrogen, Nitrate + Nitrite <i>(Method E353.2)</i>	Dissolved + Total Iron and Manganese <i>(Methods E200.7/E200.8)</i>
20 Possible Monitoring Wells	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
2 Existing SVE Wells	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
2 New SVE Wells	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
3 Existing IAS Wells	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
2 Duplicates	--	✓	--	--	--	--	--	--	--	--	--	--



APPENDIX E
Standard Operating Procedures



STANDARD OPERATING PROCEDURE

Field Sampling Equipment Decontamination

AWS SOP-01

EQUIPMENT:

- Disposable gloves (e.g., latex, nitrile)
- Eye protection
- Phosphorus-free detergent concentrate (e.g., Alconox®, Liquinox®)
- Concentrated alcohol (e.g., isopropyl, methanol) to make 10% solution
- Concentrated nitric acid to make 10% solution
- Deionized (DI), distilled, or potable tap water
- Spray bottles, collapsible dispensers, buckets, basins
- Scrub brushes
- Disposable wet-wipes
- Paper towels
- HEPA-filtered vacuum
- Garbage bags

PROCEDURE:

Decontamination of asbestos sampling tools and equipment is generally accomplished using HEPA-filtered vacuums, disposable wet-wipes, or water and paper towels. Cleaning is continued until visible contaminants are removed to prevent cross contamination between samples, and to prevent potential fiber exposure.

Decontamination of petroleum investigation sampling equipment generally includes a 3-step process: 1) detergent scrub; 2) alcohol/acid rinse; and 3) water rinse.

Prepare detergent solution by mixing detergent concentrate with potable water in a large cooler or basin. Keep this mixture free from contaminants; draw small portions out into smaller basins/buckets as needed. Prepare 10% alcohol-in-water and 10% nitric acid-in-water solutions in collapsible containers and/or spray bottles. Methanol and nitric acid solutions should be prepared using DI or distilled water.

Decontamination should be performed in an area upwind of the contamination zone or otherwise reasonably free from contaminants of concern. Gross contaminants/debris should be removed from equipment and left in the sampling area(s) if practicable. Remove remaining gross contamination by scrubbing equipment with detergent solution in a small basin. Empty basin and refill with fresh detergent solution as necessary. Rinse with alcohol solution, nitric acid solution (when sampling for metals), and DI/distilled water.

Dry decontaminated equipment using paper towels or place in an area as free from contaminants of concern as practicable and allow to air dry.

Caution should be used to avoid direct contact with contaminated materials; gloves and eye protection should be worn during preparation of decontamination fluids and during decontamination of sampling equipment. Decontamination fluids should be prepared in a location as free from contamination as practicable.



STANDARD OPERATING PROCEDURE

Field Sampling Equipment Decontamination

AWS SOP-01

DISPOSAL:

All disposable items (soiled wipes, used paper towels, vacuum filters, etc.) should be deposited into a garbage bag and properly disposed. Decontamination waste from asbestos decontamination may require disposal as asbestos waste.

Decontamination fluids for petroleum investigations do not need to be collected under most circumstances. Spread decontamination fluids over a paved surface, if practicable.



STANDARD OPERATING PROCEDURE

Soil Sample Collection

AWS SOP-02

EQUIPMENT:

- Shovels, spades, hoes, trowels, etc.
- Stainless steel mixing bowl
- Stainless steel hand auger
- Excavation equipment (e.g., backhoe, trackhoe)
- Drill rig sample equipment (e.g., steel split spoons, MacroCore® tubes)
- Field forms
- Disposable gloves and decontamination fluids (per AWS SOP-01)
- Leak-tight cooler with ice

GENERAL:

Soil samples should be described according to the procedures outlined in the Unified Soil Classification System (USCS – method ASTM D2487) or the Soil Conservation Service (SCS) classification system. Soil texture should be classified by either the USCS or USDA classification.

Pertinent soil sample information should be recorded on sampling forms or on specific documents identified in the SAP. Information should be recorded in a way to facilitate preparation of an overall soil sample summary. Information to be recorded for individual soil samples typically includes the following:

- Sample name/I.D.
- Collection date and time
- Sample type (grab/composite; natural/duplicate)
- Sample location, including diagram reference, if applicable
- Sample preservation, if applicable
- Analysis(es) to be performed
- Notation of deviations from SOP, if applicable

Decisions regarding sample collection and analyses will be guided by project-specific parameters and conditions. Collection and analysis of soil samples for evaluation of suspected or confirmed petroleum releases will generally be completed in accordance with the Montana Department of Environmental Quality (DEQ) *Final February 2024 Montana Risk-Based Corrective Action Guidance for Petroleum Releases (RBCA)*. Sampling requirements stipulated in the RBCA are shown in *Table B – Testing Procedures for Soils and Water* from the RBCA, which is presented on the following page of this SOP.

Decontamination will be completed following procedures outlined in AWS SOP-01.



STANDARD OPERATING PROCEDURE

Soil Sample Collection

AWS SOP-02

Petroleum Product	VPH	EPH Screen	EPH Fractionation	EPH for PAHs	RCRA Metals + Zinc	EPA Method 8260B – Oxygenates /VOCs	Lead Scavengers
Gasoline/Aviation Gasoline	R						SS
Diesel (#1 & #2)	R	R	X	SS			
#1 - #2 Heating Oils	R	R	X	SS			
#3 - #6 Fuel Oils		R	X	X			
Used/Waste Oil	R	R	X	X	SS	R	SS
Kerosene, Jet Fuel (Jet-A, JP-4, JP-5, JP-8, etc.)	R	R	X	SS			
Mineral/Dielectric Oils		R	X				
Heavier Wastes		R	X	X			
Crude Oil	R	R	X	X			
Unknown Oils/Sources	R	R	X	X	SS	R	SS

Table B - Testing Procedures for Soils and Water

R - required analysis

X - analysis to be run if the EPH screen concentration in is >200 mg/kg TEH or >1,000 µg/L TEH in soil and water, respectively.

SS - Site-specific determination.

SURFACE SAMPLING:

Surface soil samples are collected from the surface to depths of approximately 6 inches below ground surface (bgs), unless otherwise specified in the project specific SAP. Sufficient sample will be collected for the analysis that will be performed, but generally, this will be less than 1 quart. Soil samples will be collected in either wide mouth glass jars or re-sealable polyethylene bags (Ziploc® or equivalent).

Samples should be collected from an area of approximately 1 square foot or less using shovels, trowels, etc., as appropriate. Where composite samples are desired for petroleum samples, care should be taken to minimize volatilization while mixing. Field mixing may be accomplished in the mixing bowl or in a sealed Ziploc bag for EPH and metals samples. Field compositing should not be completed for VPH or VOC samples. Aliquots may be containerized individually and submitted for laboratory compositing, if necessary.

If a sod or duff layer is present, this layer should be peeled back to the top of the mineral soil. Likewise, larger aggregate (e.g. > ¾" diameter) should generally be removed from the sample.

The sample must be well mixed, with a representative portion placed in the sample container. Quarter the sample in the bowl/bag and place an equal volume of soil from each quarter in the sample container(s) provided by the laboratory. Label sample containers (location, depths, etc.) and place on ice as quickly as practicable and keep cool until receipt by laboratory. Transfer to laboratory using chain-of-custody (COC) protocol and overnight shipping or direct delivery, if applicable.



STANDARD OPERATING PROCEDURE

Soil Sample Collection

AWS SOP-02

SUBSURFACE SAMPLING:

Ensure subsurface utilities, including any private utilities (e.g., electrical for signs, water & controls for irrigation, etc.) have been surface-marked prior to initiation of subsurface sampling activities. Consider utilizing “daylighting” techniques where utility locations are unknown.

Arrange for disposal of cuttings/waste material prior to initiation of sampling (e.g., return to boring/excavation; transport/dispose at a landfill; etc.), including waste manifesting, if appropriate. Where waste materials must be temporarily left on site, arrange for storage in drums, lined berms, etc., as appropriate.

Ensure equipment (drill rigs, backhoes, trackhoes, etc.) can safely access the areas to be sampled. Minimize damage to the surface (landscaping, pavement, etc.) as feasible, or arrange for repair prior to on-site activities.

Subsurface sampling will generally be completed using a hand auger, excavator, or drill rig. Sampling procedures for each type of equipment are described below. Sample collection, homogenization, compositing, transfer to sampling containers, and transmittal to the laboratory should follow the same procedures as outlined for collection of surface samples.

Hand auger: Auger holes can be drilled at a consistent diameter or in a telescoping manner, if contamination between sample intervals is a concern. The telescoping method includes advancing the largest auger to an approximate depth of 3 feet bgs, collecting specified depth increment samples as the auger is advanced. Install temporary casing (e.g., new or decontaminated PVC) with a diameter slightly smaller than the borehole to keep the hole open and reduce possible cross-contamination between depth intervals. Using the next size smaller bucket auger, repeat the process. Record lithology from recovered cuttings throughout. Select sample intervals for field screening and packaging for laboratory analysis in accordance with procedures described in the SAP. Return cuttings to the boring as feasible, or abandon the boring with hydrated bentonite chips. Restore the site in accordance with the project plan.

Drill Rig: Retrieve sampler from driller. Split spoon samplers are generally utilized by advancing alternating larger samplers (~3-inch diameter) and small samplers (~1.5-inch diameter), both being approximately 2.5-feet long, using hollow-stem auger drilling methods. MacroCore® samples are generally obtained by advancing 4-foot-long sample tubes of approximately 1.5-inch diameter using a direct-push drilling method. In either case, record lithology and percent recovery from cores retrieved. Collect at least 1 sample interval from each recovered interval for field screening, and select sample intervals for packaging for laboratory analysis in accordance with procedures described in the SAP. Return cuttings to the boring as feasible, or abandon the boring with hydrated bentonite chips. Restore the site in accordance with the project plan.

Excavations: Excavate to the prescribed depth. If the excavation depth exceeds 5 feet, OSHA construction standards for shoring or sloping must be followed to prevent accidental injury. Sampling personnel should enter the excavation only as necessary, and always with care, during and after excavation. Soil profile descriptions shall be made from a freshly



STANDARD OPERATING PROCEDURE

Soil Sample Collection

AWS SOP-02

scraped surface along the excavation wall or base, as feasible. Soil samples shall be collected from depth intervals specified in the SAP.

After sampling is completed, the excavation should be backfilled with excavation material in the reverse order that it was excavated so topsoil material is returned to the surface. Alternatively, if excavated material is being disposed, backfill with imported fill material. Backfill material should be mechanically compacted to extents feasible, or in accordance with project-specific requirements in the SAP. Restore the site in accordance with the project plan.

PREPARATION AND PRESERVATION:

All soil samples will be packaged and preserved in accordance with the respective analytical method(s), using containers and preservatives provided by the analytical laboratory, where applicable. Samples will be placed in coolers with ice (or refrigerators) as soon as practicable following collection and will be kept cool until received by the laboratory, as required for the respective method(s).

Samples will be containerized and shipped using chain-of-custody protocol, as outlined in AWS SOP-08. This includes placement of custody seals on coolers (or on individual sample containers).

Standard analytical methods, sample container and preservation requirements, and analytical hold times are presented in *Table A – Soil Sampling and Preservation Protocol* on the following page of this SOP. The provided *Table A* has been taken from DEQ's *Final February 2024 RBCA*.



STANDARD OPERATING PROCEDURE

Soil Sample Collection

AWS SOP-02

Parameter	Analytical Method	Sample Container/ Preservation	Holding Time
Soil Samples			
VPH	Montana Method VPH	60 mL or 40 mL VOA vials or 4 oz wide mouth jar. Collect at least 10 g of soil, cool to 4 ±2° C. Must be preserved at the lab in methanol within 48 hours of collection. or Methanol preservation in the field. 1 mL methanol for every g soil, +/- 25%; lab can provide appropriate vials with methanol for easy collection; cool to 4 ±2° C. If preserving with methanol in the field, a sample containing no methanol must also be submitted for determining moisture percentage.	28 Days to analysis from collection. If collecting in the field without methanol, lab preservation in methanol w/in 48 hours and 28 days to analysis from collection.
EPH Screen	Montana Method EPH	4-oz wide-mouth amber glass jar, cool to 4±2° C	Extracted within 14 days of collection. Analyzed within 40 days of extraction.
EPH Fractionation with or without PAH's	Montana Method EPH (PAHs: 8270))	One 4-oz glass jar, cool to (4 ± 2) °C	Following EPH Screen 14-day to extraction, 40 days to analysis.
VOCs/Oxygenates/ 1,2 DCA/lead scavengers EDB	EPA Method 8260 /SW-846-5035A	One 4-oz. glass jar, cool to (4 ± 2) °C Preserve in methanol in field or at lab within 48 hours of collection.	48 hours to lab extraction. 14-day hold time from collection MeOH preservation: 14 days to extraction and analysis from collection.
RCRA Metals plus zinc (Except Hg)	EPA Method 6010 or 6020	One 4-oz. plastic or glass jar, no preservation	6 months
Mercury (Hg)	EPA Method 7471 B	One 4-oz. plastic or glass jar, no preservation	28 days
% Moisture-required for all soil samples	USDA Handbook 60 method 26 (or equivalent)		

Table A - Soil Sampling and Preservation Protocol

Alternate approved versions of the methods are allowed.



STANDARD OPERATING PROCEDURE

Field Measurement of Total Volatile Organic Compounds

AWS SOP-03

EQUIPMENT:

AWS measures total volatile organic compounds (VOC) using a photoionization detector (PID) with a 10.6 electron volt (eV) lamp, following a “heated headspace” method. The PID should be fully charged the day prior to field usage, and extra batteries or field chargers should be available, as feasible. Calibration equipment and supplies should be included in the field kit based on the recommendations of the manufacturer. These generally include a cylinder of compressed calibration gas, a pressure/flow regulator, and an activated carbon “zero” filter.

Field screening sample containers may consist of either heavy zip-top plastic bags (e.g., Ziploc® Freezer bags or equivalent) or glass canning jars fitted with aluminum foil under the metal lid rings. Plastic bags and aluminum foil should never be reused. When using canning jars, the jars and rings should be decontaminated between sample analyses (see AWS SOP-01). Whether plastic bags or glass jars are used, sample vessels and sample amounts should be consistent in composition and volume for all field total VOC samples collected for a given project. This will facilitate consistent sample headspace for all field screening samples, increasing data reliability.

Use of personal protective equipment (e.g., disposable latex or nitrile gloves, eye protection, etc.) and decontamination fluids and equipment should be consistent with AWS SOP-01 and AWS SOP-02.

CALIBRATION:

The PID should be field calibrated prior to use at least once per day, at a minimum. Bump testing and/or recalibration should be completed if the accuracy of field data are questioned by the operator, or if the duration of field activities following initial calibration exceeds 8 hours.

In an upwind or otherwise vapor-free atmosphere, turn the instrument on and initiate the calibration procedure per the manufacturer’s instructions. Ensure the calibration span setting in the instrument matches that of the calibration gas. The calibration span gas utilized for field screening of total VOCs at petroleum release investigation projects is 100 parts per million (ppm) isobutylene in air.

PROCEDURE:

Collect soil samples following AWS SOP-02, including labeling of field screening sample containers with the appropriate sample name/identification (ID). Field screening samples are often collected from the same locations as laboratory samples. In such instances, the portions to be containerized for field screening are referred to as field “split” samples.

Ensure field split samples are kept out of direct sunlight, allowing them to warm to approximately 70-80 degrees Fahrenheit (°F) as determined by feel (approximately room temperature). This may be accomplished by placing the sample vessel on the floor board of a running vehicle with the heater turned on. In this scenario, caution should be used to avoid exposing vehicle occupants to VOCs (roll-down windows to provide cross-ventilation). To ensure data precision, warm all samples for a given project to approximately the same temperature over approximately the same amount of time, if practicable.



STANDARD OPERATING PROCEDURE

Field Measurement of Total Volatile Organic Compounds

AWS SOP-03

Attach the sample probe to the PID and allow the instrument to complete its warm-up cycle, if necessary. Opening the sample vessel as little as possible, insert the probe into the “headspace” of the sample vessel. This can be accomplished by opening the zip-top plastic bag enclosure approximately ¼-inch or by poking the probe through the foil jar cover. In either instance, avoid inserting the sample probe directly into the soil. Samples should be analyzed in order of assumed impacts, beginning with the samples inferred to be least impacted and finishing with the samples inferred to be most-impacted.

Continually observe the instrument readout and record the highest concentration (or use the instruments “Max” function, if available, taking care to reset the instrument’s “Max” value after each sample reading). Sample name/ID and observed total VOC concentrations should be recorded in a way to facilitate preparation of an overall soil sample and field screening data summary for the project.

Heated and analyzed soil samples must never be containerized for laboratory analysis. Laboratory samples must be split from the original sample and containerized and preserved separately, immediately following collection. Alternatively, laboratory samples may be collected and containerized separately following completion of field analyses.

MAINTENANCE:

The instrument should always be stored in the case provided by the manufacturer when not in use. Maintenance and storage of the instrument and batteries should be conducted in accordance with the manufacturer’s recommendations.

Periodic instrument maintenance should be completed as recommended by the manufacturer, including occasional partial disassembly and removal, cleaning, or replacement of in-line filters and or lamps. Other failed components should be replaced as necessary as well. Some maintenance may need to be completed by the manufacturer or authorized service center.



STANDARD OPERATING PROCEDURE

Field Measurement of Depth to Groundwater

AWS SOP-04

EQUIPMENT:

- Electric Water Level Indicator (well probe)
- Electronic Oil-Water Interface Probe (interface probe)
- Extra batteries
- Field sampling forms
- Decontamination equipment

CALIBRATION:

The well probe and interface probe should be checked annually at a minimum, or more frequently as needed, for proper operation prior to completing field activities. The well probe should be checked by lowering the probe into a cup of clean water and confirming the probe's proper response. The interface probe should be checked by lowering the probe into a cup containing both vegetable oil and clean water, and where the oil and water have had time to separate into two distinct layers, and confirming the probe's proper response to each layer.

GENERAL:

Measure the depth to water in all wells, using the well probe, from the north quadrant of the top of the well casing or from a designated measuring point, as appropriate. Measure and record vertical distance from measuring point to ground level (unless measuring point has been surveyed for elevation). Make sure the measuring point is labeled or marked on the well casing so future measurements can be made from the same location. Obtain a depth to water from the established measuring point to the nearest hundredth of a foot. Record data on appropriate field forms.

Decontaminate the well probe between each well in accordance with AWS SOP-01 and/or the project-specific SAP.

If free-product petroleum is known or suspected to be present in a well, an interface probe should be used to measure the depth to water and thickness of free product in the well.

Using the interface probe, measure the depth to the top of free-product below the designated measuring point. Continue to lower the probe until the bottom of the product/top of groundwater interface is reached. Record both measurements on field forms. Product thickness can be calculated by subtracting the depth to the top of free-product measurement from the depth to groundwater/free-product interface measurement.

Decontaminate the interface probe between each well in accordance with the AWS SOP-01 and/or the project-specific SAP.



STANDARD OPERATING PROCEDURE

Monitoring Well Development

AWS SOP-05

EQUIPMENT:

- 5-gallon bucket graduated in quarter gallons
- Electric Oil-Water Interface Probe (interface probe)
- Bailer(s)
- Disposable bailer rope or reusable Teflon cable on a reel
- Field forms
- Decontamination equipment

GENERAL:

Groundwater will be allowed to equilibrate in the new monitoring well for several days before development. Immediately prior to initiation of development activities, depth to water (DTW) will be measured relative to the previously established measuring point using an interface probe, in accordance with AWS SOP-04 and/or the project-specific SAP. DTW data will be recorded on field forms and will be used to calculate the casing water volume for well development purposes.

A new, disposable, polyethylene bailer will be used to develop the new well. A surge and bail technique will be used to remove sediment from the filter pack. Bailed water and sediment will be contained in a graduated 5-gallon bucket and DTW measurements will be intermittently collected after bailing events to monitor infiltration of groundwater into the well. If sufficient groundwater infiltration to the well occurs, development will continue until purge water turbidity is visibly decreased, or until 10 casing volumes of water have been evacuated. Following development of the well, the post-development DTW will be measured. DTW measurements, purge volumes, and visual observations (qualitative turbidity descriptions) will be recorded on a field form.

If free product petroleum is present in the new well, it will not be developed. In this instance, the thickness of the free product layer would be measured with the interface probe and the measurement recorded on a field form. If the interface probe measurement is inconsistent or if the interface probe is unavailable, an approximate measurement of visible product thickness will be determined using a bailer and tape measure. Recovery, sampling, and analysis of free product petroleum will not be performed under this scope of work.

If specified in the SAP to be completed during the evacuation process, collect water samples for field determinations of temperature, specific conductivity, and pH. Continue developing the well until field parameters stabilize to within $\pm 5\%$ on 3 consecutive measurements. Report field observations and volume of water removed on the field forms.

Dispose purge water in accordance with AWS SOP-56.



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

EQUIPMENT:

- 5-gallon bucket graduated in gallons
- Low-flow cell or 12-ounce glass jar
- Hydrogen potential (pH) and temperature meter
- Specific conductance (SC) meter
- Dissolved oxygen (DO) meter
- Oxidation/reduction potential (ORP) meter
- Turbidity meter
- Coolers and ice
- Sample bottles
- Sampling pump – Peristaltic or Bladder-type with controller and compressor
- Disposable bladders (if using bladder pump)
- Disposable tubing
- Bailer(s)
- Bailer rope or Teflon cable reel
- Preservatives
- Disposable in-line filters or filter apparatus with filter media
- Field sampling forms
- Decontamination equipment and indelible marker
- Fluids
- Stopwatch
- Electronic Oil-Water Interface Probe (interface probe)
- Graduated vessel

MAINTENANCE:

All equipment should be inspected for damage and proper functionality (including battery charge) prior to use in the field. Unstable or “drifting” measurement readouts may be indicative of damaged probes/sensors, especially if the problem persists following recalibration. Damaged or improperly functioning equipment should be repaired or replaced as appropriate.

All meters, probes, pumps, sampling equipment, and sample vessels should be decontaminated in accordance with AWS SOP- 01 and following completion of sampling.

CALIBRATION:

Instruction manuals should always be kept with meters, especially sections pertaining to calibration and trouble shooting. Keep spare batteries with each meter. Calibration fluids appropriate for the anticipated sample ranges (pH 4.01 buffer solutions for acidic samples) should be kept with meters and should not be used if marked expiration dates have been exceeded. Several small sample vessels should be kept with meters for calibration and sample analyses.

Calibration of individual meters will vary; calibration should always be performed in accordance with the manufacturer’s recommendations. In general, most meters should be calibrated at the beginning of each field day, at a minimum. Additional calibrations may be necessary if meter readings become questionable. Performance of “bump testing” to



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

determine whether meters are within acceptable calibration ranges is advisable for sampling events longer than approximately 6 hours.

DO meters calibrate with barometric pressure. ORP and SC meters may only require periodic calibration using calibration solutions appropriate for the anticipated sample ranges. Two or three-point calibration is advisable for most pH meters; for two-point calibrations, consideration should be given to the anticipated sample range. Turbidity meters use four standards for calibration (800 NTU, 100 NTU, 20 NTU, and 0.02 NTU), if 20, 100, or 800 NTU drifts more than 10% the solution needs to be replaced. Temperature sensors for most meters do not require calibration.

PROCEDURE:

AWS will complete groundwater sampling in accordance with the procedures presented below. Where applicable, groundwater sampling procedures will also be completed in accordance with the current version of DEQ's *Groundwater Sampling Guidance*.

Initial Measurements - Begin by determining the depth-to-water (DTW) in accordance with the AWS SOP-04, and/or the project-specific SAP. If DO is a desired field analysis, gently lower the DO meter's probe, calibrated per manufacturer's guidelines, to just beyond the DTW observed in the previous step. Once submerged, readings will begin trending in a consistent increasing or decreasing manner, until a transitional point is reached and the initial trend is reversed. This transitional point should be recorded on the appropriate sampling form as the pre-purge DO.

Well Purging - Purging must be performed on all wells prior to sample collection. Well purging will be accomplished using a peristaltic pump, bladder pump, or with a disposable polyethylene bailer. The specific purging method shall be chosen based on the following: DTW; diameter of well; existing well configuration; contaminant(s) of concern; and/or, the project-specific SAP. Sampling is generally not conducted when free product (e.g., light non-aqueous phase liquid, or LNAPL) is present.

Where pumping methods are used, field water quality indicators (WQIs) will be observed and recorded in approximate five-minute intervals. Evacuation of fluids will continue until DO, pH, SC, ORP, and turbidity readings stabilize. Stabilized readings will include changes of no more than 0.1 standard unit (su) for pH and no more than 3 percent (%) for SC, no more than 10 percent (%) for DO and turbidity, and 10 millivolts (mV) for ORP.

Where bailer methods are used, purging should remove at least three (3) casing volumes of fluid from the well and until stabilized WQIs are achieved. The following equation is used to calculate well casing volume in gallons:

$$V = 3.14 \times (r^2) \times h \times 7.48$$

Where: V = volume (gallons)
r = well radius (feet)
h = height of water column in well (feet)



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

The radius of the well pack will be used for the well radius (r) for calculating volumes. For example, a 2-inch diameter PVC monitoring well installed in a 6-inch diameter borehole with sand filter pack would use a well radius of 3 inches or 0.25 feet.

The height of the water column (h) is calculated as the total well depth minus the DTW measurement for the well.

WQIs will be observed during bailing of each well, if feasible. Stabilized readings will include changes of no more than 0.1 su for pH, no more than 3% for SC, no more than 10% for DO or turbidity, and no more than 10 mV for ORP. If WQIs have not stabilized after five (5) casing volumes have been evacuated, it is at the discretion of the AWS field technician whether to collect a sample or to continue purging.

The actual pumping duration and/or volume of water purged from the well, along with the WQI readings, must be recorded on appropriate sampling forms for all methods of purging.

Wells with documented or expected low yield/slow recovery may require sample collection without prior purging due to limited available water volume.

If the recovery of a low-yield well exceeds 2 hours after purging, a sample shall be extracted as soon as sufficient volume is available in the well. At no time will a monitoring well be pumped dry if the recharge rate causes formation water to cascade down interior portions of the well casing, causing an accelerated loss of volatile organics and change in pH.

General Well Sampling - Wells must be sampled from the least contaminated to the most contaminated, if known. Open well and measure DTW in accordance with the AWS SOP-04. Decontaminate all sampling/down-well equipment in accordance with the AWS SOP-01. Use disposable nitrile gloves throughout decontamination and sampling procedures and use new gloves for each sampling point.

The actual pumping duration and/or volume of water removed from the well, along with all WQI readings, must be recorded on appropriate sampling forms for all methods of sampling.

Low-Flow Method - The goal of low flow purging and sampling is to collect water samples that reflect the total mobile organic and inorganic loads transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. During this procedure, emphasis is placed on minimizing hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations.

WQIs are monitored during purging to identify stabilized conditions to determine when sample collection may begin. Stabilized readings will include changes of no more than 0.1 su for pH, no more than 3% for SC, no more than 10% for DO or turbidity, and no more than 10 mV for ORP.



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

The low-flow method should be implemented with a positive-lift pump (e.g., peristaltic or bladder pump). The pump intake should be located within the well-screen interval and at a depth that will remain under water at all times. It is recommended that the intake depth and pumping rate remain the same for all sampling events. The following equation is used to calculate the pump intake depth or sampling depth:

$$SD = DTW + [(TD - DTW) \div 3]$$

Where: SD = Sampling depth (feet)
DTW = Depth to water (feet)
TD = Total well depth (feet)

Note this equation places the pump intake in the upper one-third of the water column and should be modified to sample from deeper depths, accordingly (e.g., if wanting to sample from the middle of the water column, replace the value of 3 with 2 in the equation).

The low-flow cell should be set up over the 5-gallon bucket so that the pump tubing discharge flows into the cell and overflows into the bucket. The pH, temperature, SC, and ORP (if used) meters should be set up to monitor water quality in the low-flow cell during purging and sampling.

Disposable tubing should be cut to a length that extends from the down-well bladder pump, or sampling depth for peristaltic pump, to the low-flow cell discharge point.

DTW should be measured before installing the pump and continuously recorded during purging at consistent intervals (e.g., 5 or 10 minutes). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure drawdown of less than 0.3 foot or stabilization of the water level. If the minimal drawdown that can be achieved exceeds 0.3 foot, but remains stable, continue purging until the three (3) casing volumes are removed and/or water quality parameters stabilize.

The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 foot and WQIs have stabilized, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Bailer Method – Removal of water from the well by bailing will be accomplished using a new, disposable, polypropylene (or other material specified in the SAP), bailer and a spool of polypropylene rope or equivalent bailer cord (e.g., Teflon-coated stainless-steel cable). The length of the bailer and cord should be long enough so that the bailer intake reaches the middle of the well-screen section, but should be long enough to evacuate water from the lower one-third of the well depth if needed.



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

Bailing should be a semi-continuous procedure of removing water from the upper one-half of the water column. Care should be taken not to disturb sediment in the bottom of the well.

Bailed water should be gently poured into a decontaminated, 12-ounce glass jar equipped with pH, temperature, SC, and ORP (if used) meters to monitor water quality. Bailing will continue until the purging requirements stated previously are achieved.

Domestic Well Sampling – If an active domestic or irrigation well needs to be sampled, then the water needs to be initially purged. First, the total volume of water in the well casing is calculated using equation provided on Page 2 of this SOP. Thereafter, a minimum of three (3) casing volumes of water need to be evacuated from the well prior to sampling.

Well purging should be accomplished by opening a faucet connected to the well pump. A faucet location should be selected as close to the well pump as possible. The faucet shall not be located after water treatment systems such as softeners or filtration units.

Flow from the faucet should be measured using a graduated vessel and stopwatch. Several measurements should be taken to monitor possible changing flows during the purging procedure.

If desired, WQIs may be monitored in the discharged fluid during the well purging.

Collecting Water Samples - Label each sample container with project number, sample location, well owner, date, time, sampler's initials, preservative, and analysis required. Wear new disposable nitrile gloves immediately prior to obtaining the sample.

For low-flow samples, several inches should be cut from the end of the sample effluent tubing (i.e., removing the portion in contact with the flow-through monitoring cell) before collecting water samples. A disposable in-line filter should be attached to the cut end of the tubing, as needed, prior to collection of filtered samples.

For domestic well sampling, pump flow should be reduced so that a constant minimal flow is achieved from the faucet. Samples should be collected directly from the faucet and not through rubber hoses. Filtered samples may be obtained by using a filter apparatus fitted with new filter media.

When using a bailer, take care to minimize degassing or contamination of the sample by submerging and withdrawing the bailer slowly to avoid splashing. Do not place the bailer on the ground. Filtered samples may be obtained by using a filter apparatus fitted with new filter media.

Add preservatives to the sample container prior to sample collection. Remove water from the well and transfer sample water directly into sample bottles (using an in-line filter or filter apparatus, as necessary), maintaining a slow linear flow with as little agitation as possible.



STANDARD OPERATING PROCEDURE

Groundwater Sampling

AWS SOP-06

For volatile analyses, fill vials at the rate of about 100 milliliters per minute (24 seconds for 40 mL vial) or less. Fill each sample vial completely so the water forms a convex meniscus at the top to ensure no air space exists in the vial after it has been capped. After filling, immediately cap, invert, and gently tap the vial to check for trapped air. If air bubbles are present, un-cap vial, add more sample water and repeat procedure. If air bubbles continue to be present after repeated filling attempts, cap the vial, keep for laboratory analyses, and note the condition on the field form.

For inorganics samples not requiring preservatives, rinse sample containers three (3) times with sample water before final collection. Do not rinse containers for organics analysis.

Water samples should be preserved as described in the following table:

PARAMETER	NUMBER	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME UNTIL EXTRACTION / ANALYSIS
VOCs	3	40 mL glass VOA	6°C and HCL	14 days
VPH	2	40 mL glass VOA	6°C and HCL	14 days for extraction/ 28 days for analysis
EPH	2	1000 mL glass bottle	6°C	14 days for extraction/ 28 days for analysis
SVOCs	2	1000 mL glass bottle	6°C	7 days for extraction/ 40 days for analysis
Metals	1-2*	250 mL plastic bottle	6°C and HNO ₃	6 months 28 days for mercury
Inorganics	1	Varies	varies	Varies – contact laboratory

NOTE: VOCs – Volatile Organic Compounds; VPH – Volatile Petroleum Hydrocarbons; EPH – Extractable Petroleum Hydrocarbons; SVOCs – Synthetic Volatile Organic Compounds; mL – milliliter; °C – degrees Celsius; HCL – hydrochloric acid; HNO₃ – nitric acid. *Filtered and/or Unfiltered.

Replace well cap and lock (if present) when sampling is complete.

Replace all appurtenances on the domestic well, if present prior to work, when sampling is complete.

Prepare all necessary chain-of-custody forms, sampling forms, and other documentation.

Prepare and ship samples in accordance with AWS SOP-08.



STANDARD OPERATING PROCEDURE

Sample Packaging and Shipping

AWS SOP-08

CHAIN-OF-CUSTODY (COC) PROCEDURES:

A chain-of-custody (COC) form must be prepared for all samples collected in the field for laboratory analysis. Multiple samples from the same sampling event, relating to a specific single project, may be included on a COC form. Samples from more than one project should not be included on the same COC form. The sampler should use a COC form provided by the laboratory performing sample analyses.

Completed COC forms must be maintained from the time of sample collection until the time of sample delivery to the analytical laboratory. The completed COC form should accompany the samples through analysis and final disposition. A copy(ies) of the COC form(s) should be maintained in the project file.

Information to be included on the COC form will include, but is not limited to:

- Project number / name
- Sampler's name and signature
- Date and time of sample collection, per sample
- Unique sample name/identification (ID)
- Number of containers per sample
- Sample media (e.g., soil, water, vapor)
- Sample preservative (if applicable)
- Requested analysis(es)
- Comments or special instructions to the laboratory

All samples must be assigned unique sample names/IDs. The information on the COC form, including the ID for a specific sample, must correspond to the information recorded by the sampler on the field forms, and the sample ID label on the sample container, for the respective sample.

A sample is considered under a person's control when it is in their possession. When custody of a sample is relinquished by the sampler, the sampler will sign and date the COC form and note the time that custody was relinquished. The person receiving custody of the sample will also sign and date the form and note the time that the sample was accepted into custody. The goal is to provide a complete record of control of the samples. Should the chain be broken (signed by the relinquisher, but not receiver, or vice versa), the integrity of the sample is lost and the reliability of the resulting analytical data may be degraded.

Samples must be packaged and shipped (or directly transported) to the laboratory following the procedures described below. If an overnight shipping service is used to transport the samples to the laboratory, custody of the samples must be relinquished to the shipping service. If possible, have the shipping service sign the COC form prior to placing the COC form in the sample cooler. If this is not possible (i.e., form placed in sealed cooler), a note should be included on the COC that the shipping company will receive the samples with the COC form inside the sample container.

PACKAGING:

All environmental samples should be packaged and shipped using the following procedures:



STANDARD OPERATING PROCEDURE

Sample Packaging and Shipping

AWS SOP-08

- Label all sample containers with indelible ink (on the side of the container, not on the cap or lid).
- Place labeled sample containers in a sturdy outer shipping box or cooler. When samples must remain refrigerated, use a well-insulated cooler containing an adequate amount of ice, making sure the cooler drain plug is taped shut (if applicable). Water ice should be used whenever feasible. Use of dry ice is more likely to result in freezing of samples, and use of reusable (e.g., “blue”) ice packs is likely to result in samples exceeding the allowable temperature range.
- Place soil and water sample containers in an upright position and wrap the containers with cushioning material for stability during transport. Samples should not be loose; the cooler and packed samples should be able to withstand rough handling during shipment without sample container breakage. If feasible, all sample containers and ice bags should be placed inside at least 1 heavy plastic bag, inside the cooler. The top of the outer bag should be twisted and taped in a “goose neck” fashion to help prevent leaks. It is advisable to place absorbent materials in the outer bag when liquids (including water ice) will be shipped.
- Fill out the appropriate shipping forms and place the paperwork in a Ziploc® bag (or equivalent) and tape it to the inside lid of the shipping container. Shipping forms usually include: 1) a COC form, documenting the samples included in the shipment; 2) an analysis request form, specifying the laboratory analyses for each sample (these are usually on the same form but may be separate).
- If more than one cooler is used per COC, put a photocopy in each of the additional coolers and mark them as a copy. Clearly identify on the COC (and copies) the total number of coolers included in the sample group.
- Complete and apply a custody seal to the exterior of each cooler where the lid meets the cooler container. Close and seal the cooler using clear packing tape. Secure the shipment label with address, phone number and return address clearly visible.

SHIPPING HAZARDOUS MATERIALS / WASTE:

Hazardous materials need to be shipped using procedures specified under Federal Law.

Transportation regulations for shipping of hazardous substances and dangerous goods are defined by the U.S. DOT in 49 CFR, Subchapter C, Part 171 (October 1, 1988); IATA and ICAO. These regulations are accepted by Federal Express and other ground and air carriers.

According to U.S. DOT regulations, environmental samples are classified as Other Regulated Substances (ORS). ORS are articles, samples, or materials that are suspected or known to contain contaminants and/or are capable of posing a risk to health, safety, or property when transported by ground or air. Samples, substances, or materials from sources other than material drums, leachate streams, and sludges should be considered as ORS or environmental samples. Materials shipped under the classification of ORS must not meet any of the following definitions:

- Class 1: explosives
- Class 2: gases (compressed, liquefied, dissolved under pressure, or refrigerated)
- Class 3: flammable liquids
- Class 4: substances susceptible to spontaneous combustion



STANDARD OPERATING PROCEDURE

Sample Packaging and Shipping

AWS SOP-08

- Class 5: oxidizing substances
- Class 6: poisonous (toxic and infectious)
- Class 7: radioactive materials
- Class 8: corrosives.

Coordinate special shipping or direct-delivery arrangements with the Project Manager for samples meeting any of the definitions above.



STANDARD OPERATING PROCEDURE

Disposal of Investigation-Derived Waste

AWS SOP-56

EQUIPMENT:

- Disposal drums (typically steel)
- Adjustable wrench, end wrench, or ratchet/socket for drum lids
- Buckets
- Funnels
- Plastic sheeting (typically 6-mil or heavier)
- Utility knife or scissors
- Shovels (flat, spade, etc.)
- Plastic garbage bags

SOLID WASTE:

Solid investigation-derived waste (IDW) generally includes small quantities of soil generated from drilling or test pit excavations. Larger quantities of waste generated from remedial actions are excluded from this SOP.

Soil cuttings are typically placed back in the holes from which they originated, thereby negating the need for disposal. Similarly, if drill or test pit cuttings do not demonstrate evidence of contamination, as determined through visual or olfactory observations, or through field analysis of total volatile organic compounds (VOC; see AWS SOP-03), the cuttings may instead be spread on unpaved areas of the site. In such instances, coordinate with project stakeholders (e.g., the client, site owner, regulatory personnel, etc.) to determine acceptable areas for placement.

Cuttings which demonstrate evidence of contamination must be transported to an appropriate solid waste disposal facility, such as a licensed landfill or permitted land farm. Characterization of cuttings waste should be completed in accordance with the requirements of the disposal facility selected for the project, as requirements often vary by facility.

Contaminated cuttings may be temporarily stored at the site in steel drums, or stockpiled on paved surfaces or plastic sheeting, when characterization has been completed in advance. Care should be taken to limit the potential for runoff of contaminant from uncovered stockpiles in the event of a precipitation event. For example, berms under plastic sheeting around the perimeter of the stockpile will help prevent runoff. In any case, stockpiled cuttings should be loaded and transported for disposal as quickly as feasible.

Alternatively, when advanced characterization is not feasible, the cuttings may be placed in steel drums and temporarily stored at the site. In some cases, temporary storage of stockpiled soil may be required, in which case stockpiles should be placed on and covered by plastic sheeting, with covered berms utilized as appropriate to limit the potential for runoff of contaminant. Coordinate the temporary storage approach and locations with project



STANDARD OPERATING PROCEDURE

Disposal of Investigation-Derived Waste

AWS SOP-56

stakeholders, and complete waste characterization, transport, and disposal as promptly as feasible.

General trash and personal protective equipment waste shall be cleansed of any gross contaminated soil accumulation and shall be placed in plastic garbage bags and properly disposed at a licensed solid waste disposal facility.

LIQUIDS:

Liquid IDW includes purge water generated during well development and groundwater monitoring activities. Purge water shall be assessed in accordance with the Montana Department of Environmental Quality (DEQ) flow chart provided below.

Purge water assessed via the DEQ flow chart and determined not to contain known contaminants may be spread on the ground surface near the source well or boring. Where feasible, such purge water will be surface applied on paved surfaces. Purge water shall not be poured into storm water inlets, sewer manholes, natural drainages, or surface water bodies.

Purge water which is assessed via the DEQ flow chart and is determined to be contaminated shall be contained in drums and disposed at a licensed liquid waste disposal facility in accordance with that facility's disposal requirements. Alternatively, options for disposal of contaminated purge water may be discussed with DEQ in accordance with the flow chart on the following page. Temporary on-site storage of liquid waste in drums should be coordinated with project stakeholders. Characterization of liquid waste should be completed in accordance with the requirements of the disposal facility selected for the project, as requirements often vary by facility. Waste characterization and disposal should be completed as quickly as feasible.

