- **2007 –** JBR replaced well MW-2, because it had been destroyed, and drilled and completed well MW-8.
- **2007 through 2012 –** JBR continued to monitor all wells. Petroleum impacted groundwater, at concentrations above regulatory guidelines, was initially identified in wells MW-1, MW-2, MW-4, and MW-6. By 2012, concentrations had reduced to be below regulatory standards in all wells except well MW-1.
- **2016 –** CTA Environmental completed groundwater monitoring in January and July. Monitoring data from both events identified petroleum contamination above DEQ promulgated guidelines only in well MW-1.
- **2021 –** AWS completed groundwater monitoring in September. Monitoring data continued to identify petroleum contamination above DEQ promulgated guidelines only in well MW-1.
- **2022 –** Mountain View Co-Op opted to remodel the entire site. This included razing the existing buildings, removing and replacing the UST systems, grading the site, and constructing a new site convenience store. The following incidents occurred during the remodel work:
    - A diesel fuel release was identified during removal of the existing UST systems. This release was reported to DEQ and given the Incident Identifier CVID 24284. The release appeared to be caused by tank overfill events that occurred prior to secondary containment requirements mandated for tank systems beginning in 2015.
    - Mountain View Co-Op had their contractor excavate and remove visibly impacted tank basin materials associated with release CVID 24284. This resulted in approximately 200 cubic yards of impacted material being transported offsite for disposal.
    - To accommodate the installation of new UST systems, Mountain View Co-Op had their contractor deepen and widen the former UST basin area. During the excavation work, Mountain View Co-Op and AWS personnel visibly identified the location of residual petroleum-impacted soil and bedrock from Release 1728 as present below the former USTs.
    - The excavation work deepened the tank basin by approximately 1 to 1.5 feet across a 2,400 square foot area. The excavated materials were notably impacted by Release 1728; and thus, the work resulted in the remediation of approximately 89 to 133 cubic yards of petroleum impacted materials.
    - Mountain View Co-Op personnel collected and laboratory analyzed samples from the base of the excavation area. As noted in an October 5, 2022, report prepared by AWS and submitted to DEQ for the closure of the CVID 24284 incident, the sampling confirmed that only a small area of residual petroleum impacted soil and bedrock was left in place. This finding was based on the concentrations being compared to maximum allowed concentrations promulgated by the DEQ at that time.
- **2025** – After construction was completed, AWS assessed the monitoring well network and found that wells MW-2, MW-3, MW-4, MW-5, and MW-7 were destroyed. Wells MW-1 and MW-8 were damaged and subsequently abandoned. A new monitoring well, identified as

MW-1R, was drilled and constructed. The new well, along with existing well MW-6, were sampled and concentrations of petroleum groundwater contaminants, above DEQ guidelines, were only identified in the samples from well MW-1R. AWS recommended the installation of additional wells to further characterize the groundwater impacts and completion of a site survey to map current site conditions for continued cleanup planning.

- **2026** - On June 4, 2026, DEQ issued a work plan request letter agreeing with AWS's recommendations.

OBJECTIVES

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

- Define current groundwater petroleum contaminant concentrations at and around well MW-1R and compare them to RBSL values provided in the most current version of Montana's RBCA Document.
- Locate and map current post-construction site features to aid in evaluating contaminant cleanup options.
- Recommend strategies that will lead to closure of Release 1728.

Tasks designed to address these objectives are described in the following Scope of Work section.

SCOPE OF WORK

In order to achieve the project objectives identified above, AWS has prepared the scope of work for this work plan to include the following 11 tasks: 1) Preliminary Coordination and Work Plan Preparation; 2) Project Management; 3) Mobilization; 4) Monitoring Well Installation; 5) Site Survey; 6) Monitoring Well Development; 7) Groundwater Monitoring; 8) Laboratory Analyses; 9) Data Validation Form Preparation; 10) Release Closure Plan Update; and, 11) Report Preparation.

Implementation of the scope of work will be accomplished following a combination of AWS's SOPs and additional methods discussed below, where applicable. SOPs referenced in this work plan are presented in Attachment C.

Task 1 – Preliminary Coordination and Work Plan Preparation

Prior to and during preparation of this work plan, AWS completed a variety of preliminary coordination efforts. These included correspondence with Mountain View Co-Op and DEQ regarding scoping and other elements necessary for the preparation of this work plan.

This work plan has been created to satisfy the requirements stipulated in DEQ's RI Guidance. Additionally, the general scope of work presented herein is intended to address the items stated in the Objectives section above. Preliminary coordination elements have already been completed by AWS as necessary to develop the scope of work, and supplemental work plan preparation tasks are understood to be actual, reasonable, and necessary to the ongoing investigation and remediation of the release.

Task 2 – Project Management

Project management activities include correspondence with Mountain View Co-Op and DEQ staff throughout the period of performance; coordinating the schedule for on-site activities with Mountain View Co-Op's personnel; preparation of a project-specific health and safety plan (HASP); scheduling AWS's field personnel and activities; and, procuring and coordinating equipment, supplies, and subcontracted and vendor services as necessary to complete the scope of work. Project management activities also include project 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.

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:

- Monitoring Well Installation
    - 1 mobilization event
    - Staff Scientist
- Site Survey
    - Tech II will be onsite for completion of Monitoring Well Development task, so no additional mob costs for them as part of Site Survey task.
- Monitoring Well Development
    - 1 mobilization event
    - Tech II
- Groundwater Monitoring – Event #1
    - 1 mobilization event
    - Tech II
- Groundwater Monitoring – Event #2
    - 1 mobilization event
    - Tech II

Task 4 – Monitoring Well Installation

Previous drilling at the site has encountered sandstone bedrock at depths less than 8 feet bgs. Groundwater is present within the sandstone bedrock and comprises a bedrock aquifer below the site. To intercept and complete wells within the aquifer, AWS will subcontract a drilling contractor who utilizes the air-rotary drilling method to complete environmental monitoring wells.

Groundwater elevations proximate to well MW-1R, as previously determined in that well and former wells MW-3, MW-4, and MW-8 (see locations shown in Figure 2 provided in Attachment B), indicate a groundwater gradient decreasing from northwest to southeast. As shown in Figure 2, two boreholes will be drilled, and the locations were selected to obtain groundwater information upgradient and downgradient of well MW-1R.

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.

Each borehole will be drilled to approximately 20 feet bgs. Thereafter, groundwater monitoring wells will be constructed in the two boreholes. The wells will consist of 2-inch diameter, schedule 40 polyvinylchloride (PVC) well casing blank and factory-slotted (0.010-inch or 0.020-inch) well screen. Casing joints will be flush-threaded; no PVC glue or adhesive will be used. The wells will be screened from approximately 5 to 20 feet bgs. AWS will mark the top north quadrant of each well casing with indelible ink to establish a permanent measuring point.

The annular space of the boring will be backfilled with inert filter-pack sand from the bottom of the screened interval to above the screened interval. Hydrated granular or chipped bentonite will be placed above the filter pack to create a well seal. A steel, flush-mounted well protector will be grouted in place over the well casing; concrete around the well protector will be finished smooth to match surrounding pavement and to prevent premature degradation.

Proposals were requested from two air-rotary drilling contractors who: (1) have direct experience working with AWS to drill and construct environmental monitoring wells using the air-rotary drilling method; and (2), do not have a conflict with working on Mountain View Co-Op properties. AWS requested quotes from Boland Drilling (Boland) and O’Keefe Drilling (O’Keefe). O’Keefe replied with a ‘no bid’ response and Boland provided a fee proposal. As shown on the request and proposal documentation provided in Attachment E, AWS anticipates retaining Boland to complete the monitoring well installation work.

The air rotary drilling method provides cuttings which allow interpretation of geologic materials; however, it is not conducive to the collection of soil samples for field and/or laboratory analyses of petroleum constituents due to volatilization during the drilling process. Cuttings may be periodically evaluated in the field for total VOCs following *AWS SOP-03 – Field Measurement of Total Volatile Organic Compounds*. Observations of lithology and the presence or absence of visual/olfactory evidence of petroleum impacts will be recorded on field forms, as feasible for the drilling method. Total VOC concentrations will also be recorded on field forms.

Cuttings from each borehole will be transferred to steel drums for eventual offsite disposal. As shown on Boland’s proposal in Attachment E, two steel drums will be needed. AWS will collect 1 composite sample from each drum to characterize the waste for disposal. No other soil samples will be collected for laboratory analyses as part of Task 4.

Laboratory samples will be containerized, preserved, and transported to the analytical laboratory following the procedures outlined in *AWS SOP-08 – Sample Packaging and Shipping*, and in accordance with the referenced analytical methods, using vessels and preservatives provided by the laboratory. Laboratory analyses to be requested are discussed in Task 8, below.

AWS will provide Boland with the drum sample laboratory results after their receipt from the laboratory. Thereafter, Boland will transport the drummed cuttings to the Hill County Municipal Landfill facility for disposal.

Task 5 – Site Survey

The intent of the site survey will be to accurately locate post-construction improvements and the monitoring well network, as well as creation of an updated site map. Items to be surveyed will include the property boundaries, the building, the petroleum systems (buried tank access lids, above ground vent piping, and fuel dispenser islands), the overhead canopy, overhead and buried utilities, paving and landscaping, and other site features. Additionally, the location and elevations of the two existing and two new monitoring wells will be surveyed, to an accuracy of 0.01 foot, and in relation to a United States Geological Survey datum.

Proposals were requested from 3 separate surveying firms for the scope of work described above, including: Arrow Creek Survey Co. (Arrow Creek); Atlas Land Surveys (Atlas); and Backcountry Surveys and Engineering (Backcountry). Arrow Creek replied with a 'no bid' response, and no correspondence was received from Backcountry. Atlas provided a fee proposal, as shown in the proposal documentation provided in Attachment E. AWS anticipates retaining Atlas to complete the site survey.

AWS intends to coordinate completion of Task 6 well development activities with Atlas so that AWS personnel are on site when they are completing surveying services. This is needed so that AWS personnel are present to assist with identifying, opening and closing monitoring wells, and to assist with the leveling procedure.

Atlas will provide AWS with the following information as part of their work: a spreadsheet with the coordinates and elevations of the four monitoring wells; a copy of the site survey in AutoCAD DWG format; and a copy of the site survey in PDF format.

Task 6 – Monitoring Well Development

Newly installed groundwater monitoring wells will be developed following the procedures outlined in *AWS SOP-04 – Field Measurement of Depth of Groundwater* and *AWS SOP-05 – Monitoring Well Development*. Purge water generated during development will be handled in accordance with *AWS SOP-56 – Disposal of Investigation-Derived Waste*. Reusable down-hole equipment will be decontaminated prior to initiating development of each well following *AWS SOP-01 – Field Sampling Equipment Decontamination.*

As stated under Task 5, AWS intends to coordinate completion of well development activities with Atlas so that AWS personnel are on site to assist with completion of the survey tasks.

Task 7 – Groundwater Monitoring

AWS will complete two groundwater monitoring events to determine parameters during high and low groundwater conditions. For planning, these two events are described as follows:

Event #1

- To be completed as soon as feasible (at least 1 week) following well development.
- Samples collected from the two new wells and from existing well MW-1R.
- One duplicate sample collected for data validation.
- Measure DTW only in well MW-6.

Event #2

- Schedule to be determined, pending completion of Event #1.
- Samples collected from the two new wells and from existing well MW-1R.
- One duplicate sample collected for data validation.
- Measure DTW only in well MW-6.

Historic monitoring at the site found groundwater elevations to be at their highest values mid-year (e.g., July) and at their lowest values in winter (e.g., November through January). Thus, Event #1 and Event #2 will be scheduled to obtain information during these high and low periods.

During each event, DTW and DTP will be measured in the 4 wells following the procedures outlined in *AWS SOP-04 – Field Measurement of Depth to Groundwater.* Groundwater monitoring will be completed in the 3 wells in accordance with *AWS SOP-06 – Groundwater Sampling*. The sampling scenario for each event, along with the analytical parameters to be evaluated for the sampled wells, are summarized in the groundwater monitoring analytical plan presented in Attachment D.

AWS will utilize a peristaltic pump system to obtain samples for this project. Unused water evacuated from each well will be handled in accordance with *AWS SOP-56 – Disposal of Investigation-Derived Waste*. Reusable monitoring and sampling equipment will be decontaminated following *AWS SOP-01 – Field Sampling Equipment Decontamination* prior to use in each monitoring well.

Laboratory samples will be containerized, preserved, and transported to the analytical laboratory following the procedures outlined in *AWS SOP-08 – Sample Packaging and Shipping*, and in accordance with the referenced analytical methods, using vessels and preservatives provided by the analytical laboratory. Laboratory analyses to be requested are discussed in Task 8 below.

Task 8 – Laboratory Analyses

AWS will submit the drummed cuttings and groundwater samples collected during completion of this work plan to Energy Laboratories, Inc. (Energy) in Helena, Montana. Standard analytical turnaround time will be requested for all analyses. Laboratory analyses of the samples will be in accordance with the requirements of the RBCA document for gasoline and diesel contamination.

Please note that analyses for the lead scavengers DCA and EDB have been completed for soil and groundwater samples originating from the site during past investigations. The analyses did not identify detectable concentrations of either DCA or EDB in the samples, and thus, these analytes have been excluded from the planned scope of work.

Groundwater samples will be analyzed for several organic and inorganic constituents in addition to the analyses for regulated contaminants. These IBI results provide key geochemical parameters to aid in evaluating aquifer conditions contributing to the degradation of the regulated contaminants and are also needed to evaluate cleanup strategies utilizing bioremediation processes.

Drummed Cuttings Samples (Task 4)

The 2 drum samples will be analyzed for the following parameters:

- *VPH*, by the Montana VPH Method.
- *EPH Screen*, by the Montana EPH Method.
- *EPH Fractions*: Samples exhibiting TEH concentrations exceeding DEQ's EPH Screen criterion of 200 mg/kg will be fractionated without PAHs.

Water Samples from Groundwater Monitoring Events (Task 7)

The analytical parameters to be evaluated for the wells sampled during both Event #1 and Event #2, including a duplicate sample collected during each event, are summarized in the groundwater monitoring analytical plan presented in Attachment D.

Task 9 – Data Validation Form Preparation

Upon receipt of final laboratory analytical data for the drummed cuttings and after each groundwater sampling event, AWS will complete data validation in accordance with DEQ's *Data Validation Summary Form*. Data will be validated to assess the precision, accuracy, repetitiveness, comparability, and completeness of the reported parameters.

Note that PTRCB reimburses preparation of DEQ's *Data Validation Summary Form* separately from the actual validation of data, which is reimbursed as a portion of the Report Preparation task. AWS anticipates preparing a total of 3 *Data Validation Summary Forms* for this project.

Task 10 – Release Closure Plan Update

Following completion of Tasks 3 through 9, including receipt and review of all final analytical data, AWS will update the previous RCP. This will include assessing available historical data for the release, as well as data collected during the investigation to be completed under this work plan. The results will be evaluated to help determine an appropriate remediation plan to address residual contamination from the petroleum release at the site. The updated RCP will also list identified data gaps which should be addressed during future work.

Task 11 – Report Preparation

Following completion of Tasks 3 through 10, including receipt and review of all final analytical data, AWS will prepare a summary report which will comply with DEQ's RI Guidance. As noted above, PTRCB reimburses data validation as a portion of the Report Preparation task, so data validation will be completed under Task 11, even though completion of the *Data Validation Summary Forms* will technically be completed under Task 9.

The report will include a discussion of methods and findings of the remedial activities completed as part of this scope of work; discussion of data validation; and discussion of the updated RCP. 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 of the report will not be prepared or provided.

SCHEDULE

Note that DEQ typically requires initiation of a work plan once approved, without regard to the timing of PTRCB's obligation of funding. AWS will initiate implementation of Tasks 2 through 11 following our receipt of DEQ's work plan approval, but only after also receiving Mountain View Co-Op's authorization to proceed. Any delay of implementation after issuance of DEQ's work plan approval letter will need to be coordinated with DEQ.

The actual project schedule will be contingent on various conditions which are indeterminable at the time of preparation of this work plan, including but not limited to approval from all listed parties, weather, and availability of AWS personnel and subcontractors. AWS will coordinate with Mountain View Co-Op, DEQ, and other stakeholders as appropriate and will make reasonable efforts to adhere to the desired schedule.

FEE

AWS's fee for completing the scope of work described in this Work Plan will be assessed in accordance with the cost estimate presented in Attachment E. The cost estimate includes drilling and survey subcontractor fee proposals, as well as applicable portions of the DEQ/PTRCB groundwater monitoring unit cost tool. Services provided will be invoiced using AWS's PTRCB labor and equipment rates for the period of performance. Our estimated total fee for completing the scope of work detailed above is approximately $34,611. The estimated total fee is based on our 2026 PTRCB billing rates and the assumptions noted herein.

Actual costs may vary somewhat, 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, if necessary, with Mountain View Co-Op, DEQ, and PTRCB staff prior to implementing the changes.

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.

Monitoring results represent a "snapshot" of conditions during the monitoring period from which the samples were collected and may not be representative of potential future conditions.

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

It is understood Mountain View Co-Op will provide formal authorization to complete the scope of work presented in this work plan by returning a signed copy of AWS's work order for this project. AWS's work order documentation will be sent to Mountain View Co-Op for contractual purposes after receiving DEQ's approval of the herein work plan.

If you have any questions or concerns relating to this work plan, please call me at your earliest convenience to discuss (406.315.2201).

Respectfully Submitted,

Rob Craft
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Alan Frohberg, P.E.
Project Manager
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Attachments: A – Definitions of Acronyms
B – Figures
C – AWS Standard Operating Procedures
D – Groundwater Monitoring Analytical Plan
E – Cost Estimate

cc: Donnie McCurry, Montana DEQ PTCS, P.O. Box 200901, Helena, MT 59620. Transmitted via DEQ FTP website.

ATTACHMENT A

Definitions of Acronyms

DEFINITIONS OF ACRONYMS

ARM	Administrative Rules of Montana
AST	aboveground storage tank
bgs	below ground surface
BH	borehole
BTEXMN	benzene, toluene, ethylbenzene, xylene, MTBE, naphthalene
COC	contaminant of concern
CSM	Conceptual Site Model
cu yd	cubic yard
DCA	1,2-Dichloroethane
DEQ	Montana Department of Environmental Quality
DO	dissolved oxygen
DTP	depth to product
DTW	depth to water
EDB	1,2-Dibromoethane
EPA	United States Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
GWE	groundwater elevation
IBI	intrinsic biological indicator
ISCO	In-Situ Chemical Oxidization
LNAPL	light non-aqueous phase liquid
LUST	leaking underground storage tank
MNA	monitored natural attenuation
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTBE	Methyl-Tertiary-Butyl-Ether
MW	monitoring well
ORP	oxidization-reduction potential
PAH	polycyclic aromatic hydrocarbons
pH	potential of Hydrogen
PID	photoionization detector

DEFINITIONS OF ACRONYMS CONTINUED

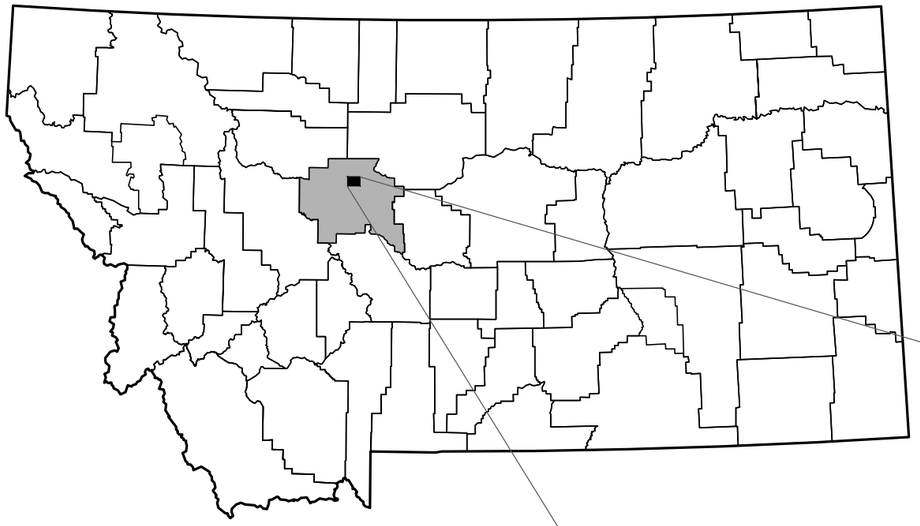
ppb	parts per billion
ppm	parts per million
PTCS	Montana Petroleum Tank Cleanup Section
PTRCB	Montana Petroleum Tank Release Compensation Board
PVI	petroleum vapor intrusion
RBSL	Risk-Based Screening Level
RBCA	Montana *Risked-Based Corrective Action Guidance for Petroleum Releases*
RCP	Release Closure Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RL	reporting limit
RP	Responsible Person
RSL	EPA Regional Screening Levels
SB	soil boring
SC	specific conductance
SOP	Standard Operating Procedure
SVE	Soil Vapor Extraction
sq feet	square feet
TEH	Total Extractable Hydrocarbons
TP	temporary piezometer
TPH	Total Purgeable Hydrocarbons
UST	underground storage tank
VI	vapor intrusion
VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbons
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter

ATTACHMENT B

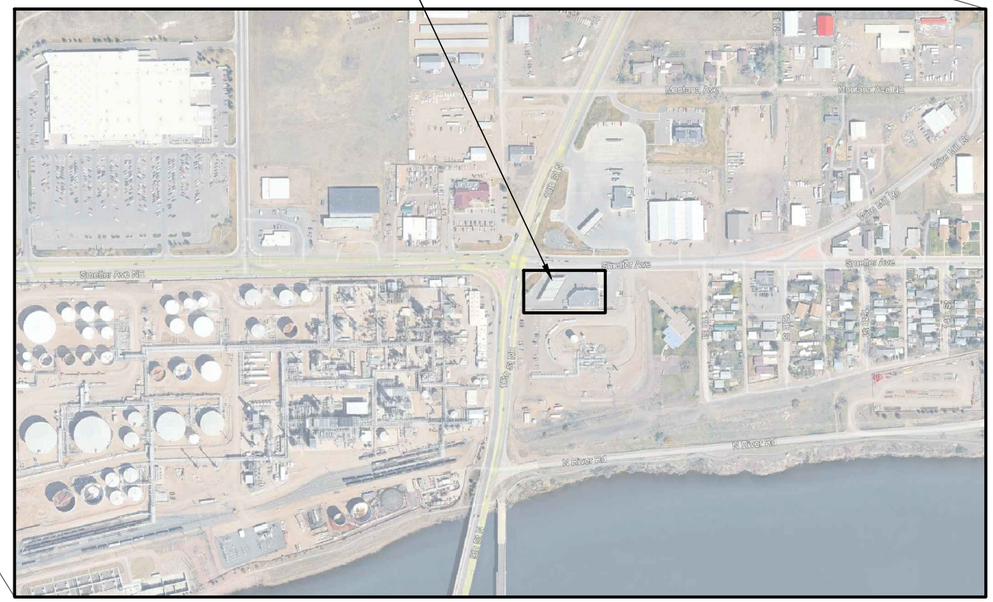
Figures

AIR WATER SOIL
GREAT FALLS, MT
p 406.315.2201

BLACK EAGLE, CASCADE COUNTY, MONTANA



PROJECT SITE



NORTH

1
FIG 1

SITE VICINITY MAP

1000 SMELTER AVENUE, GREAT FALLS, MONTANA

REMEDIAL INVESTIGATION WORK PLAN
MOUNTAIN VIEW CO-OP

7.20.2026
14064.3.7

DRAWN BY
DRESCH

CHECKED BY
FROHBERG

SITE VICINITY MAP

FIGURE
1

AIR WATER SOIL
GREAT FALLS, MT
p 406.315.2201

NORTH

1
FIG 2
SITE MAP

LEGEND
EXISTING MONITORING WELL
MONITORING WELL (ABANDONED)
PROPOSED MONITORING WELL

1000 SMELTER AVENUE, GREAT FALLS, MONTANA
REMEDIAL INVESTIGATION WORK PLAN
MOUNTAIN VIEW CO-OP

7.20.2026
14064.3.7

DRAWN BY
DRESCH

CHECKED BY
FROHBERG

SITE MAP

FIGURE
2

ATTACHMENT C

AWS 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 an 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.

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

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.

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 ±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

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 manor, 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)

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.

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 sufficient for the bailer intake to reach the middle of the well-screen section, and to allow evacuation of water from the lower one-third of the well casing, if needed.

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 should 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.

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, or in accordance with instructions from the analytical laboratory, if different:

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

Notes: 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; HNO_3 – nitric acid. *Filtered and/or unfiltered.

Dispose purge water in accordance with AWS SOP-56.

Replace well cap and lock (if present) when sampling is complete, and replace all appurtenances on domestic wells (if present prior to work), when sampling is complete.

Prepare all necessary chain-of-custody forms, sampling forms, and other documentation. Package and ship samples in accordance with AWS SOP-08.

STANDARD OPERATING PROCEDURE

Sample Packaging and Shipping

AWS SOP-08

CHAIN-OF-CUSTODY 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:

- 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

- 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

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

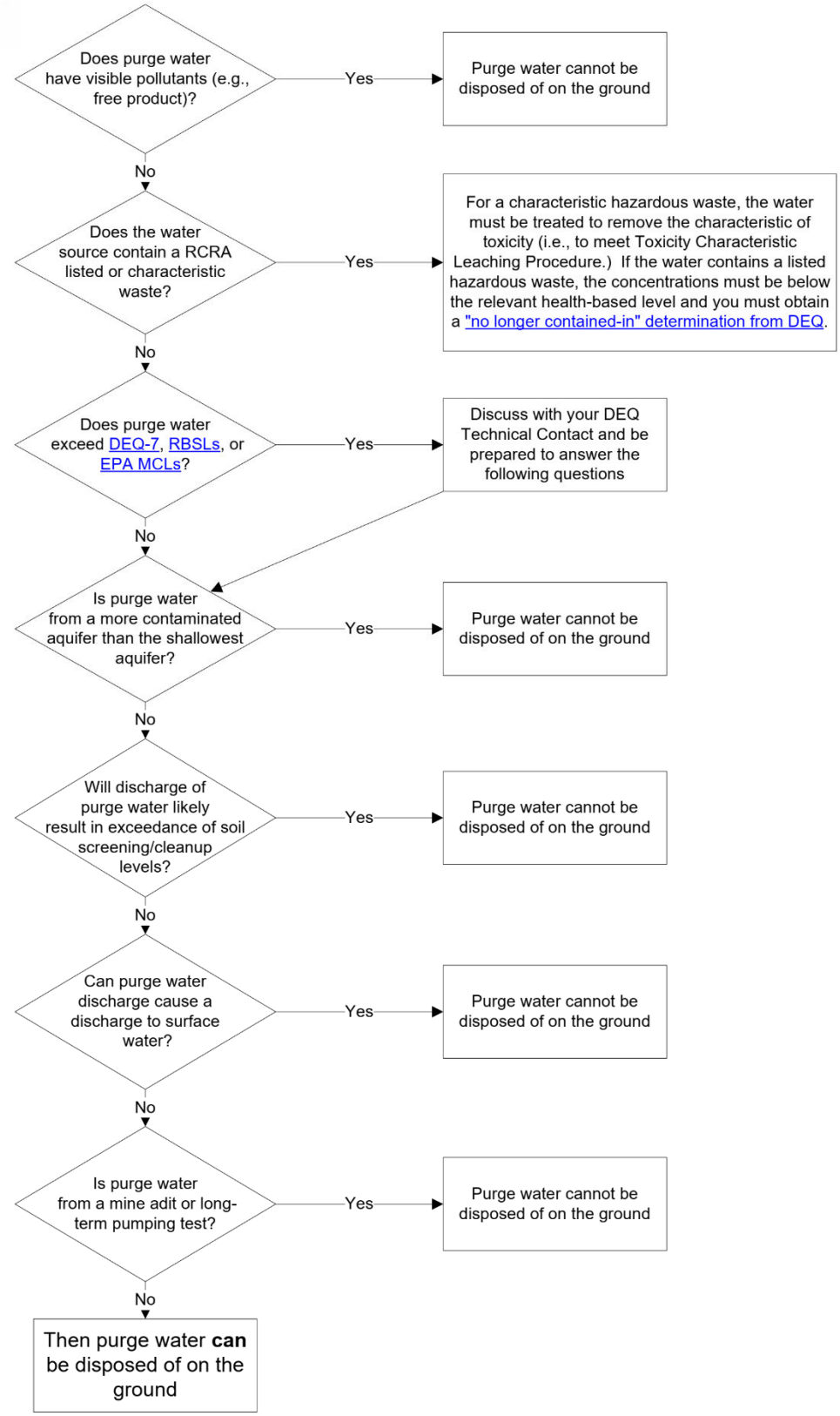
General trash and personal protective equipment waste shall be cleansed of any gross contaminated soil accumulation and shall be placed in plastic garbage bags and properly disposed at a licensed solid waste disposal facility.

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.


Does purge water have visible pollutants (e.g., free product)?
Yes
Purge water cannot be disposed of on the ground
No
Does the water source contain a RCRA listed or characteristic waste?
Yes
For a characteristic hazardous waste, the water must be treated to remove the characteristic of toxicity (i.e., to meet Toxicity Characteristic Leaching Procedure.) If the water contains a listed hazardous waste, the concentrations must be below the relevant health-based level and you must obtain a "no longer contained-in" determination from DEQ.
No
Does purge water exceed DEQ-7, RBSLs, or EPA MCLs?
Yes
Discuss with your DEQ Technical Contact and be prepared to answer the following questions
No
Is purge water from a more contaminated aquifer than the shallowest aquifer?
Yes
Purge water cannot be disposed of on the ground
No
Will discharge of purge water likely result in exceedance of soil screening/cleanup levels?
Yes
Purge water cannot be disposed of on the ground
No
Can purge water discharge cause a discharge to surface water?
Yes
Purge water cannot be disposed of on the ground
No
Is purge water from a mine adit or long-term pumping test?
Yes
Purge water cannot be disposed of on the ground
No
Then purge water **can** be disposed of on the ground

AIR WATER SOIL

ATTACHMENT D

Groundwater Monitoring Analytical Plan

GROUNDWATER MONITORING ANALYTICAL PLAN

Remedial Investigation Work Plan
Mountain View Co-Op – 1000 Smelter Avenue, Great Falls, Montana
DEQ Facility ID 07-00004 (TID 18320); Release 1728; WPID 35200

Wells	Depth to Water (DTW)	Volatile Petroleum Hydrocarbons (VPH) *(MT VPH Method)*	Extractable Petroleum Hydrocarbons (EPH) Screen *(MT EPH Method)*	EPH Fractions *(MT EPH Method)*	1,2-dichloroethane (DCA) *(Method 8260B)*	Ethylene Dibromide (EDB) *(Method 8011)*	Alkalinity *(Method A2320B)*	Dissolved Methane *(Method SW8015M)*	Sulfates *(Method E300.0)*	Sulfides *(Method A4500-SF)*	Nitrogen, Nitrate + Nitrite *(Method E353.2)*	Dissolved + Total Iron and Manganese *(Methods E200.7/E200.8)*
GROUNDWATER MONITORING EVENT #1												
MW-1R	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
MW-6	✓	--	--	--	--	--	--	--	--	--	--	--
1st New Well	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
2nd New Well	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
Duplicate	--	✓	--	--	--	--	--	--	--	--	--	--
GROUNDWATER MONITORING EVENT #2												
MW-1R	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
MW-6	✓	--	--	--	--	--	--	--	--	--	--	--
1st New Well	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
2nd New Well	✓	✓	✓	✓	--	--	✓	✓	✓	✓	✓	✓
Duplicate	--	✓	--	--	--	--	--	--	--	--	--	--

Notes:

MW-##	Existing monitoring wells (MW-##) are shown in black text.
1st New Well	Proposed new wells shown in italicized text.
DCA and EDB	DCA and EDB will not be part of the analyses suite based on the non-detection of these contaminants during previous sampling events.