BIG SKY CIVIL & ENVIRONMENTAL, INC

January 29, 2026

Mr. William Bergum
DEQ Petroleum Tank Cleanup Section
P.O. Box 200901
Helena, MT 59620-0901

Ms. Sandra Johnson-Thares
P.O. Box 1667
Great Falls, MT 59403
Email: omi@mcn.net

RE: Groundwater Monitoring Work Plan (WP) for the Petroleum Release at former Stanfield 7th St Exxon, 700 Central Ave, Great Falls, MT 59401
Facility ID #07-00622 (TID 18356), Release 0809, Work Plan 35127

Dear Mr. Bergum,

Big Sky Civil & Environmental, Inc. (BSCE) has prepared this Groundwater Monitoring Work Plan (WP) for continued compliance monitoring of residual subsurface petroleum contamination at the subject release. In accordance with the Montana DEQ request letter dated December 30, 2025, groundwater monitoring will be completed semiannually for three years (a total of six events) and samples will be collected from MW-10. If contamination levels remain above risk-based screening levels (RBSLs), the work plan may be extended for additional groundwater monitoring, sampling and analysis, and reporting.

Facility History and Release Background

The Former Stanfield 7th St Exxon Site is located at 700 Central Avenue in Great Falls, MT. The site was previously operated as Stanfield Exxon, which contained retail fueling operations. According to correspondence from the Montana DEQ, all underground tanks and piping systems were removed at the facility in September 1995. During removal of the fuel system, 400 cubic yards of contaminated soils were removed and disposed of at a licensed landfarm.

The site is currently used for storage of supplies/paperwork and as parking for the adjacent business to the south, O'Haire Motor Inn. No petroleum storage tanks are currently located at the site. The property is situated on the southeast corner of the intersection of Central Avenue and 7th Street South.

The type of petroleum products previously stored at facility is unknown. Based on review of analytical results from previous investigations, the release was likely gasoline and diesel.

Previous investigations, cleanups and potential exposure and/or receptor concerns are detailed in previous Groundwater Monitoring Reports dated January 19, 2021, and January 17, 2023 (also see release closure plan in the reports). Based on historical groundwater monitoring, the depth of groundwater that will be sampled is expected to range from approximately 3'-9' bgs.

Objectives of Groundwater Monitoring

- The objective of groundwater monitoring is to complete compliance monitoring, assess concentrations of petroleum hydrocarbons, and evaluate ongoing natural attenuation trends at the subject site and for formal closure of the release.

Work Plan Tasks

- Site work will be coordinated with the current facility owner and the Montana Department of Environmental Quality (DEQ).

- Up to three (3) years of semiannual groundwater monitoring will be completed at the subject site for a total of six (6) events. During each year, one event will be completed during seasonally high groundwater levels and the other event will be completed during seasonally low groundwater levels.

- Groundwater monitoring will consist of the following tasks. Samples will be collected from MW-10 (with a duplicate sample for QA/QC) in accordance with the attached SOP and generally as follows.

    - First, water level measurements will be taken using a Solinst oil/water interface probe. Next, wells will be purged using a peristaltic pump and field parameters (dissolved oxygen, pH, temperature, conductivity, oxidation-reduction potential and turbidity) as well as water levels will be measured and recorded in approximately five minute intervals. After stabilization of field parameters, samples will be collected and sent to Energy Laboratories, Inc. in Helena, MT.

- Groundwater samples will be analyzed by the lab for volatile petroleum hydrocarbons (VPH).

- Investigation derived waste (IDW) will be disposed of in accordance with the applicable standard operating procedure (SOP). Purge water will be disposed of according to DEQ's Purge Water Disposal Flowchart. It is anticipated that purge water will be spread out on the pavement at the site and allowed to evaporate.

- Fieldwork and related items will be discussed with DEQ's project manager, as necessary, in order to achieve the work plan objectives.

Schedule & Reporting

- Groundwater monitoring events are anticipated to be completed during seasonally high and low groundwater levels each year. Generally, the 1st event will be completed in spring (March through June), and the 2nd event in fall (September through December).

Work Plan Implementation Schedule	
Groundwater Monitoring Events	Spring 2026
	Fall 2026
	Spring 2027
	Fall 2027
	Spring 2028
	Fall 2028
Groundwater Monitoring Report	December 31, 2028

- Following receipt of analytical results, reporting will be completed as follows:
    - After each of the first two years of groundwater monitoring, an Interim Data Submittal Report may be prepared and submitted following the Groundwater Monitoring Report guidance for Petroleum Releases including but not limited to: data, tables, data validation summary form (DVSF) and figures.
    - After completion of the final monitoring event, and as deemed appropriate by the consultant and Montana DEQ, a Groundwater Monitoring Report will be prepared following the above-mentioned guidance. At a minimum the report will include: scaled map(s) showing the location of all sampling points and physical features of the site, tabular presentation of cumulative groundwater data, a discussion section identifying results of the completed monitoring and conclusions & recommendations to resolve the release. The following will be appended to the report: field sampling forms, analytical lab reports, data validation summary forms (DVSFs) and an updated release closure plan (RCP).
- Reports and supporting documentation will be submitted following DEQ submittal requirements and using standardized report formats.

Quality Assurance and Quality Control (QA/QC)

All sampling will be completed in strict accordance with BSCE's standard QA/QC procedures. The following procedures will be used during sample collection to provide quality assurance and quality control (QA/QC), to minimize loss of volatiles, and to maintain the suitability of samples for analysis. Sample collection and analytical procedures were consistent with SW-846: *Test Methods for Evaluating Solid Waste*, November 1986, and updates published by the U.S. EPA. QA/QC methods used are defined below:

- All sample containers/preservatives will be supplied by a state-certified laboratory. Analyses will be performed by a state-certified laboratory.
- All samples will be handled in a manner which minimizes the loss of organic compounds to volatilization and biodegradation.
- All samples for analyses will be placed in a cooler on ice (at a temperature of 4° C) immediately following collection.
- Chain-of-custody procedures will be utilized during sampling and delivery.
- Documentation of the sampling and QA/QC procedures including notes will be available for DEQ inspection. These notes will document the procedures for sampling and all other routine activities.

Additionally for laboratory QA/QC, duplicate samples will be collected during sampling of MW-10 and submitted for analysis. The duplicate samples will be analyzed for VPH. Results of duplicates will be compared using relative percent difference (RPD). Data quality objectives are an RPD less than 30.

Cost Estimate

Attached is a cost estimate for completing the above-mentioned groundwater monitoring, analytical testing and report writing. If additional monitoring is deemed necessary, then work plan modification may be submitted to DEQ in writing and funding will be addressed via the Form_8 process.

Signature

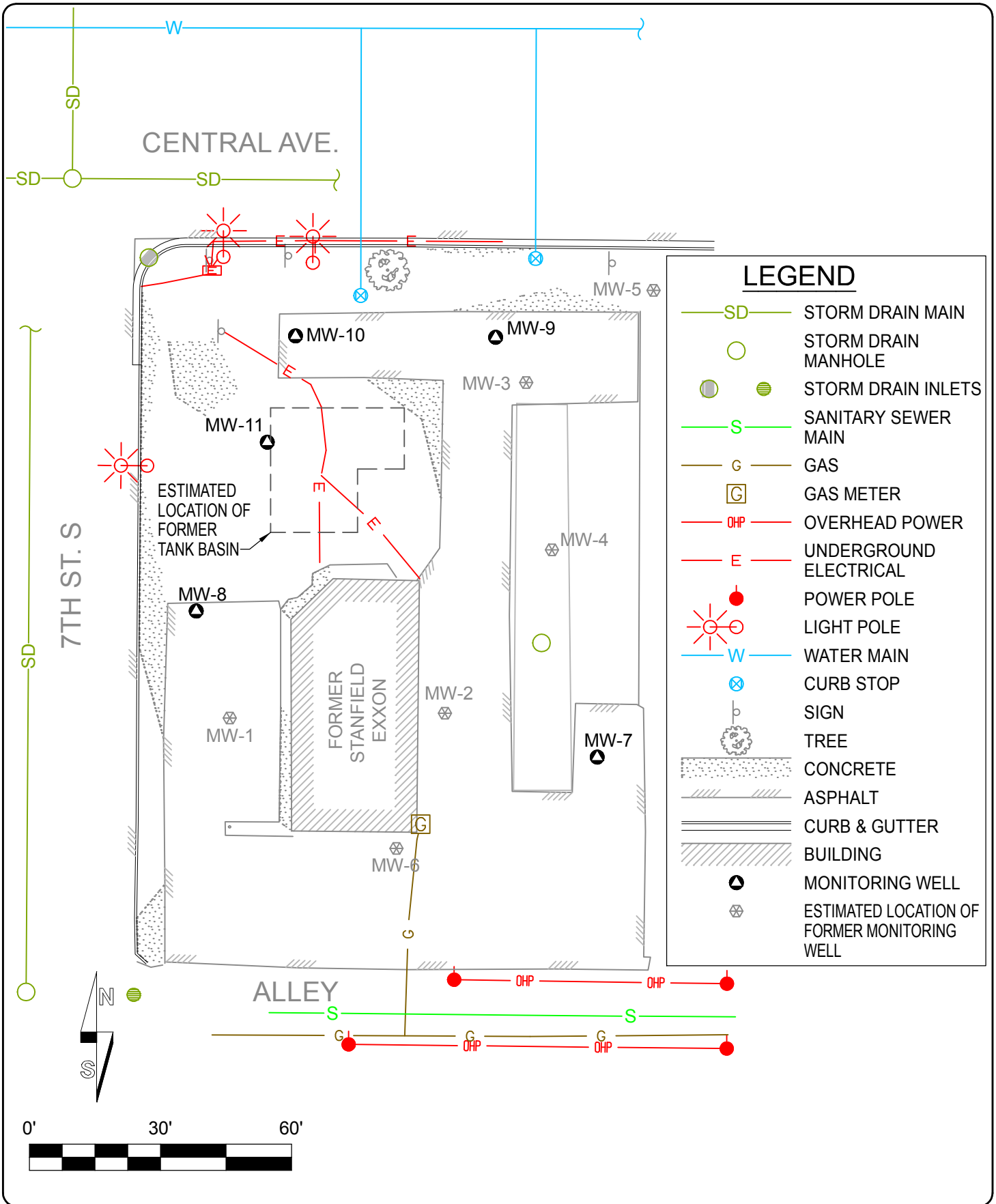
William, thank you for your continued assistance with this site. Please feel free to contact us with any questions or concerns you may have regarding this Work Plan.

Respectfully,
Big Sky Civil & Environmental, Inc.

J. Paxton Ellis, P.E.

encl. Site Map
Cost Estimate
Standard Operating Procedures (SOPs)

cc: Sandra Johnson-Thares



TITLE:	PROJECT:	EXHIBIT:
SITE MAP	FORMER STANFIELD EXXON	FIG. 2

bsc&e
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Petroleum Tank Release Compensation Board
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Groundwater Monitoring and Sampling Unit Cost Worksheet

7/28/2022

Cost Estimate Expl. | Work Plan Tasks | Unit Cost Worksheet | Help

Contractor Information

Company Name:	Big Sky Civil & Environmental, Inc. (BSCE)		
Address:	P.O. Box 3625		
City, State, Zip:	Great Falls, MT 59403		
Cost Estimator/Print Name:	Paxton Ellis, P.E.	Phone:	406-727-2185
Signature:	*Paxton Ellis*	Date:	1/26/2026

Project Information

Site Name:	former Stanfield 7th St Exxon	Facility ID#	07-00622
Address:	700 Central Avenue	Release #	809
City:	Great Falls, MT 59401	WP ID#	35127
		Treads ID#	18356

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Groundwater Monitoring and Sampling Summary Sheet

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Monitoring Well Details

5	Total Number of Wells at Site
0	Number of Fluid Level Measurements Only (2)
1	Number of Wells to be Monitored/Sampled (4-11)
2	Average Well Casing Diameter (inches)
7.5	Average Depth to Groundwater (ft)
19	Average Depth of Wells (ft)

Sampling Method

☑	Low-Flow
X	Low Yield Aquifer
	No Purge
☐	Other (please specify)

of Events - Monitoring/Sampling Interval

Estimated Start Date: Spring 2026

6	Semi-Annual
	Annual
	Bi-Annual
	Other

6 Total Events

6	< 25 ft total depth
	25 - 50 ft total depth
	50 - 75 ft total depth
	75 - 100 ft total depth
6	Total

Sampling Instrument

X	Peristaltic Pump
	Bladder Pump
☐	Submersible Pump
☐	Bailer
☐	Other (please specify)

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Groundwater Monitoring and Sampling Unit Cost Worksheet

Task	Events												Totals		
	1		2		3		4		5		6				
	Units	Unit Cost	Units	Unit Cost	Units	Unit Cost	Units	Unit Cost	Units	Unit Cost	Units	Unit Cost	Units	Unit Cost	Total Cost
Sampling Frequency	Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual				
Work Plan Type	GWM WP														
Work Plan Preparation	1	$775.00											1	$775.00 /work plan	$775.00
Project Management	3	$160.00	3	$160.00	3	$160.00	3	$160.00	3	$160.00	3	$160.00	18	$160.00 /hr	$2,880.00
Mobilization/Demobilization (1)	20	$20.00	20	$20.00	20	$20.00	20	$20.00	20	$20.00	20	$20.00	120	$20.00 /mile	$2,400.00
Field Work															
Fluid Level Measurements (2)														/well	
Groundwater Monitoring Setup (3)	1	$85.00	1	$85.00	1	$85.00	1	$85.00	1	$85.00	1	$85.00	6	$85.00 /day	$510.00
Groundwater Monitoring (<25ft total depth) - Peristaltic (4)	1	$247.50	1	$247.50	1	$247.50	1	$247.50	1	$247.50	1	$247.50	6	$247.50 /well	$1,485.00
Groundwater Monitoring (<25ft total depth) - Bladder (5)														/well	
Groundwater Monitoring (25-50ft total depth) - Bladder (5)														/well	
Groundwater Monitoring (50-75ft total depth) - Bladder (5)														/well	
Groundwater Monitoring (75-100ft total depth) - Bladder (5)														/well	
Groundwater Monitoring - No Purge (6)														/well	
Modifiers															
Groundwater Monitoring - Low Yield Modifier (7)	1	$27.50	1	$27.50	1	$27.50	1	$27.50	1	$27.50	1	$27.50	6	$27.50 /well	$165.00
Groundwater Monitoring - IBI Modifier (8)														/well	
Groundwater Monitoring - Filters (9)														/filter/well	
Contaminated Purge Water - Offsite Disposal (10)														/each	
Duplicate Sample Modifier (11)	1	$20.00	1	$20.00	1	$20.00	1	$20.00	1	$20.00	1	$20.00	6	$20.00 /each	$120.00
Other Services															
Other Service (please specify)														/each	
Other Service (please specify) Data Validation Summary Forms	1	$160.00	1	$160.00	1	$160.00	1	$160.00	1	$160.00	1	$160.00	6	$160.00 /each	$960.00
Lodging & Per Diem (Lodging - actual only)															
Lodging: # of people 1														/night	
Food: # of people 1	1	$13.30	1	$13.30	1	$13.30	1	$13.30	1	$13.30	1	$13.30	6	$13.30 /day	$79.80
(Breafast $7.50, Lunch $8.50, Dinner $14.50)															
Laboratory Analysis (12)	Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual		Semi-Annual				
Volatile Petroleum Hydrocarbons (VPH)	2	$150.00	2	$150.00	2	$150.00	2	$150.00	2	$150.00	2	$150.00	12	$150.00 /sample	$1,800.00
Extractable Petroleum Hydrocarbons (EPH)															
EPH "screen"														/sample	
EPH "fractions"														/sample	
Polycyclic Aromatic Hydrocarbons (PAHs)														/sample	
Lead Scavengers															
Ethylene dibromide (EDB)														/sample	
1,2-Dichloroethane (DCA)														/sample	
Drinking Water - EPA 524.2														/sample	
Intrinsic Biological Indicator Analyses (IBI)														/sample	
Other Analytical Methods														/sample	
Other Service (please specify)														/each	
PTRCB sampling fee (13) ($10.00 allowed)	1	$25.00	1	$25.00	1	$25.00	1	$25.00	1	$25.00	1	$25.00	6	$25.00 /sample	$150.00
Report Preparation															
Groundwater Monitoring Report - Type (14-15)	Interim Data Submittal		Interim Data Submittal		Interim Data Submittal		Interim Data Submittal		Interim Data Submittal		GWM Report				
Groundwater Monitoring Report - Base Cost (14)			1	$600.00			1	$600.00			1	$3,750.00	3	$1,650.00 /report	$4,950.00
IBI Modifier (16)														/event	
Additional Wells Modifier (17)														/event	
Release Closure Plan (RCP) Preparation (18)															
Create RCP														/RCP-C	
Update RCP													1	$850.00 /RCP-U	$850.00
														Monitoring & Sampling Subtotal:	**$17,124.80**

Additional Conditions/Comments/Costs:

Mobilization/demobilization - includes labor to load and unload sampling equipment as well as mileage and time to mob/demob to the site and transport samples to the courier; Groundwater Monitoring Setup - includes instrument calibration (including calibration solution) and decontamination (non-alconox wash, DI water, wash bins) for each monitoring event. Groundwater monitoring report is for six (6) events.

Additional Costs Subtotal:	
Grand Total:	**$17,124.80**

If you require assistance, call 406-444-9710
Submit completed form with your Work Plan
Provide written comments to:
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Cost Estimate Expl.

Work Plan Task List

Unit Cost Worksheet

Site Information

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Task	Total Cost
Work Plan Preparation	$775.00
Project Management	$2,880.00
Mobilization/Demobilization (1)	$2,400.00
Fluid Level Measurements (2)	$0.00
Groundwater Monitoring (4-6)	$1,995.00
Miscellaneous (Groundwater Monitoring Modifiers) (7-11)	$285.00
Lodging & Per Diem (Lodging - actual only)	$79.80
Laboratory Analysis (12-13)	$1,950.00
Report Preparation (14-17)	$4,950.00
Release Closure Plan (RCP) Preparation (18)	$850.00
Other Services	
Miscellaneous ()	$0.00
Miscellaneous (Data Validation Summary Forms)	$960.00
Monitoring & Sampling Subtotal:	**$17,124.80**
Additional Costs Subtotal:	**$0.00**
Grand Total:	**$17,124.80**

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Cost Estimate Explanations

(1) Mobilization/Demobilization: Includes all travel time, preparation time, and vehicle use costs (vehicle mileage) to transport equipment, materials, and personnel to and from the site location. More than one mobilization per event will require justification and pre-approval by the DEQ-PTCS and Board staffs. This item should be on a per mile unit rate.

(2) Fluid Level Measurements: Includes all costs (labor, equipment, materials, and well consumables) to measure fluid depth, collect other groundwater information from well, and decontaminate equipment. The well gauging costs should be on a per well basis and does not include purging and sampling of the well.

(3) Groundwater Monitoring Preparation/Setup/Cleanup: Includes all on-site labor costs to unload, setup, and calibrate monitoring equipment prior to initiation of groundwater monitoring activities, and all on-site labor costs to load and secure equipment and samples prior to leaving the site.

(4) Groundwater Monitoring - Peristaltic: Includes all costs (labor, equipment, materials, and well consumables) using a peristaltic pump to monitor, purge, sample groundwater, decontaminate equipment, take water level measurements, and handle contaminated purge water (DEQ understands this to mean disposal of groundwater to the ground surface according to the Disposal of Untreated Purge Water from Monitoring Wells flowchart dated 7/27/2015. If purge water must be containerized and/or treated in a different manner, additional scope and budget may be required.) Groundwater sampling to be conducted using a low-flow method. The cost should be on a per well basis.

(5) Groundwater Monitoring - Bladder: Includes all costs (labor, equipment, materials, and well consumables) using a bladder pump to monitor, purge, sample groundwater, decontaminate equipment, take water level measurements, and handle contaminated purge water (DEQ understands this to mean disposal of groundwater to the ground surface according to the Disposal of Untreated Purge Water from Monitoring Wells flowchart dated 7/27/2015. If purge water must be containerized and/or treated in a different manner, additional scope and budget may be required.) Groundwater sampling to be conducted using a low-flow method. The cost should be on a per well basis.

(6) Groundwater Monitoring – No Purge: Includes all costs (labor, equipment, materials, and well consumables) to monitor, sample groundwater, decontaminate equipment, and take water level measurements.The cost should be on a per well basis.

(7) Groundwater Monitoring – Low Yield Modifier: Includes all additional on-site labor costs associated with groundwater well purging, monitoring, and sampling of wells which are low yield / low production. Low yield is defined as a monitoring well that is not capable of adequate groundwater production at the median low-flow purging rate of 200 ml/min without exhibiting drawdown in excess of DEQ guidelines. The cost should be on a per well basis.

(8) Groundwater Monitoring – IBI Modifier: Includes all additional labor costs necessary for collection of groundwater samples for IBI analyses. The cost should be on a per well basis.

(9) Groundwater Monitoring - Filters: Includes the costs (materials) for the use of a filter during collection of groundwater samples for the analysis of dissolved metals. The cost should be presented on a per well basis.

(10) Contaminated Purge Water - Offsite Disposal: Includes the costs (labor, equipment, and materials) for containerizing, handling, shipping, and disposal or treatment of purge water that cannot be disposed of on the ground surface according to the Disposal of Untreated Purge Water from Monitoring Wells flowchart dated July 27, 2015. This cost should be presented on a per work plan basis.

(11) Duplicate Sample Modifier: Includes the costs (labor and materials) for the collection of a duplicate groundwater sample. The duplicate groundwater sample is to be collected using the same method (e.g., low-flow) and using the same sampling tool as the field groundwater sample. This cost should be on a per duplicate basis.

(12) Laboratory Analysis: Includes all laboratory costs for all wells, for duration of work plan. It is realized that some laboratory analyses will not be conducted for every event and that the well sampling frequency may change.

(13) PTRCB Sampling Fee: Includes all costs related to management of the sample including: sample container, cooler, packing, shipping, handling, sample preservation, and office related handling charges. The Sample is defined as the laboratory ID number on the laboratory invoice. Unusual cost can be reimbursed by presenting clear and convincing evidence to the board staff and receiving approval by the board staff prior to costs being incurred.

(14) Groundwater Monitoring Report Preparation – Base Cost: Includes all costs (labor and materials) for preparation of a base-level groundwater monitoring report. The base-level report documents one monitoring event, including monitoring and sampling of up to 10 sampling points (sum of total monitoring wells, tap samples, etc.), cumulative groundwater data tables, updated site figures showing well locations, a groundwater flow map, COC isocontour figures, analytical data, and completed data validation and summary form(s), and report submittal, including all office related costs, per report. (link to DEQ's reference guide that is currently in progress)

(15) Groundwater Monitoring Report Preparation – Interim Data Submittal: Includes all costs (labor and materials) for preparation of a base-level groundwater monitoring interim data submittal. The interim data submittal documents one monitoring event, including monitoring and sampling of up to 10 sampling points (sum of total monitoring wells, tap samples, etc.), cumulative groundwater data tables, a groundwater flow map, COC isocontour figures, well purging record, analytical data, and completed data validation and summary form(s), and report submitttal, including all office related costs, per report. (link to DEQ's reference guide that is currently in progress)

(16) Groundwater Monitoring Report Preparation – IBI Modifier: Includes all costs (labor and materials) for addition of IBI data tables, IBI data evaluation, and IBI data discussion sections to the base-level groundwater monitoring report. The cost should be presented on a per report basis. (link to DEQ's reference guide that is currently in progress)

(17) Groundwater Monitoring Report Preparation – Additional Wells Modifier: Includes all costs (labor and materials) for addition of monitoring and sampling data, data evaluation, and discussion sections to the base-level groundwater monitoring report for events including monitoring and sampling of more than 10 sampling points per event (sum of total monitoring wells, tap samples, etc. collected per event). The cost should be presented on a per report basis (only one of this modifier is allowed per report).

(18) Release Closure Plan (RCP) Preparation: Includes all costs (labor and materials) for preparation or updating of a DEQ PTCS RCP. The cost should be presented on a per report basis.

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Version: 7/28/2022

Cost Estimate Expl. | Site Information | Site Information | Unit Cost Worksheet

Helpful Sites	Links
Petroleum Tank Release Compensation Board (PTRCB)	https://deq.mt.gov/cleanupandrec/programs/ptrcb
DEQ - Petroleum Tank Cleanup Section (DEQ-PTCS)	https://deq.mt.gov/cleanupandrec/Programs/petrocleanup
DEQ Guidance Documents	https://deq.mt.gov/cleanupandrec/Programs/petrocleanup#accordion1-collapse5
Groundwater Monitoring Work Plan and Report Guidance	https://deq.mt.gov/files/Land/LUST/Documents/downloadables/GWM_WP_Rpt-Guidance_24Mar21.pdf
Groundwater Sampling Guidance	https://deq.mt.gov/files/Land/LUST/Documents/downloadables/GWSamplingGuidance-FINAL.pdf
Purge Water Disposal Flowchart	https://deq.mt.gov/files/Land/LUST/Documents/downloadables/PurgeWater7_27_15.pdf
Data Validation Guidelines	https://deq.mt.gov/files/Land/LUST/Documents/downloadables/2018-01-26%20DV%20Guidance%20Checklist%20PDF%20Version%201.3.0%20Distributed.pdf
Data Validation Summary Form	https://deq.mt.gov/files/Land/LUST/Documents/TechGuidDocs/2018-01-26%20DV%20Guidance%20Checklist%20PDF%20Version%201.3.0%20Distributed.pdf

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SOP-02 - Decontamination
SOP-03 - Sample Nomenclature & Chain-of-Custody
SOP-04 - Preparation, Packaging, & Shipping Samples
SOP-05 - Soil Investigation & Sampling
SOP-06 - Monitoring Well Installation and Construction
SOP-07 - Monitoring Well Development
SOP-08 - Groundwater Investigation & Sampling
SOP-09 - Management of IDW

Field Sampling Forms & Record Keeping

Each day and at each sample location, all pertinent information pertaining to investigation, remediation and/or monitoring will be recorded on field sampling forms. The sampling forms shall contain enough information that the sampling event could be replicated using the forms alone. Where possible, field sampling forms should consist of fill-in-the-blank style standardized forms. At a minimum, field sampling forms shall include the following:

- Project Information (including the applicable project number)
- Date and time of fieldwork and sample collection
- Onsite personnel and equipment
- Name of sample (refer to SOP-3)
- Sampling procedure(s), especially deviations from the relevant SOPs, approved work plan or SAP
- Laboratory analytical testing to be performed
- All field measurements taken (PID readings, water level measurements, field parameters, etc.)
- Other field observations, if applicable (e.g., petroleum odor/staining or presence of sheen/oil globules)

Field sampling forms shall be maintained by field personnel during use in the field (such as in a log book, binder or clip board). Upon returning to the office, the forms shall be scanned and pdf versions of the document(s) shall be placed in the secure job folder on the company server for future reference and reporting. Original copies shall be placed in applicable log books or file folders.

Equipment

- Field Sampling Forms (fill-in the blank style)
- Writing utensil (typically pen with indelible ink)
- Site map
- Equipment to document location of samples (tape measure, survey equipment, etc.)

Decontamination of Equipment

This section details general decontamination procedures for field equipment. The decontamination procedure outlined below will be performed on all nondedicated and non-disposable sampling equipment that may contact potentially contaminated materials. Field personnel must wear disposable nitrile gloves while decontaminating equipment at the project site and must change gloves between collections of each sample. Every precaution must be taken by personnel to prevent being exposed to contaminants during decontamination procedures.

Equipment

- Liquinox, or other approved product (detergent)
- Wash bins (e.g., five-gallon buckets with lids or other approved containers)
- Sufficient volume of deionized water
- Bristle brush(es) or other device to scrub/clean equipment
- Garbage bags
- Nitrile gloves
- Spray Bottles

Procedure

1. Select an appropriate decontamination area. Consideration should be given as to site traffic patterns, weather conditions (wind), and drainage characteristics (such as storm drain inlets and nearby surface water) to eliminate the unnecessary migration of contaminants.
2. Remove visible debris stuck to equipment via physical means (such as scraping or brushing).
3. Apply the detergent (Liquinox, or other) to the entire surface of equipment.
4. Rinse equipment with clean water in wash bins.
5. Repeat steps 2. thru 4. as necessary.

Dispose of gloves, wash water, and other disposable items in accordance with SOP-10 – Management of Investigation Derived Waste (IDW).

Sample Nomenclature & Chain-of-Custody

Chain-of-custody (COC) procedures document sample collection details and help communicate to the laboratory which samples should be analyzed for which parameters. Typically, the laboratory will provide a chain-of-custody document that will be filled out by field personnel after sampling is completed and before the samples are sent to the lab.

Equipment

- Chain-of-Custody form (provided by the laboratory or project-specific)
- Chain-of-Custody seals
- Writing utensil (pen with indelible ink)

Procedure

Standard chain-of-custody procedures will be used during fieldwork and collection of samples including but not limited to:

- Recording the date and time of sample collection, number/type of samples and sample names on sampling containers and the chain of custody (COC). Sample names shall be in accordance with the approved work plan (WP) or site-specific sampling and analysis plan (SAP).
- Filling out all other required information in fill in the blank areas of COC (project, job number, sample media, number of containers, requested analyses, etc.)
- Place COC form inside a plastic bag within each cooler being transported to the laboratory. For details regarding packaging coolers see SOP-4. After packaging, place COC seals on cooler opening along with shipping tape.
- If using a mail courier to ship samples, they will not fill out COC forms; rather the coolers can be tracked using online tracking.
- Maintain copies of COC forms; scan forms and file in a secure manner (see SOP-1) for subsequent reporting and future reference.

Preparation, Packaging, & Shipping Samples

The following section identifies standard procedures for preparation of samples, packaging coolers and shipping samples. Most samples must arrive at the laboratory at a temperature of less than 4° Celsius, in good condition and with the proper preservation.

Procedure

- Sample containers are supplied by a state-certified laboratory.
- Preservative, if necessary, should be placed in the sample container during collection and samples should be placed on ice immediately following collection.
- After a sample is collected, the required information should be filled out on the side of the container, on the applicable field sampling form, and on the chain-of-custody document.
- For transportation to the laboratory, samples should be placed upright in a cooler (coolers are typically provided by the laboratory) and packaged with ice and other appropriate packaging materials (bubble-wrap, absorbents, sample sleeves, etc.) to ensure breakage of the samples does not occur during transportation.
- After the samples are packaged in the cooler, place the chain-of-custody document in the cooler, close the cooler and place a signed/dated chain-of-custody seal over the opening. Finally, place a shipping label on the top of the cooler and tape it shut with packaging tape.

Soil Investigation & Sampling

Surface vs Subsurface Soils
For the purposes of this SOP, surface soils are considered to be 0'-2' below ground surface (bgs) whereas subsurface soils are considered to be >2' bgs. Soil samples collected for environmental investigation should not straddle the zone between surface soils and subsurface soils.

Photo-ionization Detector (PID) Measurement

- Perform blank and span calibrations of the PID using 100 ppm isobutylene compressed gas. Consult the operating manual if necessary.
- The standard PID lamp is 10.6 eV. Modifications to the lamp can be made if stipulated in the approved work plan or SAP.
- Place a consistent quantity of soil in a Ziploc bag (approximately 100 grams) and seal. Allow the sample to be heated for a consistent amount of time (typically 3-5 minutes) by the ambient air. Open the bag slightly and place the probe of the PID into the bag, measure and record the peak reading. Consistency between different samples is imperative as this will help determine the highest concentration relative to one another.

Soil Boreholes

Completion of boreholes is common practice and provides a cost effective means of obtaining soil samples that are representative of subsurface conditions at a site. The size, type and depth of boreholes should be defined in the approved work plan or SAP. Common types of drill rigs are as follows: hollow stem auger, air-rotary, sonic, direct-push technology, among others.

Equipment

- Site map with borehole/sample locations, blank borehole logs, and writing utensil
- Sampling containers (provided by laboratory), packaging and shipping supplies (including ice)
- PID, nitrile gloves, sampling spatula/knife
- Personal protective equipment (see health and safety plan [HASP])

Procedure

- Prior to displacing any soils, and at least 2-business days in advance, utility locate requests shall be submitted via the Montana one-call notification center (800-424-5555). If necessary, a private utility locator should identify private underground utilities (electric lines, sanitary sewer services, etc.).
- Boreholes are situated at a site in accordance with the approved work plan or SAP. Locations may have to be modified if conflicts exist. Note any modification on field sampling forms including measurements from site features for subsequent reporting and future reference.
- Utilize decontaminated equipment for completion of boreholes in accordance with SOP-2 or other approved subcontractor decontamination procedures (steam cleaning, etc.)
- During drilling, collect continuous soil samples using appropriate means for the drilling technology and field screen the soils using a PID. Note PID reading and any pertinent observations (staining/odors) on soil boring logs. Log lithologic conditions using the Unified Soil Classification System (USCS); refer to ASTM-D2488-09a for additional information.

- For analytical testing, place soil in sampling containers provided by the lab. Compact soils to minimize headspace. In addition, minimize handling soil for samples to be analyzed for VOCs in order to prevent volatilization and/or biodegradation. Place sample on ice immediately following collection.
- Decontaminate sampling equipment between collections of samples in accordance with SOP-2.

Monitoring Well Installation and Construction

Monitoring well installation is conducted following completion of soil boreholes and must be completed by a Montana-licensed well installation contractor. Well construction details including materials, screened intervals, and surface completion is typically identified in the approved work plan or SAP.

Equipment

- Monitoring well construction materials (from contractor):
  - Schedule-40 polyvinyl chloride (PVC) piping (solid and screened)
  - J-plug
  - Sand pack (typically 10/20 silica sand)
  - Bentonite (powder or chips)
  - Traffic-rated flush-mount watertight surface seal
  - Concrete mix and related equipment
- Well construction logs and writing utensil

Procedure

- After completion of the soil borehole, the well installation contractor will convert the borehole into a monitoring well. Care shall be taken to ensure well construction details are consistent with the approved work plan of SAP particularly pertaining to screened intervals.
- Typical construction details are as follows: two-inch (2”) diameter polyvinyl chloride (PVC) piping (screened and solid). The annular space surrounding the well screen is backfilled with sand pack to ~1’ above the screened interval, and the solid casing is backfilled with bentonite (powder or chips).
- Note final construction details on well construction diagram forms. Including any deviations from the approved work plan or SAP.
- Surface completion is typically flush-mount, traffic-rated, watertight surface seals (well enclosures) set in a concrete collar.
- Candles or traffic cones shall be placed immediate surrounding newly installed wells so that they are given a minimum of 24-hours to harden and cure prior to allowing vehicular traffic.

Monitoring Well Development

During well installation, silts, clays and other soils may become entrapped in the well. Well development is completed to remove silts/soils, to increase the productivity of the well and to aid with equilibration of water levels. To develop a monitoring well, purging is completed with the goal of producing water with low turbidity. Purging should be completed with a pump or bailer capable of disturbing the water column in order to remove entrapped soils.

Equipment

- Equipment to access well enclosure (e.g., socket wrench, flat head screwdriver, rubber mallet)
- Disposable plastic bailer (or other approved pump)
- Bailer chord
- 5-gallon bucket
- Turbidity meter
- Oil/water interface probe
- Well development forms with writing utensils
- Decontamination supplies

Procedure

- Access the well using necessary tools/equipment.
- Complete well development according to any details in the approved work plan or SAP.
- Typically, development of a well is completed using a 2” disposable plastic bailer. Care shall be taken to ensure the bailer does not break free of the bailer chord and become lost down the well.
- During purging of the well, record the volume of water produced, the estimated rates of pumping, water level measurements, the initial and final turbidity readings, and other pertinent information on field forms.
- Dispose of purge water and other IDW in accordance with SOP-10 and the disposal of untreated purge water flow chart from the Montana Department of Environmental Quality (DEQ).

Groundwater Investigation and Sampling

The Montana Department of Environmental Quality (DEQ) Groundwater Sampling Guidance document should be reviewed prior to completion of groundwater sampling. Low-flow sampling is the preferred sampling procedure, details of which are generally included below. No purge, multiple volume purging, passive sampling and other methods may be utilized if approved by DEQ or as detailed in the approved work plan or SAP.

Equipment

- Field sampling forms with writing utensil
- Oil/water interface probe
- Multiparameter probe
- Pump and required tubing/equipment for operation (typically peristaltic pump or bladder pump)
- RV or marine Battery
- Five-gallon bucket
- Decontamination supplies
- Stopwatch and graduated cylinder
- Equipment to open well enclosure
- Sample containers and packaging equipment (including ice)

Procedure

- Don nitrile gloves.
- Calibrate the mulitparameter probe according to operating manual
- After opening the well enclosure, measure and record the water level using the oil/water interface probe.
- Review the well construction details and the water level measurement to determine the depth of the pump/tubing for purging and sampling. Generally, the pump intake shall be situated near the center of the screened interval of the well casing.
- Begin purging the well. Before, during and after sampling, record necessary information on field sampling forms.
- Measure and record water level measurements and field parameters (dissolved oxygen, pH, temperature, conductivity, oxidation-reduction potential and turbidity) in five minute intervals. Change purge rates on pump until water levels stabilize.
- The Groundwater Sampling Guidance document states that “stabilization is considered achieved when three consecutive readings are within the following ranges:”

Water Quality Indicator Parameter	Stabilization Range
pH	± 0.1 units
Specific Conductance	± 3%
Dissolved Oxygen (DO)	± 10%
Turbidity	± 10%
Oxidation/Reduction Potential (ORP)	± 10 millivolts

Generally, if greater than 2’ of water level drawdown is encountered during purging (using rates less than or equal to 0.20 L/min), then samples will be collected prior to stabilization of water levels and/or field parameters in order to minimize the hydraulic stress on the well and levels of turbidity in the sample. This

should be coordinated with the project manager prior to completion. Note any modifications to low-flow sampling mentioned above on field sampling forms.

- Following stabilization, collect samples using containers supplied by the laboratory. If necessary, apply appropriate preservatives to sample containers and collect VOA vials for analysis of volatile organic compounds (VOCs) with zero headspace.
- Label sample jars, field sampling forms, and chain-of-custody documents with appropriate information.
- Immediately place samples one ice and in the sample cooler. Minimize exposure to sunlight and oxygen to avoid volatilization and biodegradation.
- Complete decontamination of sampling equipment as necessary (see SOP-2).
- Dispose of purge water and other IDW in accordance with SOP-10 and the disposal of untreated purge water flow chart from the Montana Department of Environmental Quality (DEQ).

References

Montana Department of Environmental Quality, 2018. *Groundwater Sampling Guidance.* https://deq.mt.gov/files/Land/LUST/Documents/downloadables/GWSamplingGuidance-FINAL.pdf

Management of Investigation Derived Waste (IDW)

The procedures outlined below are for management and disposal of waste generated during environmental investigation. Typically, disposable items are disposed of via the dumpster and hauled to the landfill. If additional considerations are necessary, this will be identified in the approved work plan or SAP.

This procedure assumes that the IDW and other waste is non-hazardous waste. Hazardous waste should be handled and disposed of according to the Resource Conservation and Recovery Act (USEPA) as well as 40 CFR 264 and 265.

Equipment

- 55-gal steel or plastic drums (department of transportation [DOT] approved containers) or other approved containers
- Shovel
- 15/16” socket wrench
- Labels or labelling markers
- PPE as identified in the HASP

Procedure

- Clean soil as determined by field observations, PID readings, and analytical results may in certain instances be spread onsite or used to abandon boreholes. Check with the project manager and DEQ, if necessary.
- Purge water from groundwater monitoring and well development will be disposed of according to the untreated purge water flow chart from the Montana Department of Environmental Quality (DEQ).
- While drilling soil boreholes, place contaminated soil cuttings in 55-gal DOT drums. Drums will remain onsite until approval from the landfill is received to dispose of the material.
- Do not place disposable items in drums (such as gloves, clothing, etc.)
- Do not fill drums completely full (to allow for expansion of materials, if any).
- Adequately close drums depending on the style of container.
- Label the drums with contents, date for generation of IDW, contact information for consultant, and other project information.
- Once approval is received, haul soil to the landfill and dispose.

Superfund Requirements

Management of IDW from state or federal superfund sites will be addressed in the Site-Specific SAP.