WGMGROUP

Cleanup Work Plan Modification
Pacific Coast Supply, LLC
Facility ID 07-06130 (TID 18615), Release 1054, Work Plan ID 34891
WGM Project Number: 25-03-18
01.21.2026

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PREPARED FOR:
GFA LLC

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Senior Geologist
WGM Group, Inc.

REPORT DATE:
01.21.2026

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APPENDICES

1.0 INTRODUCTION

WGM Group, Inc. (WGM), prepared this modification to the Cleanup Work Plan (CWP) for the Pacific Coast Supply property (Facility ID 07-06130, Release 1054) in Great Falls, Montana. The CWP is being prepared as a revision to the CWP submitted to Montana Department of Environmental Quality (DEQ) by WGM on April 1, 2025 (WGM, 2025). This CWP modification includes requirements listed in letter correspondence dated January 12, 2026, which is attached as **Appendix A**.

1.1 SITE DETAILS

The Pacific Coast Supply Facility (Site) is comprised of two parcels which are currently owned by GFA, LLC. **Figure 1** shows the Site Vicinity map and **Figure 2** shows the Site Map. The site is developed with an approximate 30,000-square foot (sf) commercial warehouse and an asphalt-paved parking lot. The Site is bordered by vacant land, warehouses, and commercial properties.

1.2 SITE HISTORY

The Site was developed with a structure that appeared to be associated with an adjoining rail yard from at least 1946 until sometime prior to 1964, when it was demolished. The current warehouse structure was constructed in 1978. Previous tenants included various transfer, storage, and transportation facilities (Terracon, 2024). Regulatory history of the Site includes the following information.

- A former UST was removed from the Site in 1991 with reported petroleum hydrocarbon impacts, but the facility received regulatory closure at that time.
- A Phase I Environmental Site Assessment (ESA) was completed by Terracon (Terracon, 2020a) that identified two recognized environmental conditions (RECs) at the Site including the removed UST and a trench drain/sump installation in the parking lot south of the warehouse.
- Terracon conducted a Limited Site Investigation (LSI) in October 2020 that reported soil samples in the vicinity of the former UST basin with exceedances of DEQ's Tier 1 Risk-Based Screening Levels (RBSLs) for volatile petroleum hydrocarbons (VPH) and detections of extractable petroleum hydrocarbons (EPH) above RBSLs near the trench drain/sump installation (Terracon, 2020b). The LSI installed temporary groundwater monitoring wells that detected VPH and EPH compounds above RBSLs in the vicinity of the former UST basin; no petroleum compounds were detected in groundwater above RBSLs near the trench drain/sump. The LSI recommended further investigation of impacts near the former UST basin.
- Based on the results of the ESA and LSI, DEQ recategorized release #1054 as "active" in a letter dated May 21, 2021, and required additional remedial investigations for the Site to determine the extent and magnitude of petroleum impacts to soil and groundwater; and to recommend remediation work required to cleanup and resolve the Release.
- Terracon conducted remedial investigations (Terracon, 2024) at the Site in April 2022 and April/May 2023 and prepared an RI report dated May 31, 2024. The RI report described a High-resolution Site Characterization (HRSC) that advanced 12 Laser-induced Fluorescence (LIF) probe locations and 15 Membrane Interface Probe Hydraulic Profiling (MIHPT) probe locations to assess lithology, nonaqueous phase liquid, and dissolved phase organic constituents. The RI report also described installation of six soil borings that were converted into monitoring wells. The RI report delineated petroleum hydrocarbon to the northwest and southeast of the former UST basin but indicated that additional delineation may be required to the northeast and southwest of the UST basin. The RI also included a release closure plan (RCP) that detailed, among other information, RI results, conceptual site model (CSM), evaluation of cleanup alternatives, and expected compliance monitoring. The RCP recommended delineation of impacts to soil and groundwater to the northeast and southwest of the former UST basin and

implementing a petroleum mixing zone (PMZ) along with a restrictive covenant for closure of the Site.

- In response to the recommendations presented in the May 2024 RI report, DEQ requested an Remedial Investigation Work Plan (RIWP) to determine the extent and magnitude of petroleum impacts to soil and groundwater, and to recommend remediation work required to cleanup and resolve the Release.
- At the request of Pacific Coast Supply LLC, Terracon prepared a request to DEQ to extend the due date of the requested RI Work Plan as Pacific Coast Supply LLC was in negotiations with a potential purchaser of the property. DEQ responded that the extension was appropriate and approved it in a letter on September 23, 2024.
- The CWP prepared by Terracon on March 12, 2025 (Terracon, 2025) included an RIWP which was revised by WGM on April 1, 2025 (WGM, 2025). The WGM CWP also included an RIWP to assess existing conditions at the Facility.
- The CWP prepared by WGM included work for both an additional remedial investigation and cleanup actions (WGM, 2025). On May 7, 2025, DEQ approved the Cleanup Work Plan.

1.3 CURRENT CONDITIONS

In July 2025, as part of the DEQ-approved CWP (WGM, 2025), WGM completed additional remedial investigation (RI) fieldwork to further delineate the extent of petroleum hydrocarbon impacts at the Facility. This work included drilling three additional boreholes and converting two of them into monitoring wells. The results from the soil and groundwater sampling showed that the extent of soil and groundwater contamination at the site was larger than previous data had shown. **Figure 3** shows the locations of the additional monitoring wells installed during the RI work and the current estimated extent of impacts to soil and groundwater found during the July 2025 fieldwork. **Appendix B** includes all the site data collected at the facility. This CWP modification has been prepared to address the larger volume of impacted media identified in the July 2025 RI fieldwork.

1.4 OBJECTIVES & GOALS

The goal of this CWP is to achieve closure of release #1054. Specific objectives of this CWP are to remediate petroleum hydrocarbons in soil and groundwater at the Site to levels below DEQ Tier 1 RBSLs.

2.0 REVISED CLEANUP SCOPE OF WORK

2.1 CLEANUP SCOPE OF WORK

A revised Release Closure Plan (RCP) is included in **Appendix C** that updates the RCP with new data from the July 2025 RI fieldwork and revises the cleanup methods chosen for this CWP. The bids from vendors and subcontractors solicited for the injectate work are included with this document in **Appendix D**. WGM has selected Regenesis to provide the remediation injectates and Olympus Technical Services (Olympus) as the direct push application subcontractor.

2.1.1 DIRECT PUSH DRILLING EQUIPMENT

In-situ chemical oxidation (ISCO) using RegenOx® and calcium peroxide-based oxygen injection using ORC Advanced® (ORC-A) will be applied to subsurface soil and groundwater using direct-push hydraulic equipment (e.g. Geoprobe®) as described in the Regenesis Direct Push Application Instructions shown in **Appendix D**. The direct push subcontractor will be required to provide the following equipment and supplies:

- Direct push rig
- Drive Rods (typically 1 ½-inch O.D.) & Injection Tooling with fluid deliver sub-assembly
- Injection Pump rated for 5 gallons per minute (gpm) @ at 800 psi for silt and clay formations
- Injection hosing and a pressure relief valve with a bypass
- Clear hosing between mixing tank/drum and pump
- Pressure gauges
- Power drill paint stirrer (3-inch diameter or smaller propeller tip)
- Plastic bucket lid puller tool/opener tool
- 5-amp sump pump and hose
- Three to four 55-gallon drums or similarly-sized mixing tanks for RegenOx mixing
- Sand, bentonite chips, granular bentonite, cement, hydraulic cement, and quick-set concrete for
- closing and sealing temporary injection holes
- Wood plugs or similar for temporarily sealing injection holes prior to grout sealing
- Access to water and electricity

2.1.2 INJECTATE TECHNOLOGY & METHODOLOGY

WGM is proposing two events of RegenOx followed by an application of ORC-A. The treatment footprint is identified in the “the Small Plume Option” included in **Appendix D** and covers 3,674 square feet (**Figure 3**). All injection points will be completed via temporary direct-push technology (DPT) injection points from 14 to 20 feet below ground surface. The RegenOx scope consists of two application events spaced 1 to 2 weeks apart, with injection locations for the second event staggered from the first for better distribution in between injection locations. Following completion of the second RegenOx event, the ORC-A component is planned to be conducted immediately afterwards during the same mobilization. Application sequencing will be as follows:

Week 1 – RegenOx® Injections
Week 3 & 4 – RegenOx® Injections and ORC-A® Injections

2.2 GROUNDWATER MONITORING SCOPE OF WORK

The first groundwater monitoring event under this work plan will occur prior to the initial RegenOx® injectate application and then a minimum of three months after the ORC-A® application; followed by one routine quarterly groundwater monitoring event three months later. All groundwater sampling methods below will follow the WGM Standard Operating Procedures (SOPs) included in **Appendix E**.

2.2.1 GROUNDWATER MONITORING SAMPLING

WGM will conduct a total of three groundwater sampling events. Monitoring will include measuring depth-to-water and collecting groundwater samples from the monitoring wells that were sampleable in July 2025, including MW-1, MW-2, MW-5, MW-7, MW-8, and MW-9. Samples will be collected using a bladder pump, disposable polyethylene tubing, and low-flow purge and sampling procedures. Groundwater field parameters (temperature, turbidity, conductivity, dissolved oxygen, pH, and oxygen reduction potential) will be measured in each well every three to five minutes during purging, and once parameters stabilize for three consecutive readings, groundwater samples will be collected in laboratory-supplied containers. The stabilization criteria are presented in the DEQ document entitled Groundwater Sampling Guidance dated March 2018 (DEQ-WMRD-GWM-1) and excerpted below:

WATER QUALITY PARAMETER	STABILIZATION CRITERIA
pH	+/- 0.1 s.u.
Specific Conductance	+/- 3%
Dissolved Oxygen	+/- 10%
Turbidity	+/- 10%
Oxidation-Reduction Potential	+/- 10 mV

One trip blank and one field duplicate sample will be analyzed for quality assurance/quality control (QA/QC) purposes. The field duplicate sample will be collected concurrently with the groundwater sample from a randomly chosen monitoring well.

2.2.2 ANALYTICAL METHODS

Groundwater samples will be submitted for laboratory analysis of VPH and EPH Screen. If the EPH screen result for soil is greater than 1,000 micrograms per liter (µg/L), the sample will be submitted for EPH fractionation analysis, by the Montana Method. In addition to these parameters, Regenesis recommends collection of dissolved Fe^2 and dissolved Mn^2 to determine microbial activity, redox conditions (oxidation-reduction potential), and the overall effectiveness of the treatment process.

All samples will be preserved and shipped with appropriate custody sheets and seals. Samples will be analyzed using standard turnaround times unless otherwise requested by DEQ. The selected samples will be placed into a laboratory-supplied container, labeled, stored on ice, and submitted to Energy Laboratory in Helena, Montana.

2.3 DISPOSAL OF INVESTIGATION-DERIVED WASTE

Soil removed from direct-push boreholes will be monitored by field staff for obvious signs of staining, olfactory clues of petroleum presence. If impacted soil is observed, the soil cuttings will be placed into sealable plastic buckets (direct-push cuttings will be minimal). The containerized soil cuttings will be kept in sealable containers and stored in a storage building onsite. If results indicate that soil requires landfill disposal, it will be properly disposed of in accordance with state regulations based on the analytical results. Any drill cuttings that reach the surface and do not show signs of visual or olfactory clues of contamination will be spread at a property owner-approved location on the Site. All

groundwater monitoring purge water will be disposed of in accordance with the DEQ's Disposal of Untreated Purge Water from Monitoring Wells Flow Chart (DEQ, 2015). If the purge water is determined to not require disposal, it will be disposed of at a location where there are no aesthetic concerns.

2.4 QA/QC PROCEDURES

Quality assurance and quality control procedures will be in accordance with WGM SOPs (**Appendix E**).

2.5 DATA VALIDATION

Data validation will be completed in accordance with DEQ's *Data Validation Summary Form* (DVSF; DEQ, 2018).

3.0 SCHEDULE & REPORTING

The fieldwork will be scheduled upon DEQ approval of this CWP and Petro Fund obligation of funding. The approximate schedule for the work proposed in this WP is presented below.

APPROXIMATE WORK SCHEDULE

DELIVERABLE / ACTION	APPROXIMATE COMPLETION DATE*
CWP Approval by DEQ and fund obligation by PTRCB	March 2026
1st Groundwater Monitoring Event	March 2026
1st RegenOx Injection	April 2026
2nd RegenOx Injection	April 2026
1st ORC-A Injection	April 2026
2nd Groundwater Monitoring Event	June/July 2026
Interim Data Submittal (IDS) Report	July/August 2026
3rd Groundwater Monitoring Event	September/October 2026
Cleanup Report & Revised RCP	October/November 2026

* Actual completion dates will be dependent upon DEQ approval timelines, laboratory turnaround times, and subcontractor availability.

The initial groundwater monitoring event is estimated to begin as soon as March 2026. The first round of RegenOx injections will occur following the initial groundwater monitoring. Approximately 1 to 2 weeks following the initial injection of RegenOx, a second round in RegenOx injections will occur. Injection locations for the second event will be staggered from the first injection event for better distribution in between injection locations. Following the completion of the second RegenOx event, the ORC-A injections are planned to be conducted immediately afterwards during the same mobilization. Approximately three months after the final ORC-A® injection date (presumed to be June or July 2026), a post-injectate groundwater monitoring event will be conducted, with one final groundwater monitoring to occur in September/October 2026. After the second groundwater monitoring event in May or June 2026, an Interim Data Submittal (IDS) report will be completed. Following the final groundwater monitoring in September/October 2026, a corrective actions (CA) Cleanup Report will be prepared that includes all data and results described in this CAP. The CA Cleanup Report summarizing the results will be completed by October 2026. The CA Cleanup Report will include:

- Figures depicting injection locations, site structures, sampling locations/results, groundwater flow direction, and potentiometric groundwater surfaces for the events
- The CA report will describe the sampling and investigative methods and list any deviations from the CAP
- Groundwater trend lines for VPH and EPH will be analyzed to assess the timeline for potential closure and effectiveness of the RegenOx® and ORC-A® injections
- Laboratory analytical reports and tabulated summaries of the laboratory data, along with a comparison of the data to applicable screening levels
- The CA report will provide a conclusion on the effectiveness of the corrective actions
- Data validation forms completed as described in **Section 2.5**
- Field notes, including boring logs, sampling forms, and investigation photographs

As part of the preparation of the CA Report, a revised Release Closure Plan (RCP) will be prepared.

4.0 COSTS

Implementation of the proposed work can begin within 30 calendar days following PTRCB approval of this CWP, which is expected sometime in spring of 2026. All previously obligated costs associated with the previous CWP (WGM, 2025), dated April 1, 2025, should be discarded. The project, as described in this work plan, will be completed by December 2026.

WGM proposes completing the required scope of work as described herein on a Time and Materials basis for the estimated cost of $203,470.80. This cost estimate includes WGM's professional labor costs, travel and direct client expenses required to complete this scope of work. Work effort levels have been estimated based on WGM's experience on the project site and on similar projects. A detailed cost estimate to perform this scope of work is included **Appendix F**.

5.0 REFERENCES

DEQ, 2015. Disposal of Untreated Purge Water from Monitoring Wells. July 2015

DEQ, 2018. Data Validation Summary Form, Version 1.3.0. Montana Department of Environmental Quality guidance for data validation. Revised, January 2018.

Terracon, 2020a. Phase I Environmental Site Assessment. Report No. 26207128. October 5, 2020.

Terracon, 2020b. Limited Site Investigation Report, 4000 North Star Boulevard, Great Falls, Cascade County, Montana. Prepared for Locke Lord LLP. December 20, 2020.

Terracon, 2024. Remedial Investigation Report, Pacific Coast Supply LLC, 4000 North Star Boulevard Great Falls, Cascade County, Montana, Facility ID 07-06130 (TID 18615), Release 1054, Work Plan ID 34891. May 31, 2024.

Terracon, 2025. Remedial Investigation Work Plan - Revised, Petroleum Release at Pacific Coast Supply LLC, 4000 North Star Boulevard Great Falls, Cascade County, Montana, Facility ID 07-06130 (TID 18615), Release 1054, Work Plan ID 34891. March 12, 2025.

WGM Group, Inc., 2025. Cleanup Work Plan, Pacific Coast Supply, LLC. Facility 07-06130 (TID 18615), Release 1054, Work Plan ID 34891. April 1, 2025.

FIGURES

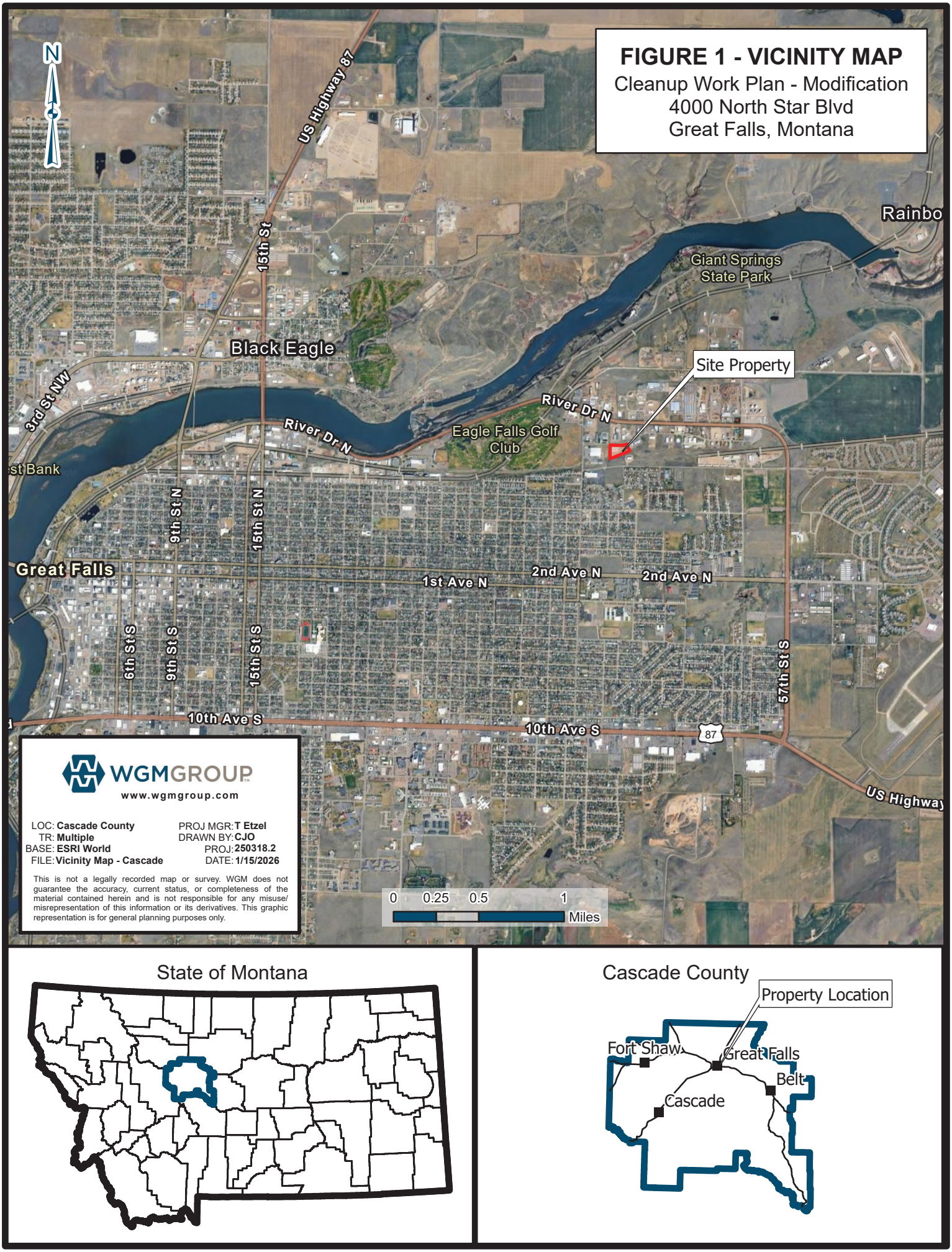
FIGURE 1 - VICINITY MAP
Cleanup Work Plan - Modification
4000 North Star Blvd
Great Falls, Montana
N
US Highway 87
15th St
Rainbo
Giant Springs
State Park
Black Eagle
Site Property
3rd St NW
River Dr N
River Dr N
Eagle Falls Golf
Club
st Bank
9th St N
15th St N
Great Falls
1st Ave N
2nd Ave N
2nd Ave N
6th St S
9th St S
15th St S
57th St S
10th Ave S
10th Ave S
87
US Highway
WGMGROUP
www.wgmgroup.com
LOC: Cascade County
TR: Multiple
BASE: ESRI World
FILE: Vicinity Map - Cascade
PROJ MGR: T Etzel
DRAWN BY: CJO
PROJ: 250318.2
DATE: 1/15/2026
This is not a legally recorded map or survey. WGM does not guarantee the accuracy, current status, or completeness of the material contained herein and is not responsible for any misuse/ misrepresentation of this information or its derivatives. This graphic representation is for general planning purposes only.
0 0.25 0.5 1
Miles
State of Montana
Cascade County
Property Location
Fort Shaw
Great Falls
Belt
Cascade

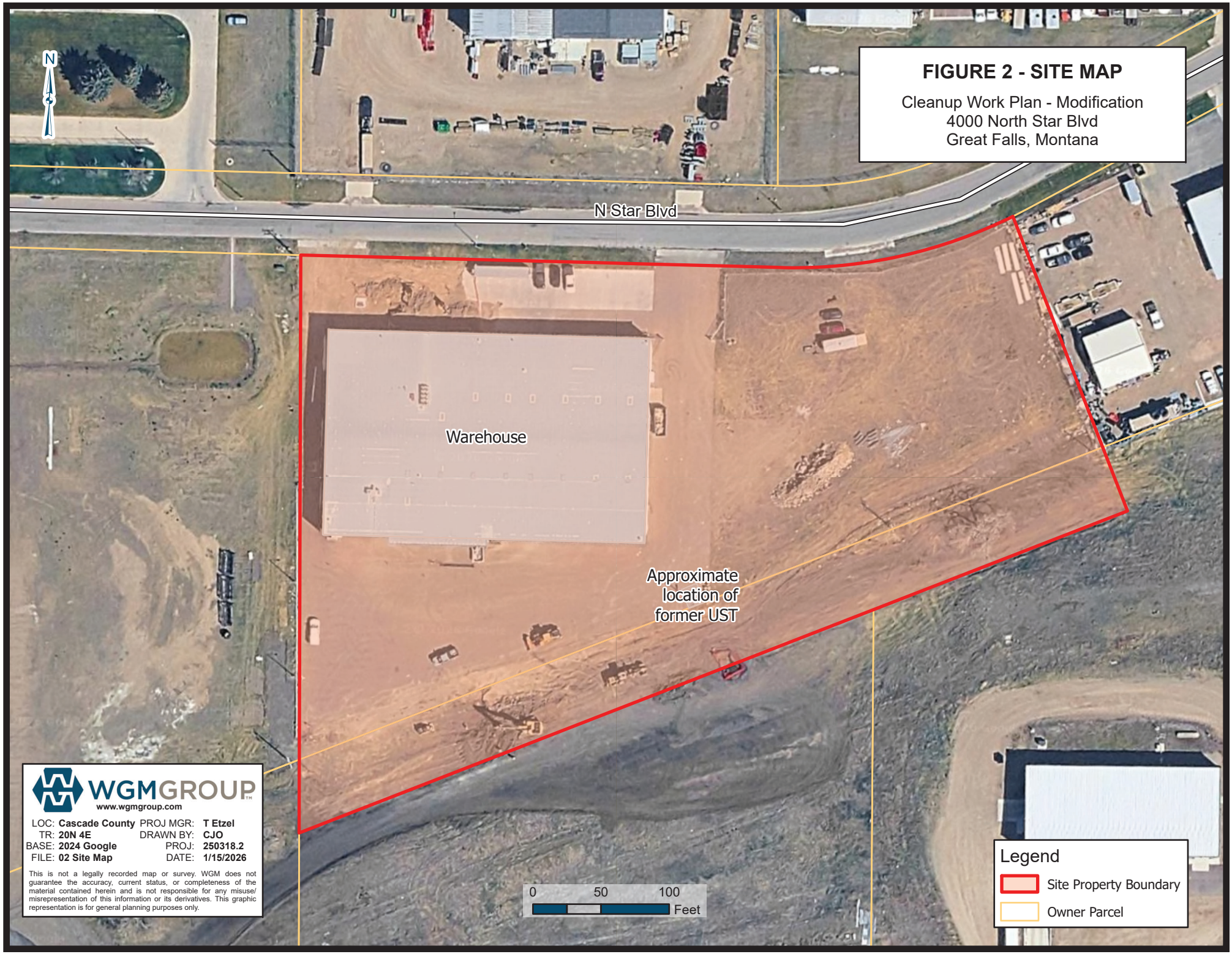

FIGURE 2 - SITE MAP

Cleanup Work Plan - Modification
4000 North Star Blvd
Great Falls, Montana

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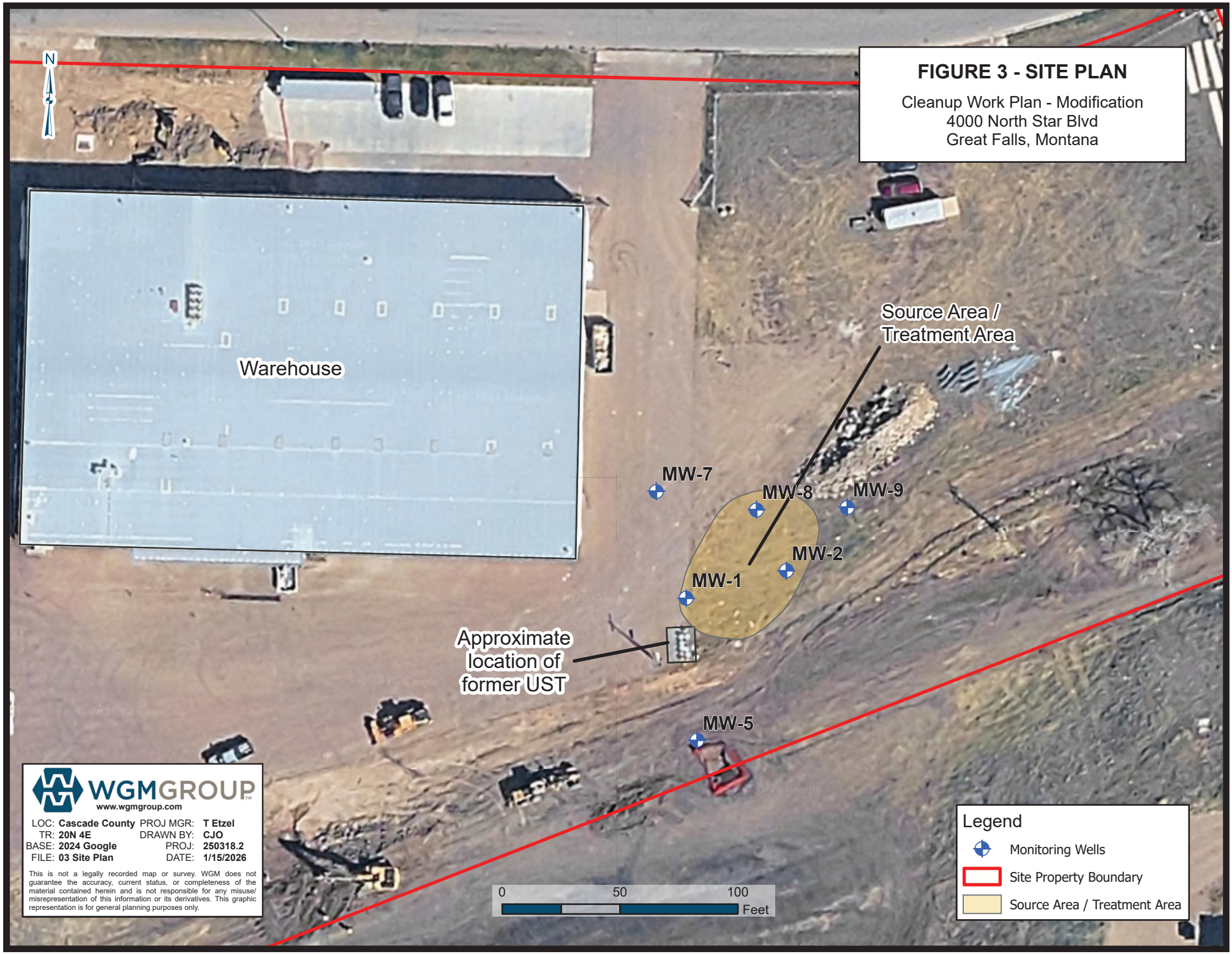
LOC:	**Cascade County**	PROJ MGR:	**T Etzel**
TR:	**20N 4E**	DRAWN BY:	**CJO**
BASE:	**2024 Google**	PROJ:	**250318.2**
FILE:	**02 Site Map**	DATE:	**1/15/2026**


N
FIGURE 3 - SITE PLAN
Cleanup Work Plan - Modification
4000 North Star Blvd
Great Falls, Montana
Warehouse
Source Area /
Treatment Area
MW-7
MW-8
MW-9
MW-2
MW-1
Approximate
location of
former UST
MW-5
WGMGROUP
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LOC: Cascade County
TR: 20N 4E
BASE: 2024 Google
FILE: 03 Site Plan
PROJ MGR: T Etzel
DRAWN BY: CJO
PROJ: 250318.2
DATE: 1/15/2026
This is not a legally recorded map or survey. WGM does not guarantee the accuracy, current status, or completeness of the material contained herein and is not responsible for any misuse/ misrepresentation of this information or its derivatives. This graphic representation is for general planning purposes only.
0
50
100
Feet
Legend
Monitoring Wells
Site Property Boundary
Source Area / Treatment Area

APPENDIX A
DEQ CWP MODIFICATION REQUEST LETTER

Montana Department of Environmental Quality

January 12, 2026

Todd Waller
Venture West Development, LLC.
529 E. Main Street, Suite 104
Bozeman, MT 59715

Re: Modification of the Cleanup Work Plan, dated April 1st, 2025, for the Petroleum Release at Pacific Coast Supply, 4000 N Star Blvd, Great Falls, Cascade County, Montana; Facility ID 07-06130 (TID 18615), Release 1054, Work Plan ID 34891

Dear Mr. Waller:

DEQ is requiring a modification to the above-referenced approved Work Plan (WP) and budget. The revised scope is based on the soil and groundwater data obtained from a recent limited remedial investigation conducted in July 2025. The new data supports a revised size of area for in-situ injections, along with the type of amendments chosen for in-situ injection. DEQ discussed the modification with your consultant, WGM Group, on January 9th, 2026.

This letter will also function as an extension to the report due date.

An updated WP with the above changes in scope is due on **February 20th, 2026**. The work detailed in the above-referenced WP is due on a revised date of **November 20th, 2026**. No additional work is authorized beyond that date unless approved in writing by DEQ.

OSHA regulations require your consultant or contractor to have and maintain a current site-specific health and safety plan during all field activities[1].

DEQ reserves the right to modify the WP, including any approved changes, before you implement it or to require the use of a different remediation method if site conditions change or if additional information becomes available that affects your proposed remediation plan. Please notify DEQ's project manager at least 10 working days prior to performing any field activities so that we can schedule a visit, if necessary.

If you have any questions, please contact me at (406) 444-7219 or rachel.mindt@mt.gov.

[1] U.S. Occupational Safety and Health Administration, Hazardous Waste Operations and Emergency Response Regulation 29 CFR 1910.120

Sincerely,

Rachel Mindt

Rachel Mindt
Environmental Project Officer
Petroleum Tank Cleanup Section

cc: AJ Pate, PTRCB
Rhonda Knudsen, County Sanitarian
Tyler Etzel, WGM Group
Todd Waller, Venture West Development, LLC.

APPENDIX B
TABULATED SITE DATA

TABLE 1
Soil Results - VPH
Pacific Source Supply
Great Falls, Montana

Sample ID	Date Collected	Sample Type	Sample Depth (feet bgs)	Volatile Petroleum Hydrocarbons (VPH)									
				MTBE	Benzene	Ethylbenzene	Toluene	Total Xylene	Naphthalene	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics	TPH
DEQ Default RBSL [1]				**0.078**	**0.07**	**6.4**	**21**	**72**	**2.2**	**52**	**77**	**130**	**n/a**
MW-1	4/11/2023	grab	13-15	<0.0439	**28**	**168**	**301**	**1,310**	**87.8**	**3,030**	**2,870**	**2,340**	**10,800**
MW-2	4/11/2023	grab	17-19	<0.0391	**2.78**	**7.11**	<0.145	**28.8**	**15.4**	**754**	**446**	**460**	**1,760**
MW-5	4/12/2023	grab	19-21	<0.000525	<0.000701	<0.00111	**0.0133**	**0.00684** J	<0.00732	<10.3	<10.3	<10.3	<20.5
WSB7-1	7/8/2025	grab	18.3-18.8	<1.1	<0.56	<0.56	<0.56	<0.56	<1.1	<22	<22	<22	<22
WSB8-2 (MW-8)	7/8/2025	grab	15.8-16.1	<3.0 D	**7.2**	**103**	**181**	**607**	**68**	**1,420**	**2,160**	**2,260**	**6,320**
WSB8-1 (MW-8)	7/8/2025	grab	17.8-18.2	<0.50 D	**0.72**	**11**	**0.88**	**34**	**11**	**348**	**391**	**390**	**1,110**
MW-9	7/9/2025	grab	18.3-19	<0.21 D	<0.11 D	**2.8**	**0.29**	**2.1**	**1.1**	**73**	**178**	**128**	**388**

Notes:

All results in milligrams per kilogram (mg/kg; ppm)

[1] DEQ Tier 1 RBSLs for soil – (DEQ Table 1, Feb, 2024)

< indicates that the analyte was not detected above the laboratory reporting limit

n/a indicates no screening level available or not published

J indicates the value was estimated by the laboratory because it was present but less than the reporting limit

D indicates that the reporting limit (RL) was increased due to sample matrix interference

MTBE and Benzene were not detected, but the laboratory reporting limits are above the DEQ Default RBSLs

TABLE 2
Soil Results - EPH
Pacific Source Supply
Great Falls, Montana

Sample ID	Date Collected	Sample Type	Sample Depth (inches bgs)	Extractable Petroleum Hydrocarbons (EPH)				
				EPH Screen	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	TEH
DEQ Default RBSLs [1]				**200 ***	**290**	**25,000**	**370**	**n/a**
MW-1	4/11/2023	grab	13-15	**1,890**	**539** DJ	**5.09** DJ	**307**	**851**
MW-2	4/11/2023	grab	17-19	**366**	**125**	**3.11** DJ	**73.0**	**201**
MW-5	4/12/2023	grab	19-21	**10.2** J	----	----	----	----
WSB7-1 (MW-7)	7/8/2025	grab	18.3-18.8	<200	----	----	----	----
WSB8-2 (MW-8)	7/8/2025	grab	15.8-16.1	**421**	**68**	**15**	**34**	**190**
WSB8-1 (MW-8)	7/8/2025	grab	17.8-18.2	**923**	**275**	<11	**87**	**583**
MW-9	7/9/2025	grab	18.3-19	**58**	----	----	----	----

Notes:

All results in milligrams per kilogram (mg/kg; ppm)

[1] DEQ Tier 1 Default RBSLs for soil – (DEQ Table 1, Feb, 2024)

* DEQ RBCA screening level used to determine whether EPH fractionation is required (not an RBSL exceedance)

< indicates that the analyte was not detected above the laboratory reporting limit

---- indicates that the compound was not analyzed for the indicated parameter

n/a indicates no screening level available or not published

Bolded value indicates the parameter was detected above the laboratory reporting limit

D qualifier indicates the laboratory reporting limit (RL) was increased due to sample matrix interference

J indicates the value was estimated by the laboratory because it was present but less than the reporting limit

Table 3
VPH_VOCs Results - Groundwater
Pacific Coast Supply
Great Falls, Montana

Well ID	Date Collected	Volatile Petroleum Hydrocarbons (VPH)										Lead Scavengers	
		MTBE	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C9-C10 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	TPH	1,2-Dichloroethane (DCA)	1,2-Dibromoethane (EDB)
MDEQ Tier 1 RBSL		**30**	**5**	**1,000**	**700**	**10,000**	**100**	**980**	**700**	**3,000**	**n/a**	**4**	**0.017**
MW-1	5/17/2023	<0.101	**53.4**	**1,090**	**159**	**2,820**	**66.3**	**3,160**	**1020**	<33.3	**8,520**	<0.0819	<0.126
	7/9/2025	<6.5 D	**459**	**4.6**	**465**	**38**	**4.9 DJ**	**1,740**	**1080**	**1,010**	**4490**	----	----
MW-2	5/17/2023	<0.101	**64.5**	**0.627** J	**9**	**73**	**13.2**	**446**	**515**	**274**	**1,380**	**2.61**	<0.126
	7/9/2025	<1.9 D	**70**	**0.57**	**20**	**1.0**	<1.0	**135**	**196**	**93**	**488**	----	----
MW-5	5/17/2023	<0.101	<0.0941	<0.278	<0.137	<0.174	<1.00	<33.3	<33.3	**41.9** J	<66.7	<0.0819	<0.126
	7/8/2025	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20	----	----
MW-8	7/9/2025	<10 D	**108**	**833**	**235**	**1,240**	**52**	**1,240**	**1,050**	**894**	**5,140**	----	----
MW-9	7/9/2025	<1.0	<0.50	**0.35**	**1.2**	**4.0**	**1.8**	**90**	**45**	**52**	**181**	----	----

Notes:

All results in micrograms per Liter (µg/L)

< indicates that the analyte was not detected above the laboratory reporting limit

J indicates the value was estimated by the laboratory because it was present but less than the reporting limit

D indicates that the laboratory Reporting Limit (RL) increased due to sample matrix interference

---- indicates no analysis was performed for the analyte

Bolded value indicates the value was detected above the laboratory reporting limit

Bolded/shaded value indicates the analyte exceeds Montana Department of Environmental Quality (MDEQ) Tier 1 Risk-Based Screening Level (RBSL), Table 3, Feb. 20, 2024

WGMGROUP

Table 4
EPH Results - Groundwater
Pacific Coast Supply
Great Falls, Montana

Well ID	Date Collected	Extractable Petroleum Hydrocarbons (EPH)				
		TEH SW 8015M	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	TEH MA-EPH
MDEQ Tier 1 RBSL		**1,000** [1]	**1,400**	**1,000**	**1,100**	**n/a**
MW-1	5/17/2023	**4,090**	<200	<200	**547** J	**547** J
	7/9/2025	**2,650**	**194** JL	< 314 L	**343**	**1,660**
MW-2	5/17/2023	**536**	----	----	----	----
	7/9/2025	**411**	----	----	----	----
MW-5	5/17/2023	<100	----	----	----	----
	7/8/2025	<300	----	----	----	----
MW-8	7/9/2025	**2,380**	**164** JL	<307 L	<307 L	**1,460**
MW-9	7/9/2025	<300	----	----	----	----

Notes:

All results in micrograms per Liter (µg/L)

[1] indicates the TEH concentration exceeded the level used to determine if additional analysis (fractionation) is needed

< indicates that the analyte was not detected above the laboratory reporting limit

J indicates the value was estimated by the laboratory because it was present but less than the reporting limit

L indicates that the lowest available Reporting Limit (RL) for the analytical method used and/or volume submitted

---- indicates no analysis was performed for the analyte

Bolded value indicates the value was detected above the laboratory reporting limit

Bolded/shaded indicates the analyte exceeds TEH screening level, Table 3, Feb. 20, 2024

WGMGROUP

APPENDIX C
RELEASE CLOSURE PLAN REVISION

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases

Part 1: Site Summary & Remedial Investigation (RI) Results

reference: MT DEQ Remedial Investigation (RI) Guidance for Petroleum Releases

Consultant:	**WGM GROUP, INC.**		Date: 1/12/2026	DEQ PM:	RACHEL MINDT
Facility Name / Address:	PACIFIC COAST SUPPLY, LLC				
Facility ID:	**07-06130**	**Release:** **1054**		WP ID:	34891

Site Information	Release Cause, Source(s) & Petroleum Types:	Dispensers or piping at the dispensers; northern USTs
	other releases onsite and nearby:	Probable release related to UST leaks
	Site Use(s) -- Former, Current & Planned:	commercial petroleum services since the early 1900s and current commercial petroleum dispensing
	Surface Conditions & Access:	Asphalt and concrete / adjacent roadway
	former Petroleum Tank Systems:	Three (3) 10,000 gal gasoline, 1,000 gal waste oil, two (2) 6,000 gal gasoline, 3,000 gal gasoline, 3,000 gal kerosene
	current Petroleum Tank Systems:	7,800 gal unleaded gasoline, 4,200 gal super unleaded gasoline, 5,500 gal diesel #2, 4,500 gal diesel #1, 10,000 gal diesel
	Other:	1,000 gal anti-freeze
Subsurface	Stratigraphic sequence - layers & thicknesses:	0-3 feet below ground surface (ft bgs): gravel fill material/10-12 ft bgs: silty clay, clay, sandy clay/12-23 ft bgs: intermittent sand & gravel lenses insterspersed between clayey & silty gravels
	Stratigraphic Continuity - Lateral Variation(s):	From 12-23 ft bgs: intermittent sand & gravel lenses insterspersed between clayey & silty gravels are not laterally continious and pinch out horizontally
	Groundwater Depth & Flow Direction(s):	Ave. depth to groundwater is 15.15 ft bgs. Ave. groundwater flow direction is northeast to east-northeast.
	Aquifer(s) unconfined, confined, perched:	Laterally discontinuous perched aquifers appear to exist from 5- 10 ft bgs in the vicinity. Upper, unconfined aquifer exists and coincides with intermittent sand & gravels that occur at approx. 12 ft bgs. Total depth of the unconfined aquifer is not known.
	Receptor Depth/Location (basements, utilities):	Two commercial warehouse buildings exist on the property that have no basement. Utilities include sewer, water, telecommunications, and power. The water line depths are 5.5 ft bgs and sewer line depth is 5 ft bgs. Telcom and power utilities are bured from 2 to 3 ft bgs.
	Other:	
Extent & Magnitude	Petroleum Types, Age & NAPL Mobility:	The site has operated USTs with gasoline, diesel, kerosene, and waste oil. Age of the petroleum release is at least 25 years or older as the Site has operated commercial petroleum dispensing since the early 1900s. No NAPL has been measured at the Site.
	Surface Soil Impacts (0 to 2 ft bgs):	none known
	Vadose-Zone Soil Impacts:	Soil samples collected from WSB-3 (FFU-10) from approximately 5 to 8 ft bgs showed RBSL exceedances for VPH aromatic and aliphatic fractions. Soil samples collected from MW-8 showed VPH exceedances from 15.5 to 18 ft bgs. Soil samples collected from MW-9 showed VPH exceedances from 19 to 18 ft bgs.No other vadose zone soils have shown impacts above Tier 1 RBSLs at the site.
	Smear-Zone Soil Impacts:	Data show smear zone impacts ranging from approximately 10 ft bgs to the groundwater interface (15 to 19 ft bgs) in the northeastern corner of the site.
	Groundwater Impacts:	Tier 1 RBSL exceedances for benzene in FFU-2 and FFU-10; Tier 1 RBSL exceedances in MW-8. No other exceedances for any VPH constituents in any wells.
	Surface Water Impacts:	none known
	Petroleum Vapor Impacts:	none known
	Other:	
Reports	RI and Monitoring Reports & Dates:	RI - Aug. 1999, Sept. 2001, Oct. 2002, Aug. 2020 / GWM - June 2001, Oct. 2003, Aug. 2004, May 2012, Aug 2022, Aug 2023, Jan 2023, Sept 2024; RI - July 2025
	Pilot Tests & Results:	none
	Results from Cleanup(s):	Dec 1998-excavation of 60-80 cy at the north dispenser island. Aug 2001-over excavation of 630 cy around northern UST basin.
	Other:	
What currently prevents Release Closure?		Residual impacts to smear zone soil in the northeast corner of the Site (east of the former Northern UST basin and north of the Northern dispenser islands) contain petroleum hydrocarbons that are being leached into groundwater and causing benzene to be detected in FFU-2 (MW-2), FFU-10 (MW-10) and MW-8 above the RBSLs.
additional information required for PMZ Closure:		PMZ closure not considered at this time but will be in the future after remediation actions in Summer 2026.
Information & Data Gaps:		Data gaps exist for the site, and they include absence of natural attenuation soil data for the NE boundary of the property.
Recommendations and comments:		Based on the current July 2025 RI results, WGM recommends treatment of the groundwater plume area with in-situ direct injection technology.

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)

for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases

Part 2: Conceptual Site Model (CSM) - Evaluation of Exposure Pathways

reference: MT DEQ Risked-

Based Corrective Action (RBCA) Guidance for Petroleum Releases

Consultant:	WGM GROUP, INC.	Date:	1/12/2026	DEQ PM:	RACHEL MINDT
Facility Name:	PACIFIC COAST SUPPLY, LLC				
Facility ID:	**07-06130**	**Release:**	**1054**	WP ID:	34891

Petroleum Source(s)	Affected Medium	Exposure Medium / Point	Exposure Route	Receptor	Complete Description for All Receptors Describe why a Receptor is not threatened or impacted; and Describe proposed Investigation, Cleanup, and/or Monitoring Methods for each threatened or impacted Receptor.
Required: Complete Description of the Source(s) of Petroleum Release	Surface Soil (0 - 2 ft bgs)	Soil	Ingestion Dermal	Resident and/or Worker	No known surface soil impacts.
		Soil	Leaching	Groundwater	No known surface soil impacts.
		Dust/Vapors	Inhalation	Resident and/or Worker	No known surface soil impacts.
		Surface Erosion to Surface Water and Sediment	Ingestion Dermal	Recreator, Ecological Receptor [1]	No known surface soil impacts.
	Sub-Surface Soil (> 2 ft bgs)	Soil	Ingestion Dermal	Construction Worker [2]	Subsurface soil impacts in the vadose zone from approx. 5 to 8 ft bgs. A previous Tier 2 RBCA analysis showed that direct contact does not exhibit a risk that exceed DEQ's allowable levels.
		Soil	Leaching	Groundwater	The main bulk and source of contamination at the site has been removed. However, in the northeastern corner of the site, an unknown volume of impacted soil in the smear zone contains petroleum hydrocarbons at concentrations that are leaching from soil to groundwater.
		Indoor Air	Inhalation	Commercial or Residential	No basement is present beneath the onsite building. Depth of impacted soil near the building indicates that indoor air vapor intrusion (VI) is not expected to readily occur.
		Dust/Vapors	Inhalation	Construction Worker	A Tier 2 RBCA evaluation has shown that subsurface impacts do not exhibit a risk that exceed DEQ's allowable levels.
		Buried Water Line	Ingestion Dermal	Resident and/or Worker	Public utility buried water lines located offsite are likely above impact depths at 5.5 ft bgs; However, a Tier 2 RBCA evaluation has shown that subsurface impacts do not exhibit a risk that exceed DEQ's allowable levels.
		Buried Utility Line	Inhalation of Indoor Air	Indoor Resident and/or Worker	Buried utilitiy lines located offsite are likely above impact depths at 5 ft bgs; However, a Tier 2 RBCA evaluation has shown that subsurface impacts do not exhibit a risk that exceed DEQ's allowable levels.
	Groundwater	Groundwater		State water [3]	Monitoring wells (FFU-2/MW-2, FFU-10, and MW-8) in the NE portion of the site detect benzene concentrations above the RBSL of 5 ppm. Ongoing groundwater monitoring has shown that the benzene plume remains stable in it's position at the northeast corner of the Site.
		Indoor Air [4]	Inhalation of Indoor Air	Resident and/or Worker	No basement is present beneath the onsite building. Depth of impacted soil near the building indicates that indoor air vapor intrusion (VI) is not expected to readily occur.
		Groundwater and Vapors	Ingestion Dermal Inhalation	Construction Worker [2]	The remaining impacted groundwater on the site is located in the NE portion of the property and concentrations are relatively low. Because of these conditions, inhalation/ingestion of vapors not expected to readily occur. The impacted groundwater at the site is likely deeper than expected construction so no dermal contact is expected to occur.
		Drinking Water	Ingestion Dermal	Resident and/or Worker	Currently, there is no known drinking water wells on the site or downgradient of the Site. Residents obtain their drinking water from a municipal public water supply system (PWSID #MT0000213). Two active wells and one backup well are used to supply water for the Fairview public water supply. These wells range from 145 to 150 feet bgs in total depth and are situated approximately 1,900 feet north of the Site, and ingestion or dermal contact with impacted drinking water is unlikely.
		Surface Water and/or Sediment	Ingestion Dermal Inhalation	Recreator, Ecological Receptor	Currently, there is no known dissolved phase or solid phase groundwater plume or Tier 1 RBSLs exceedances that could affect surface water or sediment at this site.
		Buried Water Line	Ingestion Dermal	Resident and/or Worker	Public utility buried water lines located offsite are likely above impacted groundwater depths at 5.5 ft bgs. A Tier 2 RBCA evaluation showed that subsurface impacts do not exhibit a risk that exceed DEQ's allowable levels.
		Buried Utility Line	Inhalation of Indoor Air	Indoor Resident and/or Worker	Public utility lines located offsite are likely above impacted groundwater depths at 5.5 ft bgs. A Tier 2 RBCA evaluation shows that subsurface impacts do not exhibit a risk that exceed DEQ's allowable levels.

Data Gaps:	Data gaps exist for the site, and they include absence of natural attenuation soil data for the NE boundary of the property.
Recommendations:	Based on the current July 2025 RI results, WGM recommends treatment of the groundwater plume area with in-situ direct injection technology.

Footnotes:

1. Ecological Receptors (e.g. plants and animals) can be added as a separate line associated with surface soil but it is not common for PTC sites.
2. Construction worker covers excavations conducted for building construction, utility installation and repair, as well as residents planting trees, etc.
3. Standard or RBSL exceedence are a complete pathway to a receptor, which is state water (or groundwater).
4. Indoor Air is the exposure medium for a potential or known vapor intrusion setting where a resident or an employee of a business may breathe petroleum vapor from the release.

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases

Part 3: Evaluation of Cleanup Alternatives
reference: MT DEQ Remedial Alternatives Analysis (RAA) Guidance for Petroleum Releases

Consultant:	WGM GROUP, INC.	Date:	1/12/2026	DEQ PM:	RACHEL MINDT	
Facility Name / Address:	PACIFIC COAST SUPPLY, LLC					
Facility ID:	**07-06130**	**Release:**	**1054**	WP ID:	34891	

Administrative Rules of Montana 17.56.605(3) requires screening and selection of cleanup methods to develop a matrix evaluation of cleanup alternatives. A cleanup plan requires information on all alternatives and an explanation why any alternative was selected.

Enter appropriate site-specific Cleanup Methods that are based on RI results & CSM

Evaluation Criteria		No Action*	Monitored Natural Attenuation (MNA)	In-situ Chemical Oxidation (ISCO) & ORC-A	Full Excavation with MNA			
	Estimated Costs	0	$200,000 (est. for 20 years)	$203,470	325,000			
Performance	Protective of Human Health & Environment (e. g. residences, utilities, water supply, future use)	no	NO	YES	YES			
Performance	Method-specific regulatory requirements (e. g. disposal of impacted soil & water, access agreements)	N/A	NO	Injection followed by quarterly/semi-annual monitoring	Waste characterization and disposal at an approved facility			
Performance	Method-specific feasibility requirements (e. g. pilot tests, treatability studies)	N/A	YES	N/A - Based on knowledge of existing lithology, a pilot test should not be required.	N/A			
Performance	Contaminant-specific requirements (e. g. method achieves soil & GW RBSLs & DEQ-7 standards)	NO	NO	Yes - method anticipated to achieve GW RBSLs & DEQ-7 Standards	Yes - method anticipated to achieve GW RBSLs & DEQ-7 Standards			
Performance	Location-specific requirements (e. g. potential historical, cultural, or ecological significance, or site near wetlands, floodplains, surface water, endangered species / migratory bird habitat)	N/A	N/A	N/A	N/A			
	Reliability -- Short Term	NO	YES	GENERALLY RELIABLE	POSSIBLY RELIABLE			
	Reliability -- Long Term	NO	YES	GENERALLY RELIABLE	GENERALLY RELIABLE			
	Implementation Issues & Limitations	NONE	YES -MAY CONFLICT WITH FUTURE SITE DEVELOPMENT PLANS	Yes, may have limitations due to utilities associated with former UST basin	Clean overburden would need to be removed to access impacted soil. Required sidewall benching and depth of excavation could result in an extensive excavation due to depth required (may extend to the adjacent property).			
	Safety Issues	NONE	NONE	NONE	EXCAVATION CAVE IN			
	Effects on Public Health and Environment (includes Receptors)	NONE	NONE	Protective - groundwater monitoring required to assess protectiveness.	NONE			
	Other site-specific criteria & issues:	N/A	N/A	N/A	N/A			
	Advantages of Cleanup Method:	NONE	NONE	Actively remediates soil and groundwater	NONE			
	Disadvantages of Cleanup Method:	NOT PROTECTIVE	NOT PROTECTIVE	Cost, potential migration to off-site property	Expensive. Difficult to excavate below saturated zone and in bedrock. Partial disruption of businesses. Conflict with proposed site development.			
	Est. Years to Complete Cleanup Method:	UNKNOWN	30 YEARS EST	1-2	<10			
	Cleanup Recommendations:	NOT ADVISED	REJECT	ADVISED OPTION	Reject due to high cost and site development plans			

Information & Data Gaps:	Petroleum impacts are not fully delineated to the northeast of the former UST basin.
Recommendations and comments:	Delineate to the to downgradient extent of the former UST basin and PMZ resolution with a restrictive covenant recorded on the property title to emplace activity and use limitations around the former UST basin, or other appropriate remediation approach.

* Note: Cleanup technologies may be removed or added as appropriate for each Release; however, the 'No Action' alternative must be evaluated for comparison at every Release.

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)

for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases

Part 4: Compliance Monitoring

reference: MT DEQ Remedial Alternatives Analysis (RAA) Guidance for Petroleum Releases

Consultant:	WGM GROUP, INC.	Date:	1/12/2026	DEQ PM:	RACHEL MINDT
Facility Name / Address:	PACIFIC COAST SUPPLY, LLC				
Facility ID:	**07-06130**	**Release:**	**1054**	WP ID:	34891

Compliance & Operation Monitoring Methods to Evaluate Effectiveness of each Cleanup Alternative Listed in Part 3

	Administrative Rules of Montana 17.56.605(6) requires the cleanup plan to include a plan and schedule for compliance monitoring to evaluate the effectiveness of cleanup activities.	No Action*	Monitored Natural Attenuation (MNA)	In-situ Chemical Oxidation (ISCO) & ORC-A	Full Excavation with MNA	0	0	0
Evaluation of Cleanup	Confirmation Sampling	ongoing groundwater monitoring/sampling	soil and groundwater sampling	groundwater sampling	groundwater sampling			
	Borings/ Monitoring Wells (MWs)	no	yes (replace at least one removed well)	no	no			
	GW Monitoring (freq., wells, years)	annual, estimated 15 years	annual for 3 years (possibly more)	annual for 2-3 years	semi-annual, 1 year			
	System O/M (frequency & years)	Not needed	Not needed	Not needed	Not needed			
	Petroleum Vapor Monitoring (freq., locations, years)	Not needed	Not needed	initially (possibly) during implementation	Not needed			
	Receptor Monitoring	Not needed	Not needed	Not needed	Not needed			
	Waste Management	Not needed	yes	Not needed	Not needed			
	Other site-specific monitoring:							
	Method(s) to Evaluate Interim Results and Optimize Cleanup:	ongoing groundwater monitoring	ongoing groundwater monitoring	ongoing groundwater monitoring and potential additional injections	2 semi-annual groundwater monitoring events (1 year)			
	Est. Years to Complete all Monitoring:	An estimated 15 years	An estimated 3 years	Estimated 2-3 years	Estimated 2 years			
	Estimated costs for O/M & monitoring:	Est. $75,000 for 15 years annual groundwater monitoring	Est. $20,000 for 3 years annual groundwater monitoring	Est. $20,000 for 3 years semi-annual groundwater monitoring	Est. $10,000 for 1 year semi-annual groundwater monitoring at high and low groundwater levels			
Closure	Estimated Total Years to Closure:	15	3	3	1			
	Natural Attenuation Trends:	None monitored, but petroleum hydrocarbons at the site appear to be slowly attenuating.						
	What currently prevents Closure?	benzene above 5 ug/L in FFU-2 (MW-2) and FFU-10 (MW-10)						
	Is this a PMZ Closure Candidate?	possibly - after in-situ injection						
	Other:							
	Information & Data Gaps:	Data gaps exist for the site, and they include absence of natural attenuation soil data for the NE boundary of the property.						
	Recommendations and comments:	Based on the current July 2025 RI results, WGM recommends treatment of the groundwater plume area with chemical oxidation (ISCO) injection technology (RegenOx) and enhanced bioremediaiton (ORC-A) along with two successibe groundwater monitoring events at seasonally high and low groundwater elevations. If the benzene (and other VPH constituents) are below RBSLs, then the release will be submitted for closure.						

* Note: Cleanup technologies may be removed or added as appropriate for each Release; however, the 'No Action' alternative must be evaluated for comparison at every Release.

APPENDIX D
INJECTATE INFORMATION & SUBCONTRACTOR BIDS

WGM Group, Inc **Date:** Jan-26

Pacific Coast Supply

4000 Northstar Blvd, Great Falls, MT

Project Summary:

- direct-push 131 injection points (IPs) to 20 feet below ground surface
- first mobilization will include injection of 37 IPs and inject 207 gallons of RegenOX slurry
- second mobilization will include injection of 37 IPs and inject 207 gallons of RegenOX slurry and 37 IPs or ORC-A slurry
- all IPs need to be abandoned and patched

Subcontractor	Mob - Set Up	Lodging - Per Diem	Injections			Materials/Tools/Equipment						Proj Mngt. - Misc.	Totals
			unit	units	sub	Bentonite	Drums	Pumps Equip	misc.	patch repair	sub		
WCEC	$3,520	$4,470	$2,750	13	$35,750	$0	$0	$3,900	$200	$884	$4,984	$930	**$49,654.25**
Missoula, MT			day	days									
Cascade Drilling	$20,300	$15,000	$4,900	16	$78,400	$3,275	$1,325	$18,760	$0	$0	$23,360	$1,600	**$138,660.00**
Oregon,			day	days									
Wiley Drilling	$12,240	$10,986	$291.25	208	60,580	$420	$0	$5,850	$700	$0	$6,970	$0	**$90,776.00**
Butte, MT			hour	hours									
Olympus Tech.	$4,632	$2,946.60	$15.50	2620	$40,610	$0	$0	$0	$0	$0	$0	$0	**$48,188.60**
Helena, MT			foot	feet									

WCEC
ENVIRONMENTAL CONSULTANTS

Missoula, Montana Office
1030 South Avenue W | Missoula, MT | 59801
406.549.8487 | www.wcec.com | Fax 406.549.8490

Remediation Services
Estimated Cost Spreadsheet
WGM - Pacific Coast Supply Great Falls, MT

1.19.26

TASK	Unit Cost	Units	Total Cost
Task 1: Project Management & Coordination			
Project Manager	$155.00	6	$930.00
	Sub Total		**$930.00**
Task 2: Injection Round 1			
Vehicle Mileage	$4.00	440	$1,760.00
Injection Borings (GeoProbe w/Operators per day)	$2,750.00	5	$13,750.00
Injection Pump & Equipment (per day)	$300.00	5	$1,500.00
Borehole restoration	$6.75	37	$249.75
PPE	$50.00	2	$100.00
Per Diem (food)	$45.00	10	$450.00
Lodging	$150.00	8	$1,200.00
	Sub Total		**$19,009.75**
Task 3: Injection Round 2			
Vehicle Mileage	$4.00	440	$1,760.00
Injection Borings (GeoProbe w/Operators per day)	$2,750.00	8	$22,000.00
Injection Pump & Equipment (per day)	$300.00	8	$2,400.00
Borehole restoration	$6.75	94	$634.50
PPE	$50.00	2	$100.00
Per Diem (food)	$45.00	16	$720.00
Lodging	$150.00	14	$2,100.00
	Sub Total		**$29,714.50**
	Total		**$49,654.25**

WCEC anticipates completion of the work in 13 field day that are 8 hours long. Any additional days will be billed based on the unit costs above with a minimum charge of ½ a day of the daily rates. Borehole restoration will be charged at the per boring rate if adjustments to injection protocols are required in the field due to subsurface lithology. Standby time will be billed at $250 per hour.

Account Name	WGM Group	Bid Date	1/16/2026
Address	1111 East Broadway Missoula, Montana 59802	Quote Number Quote Revision Date	209401
		Project Name	Pacific Coast Supply - RegenOx Injection
Contact Name	Tyler Etzel	Project Address	4000 North Star Blvd
Email	tetzel@wgmgroup.com	Project City	Great Falls
Phone	M: 406-240-7795 O: 406-728-4611	Project State	Montana
Bill To Account Number		Project Zip	

Cascade Rep Contact Information

Prepared By John McAssey Email jmcassey@cascade-env.com

Scope of Work

Cascade will mobilize form Denver, CO to perform direct push injection field services for two application of RegenOx and one application of ORC.
First mobilization: Will consist of "RegenOx Part A" which will include advancing 37 IPs with a dosing of 207 gallons per IP.
Return two weeks later.
Second mobilization: Will consist of "RegenOx Part B" which will include advancing 37 IPs with a dosing of 185 gallons per IP.
Immediately after second RegenOx injection event: Inject 57 ORC-A slurry from 14 to 20 ft bgs at 57 locations with a dosing of 9.8 gallons per IP, and spaced on 8 ft centers.
- Injection rate 5gpm, water source are spigots located on the property, no site access restrictions.
- Second application shift: Work continuously for 10 days, 1 day off to comply with DOT driver regulation. Then return to complete the SOW.
- Additional Cascade project assumptions are attached below.

Project Preparation	2	Application	$ 1,050.00	$ 2,100.00
Mobilization/Demobilization	2	Application	$ 6,600.00	$ 13,200.00
Setup and Breakdown	2	Application	$ 2,500.00	$ 5,000.00
Injection (3- Person Crew) - RegenOx	6	Day	$ 4,900.00	$ 29,400.00
Injection (3- Person Crew) - RegenOx + ORC	10	Day	$ 4,900.00	$ 49,000.00
Borehole Abandonment - bentonite chips	131	Each	$ 25.00	$ 3,275.00
Rentals - Forklift & Generator	4	Week	$ 4,690.00	$ 18,760.00
Field Services Reporting and Final Report	16	Day	$ 100.00	$ 1,600.00
Drums, Steel 55-gallon (as needed)	10	Each	$ 110.00	$ 1,100.00
Drum Liners (as needed)	5	Each	$ 45.00	$ 225.00
Per Diem, 3-person crew	20	Day	$ 750.00	$ 15,000.00
	Quote Total	$138,660.00		

Colorado: 1380 S. CHEROKEE STREET, DENVER CO 80127 ♦ (303) 423-2547

This quote is based on information provided by you and is valid for 45 days from the bid date. Unless previously agreed, Cascade requires a 2-week notice prior to mobilization. Your firm is responsible for 1) Obtaining any site specific permits, 2) Locating and clearly marking underground installations or utilities, 3) Furnishing dig Alert numbers at least three working days prior to scheduled start date and proof of private locating services, 4) Obtaining access to site with no overhead wires within 20' of the holes. Cascade Drilling shall not be responsible for damages to underground improvements not clearly and accurately marked. If bedrock, cobbles, flowing sands or other adverse or unsafe drilling conditions are encountered, drilling may continue on a time and materials basis or be terminated at the discretion of Cascade. Additional costs may apply if scope is significantly changed. Well development by others may void some or all of Cascade warranties of workmanship and materials. Prices assume standard labor rates and no work hour restrictions.

Signature of Client/Owner Authorized Representative

Signature of Authorized Cascade Representative

Name & Title of Authorized Representative and Company

Name & Title of Authorized Cascade Representative

Date

Date

Cascade will perform the Work as described in this proposal subject to the terms and conditions posted at https://cascade-env.com/resources/other/terms-and-conditions/ unless MSA is already established between Cascade and Client in which case MSA takes precedence over the aforementioned terms and conditions. By signing this proposal, Client agrees that this proposal together with the terms and conditions referenced above constitute a Subcontract. Client acknowledges that Client has received and agrees with all such documents in the form provided by Cascade. Terms and Conditions are posted and accessible at the website location set forth above.


1/2026
Proposed Injection Area
Image © 2025 Airbus
Imagery Date: 9/20/2025 lat 47.517738° lon -111.236640

CASCADE
DRILLING | TECHNICAL SERVICES

Injection Services Notes & Assumptions:

- **ONE-CALL**: Cascade will Contact State of WY USA 811 system for a utility mark-out at least three business days prior to the day fieldwork is to commence and notify CLIENT Project Manager at least one business day prior to confirm mark-out completion.
- **ESTIMATED QUANTITIES**: Estimated quantities and project duration are based on the information provided by CLIENT including site accessibility, anticipated subsurface conditions. Actual conditions experienced in the field may result in an increase or decrease of the estimated quantities, durations, and associated costs. Any additional costs will be pre-approved by the client with a formal change order.
- **PPE**: Work quoted is based on modified level D personal protection equipment (PPE) and supplemental PPE for amendment handling and contaminant exposure. Additional costs for higher level PPE will be quoted as necessary.
- **DECONTAMINATION**: A temporary decontamination area will be constructed onsite. All materials will be decontaminated onsite at the completion of the project. Any site-specific decontamination requirement must be communicated to Cascade prior to implementing the above-listed services. Wastewater will be placed in 55-gallon drums and placed in a designated area identified by CLIENT for disposal by others.
- **REAGENT PURCHASE**: CLIENT will procure the listed reagents, arrange shipping and coordination of deliveries to the site. CLIENT will provide a suitable storage area. Cascade will be prepared to unload and handle reagent during field implementation. CLIENT is responsible for disposal of the waste containers and any surplus chemical.
- **IDW MANAGEMENT**: Cascade will containerize all wastes (soil, surfaced substrate and groundwater, decontamination water, unused reagent solutions etc.) in 55-gallon drums and stage them near the work area at a location identified by CLIENT. CLIENT shall be responsible for the classification, transportation (off-site) and disposal of the waste.
- **WATER MANAGEMENT & CONDITIONING**: CLIENT will provide adequate water supply that does not cross any streets, driveway, or parking lots, to meet the production goals in this proposal. The estimated production rates, project duration, and associated injection costs are subject to the availability of water supply. Insufficient water supply may affect injection schedule and costs. Cascade will notify CLIENT immediately of potential water supply concerns. Cascade will supply a City of Raymond fire hydrant water meter and will prepare water for the reagent injection mixture.
- **TRAFFIC CONTROL**: CLIENT will be responsible for traffic and pedestrian control, if required. Cascade will provide materials for an exclusion zone, assumed to be cones and caution tape unless other materials are requested by CLIENT.
- **PERMITTING AND NOTIFICATIONS**: CLIENT will be responsible for regulatory approvals and permits including but not limited to Underground Injection Control permit. Cascade will be responsible for State of California NOI boring reports.
- **ACCESS AND STORAGE**: CLIENT will be responsible for providing sufficient site access, an accessible equipment and chemical staging area, and a secure overnight equipment staging area. Cascade will store our equipment and materials onsite. No third-party security assumed or included.
- **SANITATION FACILITIES**: Client will provide access to a restroom facility for use by Cascade and CLIENT personnel.
- **WORK HOURS and STAFFING**: All work will be conducted assuming 10-hour onsite field days. Stand-by rates apply if work hours are restricted or extend beyond 10-hours. No workday can exceed 14-hours including travel to/from office/hotel/shop. Second application assumes 10 day shift with 1 day reset to comply with DOT regulations.
- **WAGE DETERMINATION**: Prevailing wage or certified payroll not included. Labor rates are based on Cascade's Standard Labor Rates.
- **PER DIEM**: Include crew cost of meals and logging from port to port.

- **UTILITY CLEARANCE**: CLIENT will be responsible to mark each boring location prior to breaking ground and shall ensure that such boring locations are free and clear of overhead, surface, and subsurface utilities and/or structures. Cascade has provided costs to clear each injection location to a depth of 5 feet bgs with use of a hand auger prior to advancement of tooling into the subsurface.
- **WARRANTIES**: CLIENT acknowledges that although this proposal may contain remediation options, Cascade bears no responsibility for remediation results or impact to existing conditions. CLIENT indemnifies, holds harmless and shall defend Cascade and affiliates against claims or actions, including third party claims or actions, arising from any remediation design, results or impact to existing conditions. A thorough investigation should be performed by the client to collect comprehensive data for the proper design of any remedial solution. In addition, treatability tests should be performed to confirm the quantity and concentrations of reagents injected to treat contaminants of concern, as well as identify any adverse reactions that might impact existing site conditions. Design Optimization Tests, if not already conducted, should also be performed to verify injection rates and pressures, reagent surfacing issues, radii of influence and impacts to existing site conditions.
- **CHANGE OF CONDITIONS**: Circumstances encountered during the performance of these services could warrant additional time or expense; e.g. difficult drilling conditions, lower injection rates and/or higher pressures, reagent surfacing, regulatory delays, adverse weather resulting in equipment freezing or overheating, muddy conditions, accumulation of rain water, lighting, client imposed injection restrictions or downtime, site access limitations, and delays due to reagent delivery or pickup for reagents. Cascade will notify CLIENT of any such circumstances that could affect completion or costs of the engagement.
-**BONDING**: This proposal does not include the costs of any certified bonding. Should Cascade need to obtain a certified bond to perform the scope of work in this proposal, a change order will be submitted reflecting the costs of the certified bond.
-**RESURFACING**: This proposal does not include costs to use hot mix asphalt for the resurfacing of the injection locations. Should hot mix asphalt be required, Cascade can provide costs.

REMEDIAL DESIGN OUTPUTS: SMALL PLUME OPTION

Project Information		
Pacific Coast Supply DEQ Facility		
Great Falls, MT		
Small Plume Option: RegenOx Treatment		
Prepared For:		
Tyler Etzel, WGM Group		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Treatment Area	ft^2	3,674
Top Treatment Depth	ft	14.0
Bottom Treatment Depth	ft	20.0
Vertical Treatment Interval	ft	6.0
Treatment Zone Volume	ft^3	22,044
Treatment Zone Volume	cy	816
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.40
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	65,960
Treatment Zone Effective Pore Volume	gals	32,980
Application Design Summary		
Treatment Area	ft^2	**3674.0**
Top Treatment Depth	ft bgs	14.0
Bottom Treatment Depth	ft bgs	20.0
Application Method	-	**Direct Push**
Spacing Within Rows	ft	10.0
Spacing Between Rows	ft	10.0
Injection Points (per app.)	-	**37**
Number of Applications	-	**2**
Total RegenOx to be Applied	**lbs**	**8,640**
RegenOx Part A	lbs	6,480
RegenOx Part B	lbs	2,160
RegenOx Part A per Application	lbs	3,240
RegenOx Part B per Application	lbs	1,080
RegenOx Part A per Point	lbs	88
RegenOx Part B per Point	lbs	29
RegenOx Part A Solution %	%	5.0%
Volume Water	**gals**	**14,754**
Total Solution Volume	**gals**	**15,301**
Application Volume per Foot	gals	34
Injection Volume per Point	gals	207
Application Dosing		
RegenOx to be Applied	**lbs**	**8,640**
RegenOx Part A to be Applied	**lbs**	**6,480**
RegenOx Part B to be Applied	**lbs**	**2,160**

Project Info		
Pacific Coast Supply DEQ Facility		
Great Falls, MT		
Small Plume Option: ORC Advanced Treatment		
Prepared For:		
Tyler Etzel, WGM Group		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Treatment Area	ft^2	3,674
Top Treatment Depth	ft	14.0
Bottom Treatment Depth	ft	20.0
Vertical Treatment Interval	ft	6.0
Treatment Zone Volume	ft^3	22,044
Treatment Zone Volume	cy	816
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.40
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	65,960
Treatment Zone Effective Pore Volume	gals	32,980
Application Design Summary		
Application Method	-	**Direct Push**
Treatment Area	ft^2	3674
Top Treatment Depth	ft. bgs	14.0
Bottom Treatment Depth	ft bgs	20.0
Spacing Within Rows	ft	8.0
Spacing Between Rows	ft	8.0
Application Points	-	**57**
ORC Advanced to be Applied	lbs	**1,720**
ORC Advanced per point	lbs	30.2
Percent Slurry	**%**	**30%**
Volume Water	gals	**480.9**
Volume ORC Advanced	gals	77.4
Total Application Volume	**gals**	**558.3**
Application Volume per Foot	gal/ft	1.63
Injection Volume per Point	gals	9.8

January 16, 2026

Attn: Tyler Etzel
WGM Group
1111 East Broadway
Missoula, MT 59802

RE: Project: WD-260116
Remediation Injections
4000 North Star Blvd
Great Falls, MT 59405

Dear Mr. Etzel:

Wiley Drilling has developed this Proposal for WGM Group (WGM) to provide Subsurface Drilling Services for the above referenced project. This Proposal was developed based on information provided by WGM which included a general scope of work and an injection location map. The purpose of this project is to provide drilling services remediation injections.

Scope of Services

Wiley has developed this proposal to include scope, costs and assumptions based on the information provided by WGM. The Scope of Services is broken down into the tasks listed below.

Task 1: Project Preparation and Mobilization

Wiley will call in utility locations in accordance with Montana State law within 3 days prior to the start of drilling. WGM is responsible for providing Wiley with a site map identifying borehole locations to call in utility locates. Wiley has assumed that WGM will be responsible for private utility locate services. Wiley will mobilize the drill rig, materials, and crew from their drill shop in Montana City, MT to the project site.

Task 2: Remediation Injections

Wiley has reviewed the Preliminary Design documents provided by WGM to develop costs and scope of work for this task. It is our understanding that 74 Regenox injection points are to be drilled to a depth of 20 feet bgs on two separate mobilizations and an additional 57 ORC injections are to be drilled to a depth of 20 feet bgs during the second mobilization totaling 2620 linear feet of drilling. The general lithology consists of clay, and the impacted zone is from 14 to 20 feet bgs. Wiley will advance the injection point boreholes using a Geoprobe 3100 GT drill rig, and direct push drill tooling with expendable points. No soil samples will be collected when advancing the injection point borehole.

- Mobilization #1 - 37 injection points will receive a slurry mixture consisting of Regenox.
- Mobilization #2 - 37 injection points will receive a slurry mixture consisting of Regenox and 57 injection points will receive a slurry mixture consisting of ORC.

The slurry mixtures will be combined with potable water in accordance with specifications provided in the Preliminary Design and injected through the drill rods into the impacted zone. Based on the Preliminary Design, we have assumed that each Regenox injection point will receive approximately 185 to 207 gallons of slurry mixture and each ORC injection point will

receive approximately 9.8 gallons of slurry mixture. A total of 15,301 gallons of Regenox slurry and 558.3 gallons of ORC slurry will be injected at the site. Wiley will provide the equipment necessary to mix and inject the slurry. This equipment will consist of:

- 250-gallon water storage poly tank
- 250-gallon slurry mixing tank
- Paddle mixer
- Geoprobe GP-800 grout pump with associated hoses and fittings

Wiley will inject the slurry through the direct push drill tooling. Our injection pump is rated for a maximum of 8 gallons per minute and 650 psi. For costing purposes, we have assumed that each injection point will receive slurry from 14 feet to 20 feet bgs. We have also assumed that each Regenox injection point will take approximately 2 hours to inject the slurry mixture and each ORC injection point will take approximately 0.6 hours to inject the slurry mixture. Wiley will backfill each injection point with medium bentonite chips upon completion of the injection.

Cost Estimate and Assumptions

The total not to exceed cost estimate for this project is **$90,776**. A breakdown of these costs is provided in Table 1 attached to this Proposal. These costs are based on our project understanding, schedule, and the following assumptions:

- Wiley will call in public utility locations in accordance with Montana state law. Additional locate services are not included in this proposal.
- Access to the borehole locations for a truck mounted drill rig and support equipment is available.
- We will do our best to minimize impacts to curbs and lawns, however, any damage to landscaping associated with borehole access will be the responsibility of others.
- Drill tooling does not need to be decontaminated between borings.
- Potable water is available on site at a minimum of 10 gallons per minute.
- Work can be performed in Level-D Personal Protective Equipment including hard hat, safety toe boots, safety glasses, hearing protection, and hand protection.
- No drilling will occur through concrete surfaces.
- Traffic control, if necessary, will be provided by others.
- Permitting, if necessary, will be provided by others.
- WGM will be responsible for calculating all slurry mixture volumes.
- Clay may cause reduced flow rates and product surfacing; this will increase costs to complete the work.
- Costs for the injectant materials to be provided by others.
- Transport of the injectant materials to the job site to be provided by others.
- Any delays that are not the responsibility of Wiley will be charged to the project at a Standby Rate of $300/hour.
- Any changes to the scope outlined in this proposal will require an updated cost estimate and proposal.

Schedule

Wiley will be available after April 13, 2026. Wiley anticipates the work will be completed in twenty-six 8-hour business days over two separate mobilizations. Wiley will reach out to you to schedule this project upon receiving this signed Proposal.

Closing

We appreciate the opportunity to provide WGM with this Proposal. Your authorization for Wiley to proceed in accordance with this Proposal can be issued by signing and returning this Proposal (Project: WD-260116). The costs associated with this Proposal are valid for 90-days.

AGREED TO:

_____
CLIENT

_____
TITLE

_____
DATE

TABLE 1: REMEDIATION INJECTION COST ESTIMATE

Geoprobe 3100 Services	Quantity	Unit	Unit Price	Total
Project Settup/Mobilization				
Project Setup	13	Hour	$ 140.00	$ 1,820.00
Load/Unload	16	Hour	$ 230.00	$ 3,680.00
Mobilization 1	1	Lump Sum	$ 1,290.00	$ 1,290.00
Daily Mobilization	1	Lump Sum	$ 4,160.00	$ 4,160.00
Mobilization 2	1	Lump Sum	$ 1,290.00	$ 1,290.00
			Total:	**$ 12,240.00**
Drilling				
Site Set-up	26	Hour	$ 230.00	$ 5,980.00
Drill/Inject - Mob 1 (Regenox)	74	Hour	$ 300.00	$ 22,200.00
Drill/Inject - Mob 2 (Regenox)	74	Hour	$ 300.00	$ 22,200.00
Drill/Inject - Mob 2 (ORC)	34	Hour	$ 300.00	$ 10,200.00
			Total:	**$ 60,580.00**
Support Equipment				
Support Trailer	26	Day	$ 25.00	$ 650.00
Injection Pump	26	Day	$ 100.00	$ 2,600.00
Mixing Tanks	26	Day	$ 50.00	$ 1,300.00
Transfer Pump	26	Day	$ 50.00	$ 1,300.00
			Total:	**$ 5,850.00**
Materials				
Bentonite	40	Each	$ 10.50	$ 420.00
1.25" Expendable Point	140	Each	$ 5.00	$ 700.00
			Total:	**$ 1,120.00**
Hotel				
Operator	26	Days	$ 150.00	$ 3,900.00
Assistant	26	Days	$ 150.00	$ 3,900.00
			Total:	**$ 7,800.00**
Per Diem				
Operator	27	Days	$ 59.00	$ 1,593.00
Assistant	27	Days	$ 59.00	$ 1,593.00
			Total:	**$ 3,186.00**
			Total Cost:	**$ 90,776.00**

Olympus Technical Services, Inc.

January 19, 2026

Tyler Etzel
WGM Group
Via email: tetzel@wgmgroup.com

Re: **Proposal for Injections**
4000 North Star Boulevard
Great Falls, Montana
Olympus Project No. C3188

Dear Mr. Etzel,

Olympus Technical Services, Inc. (Olympus) is pleased to present this proposal to WGM Group (WGM) to use Direct Push Technology (DPT) to advance injections points at the above-referenced site (Site). We understand that the scope of work (SOW) will consist of the following tasks:

- Project management including project setup, public utility locate scheduling, project coordination with WGM, and development of a health and safety plan;
- Two mobilizations to and from the Site;
- First mobilization will include up to 37 injections points to depths of approximately 20 feet below ground surface (bgs), for a total of 740 feet, or practical drilling refusal, whichever is first encountered, for injection. Regenesis product will be provided by WGM;
- Second mobilization will include up to 37 injections points to depths of approximately 20 bgs, for a total of 740 feet, or practical drilling refusal, whichever is first encountered, for injection. Immediately following the RegenOx injections, an additional 57 injection points will be advanced to 20 feet bgs, for a total of 1,140 feet for injection of ORC-A. Olympus plans to inject through the weekend to save mobilization costs. Regenesis product will be provided by WGM;
- Injections will be performed from 20 to 14 feet bgs;
- Olympus will provide necessary tooling, support equipment, tanks, and injection pumps;
- Borings will be backfilled with bentonite chips and cuttings to the ground surface and will be patched to match previous existing conditions; and,
- Decontaminate non-disposable drill tooling before drilling, between borings, and after completion of the borings.

We propose to complete the borings with a track-mounted 7822DT Geoprobe® operated by a two-person crew, mobilized out of Billings, Montana. Olympus will conduct daily health and safety meetings related to our operations.

The estimate is based on the following assumptions and as discussed with WGM:

- Work will be completed in 13-15 10-hour days, including mobilization;
- Two mobilizations are included;
- ORC-A injections will begin immediately following RegenOx injections during the second mobilization. Olympus will perform injections through the weekend;
- Subsurface lithology is suitable for use of the DPT drill rig;
- The proposed boring locations are accessible and clear of potential overhead and underground obstructions. A public utility locate ticket will be prepared by WGM and a copy will be provided to Olympus at least three days prior to the drilling date. Olympus will prepare a duplicate utility locate notification ticket upon receipt of the locate ticket from WGM. Private locates are the responsibility of WGM, if necessary;
- A water source is available onsite;
- Non-disposable drill tooling will be decontaminated between borings by washing with Alconox® soap, or similar, and rinsing with distilled water;
- Traffic control is not included in this proposal; and,
- Olympus will not be responsible for disposal of investigation-derived waste (IDW), including soil, decontamination water, and other related materials, if required.

We appreciate the opportunity to present this proposal. We propose to complete the above scope of work on a unit cost basis in accordance with the attached cost estimate. The cost estimate in this proposal is based on representative hourly rates for various categories of personnel and expected project expenses. Our invoices will reflect actual charges based on the applicable schedules and may differ from the cost estimate in this proposal. Should you authorize these Services, you will be invoiced monthly, on a unit cost basis in accordance with this cost estimate. Should unforeseen circumstances arise and warrant further work and additional costs, Olympus will contact you prior to further efforts. Any changes to our agreement must be mutually agreed and in writing.

This Task Order will be governed by an Olympus Technical Services, Inc. General Services Contract, which is also attached. Please acknowledge your acceptance of these Services by having this Task Order and attached General Services Contract properly executed by a person authorized to purchase these Services and returning a signed copy to us. We appreciate the opportunity to offer this proposal and look forward to working with you on this project. Please contact me should you have any questions regarding this proposal.

Sincerely,

Ethan J. Perro, P.G.
Drilling Manager

Attachments: Cost Estimate
Contract #8331

Approved for WGM by:

_____ _____
Signature Date

_____
Name/Title – Please Print

6809 King Ave West Unit F ● Billings, MT 59106
(406) 245-3554 ● Fax (406) 245-3555 ● E-mail: Billings@olytech.com

Olympus Technical Services, Inc. Cost Estimate **Date:** 1/15/2026

Client: WGM
Project Name: Great Falls
Olympus Project/Proposal No.: C3188

***ODC** 0%

Mobilization	**Quantity**	**Unit**	**Rate**		**Cost**
Mobilization	1	LS	$4,632.00		$4,632.00
			Mobilization Subtotal:		$4,632.00
Drilling	**Quantity**	**Unit**	**Rate**		**Cost**
Injections	2620	Feet	$15.50		$40,610.00
Standby		Hr	$250.00		
Standby (OT)		Hr	$350.00		
			Drilling Subtotal:		$40,610.00
Lodging and Per Diem	**Quantity**	**Unit**	**Rate**		**Cost**
Lodging (GSA)	24	Day	$75.00	*	$1,800.00
Per Diem (Full Day)	26	Day	$44.10		$1,146.60
			Lodging and Per Diem Subtotal:		$2,946.60

Comments/Notes:

1. 2 mobilizations from Office to Site
2. 131 points to 20 ft bgs or 2620 ft
3. Backfill with bent seal and match surface
4. Geoprobe and tooling included
5. Assumes 13 days for injection
6. IDW not included / Lodging invoiced at actual cost

Subtotal		$48,188.60
Contingency	0.0%	$0.00
GRAND TOTAL		$48,188.60

OLYMPUS TECHNICAL SERVICES, INC.
GENERAL SERVICES CONTRACT #C8331

This CONTRACT is made this _19____ day of January 2026 by and between OLYMPUS TECHNICAL SERVICES, INC. ("Olympus") and the Olympus customer ("Client"):

Client name:	WGM Group
Address:	1111 East Broadway Missoula, MT
Phone:	(406) 728-4611

For and in consideration of the mutual covenants contained herein, the parties agree:

ARTICLE I. SERVICES BY OLYMPUS

1.0 Scope of Work

Olympus will provide personnel, equipment, and materials for those services described in specific Task Orders, (hereinafter "Services") subject to this Contract, signed by Olympus and the Client.

1.1 Method of Performance

1.1.1 Olympus shall mobilize such personnel, equipment, and materials as Client may direct.

1.1.2 Olympus shall comply in all material respects with all applicable federal, state, and local laws and regulations in its performance of the Services.

1.1.3 Olympus will make its personnel available at its standard rates and those of its authorized subcontractors at Client's cost available to confer with Client to review the status of projects and to review and establish procedures for the efficient delivery of Services hereunder.

1.1.4 Neither Olympus, its authorized subcontractors, nor any of their employees shall supervise, directly or indirectly, any temporary or permanent employee of Client.

1.1.5 Olympus will bring to the location of a response action only such equipment, personnel, or other resources as Client requests for the response action, or, in the absence of prior instructions from Client, such equipment, personnel, or other resources as Olympus reasonably deems necessary.

ARTICLE II. COMPENSATION

2.1 Client shall reimburse Olympus for Services as described in each Task Order. Olympus shall invoice Client monthly for Services performed hereunder. Client shall make payment within thirty (30) days of receiving such invoice. A late fee will be added to accounts 30 days in arrears at the rate of one and one half percent (1.5%) of the amount due for each month of delinquency, prorated on a daily basis. All expenses incurred by Olympus for liening or collecting any delinquent amount including, without limitation, attorney and filing fees shall be paid to Olympus by Client.

2.2 In the event of any failure of payment by Client to Olympus when due, Olympus shall have the right to suspend work and may retain any and all documentary work product prepared by Olympus until Client makes all outstanding payments current. In such event, Olympus shall have no liability for any damages or losses that may result from any delay associated with the suspension of work or for the withholding of work product.

2.3 In the event that the services provided by Olympus under the Scope of Work and this Agreement are terminated by Client for any reason, Olympus shall be paid for all services it has performed prior to receiving written notice of termination. Client hereby agrees to pay Olympus such additional termination costs and expenses reasonably necessary to close out the project.

ARTICLE III. OLYMPUS'S LIABILITY INSURANCE

3.1 Until the Services are completed, Olympus agrees to provide and maintain at its own expense the following insurance coverage:

3.1.1 Workers' Compensation, including employers liability coverage and United States Longshore and Harbor Workers' Compensation Act where applicable, at the statutory limits for the state or states in which the work is to be performed.

3.1.2 Commercial General Liability insurance in the amount of $5,000,000 per occurrence/$5,000,000 aggregate combined single limits for bodily injury and property damage, including product liability, completed operations, contractual liability and, where applicable, coverage for damage caused by blasting, collapse, or structural injury, and/or damage to underground utilities.

3.1.3 Automobile Public Liability in the amount of $1,000,000/$5,000,000 umbrella per accident for bodily injury and property damage, including non-owned automobiles.

3.1.4 Consultants Environmental Liability in the amount of $5,000,000 per occurrence to an aggregate amount of $5,000,000.

3.1.5 In the event that Client desires additional insurance, Client will notify Olympus of such request and Olympus will obtain a quote from its insurance carrier regarding the cost of obtaining the requested coverage. The cost of such additional insurance will be borne by Client. Olympus will not procure this additional coverage without the written approval of Client.

ARTICLE IV. HEALTH AND SAFETY

4.1 Olympus will perform all Services under this Contract in accordance with generally accepted professional standards that apply in the community where the Services are performed for the type of work involved and applicable laws.

4.2 Olympus will utilize a health and safety plan for its own employees. Olympus will also use situation-specific health and safety planning for its own employees at response action sites.

ARTICLE V. ACCESS TO PROPERTY

5.1 Client has the responsibility for obtaining a right of entry to property where the Services are to be performed. The right of entry shall allow Olympus, its agents, subcontractors and employees to enter the property from time to time, as necessary to perform all acts, studies and research pursuant to the agreed services within the scope of the Work. Olympus does not assume control of nor responsibility for the property, the person in charge of the property, nor the safety of persons not in Olympus' employ.

5.2 Client recognizes that hazardous materials may be encountered at the Site or in the subsurface as part of the performance of Services under this Agreement by Olympus, its employees or agents, and Client agrees that potential hazardous materials pre-existing at the site of the Work or in the subsurface were not placed, deposited, or generated by Olympus, its employees, or agents and Olympus will not take title to the waste.

5.3 If any unforeseen conditions or occurrences, including, but not limited to, hazardous substances or pollutants, are encountered, which, in Olympus's sole judgment, significantly affect or may affect the recommended scope of the Services, then Olympus will notify Client. After such notification, Olympus will complete the original scope of Services, if appropriate, or agree with Client to modify the Agreement, or terminate this Agreement with respect to the Services pursuant to Section 6.11 hereof.

ARTICLE VI. GENERAL PROVISIONS

6.1 Indemnification

6.1.1 Subject to the party's compliance with the notice requirements set forth in Paragraph 6.14, each party shall indemnify and hold harmless the other party, its agents and employees (but not any successors and assigns, and not any other person, it being agreed and understood the indemnity is personal to the parties) from and against claims, damages, losses, and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performance of Services hereunder, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the indemnitor, anyone directly or indirectly employed by it, or anyone for whose acts it may be liable,

regardless of whether or not such claim, damage, loss, or expense is caused in part by any other person.

6.1.2 In recognition of the relative risks and benefits of the Project to both Client and Olympus and the impracticality and difficulty to determine actual damages, the risks and damages have been allocated such that Client agrees, to the fullest extent permitted by law, to limit the liability of Olympus to Client or anyone claiming by or through Client for any and all claims, losses, costs, attorney's fees, expenses of litigation or damages of any nature whatsoever arising out of, resulting from, or in any way related to the Project or the Contract from any cause or causes, so that the total aggregate liability of Olympus will not exceed $50,000.00, or Olympus' total fees for services rendered on the applicable task order(s), whichever is less. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

6.1.3 Olympus, its agents or employees, shall not be liable to Client for damages, directly or indirectly, for any disruption or inconvenience or other loss, or diminution in value or expense of any kind caused by or resulting from the performance of Services, including, without limitation, claims with respect to business interruption or loss of profits or interference with the use of Client's property.

6.2 Permits and Access

Olympus will assist Client in securing necessary project-specific permits required by authorities having jurisdiction over a given response action. Olympus will also assist Client in securing necessary permission for Olympus to enter on private property if required for the performance of Services.

6.3 Force Majeure

Delay or failure of Olympus in the performance of services hereunder shall be excused if caused by circumstances beyond the control of Olympus, including, without limitation, acts of God, strikes, fire, flood, windstorm, extreme weather events, war, riot, epidemic and action or request of governmental authority, and inability to obtain material, equipment, or services, provided that a prompt notice of such delay or failure is given and Olympus diligently attempts to remove the cause.

6.4 Independent Contractor Relationship

Olympus is and shall perform all Services as an independent contractor and as such shall have and maintain exclusive control and direction over all of its employees, agents, and operations. No other relationship is intended or created under this Agreement, and neither party to this Contract shall have authority to make any statements, representations, or commitments of any kind or to take any action that will be binding on the other party, except as may be expressly provided for in this Contract or otherwise authorized in writing.

6.5 Subcontracts

Olympus may at any time and without Client's consent delegate orally or in writing the performance of Services hereunder, or any portion thereof.

6.6 Survival

Section 6.1 and all other provisions of this Contract that may reasonably be construed as surviving the term of this Contract shall survive the term of this Contract.

6.7 Applicable Law

This Contract shall be governed exclusively by the laws of the state where the work is performed. Venue for any dispute hereunder shall be in the federal or state court sitting in the city of the nearest Olympus office in proximity to the primary location of the Services being rendered by Olympus under this Contract, and each party hereby consents to the venue of such courts for any dispute hereunder; provided, however, that nothing herein shall preclude Olympus from exercising its mechanics' or materialmen's lien rights under the laws of any jurisdiction where the Services are performed.

6.8 Severability

If any provision of this Contract is found to be illegal, invalid, or unenforceable for any reason, such findings shall not affect the other provisions hereof.

6.9 Taxes

Client shall pay all state and local sales, use, or excise taxes of any kind assessed and/or arising out of the sale or use of the Services and shall, upon demand, reimburse Olympus for any sums it has expended for such taxes.

6.10 Assignment

Neither this Contract nor any duty for payment of Services due or to become due under this Contract and its adjoining Task Order nor any right hereby granted to Olympus may be assigned by Client without the prior written consent of Olympus, and any assignment without such consent shall be void. No third party is intended to be benefited hereby.

6.11 Term and Termination

The term of this Contract shall expire upon written notice by either party; provided, however, that neither party shall have the right to terminate this Contract except pursuant to the following provisions of this Section 6.11.

6.11.1 Either party may, for its sole convenience, terminate the performance of the Services in whole or in part at any time, or from time to time, by giving ten (10)

days' written notice of intent to terminate.

6.11.2 Client will pay Olympus all time and materials costs (and any fee) which have accrued as of the effective date of termination and, in addition, those time and materials costs incurred or earned in good faith by Olympus after the effective date of termination in connection with: (1) demobilization of equipment and personnel; and (2) any necessary subcontract and/or vendor settlements.

6.11.3 The rights and remedies of the parties provided in this Section 6.11 are in addition to any other rights and remedies provided by law or under this Contract.

6.12 Entire Agreement

This Contract and its associated Task Order(s)contain(s) the entire and only agreement between Client and Olympus respecting the subject matter hereof. It supersedes all prior or conflicting agreements, representations, promises, or conditions. Any modification of this Contract must be in writing and signed by both parties and must expressly indicate an intent to modify this Contract.

6.13 Attorney's Fees

In the event of litigation or arbitration among the parties to enforce this Agreement, arising out of this Agreement, or arising out of the transaction or property involved in this Agreement, the non-prevailing Party must pay all expenses of the prevailing party (including attorneys' fees and expenses).

6.14 Notices

All notices, requests, demands, claims, and other communications hereunder will be in writing. Any notice, request, demand, claim, or other communication hereunder shall be deemed duly given if (and then two (2) business days after) it is sent by registered or certified mail, return receipt requested, postage prepaid, and addressed to the intended recipient as set forth below. Any Party may send any notice, request, demand, claim, or other communication hereunder to the intended recipient at the address set forth below using any other means (including personal delivery, expedited courier, messenger service, telecopy, telex, ordinary mail, or electronic mail), but no such notice, request, demand, claim, or other communication shall be deemed to have been duly given unless and until it actually is received by the intended recipient. Any Party may change the address to which notices, requests, demands, claims, and other communications hereunder are to be delivered by giving the other Party notice in the manner herein set forth.

For Olympus:

Olympus Technical Services, Inc.
765 Colleen Street
Helena, MT 59601

For Client:

WGM Group

6.15 Dispute Resolution.

If any dispute arises between the parties the parties agree to negotiate and informally resolve such dispute before proceeding to judicial action, as hereinafter provided. Upon notice ("Negotiation Notice") by either party to the other seeking a negotiation with respect to any issue the parties agree to meet as soon as practicable in a good faith effort to negotiate in order to seek a mutually acceptable resolution of the issue. If an issue is not resolved by negotiation within thirty (30) days of the delivery of the Negotiation Notice, either party may thereafter initiate an effort by the parties to resolve such issue through non-binding mediation under the rules of the American Arbitration Association ("AAA"). The parties agree as follows with respect to such mediation:

6.15.1 The cost of mediation including filing fees with the AAA and the fees of the mediator shall be borne equally by the parties; and

6.15.2 Mediation shall occur at such city of the nearest Olympus office as shall be designated by the mediator who shall be selected pursuant to the Mediator's Rules of the American Arbitration Association if the parties are unable to agree on a mediator within thirty (30) days of the delivery of the Negotiation Notice.

6.15.3 If a party does not participate in good faith negotiations to attempt resolution of a dispute after its receipt of a Negotiation Notice, then neither party is obligated to submit to mediation before electing to initiate litigation.

6.16 No Waiver of Performance:

The failure or delay of Olympus to require performance of any provision of this Contract shall in no manner affect its right to enforce that provision. No single or partial waiver by Olympus of any condition of this Contract, or the breach of any term, agreement or covenant or the inaccuracy of any representation or warranty of this Contract, whether by conduct or otherwise, in any one or more instances shall be construed or deemed to be a further or continuing waiver of any such condition, breach or inaccuracy or a waiver of any other condition, breach or inaccuracy.

6.17 Counterparts and Fax Signatures.

This Contract may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together will constitute one and the same instrument. An electronic signature has the same effect as an original ink signature.

SIGNATURES ON NEXT PAGE

EXECUTED as of the date first written above.

OLYMPUS TECHNICAL SERVICES, INC.

By: _____

Title: _____

Printed Name: _____

-AND-

Client: _____

By: _____
Authorized Client Signature

Title: _____

Printed Name: _____

APPENDIX E
WGM STANDARD OPERATING PROCEDURES

SOP 101 – FIELD DOCUMENTATION

PURPOSE

Provide guidance to properly document activities in the field.

A field logbook will be kept for each project to provide a permanent accountable record of field activities. The logbook will have bound, consecutively numbered pages. Each logbook will be labeled with the logbook number, company name, project number, document custodian, and date. The field logbook should contain a complete record of activities including any site survey notes, well installation and development, sampling events, field measurements, personnel, photographs, pits, excavations, borings, audits, and ancillary data. Entries in the field log book shall include:

- Project and client name
- Purpose of the fieldwork
- Names of all personnel onsite
- Description of Site conditions and weather conditions
- Details of actual work effort
- Deviations from the field work plan or standard operating procedures
- Location of sample Site, including map reference, if relevant
- Field observations
- Field measurements (e.g., PID readings, pH, temperature) on applicable forms.
- Date and time of initiation and cessation of work

Specific details for each sample collected should be recorded using WGM Group's standardized field forms. These field forms contain blank queries to be filled in by field personnel. Items typically recorded on field sampling forms consist of the following:

- Sample name
- Time and date samples were collected
- Number and type (media; natural, duplicate, QA/QC) of samples collected
- Analysis requested
- Sample preservative (if applicable)
- Sampling method, particularly any deviations from standard operating procedures
- Signature of sampler

Upon completion of the field effort, the original field forms shall be filed in the project file. Photocopies of the original field forms can be made and used as working documents.

EQUIPMENT

- Field Notebook
- Field Sampling Forms

SOP 102 – SAMPLE DOCUMENTATION

PURPOSE

Identify the requirements for labeling and documenting sample collection.

SAMPLE NOMENCLATURE

Samples will be coded to contain the project number, sample type, sample number, and sample depth. The project number shall be a six-character WGM project number which identifies the site. The sample type indicates sample media and method of collection. The sample number will be unique to each project. The sample depth will indicate the depth (if applicable) the sample was collected.

Project Number- sample type- sampling method- sample number-sample depth.

For example, the sample 999999-SS-TP1-2', indicates the sample was collected for the project number (999999), the sample was a sub-surface soil sample (SBSS), was from test pit 1 (TP-1), and was collected at 2 feet below ground surface. Prior to initiating sampling, field personnel should familiarize themselves with the work plan and the nomenclature to be used for the Site. The character prefixes in the table below will be used for sample identification.

SAMPLE DOCUMENTATION

In addition to the chain-of-custody forms discussed below, field personnel will keep a list of samples collected at the field in the field log book and on appropriate field sampling forms. Upon returning to the office, the field log book and forms should be kept in the project file and subsequent copies sent to the laboratory, or other designated parties, as needed. All entries on the log bog and field sampling forms must be made in indelible ink.

SAMPLING ACRONYM	LABEL
EB	Equipment Blank
TB	Trip Blank
FB	Field Blank
MW	Monitoring Well
DW	Domestic Well
IW	Injection Well
OB	Observation Well
UST	Underground Storage Tank
VE	Vapor Extraction
AA	Ambient Air
SUMP	Sump (Water sample)
POND	Ponds
SPR	Spring
LAKE	Lake
SW	Surface Water, Stream or River
SR	Surface Runoff
TP	Excavated Test Pit
SS	Surface Soil Sample
SBSS	Subsurface Soil Sample
GW	Groundwater Sample

SAMPLE CUSTODY PROCEDURES

The field person is responsible for custody of the samples at all times until transferred or shipped to the laboratory using a chain-of-custody form. The chain-of-custody form will be completed for all samples collected in the field for laboratory analysis and copies will be maintained in the project file. The information to be included on the chain-of-custody form will include, but is not limited to:

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

Each sample will be assigned a unique sample identification number as described above in WGM SOP-3. The information on the chain-of-custody form, including the sample identification number, will correspond to the information recorded by the sampler on the field forms and field log book and the label on the sample container.

When custody of a sample is relinquished by the sampler, the sampler will sign and date the chain-of-custody form and note the time that custody was relinquished. Samples must be shipped to the analytical laboratory following the procedures described in in SOP-4. Notify the analytical laboratory of shipment and request pick up and receipt of delivery. The project manager will determine if proper custody procedures have been followed upon review of field activities, and audits may also be conducted by the client or appropriate regulatory agency.

EQUIPMENT

- Indelible Ink Pen
- Chain-of-Custody Forms
- Field Notebook
- Field Sampling Forms

SOP 103 – SAMPLE SHIPPING

PURPOSE

Ensure samples are packaged to prevent breakage/damage and comply with appropriate regulations. When packaging samples:

- Use sample labels from the laboratory whenever possible. Place the sample label on the side of the sample container and use indelible ink when completing the label.
- Place labeled sample bottles in a cooler. Place the samples in an upright position inside the cooler and wrap the samples with cushioning material for protection during transport. The cooler should be able to withstand tough handling during shipment without sample breakage.
- Make sure the cooler has an adequate amount of ice (inside sealed plastic bags) and/or frozen blue ice (appropriate for the season) to maintain a temperature of 4°C or less inside the cooler from the time the samples are placed in the cooler until they are received by the laboratory.
- Fill out the appropriate chain-of-custody forms and place them in a plastic bag and tape it to the inside lid of the shipping container. If more than one cooler is used per chain of custody, put a photocopy in the other coolers and mark them as a copy.
- Close and seal the cooler using strapping tape.
- Place completed sample custody seals on the outside of the cooler.
- Secure the custody seals on the cooler with clear strapping tape.
- Secure a shipping label with address, phone number, and return address on the outside of the cooler where it is clearly visible.

SHIPPING HAZARDOUS MATERIALS/WASTE

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. According to 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 can pose a risk to health, safety, or property when transported by ground or air. Materials shipped under the classification of ORS will not meet any of the following definitions: Class 1: Explosives; Class 2: Gases; Class 3 Flammable Liquids; Class 4: Substances susceptible to spontaneous combustion; Class 5: Oxidizing substances; Class 6: Poisonous; Class 7: Radioactive materials; Class 8: Corrosives. If your samples might meet any of the above definitions, contact the project manager to obtain instructions on sample shipment.

EQUIPMENT

- Indelible Ink Pen
- Chain-of-Custody Forms
- Custody Seals
- Laboratory Sample Labels
- Coolers and Ice
- Field Sampling Forms

SOP 201 – GROUNDWATER LEVEL

PURPOSE

To ensure groundwater levels are accurately measured in the field.

- Verify the water level indicator is operating correctly prior to leaving for the field by placing probe in water to test the buzzer and light. Repair as necessary. Make certain the meter and extra batteries are in the carrying case.
- Prior to collecting a measurement, decontaminate the water level indicator, as appropriate, and calibrate the probe to a steel tape. Note any corrections to water level meter measurements on field forms.
- Measure all wells (monitoring and domestic) from the top of the well casing in the north quadrant or from a designated measuring point, as appropriate. Measure and record the distance from the measuring point to ground level. Make sure the measuring point is labeled on the well, so future measurements can be made from the same location.
- Measure the depth to water from the measuring point to the nearest hundredth of a foot.
- Record measurements on the appropriate field forms. Also record the presence/absence of free product on the field forms.
- Decontaminate the water level meter between each.
- If free product is known or suspected to be present in a well, an oil-water level indicator or other method should be used to measure the depth to water and the thickness of free product in the well.

EQUIPMENT

- Water Level Indicator
- Extra Set of Batteries
- Inedible Ink Pen
- Field Sampling Forms

SOP 202 - LNAPL MEASUREMENT

PURPOSE

Provide guidelines for measuring the thickness of free- phase LNAPL in monitoring wells.

GOAL & OBJECTIVE

To employ consistent measuring methods for LNAPL in monitoring wells.

Three different procedures are described in this SOP for measuring light non-aqueous phase liquid (LNAPL or product) thickness in a monitoring well. These include using a specialized probe, bailer, and product/water finding paste.

USING INTERFACE OR LNAPL PROBE

Turn the probe on and rotate the disc at the top of the probe head. To test the batteries, insert the probe into the holder, this should cause a steady beep sound. Remove the probe from the holder and slowly lower the probe into the well. When the top of the product is reached, the probe should emit a steady beep. Note the depth from measuring point on a field form and label "Depth to Product". Continue to lower the probe in the well. When the water column is reached the sound should change from a steady to an intermittent beep sound. Note this depth on the field form under "Depth to Water". Remove the probe and rotate the disc back to the off position and turn the meter off. Product thickness can be calculated by subtracting the depth to product from the depth to water. Decontaminate probe before and after each use.

USING BAILER

This method is less precise but can provide a general idea of product thickness. The resulting thickness will likely be less than what is actually in the well. Lower a bottom loading clear disposable bailer slowly into the well. You should be able to hear when it reaches the top of the fluid column. Continue to SLOWLY lower the bailer into the well no deeper than the total length of the bailer (i.e., top of bailer should remain above top of fluid in the well). Remove the bailer and measure the product thickness with a tape measure on outside of bailer.

USING PASTE AND STEEL TAPE

Using a steel tape, smear water-finding paste over a 3-4 foot interval of one side of the tape. Smear product-finding paste (or chalk) over the other side of the tape. Lower tape into the well until the bottom of the tape is roughly 2-3 feet below the top of the fluid surface in the well. Note the depth of the tape from the measuring point on the field form. Remove the steel tape and note the reading indicated by the water-finding paste or chalk, and the reading indicated by the product-finding paste (both of these should be evident as a change in color, or a wet line in the case of chalk). Depth to water is calculated by subtracting the water reading from the total tape depth. The depth to product is calculated by subtracting the product reading from the total tape depth. Product thickness is calculated by subtracting depth to product from depth to water. This procedure may need to be repeated several times, especially if the depth to water is not known, or if the product thickness is greater than the depth the tape is lowered into the fluid. Previous depth to water and product thickness readings for a particular well can be used as a guide. Decontaminate steel tape before and after each use.

EQUIPMENT

- Interface or LNAPL Probe or equivalent
- Extra Set of Batteries
- Indelible Ink Pen

- Field Sampling Form
- Decontamination Supplies

SOP 203 – WELL STABILIZATION MEASUREMENTS

PURPOSE

To ensure measurement of well stabilization parameters are done consistently and correctly in the field

GOAL & OBJECTIVE

To obtain accurate well stabilization measurements in the field

CONDUCTIVITY INSTRUMENT CALIBRATION

The conductivity meter should be calibrated prior to each sampling event following the manufacturer's recommendations. If the instrument is a multi-parameter meter, follow the instructions for measurement of electric conductivity (EC) or specific conductance (SC) from the manual.

Prior to conducting field measurements, verify the EC/SC meter automatically corrects for temperature variations. If the meter does not, apply the appropriate temperature correction to the field measurements.

FIELD MEASUREMENT PROCEDURE

Rinse a decontaminated glass container or plastic flow-through cell with sample water. Fill the container or flow-through cell with sample water, with enough available space to insert the EC/SC probe without undesired overflow.

Rinse the EC/SC or multi-parameter probe with deionized or distilled water and place it in the beaker of sample water. Immerse the probe in sample and move it around to displace any air bubbles. Keep the probe tip off of the sides of the beaker. Record the conductivity value from the meter on the field form.

Be sure to recognize the units of the meter reading value (i.e., microsiemens/centimeter (µS/cm), micromhos/centimeter (µmhos/cm), or millisiemens/centimeter (mS/cm)). Record the reading on the field sampling form and field logbook. If the reading is being taken in-situ or using a flow-through cell, wait until the reading stabilizes and record it on the sample field form.

Remove the probe from sample and decontaminate probe. Store the probe following the manufacturer's recommendations. Refer to SOP-2 for complete decontamination procedures.

PH INSTRUMENT CALIBRATION

The pH meter must be calibrated prior to each field event and after every 10 samples during a sampling event, or more frequently if required by the project/client. Follow the manufacturer's recommendations to calibrate the meter. This typically involves the following sequence of steps:

1. Verify sensor is clean and filled with solution, then turn on meter.
2. Place in pH 7 solution, press "cal", and wait until calibration is complete.
3. Rinse sensor in deionized or distilled water.
4. Place in pH 10 (or pH 4) buffer solution, press "cal" a second time, and wait until endpoint is reached.
5. Rinse in distilled water.

Three-point calibration is the standard procedure. If the instrument is a multi-parameter meter, follow instructions for measurement of pH from the manual.

Periodically throughout the field day, place the probe in 7.0 pH buffer solution. If the measured value differs from the expected
value by more than 0.1 pH units, recalibrate the meter according to the manufacturer's instructions.

FIELD MEASUREMENT PROCEDURE

1. Rinse a decontaminated glass beaker or plastic flow-through cell with sample water three times.
2. Rinse the pH probe with deionized or distilled water.
3. Fill the container with sample water.
4. Immerse the probe in the sample and agitate it to provide thorough mixing. Continue to agitate until the reading has stabilized. Read the pH value from the meter to the nearest 0.1 standard unit (s.u.) and record on the field sampling form. If the reading is being taken in-situ or using a flow-through cell, wait until the reading stabilizes and record the final pH value.
5. Note any problems such as erratic readings. If previous readings are available, compare the current measurement to previous reading to check that the current reading is within reasonable limits.
6. Rinse probe with deionized or distilled water and store according to the manufacturer's instructions (see SOP-2 for complete decontamination procedures).

ORP INSTRUMENT CALIBRATION

The oxidation-reduction potential (ORP) meter should be calibrated prior to each sampling event following the manufacturer's recommendations. If the instrument is a multi- parameter meter, follow the instructions for measurement and calibration of ORP. Use table of temperature adjustment information provided with the instrument instructions.

FIELD MEASUREMENT PROCEDURE

1. Decontaminate a clean plastic or glass container with deionized or distilled water.
2. Rinse the ORP electrode with deionized or distilled water and then with sample water prior to inserting it into the sample beaker.
3. If possible, obtain an in-situ measurement of ORP. If not possible, preferably use a flow-through cell receiving a constant stream of water from the well or sample source material. If obtaining a sample for ORP measurement, minimize agitation of the sample in an effort to limit exposure to oxygen.
4. Immerse the ORP electrode in the sample and allow at least one minute for the probe to equilibrate with the water.
5. Obtain a reading to the nearest 10 millivolts (mV).
6. Record the reading on standardized field form. Note any problems such as erratic or drifting readings.
7. Decontaminate the probe in accordance with SOP-2.

DO INSTRUMENT CALIBRATION

Before each use, clean and rinse the dissolved oxygen (DO) electrode tip in accordance with decontamination procedures outlined in SOP-2. Verify that the
membrane cap has been filled with DO electrolyte in accordance with manufacturers required maintenance schedule.

Calibrate the probe and meter using the fresh water-air calibration method described in the manufacturer's manual. Correct the calibration value for temperature and altitude and adjust the meter accordingly. Sensor can maintain polarization when disconnected from the meter for up to three hours.

FIELD MEASUREMENT PROCEDURE

Place the probe directly into the stream or well to be measured. If possible, place the probe into a flow-through cell receiving a continuous stream of water from the source being measured. Allow sufficient time for the probe to stabilize to sample temperature and DO concentration. Record the DO value on the field form. Rinse probe with deionized or distilled water when measurement is complete.

If sensor will not calibrate, becomes sluggish or erratic:

- Clean tip and refill cap with DO electrolyte in accordance with manufacturer's instructions (care must be taken to eliminate air bubbles from inside probe, and probe tip must be scarified using manufacturer-provided sandpaper).
- Check membrane for damage; replace if necessary.
- Check meter with test plug.
- Replace battery.

EQUIPMENT

- EC/SC Meter
- pH Meter
- ORP Meter
- Dissolved Oxygen Meter
- Calibration Standard(s)
- Glass Container or Flow- through Cell
- Extra Set of Batteries
- Indelible Ink Pen
- Deionized/Distilled Water
- Field Sampling Form

SOP 301 – GROUNDWATER SAMPLING

PURPOSE

Provide guidelines for sampling groundwater

Prior to initiating groundwater sampling, all equipment should be inspected for damage and repaired. Check with the project manager to be sure you understand what type of pump will be used to purge and sample groundwater. Equipment to be placed down hole must be decontaminated. Begin with the well containing the lowest level of contamination, and sample wells in succession based on anticipated increasing concentrations. If the relative degree of concentrations cannot be determined, wells should be sampled in order of increasing proximity to the suspected source of contamination, preferably from the perimeter towards the center of the site. Field sampling forms must be completed for each well to document purging and sampling.

SAMPLING FROM TEMPORARY BOREHOLES

If samples are to be collected from temporary boreholes, a temporary well screen (PVC or stainless steel) should be placed in the borehole when feasible, and the water level should be measured prior to sampling and at least 15 minutes after completion of the borehole to the sampled depth. If it is not feasible to set temporary well screen, collect the sample initially into unpreserved, laboratory-provided ultraclean containers, then filter the sample prior to placement in the final sampling containers.

When sampling from a temporary well screen, use either new tubing (LOPE or Teflon) with a stainless steel foot valve, or use a new/decontaminated bailer. Note the physical appearance of the sample (color and qualitative turbidity) on the field sampling form. Where feasible, avoid sampling from the bottom I -foot of the borehole or well screen to minimize entrainment of sediment into the sample.

WELL PURGING

Purging must be performed on all wells prior to sample collection. Before purging each well, record the depth to water from the top of the well casing to the nearest 0.01 foot using a water level meter. If sampling at a site where there may be free product, wells shall be checked for the presence of free product prior to purging and sampling using an oil-interface probe. Determine the saturated thickness by subtracting the total well depth from the depth to water.

Monitoring wells shall be purged until a minimum of three casing volumes have been removed and water quality characteristics (pH, temperature, conductivity) have stabilized. Field parameters should be measured during well purging at least three times per casing volume purged. Stabilization is achieved when pH readings stabilize to within 0.1 and temperature and conductivity stabilize to within 5% over a casing volume.

The following equation is used to calculate well volume in gallons:

$$V = 3.14 * (r^2) * d * 7.48$$

Where, V = volume (gallons)
r = well radius, feet
d = depth of water in well (feet)

The radius of the well pack will be used for the well radius for calculating bore volumes where appropriate. For example, a 2" PVC monitoring well installed in a 6" hole with sand filter pack would use a well radius of 3" or 0.25 feet.

Several general methods can be used for well purging. Well purging may be achieved using bailers, bladder pumps and submersible pumps. The specific pumping method shall be chosen based on depth to groundwater, diameter of well, existing well configuration and contaminant(s) of concern. If the recovery of a low-yield well exceeds two hours after purging, a sample shall be extracted as soon as sufficient volume is available in the well. At no time should a monitoring well be pumped dry if the recharge rate causes formation water to cascade down the well casing causing an accelerated loss of volatiles and change in pH.

Purge water must be handled in accordance with the SOP for investigative-derived wastes. is discharged directly to the ground, attention must be given to avoid direct recharge of shallow wells with the purge water. Purge water must be discharged down gradient and at an adequate distance from the well to avoid mounding and interference.

COLLECTING WATER QUALITY SAMPLES

Label each sample container with project number, sample location, well owner, date, military time, sampler's initials, preservative, and analysis required. Don clean latex or nitrite gloves immediately prior to obtaining the sample.

Obtain the sample from the well using a disposable polyethylene bailer, a decontaminated stainless steel or Teflon bailer, or pump and tubing (submersible, bladder, peristaltic, etc.), as appropriate. The pump to be used should be determined by the contaminants of concern, so check with the project manager. The pump or bailer intake should generally be placed at the midpoint of the saturated thickness in the casing for sampling. If the well is pumped dry during the purge, the pumping rate shall be reduced to match well yield if possible and a note made on the sampling form. 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.

When sampling a domestic well connect a hose to the outside fixture to direct water away from the home to an area where the water can soak into the ground. Turn on the faucet and let it run for 60 minutes. Turn flow rate down and collect a water sample in appropriate containers. Make sure to add preservatives to the sample containers prior to filling them, in accordance with the table below.

When sampling a monitoring well, add preservatives to the sample container prior to sample collection (this is often done by the analytical laboratory). Remove water from the well and transfer sample water directly into sample bottles or filter apparatus (should filtering be necessary), maintaining a slow linear flow with as little agitation as possible. For volatile analyses fill vials at the rate of 100 milliliters per minute (24 seconds for 40 milliliter 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 are still present, discard the vial. Samples should be preserved as described in the table below.

PARAMETER	#	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME EXTRACTION/ANALYSIS
VOCs	2	40 ml glass	4°C & HCL	14 days to analysis
SVOCs	1	1 liter glass	4°C	7 days/40 days from extraction to analysis
Metals	1	500 ml HDPE	4°C & HNO_3	6 months to analysis, Hg 28 days to analysis
Nutrients	1	500 ml HDPE	4°C & H_2SO_4	Varies – contact laboratory for additional information
Common Ions	1	1 liter HDPE	4°C	7 days/40 days from extraction to analysis

Be sure to properly cap and lock the well when sampling is complete.

Be sure to complete the necessary shipping and handling paperwork and record all pertinent information on Field Sampling Forms.

EQUIPMENT

- Five-gallon bucket graduated in gallons
- Purge/sampling pump(s)
- Oil-Interface Probe, as necessary
- Water Level Meter
- pH, temperature, and conductivity meter
- Filtering apparatus and hand pump (if filtering samples)
- Sample Containers
- Preservatives, as required
- Field Sampling Forms
- Decontamination equipment and fluids
- Tubing, as needed
- Generator or power supply
- Coolers and Ice

- Stopwatch
- Rope and Bailer, for backup

SOP 302 – LOW FLOW MONITORING WELL SAMPLING

PURPOSE

Provide guidelines for sampling of groundwater using low-flow methods

GOAL & OBJECTIVE

To employ a method of collecting groundwater samples that are representative of the chemistry of the aquifer

Prior to initiating groundwater sampling, all equipment should be inspected for damage and repaired/replaced, if necessary. Have on- hand: copies of well logs; sampling and analysis plan or work plan; any previous site sampling information/data; field planning worksheet; and field forms. Check with project manager to be sure you understand what type of pump(s) will be used to purge and sample groundwater. Equipment to be placed down-hole must be decontaminated.

Begin sampling at the well containing the lowest level of contamination, and sample wells in succession based on increasing contaminant concentrations. If the relative degree of concentrations cannot be determined, wells should be sampled in order of increasing proximity to the suspected source of contamination, preferably from the perimeter towards the center of the site. A standard field sampling form must be completed for each well to document purging and sampling in accordance with relevant SOPs; individual sampling forms must also be completed for any field quality control samples (e.g., duplicates, rinsate blanks, and field blanks).

WATER LEVEL MEASUREMENT

Before purging each well, record the depth to water from the designated measuring point on the top of the well casing (or the north side of the top of casing if a measuring point is not identified) to the nearest 0.01-foot using an electronic water level meter. If sampling at a site where there may be free product, wells shall be checked for the presence of free product prior to purging and sampling using an oil-interface. Determine the thickness of free product by subtracting the depth to free product from the depth to water.

Record the following dimensions on the groundwater sampling form: depth to water; total well depth; depth to top of screened interval; depth to bottom of screened interval; depth to top of filter pack interval; depth to bottom of filter pack interval; and casing diameter. Well and filter pack depth information should be referenced from the well log; do not measure total depth of the well prior to purging and sample collection to avoid resuspension of any settled solids which may have accumulated within the casing. Use the following formula to calculate the volume of water present in the well casing (casing volume):

$V = 3.14*(r2)*d*7.48$

Where:
V = volume (gallons) r = well radius (feet)
d = depth of water or saturated thickness in well (feet)

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

LOW FLOW PURGING

The goal of low flow purging 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 low flow purging, 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. Low flow purging can be completed using a submersible pump and low flow controller, an air or nitrogen powered bladder pump, or a peristaltic pump where appropriate (e.g., shallow wells; sampling for non-volatile constituents). The specific pumping method shall be chosen based on depth to groundwater, diameter of well, existing well configuration, and contaminant(s) of concern.

Decontaminated or dedicated low flow sampling equipment shall be used for purging and sampling. The pump and disposable tubing should be lowered gently and slowly and set within the upper third or fourth of the screened interval. If the static water level is below the top of the screen, then the pump shall be lowered to within the upper third or fourth of the water column. In either case, the pump intake will be placed a sufficient distance above the bottom of the well to avoid mobilization of any accumulated sediment.

Purge at a rate of 0.1 to 0.5 liter per minute (Lpm) while monitoring drawdown of the water level in the well using an electronic water level meter every 5 minutes. If drawdown exceeds 0.3 foot (0.1 meter), reduce the purge rate accordingly. Purging 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 three casing volumes are removed and/or water quality parameters stabilize (see below).

Indicator field parameters (see below) are monitored every 5 minutes during purging in order to determine when sample collection may begin in accordance with the stabilization goals specified in the table below. Indicator field parameters, including pH, Oxidation/Reduction Potential (ORP), Electrical Conductivity (EC) or Specific Conductance (SC), Temperature, and Dissolved Oxygen (DO) should be measured using a flow-through cell. Turbidity should be measured using discharge from a T-valve located upstream of the flow-through cell. Turbidity should not be measured downstream of the flow-through cell because it can entrain suspended solids resulting in inaccurate turbidity readings.

INDICATOR PARAMETER	UNITS	STABILIZATION GOAL	COMMENT
pH	standard units (s.u.)	+/- 0.1 s.u. between three readings	
Electrical Conductivity (EC) or Specific Conductance (SC)	microsiemens, millisiemens, or micromhos per centimeter (µS/cm, mS/cm or µmhos/cm)	+/- 3% between three consecutive readings	
Oxidation/Reduction Potential (ORP)	millivolts (mV)	+/- 10 mV between three consecutive readings	
Temperature	degrees Celsius (°C)	+/- 3% between three consecutive readings	

INDICATOR PARAMETER	UNITS	STABILIZATION GOAL	COMMENT
Dissolved Oxygen (DO)	milligrams per liter (mg/L)	+/- 10% between three readings or <0.5 mg/L	Considered stable if three DO values are less than 0.5 mg/L
Turbidity	Nephelometric Turbidity Units (NTU)	+/-10% between three readings and <10 NTU	If turbidity is >10 NTU, consider stable if three turbidity values are +/-10%

Note that the stabilization criteria listed in the table above are goals and may not be achievable under all situations. Dissolved oxygen and turbidity generally require the longest time to stabilize. A turbidity value of 10 NTU may not be achievable in all monitoring wells. In the event that turbidity stabilizes (+/- 10% between three readings) above 10 NTU, proceed with sample collection and note the suspected reason(s) for the elevated turbidity. Attempt to remedy the elevated turbidity for subsequent sampling events at a given monitoring well or site. Remedies for elevated turbidity may include well re- development, slightly higher pump placement, slower submersion of the sampling pump and tubing, and/or a reduced purge rate. If the water level 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 should a monitoring well be pumped dry if the recharge rate results in formation water to cascade down the well screen, causing an accelerated loss of volatiles and possible change in pH.

COLLECTING WATER QUALITY SAMPLES

Label each sample container with project number, sample location, well owner, date, military time (24- hour), sampler's initials, preservative, and analysis required. Wear new disposable latex or nitrile gloves immediately prior to obtaining the sample.

Verify that the appropriate preservatives were added by the analytical laboratory or should be added by field personnel. If required, add the necessary preservative to the appropriate sample container prior to sample collection (see table below).

Prior to filling the sample container, disconnect the flow-through cell from the pump discharge tubing while the well is still being purged. Water quality samples should never be collected downstream of the flow-through cell because the flow-through cell can entrain suspended sediment and result in a cross- contaminated sample volume with a biased concentration of analytes. Place the pump's discharge tubing directly above the receiving sample container and add the sample volume directly to the bottle, minimizing turbulence as much as possible. For volatile analyses, fill appropriate vials at the rate of about 100 milliliters per minute (mL/min) (24 seconds to fill a 40 mL vial) or less. Fill each sample vial completely so the water forms a convex meniscus at the top to ensure that no head 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 slightly more sample water and repeat procedure. If air bubbles are still present, discard the vial and fill another sample vial. If analyzing for dissolved constituents, add field filter (usually 0.45 micron (µm) pore size) to the end of the pump's discharge line, and then fill the appropriate container(s). Samples should be preserved as described in the table below, unless otherwise specified by the laboratory.

PARAMETER	NUMBER OF BOTTLES	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME EXTRACTION/ ANALYSIS
VOCs	3	40 mL glass vial	≤6°C & HCL	14 days to analysis
SVOCs	2	1 L glass	≤6°C	7 days / 40 days from extraction to analysis
Metals	1	500 mL plastic	≤6°C & HNO_3	6 months to analysis; mercury 28 days to analysis
Nutrients	1	500 mL plastic	≤6°C & H_2SO_4	Varies – contact laboratory for additional information
Common Ions	1	1 L plastic	≤6°C	7 days / 40 days from extraction to analysis

Note: VOC = volatile organic compound; SVOC = semi-volatile organic compound; mL = milliliter; L = liter; HCL = hydrochloric acid; HNO3 = nitric acid; H2SO4 = sulfuric acid; C = Celsius.

Properly cap and lock the well when sampling is complete. In the field notebook, record any damage to the well, monument, or items related to the well that need attention or repair prior to the next sampling event.

Purge water must be handled in accordance with management of investigative-derived wastes. Groundwater purged from a well during purging or sampling that has a sheen or contains free product must be containerized in an appropriately labeled 55-gallon drum or tank pending receipt of analytical results. A drum should be dedicated to each well sampled so that analytical results of the groundwater sample can be used to characterize the water in the drum. Groundwater that contains no free product, sheen, or odors may be discharged directly to the ground if approved by the property owner. If groundwater is discharged directly to the ground, attention must be given to avoid direct recharge of shallow groundwater with purge water near the well. Purge water must be discharged downgradient and at an adequate distance from the well to be sampled to avoid mounding and interference with the water table.

Complete the necessary sample handling paperwork, sample handling, packaging, and shipping, and record all pertinent information on field sampling forms and field logbook.

EQUIPMENT

- 5-gallon Bucket, graduated in gallons
- Purge/Sampling Pump(s)
- Oil-Interface Probe, as necessary Water Level Meter
- Meters or Flow-through cell to measure temperature, pH, EC/SC, DO, and ORP.
- Filtering apparatus/pump (if filtering samples)
- Sample Containers Preservatives, as required
- Field Planning & Sampling Forms Decontamination Supplies
- Tubing for pump (include air-line and water-line for bladder pump)
- Disposable bladders and O-ring kit for bladder pump
- Generator or Power Supply; controller for bladder pumps
- Coolers and Ice Stop-watch
- Rope and Bailer (for backup)

SOP 303 – FIELD SAMPLING FILTRATION

PURPOSE

Provide guidelines for filtering water samples in the field.

GOAL & OBJECTIVE

To employ a method of filtering samples in the field, thus removing sediment from the sample and allowing for analysis of dissolved constituents in the sample.

FIELD PROCEDURE

Set-up a system whereby water samples can be filtered, including a filter apparatus/pump for retrieving water from a well or water body. To avoid the need for decontamination, use disposable tubing and equipment, if possible. If using a hand-vacuum pump, place groundwater or surface water into a vessel that can be pressurized using the hand- vacuum pump. Filtered effluent from the pump can be placed directly into sample containers post-filtering with a disposable 0.45 micron (µm) filter. The filter can be attached in-line with sampling tubing. As appropriate, fill pre-preserved, laboratory supplied sample containers with filtered sample and cap each container. Invert sample container several times to insure complete sample-preservative mixing, if applicable. Place samples into cooler; package and ship in accordance with SOP-4.

If extremely turbid sample water is obtained, may need to pre-filter the sample using 3.0- or 5.0-micron filter paper followed by 0.45 micron filtration. Decontaminate all sample collection equipment.

EQUIPMENT NEEDS

- 0.45, 3.0, and 5.0 micron Disposable Filters
- Sample Collection and Filter Apparatus (Pump)
- Preservatives, as required
- Indelible Ink Pen
- Field Sampling Form

SOP 401 – WELL DRILLING & CONSTRUCTION

PURPOSE

Provide guidelines for installing monitoring wells in the field.

GOAL & OBJECTIVE

To employ a standard method of installing monitoring wells, which will allow for collection of representative groundwater samples.

FIELD PROCEDURE

The following is a generalized procedure for installing a typical monitoring well. Refer to the project- specific work plan which should include more details about the design and method of completing monitoring wells on a project site.

Arrive on site with the appropriate drilling equipment and materials for site conditions. Be sure to review the work plan or SAP to determine anticipated lithology. Filter pack material and well-screen slotting size should be based on the lithology. Ensure that the driller has properly decontaminated all drilling equipment and materials prior to arrival. Many states now require certification and licensing for monitoring well drillers. Verify the driller is licensed in the state (if required) prior to beginning field work.
Safety equipment required on-site for the drill rig is mandatory. Personal protective equipment includes (at a minimum): hardhat, safety glasses, steel-toed boots, gloves, first aid kit, and site health and safety plan (with routes to nearest hospital known by all personnel on-site).

Acceptable drilling techniques for the installation of monitoring wells include air-rotary, cable-tool, and hollow-stem auger. If unconsolidated material is encountered, it may be necessary to drive steel casing during drilling to maintain borehole integrity. Appropriate decontamination of the auger flights or drill string and other down-hole equipment, between boreholes is required. Drilling mud or drilling solutions are not to be used during drilling activities in conjunction with monitoring well construction, unless necessary and approved for the project (e.g., biodegradable material with no petroleum-based constituents). Water used for drilling purposes should be potable quality. Hydraulic jacks or the drill rig can be used to pull-back steel casing following emplacement of plastic casing.

Subsurface samples must be collected by the driller at intervals specified in the work plan. When drilling with cable tool or hollow-stem auger, down-hole soil samples should be collected using a standard 1.4-inch inside diameter split-spoon sampler and 140-pound drive hammer. The number of blows necessary to obtain an 18-inch or 24-inch length of sampler by the driller should be recorded on the boring log. When drilling with an air or mud rotary rig, cuttings will be collected from the discharge stream. A detailed lithologic boring log must be completed during drilling activities. Soils and geologic cuttings should be described on the log according to the procedures outlined in the United Soil Classification System (USCS; method ASTM D2487) or the Soil Conservation Service (SCS) classification system. Soil texture should be classified by either the USCS or the U.S. Department of Agriculture (USDA) classification. Water-bearing characteristics of the formations should also be noted on the boring log. In addition, details of monitoring well construction should be described on the well log, including total depth, perforated interval, sizes and types of construction materials, etc.

When completing the well, install factory-slotted well screen (size dependent on lithology) and blank PVC (stainless-steel or teflon for organics) well casing into the borehole. Emplace chemically inert silica sand at least 2 feet above and below any perforated sections and install a

bentonite plug above the sand. Backfill remaining well annulus with bentonite slurry, grout, or chips to the ground surface. Measure and record the depth of filter pack and sealing material at regular intervals during installation to document well construction details. Develop the well prior to sample in accordance with proper procedures. Place locking protective well cover over well casing(s) after outer steel casing has been removed from the borehole (if performed). Place bentonite plug below bottom of well cover; grout cover in place and install lock on cover.

EQUIPMENT

- Drilling System (appropriate for well design and site conditions)
- Well Completion Material (e.g., screen, filter pack, borehole seal, and surface seal) consistent with anticipated lithology
- Hand-Lens (10 power)
- USGS Soil Classification Chart and Munsel Color Book
- Latex or Nitrile Gloves
- Boring Log Forms and Field Logbook

SOP 402 – MONITORING WELL INSTALLATION WITH DIRECT-PUSH EQUIPMENT

PURPOSE

Provide guidelines for installing monitoring wells using direct- push techniques

GOAL & OBJECTIVE

To employ a standard method of well installation using direct- push techniques

FIELD PROCEDURE

The following is a generalized procedure for installing a typical monitoring well using direct-push equipment. Refer to the project-specific work plan which should include more details about the design and method of completing monitoring wells on a project site.

Arrive on-site with the appropriate drilling equipment and materials for site conditions. Ensure driller has properly decontaminated all drilling equipment and materials prior to arrival on-site.

Safety equipment required on-site is mandatory. Personal protective equipment includes (at a minimum): hard hat, safety glasses, steel-toed boots, gloves, first aid kit, and site health and safety plan (with routes to nearest hospital known by all personnel on-site).

Review work plan to determine if soil samples should be collected during advancement of direct-push equipment. If so, follow methods described in applicable SOPs for subsurface soil sampling.

Advance direct-push drill rods to the desired depth for monitoring well installation.

Describe lithology encountered on a detailed lithologic boring log form during drilling activities. Soils should be described according to procedures outlined in the United Soil Classification System (USCS; method ASTM D2487) or Soil Conservation Service (SCS) classification system. Soil texture should be classified by either the USCS or U.S. Department of Agriculture (USDA) classification.

If encountered, water-bearing characteristics of the formations should also be denoted on the boring log. In addition, details of monitoring well construction should be described on the well log, including total depth, perforated interval, sizes and types of construction materials, etc.

Construct the monitoring well with Schedule 40 or 80 PVC casing and factory-slotted well screen up to 1-inch in diameter. Once the drill rods are at the desired depth, lower the well screen and casing through the drill rods. Retract the drill rods out of the borehole while placing an inert silica sand around the screen interval to one foot above the well screen.

Install a bentonite plug above the sand at least 2-feet in thickness. Above the bentonite, backfill the remaining well annulus with a bentonite slurry or grout to ground surface.

Place locking protective well cover over the well casing after the drill rods have been removed from the borehole. Place bentonite plug below bottom of well cover; grout the cover in place and install lock on the cover.

EQUIPMENT

- Well Completion Materials, as necessary
- Latex or Nitrile Gloves
- Field Logbook
- Boring Well Log Form

SOP 403 - WELL DEVELOPMENT

PURPOSE

Provide guidelines for developing monitoring wells

GOAL & OBJECTIVE

To ensure wells are properly developed prior to groundwater sampling

FIELD PROCEDURE

Prior to sampling groundwater from a new monitoring well, the well must be developed to remove excess fines and set the filter pack installed during well construction. The following is a general procedure for performing well development:

- Visually inspect all well development equipment for damage, and repair, as necessary.
- Decontaminate all down-hole equipment, including stingers, air hoses, and surge blocks following proper procedures.
- If using compressed air method for well development, verify the compressor utilized does not produce air laden with hydraulic fluid for lubricating purposes. This may affect the integrity of the monitoring well for producing viable water quality data.
- Develop well by using surging techniques (surge block or bailer), followed by evacuation of water and sediment. Place the surge block or bailer in the well and lower to bottom. Move the surge block or bailer up and down over the entire length of the well screen several times. Remove and evacuate water from the well. Repeat this procedure until evacuated water is visibly clean and essentially sand-free. Measure clarity of water using a properly calibrated turbidity meter (turbidimeter) and record measurements on the well development form. If a turbidimeter is not available during well development activities, describe water clarity in field logbook or on a well development form using a turbidity tube, and collect a sample for future analysis.
- Record general water quality parameters (e.g., pH, conductivity, temperature) with a properly calibrated meter(s) during evacuation on a well development field form.
- Evacuated water should be disposed following the process defined in the project work plan.
- Report field observations and volume of water removed on well development form.

EQUIPMENT

- Decontamination Supplies
- Latex or Nitrile gloves
- Well Development Form
- Turbidity Meter
- Water Quality Meter for pH, conductivity, temperature

SOP 405 – INVESTIGATIVE-DERIVED WASTE

PURPOSE

Provide guidelines for handling wastes generated during site investigation.

This procedure describes how wastes generated during the investigation should be handled and is applicable to non-hazardous wastes.

SOIL

Whenever possible, soils excavated from test pits should be placed back in the test pit in the reverse order that it was excavated. To determine appropriate method for handing of drill cuttings from soil borings or monitoring well installation, soils exhumed from the borehole should be monitored for visual or olfactory impacts. If a Photoionization Detector (PID) is utilized for field screening during the investigation, it should also be used to screen soil.

Borehole cuttings with observed impacts or organic vapor concentrations greater than 100 ppm should be containerized in labeled 55-gallon drums (or roll-off containers if large volumes of cuttings are anticipated) pending further characterization. Alternatively, project personnel may elect to containerize all drill cuttings based on the presence of known contamination and contaminant concentrations. Containerized soil must be disposed of in accordance with state and federal regulations based on of soil analytical results.

Soil that does not appear to be contaminated based on observations by field personnel and PID screening may be spread on the ground near the point of origin.

GROUNDWATER

Groundwater purged from a well during development or sampling that has a sheen or contains free product will be containerized in an appropriately labeled 55-gallon drums or tank pending receipt of analytical results. A drum should be dedicated to each well sampled so that the analytical results of the groundwater sample can be used to characterize the water in the drum. If groundwater from several wells is placed in a drum, the water in the drum should be sampled for adequate characterization. The containerized water must be disposed of in accordance with state and federal regulations based on the analytical results. Groundwater that does not have a sheen or contain free product may be discharged to the ground surface and monitored to confirm infiltration in place within site boundaries.

EQUIPMENT

- DOT approved 55-gallon drums
- Drum Wrench
- PID

SOP 502 – SUBSURFACE SOIL SAMPLING

PURPOSE

Provide guidelines for collection of subsurface soil (greater than two feet below ground surface).

Subsurface soil samples are typically collected using one of the methods below:

- Hand Auger
- Backhoe excavator
- Direct-push or rotosonic drill rig
- Split-Spoon (SPT) Sampler

HAND AUGER

Arrive on-Site equipped with stainless steel auger rod and hand auger. If you intend to collect samples from different intervals below grade, bring several sizes of stainless-steel augers (e.g. 2-inch, 4-inch, 6-inch, etc.). Hand auger holes can be drilled as one size or in a telescoping manner if you wish to collect discreet samples at intervals below grade and prevent risk of cross-contamination between intervals. If a single-depth sample is required, advance the auger to the desired sampling interval depth and empty the contents of the auger in a stainless-steel mixing bowl.

For the telescoping method, advance the largest auger first to the desired depth, collecting a specified depth-increment sample as the auger is advanced. Install temporary PVC casing with a diameter slightly smaller than the borehole to keep the hole open and reduce possible cross-contamination between depth intervals. Using the next size smaller auger bucket, repeat the process. Decontaminate all equipment between sample locations and discrete depth-increment samples.

BACKHOE TEST PITS, TRENCHES, & CLEANUP EXCAVATIONS

At least three days prior to backhoe excavation, arrange for public and private utility locates. The areas of planned excavation may need to be marked with white paint prior to arranging for utility location. Excavate to the prescribed depth indicated in the sampling and analysis or the work plan. Place excavated spoil material a sufficient distance from the excavation so as not to slough off into the excavated area. If the pit exceeds five feet in depth, OSHA construction standards for shoring or sloping must be observed to prevent accidental burials. Sampling personnel should avoid entering any pit to collect samples, and if required to do so, strict adherence to all OSHA standards must be implemented.

Complete soil descriptions and take photographs before pit is sampled. Soil samples shall be collected from depth intervals specified in the work plan. When the backhoe bucket is brought to the surface, soil samples should be collected from the leading edge of the bucket with the stainless-steel trowel to assure the soil is not slough material from the excavation. When sampling for volatile organic compounds, the sample should not be mixed. After sampling is completed, the pit should be backfilled with excavated material in the reverse order that it was excavated so that topsoil material is returned to the top of the pit. When backfilling is complete the area should be cleaned up to its original condition. If a test pit is left open overnight, temporary fencing and appropriate signs and flagging tape should be used to prevent access to the excavation. Decontaminate the excavator bucket and all sampling equipment as described in the sampling and analysis plan and/or work plan.

SPLIT-SPOON (SPT) SAMPLER FOR HOLLOW-STEM AUGER DRILLING

A split spoon (SPT) sampler is an 18- to 24-inch-long cylinder typically used in conjunction with a rotary hollow-stem auger drilling rig. When the desired sample depth is reached during drilling, the SPT sampler is lowered to the base of the borehole. The SPT sampler is driven through the base of the borehole with a 140-pound weight (or "hammer"). Record number of blow counts to complete sampling over each 18-inch interval, as necessary. Retrieve and open the sampler to record observations (lithology, percent recovery, moisture content, contamination, etc.) and collect the sample. Decontaminate sampling equipment between each interval sampled, or as required by the work plan.

DIRECT-PUSH DRILLING EQUIPMENT

Direct push drilling drives or pushes small diameter coring rods into the subsurface by hydraulic or percussive methods. Advance coring rods lined with acetate sleeves to the prescribed depth. Retrieve the rods, remove the sample sleeves, and secure on the worktable. Open the sampling sleeve with a utility knife with a to record observations (lithology, percent recovery, moisture content, contamination, etc.) and collect the sample. Decontaminate sampling equipment between each interval sampled, or as required by the work plan.

SAMPLE CONTAINERS AND PRESERVATION

Soil samples should be preserved as described in the table below and Table 2 of the work plan.

PARAMETER	#	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME EXTRACTION/ ANALYSIS
VOCs	1	4 oz glass	4°C	14 days to analysis
VPH	1	4 oz glass	4°C	7 days/40 days from preservation to analysis
EPH	1	4 oz glass	4°C	14 days/40 days from extraction to analysis
SVOCs	1	4 oz glass	4°C	7 days/40days from extraction to analysis
Metals	1	4 oz glass or plastic	4°C	6 months to analysis, Hg 28 days to analysis

EQUIPMENT

- Stainless Steel Mixing Bowl
- Sampling Spoon or Trowel
- Latex or Nitrile Gloves
- Survey Flags or Stakes
- GPS Unit

SOP 504 - FIELD SCREENING PROCEDURES

PURPOSE

Provide guidelines for field screening of volatile organic compounds in soil.

- Field screening can be done using a flame ionization detector (FID), photoionization detector (PID), or combustible gas indicator (GCI). Which instrument is used will depend on the contaminants at the site and site conditions. The project SAP should be reviewed to identify the field screening instrument to be used at the site.
- If using a PID, ensure the instrument is equipped with the appropriate lamp for the compound(s) of interest (refer to table below). Use a filter to prevent moisture and dust from contacting the PID lamp.
- Calibrate the instrument prior to each field day following the manufacturer's instructions. Document the calibration on the appropriate field form or in the project field book.
- Obtain a soil sample from the interval of interest, place it in a sealable plastic bag. Shake the bag to thoroughly mix the sample with the air in the headspace.
- Allow the sample to come to room temperature (approximately 70 - 80° F) by placing it in a warm location (not in direct sunlight). In the winter, it may be necessary to place the sample bag under a vehicle heater vent.
- Insert the probe in the sealable bag and record the maximum reading on the appropriate field forms.

EQUIPMENT

- FID, PID, GCI, as stated in the SAP or QAPP
- Permanent Ink Pen
- Custody Seals
- Sealable Plastic Bags
- Latex or Nitrile Gloves
- Field Logbook or Field Sampling Forms

SOP 701 – QUALITY CONTROL SAMPLING

PURPOSE

Outline the quality control samples to be collected in the field

GOAL & OBJECTIVE

To ensure quality control samples are collected along with natural samples to validate laboratory results

Quality Control (QC) samples are submitted along with natural samples to provide supporting laboratory data to validate laboratory results. QC field samples are submitted blind to the laboratory with the exception of trip blanks. In general, field equipment blanks and duplicate samples should be collected during every sampling event.

Duplicate samples should be collected at a frequency of one sample for every 20 natural samples. Check the project-specific work plan before going to the field to determine what QC samples are required for the sampling event, and at what frequency QC samples should be collected.

With the exception of trip blanks, QC samples are prepared in the field. Trip blanks are supplied by the laboratory and will accompany each sample cooler containing samples for analysis of volatile organic compounds (VOC). Trip blanks provide data to evaluate whether the samples were affected by organic compounds during transport to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) are generated by submitting three duplicate samples from the same sample to the laboratory. The laboratory spikes two of the three samples with known concentrations of select target compounds, and all three are analyzed to evaluate the accuracy of the analysis.

The most common QC samples are shown in the table below:

MOST COMMON QUALITY CONTROL SAMPLES	
SP - Split Sample	A portion of a natural sample collected for independent analysis; used in calculating laboratory precision
D - Duplicate Sample	Two samples taken from the same media under similar conditions; also used to calculate precision
FB - Field Blank	Deionized water collected in sample bottle; used to detect contamination introduced during the sampling process.
RB - Rinsate Blank	Deionized water run through or over decontaminated equipment; used to verify the effectiveness of equipment decontamination procedures
MS/MSD – Matrix Spike/ Matrix Spike Duplicate	Certified materials of known concentration; used to assess laboratory precision and accuracy
TB - Trip Blank	Inert material (deionized water or diatomaceous earth) included in sample cooler; sent by the lab, the sample is used to detect any contamination or cross-contamination during handling and transportation.

QC sample collection frequencies are presented in the table below. Each field crew leader will be responsible for all QC samples prepared by that crew.

QC SAMPLE	PURPOSE	COLLECTION FREQUENCY
Field Duplicate	Measure analytical precision.	1 per every 20 samples
Matrix Spike/Matrix Spike Duplicate	Measure analytical accuracy.	1 per every 20 samples
Equipment Rinse Blanks	Evaluate effectiveness of equipment decontamination and sample handling procedures.	1 per sampling event per media
Field Blank	Assess possible cross- contamination of samples due to ambient conditions during sample collection.	1 per sampling event
Trip Blanks	Evaluate sample preservation, packing, shipping, and storage.	1 per sampling event with volatile constituents

EQUIPMENT

- Field Forms and Field book
- Chain-of-Custody Forms

SAMPLING ACRONYM	LABEL
EB	Equipment Blank
TB	Trip Blank
FB	Field Blank
MW	Monitoring Well
DW	Domestic Well
IW	Injection Well
OB	Observation Well
UST	Underground Storage Tank
VE	Vapor Extraction
AA	Ambient Air
SUMP	Sump (Water sample)
POND	Ponds
SPR	Spring
LAKE	Lake
SW	Surface Water, Stream or River
SR	Surface Runoff
TP	Excavated Test Pit
SS	Surface Soil Sample
SBSS	Subsurface Soil Sample
GW	Groundwater Sample

SAMPLE CUSTODY PROCEDURES

The field person is responsible for custody of the samples at all times until transferred or shipped to the laboratory using a chain-of-custody form. The chain-of-custody form will be completed for all samples collected in the field for laboratory analysis and copies will be maintained in the project file. The information to be included on the chain-of-custody form will include, but is not limited to:

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

Each sample will be assigned a unique sample identification number as described above in WGM SOP-3. The information on the chain-of-custody form, including the sample identification number, will correspond to the information recorded by the sampler on the field forms and field log book and the label on the sample container.

When custody of a sample is relinquished by the sampler, the sampler will sign and date the chain-of-custody form and note the time that custody was relinquished. Samples must be shipped to the analytical laboratory following the procedures described in in SOP-4. Notify the analytical laboratory of shipment and request pick up and receipt of delivery. The project manager will determine if proper custody procedures have been followed upon review of field activities, and audits may also be conducted by the client or appropriate regulatory agency.

EQUIPMENT

- Indelible Ink Pen
- Chain-of-Custody Forms
- Field Note Book
- Field Sampling Forms

SOP 702 – EQUIPMENT DECONTAMINATION

PURPOSE

Provide guidelines for decontamination procedures of field sampling equipment.

The following actions should be performed to decontaminate field sampling equipment:

- Set up a decontamination area upwind from your sampling area to reduce the potential for windborne contamination.
- Prior to initiating decontamination, inspect equipment and use stiff brush to remove visible material.
- Decontaminate each piece of equipment following a sequential process of washing with phosphate-free soap or an equivalent degreasing detergent; rinsing with distilled water; rinsing with 10% dilute nitric acid (or methanol if sampling for organics); and finally rinsing with distilled water three times.
- Decontaminated equipment should be wrapped in inert material if not used immediately.

All disposable items (e.g., paper towels, latex gloves) should be deposited into a garbage bag and disposed of in a proper manner. Handling and disposal procedures for the rinse and wash water will depend on the presence of contaminant in the wash water. The decontamination wash water will be containerized and disposed of in accordance with the site-specific sampling and analysis plan and/or state and federal regulations.

EQUIPMENT

- Tubs or 5-gallon buckets
- 10% nitric acid
- Spray bottle with 10% methanol or denatured alcohol
- Non-phosphate soap
- Brushes
- Garbage bags
- Disposable gloves (nitrile or latex)
- Paper towels

The amount of distilled water needed on Site will depend on the number of samples to be collected and the sampling methods. For this reason, you should evaluate the need prior to going in the field.