Water & Environmental TECHNOLOGIES

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Cleanup Work Plan for the Petroleum Release at the Former Sinclair Retail #25009

1800 Prospect Avenue, Helena, Montana, Facility ID 25-02093 (TID 23461), Release 0441, Work Plan 34664

Prepared for:
MDEQ Petroleum Tank Cleanup Section
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EXECUTIVE SUMMARY

The former Sinclair Retail #25009 facility (Facility) was formerly a fueling business with ten underground storage tanks (USTs) and associated piping (Release). The Release was discovered in April 1990 after a failed leak detection test at the site. Known previous cleanup actions include installation of a soil vapor extraction (SVE) system, UST removal, soil excavation, soil confirmation sampling, and groundwater monitoring.

The Department of Environmental Quality (DEQ) issued a workplan request letter (WPR) dated June 3, 2024, requesting additional corrective action at the Facility. The scope of work outlined in DEQ's WPR includes design and implementation of an injection program along with groundwater monitoring to evaluate the effectiveness of said injection. These activities will be conducted in accordance with the standard operating procedures (SOPs) and standard operating guidelines (SOGs) listed below, and any site-specific clarifying notes or proposed deviations from the SOPs are provided in the subsequent sections of this work plan. SOPs are included as **Appendix A**.

- SOP-0-1: Instrument Calibration Process
- SOP-1: Field Logbook and Forms
- SOP-2: Equipment Decontamination
- SOP-3: Sample Nomenclature, Documentation, and Chain of Custody
- SOP-4: Sample Package and Shipping
- SOP-5: Field Measurement of Groundwater Levels/ Light Non-Aqueous Phase Liquid Levels
- SOP-6: Measurement of Field Parameters
- SOP-7: Field Sample Filtrations
- SOP-8B: Groundwater Sampling – Low Flow Method
- SOP-10: Monitoring Well Construction
- SOP-13: Monitoring Well Development
- SOP-16: Quality Control Sampling
- SOP-17: Management of Investigation Derived Waste
- WET Data Verification & Validation SOG

Implementation of this work plan is proposed to begin upon DEQ approval and take approximately two years to complete, depending on availability of contractors and equipment.

1 FACILITY SUMMARY AND CURRENT CONDITIONS

An approximate 400-gallon gasoline release was discovered at the Facility in 1990. Free product was detected in two on-site monitoring wells. A SVE system was installed by Olympus Technical Services and operated from March 1991 to December 2003. Tanks and piping were removed in 2007 by Tetra Tech. Intermittent groundwater monitoring occurred from the time of the initial release through November 2023.

WET has conducted soil excavation with oxygen enhancement, soil sampling, soil boring, monitoring well installation, and semi-annual groundwater monitoring since consulting services were transferred from Tetra Tech to WET in 2014. During the most recent groundwater monitoring events (June 2023 and November 2023), human heath standard (HHS) or risk-based screening level (RBSL) exceedances of benzene, naphthalene, C5-C8/C9-C12 aliphatics, and C9-C10 aromatics were noted in the sampled wells. Most recently, samples collected from monitoring well PM-3 exhibited the highest benzene concentration, 698 ug/L, during the November 2023 monitoring event. The Facility is an active coffee shop (1889 Coffee House) and is paved with the exception of a few small, landscaped areas (pervious ground). Soils consist of silt, clay and sand, cobbles and boulders, and the depth to groundwater is approximately 20 feet below ground surface (ft bgs). The site location is depicted on **Figure 1**.

2 OBJECTIVES OF CLEANUP WORK PLAN (CWP)

The purpose of the proposed cleanup is to progress the Release toward closure via activated carbon (AC) injection into groundwater. The goals of this CWP are to reduce groundwater concentrations of benzene and naphthalene to below their respective HHSs of 5 µg/L and 100 µg/L, respectively. Following injection activities, groundwater monitoring will occur quarterly to evaluate injection effectiveness. This cleanup method addresses the impacted groundwater at the Facility, which is preventing closure of the release. DEQ issued a work plan request letter (WPR) dated June 3, 2024, requesting additional corrective action at the Facility. The scope of work outlined in DEQ's WPR includes:

- Complete all relevant sections for the technology recommended required in the Cleanup Guidance document.
- Propose locations, concentrations, and amounts of activated carbon to inject at the Facility.
- Conduct follow-up groundwater monitoring at an appropriate interval to assess the effects of the injection.
- Validate all laboratory analytical data using DEQ's Data Validation Summary Form (DVSF).
- Discuss ongoing WP tasks and results with DEQ's project manager; submit written agreed-upon WP modification as required to complete the WP objectives.

- Prepare an updated Release Closure Plan (RCP), discuss the results with DEQ's project manager. DEQ expects the RCP to cover the Release investigation, cleanup, and monitoring information.

- Prepare and submit a Cleanup Report detailing the results of the remediation activities. The Report is expected to include all the content outlined in the Cleanup Guidance format and appended groundwater monitoring forms, laboratory analytical data, completed DVSFs, and the RCP.

The remaining sections of this WP detail WET's proposed approach to complete these specified tasks.

3 CLEANUP METHOD CHOSEN

Monitored natural attenuation, air sparge and soil vapor extraction (AS/SVE) and AC injection were the cleanup methods evaluated for this Release. AC injection is the recommended cleanup method because it has a shorter timeline, serves as a permeable reactive barrier to contamination that may be entering the site from the south, will treat impacted groundwater and prevent further migration off-site, and is less expensive than AS/SVE which has previously been ineffective at the Facility. Based on site characteristics such as subsurface lithology, layout, and the magnitude and extent of contamination, activated carbon injection will be the least disruptive cleanup technology while actively reducing contaminant concentrations.

4 CLEANUP WORK PLAN TASKS

All tasks required for the implementation of this work plan are detailed in the following sections, except for work plan preparation, system design, and system design evaluation.

4.1 SYSTEM DESIGN

WET worked with Regenesis to develop an injection program that would adequately address impacts to groundwater and prevent further downgradient migration of contaminated groundwater. The Regenesis approach to the injection program along with their cost estimate is provided as **Appendix B**.

4.2 PROJECT MANAGEMENT

WET personnel will provide Brett Wiensch (Operator) and DEQ's project manager with updates on ongoing WP tasks and relevant results on an as-needed basis. Other duties associated with this task include preparing a task-specific health and safety plan, scheduling field work, prepare private utility locates, construction administration, project reporting administration, monitoring the project budget and deliverables, permitting, and any submitted written agreed-upon WP modifications to complete the objectives.

4.3 MOBILIZATION

Up to seven mobilizations from WET's Missoula office location are estimated for implementation of this workplan. Each roundtrip consists of approximately 240 miles and four hours of travel time for a total of 1,680 miles and 28 hours. The number of mobilizations required includes the following: test boring oversight – 1, injection oversight – 1, and groundwater monitoring – 5. One hour of loading/unloading time is included for each mobilization.

4.4 LODGING AND PER DIEM

An estimated six nights of lodging are included for the implementation of this workplan. Eight full days of per diem are included for the direct push feasibility boring installation and the injection. One lunch is included for each of the five groundwater monitoring events.

4.5 SOIL BORING/INJECTION BORING INSTALLATION

Bids were solicited from Wiley Drilling, Olympus Technical Services, and WCEC for direct push drilling services (soil borings and injection points). Wiley drilling submitted the low bid and will be awarded the work; contractor estimates are included as **Appendix C**.

4.5.1 PHASE 1: BORING FEASABILITY

Underground utilities will be located prior to the commencement of drilling activities using Montana's one call system and a private locator. To test the feasibility of direct push (DP) drilling at the Facility, one mobilization prior to injection activities will take place. Six borings will be installed in the proposed injection areas at the Facility. WET personnel will oversee all drilling activities and record instances of refusal or difficult drilling. All drill cuttings will be containerized in drums provided by Wiley Drilling. If refusal is encountered prior to the projected terminal depth of injection borings (30 feet below ground surface [ft bgs]), the driller will shift the location and re-attempt. If all of the test borings are successfully completed, DP will be utilized for the injection. Following completion of feasibility borings, each boring will be abandoned using hydrated bentonite and the asphalt will be patched.

4.5.2 PHASE 2: INJECTION BORINGS

If DP is deemed to be feasible at all proposed injection areas, WET will coordinate with Wiley and Regenesis to schedule the injection. An estimated 53 injection points are required for this scope of work. Injection will take place during high groundwater conditions and according to the details proposed by Regenesis in their Remedial Design and Proposal, included as **Appendix B.** Approximate locations of injections points are provided on Figure 1 of the Regenesis proposal (**Appendix B**). Following completion of injection activities, each boring will be abandoned using hydrated bentonite and the asphalt will be patched.

4.5.3 ALTERNATIVE TO PHASE 2: DP NOT FEASIBLE

If DP is not feasible in one or more areas, 4-inch diameter injection borings will be installed using an alternate drilling technology (ODEX or sonic), filled with sand at the injection interval (20-30 ft bgs), and sealed with bentonite. Once these borings are complete, DP will be used to inject PetroFix into these borings. Following completion of injection activities, each boring will be abandoned using hydrated bentonite and the asphalt will be patched.

4.6 INJECTION

Regenesis will work with WET to implement the scope of work associated with the application of PetroFix. Regenesis is responsible for providing the specified quantities of PetroFix and Electron Acceptor Blend, a custom-built injection system, a site-specific health and safety plan, safety equipment to delineate the immediate work area, and monitoring of injection flow rates and pressures during injectate application. Regenesis will also complete a detailed injection summary report upon completion of the injection event, which will be included in the final Cleanup Report. The injection is estimated to take six days. Should injection activities take longer than the planned

six days, Wiley's rate is $300 per hour and Regenesis' rate is $5,000 per day. A staff engineer will be required to oversee injection activities; time beyond the planned six days will be charged at WET's approved staff engineer rate.

Up to six soil borings will be completed during the injection to evaluate distribution of PetroFix. Following completion of injection activities, each boring will be abandoned using hydrated bentonite and the asphalt will be patched.

4.7 EQUIPMENT

Equipment that will be necessary to complete the injection activities includes a forklift and light stands. A forklift is necessary for maneuvering PetroFix totes around the site. Because the Facility is an active coffee shop, injection work will take place starting in late afternoon and continue into the evening. Light stands will be used to provide adequate lighting and ensure the work can be completed safely. Porta-potties will also be provided for the duration of this work plan. Rental costs for these items are included in the WET Project Cost Estimate, included as **Appendix D**.

4.8 FIELD WORK

WET personnel will oversee all subcontracted work including drilling and injection activities. All pertinent field investigation and sampling information will be recorded on field sheets or in a field notebook, as described in the WET SOP-1: Field Logbook and Field Sampling Forms (**Appendix A**).

4.9 GROUNDWATER MONITORING

WET will conduct five groundwater monitoring events of all site wells (PM-1R, PM-3, PM-4R, PM-5, PM-6, and M-8). One event will take place prior to the injection to establish baseline concentrations. Quarterly groundwater monitoring will take place starting approximately six months post injection. Fluid levels will be measured with an oil-water interface meter prior to purging the well in accordance with WET SOP-5: Measurement of Fluid Levels and will be recorded on the WET Groundwater Sampling Form in accordance with WET SOP-1: Field Logbook and Field Sampling Forms. Monitoring wells will be purged using a peristaltic pump (with new tubing for each well) and following procedures specified in this workplan and WET SOP-8B: Groundwater Sampling – Low Flow Method and DEQ's Groundwater Sampling guidance (2018). SOPs are included as **Appendix A**. Any monitoring well containing free product will not be sampled.

Groundwater field parameters for each well will be measured during purging with a YSI® Professional Plus Quatro Cable multi-meter, HACH turbidity meter, and an oil/water interface probe in accordance with WET SOP-6: Measurement of Field Parameters. Field parameter measurements consist of recording initial depth to water, temperature, specific conductivity (SC), dissolved oxygen (DO), pH, oxidation reduction potential (ORP), turbidity, final depth to water, and volume during purging. Temperature and drawdown will be monitored but are not subject to stabilization criteria. Field parameter readings should be recorded every 3-5 minutes until three consecutive readings are within stabilization range.

Once parameters stabilize according to the criteria in **Table 1**, a groundwater sample will be collected in laboratory-supplied bottles for laboratory analysis as described in Section 4.10.

Samples collected for analysis of dissolved metals (aluminum, calcium, and manganese) will be filtered prior to adding preservative as described in SOP-7: Field Sample Filtration (**Appendix A**).

Table 1. Stabilization Parameters

Water Quality Parameter	Unit	Stabilization Range	Exception
pH	standard units (s.u.)	±0.1 s.u.	
Specific Conductance (SC)	microsiemens per centimeter (µS/cm)	±3%	
Dissolved Oxygen (DO)	milligrams per liter (mg/L)	±10%	<0.50 mg/L
Turbidity	nephelometric turbidity units (NTU)	±10%	<5 NTU
Oxidation/Reduction Potential (ORP)	millivolts (mV)	±10 mV	

One duplicate and one field blank will be collected during each monitoring event for quality assurance/quality control (QA/QC) purposes. The duplicate will be collected from a well that has historically exhibited detectable concentrations of contaminants simultaneously with its parent sample. The field blank will be collected during representative sampling conditions at the Facility with laboratory provided organic-free deionized water. Both the duplicate and the field blank will be analyzed for the same constituents as the natural samples. Reusable equipment (oil/water interface probe) will be decontaminated between wells in accordance with SOP-2: Equipment decontamination (**Appendix A**).

4.10 LABORATORY ANALYSIS

Groundwater samples will be sent for laboratory analysis following the procedures outlined in WET SOP-4: Sample Nomenclature, Documentation, and Chain of Custody and WET SOP-3: Sample Package and Shipping (**Appendix A**). Groundwater samples including QA/QC samples will be analyzed for volatile petroleum hydrocarbons (VPH), sulfate, nitrate, and dissolved metals including calcium, manganese, iron, and aluminum. All samples will be analyzed by Energy Laboratories in Helena, MT.

4.11 DATA VALIDATION SUMMARY FORMS (DVSF)

WET personnel will validate each laboratory analytical report in accordance with EPA's National Functional Guidelines for Superfund Organic Methods review and the WET SOG-Data Verification & Validation. Five analytical laboratory reports will be produced during the implementation of this workplan, a data validation summary form (DVSF) will be prepared for each lab report. These summary forms will be included in the final report.

4.12 INVESTIGATION DERIVED WASTE (IDW) MANAGEMENT, CHARACTERIZATION, AND DISPOSAL

All soil cuttings from drilling activities will be containerized, sampled, characterized and scheduled for appropriate disposal. All other generated IDW, such as personal protective equipment and single use items will be disposed of in a local landfill.

Following the DEQ Disposal of Untreated Purge Water from Monitoring Wells guidance dated July 15, 2015, the purge water originates from the shallowest aquifer, does not contain free product, is not likely to result in an exceedance of sol screening levels, is not discharged to a surface water, and is not from a mine audit or long-term pumping test. Therefore, the purge water from the groundwater sampling events will be discharged to pervious Facility ground.

5 COST, SCHEDULE, AND REPORTING

5.1 COST

Work effort level has been estimated using best professional judgement and typical scenarios related to work of this type. A detailed cost estimate for the required work is provided in **Appendix D**.

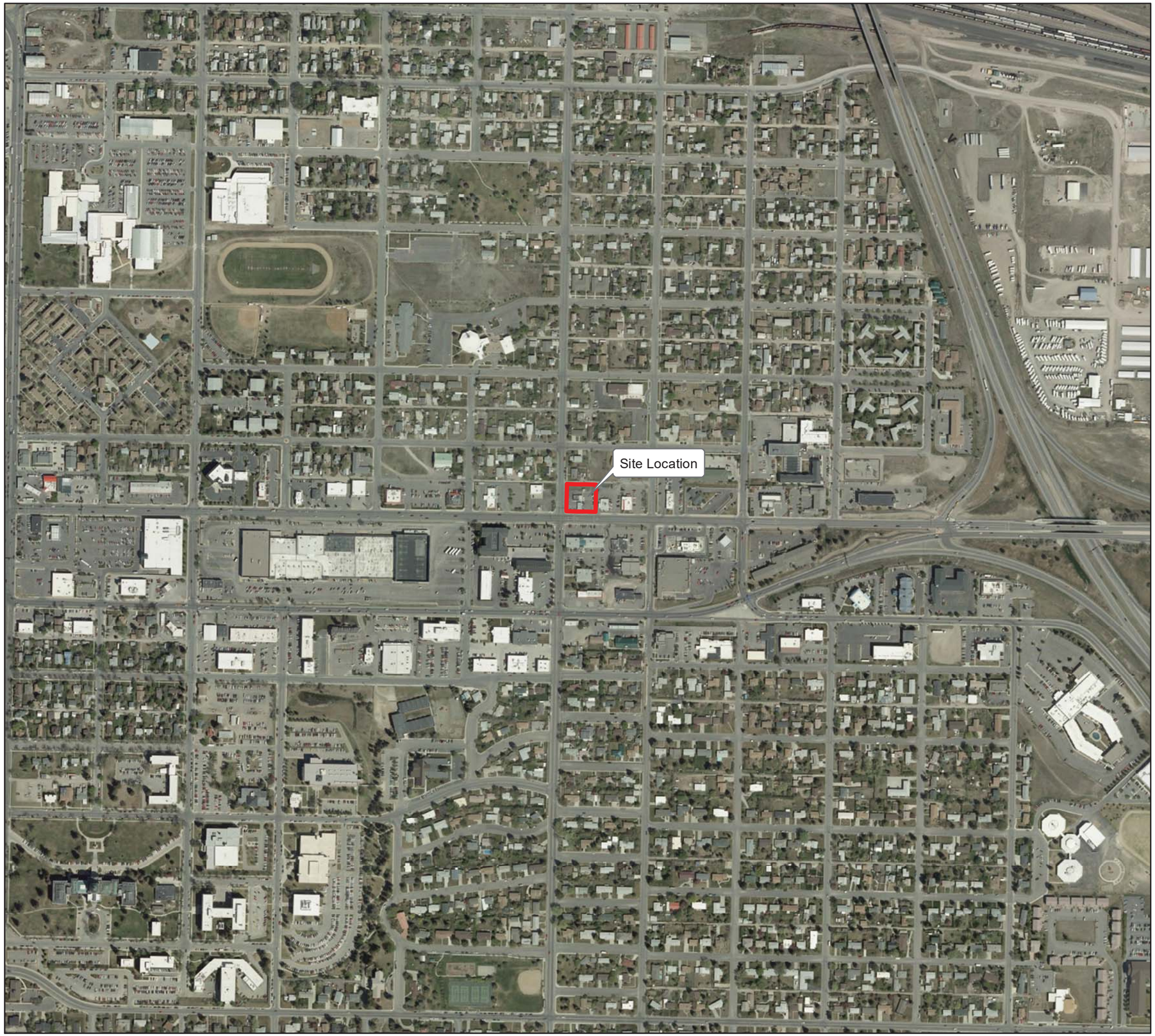
5.2 SCHEDULE

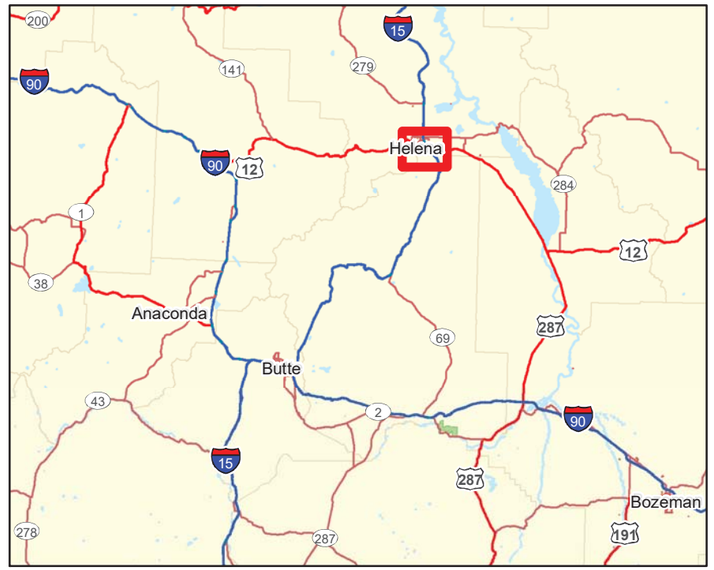
WET will begin implementation of the WP immediately upon DEQ approval. Notification for each event will also be sent to the Facility Owner and the DEQ Project Manager prior to conducting field work.

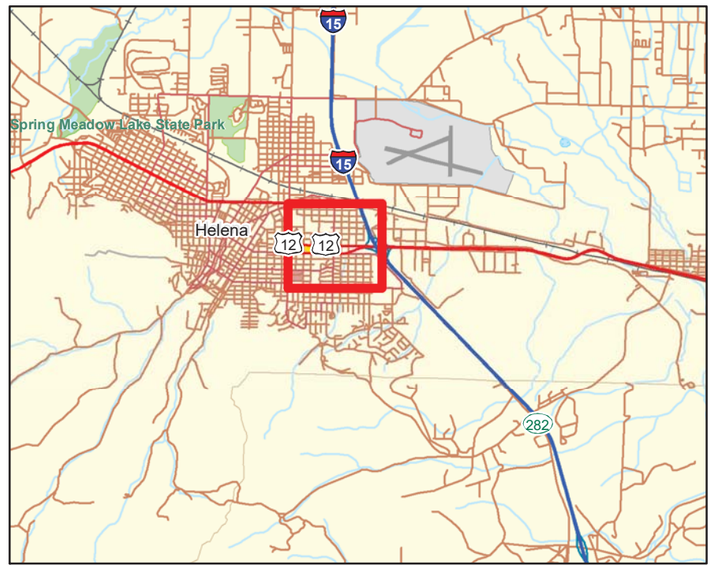
5.3 REPORTING

WET will prepare a Cleanup Report detailing the injection and cleanup activities following the completion of all groundwater monitoring events. The Cleanup Report will include all of the content outlined in the Cleanup Report format as well as appended groundwater monitoring forms, laboratory analytical data, completed DVSFs, and an updated Release Closure Plan (RCP).

Figures







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Site Location

Former Planet Motors Facility
Helena, MT

Job#:PlanetMotorsM01

Date: 1/30/2019

FIGURE 1

Path: M:\PlanetMotorsM01\Figure1_2019.mxd, Author: ceggensperger

Appendix A

Standard Operating Procedures

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SOP-0-1

Instrument Calibration Process

Revised: December 2, 2021

Doc control #:

Introduction

The purpose of this Standard Operating Procedure (SOP) is to describe the sequence of activities to be followed when using any instrument that requires field calibration. Though this SOP is meant and required to be used in harmony with any other WET SOP that addresses calibration of a specific instrument, it supersedes any procedure described in a specific SOP if in conflict with those specified in this SOP (SOP-0-1). This SOP will become obsolete and will be removed from the WET suite of SOPs when all other pertinent SOPs are appropriately amended.

Equipment

- Calibration standard(s) (main source)
- Calibration standard(s) in packets or containers, and/or required hardware
- Instrument to be calibrated
- Instrument guide, manual or pertinent SOP where the calibration process of the given instrument is defined
- Instrument-specific health and safety items

Process

1. Before traveling with a field instrument, the instrument should be checked to ensure it is in good working order before leaving the office. Place the instrument in measuring mode, use calibration standards (if required) to test - measure all values that will be required in the field monitoring event. Values close to calibration standards are indicative of the instrument being in working conditions.
2. In the field: shortly before initiating field measurements at the work site, calibrate the instrument as instructed by the instrument instruction manual using standards contained in disposable packets or containers. The use of disposal packets eliminates a risk of contaminating the main source of the standard.
3. After field measurements are completed for the day, with the instrument in measuring mode, use calibration standards to measure their values. Record these values in the newly updated Calibration Record form.

Justification and Comments

Both EPA (1, 2) and Montana DEQ (3) in their guidance for groundwater sampling collection require checking whether the instruments remained in calibration by the end of the day. EPA (2) explains that the check of calibration is performed while the instrument is in the measurement mode, not calibration mode. EPA (1) expounds that the difference between the measured value and the initial calibration value is then compared to the drift criteria described in QAPP or SAP for the project.

If the QAPP or SAP do not list the drift criteria, EPA (1) provides drift criteria for DO, SI, pH, turbidity and ORP. For instruments that measure other parameters of water and instruments used for other media, the drift criteria must be specified and documented by the project manager (PM) or Lead Engineer / Scientist (LE/S) prior to taking the measurements. In such a case the PM is encouraged to research the instrument-relevant sources to be able to provide basis for the selected drift criteria.

If the instrument allowable drift criteria are not met, all data of the period in question will be marked with a qualifier “+” or “-“ (depending on the drift direction) and its usage determined by the PM or LE/S.

References

1. USEPA Region 1, 2017. Standard Operating Procedure, Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction potential [ORP], and turbidity)). EQASOP-FieldCalibrat3.
2. EPA Region 1, 2010. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. EQASOP-GW 001.
3. DEQ Montana, 2018. Groundwater Sampling Guidance. DEQ-WMRD-GWM-1.

Prepared by: _____ _____
(Marek Zaluski, Ph.D. Senior Hydrogeologist) Date

Approved by: _____ _____
(Elizabeth Erickson, Sr. Vice President, Quality Manager) Date

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SOP-1

FIELD LOGBOOK AND FORMS

All pertinent field investigation and sampling information will be recorded in a field logbook, field form, or a Daily Activity Log (DAL) during each day of the field effort and at each sample site. The field crew leader will be responsible for ensuring that sufficient detail is recorded in the field logbook or DAL. No general rules can specify the extent of information that must be entered in the field logbook or form. However, field logbooks, field forms, or DALs must contain sufficient information such that someone could reconstruct all field activities without relying on the memory of the field crew. All entries shall be made in indelible ink, weather conditions permitting. Each day's or site's entries will be initialed and dated at the end by the author.

At a minimum, entries on the field sheet or in field notebook must include:

- Project information and location
- Project and task number
- Date and applicable times
- Name(s) of field personnel
- Environmental, site, or weather conditions
- Safety briefing attendance
- Details of actual work effort, particularly any deviations from the field work plan or standard operating procedures
- Comments or observations regarding any unusual circumstances
- Any field measurements made (e.g., PID readings, pH, temperature)

For sampling efforts, specific details for each sample should be recorded using a standardized field form designed specifically for the sampling activity being conducted (e.g., low-flow groundwater monitoring, soil gas sampling). Sampling field forms contain fill-in-the-blank type information to ensure that all pertinent information will be recorded. In addition to the items listed above, the following information is recorded on field forms during sampling efforts:

- Sample identification
- Date and time samples were collected
- Sampling methods, particularly any deviations from field work plan or standard operating procedures
- Field data and measurements
- Containers used to collect samples
- Sample preparation (filtration, preservation)
- Analyses and methods requested
- Note any QA/QC samples collected (duplicates, blanks)

Strict custody procedures will be maintained with the field forms. Field forms must always remain with the field team while being used in the field. Upon completion of the field effort, the original field forms will be scanned and copied to the project folder. Original field forms will be filed in an appropriately secure manner.

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SOP-2

EQUIPMENT DECONTAMINATION

INTRODUCTION

The purpose of this section is to describe general decontamination procedures for field equipment. Decontamination will be performed on all non-dedicated and non-disposable sampling equipment that may contact potentially contaminated media. Field personnel must wear disposable latex or nitrile gloves while decontaminating equipment at the project site and change gloves between every sample. Personnel must take every precaution to prevent contaminating themselves with the wash water and rinse water used in the decontamination process.

EQUIPMENT

- Liquinox (or equivalent laboratory-grade detergent)
- Sufficient volume of tap water
- Sufficient volume of deionized water
- Sufficient volume of methanol or pesticide-grade acetone for organics
- Sufficient volume of any other decontamination solutions specifically required by the project work plan.
- Necessary containers for each decontamination station (totes or tubs, graduated cylinders or similar tubes, spray bottles, etc.)
- Tarp or other platform to form barrier between decontamination stations and ground (if necessary)
- Applicable brushes (if necessary)
- Aluminum foil (for soil sampling devices)
- Latex or nitrile gloves
- Paper towels
- Garbage bags

PROCEDURES

The following should be done in order to complete thorough decontamination:

1. Set up the decontamination zone downwind from the sampling area to reduce the chances of windborne contamination.
2. Visually inspect sampling equipment for contamination; use brush to remove visible material.
3. The general decontamination sequence for field equipment includes washing with Liquinox (or equivalent laboratory-grade detergent), deionized water rinse, additional solution rinse specified by project work plan, and triple deionized water rinse.
4. Store equipment in clean containment or according to project work plan if not used immediately.
5. All disposable items (e.g., paper towels, latex gloves), as well as rinse and wash water generated during decontamination, should be disposed of in accordance with SOP-17 (Management of Investigation-Derived Waste).

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SOP-3

SAMPLE NOMENCLATURE, DOCUMENTATION, AND CHAIN OF CUSTODY

INTRODUCTION

Sample documentation is an important step to ensure the laboratory, project manager, and field personnel are informed on the status of field samples. Depending on the specifics required for each project, several forms will need to be filled out. Most sample documentation forms are pre-printed carbonless triplicates, enabling copies to be filed or mailed from labs or offices. The forms will be completed by field personnel, who have custody of the samples. The office copy will be kept in the project file and subsequent copies sent to the laboratory, or other designated parties.

Responsibility for completing the forms will be with each field crew leader. It is important that the field crew leader is familiar with the completion process for filling out forms, and the expected information is included.

Potential documents to be completed clearly in indelible ink for each sample generated include:

- Field form(s) or field logbook
- Chain-of-custody forms
- Custody seal(s)

A chain-of-custody form will be generated for all samples collected in the field for laboratory analysis. The sampler may use a project-specific chain-of-custody form or a chain-of-custody form provided by the laboratory. It is of the upmost importance that the chain-of-custody form be filled out correctly. This form is the first thing that third parties and regulators verify when assessing the quality of the job.

FIELD EQUIPMENT

- Indelible ink pen(s)
- Field form(s) or field logbook
- Chain-of-custody form(s)
- Custody seal(s)

PROCEDURES

Sample custody records must be maintained from the time of sample collection until the time of sample delivery to the analytical laboratory and should accompany the sample through analysis and final disposition. The information to be included on the chain-of¬-custody form will include, but is not limited to:

- Accounting and reporting information
- Project number and/or site name (If there are any questions about this, contact the project manager)
- Sampler's name, information, and signature
- Unique sample identification number or name
- Date and time of sample collection

- Number of containers
- Sample media (e.g., soil, water, vapor, etc.)
- Sample preservative (if applicable)
- Requested analyses
- Comments or special instructions to the laboratory

Each sample will be assigned a unique sample identification number or name. The information on the chain-of-custody form, including the sample identification number or name, must correspond to the information recorded by the sampler on the field forms (refer to SOP-01) and the label on the sample container.

A sample is considered under a person's control when it is in their possession such that tampering is prevented. This includes placing the samples in an area of controlled access such as a building or locking the samples in a vehicle. 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. The person receiving custody of the sample will also sign and date the form and note the time that the sample was accepted into custody. Samples will be shipped to the analytical laboratory following the procedures in SOP-04. If an overnight shipping service is used to transport the samples to the laboratory, custody of the samples will be relinquished to the shipping service. The shipping service will not sign the chain-of-custody form; however, the samples can be tracked while in the custody of the shipping service. More than one sample may be included on a chain-of-custody form, if all the samples are for the same project. Copies of the chain-of-custody form will be maintained in the project file, in accordance with standardized or project-specific data management procedures.

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SOP-4

SAMPLE PACKAGE AND SHIPPING

PACKAGING

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

1. Label all sample containers with indelible ink (on the label, on the side, not on the cap or lid). Place labeled sample bottles in a high-quality cooler containing an adequate amount of ice (sealed inside two Ziploc bags) to maintain a temperature of 4°C or less inside the cooler. Freeze packs, or "Blue Ice" are NOT to be used. Ensure the cooler drain plug is taped shut.
2. Place the samples in an upright position and wrap the samples with absorbent, cushioning material for stability during transport. Samples should not be loose; the cooler should be able to withstand tough handling during shipment without sample breakage.
3. A temperature blank is to be included in each cooler.
4. When sampling for volatile organic compounds, a trip blank supplied by the lab must be included in each cooler.
5. Fill out the appropriate shipping forms and place in a Ziploc bag then tape it to the inside lid of the shipping container. Shipping forms usually consist of a chain-of-custody form, which documents the samples included in the shipment and specifies the laboratory analyses for each sample. *Note: There should be one chain-of-custody form per cooler, which only lists the samples that are present in that cooler. For large sample efforts requiring samples be shipped in two or more coolers, DO NOT fill out a single chain-of-custody form for the entire set of samples and place multiple copies of the same form in multiple coolers.*
6. Close and seal the cooler using packing tape.
7. Place completed custody seals on the cooler such that the seals will be broken when the cooler is opened. The custody seal must contain, at minimum, the signature of the person relinquishing custody of the samples and the date the cooler is sealed. Secure the custody seals on the cooler with clear packing tape.
8. Secure the shipping label with address, phone number, and return address clearly visible. If carrier labels (UPS or FedEx) were provided by the laboratory, affix the label(s) to the top of the cooler(s) and get a receipt from the carrier when dropping off the cooler(s) for shipment.
9. Plan ahead for shipping. If holding times are likely to be exceeded when using a carrier, the samples may need to be hand-delivered. Similarly, if outdoor temperatures are extremely hot or extremely cold, which could result in freezing of samples or cooler temperatures exceeding 4 degrees C during transit, samples may also need to be hand-delivered

SHIPPING HAZARDOUS MATERIALS/WASTE

Hazardous materials need to be shipped using procedures specified under Federal Law. Samples need to be shipped in Ziploc bags or paint cans filled with packing material, depending on the level of hazard. Special package labeling may be needed. Consult the project manager for specific shipping procedures.

SHIPPING AIR AND SOIL VAPOR SAMPLES

Hazardous materials need to be shipped using procedures specified under Federal Law. Samples need to be shipped in Ziploc bags or paint cans filled with packing material, depending on the level of hazard. Special package labeling may be needed. Consult the project manager for specific shipping procedures.

Water & Environmental TECHNOLOGIES

SOP-5

FIELD MEASUREMENT OF GROUND-WATER LEVELS/LIGHT NON-AQUEOUS PHASE LIQUID LEVELS

INTRODUCTION

In general, groundwater levels (and LNAPL levels, if applicable) in wells will be measured prior to commencing development, purging, sampling, pumping tests, or other activities that disturb the fluid pressure relationships in the well. Measurements may be taken during such events for purposes other than determining static conditions and may also be taken to determine static conditions after such activities if an appropriate period has elapsed to allow steady-state conditions to return.

EQUIPMENT

- Electronic water level monitoring probe (for water levels only),
- Electronic multi-phase interface monitoring probe (for measuring water levels and LNAPL levels)
- Keys for well locks
- Tools to open well covers (e.g., socket wrench, spanner wrench, etc.)
- Watch or stopwatch
- Pens and field logbook or other appropriate field forms (e.g., groundwater purge and sample forms)
- Monitoring well construction data (for total depth and screen intervals of well)
- Personnel and equipment decontamination supplies (refer to SOP-2)

PROCEDURES

1. If more than one well will be measured, conduct measurements in the order of lowest to highest chemical concentrations previously detected in samples from the monitoring wells.
2. Allow the well to equilibrate by removing the protective cap and leaving the well open for a period before beginning taking measurements. Generally, removing all site well caps prior to collecting the first liquid level measurement provides sufficient time to reach equilibrium.
3. Examine the monitoring well for any structural damage, poorly fitting caps, and leaks into the inner casing. Record all well maintenance issues on the appropriate field sampling form or field log book.
4. If LNAPL is not present, use a pre-cleaned water level probe or equivalent to measure depth to water from the indicated survey mark on the well casing. If a mark is not present, measure from the top of the northern side of the well casing.
5. If LNAPL may be present, use a pre-cleaned, electric, multi-phase interface probe to mea sure depth of the LNAPL and depth to water. Record both measurements on the sam pling form or field logbook. Unless otherwise instructed, always measure depths to LNAPL layer and groundwater from the indicated survey mark. If a mark is not present, measure from the top of the northern side of the well casing.
6. Repeat measurements at least once by lifting the probe tape at least one foot out of the well, allowing the measurer to confirm the accurate foot, tenth-of-a-foot, and hundredth-of-a-foot mark on the tape.
7. Follow personnel and equipment decontamination procedures outlined in SOP-2.

Water & Environmental TECHNOLOGIES

SOP-6

MEASUREMENT OF FIELD PARAMETERS: Temperature, Dissolved Oxygen (DO), Specific Conductance, pH, Oxidation Reduction Potential, and Turbidity

INTRODUCTION

This guideline describes the procedures typically used to measure the temperature, DO, Specific Conductance (SC), pH, Oxidation Reduction Potential (ORP), also referred to as redox potential, and turbidity of ground- or surface water.

EQUIPMENT

- Multi-parameter water quality meter
- Flow-through cell or plastic cup
- Transport/calibration cup
- Probe sensor guard
- Operations manual
- Spare batteries
- Standard conductivity calibration solutions [447, 1413, 2074, 8974 microSiemens per centi meter (µS/cm)]
- pH buffers (4.00, 7.00, 10.00)
- ORP calibration solution
- Pens, field logbook, and/or appropriate field forms (e.g., groundwater purge and sample form)
- Personnel and equipment decontamination supplies

PROCEDURES

Calibrate multi-parameter water quality meter at the office prior to commencement of field activities to check instrument is in proper working order. At a minimum, calibrate before use each day (or more frequently as necessary) as indicated below. The initial daily calibration may be performed at the office (if located in proximity to the site), motel, or in the field.

1. Press the On/Off key. Check the battery charge indicator located at the bottom of the liquid crystal display (LCD) screen. Replace batteries if the battery charge indicator is low.
2. Calibrate the meters according to the manufacturer's instructions. *Note: The meter must be calibrated for each field parameter in accordance with the instructions in the operations manual at the beginning of each sampling day. Additional calibrations may be performed during the day if deemed necessary.*
3. If instruments were used in humid or wet environmental conditions, store them in the case open overnight for evaporation so that moisture and mold do not infiltrate sensitive parts.
4. Multi-parameter water quality meter use:
   a. Connect the probe sensor to the flow-through cell. If the flow cell is not used, make sure the probe sensor guard is installed.
   b. Begin passing water into the flow-through cell. If the flow-through cell is not used, place the probe module into a sample of the water or directly into the body of water being evaluated. Be sure to completely immerse all sensors into the water.
   c. Provide a constant flow of fresh water across the probe module to actuate readings.

d. Observe the meter's LCD display and record the values on the groundwater purge and sample form or field logbook.
e. Once purging is complete, remove the probe from the sample water and rinse the probes and flow-through cell with distilled water.

5. Place the probe sensor in the transport/calibration cup with 0.5-1 inch of 4.00 pH buffer for short-term/overnight storage for optimal calibration conditions the next day. Place the probe sensor in the transport/calibration cup with 0.5-1 inch of potable water for long-term storage. The transport/calibration cup should be sealed to prevent evaporation. *Note: Storing the probes in dry conditions will damage the sensors.*
6. Turbidity meter use:
   a. Fill a turbidity meter sample vial with water to the fill indication line. Cap the vial securely.
   b. Dry the outside of the sample vial. Line the arrow or alignment indication line on the vial with the arrow or alignment indication line on the turbidity meter. Push the vial all the way into the sample vial port. Ensure that the cap/cover is closed all the way.
   c. Ensure that the turbidity meter is on a level surface and will not be disturbed during the analysis process. Press the Read key. Do not disturb the turbidity meter or open the cap/cover during reading.
   d. Record the value provided. If the reading seems inaccurate, ensure that the sample vial is dry and does not have any streaking or staining and re-read the sample.

Water & Environmental TECHNOLOGIES

SOP-7

FIELD SAMPLE FILTRATION

INTRODUCTION

The purpose of field sample filtration is to filter sediments and other foreign materials out of aqueous samples destined for analysis of dissolved-only constituents. If an in-line filter is unavailable, use the equipment and follow the procedures outlined below.

EQUIPMENT

- Filters; 0.45 (micro)m mesh, 47 mm diameter
- Tweezers/tongs
- Squirt bottle filled w/ deionized water
- Filtration funnel w/ magnetic base and rubber stopper
- Hand pump
- Flask, 1000 ml nalgene or equivalent w/ tubing port
- Clear plastic tubing to fit flask port, approximately 2'
- Temporary sample container filled with sample water as per SOP # GW-060
- Sample container (cubitainer) with label and green marking as per SOP # GW-060, Appendix A

PROCEDURES

Rinse the filter funnel and flask with distilled water or excess sample water.

1. Separate the funnel into its top and bottom portions.
2. In a wind-free environment, use the tweezers to separate a filter disc (white) from its wrapper and protector and place the filter on the bottom portion of the magnetic funnel. Do not touch the filter with your fingers – fingers can impart oil, dirt, or other contaminants to the filter. A drop of rinse water on the funnel screen (on the bottom portion of the funnel) will help keep the filter in place. Reconnect the top and bottom portion of the funnel. *Note: if a filter disc has been left on the screen from the previous sample, be sure to remove it before emplacing the new filter and decontaminate equipment, as necessary.*
3. Connect the funnel to the flask by inserting the rubber stopper on the bottom portion of the funnel into the flask neck.
4. Connect the hand pump and tubing to the flask tubing port.
5. Pour a small amount (50-100 mL) of sample water into the filter funnel.
6. Squeeze the hand pump until the sample water is pulled through the filter.
7. Rinse the flask by swirling the filtered water all around the inside of the flask.
8. Discard the rinse water.
9. Fill the funnel with sample water and squeeze the hand pump until the sample water is pulled through the filter. Continue adding sample water until all of it has been filtered.
10. Fill laboratory-supplied sample container(s) with filtered sample water.
11. Preserve and store the sample appropriately for the analytical method and project requirements.

12. Take the filtration funnel apart and observe the filter paper. Note on the field data sheet the presence of any sediment or other contaminants. Leave the filter disc in place until it is time to decontaminate the funnel and collect a subsequent sample.
13. Disassemble the remaining filtration equipment and secure all equipment for transport to the next sampling site.

Water & Environmental TECHNOLOGIES

SOP-8B

GROUNDWATER SAMPLING—LOW FLOW METHOD

INTRODUCTION

These instructions are in general accordance with the United States Environmental Protection Agency (EPA) Region One Low-Stress (Low-Flow) Standard Operating Procedure (September 2017), and are applicable for using an adjustable rate submersible, peristaltic, or bladder pump with the pump's intake placed at the midpoint of a 10-foot or less well screen or an open interval. Field instruments are already calibrated. The equipment is set up according to the diagram at the end of these instructions.

EQUIPMENT

- Documentation Items:
  - Field sampling forms or field tablet with appropriate Survey123 sampling forms
  - Pens and indelible markers
- Sampling Items:
  - Sample bottle(s)
  - Preservative(s)
  - Coolers for sample bottle(s)
  - Ice for cooler(s)
  - Filter(s) (if required)
  - Laboratory-grade deionized (DI) water (for field blanks)
- Equipment/Instrumentation:
  - Water level or interface meter
  - Pump
  - Pump controller
  - Tubing (poly and silicone)
  - Appropriately sized t-splitter
  - Bailer(s) and rope
  - Multi-parameter meter (temperature, dissolved oxygen [DO], specific conductance [SC], pH, oxidation/reduction potential [ORP]) with low-flow cell
  - Turbidity meter
  - Graduated cup
- Power (if required)
  - Generator
  - Air compressor
  - Fuel
- Investigation-Derived Waste (IDW)
  - Sampling tote with elevated rack (if necessary)
  - Five-gallon bucket(s)
  - Purge water tank (if necessary)
  - 2L graduated cylinders (for decontamination)
  - Decontamination liquids (tap water, laboratory-grade detergent, distilled or DI water, acids, etc.)

All sampling equipment shall be inspected for damage and repaired, if necessary, prior to arriving on-site.

GENERAL PROCEDURES—PURGING

1. Review well installation information. Record well depth, length of screen or open interval, and depth to top of the well screen. Determine the pump's intake depth (e.g., mid-point of screen/ open interval).
2. On the day of sampling, check security of the well casing, perform any safety checks needed for the site, and set up the equipment.
3. Check well casing for a reference mark. If missing, make a reference mark on the northern side of the casing and notate in the field sampling form. Measure the water level (initial) to 0.01 ft. and record this information.
4. Measure product level, if present, and water level and record this information on the field sampling form. For wells of 2-inch diameter or less, the water level or interface meter will have to be removed from the well to install the pump, but then lowered back down the well after the pump is installed to monitor water level during the purge.
   a. If free product is present, the well is not to be sampled.
   b. If the water column is less than the length of the pump being used, or 12" if using a peristaltic pump, bailing the sample is the best option. See step 6c for bailing instructions.
5. Install the pump's intake to the appropriate depth (e.g., midpoint) of the well screen, which is often the midpoint of the screen interval for fully submerged well screens, or at the midpoint of the portion of screen penetrating the saturated zone for well screens straddling the water table.
   a. a. Attach the pump discharge line to the t-splitter.
   b. b. Attach tubing between the other side of the t-splitter to the lower stem of the multi-parameter meter low-flow cell.
   c. c. Attach tubing to the lower part of the t-splitter and either a valve end or a clamp on the end of the tubing. This is for turbidity readings, as they must be collected prior to entering the low-flow cell.
   d. d. Attach tubing from the upper stem of the multi-parameter meter low-flow cell and run it to a purge tank or bucket.
6. Start the pump and monitor the water level to assess if drawdown is occurring.
   a. a. Slow the rate if drawdown occurs until water level holds stable or is drawing down slowly enough that it will not exceed the 0.33 ft max or below the top of the well screen.
   b. b. If the rate cannot be lowered enough to avoid excess drawdown (>0.33 ft), then record this deviation in the sampling form. If the water level stabilizes after exceeding 0.33 ft, calculate the volume of water between the initial water level and the stabilized water level and purge at least that amount of water before collecting a sample.
   c. c. If the well runs dry or the water level gets to a point where the pump can no longer produce water, then a bailer can be used. Collect samples for containers in order of priority, and if enough water is left in the well, collect a sample for the multi-parameter storage cup for a single set of parameters.
   d. d. Once the water level is stable, record the pump settings and purge rate using a graduated cup and a timing device. *Note: Flow rate should not exceed 500 mL/min.*
7. After starting the pump, turn on the multi-parameter and turbidity meters and take readings every three to five minutes. Three consecutive readings must be within stabilization criteria before collecting a sample. Stabilization criteria may be set by the specific project, but otherwise, use the stabilization criteria defined in table 1 below.

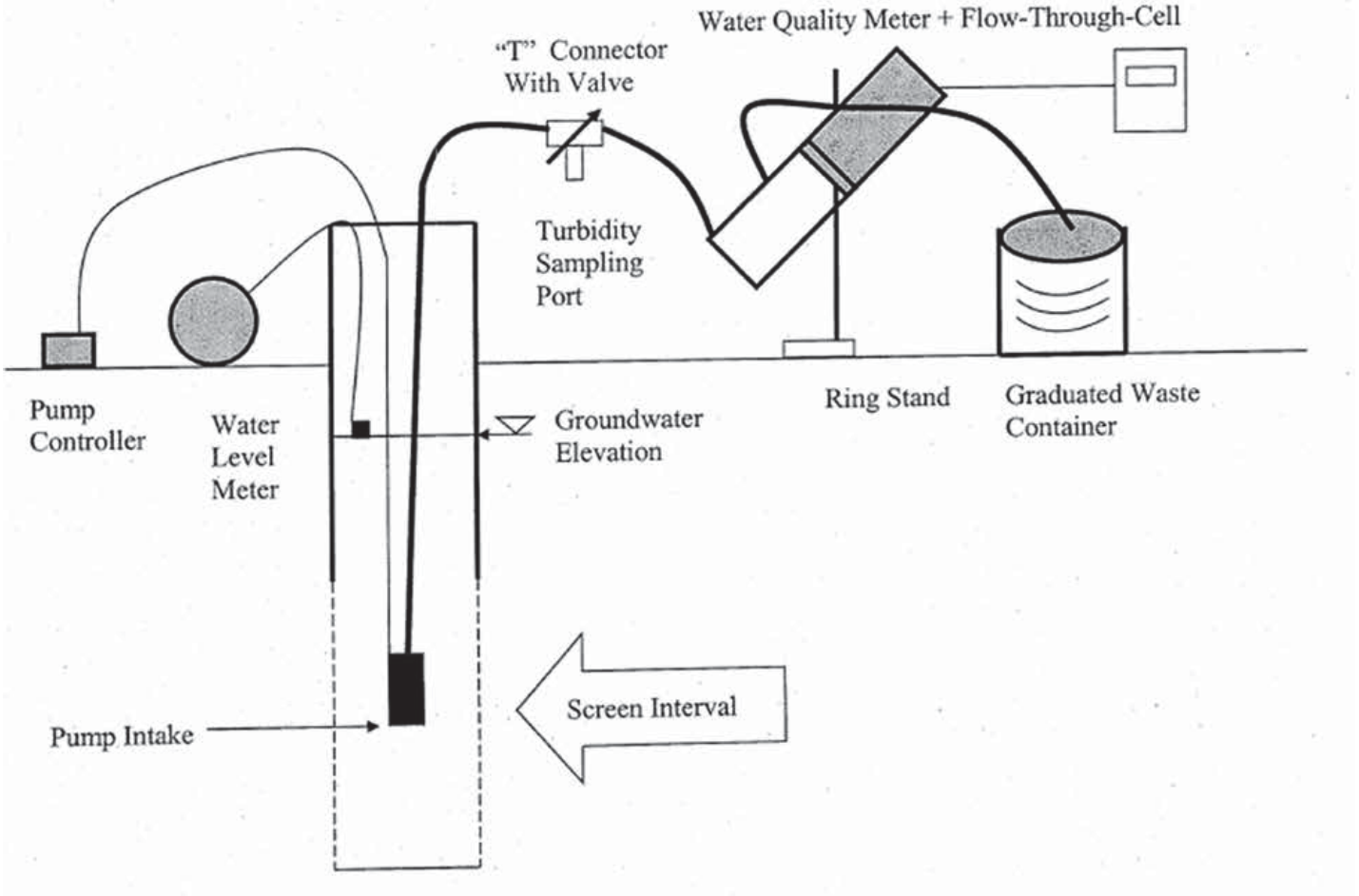
Table 1. Stabilization Criteria

Parameter	Unit	Stabilization Criteria	Exception
Dissolved Oxygen (DO)	milligrams per liter (mg/L	10%	<0.50 mg/L
Oxidation/Reduction Potential (ORP)	millivolts (mV)	±10 mV	
pH	standard units (s.u.)	±0.1 s.u.	
Specific Conductance (SC)	microsiemens per centimeter (µS/cm)	3%	
Turbidity	nephelometric turbidity units (NTU)	10%	<5 NTU

If these parameters do not stabilize by 30 minutes since start of purge, collect the sample and note a deviation of non-stabilized parameters and list which ones in field documentation.

8. Once criteria is met to collect a sample, turn off the multi-parameter and turbidity meters and disconnect the pump discharge tubing from the t-splitter and begin collecting water in the sample containers in order of priority. Collect, preserve, close, and store samples as soon as possible and according to the analytical method(s). *Note: Make sure sample collection takes place over a containerized area (sampling tote or bucket) so that spills are captured.*
    a. If collecting samples for organic compounds, including petroleum hydrocarbons, ensure that all engines (vehicles, generators, etc.) operate 20 feet downwind of the sampling area. Engines will be shut down prior to opening sample collection containers. During sample collection, pumps and meters should be powered using the vehicle battery or a portable battery. Use of disposable gloves will be used whenever fueling generators, to eliminate the possibility of cross-contamination of samples.
    b. Volatiles and dissolved gas analysis samples should be collected first, followed by semi-volatile organic compounds, then inorganic parameters, as required by the sampling and analysis plan.
    c. Field duplicate samples should be collected in conjunction with the natural/original/parent sample.
    d. Field equipment rinse samples should be collected in the same manner as a natural sample, after the decontamination process.
    e. Field blank samples are collected by pouring laboratory-grade DI water into sampling containers.
9. Once samples are collected, acquire a final depth-to-water measurement, and turn off the pump. Record the total purged volume by calculating the time from pump start to stop with the purge rate. Remove the pump from the well and decontaminate the sampling equipment.

Low-Flow Setup Diagram



SOP-10

MONITORING WELL CONSTRUCTION

INTRODUCTION

This guideline describes procedures to construct and develop monitoring wells. Monitoring well construction will be completed by a licensed monitoring well contractor and be completed consistent with applicable state and local requirements, such as Administrative Rules of Montana - Montana Board of Water Well Contractors guidance (ARM 36.21.801 to 809) for work in Montana.

Monitoring wells logs will be completed by contractor licensed in the state in which the work is being conducted, and submitted to the appropriate agency, such as defined by Montana Code Annotated (MCA 85-2-516) for work in Montana.

Equipment

- Drill rig
- Schedule 40 polyvinyl chloride (PVC) blank casing
- Schedule 40 PVC slotted casing of appropriate slot size
- Schedule 40 PVC threaded and slip caps
- Schedule 40 stainless steel blank casing
- Schedule 40 stainless steel, wire-wrapped casing, of appropriate slot size
- Stainless steel threaded and slip caps
- Stainless steel well centralizers (for deep wells)
- Mild steel isolation casing with welded centralizers
- Locking standpipes
- Ground-level, traffic-rated, watertight well housing enclosure
- Locking expansion plugs
- Combination or key lock
- Filter pack sand
- Type I or II Portland cement
- Concrete
- Bentonite powder
- Bentonite pellets or chips
- Personnel and equipment decontamination supplies
- Personal protective equipment as specified in the Site-Specific Health and Safety Plan (HASP)

Procedures

1. Arrive on-site with the appropriate drilling equipment and materials for site conditions. The driller shall properly decontaminate all drilling equipment and materials prior to arrival on-site. Decontamination usually includes steam or hot water cleaning methods.

2. Drilling muds or drilling solutions of any kind are not to be used during drilling activities in conjunction with monitoring well construction. Acceptable drilling techniques include air-rotary, cable tool, roto sonic, hollow-stem auger, and direct-push methods. If unconsolidated material is encountered, it may be necessary to drive steel casing during drilling to maintain borehole integrity. Hydraulic jacks or the drill rig can be used to pull back the steel casing following emplacement of well casing.

3. A detailed lithologic / well log shall be completed during drilling activities. Water bearing characteristics and lithologic formations should be denoted on the log. In addition, details of monitoring well construction should also be described on the well log including total depth, perforated interval, sizes, and types of construction materials, etc.

4. After completing a boring, verify the monitoring well screen and blank casing specifications stated in the task-specific work plans (if applicable). Assemble and install the monitoring well screen and blank casing through the center of the hollow stem auger, drive casing, or open boring. The assemblage typically consists of a slotted section of threaded Schedule 40 PVC or stainless-steel wire-wrapped screen with a threaded bottom cap and a threaded blank section of well casing long enough to reach the ground surface (or higher if a standpipe monument is used). Affix a slip cap or watertight expansion plug to the top of the casing during installation to prevent debris from entering the well. Typically, the casing string is held in tension and supported with a wire line while it is being lowered into the boring and, if possible, while the drilling string is being removed.

5. If appropriate based on formation characteristics, place clean, appropriately sized, commercial sand (filter pack) around and to 2- or 3-feet (as specified in the task specific work plans) above the slotted section of the monitoring well casing. If pre packed screens are used, it may not be necessary to place extra sand above the pre-packed screened casing. However, this step may still be appropriate to prevent well-seal materials from entering the filter-pack. Carefully pour the filter pack through the drill string annular space as the auger, direct-push rods, or temporary casing is removed from the boring. If possible, use a measuring device to observe the height of the sand column and monitor for bridging of the material.

6. Place a 2- to 3-foot-thick bentonite seal, or as described in scope of work, above the sand or natural filter-pack while the auger and/or conductor casing is removed from the boring. If required by a well construction permit, notify the appropriate inspector before placing the well seal.

7. Fill the remainder of the annulus between the well casing and the borehole wall with bentonite chips, cement/bentonite grout (with approximately 5 percent bentonite), or a high-solids bentonite slurry (typically 11 to 13 pounds per gallon), to a depth of approximately 1-foot bgs. If the water level is higher than the seal, use a tremie pipe to place the grout/slurry. In sand and gravel formations, a minimum of 10-feet of surface seal shall be used unless the zone of monitoring is higher.

8. Install a protective well monument over the casing.
   a. For a flush-mounted monument, cut off the blank well casing so that it is approximately 4-inches below the ground surface (unless otherwise specified by local requirements). Install a threaded cap or a locking, watertight, expansion plug on the monitoring well. Cover the casing opening and pour rapid-setting cement into the upper foot of the boring around the casing. Set a traffic-rated, pre-cast concrete or steel, well enclosure with a watertight rubber seal into the cement (to approximately 1-foot bgs), with the upper rim of the monument extending above grade (unless otherwise specified by local requirements). Construct a concrete apron around the monument to direct precipitation runoff away from the well.

   b. For aboveground completion, extend the well casing to a sufficient height above the ground surface (2- to 2.5-feet) (unless otherwise specified by local requirements). Pour cement into the upper 1-foot of the well boring and install a 5- to 6-foot-long, locking, steel well housing in the cement around the well casing so that the monument extends approximately 2- to 3-feet bgs. Construct a circular or square concrete pad (approximately 4-square-feet) around the monument and extending approximately 4-inches above grade. Install at least three traffic bollards (at least 3-inches in diameter) around the well monument pad in a triangular array if the well is in an area where vehicular traffic may reasonably be expected. Install a threaded cap or a locking, watertight, expansion plug on the monitoring well and a padlock on the monument lid hasp.

Water & Environmental TECHNOLOGIES

SOP-13

MONITORING WELL DEVELOPMENT

EQUIPMENT

- 2- or 4-inch-diameter vented surge block
- Centrifugal surface pump
- Submersible pump (4-inch-diameter wells or larger)
- 55-gallon Department of Transportation (DOT)-approved drums
- Teflon®, stainless steel, or PVC bailer
- Teflon®-coated bailer retrieval wire
- Airlift pump with foot valve and compressor
- Bladder pump (2-inch-diameter wells only)
- Electric water level monitoring probe
- Multi-phase interface monitoring probe
- Multi-parameter water quality meter
- Sample labels, pens, and field logbook or other appropriate field forms (e.g., groundwater well development form)
- Personnel and equipment decontamination supplies
- Personal protective equipment as specified in the Site-Specific Health and Safety Plan (HASP)

PROCEDURES

1. After allowing the well seal and monument to cure for a sufficient period, develop the well unless development will compromise the potential usability of the well or exacerbate turbidity problems. [Note: In general, wells containing light non-aqueous phase liquid (LNAPL) should not be developed.] The purpose of developing a monitoring well is to remove drilling fluids and fines from the borehole/filter pack.
2. Prior to development activities, measure and record the total casing and groundwater depth.
3. If applicable, evaluate the well for the presence of LNAPL.
4. If the depth to water in the monitoring well is less than 25 feet bgs, the well may be developed using a centrifugal surface pump with flexible, discharge tubing. If the depth to water in the well is greater than 25 feet bgs, a submersible impeller or airlift pump (with an oil trap and filter) may be used. In some cases, a well may be developed by hand bailing using either a pre-cleaned stainless steel or PVC bailer.

   A surge block of appropriate size can be moved up and down inside the screened section of the well casing to create a surging action that hydraulically stresses the filter pack. When an impeller pump is used for development, the pump itself can be moved up and down in the casing to create a surging action.

5. During development of the well, record the following water quality parameters and observations on a groundwater well development form:

- Depth to water
- Development time and volume
- Development (flow) rate
- pH, temperature, specific conductance, and turbidity
- Other observations, as appropriate (e.g., color, presence of odors, or sheen).

6. Continue developing the well until water quality parameters have stabilized and the turbidity of the discharge water is low.

Note: If fine-grained materials are present, low turbidity may not be achievable. Stop development if the development process is causing an increase in the turbidity of the produced groundwater.

7. Follow personnel and equipment decontamination procedures outlined in SOG-2.

Note: It is customary to wait 1 to 3 days after developing a well before sampling; however, the appropriateness of sampling a well after development should be determined on a case-by-case basis. In general, wells completed in highly transmissive formations can be sampled immediately following development without concern that development will introduce bias into sampling results.

Water & Environmental
TECHNOLOGIES

SOP-16

QUALITY CONTROL SAMPLING

Quality Control (QC) samples are submitted along with natural samples to provide supporting laboratory data to validate laboratory results. QC samples are submitted blind except for matrix spikes and trip blanks, and do not have any unique identifying codes that would enable the lab or others to bias these samples in any way. Usually, the time or sampling location is modified in a way which will separate blank and standard samples from the rest of the sample train. QC samples are identified only on field forms and in field notebooks. The following codes are typically used:

N	Natural Sample	Soil, water, air, or other of interest material from a field site
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 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 Spike Duplicate 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.

In general, selected QC samples will be inserted into the sample train within a group of twenty samples. QC samples will be prepared in the field, apart from trip blanks. Trip blanks will be supplied by the laboratory and will accompany each sample cooler containing samples for analysis of volatile organic compounds.

Typical QC sample collection frequencies are presented in the table below. However, at some sites, especially ones where streams or ponds are sampled, QC samples may need to be taken at a higher frequency. Refer to the project-specific sampling and analysis plan or quality assurance plan for the appropriate QC sample frequency. 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 type
Field Blank	Assess possible cross-contamination of samples due to ambient conditions during sample collection	1 per sampling event
Trip Blank	Evaluate sample preservation, packing, shipping, and storage	1 per cooler containing samples with volatile constituents

Methods for computing data validation statements can be found in EPA documents or obtained from Geomatrix.

Water & Environmental TECHNOLOGIES

SOP-17

MANAGEMENT OF INVESTIGATION-DERIVED WASTE

INTRODUCTION

This SOP describes the management of investigation-derived waste (IDW). The project specific Sampling and Analysis Plan should be referenced for additions or deletions to the methods noted below.

EQUIPMENT

- Department of Transportation (DOT)-approved packaging (typically DOT 17E or 17H drums) or other appropriate containers
- Funnel
- Bushing wrench
- 15/16-inch socket wrench
- Shovel
- Appropriate markers (spray paint, paint pen) and labels
- Plastic sheeting
- Drip pans
- Pallets
- Personal protective equipment as specified in the Site-Specific Health and Safety Plan (HASP)

PROCEDURES

Preparing Containers

1. Place each container on a pallet if it is to be moved with a forklift after it is full.
2. Ensure that packaging materials are compatible with the wastes to be stored in them. Bung-type drums should be used to contain liquids. If a liquid is corrosive, a plastic or polymer drum should be used.
3. Solids should be placed in open-top drums. Liners are placed in the drums if the solid material is corrosive or contains free liquids (other than water). Gaskets are also used on open-top drum lids.

KNOWN OR ASSUMED NON-HAZARDOUS WASTE

1. As waste materials are generated, place them directly into storage containers. Alternatively, depending on quantity, soils may be contained onsite on plastic sheeting and covered pending analytical results. In certain instances, if it is known that the IDW is not hazardous, it can be disposed of onsite (e.g., dispose the purge water on the ground, place soils back into test pits).
2. If the IDW is placed into a container, do not fill storage containers/drums completely. Provide sufficient space so that containers will not be overfull if their contents expand.
3. After filling a storage container/drum, seal it securely. Use a bung wrench or socket wrench, for a bung-type or open-top drum, respectively.
4. Label the container indicating its content, date, and origin/location.
5. If it is known that the IDW is not hazardous, arrange for disposal of the IDW as a solid waste.

6. If no information exists as to determine whether the IDW is hazardous (e.g., records, analytical results, of other knowledge of the IDW properties), the IDW must be profiled to determine disposal options.
7. To profile the waste:
   a. Contact the proposed disposal facility to obtain the type of information the disposal facility will need before accepting the IDW, including necessary analytical data.
   b. If analytical data are needed, collect a sample or samples of the IDW and submit to an analytical laboratory.
   c. Upon receiving the analytical results, arrange for the proper disposal of the IDW.

Note: The disposal facility will rely on you to provide information regarding the types of constituents that may be present in the IDW.

HAZARDOUS WASTES

1. As waste materials are generated, place them directly into storage containers.
2. Do not fill storage containers/drums completely. Provide sufficient space for expansion.
3. After filling a storage container/drum, seal it securely. Use a bung wrench or socket wrench, for abung-type or open-top drum, respectively.
4. Label drums or other packages containing hazardous waste. To comply with marking and labeling requirements, affix a properly filled out yellow hazardous waste marker. Do not mark drums with Water & Environmental Technologies' name. All waste belongs to the client. Include the accumulation start date on the label.
5. During an ongoing investigation, use a paint marker to mark the contents, station number, date, and approximate quantity of material on each drum or other container.
6. Do not mix IDW with one another or with other materials. Do not place items such as Tyvek® suits, gloves, equipment, or trash into drums containing soils or liquids, and do not mix water and soil. Disposable protective clothing, trash, soil, and water materials should be disposed of in separate containers.
7. Place the containers in a secured area equipped with a secondary containment system, if appropriate.
8. While storing the IDW, the substantive standards in 40 Code of Federal Regulation (CFR) Parts 264 and 265 Subparts I and J or State equivalent must be complied with.
9. Dispose the IDW upon completion of the field work or incorporate the IDW into the remedial action upon initiation of the final remedy. If the IDW will be disposed offsite, the IDW will need to be manifested for transportation in accordance with federal or state requirements.

SUPERFUND REQUIREMENTS

Testing and management of IDW originating from within a Superfund area, such as operable of the Butte/Anaconda NPL Sites, must be addressed in Site-Specific SAPs.

REFERENCE

Montana Department of Environmental Quality. (Undated). Technical Guidance Document #10 - Options for Discharge of Hydrocarbon-Contaminated Wastewater. Montana Department of Environmental Quality, Remediation Division, Petroleum Release Section, Helena, Montana.

Appendix B

Regenesis Remedial Design and Proposal

REGENESIS

Technology-Based Solutions for the Environment

PROJECT NAME

Former Planet Motors Facility

1800 Prospect, Helena MT

PREPARED FOR

Water & Environmental Technologies
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PREPARED BY

REGENESIS
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July 10, 2024

Project Summary

REGENESIS appreciates the opportunity to provide Water & Environmental Technologies our remedial design and cost estimate for the Former Planet Motors Facility project. This proposal includes an overview of our proposed appproach, the project goals, technologies proposed, application design summary table and a treatment area map.

Proposed Solution

We propose the implementation of PetroFix Remedial Fluid to remediate dissolved phase hydrocarbons at your project site.

Project Goals

- Remediate groundwater to State Cleanup Objectives in Wells PM-1R, PM-5 and PM-3
- Reduce downgradient migration of plume in the area of PM-3

Design Assumptions

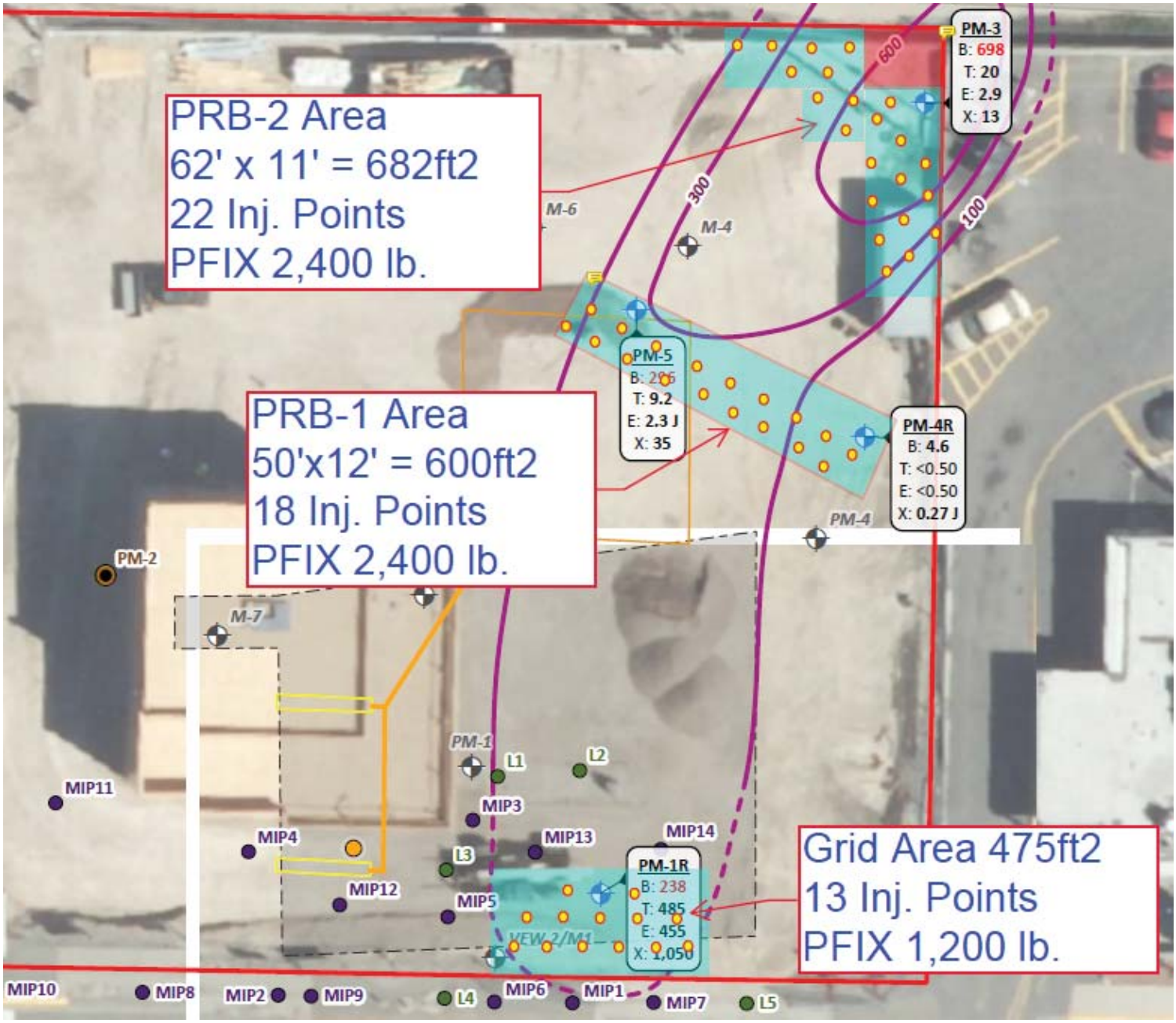
- Approach is limited areas as represented by existing wells PM-1R, PM-3 and PM-5.
- Hydrocarbon distribution and concentrations in groundwater will not increase above those provided on Figure 5 dated February 26, 2024.
- Injection can be performed by Standard Direct Push Injection (DPI) methods.
- In areas those areas of the site that are inaccessible via standard DPI methods, Water & Environmental Technologies (WET) will be in charge of gaining access by auger drilled borings completed with sand in the Target Treatment Zone (TTZ) and appropriately installed and cured seal to surface. Alternatively in those accessible areas WET will advance DPI tooling to the TTZ depth and applied as typical.

Design Summary

PetroFix Grid 1		
Design Parameters	**Unit**	**Value**
Treatment Area	ft	475
Top Treat Depth	ft	20
Bot Treat Depth	ft	30
Vertical Treatment Interval	ft	10
Soil Type		Mix of Coarse and Fine
Observed Mobile LNAPL		No
Total BTEX	mg/L	2.23
Application Summary		
Spacing Within Rows	ft	6
Spacing Between Rows	ft	6
Injection Points		13
Product Dosage		
PetroFix Remedial Fluid	lb	1,200
Electron Acceptor Blend	lb	60
Water Required	gallons	3,562
Total Volume Applied	gallons	3,685

PetroFix PRB-1		
Design Parameters	**Unit**	**Value**
Barrier Length	ft	50
Top Treat Depth	ft	20
Bot Treat Depth	ft	30
Vertical Treatment Interval	ft	10
Soil Type		Mix of Coarse and Fine
Total BTEX	mg/L	0.73
TPH-G	mg/L	3.00
Application Summary		
Number of Rows		2
Spacing Between Rows	ft	5.0
Spacing Between Points	ft	6.0
Injection Points		18
Product Dosage		
PetroFix Remedial Fluid	lb	2,400
Electron Acceptor Blend	lb	120
Water Required	gallons	4,931
Total Volume Applied	gallons	5,177

PetroFix PRB-2		
Design Parameters	**Unit**	**Value**
Barrier Length	ft	62
Top Treat Depth	ft	20
Bot Treat Depth	ft	30
Vertical Treatment Interval	ft	10
Soil Type		Mix of Coarse and Fine
Total BTEX	mg/L	0.73
TPH-G	mg/L	3.00
Application Summary		
Number of Rows		2
Spacing Between Rows	ft	5.0
Spacing Between Points	ft	6.0
Injection Points		22
Product Dosage		
PetroFix Remedial Fluid	lb	2,400
Electron Acceptor Blend	lb	120
Water Required	gallons	5,219
Total Volume Applied	gallons	5,464



Former Planet Motors Facility

Water & Environmental Technologies

Figure 1-Treatment Area Map

REGENESIS
Technology-Based Solutions for the Environment

Technical Approach

Site Specific Recommendations

Due to geologic conditions it is unclear if direct push methods will reach the desired target treatment interval of 20 ft. to 30 ft. Below Ground Surface (BGS). We understand that in parts of the site cobbles and related soil conditions have caused Direct Push refusal above the Target Treatment Zone.

We advise that WET perform a series of Direct Push Feasibility Tests in each of the applications areas provided on Figure 1 to determine if and where Direct Push Methods can achieve depths of 30 feet BGS. We recommend that multiple tests in each work area be performed. These test should be placed parallel to PRBs at regular intervals along width of each PRB with the objectives of determining where Direct Push Methods can achieve the target depths.

- If the DP Methods fail to reach the target depth then WET should plan to define where in each work area the depth and extent of the refusal with in the work area.
- Upon determination of the areas of refusal in WET should plan to drill to the target depth using 4 inch hollow stem augers and upon clearing the boring to back fill the Target Treatement zone (20-30 ft BGS) with a clean sand pack and backfill with a bentonite slurry to surface. A minimum of 1 week should be allowed for the bentonite to cure before injection.

Estimated Flowrates and Pressures

PetroFix is designed to be applied at low to moderate pressures, typically in the range of 20-80 PSI and 2-10 GPM. Higher injection pressures may sometimes be needed on some sites, but precautions should be taken to avoid fracture emplacement or surfacing when close to ground surface.

Injection Point Spacing

PetroFix distribution is the most important aspect of the application process, and injection point spacing can be a critical step in the success of the injection and the achievement of proper PetroFix distribution. The injection point spacing provided by REGENESIS should be the distance between injection locations, not the distance from a monitoring location. In grids and barriers containing multiple rows, Regenesis recommends staggering rows like in the example layout below to limit the potential for gaps in the treatment area. A recommended injection array for the 3 application areas is provided on Figure 1.

In injection grids, the grid should be positioned centered upon the most contaminated monitoring well or other sampling location. This will help ensure that these contaminated areas are treated from all angles. In the case of barriers, injection points should be positioned immediately upgradient of the sampling location, with the sampling location still comfortably within the estimated radius of influence.

Monitoring Parameters

To measure performance at your site, we recommend the following analytical parameters be collected at all monitoring locations constructed in or within 10 ft of the planned treatment areas. The recommended PetroFix Monitoring Parameters (see next page) should be recorded for at least one sampling event before the application of PetroFix to establish a baseline as well as sampling events following the application of PetroFix. The recommended parameters are all that are needed for most sites. If you seek to identify microbial response post application, we recommend including methane, CO2, and QuantArray-Petroleum on the optional list at locations where PetroFix has been confirmed to have been distributed. Please contact REGENESIS for questions.

Analytical Parameter	Method
Recommended	
Contaminants of Concern (COC's)	Varies by site. Recommend a minimum of BTEX analysis plus Total Petroleum Hydrocarbon (TPH) measurements for gasoline (TPH-G) and/or diesel range contamination (TPH-D) based on contaminant source.
pH	Meter reading taken in flow-through cell (DO can also be measured with a Hach kit)
Dissolved Oxygen (DO)	
Oxidation Reduction Potential (ORP)	
Electral Conductivity (EC)	
Cations - Ca, Mn, Al*	EPA Method 6010
Sulfate	EPA 375.3 or EPA 9056
Nitrate	EPA 353.1 or EPA 9056
Visual Confirmation of PetroFix in Wells**	Place groundwater sample in 40 mL VOA for inspection. PetroFix shipments come with a field concentration test kit taped to the top of a drum or a tote. See the groundwater sampling guidance document via the hyperlink at the bottom of the page for more information.
Optional	
Total Fe	Colorimetric Hach Method or EPA 6000 series with filtered and unfiltered samples
Total Mn	
Dissolved Fe	
Dissolved Mn	
Sulfide	EPA 376.1
Chemical Oxygen Demand (COD)	EPA 410.1-.2
Biological Oxygen Demand (BOD)	EPA 5210B
Methane and CO_2	ASTM D1945
Evaluation of biodegradation response through measurement of functional genes	QuantArray Petroleum

Regenesis recommends that baseline samples of all monitoring parameters be taken before injection. Please check any state-specific underground injection control (UIC) guidelines for parameters that may also need to be collected, but are not included in this table.

*Cations listed are recommended for applications involving dedicated well injection or borehole injection.

As is normal in any injection PetroFix may flow into adjacent wells during application. Observation in wells is helpful in knowing that you are achieving product distribution. As an option, PetroFix can be flushed from wells post injection with a clearwater flush. PetroFix normally takes a few weeks/months to attach to soils and clarify from groundwater and sampling precautions should be taken if sampling is needed during the attachment phase. **Helpful technical bulletins on post-application groundwater sampling, well flushing, and other information are provided online per the resource section link below.

Pricing

Below is the cost estimate to provide the remediation technologies and execute the application design provided in this proposal. Please also see the assumptions and qualifications section.

Description	Price	Qty	Subtotal
PetroFix Totes (2000 lb)	$5.57	6000	$33,420
PetroFix EA Blend Pail (20 lb)	$0	280	$0
Shipping (Estimated)			$4,063.92
Remediation Services Includes mob/demob, injection trailer and crew for 6 days on-site			$44,128
Total			**$81,611.92**

Electron Acceptor Blend (a mix of ammonium sulfate and sodium nitrate) is included in the price of PetroFix.

The cost provided above is inclusive of all product, estimated product freight, product mixing, injection services as outlined within this proposal, tax and materials to complete the work. We will submit invoice(s) when product ships and upon project completion or end of calendar month for remediation services. **Payment terms are Net 30 days upon invoice submittal. Should payment terms be extended beyond 30 days, finance charges may be applied.**

Please note that this pricing is contingent upon completion of this scope of work without delays or work stoppages once mobilization occurs. RRS has allotted **six (6)** on-site working days (10-hr days, Monday through Friday) to apply the remediation technologies. RRS believes the scope of work provided above can be completed in this timeframe proposed, however, if the project is delayed due to circumstances beyond our control, RRS will utilize a daily rate of **$5,000.00** plus applicable tax to the invoice price. Should the project be completed ahead of schedule, a portion of the daily rate may be credited to the final invoice after review. RRS reserves the right to modify the design and associated cost if additional information gathered warrants modification.

COST ESTIMATE DISCLAIMER: The cost listed assumes conditions set forth within the proposed scope of work and assumptions and qualifications. Changes to either could impact the final cost of the project. This may include final shipping arrangements, sales tax or application-related tasks such as product storage and handling, access to water, etc. If items listed need to be modified, please contact Regenesis for further evaluation.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those who completed the earlier environmental site assessment(s), and in reliance upon REGENESIS' prior experience on similar project sites. The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity that seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity that seeks reimbursement from Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the government.

PROFESSIONAL JUDGEMENT: In generating this estimate, REGENESIS relied upon professional judgment and site-specific information provided by others. Using this information as input, we performed calculations based upon the known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to effect remediation of the site.

Technology Overview

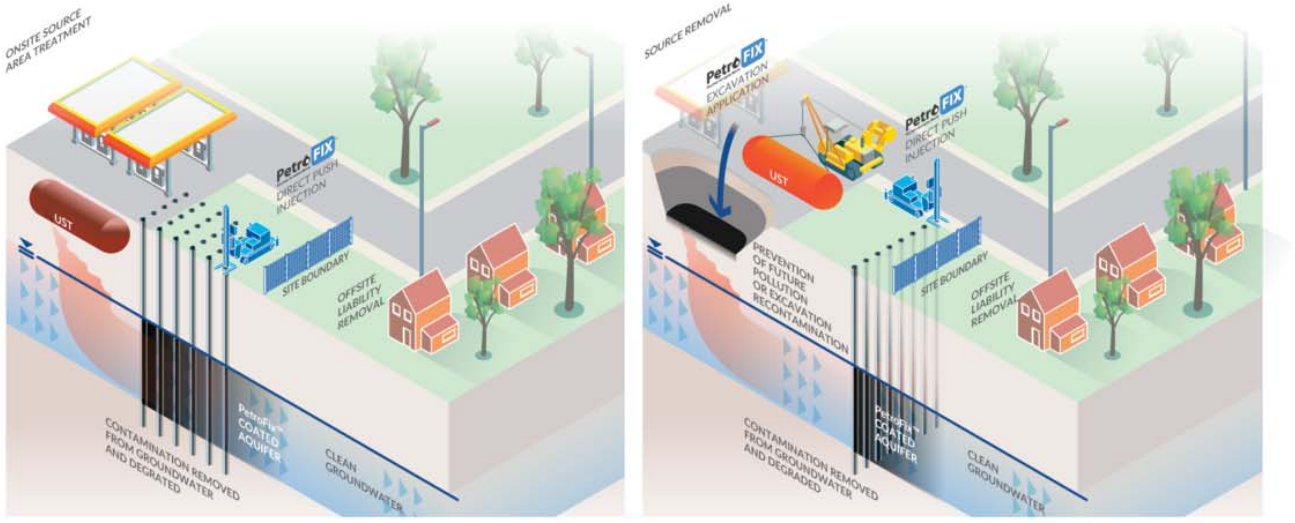
PetroFix is a unique activated carbon remedial fluid (carbon milled to a diameter of 1 to 2 micrometers) paired with soluble, anaerobic electron acceptors designed to remediate dissolved hydrocarbons. This allows the product to be injected as a fluid using low pressure. PetroFix is commonly used for source and plume treatment, excavation polishing, and barrier applications. PetroFix features:

- Provides rapid and sustained results allowing for faster and more certain site closure
- Dual-technology approach relies on both carbon sorption and anaerobic biodegradation
- Low-pressure "flooding" vs high pressure "fracturing" improves distribution and reduces surfacing
- Safe to handle because is non-hazardous and shipped as a liquid (no fugitive carbon dust)
- Mitigates hydrocarbon back diffusion which is a cause of concentration rebound

PetroFix is typically self-applied and is supported by a large library of application instruction, technical bulletin, and videos. Based on our experience at hundreds of sites we have developed recommendations listed in a hyperlinked planning document included in the following sections. Below are links for additional technologies information:

PetroFix - An Animated Overview

PetroFix - All Webinars



Storage

While PetroFix has a multiple month shelf-life while stored in proper conditions, it is recommended to deliver PetroFix as soon to the planned application as possible.

How to store for immediate use:

- Out of direct or prolonged sunlight
- Prevent freezing conditions
- Do not store in temperatures exceeding 90 degrees for greater than three weeks

Additional information on long term storage can be found in the PetroFix Technical Memo: Freezing and Hot Weather Handling document. Proper prolonged storage conditions include:

- Shade - no direct sunlight
- In original CLOSED containers
- Between 40 - 90^{o}F
- Well ventilated

PetroFix Test Kit

Each shipment of PetroFix comes with a quantitative test kit. These test kits should arrive taped to the tops or sides of PetroFix or associated electron acceptor containers upon shipment. If a test kit cannot be found, please inform REGENESIS, and a replacement can be shipped to site.

These test kits are reusable if stored similar to the recommended storage conditions for PetroFix.

Test kits should be used during the PetroFix application to help determine the radius of influence and during monitoring.

RRS Statement of Qualifications

RRS provides turn-key remediation planning, design, and application services. RRS field scientists are college degreed professionals who understand the details of each remediation design, the conceptual site model, the remediation chemistry being applied, the significance of the designed amendment dosing and achieving subsurface distribution, and how a breakdown of any one of these and other factors can result in poor remediation performance. They have the unique background and experience to understand the significance of modifications made in the field.

RRS' direct management of the injection program optimizes the design and ultimately, the overall remedy performance. No one has more professional experience handling and applying *in situ* remediation products than RRS personnel.

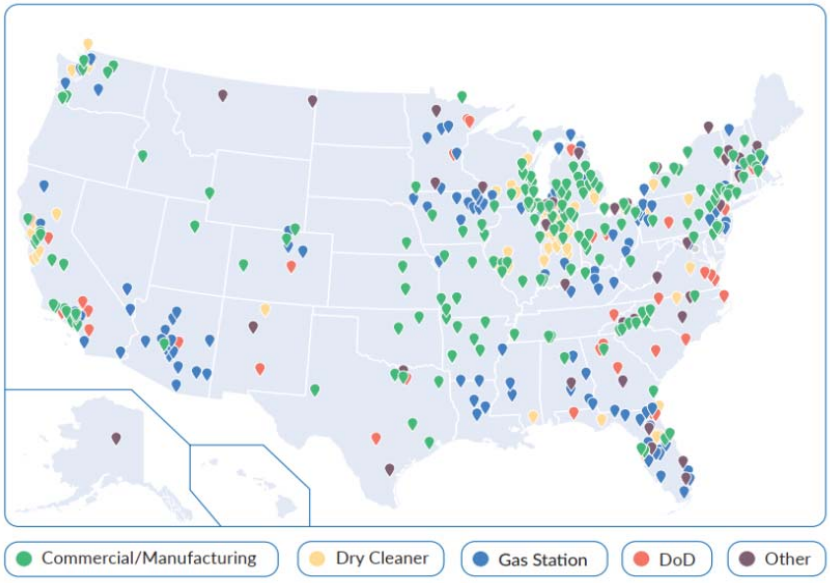
RRS has been offering industry-leading application services combined with excellence in field activity management for over a decade. We succeed by meeting the cleanup objectives established by the environmental engineering firms who contract our services. To produce this outcome, we employ field-experienced, disciplined, and dedicated project teams who work with our clients to address the unique requirements of each project site. Astute technical insight and timely, direct, and honest communication are hallmarks of RRS. Our reputation for meeting or exceeding clients' objectives has been proven in project successes throughout North America.

Further information on what sets RRS apart is provided in the following technical resources:

- RRS: Performance Driven, Results Based
- The RRS Difference
- RRS Project Experience

With decades of application experience, RRS is strategically located across the country to mobilize and assist on a wide range of sites throughout the US.

RRS consistently completes over 100 Projects annually across the US. For a current map of projects completed please click this link.



RRS Scope of Services

RRS, as part of its role, will operate under the guidance of Water & Environmental Technologies to execute the remedial actions in the field, employing the chosen remediation methodologies. The collaboration between RRS and Water & Environmental Technologies will entail joint responsibilities in carrying out this scope of work.

The distribution of responsibilities is elaborated upon in this section as well as under the Assumptions/Qualification segment. At the outset of each day, RRS will convene a safety tailgate meeting to discuss the day's objectives, procedures, assigned roles, and review health and safety concerns.

RRS will be outfitted with various injection tool alternatives compatible with the selected diameter Direct Push Technology (DPT) rods. The injection tool configuration will be advanced either to the upper or lower extent of the target treatment zone, and injections will be conducted utilizing either a bottom-up or top-down technique based on the subsurface lithology.

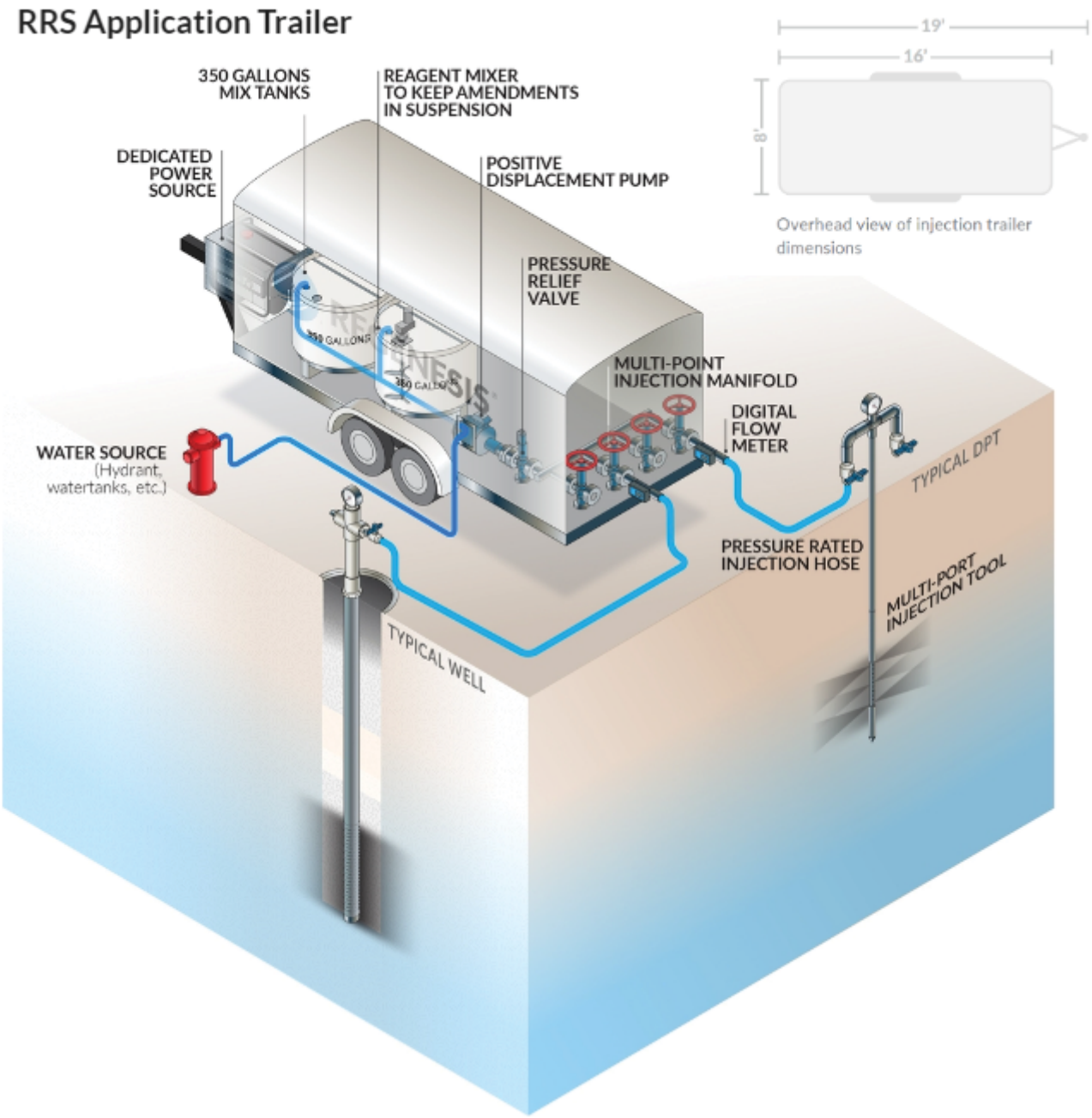
Remediation technologies will be mixed with water, utilizing a custom-built injection system (see below), adhering to the specified solution concentration. This mixture will be consistently agitated during the injection process. Parameters such as pressures, flow rates, and overall volume will be closely monitored and digitally recorded for each injection interval. To enhance efficiency on-site, simultaneous injections at multiple locations may be performed. RRS will vigilantly monitor the injection points and their surroundings for any indications of surfacing, and a spill response kit will remain on standby.

Throughout the application, real-time data will be collected and analyzed to corroborate design assumptions and the dispersion of reagents in the subsurface. Depending on the remedial agent applied, the gathered and analyzed data may encompass groundwater quality parameters (e.g., pH, conductivity, Dissolved Oxygen (DO), Oxidation-Reduction Potential (ORP), etc.), measurements of water table depth, visual indicators observed via groundwater or soil samples, and in-field concentration tests of injected substances. This data collection is typically conducted during the application process when operating within 10 feet of appropriately screened monitoring wells.

Guided by the collected information, the project team may introduce adjustments to the remediation design to enhance the injection application's efficacy. These adjustments might involve alterations in injection concentrations and volume per location.

Guided by the collected information, the project team may introduce adjustments to the remediation design to enhance the injection application's efficacy. These adjustments might involve alterations in injection concentrations and volume per location.

Upon the conclusion of the injection operation, RRS will demobilize all equipment and personnel from the site. A comprehensive injection summary report, encompassing details of injection points (interval depths, injection pressure/ flow rates, reagent volume, time elapsed, and surfacing occurrences), on-site observations, and any notable information, will be prepared and submitted to Water & Environmental Technologies.



Project Responsibilities

RRS will work with Water & Environmental Technologies to implement the scope of work associated with the application of the selected remediation technologies. Responsibilities for the implementation of this project will be shared between RRS and Water & Environmental Technologies. Responsibilities for each are listed below and further under the Assumptions/Qualifications section.

RRS Responsibilities:

- RRS will provide and ship the specified quantities of the remediation technologies to the site address provided by Water & Environmental Technologies. RRS will coordinate with Water & Environmental Technologies prior to any shipment of product.
- RRS will provide qualified and experienced 40-hour HAZWOPER-certified personnel to implement and manage the remediation application scope of work.
- RRS will provide a custom-built injection system and other miscellaneous support equipment to handle, prepare, and apply the remediation technologies during the application process.
- RRS will perform site reconnaissance and pre-application activities that include H&S orientation, sensitive receptor identification and protection, treatment area identification, and equipment staging.
- RRS will prepare a site-specific health and safety plan.
- RRS will provide site safety equipment, including cones and caution tape, to delineate the immediate work area while making efforts to limit the impact on business operations at the site.
- RRS will perform real-time reagent distribution diagnostics during injection activities to allow for field modifications, as needed, to ensure optimal results.
- RRS will monitor the injection flow rates and pressures and observe signs of reagent surfacing around active injection areas. If surfacing is detected, RRS will stop or slow down injection activities at that location to stop additional surfacing and remove/vacuum up recoverable surfaced fluid.
- RRS will work directly with our design team to fill any data gaps identified during the injection application, thereby more effectively maintaining the project objectives and goals.
- RRS will generate a detailed injection summary report upon completion of the injection event. Items to be incorporated will include injection depths, material quantities, injection flow rates and pressures, an injection location map, implementation pictures, and other noteworthy field observations.

Water & Environmental Technologies Responsibilities:

- Water & Environmental Technologies will coordinate project schedule and remediation technology order with REGENESIS to ensure adequate shipping and mobilization time.
- Water & Environmental Technologies will coordinate site access with property owner to coincide with project schedule and identify a secure product staging area.
- Water & Environmental Technologies will take delivery of the remediation technology prior to RRS mobilization and stage inside a secure location where the material will not be affected by inclement weather and is accessible by forklift or other equivalent means.
- Water & Environmental Technologies will provide the means to further maneuver product around the site (forklift or equivalent) as needed during the duration of the application activities. Product containers will need to be staged within 10 ft. of the remediation injection system.
- Water & Environmental Technologies will provide a water source (e.g., hydrant) capable of producing at least 30 gpm for the duration of the project within 300 ft. of the project staging area, at no cost to RRS. Water & Environmental Technologies will coordinate and provide a backflow preventer for on-site hydrant utilization.
- Water & Environmental Technologies will subcontract a Direct Push Technology contractor with a qualified operator and crew of sufficient size to advance the appropriate tooling to the targeted treatment depth. The Direct Push Technology contractor will be equipped with enough downhole tooling for multiple simultaneous injections, hole abandonment supplies to close boring locations to the ground surface, and other required items to complete the scope of work.
- Water & Environmental Technologies will coordinate with the Direct Push Technology contractor and request a public utility locate through the nationwide “811 call before you dig” resource to approximate the location of buried public utilities at the site.
- Should private underground utilities be within or near the treatment area, Water & Environmental Technologies will contract with a private utility locating service provider to identify and mark the approximate location prior to RRS mobilization.
- Water & Environmental Technologies will procure any necessary permits needed to complete the project including right of way, UIC and municipal.
- Water & Environmental Technologies is responsible for all soil, air and groundwater sampling and analysis.
- Should surfaced/short-circuited remediation technology material need to be containerized, Water & Environmental Technologies is responsible for the classification, transportation and disposal of the waste.
- Water & Environmental Technologies will provide a depth to water meter and field water quality meter similar to a YSI 556 with a down-hole sensor capable of reaching the water table and well screen interval while on-site for injection activities.
- Water & Environmental Technologies will provide access to a restroom during on-site hours.
- All empty product containers will be the responsibility of Water & Environmental Technologies for proper disposal/recycling. General refuse will be collected and disposed of in a Water & Environmental Technologies provided refuse container on-site.
- Any traffic control requirement beyond providing cones and caution tape is the responsibility of Water & Environmental Technologies

RRS Assumptions and Qualifications

In generating this proposal, RRS relied upon professional judgment and site-specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to estimate product quantities and subsurface placement required to achieve the remedial goals. The attached design summary tables specify the assumptions used to complete the remedial design. We request that these modeling input assumptions be verified by your firm before injection. Other assumptions and qualifications related to this proposal are as follows:

- The product and services cost outlined will be valid for 60 days from the proposal date. If beyond 60 days, RRS reserves the right to update the cost.
- The freight charges included for product delivery above are estimated at the time of proposal generation. Actual freight charges are neither set nor guaranteed by RRS and are calculated when the product order is placed. This price may vary from what is estimated above. Actual freight charges for product delivery will be invoiced.
- Freight delivery time frames cannot be guaranteed and RRS will not be responsible for any delays or increased costs associated with those delays.
- If applicable, sales tax charges for product, freight, and services are considered estimated at the time of proposal submittal. The appropriate sales tax category (i.e., product, freight, and services) and actual sales tax rate are finalized at the time of invoice and may change from date of proposal submittal.
- RRS will have access to the site for equipment operation and secure storage of materials and equipment throughout the project duration. Access to each work area location will be clear and free of obstructions. RRS also assumes the injection trailer can be staged within 80 feet of the furthest injection point location.
- For safety reasons, access to the treatment area will be limited to RRS and Water & Environmental Technologies personnel.
- RRS is not responsible for treatment chemistry infiltration into undesired locations beyond our visible control. The remediation design and injection procedures contain the necessary precautions to minimize the likelihood of surfacing of the treatment chemistry.
- RRS personnel will have access to the site for work up to 12 hours per day, Monday through Friday (daylight hours). However, the standard workday does not exceed 10 hours, with travel time Monday through Friday. A 10-hour workday does not mean 10 hours on-site and/or injection pumping. Additional charges may apply for work completed on Saturday and Sunday.
- RRS is not responsible for damage to unmarked utilities and subsurface structures. Water & Environmental Technologies will review as-built drawings with RRS and confirm clearance prior to injection activities and the remedial fluids being distributed throughout the subsurface.
- Pricing and work schedule assume union labor and prevailing wages (Davis-Bacon) are not required.
- RRS assumes that a direct-push style drill rig (7800 series or smaller) can access all injection point locations and drive a minimum of 1.5" diameter injection tooling to the required depth. If site conditions limit the use of the provided direct-push rig or tooling for any injection point and other drilling methods are required to complete the task, additional charges will apply.
- Ground surface restoration costs have not been included. Additional charges will apply if surface restoration is needed.
- Site conditions can change over time and should be monitored post-injection. RRS is not responsible for changing site conditions after completing the scope of work and demobilizing. Such changes include but are not limited to changes related to applicable borehole abandonment (i.e., swelling of backfill material), surface restoration, well conditions, and on-site utilities.

- RRS understands that some injection point locations will not be able to be drilled to the target depth of 30 ft. below ground surface with a standard DPT drilling rig. RRS assumes these locations will be pre-drilled with a rotary-style drilling rig, back filled with sand and sealed with bentonite prior to RRS mobilization to site. If there are any delays due to refusal, addition charges may apply.

Health and Safety Plan

RRS is committed to providing a safe and healthy working environment for all on-site employees, including Water & Environmental Technologiess and contractors on-site. Before mobilization, RRS will develop a site-specific Health and Safety Plan (HASP) and designate an on-site safety officer. All personnel on-site are required to participate in daily safety tailgate meetings to proactively identify potential hazards and mitigate risks to the full extent possible.

In addition to the hours of rigorous safety training courses all personnel are required to complete, RRS also incorporates a behavior-based safety program by utilizing our DoneSafe mobile application (app) interface on every site. This app encourages our personnel to actively search for potential on-site risks and document mitigation actions. The effectiveness of our safety program can be seen in our industry-leading Experience Modification Rating (EMR) listed in table below.

Year	Total Hours	EMR
2023	193,433	0.67
2022	189,458	0.73
2021	125,592	0.71
2020	162,037	0.64

RRS safety tailgate meetings and HASP will include the following:

- Site map .
- List of personnel and contact information for employees on-site and supporting the project.
- Route to the nearest occupational treatment facility and hospital along with contact information.
- Job Hazard Analysis (JHA) detailing each job task on-site with its potential hazards and best practices to avoid those hazards.
- Description and hazards of the contaminants of concern (COC) with appropriate Personal Protection Equipment (PPE) requirements.
- List and description of REGENESIS chemicals on-site including a Safety Data Sheet (SDS) for each chemical.
- Checklist of site safety equipment including fire extinguishers, eyewash station, first aid kit, spill prevention kit and any site-specific equipment needed.
- Daily tailgate safety meeting sheet with identified hazards and risks associated with the site and job tasks for that day, along with shared learning observations from the previous day.

Acknowledgement

This scope and associated costs are budgetary and should not be considered final. Listed below are the next steps to secure a final design and cost estimate from REGENESIS.

Steps to Final Design and Scope of Work

1. Signature notifying REGENESIS to proceed with final design.
2. REGENESIS technical team contacts Water & Environmental Technologies to review final scope of work and provide detailed design and cost estimate
3. Provide Detailed Remediation Services Scope of Work, if applicable.
4. Confirm Implementation Schedule
5. Submit Detailed Design and Cost Estimate to Water & Environmental Technologies for review and final approval

Signature below confirms signee accepts this preliminary scope of work and would like REGENESIS to proceed with a detailed design and cost estimate.

SIGNATURE
Raye Surratt

Not yet accepted

Water & Environmental Technologies | Raye Surratt,

Terms & Conditions

1. **PAYMENT TERMS.** Net 30 Days. Accounts outstanding after 30 days will be assessed 1.5% monthly interest. Volume discount pricing will be rescinded on all accounts outstanding over 90 days. An early payment discount of 1.5% Net 10 is available for cash or check payments only. We accept Master Card, Visa and American Express.
2. **RETURN POLICY.** A 15% re-stocking fee will be charged for all returned goods. All requests to return product must be pre-approved by seller. Returned product must be in original condition and no product will be accepted for return after a period of 90 days.
3. **FORCE MAJEURE.** Seller shall not be liable for delays in delivery or services or failure to manufacture or deliver due to causes beyond its reasonable control, including but not limited to acts of God, acts of buyer, acts of military or civil authorities, fires, strikes, flood, epidemic, war, riot, delays in transportation or car shortages, or inability to obtain necessary labor, materials, components or services through seller's usual and regular sources at usual and regular prices. In any such event Seller may, without notice to buyer, at any time and from time to time, postpone the delivery or service dates under this contract or make partial delivery or performance or cancel all or any portion of this and any other contract with buyer without further liability to buyer. Cancellation of any part of this order shall not affect Seller's right to payment for any product delivered or service performed hereunder.
4. **LIMITED WARRANTY.** Seller warrants the product(s) sold and services provided as specified on face of invoice, solely to buyer. Seller makes no other warranty of any kind respecting the product and services, and expressly DISCLAIMS ALL OTHER WARRANTIES OF WHATEVER KIND RESPECTING THE PRODUCT AND SERVICES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE AND NON-INFRINGEMENT.
5. **DISCLAIMER.** Where warranties to a person other than buyer may not be disclaimed under law, seller extends to such a person the same warranty seller makes to buyer as set forth herein, subject to all disclaimers, exclusions and limitations of warranties, all limitations of liability and all other provisions set forth in the Terms and Conditions herein. Buyer agrees to transmit a copy of the Terms and Conditions set forth herein to any and all persons to whom buyer sells, or otherwise furnishes the products and/or services provided buyer by seller and buyer agrees to indemnify seller for any liability, loss, costs and attorneys' fees which seller may incur by reason, in whole or in part, of failure by buyer to transmit the Terms and Conditions as provided herein.
6. **LIMITATION OF SELLER'S LIABILITY AND LIMITATION OF BUYER'S REMEDY.** Seller's liability on any claim of any kind, including negligence, for any loss or damage arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair or use of any goods or performance of any services covered by or furnished hereunder, shall in no case exceed the lesser of (1) the cost of repairing or replacing goods and repeating the services failing to conform to the foregoing warranty or the price of the goods and/or services or part thereof which gives rise to the claim. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, OR FOR DAMAGES IN THE NATURE OF PENALTIES.
7. **INDEMNIFICATION.** Buyer agrees to defend and indemnify seller of and from any and all claims or liabilities asserted against seller in connection with the manufacture, sale, delivery, resale or repair or use of any goods, and performance of any services, covered by or furnished hereunder arising in whole or in part out of or by reason of the failure of buyer, its agents, servants, employees or customers to follow instructions, warnings or recommendations furnished by seller in connection with such goods and services, by reason of the failure of buyer, its agents, servants, employees or customers to comply with all federal, state and local laws applicable to such goods and services, or the use thereof, including the Occupational Safety and Health Act of 1970, or by reason of the negligence or misconduct of buyer, its agents, servants, employees or customers.

8. **EXPENSES OF ENFORCEMENT.** In the event seller undertakes any action to collect amounts due from buyer, or otherwise enforce its rights hereunder, Buyer agrees to pay and reimburse Seller for all such expenses, including, without limitation, all attorneys and collection fees.
9. **TAXES.** Liability for all taxes and import or export duties, imposed by any city, state, federal or other governmental authority, shall be assumed and paid by buyer. Buyer further agrees to defend and indemnify seller against any and all liabilities for such taxes or duties and legal fees or costs incurred by seller in connection therewith.
10. **ASSISTANCE AND ADVICE.** Upon request, seller in its discretion will furnish as an accommodation to buyer such technical advice or assistance as is available in reference to the goods and services. Seller assumes no obligation or liability for the advice or assistance given or results obtained, all such advice or assistance being given and accepted at buyer's risk.
11. **SITE SAFETY.** Buyer shall provide a safe working environment at the site of services and shall comply with all applicable provisions of federal, state, provincial and municipal safety laws, building codes, and safety regulations to prevent accidents or injuries to persons on, about or adjacent to the site.
12. **INDEPENDENT CONTRACTOR.** Seller and Buyer are independent contractors and nothing shall be construed to place them in the relationship of partners, principal and agent, employer/employee or joint ventures. Neither party will have the power or right to bind or obligate the other party except as may be expressly agreed and delegated by other party, nor will it hold itself out as having such authority.
13. **REIMBURSEMENT.** Seller shall provide the products and services in reliance upon the data and professional judgments provided by or on behalf of buyer. The fees and charges associated with the products and services thus may not conform to billing guidelines, constraints or other limits on fees. Seller does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where seller may serve as a supplier or subcontractor to an entity that seeks reimbursement from the Government for all or part of the services performed or products provided by seller, it is the sole responsibility of the buyer or other entity seeking reimbursement to ensure the products and services and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity that seeks reimbursement from the Government, seller does not knowingly present or cause to be presented any claim for payment to the Government.
14. **APPLICABLE LAW/JURISDICTION AND VENUE.** The rights and duties of the parties shall be governed by, construed, and enforced in accordance with the laws of the State of California (excluding its conflict of laws rules which would refer to and apply the substantive laws of another jurisdiction). Any suit or proceeding hereunder shall be brought exclusively in state or federal courts located in Orange County, California. Each party consents to the personal jurisdiction of said state and federal courts and waives any objection that such courts are an inconvenient forum.
15. **ENTIRE AGREEMENT.** This agreement constitutes the entire contract between buyer and seller relating to the goods or services identified herein. No modifications hereof shall be binding upon the seller unless in writing and signed by seller's duly authorized representative, and no modification shall be effected by seller's acknowledgment or acceptance of buyer's purchase order forms containing different provisions. Trade usage shall neither be applicable nor relevant to this agreement, nor be used in any manner whatsoever to explain, qualify or supplement any of the provisions hereof. No waiver by either party of default shall be deemed a waiver of any subsequent default.

Design Summary Tables

REGENESIS

PetroFix Application Summary
Grid Estimate
1800 Prospect
PetroFix Grid 1

PetroFIX Remediation Fluid

PetroFix Amount	1,200 lb
Electron Acceptor Amount	60 lb
Treatment Surface Area	475 ft^2
Injection Points	13
Point Spacing	6.0 ft
Top of Treatment Interval	20.0 ft bgs
Bottom of Treatment Interval	30.0 ft bgs
Treatment Volume	176 yd^3
PetroFix Dose	6.8 lb/yd^3

Total Volume	3,685 gal
Product Volume	123 gal
Water Volume	3,562 gal
Injection Volume Per Point	283 gal
Injection Volume Per Vertical Foot	28 gal
Product/Point	9.4 gal
Water/Point	274.0 gal
Soil Type	Mix of Coarse and Fine
Effective Pore Volume Fill %	52%

Mix Tank Volume*	275 gal
Dilution Factor	30.0 x
PetroFix per Mix Tank	9.2 gal
Water Per Mix Tank	265.8 gal
Electron Acceptor per Mix Tank	4.5 lb
Number of Batches Required	13.4

**Adjust tank volume to that used in field.*

AREA NOTES

Reported Groundwater Concentrations (mg/L)

Benzene	0.238	Isopropylbenzene	0.000
Toluene	0.485	Naphthalenes	0.000
Ethylbenzene	0.455	MTBE	0.003
Xylenes	1.050	TPH-GRO	3.000
Trimethylbenzenes	0.000	TPH-DRO	0.000
Butylbenzene	0.000	TPH-ORO	0.000

Application Resources (hotlinked or available at www.petrofix.com/resources):

Summary of PetroFix Direct Push Application Instructions
PetroFix Pre-Application Presentation (Includes Field Verification Testing)
Storage requirements for freezing or hot weather
Safety Data Sheets (SDS)

Site Address:
Helena, MT

Please call the number below or 949-366-8000 if you have any questions.

Date Generated: 07/10/2024

Prepared By: Craig Sandefur
www.petrofix.com

CSandefur@regenesis.com, 949-218-0683 x0683

REGENESIS

PetroFix Application Summary
Barrier Estimate
1800 Prospect
PetroFix PRB-1

PetroFIX Remediation Fluid

PetroFix Amount	2,400 lb
Electron Acceptor Amount	120 lb
Barrier Length	50 ft
Delivery Points	18
Point Spacing Within Rows	6.0 ft
Point Spacing Between Rows	5.0 ft
Number Of Barrier Rows	2
Top of Treatment Interval	20.0 ft bgs
Bottom of Treatment Interval	30.0 ft bgs
Treatment Area	600 ft^2
PetroFix Dose Within Barrier	10.8 lb/yd^3

Total Volume	5,177 gal
Product Volume	246 gal
Water Volume	4,931 gal
Injection Volume Per Point	288 gal
Injection Volume Per Vertical Foot	29 gal
Product/Point	13.6 gal
Water/Point	273.9 gal
Soil Type	Mix of Coarse and Fine
Effective Pore Volume Fill %	58%

Mix Tank Volume*	275 gal
Dilution Factor	18.0 x
PetroFix per Mix Tank	13.0 gal
Water per Mix Tank	262.0 gal
Electron Acceptor per Mix Tank	6.4 lb
Number of Batches Required	18.8

**Adjust tank volume to that used in field.*

AREA NOTES

Reported Groundwater Concentrations (mg/L)

Benzene	0.698	Isopropylbenzene	0.000
Toluene	0.020	Naphthalenes	0.000
Ethylbenzene	0.003	MTBE	0.000
Xylenes	0.013	TPH-GRO	3.000
Trimethylbenzenes	0.000	TPH-DRO	0.000
Butylbenzene	0.000	TPH-ORO	0.000

Application Resources (www.petrofix.com/resources):

Summary of PetroFix Direct Push Application Instructions

PetroFix Pre-Application Presentation (Includes Field Verification Testing)

Storage requirements for freezing or hot weather

Safety Data Sheets (SDS)

Site Address:
Helena, MT

Please call the number below or 949-366-8000 if you have any questions.

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www.petrofix.com

REGENESIS

PetroFix Application Summary
Barrier Estimate
1800 Prospect
PetroFix PRB-2

PetroFIX Remediation Fluid

PetroFix Amount	2,400 lb
Electron Acceptor Amount	120 lb
Barrier Length	62 ft
Delivery Points	22
Point Spacing Within Rows	6.0 ft
Point Spacing Between Rows	5.0 ft
Number Of Barrier Rows	2
Top of Treatment Interval	20.0 ft bgs
Bottom of Treatment Interval	30.0 ft bgs
Treatment Area	682 ft^2
PetroFix Dose Within Barrier	9.5 lb/yd^3

Total Volume	5,464 gal
Product Volume	246 gal
Water Volume	5,219 gal
Injection Volume Per Point	248 gal
Injection Volume Per Vertical Foot	25 gal
Product/Point	11.2 gal
Water/Point	237.2 gal
Soil Type	Mix of Coarse and Fine
Effective Pore Volume Fill %	54%

Mix Tank Volume*	275 gal
Dilution Factor	19.0 x
PetroFix per Mix Tank	12.4 gal
Water per Mix Tank	262.6 gal
Electron Acceptor per Mix Tank	6.0 lb
Number of Batches Required	19.9

**Adjust tank volume to that used in field.*

AREA NOTES

Reported Groundwater Concentrations (mg/L)

Benzene	0.698	Isopropylbenzene	0.000
Toluene	0.020	Naphthalenes	0.000
Ethylbenzene	0.003	MTBE	0.000
Xylenes	0.013	TPH-GRO	3.000
Trimethylbenzenes	0.000	TPH-DRO	0.000
Butylbenzene	0.000	TPH-ORO	0.000

Application Resources (www.petrofix.com/resources):

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