Corrective Action Plan

35109

Paws Up Ranch LLC

40060 Paws Up Road

Greenough, MT

Facility ID 32-01458 (TID 31141),

Release 6643, Work Plan 34842

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1.0 Introduction

West Central Environmental Consultants (WCEC) has prepared this corrective action plan (CAP) for monitoring groundwater monitoring at the Paws Up Ranch LLC facility (Facility ID 32-01458 (TID 31141), Release 6643, Work Plan ID 34842). The corrective action plan was generated in response to the request by the Montana Department of Environmental Quality (MTDEQ) on December 2, 2025.

1.1 Site Location

The Paws Up Ranch LLC is operated as a luxury resort and operational cattle ranch. The release occurred at the operations bulk fueling area at the southwest corner of the resort headquarters. The maintenance shop is located to the north of the AST site, and a large pole barn used for storage is located east/northeast of the ASTs. The release impacted soils west and north of the diesel AST, with the majority of the area impacted consisting of a gravel surface used for local vehicle traffic and equipment parking. A site location map and a site details map are included as Figure 1 and 2. The Public Land Survey System (PLSS) description for the site is the NW/4, NE/4, of Section 1, T13N, R15W. The approximate geographic coordinates are Latitude 46.9156°, Longitude -113.4358°. Township, range, and section information was obtained using the United States Geological Survey (USGS) Greenough, Montana 1:24,000 Quadrangle. The site is located within the Blackfoot River Hydrologic Unit.

1.2 Geologic/ Hydrogeologic Setting

The surficial geology at the site was deposited during the Tertiary and consists of poorly to moderately sorted conglomerate containing locally derived subangular to subrounded boulders with cobble and silt. Probably correlative with the Sixmile Creek Formation. The total thickness is usually less than 10 m (30 ft) [Lonn, 2010]. This layer is overlain by road gravel placed on the driving surface of the site. Groundwater at the site is between 8 and 11 feet below grade depending on location.

2.0 Site History

On November 28, 2023, at approximately 7:00 PM a fuel transport truck operated by Hi Noon Petroleum was delivering fuel to the above ground storage tank (AST) at the Paws Up Ranch facility. During this transfer of fuel from the Hi Noon Petroleum truck to the Paws Up Ranch AST the tank was over filled causing diesel fuel to flow out of the vent pipe and onto the ground surface. A portion of the diesel fuel flowed to the north across the gravel surface and pooled in small depressions. The remainder of the fuel flowed into a slight depression west of the two ASTs.

Initial emergency response was conducted by the Hi Noon Petroleum driver and transportation manager. Oil absorbent pads were placed across the surface of the spill to collect all remaining free product from the surface on November 28, 2023. It is estimated that the total volume of diesel fuel lost during the incident was approximately 700-750 gallons.

A remedial excavation was scheduled for the following week and Petrocon Systems, Inc. of Lolo, Montana was contracted to disconnect the control wires, power, and piping attached to the diesel AST located at the facility prior to the excavation. This was completed on December 3, 2023.

WCEC conducted the remedial excavation of impacted soils from December 4 to December 7, 2023. The excavation had a length of 210 feet and a maximum width of 35 feet. The total surface area of the excavation was 3,535 square feet. The maximum depth of the excavation was 10.6 feet below ground surface underlying the release location. Groundwater was encountered at this depth and additional excavation below this elevation was not feasible. The excavation of the shallow depression west of the gasoline AST was also limited vertically by electrical utility lines for the ASTs and pumps. The gasoline AST was still full at the time of the excavation and concerns about soil stability were also a factor in the suspension of excavation activities in this area.

The depth below grade of excavation across most of the excavated area was between 2 and 3 feet below grade. With impacts in the immediate area of the diesel AST extending vertically to the groundwater interface at 10.6 feet below grade. A total of 659.59 tons (approximately 500 cubic yards) of soil were excavated and delivered to the landfill.

WCEC completed a survey of potential sensitive receptors near the release area. The nearest structure to the release is located 100 feet east/northeast of the release and is a pole barn with a gravel floor that is used for equipment storage. This is an unheated structure with no insulation. The next closest building is located 200 feet north of the release location. It is used for vehicle and heavy equipment repair and is a steel building constructed slab on grade. WCEC's assessment is that these two structures do not present a vapor intrusion risk resulting from the release.

WCEC located 4 wells within 1000 ft of the release location. The nearest well is located 180 feet north of the release location. This well is used solely for watering landscaping on the property according to Paws Up staff. The next two closest wells are located 270- and 450-feet west northwest of the release location and are constructed as monitoring wells for the Greenough Cattle Company release 3254.

The public drinking water supply well is located 944 feet west/southwest of the release location. This well is located in a cross-gradient direction from the release. The ground surface elevation next to the well head is 7 feet lower than the ground surface at the release location [Figure 2]. This well is drilled to 75 feet and is constructed with an open bottom. No threat to the public drinking water well exists from the release based on distance and well construction

3.0 Scope of Work

3.1 Scope of Work

The scope of work required by the MTDEQ consists of:

- Monitoring all site wells during high and low groundwater conditions on a semiannual basis for one year. Submit groundwater samples for Volatile Petroleum Hydrocarbons (VPH) and Extractable Petroleum Hydrocarbons (EPH) screen. If EPH screening limit of 1000 µg/L is exceeded fraction analysis will be requested.
- Monitor groundwater by gauging fluid levels and collecting samples by low-flow sampling according to the Montana DEQ Groundwater Sampling Guidance.
- Analyze groundwater samples for petroleum constituents according to the Montana Risk-Based Corrective Action Guidance for Petroleum Releases. Include the analysis of constituents necessary to assess risk or determine appropriate remedial actions.
- 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 modifications as required to complete the WP objectives.
- Submit one groundwater monitoring report detailing the results of both semiannual sampling events. The Report is expected to include all the content outlined in the Report format, including but not limited to discussion, recommendations, conclusions, cumulative data tables, maps, and necessary appendices.
- Use standardized DEQ WP and Report formats found online.
- Submit WP and Reports electronically following the PTCS submittal requirements.

3.2 Groundwater Monitoring

Semiannual groundwater monitoring will be conducted during high and low groundwater periods for one year. Groundwater samples will be collected from all four site monitoring wells to delineate that downgradient migration of impacts has not occurred and to ensure that samples have been collected during both high and low groundwater conditions to comply with future closure requirements. Well sampling will be completed during each groundwater monitoring event using low flow sampling methodologies in accordance with MTDEQ requirements and WCEC SOPs. WCEC will use a peristaltic pump to purge and sample each monitoring well. Purge rates will be adjusted to minimize draw down and limit stress on hydrologic system (<0.3 ft). Groundwater quality parameter data (conductivity, pH, salinity, dissolved oxygen, temperature, ORP, and turbidity) will be acquired from all site wells sampled using a flow through cell. Groundwater sample collection from each well will be completed following stabilization of groundwater quality parameters. Groundwater is considered stabilized when the following groundwater parameters exhibit a change less than the acceptable range for each parameter (DO: 10%; temperature: 3%; pH: +/- 0.1 unit; Specific Conductance: +/- 3%; turbidity: +/- 10%; ORP:+/- 10 millivolts). Static water levels, groundwater quality parameters, and purge rate for each well will be recorded in the field using WCEC's Well Sampling Form. Depth to water measurements will be used to calculate the potentiometric groundwater surface, flow direction, and gradient for each event.

Analytical Analysis Chart					
Sample Location	VPH	EPH	Lead Scavengers	IBI - Injection parameters	Depth to Water only
MW1	**x**	**x**	-	-	-
MW2	**x**	**x**	-	-	-
MW3	**x**	**x**	-	-	-
MW4	**x**	**x**	-	-	-
Analysis per event	4	4	0	0	0
Total all events	8	8	0	0	0

Groundwater samples will be preserved in accordance with analytical methods, packed on ice, and delivered to Energy in Helena, Montana under chain of custody. All groundwater samples collected will be submitted for VPH and EPH analyses. Additionally, EPH fraction analysis will be performed for any samples which exceed the EPH screening limit of 1,000 µg/L.

3.3 Data Validation

WCEC will complete the MTDEQ – Waste Management and Remediation Division Data Validation Summary Form for each monitoring event. The laboratory analytical report and associated data validation summary form will be included as appendices of the monitoring report.

3.4 Reporting

A cumulative groundwater monitoring report will be prepared following receipt of analytical results for the second semiannual groundwater monitoring event. The report will detail the high and low groundwater monitoring events. Cumulative data tables will include all new and historical soil and groundwater analytical data associated with the facility. Figures will detail the locations of monitoring wells, irrigation wells, drinking wells, and buried utilities at the facility. A groundwater potentiometric surface map will be created for each groundwater monitoring event.

The groundwater monitoring report will include discussion and recommendations to bring the site to closure. These recommendations will be based on the results of the analysis in the Release Closure Plan that will be included as an appendix to the report. Additional appendices will include groundwater analytical reports with data validation summary forms and groundwater monitoring field data sheets for both events.

4.0 Timeline and Costs

The attached *PTRCB Groundwater Monitoring and Sampling Unit Cost Work Sheet* [Appendix A] details anticipated project costs to complete the MTDEQ required scope of work. The scope of work outlined in this work plan will be conducted following approval of the MTDEQ. WCEC expects the initial groundwater monitoring event to occur in May 2026 with the second low water sampling event being completed in October 2026.

4.1 Planned Workflow & Cost Explanations

The estimated costs are included in Appendix A and include completion of semiannual groundwater monitoring in the spring and fall of 2026. The expected timeline and staffing for the two events is as follows:

Event 1: Initial groundwater monitoring event May 2026. Staff scientist (1 staff, 1 vehicle)

Events 2: Second semiannual groundwater monitoring event October 2026. Staff scientist (1 staff, 1 vehicle)

This workflow is outlined in sequential order of required tasks outlined in this CAP. The attached PTRCB Groundwater Monitoring and Sampling Unit Cost Worksheet details the anticipated cost of completing Corrective Action Plan 35109.

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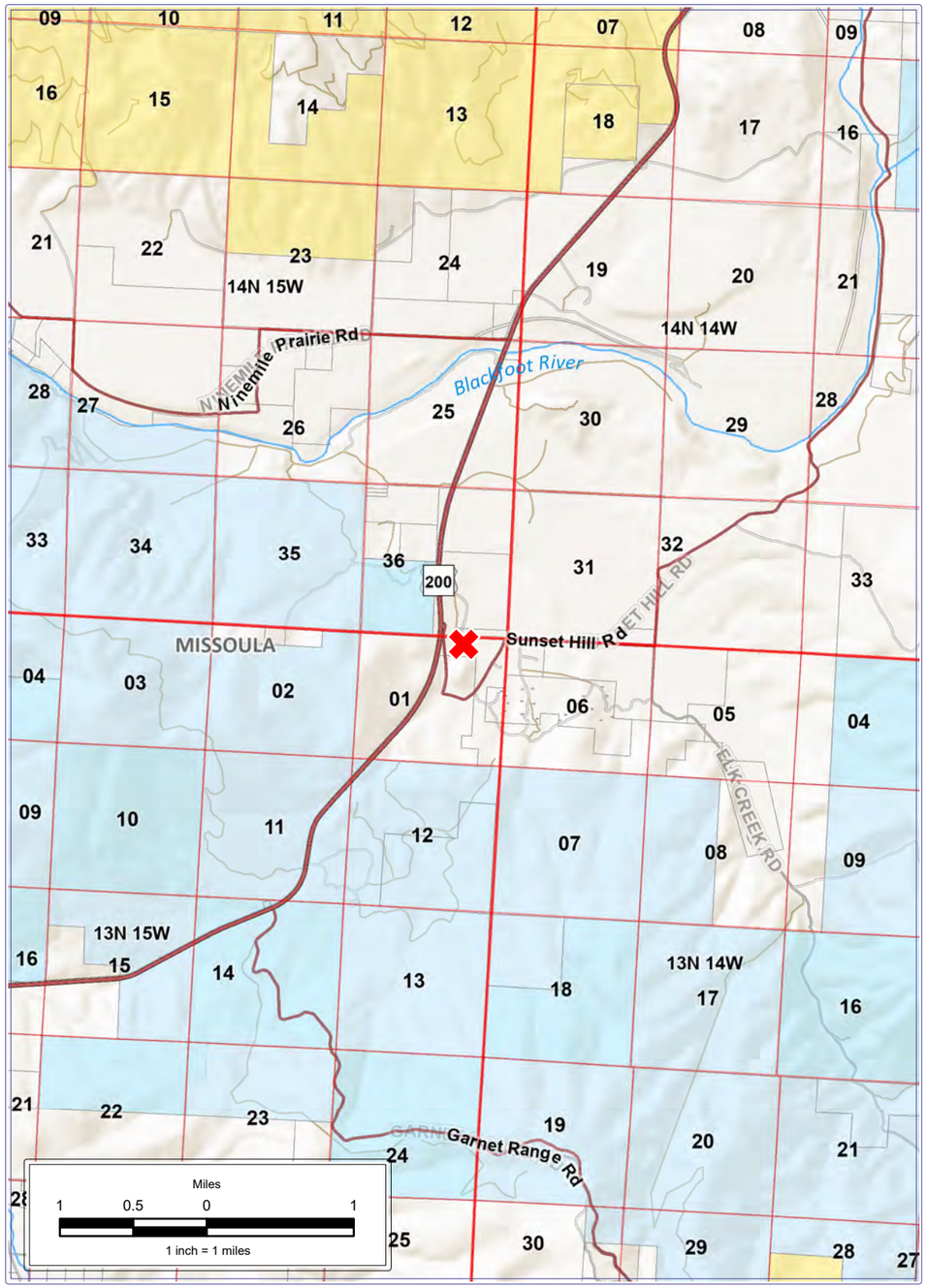
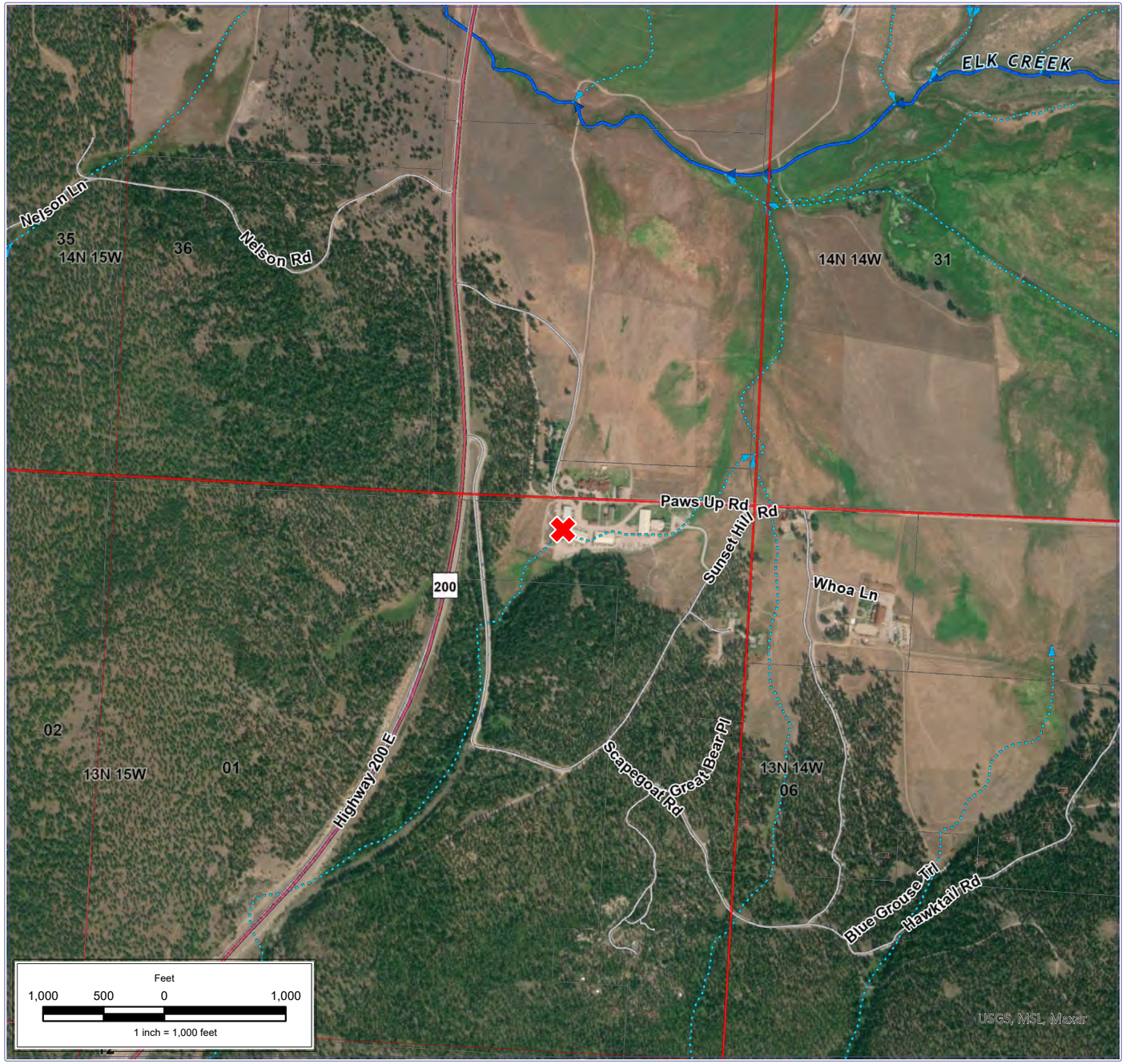
Figure 1: Site Location Map

Figure 2: Site Details Map





Site Location

N

Site Location

Hi Noon - Paws Up
40425 Paws Up Rd.
Greenough, MT

DRAWN BY: TCP
DATE: 06/11/25
SCALE: 1:12,000

PROJECT NUMBER: 2401-0869

IMAGE SOURCE: ESRI BASEMAPS

WCEC
ENVIRONMENTAL CONSULTANTS

FIGURE 1

Hi Noon - Paws Up
40425 Paws Up Rd.
Greenough, MT

Site Details Map

JOB NO.: 2401-0869	DATE: 06/11/25	DRAWN BY: TCP	IMAGE SOURCE: Google

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FIGURE 2

Appendix A

PTRCB Groundwater Monitoring and Sampling Unit Cost Worksheet

Appendix B

Field Investigation Standard Operating Procedures

Field Investigation Standard Operating Procedures

WCEC

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1.0 Field Notes

Field books are bound and all information recorded in these books are written in indelible ink. All deletions are a single line cross out. The field books contain:

- Time and date fieldwork started.
- A purpose and description of the proposed field task.
- Location and description of the work area.
- Names of field personnel.
- Name, address, and phone number of any field contacts.
- Weather conditions.
- Details of the fieldwork performed, including sketches of locations, construction details, and field analytical results.
- All field measurements gathered.
- Record of any on-site communication with clients.

2.0 Boring Logs/ Well Logs

A boring log is constructed for each boring done at a specific location. Boring logs include the following:

- Project name, project number, Facility ID number, and boring identification number.
- Driller.
- Date and time that drilling begins and ends.
- ASTM symbol and depth for each lithologic unit.
- Material description and geologic origin for each lithologic unit.
- Photoionization detection readings of samples from a particular horizon.
- Depth that groundwater is encountered.
- Type, depth, and type of analysis of samples collected.
- Comments made during the drilling.

3.0 Photographs

Photographs of field activities are taken with a perspective similar to the naked eye. Photographs include a scale in the picture when practical. The following information is recorded in the field notebook:

- Photographer's name, date and time photo was taken, general direction of photo.
- Description of the subject and fieldwork portrayed in the picture.
- Sequential number of the photograph and the associated roll number.

4.0 Sample Identification and Sample Labels

A sample numbering system will be developed on a site specific basis to identify each soil or ground water sample obtained during a field investigation. This numbering system provides a tracking procedure to allow retrieval of information about a particular sample and assure that each sample is uniquely numbered.

Each unique sample number is entered onto the sample label using indelible ink. Additional information included on to the label includes the analytical parameter(s), preservative(s), sampling personnel, date of sample collection, time of sample collection, sample type (grab or composite) and the project number. The sample label is then directly affixed to the appropriate sample container and may be covered using clear tape.

5.0 Sample Custody

Samples are logged onto a chain-of-custody (COC) form while on-site. This record contains the following information: Project number, sample description, matrix, number of containers, type of preservative, analyses requested, sampling date, sampler(s), sampler(s') signature(s), West Central Environmental Consultants (WCEC) relinquishing signature(s), date, and time.

The last page of the COC form is retained by WCEC; the remainder of the form is shipped with the samples to the laboratory. At the laboratory, the COC form is signed by the appropriate laboratory personnel at the time the samples are received. A copy of this COC form is included in each laboratory report sent to WCEC. As few people as possible handle the samples and COC.

Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample cooler. All shipments will be accompanied by the COC form identifying the contents. The original copy and one copy will accompany the shipment, and one copy will be retained by the sampler.

If samples are sent by common carrier, a bill of lading should be used. If sent by mail, the package will be registered with the return receipt requested. Commercial carriers are not required to sign off on the custody forms as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

6.0 Health & Safety Plan

A site specific Health and Safety Plan indicates the necessary site information (address, phone numbers, contact, etc.) and all pertinent data regarding potential health risks. A map indicating the site address and the closest hospital with an emergency route are included as a part of this Plan. General information and procedures pertaining to company wide health and safety are part of the WCEC Health and Safety Plan.

7.0 Sampling/Handling Procedures

Disposable latex gloves are used by field technicians at all times during sampling. Gloves are replaced when soiled and between each sampling point to minimize cross or background contamination. Sampling equipment and sampling jars are kept segregated from potential sources of cross or background contamination and are replaced if deemed necessary.

8.0 Equipment Decontamination

All non-disposable sampling equipment used is scrubbed in a solution of biodegradable Alconox detergent and warm de-ionized water, then rinsed with de-ionized water, followed by a methyl alcohol rinse (when applicable), and finally triple-rinsed with warm de-ionized water. Water disposal is in accordance with state guidelines.

9.0 Quality Assurance / Quality Control

In order to detect background contamination (for VOCs, BTEX, MTBE, and/or GRO), laboratory supplied trip blanks are kept with the sample jars and exposed to the same conditions as the actual samples. Trip blanks are not opened until analyzed by the laboratory.

Duplicate water samples are collected to evaluate the variability in laboratory analytical methods. When possible, an additional set of samples is collected from a well with petroleum contamination. This duplicate is

labeled as an additional monitoring well and is kept with the other samples to be analyzed for all project parameters.

When re-usable sampling equipment is used for water sampling, field blanks may be collected to detect possible cross-contamination. The field blank samples are collected by running distilled water through the same equipment used to collect the actual samples; the field blank samples are then analyzed by the laboratory for the same project parameters.

10.0 Investigation Procedures

10.1 Surface Soil Sampling

The following procedure is used to collect surface soil samples:

- Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

- If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon or equivalent, and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval.

- Place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

10.2 Solid Investigation Derived Waste (IDW)

General trash and personal protective equipment will be cleansed of any gross soil accumulation and placed in plastic garbage bags, double bagged, and transferred or transported to a licensed solid waste disposal facility as municipal waste.

Soil cuttings which exhibit obvious signs of contamination will be segregated and stockpiled on plastic or containerized pending profiling for disposal. Methods for soil cutting profiling and disposal will be determined on a case-by-case basis by the WCEC project manager in conjunction with the appropriate regulatory agency.

11.0 Headspace Analysis

Soil samples for on-site screening are placed in plastic zip lock baggies or glass "Mason" style jars. Each baggie is one third filled with soil and sealed trapping headspace air. Each jar is half-filled with soil and covered with aluminum foil. To seal the sample, a ring lid is carefully screwed onto the jar.

Headspace development proceeds for a minimum of 5 minutes; each baggie or jar is shaken for 15 seconds before and after this period. Analysis is completed with a MiniRAE 3000 photoionization detector (PID) with 10.2 eV lamp. The PID is calibrated on-site prior to commencement of field activities, and as necessary with compressed isobutylene gas to read parts-per-million volume/volume of volatile organic compound vapors. Additionally, the PID is recalibrated in the factory every year. To perform the analysis, the PID probe is inserted into the container or baggie to a depth of approximately one half of the total headspace, and maximum meter response over a period of 5 seconds is recorded.

12.0 Receptor Survey

A county water well receptor search is conducted using the Ground Water Information Center (GWIC) developed by the Montana Department of Natural Resources (DNRC). The GWIC is searched for wells within ½ mile of the release site. If greater than 25 wells exist within ½ mile, information is included for the nearest 25 wells. If no wells exist within ½ mile of the release site, the search is extended to 1 mile. The County sanitarian is also contacted; information is requested on wells within either ½ mile or 1 mile of the release, depending on the range of the GWIC search. If additional information is still required, the DNRC will be contacted directly.

13.0 Well Monitoring Procedures

13.1 Monitoring Well Water Level Measurement

The static water level in each well is measured to the nearest 0.01 foot from a referenced point on the well casing using a factory-calibrated electric water level probe. Water level measurements are collected from all monitoring wells on site within the shortest time interval achievable and recorded in the Monitoring Well Sampling Field Sheet. Water levels are measured from the least contaminated wells (known or suspected) first followed by increasingly contaminated wells. Water level measurements are converted to water level elevations using surveyed elevations of the reference points on the innermost well casings. Water level probes are decontaminated after each use according to WCEC's Decontamination procedures.

13.2 Monitoring Well Free Product Measurement

If free product is present in a monitoring well, the thickness in feet or inches is measured and recorded in the Monitoring Well Sampling Field Sheet. Free product measurements are obtained using an oil/water interface probe.

13.3 Monitoring Well Purging and Sample Collection

In order to ensure that representative groundwater samples are collected WCEC will purge each monitoring well until all groundwater quality parameters stabilize. Groundwater parameters of temperature, dissolved oxygen, temperature, conductivity, salinity, pH and ORP are recorded after stabilization in a site specific field log. Monitoring wells will be purged using a peristaltic pump which discharges into a YSI-556 multi-parameter meter flow through cell. All purge water will be collected in a volumetrically scaled container for accurate measurement of total volume of purged water. New tubing is used for each well to ensure that cross contamination between wells is impossible. Prior to sample collection personnel raise the sample tubing to an elevation immediately

below the water interface, and then cut the tubing between the YSI flow through cell and the peristaltic pump to allow for sample collection.

In the event that the depth to water is greater than the capabilities of the peristaltic pump, a bladder pump or disposable bailers will be used for well purging and sample collection. Three well volumes will be purged from each well prior to sample collection. All purge water will be collected in a volumetrically scaled container for accurate measurement of total volume of purged water. Samples will be collected from the uppermost groundwater interface with the bailer after the well has been purged. Water quality parameters will be recorded after laboratory sample collection is completed with a sensor probe lowered down the well to a depth slightly below the water interface attached to a YSI-556 multi-parameter meter. The YSI sensor probe is decontaminated after each use according to WCEC's Decontamination procedures.

Samples are transferred to the appropriate laboratory-supplied sample jars with as little disturbance as possible and with minimal exposure to the atmosphere. Homogenous water samples are collected by grouping sample vials and adding water to each vial in a cyclical order attempting to reach the required sample volume in each vial at approximately the same time. All water samples are labeled with the date, time, facility, well designation, and name of sample collector. Sample times, dates, and samplers are recorded in the site specific log book and recorded onto a chain-of-custody following sample collection. Samples are preserved as necessary for analytical method, placed in a cooler on ice to decrease the sample temperature to below 4 degrees Celsius, and shipped/delivered for analysis at an analytical laboratory on the MT DEQ Approval list.

All water sample collection, handling, and storage procedures are conducted to minimize the potential for contamination of the water sample. Monitoring well sampling details are recorded in the *Site Specific Field Log Book* or *Groundwater Sampling Field Data Sheet*, and included the date the site was sampled on, facility name, location, facility ID and release number, description of weather conditions, current barometric pressure, samplers names, laboratory analysis samples will be analyzed for, number and volume of sampling containers, methods of sample preservation, time of sample collection, depth to static water level in wells, field chemistry parameters of salinity, pH, conductivity, dissolved oxygen in mg/L and percent, temperature, and oxygen-reduction potential (ORP). Turbidity will also be recorded if requested on a site specific basis. Field personnel will record visual and olfactory properties of the purge water from each well.

13.4 Disposal of Contaminated Groundwater Monitoring Purge Water

Purge water removed from monitoring well for the purpose of collecting representative groundwater samples will be discharged in accordance with the Montana Water Quality Act (75-5-101) as defined in the MT DEQ Technical Guidance Document #10 and according to the MT DEQ Disposal of Untreated Purge Water From Monitoring Wells Flow Chart. In the circumstance that the purge water contains a listed or characteristics waste covered by the Resource Conservation and Recovery Act (RCRA), free product or visible pollutants, could enter a shallower aquifer that is less contaminated, or if discharge could enter surface water or storm drains, purge water will be containerized and stored at the site. An assessment of the most economical disposal options that comply with federal, state, and local regulations will be conducted by WCEC's project manager for the facility in conjunction with the MT DEQ project manager. In the event that purge water meets the criteria established in the MT DEQ Flow Chart, purge water will be discharged onto the ground next to the well, allowing the purge water to return to the same groundwater where it originated.

13.5 Sample Handling

Disposable nitrile gloves are used by field technicians at all times during sampling. Gloves are replaced when soiled and between each sampling point to minimize cross and/or background contamination. All sampling equipment and sampling jars are kept away from potential sources of cross and/or background contamination and are replaced if deemed necessary.

13.6 Equipment and Work Area Decontamination

All non-disposable or non-dedicated equipment introduced to the well is scrubbed in a solution of biodegradable Alconox detergent and warm distilled water, and then rinsed with distilled water. All sampling work and equipment storage space is maintained free of possible sources of cross contamination. Work space is cleaned using Alconox and/or distilled water.

13.7 Chain-of-Custody

Samples are logged onto a lab-specific chain-of-custody form. This record contains the following information: project number, sample description, environmental matrix, number and type of containers, type of preservative, analytical method to be conducted, date and time of sample collection, sampler(s), sampler's signature(s), WCEC relinquishing signature(s), date, and time. Samples that are shipped to the laboratory will be custody sealed prior to shipment by relinquishing signatory.

The last page of the chain-of-custody form is retained by WCEC; the remainder of the form is shipped with the samples to the appropriate laboratory. At the laboratory, the chain-of-custody form is signed by the appropriate laboratory personnel at the time the samples are received. A copy of this chain-of-custody form is included in each laboratory report sent to WCEC. As few people as possible handle the samples and chain-of-custody forms.

13.8 Quality Assurance / Quality Control

In order to detect background petroleum hydrocarbon contamination, laboratory supplied trip blanks are kept with the sample jars and exposed to the same conditions as the actual samples. Trip blanks are not opened until analyzed by the laboratory. Temperature blanks accompany samples in each cooler to ensure that samples are kept at or below 4 degrees Celsius.

Field blanks may be collected to detect contamination from ambient sources. A field blank is collected by pouring distilled water directly into the sample jars in the same location that samples are collected. Equipment sample blank collection may be conducted to detect contamination from sampling equipment and/or sampling method. An Equipment sample blank is collected by running distilled water through the same equipment used to collect the actual sample. Field and equipment blanks are kept with the other samples and analyzed by the laboratory for the same project parameters.

Duplicate water samples are collected to evaluate the variability in laboratory analytical methods. The duplicate consists of an additional set of homogenous samples collected by grouping sample vials and adding water to each vial in a cyclical order attempting to reach the required laboratory sample volume in each vial at approximately the same time. Duplicate samples are collected from wells with known petroleum contamination and are assigned a mock sample ID's to maintain the principals of a scientific single blind to prevent laboratory personnel from consciously or unconsciously biasing the analytical results. The duplicate samples are kept with the other samples and analyzed by the laboratory for the same project parameters.

When applicable, WCEC will complete the MT DEQ Data Validation process.

13.9 Survey of Monitoring Wells

Survey elevation measurements are collected from the northern rim at the top of the PVC monitoring well casing. The survey location is marked for use when collecting depth to water measurements from the monitoring well. The location of this measuring point is accurately located in both the latitude and longitude plan as well as the vertical dimension. Vertical survey measurements are accurate to the Fourth Order (0.10 feet x square root of total distance of level loop in miles) with a measurement precision of 0.01 feet (US Army Corps of Engineers Manual "Geodetic and Control Surveying). Latitude and longitude measurements are typically accurate to a precision of 1.0 feet, but may deviate on a case-by-case basis if necessary. GPS devices may be used to collect latitude and longitude coordinates.

The vertical control datum used to determine the elevation of the well is the North American Vertical Datum of 1988 (NAVD 88), which is referenced to a nearby United States Geological Survey (USGS), or equivalent, benchmark. Deviations from this technical standard may be made on a case -by-case basis where another datum can be justified. The North American Datum of 1983 (NAD 83) is used for determining latitude and longitude coordinates and are also referenced to a nearby USGS, or equivalent, benchmark. Deviations from this technical standard may be made on a case-by-case basis where another datum can be justified. GPS devices may be used to collect latitude and longitude coordinates.

14.0 Procedures For Low-Flow Sampling With Pumps

The general steps are outlined below. Begin with least contaminated well and progress to the most contaminated well. Where applicable, WCEC will conduct low-flow groundwater sampling in accordance with MT DEQ Groundwater Sampling Guidance (March 2018).

- To avoid disturbing particulates, complete a round of water levels before sampling; record water levels and measuring point in logbook.
- Calibrate field water quality instruments at the beginning of each sampling day.
- Wearing gloves, install tubing and/or pump equipment and slowly lower until intake is positioned at selected depth.
- Purge well; if using an adjustable rate pump, adjust pump rate to achieve minimal drawdown.
- Every 5 minutes measure water levels (using an electric water level probe) and pumping rate (using a bucket graduated for volume measurement).

- Monitor indicator parameters every three to five minutes by placing probes in a clean container of the purge water. Stabilization is considered complete when three consecutive readings are within the following limits:
  DO: 10%; temperature: 3%; pH: +/- 0.1 unit; Specific Conductance: +/- 3%; turbidity: +/- 10%; ORP: +/- 10 millivolts.

15.0 Water Supply Well Sampling Procedures

When water samples are required to be drawn from wells used as drinking or industrial water supplies, the following procedures are followed:

- Samples are collected from the point in the waterline closest to the well; that is before water is softened, filtered, or heated.

- All aerators, filters, or other devices are removed from the tap before sampling. If possible, samples are taken before the water enters the pressure tank. If that is not possible, the water is run to waste long enough to empty the tank and the water in storage in the pipes. One well volume (and the pressure tank) is evacuated to obtain a sample of fresh aquifer water.

- The water being collected should be withdrawn from the source at a slow rate.

- Water samples are collected according to protocol for laboratory analysis in laboratory-supplied, test-specific sample containers.

- Samples are labeled and logged onto a chain-of-custody form in the field, then stored and shipped at 4° C in an ice-filled cooler along with the completed chain-of-custody. Any pertinent details regarding the samples or sampling procedure are noted in the Site Specific project notebook.