




Montana Groundwater Monitoring Work Plan and Report Guidance for Petroleum Releases

Draft
March 2021

	Department of Environmental Quality Waste Management and Remediation Division Petroleum Tank Cleanup Section Guidance Document	Number:	DEQ-PTCS-GWM
		Original Effect. Date:	September 2013
		Revision No.:	1
Document Type:	Technical Guidance		
Resource Contact:	Supervisor of Petroleum Tank Cleanup Section	Review Schedule:	Annual
Originating Unit:	Petroleum Tank Cleanup Section	Last Reviewed:	March 2021
<h2>Montana Groundwater Monitoring Work Plan and Report Guidance for Petroleum Releases</h2>			

Purpose:	The purpose of this document is to describe the objectives, expectations, and detailed items necessary for monitoring groundwater at a petroleum release to meet requirements in state laws; these include a groundwater monitoring work plan and a groundwater monitoring report of the work, data, results, and recommendations for additional remediation work to resolve the release.
Scope:	This guidance applies to petroleum products and constituents of petroleum products released to the environment from petroleum storage tank systems that are regulated under the Petroleum Storage Tank Cleanup Act (§75-11-301 et seq.) or the Montana Underground Storage Tank Act (§75-11-501 et seq.) and administrative rules promulgated thereunder. Accordingly, this guidance is applicable to petroleum releases defined by Administrative Rules of Montana (ARM) 17.56.5; and the requirements for compliance monitoring under ARM 17.56.6. This guidance supersedes all previous versions of guidance addressing groundwater monitoring at petroleum storage tank releases.

Revision Date	Revision Description
March 2021	Extensive update to and consolidation of the following work plan and report formats: Abbreviated Groundwater Monitoring Corrective Action Plan and Budget Format, Standardized Corrective Action Plan for Groundwater Monitoring, Abbreviated Report Form for Groundwater Monitoring at a Petroleum Release Site, and Standardized Report Format for Groundwater Monitoring at Petroleum Release.

Contents

Referenced Documents	iv
Montana Groundwater Monitoring Work Plan and Report Guidance.....	1
Overview.....	1
Objectives.....	1
Expectations	1,2
Groundwater Monitoring Work Plan and Report Procedures	2
GWM Work Plan Process.....	2,3
GWM Report Process	3
Groundwater Monitoring – Work Plan Expectations	4
Groundwater Monitoring – Interim Data Submittal Expectations	7
Groundwater Monitoring – Report Expectations	9
Example – Site Map	16
Example – Groundwater Elevation Map	17
Example – Groundwater Elevation Interpolated Contour Map	18
Example – Groundwater Chemical Concentration Contour Map	19
Example – Table for Cumulative Groundwater Data	20
Example – Table for Intrinsic Biological Indicator/Monitored Natural Attenuation Data	21
Release Closure Plan (RCP) Format	22
Part 1: Site Summary & RI Results	22
Part 2: CSM - Evaluation of Exposure Pathways	23
Part 3: Evaluation of Cleanup Alternatives	24
Part 4: Monitoring Required to Close Release	25

Referenced documents available at DEQ’s website:

- MT DEQ Risked-Based Corrective Action (RBCA) Guidance for Petroleum Releases
- MT DEQ Remedial Investigation (RI) Guidance for Petroleum Releases
- MT DEQ Remedial Alternatives Analysis (RAA) Guidance for Petroleum Releases
- MT DEQ Cleanup Guidance for Petroleum Releases
- MT DEQ Release Closure Plan (RCP) for Petroleum Releases
- MT DEQ Vapor Intrusion (VI) Guidance
- MT DEQ Groundwater Sampling Guidance
- MT DEQ Monitored Natural Attenuation
- MT DEQ Petroleum Release Closure Guidance
- MT DEQ Glossary of Terms
- Montana Quality Assurance Plan (QAP) for Investigation of Underground Storage Tank Releases

Montana Groundwater Monitoring Work Plan and Report Guidance

Montana Department of Environmental Quality (DEQ)
Petroleum Tank Cleanup Section (PTCS)

Overview

This DEQ guidance describes the objectives and expectations required for a groundwater monitoring work plan (WP) and report to comply with Montana law that addresses petroleum tank release (Release). These include specific items for a groundwater monitoring work plan and detailed items for a groundwater monitoring report. A Release in this guidance is defined by Administrative Rules of Montana (ARM) 17.56.5 and includes all reportable leaks, spills, and overflows of petroleum or petroleum products from petroleum storage tank (PST) systems including but not limited to underground storage tanks (UST), aboveground storage tanks (AST), piping, sumps, and dispensers.

ARM 17.56.605 requires the owners and operators (O/Os) of Releases to monitor the effectiveness of cleanup activities and monitor the extent, magnitude, and concentrations of dissolved contaminant plumes.

Objectives

The groundwater monitoring objectives for each Release are to collect sufficient information and data of documented quality needed to meet the following purposes: document the impacts and potential impacts on public health and the environment; recommend and select effective cleanup methods to protect human health and the environment; monitor the effectiveness of cleanup activities; and consider reliable closure pathways to resolve the Release. The groundwater monitoring WP and report discussed herein are intended for stand-alone monitoring efforts. When groundwater monitoring is part of a remedial investigation or cleanup work plan, the work plan and report are to comply with the requested and approved format.

Expectations

DEQ expects an owner and/or operator (O/O) of a PST system – including properties that historically had a PST system (Facility) – associated with a Release to accomplish the following:

- Obtain professional environmental consulting services to plan and monitor groundwater; the consultant represents the O/O and should be experienced with successful investigations, cleanups, and resolutions of Releases;
- Meet with the O/O's consultant and DEQ's project manager to discuss the Release, plan work required to monitor groundwater, and develop a plan to resolve the Release;
- Prepare and submit a Groundwater Monitoring work plan (WP) to DEQ for review and approval;
- Monitor groundwater according to a DEQ-approved WP and maintain contact with DEQ. Recommend and discuss WP modifications required to achieve the monitoring objectives. DEQ will approve agreed upon WP modifications;
- Submit Interim Data Submittals and Groundwater Monitoring Report(s) that include an updated Release Closure Plan;

Groundwater should be monitored using current scientific and engineering principles, technology, and methods to complete with a reasonable degree of certainty of the following:

- Monitor the extent and magnitude of petroleum impacts to surface water and groundwater via collection and appropriate laboratory analysis of samples as specified in DEQ's RBCA Guidance Document Table C – Testing Procedures for Groundwater and in the Montana Quality Assurance Plan for Investigation of Underground Storage Tanks (MT QAP).
- Assess trends of petroleum contaminant concentrations and geochemical indicators in groundwater to determine the extent to which additional investigation, remediation, and/or monitoring is necessary to resolve the release.
- Identify and mitigate risks that may pose an immediate threat to receptors; and the O/O or their representative should immediately notify DEQ.
- Identify issues and obstacles that interfere with achieving the groundwater monitoring objectives; promptly discuss issues with DEQ's project manager; and recommend appropriate modifications to the WP that will ensure the objectives are met.
- Prepare detailed maps and summary tables that illustrate and summarize the site-specific data.
- Update the Release Closure Plan using the DEQ-provided form.
- Prepare and submit Groundwater Monitoring Report(s) to DEQ.

Groundwater Monitoring Work Plan and Report Procedures

The WP and report expectations discussed in this guidance and detailed below address the issues and expectations for most petroleum releases. Use of this guidance will facilitate preparation and review of documents; ensure that required information is collected to document the impacts and potential impacts on public health and the environment; monitor the effectiveness of cleanup methods; and consider reliable closure pathways to resolve the Release.

O/Os and their consultants are encouraged to contact DEQ's project managers to confer on draft work products as they are being prepared for groundwater monitoring, clarify any portion of a WP request that is not clearly understood, and propose site-specific modifications to WP tasks necessary to meet monitoring objectives. DEQ will work with the O/Os and their consultants to define the additional WP tasks and expectations. Only DEQ can approve modifications to the WP tasks and report expectations in this guidance.

DEQ will use this Groundwater Monitoring Work Plan and Report Guidance to review submitted WPs and reports. DEQ's approval of the modifications is required before the work is completed, not after. O/Os and their consultants may proceed with work plan tasks prior to DEQ's approval of the WP; however, there is a risk of work completed prior to DEQ's approval might result in methods, data, or information not being approved after-the-fact and additional or different work being required.

Groundwater Monitoring Work Plan Process

When DEQ requests groundwater monitoring, the O/O and their consultant will prepare a WP in accordance with the expectations for a Groundwater Monitoring WP (refer to WP Expectations detailed below) and submit the WP to DEQ for approval. DEQ may also provide site-specific guidance to the O/O for additional items to be included or excluded in the Groundwater Monitoring WP.

DEQ will review and approve the WP if it meets the detailed Groundwater Monitoring WP Expectations listed below and site-specific guidance provided by the DEQ project manager. The O/O will be notified of DEQ's approval and a deadline to have the work outlined in the WP completed and a report submitted to DEQ. DEQ will determine a reasonable deadline based upon severity of risks posed to human health, safety, and the environment, the amount of prior work completed, and other relevant factors.

Because groundwater monitoring serves multiple purposes (e.g., compliance monitoring, performance monitoring, etc.) modifications to the work plan may be required such as: extension of the deadline, additional monitoring events, modification of the analytical suite, or modification of the wells sampled. The O/O and their consultant are expected to communicate with DEQ regarding recommendations to modify the WP to better achieve groundwater monitoring objectives and about any issues that are not clearly understood regarding completion of the WP. If conditions are identified that may pose an immediate risk to receptors at any time during groundwater monitoring, the O/O or their consultant should immediately notify DEQ and take steps to mitigate the risks.

Groundwater Monitoring Report Process

It is DEQ's intent to outline the reporting process for Interim Data Submittals and the comprehensive Groundwater Monitoring Report. Interim Data Submittals should clearly document individual groundwater monitoring events. A comprehensive Groundwater Monitoring Report is to be submitted at the agreed upon frequency to document the methods and results of all groundwater monitoring events not previously reported (refer to Report Expectations detailed below).

Upon completion of fieldwork and receipt of analytical data, updated tables and figures are to be prepared and submitted as an Interim Data Submittal. The O/O and/or their consultant will discuss the results with DEQ, assess the remaining scope of the approved work plan, and evaluate the need for work plan modifications.

Upon completion of all mutually agreed upon groundwater monitoring events, the O/O should document the results of the groundwater monitoring in accordance with the Groundwater Monitoring Report Expectations below and site-specific guidance provided by the DEQ project manager. The results of all WP tasks, conclusions, recommendations, an updated Release Closure Plan, and all supporting data should be included in the Groundwater Monitoring Report. DEQ will evaluate the submitted report based on the detailed report expectations listed below; if DEQ determines additional information, data, analysis, or corrections are required to meet groundwater monitoring objectives, DEQ will notify the O/O and their consultant of report deficiencies.

Groundwater Monitoring – Work Plan Expectations

This section describes items to assist O/Os and their consultants to meet the minimum requirements for a Groundwater Monitoring Work Plan (WP) as required by Montana laws for petroleum storage tank (PST) systems, including properties that historically had a PST system (Facility). This guidance provides O/Os and their consultants with the basic expectations for a Groundwater Monitoring WP before it will be approved by DEQ. It is the O/O's responsibility to confer with the DEQ project manager to determine if, and what, modifications to the WP will be necessary based on potentially changing conditions at the Facility.

DEQ will evaluate the submitted WP against the Groundwater Monitoring WP requirements listed below and site-specific guidance provided by the DEQ project manager. If the WP adequately address all requirements, the WP will be approved. If the WP is not approved, DEQ will notify O/Os and their consultant of deficiencies.

Section 1: Title Page

Cover letter should be no longer than one page and include the following:

- Date
- Responsible party's name, mailing address, and email address
- Contact person's name, mailing address, and email address (if different from above)
- Subject line with the following information:
 - Groundwater Monitoring Work Plan for the petroleum release at (Facility name, street address, town), MT (zip code)
 - DEQ Facility ID (number), Treads ID (number), Release (number), and Work Plan (number)
- Introductory paragraph containing reference to DEQ's request for a Groundwater Monitoring Work Plan and general scope of work to be conducted
- Consultant's name, mailing address, and email address (if not on letterhead)

Section 2: Facility History/ Release Background

Summarize the currently known history of the Facility and Release background based on information detailed in previously completed corrective action reports, including the following:

- Previous Facility use/owner/operator information
- Current Release: notification date, cause and source, type and amount of petroleum products lost
- Type of petroleum products past and present stored at Facility
- Known and suspected contaminants of concern
- Summary of assessment and cleanup actions undertaken including dates of actions and/or operation
- Average depth of groundwater that will be sampled
- Potential exposure and/or receptor concerns as identified in the Conceptual Site Model or Release Closure Plan

Section 3: Objectives of Groundwater Monitoring

State the site-specific objectives for the Groundwater Monitoring of this Release.

- Specific goals of groundwater monitoring (e.g., compliance monitoring, performance monitoring, assessment of geochemistry to enhance attenuation, evaluate trends, etc.)
- Criteria that will be measured to assess compliance with stated goals and objectives
- Potential modifications to the work plan to meet goals and objectives based on the measured criteria

Section 4: Minimum Work Plan Tasks

This section defines expectations for tasks that will be defined, planned, and budgeted in the WP; however, they are not intended to be performed during the generation of the WP. Rather the work defined in most of these tasks will occur during the implementation of the DEQ-approved WP.

- Project management for all tasks related to the WP
- Describe the WP tasks; and solicit bids as required from subcontractors
- Prepare a WP and submit it to DEQ for approval
- Mobilization and travel to/from the Facility to conduct onsite WP tasks
- Assess Completeness of Receptor Survey completed previously as described in the MT DEQ Remedial Investigation (RI) Guidance for Petroleum Releases
 - Potential exposure media, exposure points, and receptors in the Release area (e.g., surface/subsurface soil, groundwater, surface water, structures, utility corridors, drinking water and irrigation wells, storm and sanitary sewers, and sumps) have previously been identified during the Remedial Investigation and mitigated by remedial action. Assess conditions to confirm that new receptors are not present and that mitigating factors limiting the exposure of potential receptors to residual petroleum contamination are still in place.
- Monitor groundwater to achieve the specific goals and objectives of monitoring, for more details of how to develop a sampling plan, see the MT QAP:
 - Identify monitoring wells to be gauged and sampled
 - Identify the schedule (e.g., seasonal high or low groundwater conditions) and frequency (e.g., semiannual, annual, biennial, etc.) of monitoring
 - Description of sampling methodology and site-specific conditions that may affect sampling (e.g., depth to groundwater, low-yield aquifer, etc.)
 - Methods of waste disposal: spent non-reusable sampling equipment, spent personal protective equipment (PPE), water used for decontamination of reusable equipment, and purge water
 - Standard Operating Procedures (SOPs) for fluid level measurements, sampling and sample preservation methodology, field parameter measurements, decontamination of reusable sampling equipment, laboratory analysis, etc.
 - Describe the QC protocols (as outlined in the MT QAP), including the collection of duplicates, blanks, etc. and the acceptance criteria for laboratory and field QC samples.
 - Identify the analytical suite based on the nature and date of the release, historical monitoring data, and identified objectives of monitoring
 - Submit all samples to an analytical laboratory for analysis of petroleum constituents as outlined by Montana Risk-Based Corrective Action Guidance for Petroleum Releases (RBCA Guidance) and to achieve the identified monitoring objectives
 - Chain-of-custody procedures
- Prepare and submit Interim Data Submittals according to specifications detailed below

- Participate in meetings with the O/O and DEQ's project manager to discuss the results of groundwater monitoring and recommend additional work to achieve the monitoring objectives. DEQ will approve agreed upon WP modifications. Examples of WP modifications include the following:
 - Monitoring well repair and/or redevelopment to ensure sample integrity
 - Additional monitoring events or monitoring frequency changes to confirm anomalous data, confirm trends, or extend monitoring timeline
 - Modification to the monitoring wells selected for sampling
 - Modification to the analytical suite
- Prepare detailed maps to illustrate the results of WP tasks (see Groundwater Monitoring Report Expectations below)
- Update the Release Closure Plan (RCP)
 - Update the existing RCP to assess the performance of continued groundwater monitoring to advance the Release to closure in the projected timeframe
- Prepare a detailed Groundwater Monitoring report
 - Consolidation and tabulation of data
 - Evaluation and interpretation of data and results
 - Results, Conclusions, and Recommendations

Section 5: Schedule and Reporting

Groundwater monitoring serves many purposes, the results of which can be used to assess compliance with regulatory standards or evaluate the need for additional remedial action. O/O or their consultant is expected to provide sufficient data and information to have a discussion with DEQ's project manager upon the completion of decision-critical tasks such as the following:

- Recommend modification(s) to the work plan
- Receipt of analytical data
- Submittal of Interim Data Submittals
- Updates to the Release Closure Plan
- Other site-specific milestones

Section 6: Appendices for Work Plan

DEQ may require site-specific attachments to the WP; however, the following appendices for a Groundwater Monitoring WP are expected.

- Standard Operating Procedures (SOPs) for all methods and sampling protocols
- Budget detailing costs for each WP task if the O/O expects to apply for reimbursement from the Petroleum Tank Release Compensation Fund, or upon DEQ's request

Groundwater Monitoring – Interim Data Submittal Expectations

Owners and operators (O/O) of properties with petroleum releases (Release) from petroleum storage tank (PST) systems, including properties that historically had a PST system (Facility), are required under Montana law to monitor petroleum contamination in groundwater associated with a petroleum release (Release) and to evaluate the risk it poses to human health, safety, and the environment. This outline provides O/Os and their consultants with the basic Expectations for a Groundwater Monitoring Interim Data Submittal. It is the O/O's responsibility to stay in contact with the DEQ project manager to determine whether modifications to the WP will be necessary to complete groundwater monitoring objectives.

DEQ will evaluate the submitted Interim Data Submittal against the detailed expectations listed below; and if found to adequately document monitoring and address all requirements, the Interim Data Submittal will be accepted. If DEQ determines additional information, data, or corrections are required to meet groundwater monitoring objectives then DEQ will notify the O/O and their consultant of deficiencies.

Cover Letter

- Subject: Groundwater Monitoring - Interim Data Submittal
- Facility name
- Facility address
- DEQ Facility ID Number, Treads Facility ID Number, Release Number, and Work Plan ID
- Responsible party's name, mailing address and phone number
- Contact person's name, mailing address and phone number (if different from above)
- Date Interim Data Submittal prepared
- A brief (one page or less) executive summary of the groundwater monitoring event
 - Provide the date(s) of groundwater monitoring
 - Identify the sampling points (monitoring wells, tap water, etc.)
 - Identify the sampling method(s)
 - Identify sampling points that have been damaged, need repair, or need redevelopment
 - Identify deviations from the approved work plan
 - Comment on the validity/usability of the data
 - Describe any changes to the facility or adjacent properties that have occurred since the last monitoring event that may influence groundwater monitoring results
- Present groundwater analytical results and field parameters in cumulative table(s) including field data such as sample identification, screened interval, depth to fluid(s), free-product thickness (if present), and collection date (refer to example Groundwater Table below).
 - Groundwater analytical results should be compared to current Risk-Based Screening Levels (RBSLs) published in RBCA.
 - Intrinsic Biologic Indicators (IBI) analytical results and related field parameters should be documented and presented as provided in the IBI section and Example section below.

- Present groundwater elevation calculations in a table
- Construct maps that illustrate the results of groundwater monitoring, including the following:
 - Potentiometric surface with groundwater flow direction(s)
 - Isopleth (iso-concentration) map depicting at least one analyte for each contaminant type (gasoline, diesel, etc.) that best depicts extent and magnitude of that contaminant type.
Consult with DEQ's project manager for selection of analytes depicted
- Completed well purging field sheets for each monitoring point sampled
- Laboratory analytical data package with chain-of-custody
- Completed Data Validation Summary Form(s)

Groundwater Monitoring – Report Expectations

Owners and operators (O/O) of properties with petroleum releases (Release) from petroleum storage tank (PST) systems including properties that historically had a PST system (Facility) are required under Montana law to monitor petroleum contamination in groundwater associated with a petroleum release (Release) and to evaluate the risk it poses to human health, safety, and the environment. This outline provides O/Os and their consultants with the basic Expectations for a Groundwater Monitoring Report (Report). It is the O/O's responsibility to stay in contact with the DEQ project manager to determine whether modifications to the WP will be necessary to complete groundwater monitoring objectives.

DEQ will evaluate the submitted Groundwater Monitoring Report against the detailed report expectations listed below; and if found to adequately document monitoring and address all requirements, the Report will be accepted. If DEQ determines additional information, data, analysis, or corrections are required to meet groundwater monitoring objectives then DEQ will notify the O/O and their consultant of report deficiencies.

Note: DEQ expects a certain amount of detail in reports submitted during the investigation, cleanup, and monitoring of a Release from a PST system to meet the requirements of Montana law. In many instances some information, such as facility history and release background has been previously reported in Remedial Investigation Report(s) or Cleanup Report(s). Information and details that have not changed significantly may be excerpted from other reports with little or no modification (e.g., facility location, geology, hydrogeology, sampling protocol followed for groundwater sampling, CSM, QA/QC procedures, Standard Operating Procedures (SOPs), etc.). However, all tables, maps, and the Release Closure Plan should be updated when additional data are collected or available for each successive report.

Title Page

- Title of report: Groundwater Monitoring Report
- Facility name
- Facility address
- DEQ Facility ID Number, Treads Facility ID Number, and Release Number
- Responsible party's name, mailing address and phone number
- Contact person's name, mailing address and phone number (if different from above)
- Consultant's name, address, and phone number
- Date report prepared

Executive Summary

The executive summary should not exceed one page in length. It should provide a succinct summary of the groundwater monitoring results, findings, conclusions, and recommendations.

Purpose and Objectives of Investigation

State the site-specific objectives for the Groundwater Monitoring of this Release.

- Specific goals of groundwater monitoring (e.g., compliance monitoring, performance monitoring, assessment of geochemistry to enhance attenuation, etc.)
- Criteria measured to assess compliance with stated goals and objectives
- Potential modifications to the work plan to meet goals and objectives based on the measured criteria

Facility History and Release Background

The history of the Facility should include information about the current and historical property use; and the physical and legal aspects of the property that may affect the Release and its impacts to human health and the environment. The background of the Release should include known and suspected petroleum sources, known and potential petroleum impacts, any actions taken to address the Release, and previous investigations of petroleum release(s) at the Facility.

- Describe the history of operation of PST system(s) at the Facility including the following:
 - Owner/operator of the property, the Facility, and of the PST system
 - Previous use information of Facility identified through previous assessments and corrective actions.
 - Current Release(s): date, cause and source, type and amount of petroleum product lost
 - Type of petroleum products stored at Facility (past and current)
 - Dates (if known) of installation and removal of all existing and former PST systems
 - Other available information that would be beneficial in assessing groundwater monitoring data, attenuation rates, data anomalies, etc.
- Summarize the method(s) and conclusions of the site investigation(s). The following information should be included:
 - Method(s) of investigation used to determine the magnitude and extent of petroleum contamination (e.g., borings, monitoring wells, test pits, etc.)
 - The extent of petroleum contamination in soil and groundwater
 - Potential human and/or ecological receptors identified; with discussion supported by the Conceptual Site Model portion of the Release Closure Plan
 - Potential preferential pathways (e.g., utility trenches) within the plume extents (lateral and vertical) that may affect groundwater flow
 - Site-specific conditions identified during the investigation that may affect groundwater monitoring activities, results, or attenuation of petroleum contamination in groundwater
- Describe all clean up actions taken to address petroleum contamination at the facility. The following information should be included for each occurrence:
 - Clean up actions taken
 - Dates of cleanup or system operations, including dates of prolonged system shut down(s), and transitions to subsequent phases of treatment
 - Off-site effects

Maps required to Illustrate Facility Location and Site Features

All maps should include a north arrow, scale, map legend, and title with the Facility name in the title block. It is recommended that a true-scale map from previous investigation and/or cleanup reports be the base for the maps in this report. Other maps which may have been produced for the site investigation and/or cleanup may be required to show location and site-specific conditions that influence the interpretation of groundwater monitoring data. At a minimum, the following maps are required to show site features and groundwater monitoring results.

- Site map(s) should illustrate Facility details (refer to example Site Map below) including the following:
 - Current and former USTs, ASTs, piping, dispensers, and other sources of petroleum
 - Facility buildings and structures
 - Locations of environmental and construction activities pertinent to the release (excavations, test pits, soil borings, samples, monitoring wells, recovery wells, sparge/injection points, etc.)
 - Remediation equipment and systems (if installed, current and historical)
 - Existing and former hazardous material/waste storage areas
 - Location of all current and previous Releases at Facility and on adjacent properties
- Potentiometric surface map(s) should include select Facility details to illustrate the location of current and historical features that may influence groundwater monitoring results. Additionally, include the following:
 - Current and former monitoring wells and sampling points; include all sampling points referred to in the cumulative data table and use unique symbols for active monitoring wells, abandoned monitoring wells, and temporary sampling points.
 - Annotated potentiometric surface elevation for each point measured during the monitoring event; numerical values considered anomalous and not used to contour the potentiometric surface should be shown in brackets, but still included
 - Potentiometric surface contours at an interval appropriate for the site and observed data to show the groundwater flow direction and gradient
 - The predominate groundwater flow direction(s) indicated
- Iso-concentration map(s) of at least one parameter for each fuel type (e.g., gasoline, diesel, etc.). Include select Facility details to illustrate the location of current and historical features that may influence contaminant migration and the following:
 - Consult the DEQ project manager to select the most representative parameter(s)
 - Current and former monitoring wells and sampling points; include all sampling points referred to in the cumulative data table and use unique symbols for active monitoring wells, abandoned monitoring wells, and temporary sampling points
 - Annotated concentration of the selected parameter; concentrations that exceed the applicable RBSL should be distinguished from those less than RBSLs by highlighting, bolding, or some other method
 - Iso-concentration contours at an interval appropriate for the site and observed data; one iso-contour should represent the RBSL

Receptor Survey

Potential receptors and migration pathways have been previously identified in the areas of petroleum-impacted soil and the groundwater plume during the remedial investigation and cleanup. Discuss the exposure potential for receptors as follows:

- Evaluate potentially complete pathways identified in the Conceptual Site Model of the Release Closure Plan
- Describe any changes to the site or neighboring area since the previous report that may have introduced new potential receptors or modified the mitigating factors limiting exposure of potential receptors to residual petroleum contamination

Groundwater Monitoring

Describe the method(s), equipment types, and results of the completed groundwater monitoring including fluid level measurements, monitoring methodology, laboratory analyses, evaluation of results and trends; include the following:

- Describe the typical monitoring well and sampling points: well diameter, screened interval, length of screen, type of native soil screened, surface completion, and total depth
 - If multiple aquifers are screened, describe the typical monitoring well for each aquifer
 - If a subset of well(s) deviate from the typical, identify the wells and describe the discrepancies
- Groundwater monitoring procedures including date, fluid-level measurement, sampling method, purging method, and stabilization parameters; sampling plans may be referenced and placed in appendices or in a standard operating plan (SOP) submitted to DEQ
- Document analytical procedures: name and address of laboratory, analytical methods, field duplicates, and blanks
- Discuss sample collection deviations from the WP, if any reporting limits are above screening levels, QC samples outside acceptance criteria and the usability of associated samples, completeness and other QC criteria required by the MT QAP.
- Describe method(s) of waste disposal: water from well-development, purging, decontamination, etc., and free product (if applicable)
- Describe well rehabilitation or redevelopment procedures (if applicable) including: date, type of development, volume of water removed, and water quality
- Provide results of surveyed locations and elevations of wellheads; describe referenced datum (if applicable)
- Describe characteristics of the aquifer(s) based on monitoring results, including
 - Hydraulic characteristics based on the observed purge rate and recovery
 - Measurements of fluid depths and calculated groundwater elevations should be presented in a cumulative data table
 - Direction(s) of groundwater flow
 - Perched or confined aquifer conditions
 - Other site-specific aquifer characteristics
- Present groundwater analytical results in cumulative table(s) including field data such as sample identification, screened interval, depth to fluid(s), free-product thickness (if present), and

collection date (refer to example Groundwater Table below). Groundwater analytical results should be compared to current Risk-Based Screening Levels (RBSLs) published in RBCA.

- Prepare maps according to the specifications provided above.
- If kriging or statistical analyses are used to interpolate potentiometric surface or iso-concentration contours, document and provide justification for the method used including the following: citations for kriging techniques or statistical analyses, identify the program used, analyses employed, grid boundary specifications, and other contouring methods (if multivariable). Note any modifications to the kriging outputs based on site-specific information.

Intrinsic Biodegradation Indicators (IBIs)

Intrinsic Biodegradation Indicator (IBI) data should be presented in a way that summarizes the attenuation processes occurring per sample point, what those processes mean in relation to attenuation rates of observed groundwater contaminant concentrations, position within the plume, limitations of respiration, and recommended amendments if necessary.

Describe the purpose and objectives of collected IBI data, the type of IBI data collected, and evaluation of results and trends; include the following:

- Detail parameters analyzed as part of the investigation of IBIs and include rationale for data point choice and associated analysis.
- Provide a table that includes analyte results and field parameter data (example provided below).
- Describe the processes occurring in the background (non-impacted) aquifer, upgradient, source, and peripheral wells and data points. Indicate spatially the predominant attenuation processes.
 - Note whether IBI parameter trends are increasing or decreasing in each well.
 - Provide an indication of the type and degree of respiration occurring in each well.
 - Compare and contrast attenuation processes between select sample locations. Wells to consider include those that represent background, source, and downgradient conditions.
 - Provide comments on IBI and natural attenuation processes as they relate to contaminant concentrations.
- Describe what limits degradation spatially, provide a discussion on the relationship between IBI parameters as they either inhibit or promote attenuation.
 - Additional statistical analysis of IBI data may be necessary based on consultation with the DEQ project officer.
- Provide site-specific recommendations for additional sample points, IBI analyses, groundwater monitoring schedules, and amendments as necessary to achieve closure.
- Document sources/citations pertinent to IBI discussion.

Data Validation and Usability Summary

Briefly summarize the results of data validation and make a statement as to the usability of the data; refer to the details in the data validation summary form appended to the report.

- Describe any deviations from the WP of sampling, sample preservation, shipping, etc. that may influence the validity and usability of the data
- Identify blanks collected (e.g., trip, field, equipment), their purpose, if detections were reported, conditions that may have contributed to reported detections, and the influence the analytical results of the blanks have on the usability of the data

- Identify duplicate samples and parent samples, calculate the relative percent difference, and explain how the results influence the validity and usability of the data
- Identify if any reporting limits are great than screening limits and influences on the usability of the data.
- Identify percent completeness of the planned vs. actual sampling and any influences on the usability of the data. Please see the MT QAP for a full description of quality assurance/quality control requirements.

Data and Results

Interpret all available data and describe in detail the results of the groundwater monitoring; technical evaluations should be stated with reasonable professional certainty and under the standard of care applicable and are expected to include at least the following:

- Describe the vertical and horizontal extent and magnitude of petroleum impacts to groundwater by referring to the table of cumulative groundwater monitoring data and constructed maps
- Describe the plume stability (i.e., expanding, stable, decreasing, migrating) with reference to specific wells that support the interpretation
- Describe the trends in contaminant concentrations, refer to the details in the tables and figures
 - Discuss the influence of cleanup action on the observed trend
 - Discuss the influence of groundwater elevation on the observed trend
 - Discuss the projected time that RBSLs will be reached

Release Closure Plan (RCP)

The O/O and their consultant should have developed a RCP to cleanup, monitor, and resolve the Release during the investigation and cleanup phases. Update the RCP based on the results of groundwater monitoring. The plan should be based on the data documenting the extent and magnitude of petroleum impacts, professional judgement, and experience in the area.

- Update the site-specific RCP based on the groundwater monitoring results and any changes to potential receptors or exposure scenarios. Use the RCP Excel spreadsheet format available at DEQ's website).
- Propose closure of the Release only if all the data demonstrate that there are no petroleum impacts exceeding RBSLs or regional screening levels for all media or that all exposure pathways are incomplete
- If attenuation rates suggest that RBSLs will not be reached within the timeframe previously estimated, re-evaluate cleanup options and determine if additional remedial action is necessary.
- Discuss the Release Closure Plan and proposed cleanup methods with DEQ's project manager while preparing the groundwater monitoring report and prior to submitting report to DEQ
- Update the RCP; include a brief discussion of the plan in the report text and append a copy of the completed RCP to the report

Conclusions

Briefly state whether the groundwater monitoring objectives have been met for the Release; technical conclusions should be stated with reasonable professional certainty and reference should be made to the

WP goals, objectives, and acceptance criteria. Conclusions must be supported by the data and discussion in the report. Include the following:

- Magnitude and extent of petroleum contamination in groundwater
- Apparent attenuation rates post-cleanup
- Suitability of conditions for continued attenuation
- Potential exposure pathways
- Effect on public health and the environment
- Closure pathways to resolve the Release

Recommendations

State recommendations for additional work required to cleanup, monitor, and close the Release.

Technical recommendations should be stated with reasonable professional certainty and should include the following

- Site-specific recommendations that are consistent with details in the groundwater monitoring report and summarized in the Release Closure Plan
- Propose a site-specific cleanup plan, if required
- Propose a site-specific monitoring plan, if required

Signature page should be signed and dated

Limitations

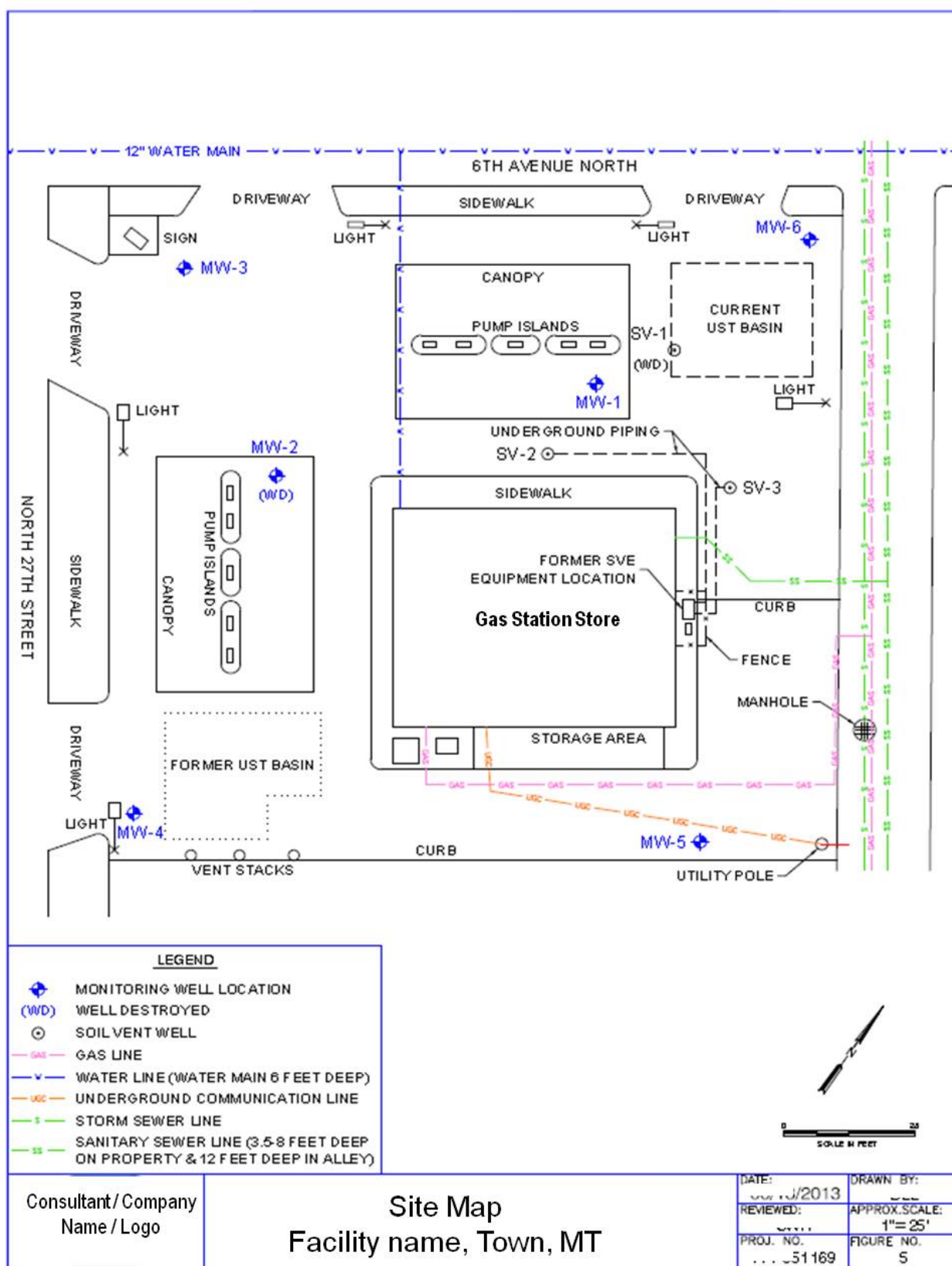
References

Appendices

DEQ may require site-specific attachments to the report; however, the following appendices for all Groundwater Monitoring Reports are typically required.

- Maps
- Tables summarizing laboratory analytical and field data
- Updated Release Closure Plan
- Groundwater sampling logs
- Laboratory reports including the following:
 - Original (or copy of original) analytical result reports
 - Chain of custody documentation
 - Sample receipt checklist(s)
 - Quality assurance/quality control report(s)
 - Chromatograms
- Completed Data Validation Summary Forms

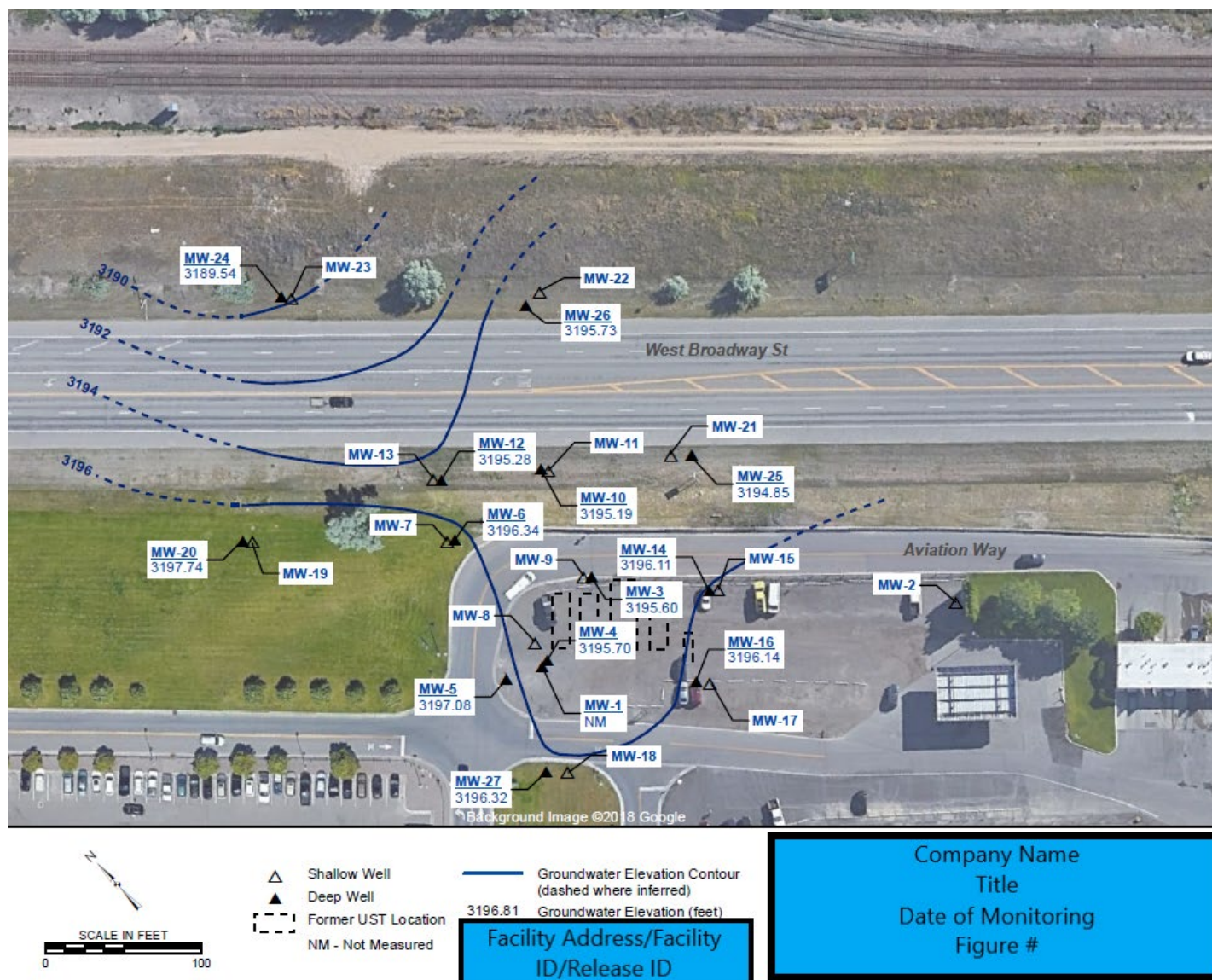
Example – Site Map (adapted from a submitted report)



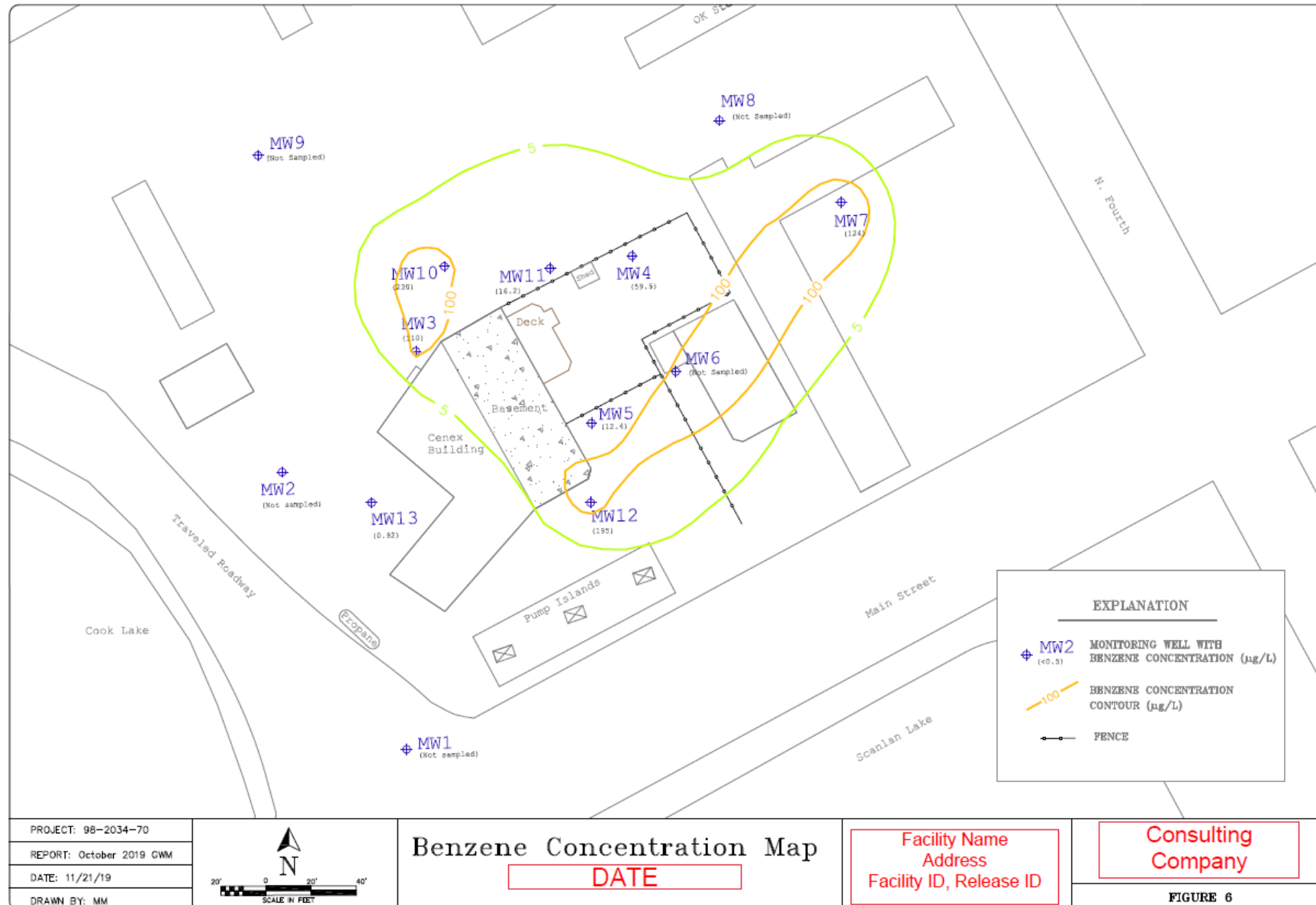
Example - Groundwater Elevation Map (adapted from a submitted report)



Example - Groundwater Elevation Map with Interpolated Contours (adapted from a submitted report)



Example - Chemical Concentration Contour Map (Adapted from a submitted report)



Example – Tabular Summary of Cumulative Groundwater Data

Example Table 2: Cumulative Groundwater Monitoring (2007 - 2013) at Facility Name, Address, City / Town																								
Facility ID: number, Release number																								
Sample / Field Data					Laboratory Analytical Data, ug/L																			
					Volatile Petroleum Hydrocarbons										Lead Scavengers		Extractable Petroleum Hydrocarbons							
Well / Boring ID	Water Depth, ft bgs	NAPL Thickness, ft	Groundwater Elevation (ft. MSL)	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Naphthalene	TPH	C ₅ - C ₈ Aliphatics	C ₉ - C ₁₂ Aliphatics	C ₉ - C ₁₀ Aromatics	EDB 1,2-Dibromoethane	DCA 1,2-Dichloroethane	EPH Screen	TEH	C ₉ - C ₁₈ Aliphatics	C ₁₉ - C ₃₆ Aliphatics	C ₁₁ - C ₂₂ Aromatics			
MW-1 (Measuring Point Elevation: 2956.45 ft. MSL)	Screened 5 ft to 15 ft bgs																							
	12.15	---	2,944.30	5/18/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	10.30	---	2,946.15	9/10/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	11.17	---	2,945.28	12/5/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	13.40	---	2,943.05	3/19/2008	<0.5	<0.5	<0.5	<1.5	<2	<1	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	10.40	---	2,946.05	6/3/2010	<0.25	<0.25	<0.25	<0.75	<1.0	5.4	<50.0	<50.0	<50.0	<50.0	NA	NA	<111	NA	NA	NA	NA			
	13.93	---	2,942.52	1/29/2013	<0.15	<0.23	<0.17	1.3J	<0.29	<0.35	11.7J	2.2J	1.0J	6.1J	<0.0063	<0.088	<112	NA	NA	NA	NA			
14.63	---	2,941.82	4/1/2013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
MW-2 (2955.87 ft. MSL)	Screened 5 ft to 15 ft bgs																							
	11.65	---	2,944.22	5/18/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	10.52	---	2,945.35	9/10/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	11.11	---	2,944.76	12/5/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	11.66	---	2,944.21	3/19/2008	<0.5	<0.5	<0.5	<1.5	<2	<1	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	10.73	---	2,945.14	6/3/2010	<0.25	<0.25	<0.25	<0.75	<1.0	<2.5	<50.0	<50.0	<50.0	<50.0	NA	NA	<112	NA	NA	NA	NA			
	12.78	---	2,943.09	1/29/2013	<0.15	<0.23	<0.17	<0.34	<0.29	<0.35	1.7	<0.91	<0.86	0.55J	<0.0062	<0.088	<122	NA	NA	NA	NA			
13.37	---	2,942.50	4/1/2013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
MW-3 (2956.54 ft. MSL)	Screened 5 ft to 15 ft bgs																							
	12.52	0.25	2944.25	5/18/2007	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	10.49	0.10	2946.14	9/10/2007	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	12.14	sheen	2944.40	12/5/2007	1188	13	4	4	<2	51	17,800	7,500	3,600	2,050	NA	NA	3,000	2,800	280 J	230 J	370			
	12.52	sheen	2944.02	3/19/2008	1050	<1	<1	<3	<2	<5	11,560	5,500	2,600	1,500	NA	NA	1050	590	<200	<200	<200			
	---	---		6/3/2010	source area well removed during remedial excavation, April 2010																			
MW-3a (2956.48 ft. MSL)	Screened 5 ft to 15 ft bgs, replacement source-area well, 11/15/2012																							
	13.49	0.00	2942.99	1/29/2013	55	4.5	1.2	2.0	<2	11	1,755	880	815	950	NA	NA	340	NA	NA	NA	NA			
	14.05	0.00	2942.43	4/1/2013	6	<0.25	<0.25	<0.75	<1.0	<2.5	1,150	670	350	165	NA	NA	<111	NA	NA	NA	NA			
MW-4 (2955.72 ft. MSL)	Screened 4 ft to 14 ft bgs																							
	9.35	---	2,946.37	6/12/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	8.88	---	2,946.84	9/10/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	9.37	---	2,946.35	12/5/2007	<1	<1	<1	<3	<2	<5	<200	<100	<100	<20	NA	NA	<210	NA	NA	NA	NA			
	8.01	---	2,947.71	3/19/2008	<0.5	<0.5	<0.5	<1.5	<2	<1	<200	<100	<100	<20	NA	NA	<200	NA	NA	NA	NA			
	8.29	---	2,947.43	6/3/2010	<0.25	<0.25	<0.25	<0.75	<1.0	<2.5	<50.0	<50.0	<50.0	<50.0	NA	NA	<108	NA	NA	NA	NA			
	8.79	---	2,946.93	1/29/2013	<0.15	<0.23	<0.17	<0.34	<0.29	<0.35	<1.7	<0.91	<0.86	0.26J	<0.0062	<0.088	<114	NA	NA	NA	NA			
9.13	---	2,946.59	4/1/2013	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
MT DEQ RBSLs, 2018					5	1,000	700	10,000	30	100	NE	650	1,400	1,100	0.017	4	1,000	NE	1,400	1,000	1,100			
Bold: Analyte >DEQ RBSLs, MT DEQ Risk Based Corrective Action, 2018, Table 3					NA: Not analyzed					---: not sampled					ND: Not Detected					NE: Not Established				
J: Value is estimated - falls between detection limit & limit of quantitation					B: Analyte detected in method blank; not corrected for method blank concentration.																			

Example - Intrinsic Biodegradation Indicator/Monitored Natural Attenuation Data Table

Sample Intrinsic Biological Indicator/Monitored Natural Attenuation Data Table							
		Concentration/Measurement					
Well ID	Parameters Investigated	Sample Date	Sample Date	Sample Date	Sample Date	Trend Increasing/ Decreasing? (+ or -)	Position within the plume (upgradient, source, mid-point, peripheral, downgradient, etc.)
MW1	pH						
	DO (mg/L)						
	ORP (mV)						
	Nitrate + Nitrite						
	Manganese						
	Iron						
	Sulfate + Sulfite						
	Methane						
	Other						
	_TPH						
	_TEH						

Sample Intrinsic Biological Indicator/Monitored Natural Attenuation Data Table							
		Concentration					
<u>Well ID</u>	Parameters Investigated	Sample Date	Sample Date	Sample Date	Sample Date	<u>Trend</u> Increasing/Decreasing? (+ or -)	Position within the plume (upgradient, source, mid-point, peripheral, downgradient, etc.)
MW1	pH						
	DO (mg/L)						
	ORP (mV)						
	Nitrate						
	Nitrite						
	Mn4+						
	Mn2+						
	Ferric Iron						
	Ferrous Iron						
	Sulfate						
	Sulfite						
	Methane						
	Other						
	TPH						

Please Note: the sample data table provided above allows for easy presentation and interpretation of IBI results. The table provides space for commonly observed parameters observed in a basic IBI evaluation and can be expanded to include other analytes as necessary. Parameters provided are listed in order from top-to-bottom by order of greatest to least aerobic reactivity. It is the hope that data will be analyzed in order of highest aerobic reactivity to least aerobic reactivity to provide a more thorough evaluation of attenuation processes. Data should be compared to TPH and or TEH levels in each well to draw correlations between IBI parameters and concentration data as it relates to total respiration.

Release Closure Plan – Part 1: Site Summary & RI Results

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)				
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases				
Part 1: Site Summary & Remedial Investigation (RI) Results				
reference: MT DEQ Remedial Investigation (RI) Guidance for Petroleum Releases				
Consultant:			Date:	DEQ PM:
Facility Name / Address:				
Facility ID:		Release:	WP ID:	
Site Information	Release Cause, Source(s) & Petroleum Types:			
	other releases onsite and nearby:			
	Site Use(s) -- Former, Current & Planned:			
	Surface Conditions & Access:			
	former Petroleum Tank Systems:			
	current Petroleum Tank Systems:			
	Other:			
Subsurface	Stratigraphic sequence - layers & thicknesses:			
	Stratigraphic Continuity - Lateral Variation(s):			
	Groundwater Depth & Flow Direction(s):			
	Aquifer(s) unconfined, confined, perched:			
	Receptor Depth/Location (basements, utilities):			
	Other:			
Extent & Magnitude	Petroleum Types, Age & NAPL Mobility:			
	Surface Soil Impacts (0 to 2 ft bgs):			
	Vadose-Zone Soil Impacts:			
	Smear-Zone Soil Impacts:			
	Groundwater Impacts:			
	Surface Water Impacts:			
	Petroleum Vapor Impacts:			
	Other:			
Reports	RI and Monitoring Reports & Dates:			
	Pilot Tests & Results:			
	Results from Cleanup(s):			
	Other:			
What currently prevents Release Closure?				
additional information required for PMZ Closure:				
Information & Data Gaps:				
Recommendations and comments:				

Release Closure Plan – Part 2: CSM - Evaluation of Exposure Pathways

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan						(7 Mar 2018)	
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases							
Part 2: Conceptual Site Model (CSM) - Evaluation of Exposure Pathways							
reference: MT DEQ Risked-Based Corrective Action (RBCA) Guidance for Petroleum Releases							
Consultant: 0		Date: 1/0/1900		DEQ PM: 0			
Facility Name: 0		Complete Description for All Receptors Describe why a Receptor is not threatened or impacted; and Describe proposed Investigation, Cleanup, and/or Monitoring Methods for each threatened or impacted Receptor.					
Facility ID: 0						Release: 0	
Petroleum Source(s)	Affected Medium	Exposure Medium / Point	Exposure Route	Receptor			
Required: Complete Description of the Source(s) of Petroleum Release →	Surface Soil (0 - 2 ft bgs) →	→ Soil →	Ingestion Dermal →	Resident and/or Worker			
		→ Soil →	Leaching →	Groundwater			
		→ Dust/Vapors →	Inhalation →	Resident and/or Worker			
		→ Surface Erosion to Surface Water and Sediment →	Ingestion Dermal →	Recreator, Ecological Receptor ¹			
	→	Sub-Surface Soil (> 2 ft bgs) →	→ Soil →	Ingestion Dermal →	Construction Worker ²		
			→ Soil →	Leaching →	Groundwater		
			→ Indoor Air →	Inhalation →	Commercial or Residential Indoor Air		
			→ Dust/Vapors →	Inhalation →	Construction Worker		
			→ Buried Water Line →	Ingestion Dermal →	Resident and/or Worker		
			→ Buried Utility Line →	Inhalation of Indoor Air →	Indoor Resident and/or Worker		
	→	Groundwater →	→ Groundwater →	→	State water ³		
			→ Indoor Air ⁴ →	Inhalation of Indoor Air →	Resident and/or Worker		
→ Groundwater and Vapors →			Ingestion Dermal Inhalation →	Construction Worker ²			
→ Drinking Water →			Ingestion Dermal →	Resident and/or Worker			
→ Surface Water and/or Sediment →			Ingestion Dermal Inhalation →	Recreator, Ecological Receptor			
→ Buried Water Line →			Ingestion Dermal →	Resident and/or Worker			
→ Buried Utility Line →			Inhalation of Indoor Air →	Indoor Resident and/or Worker			
Data Gaps:							
Recommendations:							
Footnotes:							
1. Ecological Receptors (e.g. plants and animals) can be added as a separate line associated with surface soil but it is not common for PTC sites. 2. Construction worker covers excavations conducted for building construction, utility installation and repair, as well as residents planting trees, etc. 3. Standard or RBSL exceedence are a complete pathway to a receptor, which is state water (or groundwater). 4. Indoor Air is the exposure medium for a potential or known vapor intrusion setting where a resident or an employee of a business may breathe petroleum vapor from the release.							

Release Closure Plan – Part 3: Evaluation of Cleanup Alternatives

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)							
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases							
Part 3: Evaluation of Cleanup Alternatives reference: MT DEQ Remedial Alternatives Analysis (RAA) Guidance for Petroleum Releases							
Consultant:		0		Date:		1/0/1900	
DEQ PM:		0					
Facility Name / Address: 0							
Facility ID: 0		Release: 0		WP ID: 0			
Administrative Rules of Montana 17.56.605(3) requires screening and selection of cleanup methods to develop a matrix evaluation of cleanup alternatives. A cleanup plan requires information on all alternatives and an explanation why any alternative was selected.		Enter appropriate site-specific Cleanup Methods that are based on RI results & CSM					
		No Action*	e.g. Excavation	e.g. Excavation & ORC	e.g. SVE & AS	fill-in as needed or leave blank	fill-in as needed or leave blank
Evaluation Criteria	Performance	Estimated Costs					
	Protective of Human Health & Environment (e.g. residences, utilities, water supply, future use)						
	Method-specific regulatory requirements (e.g. disposal of impacted soil & water, access agreements)						
	Method-specific feasibility requirements (e.g. pilot tests, treatability studies)						
	Contaminant-specific requirements (e.g. method achieves soil & GW RBSLs & DEQ-7 standards)						
	Location-specific requirements (e.g. potential historical, cultural, or ecological significance, or site near wetlands, floodplains, surface water, endangered species / migratory bird habitat)						
	Reliability -- Short Term						
	Reliability -- Long Term						
	Implementation Issues & Limitations						
	Safety Issues						
	Effects on Public Health and Environment (includes Receptors)						
	Other site-specific criteria & issues:						
	Advantages of Cleanup Method:						
	Disadvantages of Cleanup Method:						
Est. Years to Complete Cleanup Method:							
Cleanup Recommendations:							
Information & Data Gaps:							
Recommendations and comments:							

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

Release Closure Plan – Part 4: Compliance Monitoring and Monitored Natural Attenuation

MT DEQ Petroleum Tank Cleanup Section -- Release Closure Plan (7 Mar 2018)							
for the Investigation, Cleanup, Monitoring & Closure of Petroleum Releases							
Part 4: Compliance Monitoring reference: MT DEQ Remedial Alternatives Analysis (RAA) Guidance for Petroleum Releases							
Consultant:		0		Date:	1/0/1900		DEQ PM:
Facility Name / Address:		0					
Facility ID:		0		Release:	0		WP ID:
Compliance & Operation Monitoring Methods to Evaluate Effectiveness of each Cleanup Alternative Listed in Part 3							
Administrative Rules of Montana 17.56.605(6) requires the cleanup plan to include a plan and schedule for compliance monitoring to evaluate the effectiveness of cleanup activities.		No Action*	e.g. Excavation	e.g. Excavation & ORC	e.g. SVE & AS	fill-in as needed or leave blank	fill-in as needed or leave blank
Evaluation of Cleanup	Confirmation Sampling						
	Borings/ Monitoring Wells (MWs)						
	GW Monitoring (freq., wells, years)						
	System O/M (frequency & years)						
	Petroleum Vapor Monitoring (freq., locations, years)						
	Receptor Monitoring						
	Waste Management						
	Other site-specific monitoring:						
	Method(s) to Evaluate Interim Results and Optimize Cleanup:						
	Est. Years to Complete all Monitoring:						
Closure	Estimated costs for O/M & monitoring:						
	Estimated Total Years to Closure:						
	Natural Attenuation Trends:						
	What currently prevents Closure?						
	Is this a PMZ Closure Candidate?						
Other:							
Information & Data Gaps:							
Recommendations and comments:							
* Note: Cleanup technologies may be removed or added as appropriate for each Release; however, the 'No Action' alternative must be evaluated for comparison at every Release.							