Montana DEQ State Superfund Unit
Feasibility Study Guidance
May 2022

Purpose of a Feasibility Study

The feasibility study (FS) process consists of the development and screening of remedial alternatives or cleanup options and a detailed analysis of a limited number of the most promising options to establish the basis for a remedy selection decision. A range of viable alternatives are developed that meet the remedial action objectives developed during scoping and refined as the FS progresses.

This guidance outlines key steps in the FS process and provides detailed descriptions of the steps. Examples are provided to further assist with development of site-specific documents. Please submit all documents to DEQ in optimized compiled PDF, hard copy, and modifiable electronic formats. In addition, a schedule for submittal of all required work should be included.

Planning

Utilizing the remedial investigation, risk assessment, and fate and transport evaluation results:

- Identify the contaminants of concern (COCs) that pose an unacceptable risk to human health and the environment.
- Show the areas of the facility that have an unacceptable risk on a figure(s) and table(s) and explain which uses (e.g., commercial/industrial, residential, etc.) have an unacceptable risk (see examples 1, 2, and 3).
- Identify the COC site-specific cleanup levels (SSCLs) that are protective of specific uses (calculated during the risk assessment/fate and transport evaluation).
- Identify if free product is present on groundwater or surface water or if sludge is present in soils or open pits.
- Identify any unique situations that may pose safety concerns (entrapment features, structural integrity issues, high-pressure gas lines, active railroad tracks, etc.).
- Identify present and reasonably anticipated future land uses on or adjacent to the facility.

This information should be submitted to DEQ along with the initial alternatives screening table (IAST) described below.

Develop Preliminary IAST

Using facility-specific information, identify and describe all potential remedy alternatives that may be used at the facility. The Federal Remediation Technologies Roundtable's (FRTR) Remediation Technology Screening Matrix may be used as a resource. FRTR's technology screening matrix screens soil and groundwater alternatives against factors such as availability, implementability/developmental status, effectiveness, reliability/maintainability, and relative cost.

For DEQ State Superfund purposes, the factors that should be used to initially screen alternatives will be implementability, effectiveness, and cost.

- *Implementability* includes availability, site conditions, and permits, etc. The FTRF refers to implementability as developmental status. If a presumptive remedy is not implementable, a justification/discussion should be provided.
- *Effectiveness* includes chemical-specific considerations, reliability, maintainability, etc.
- *Cost* includes both capital and operation and maintenance (O&M) costs. Periodic inspection and enforcement of institutional controls (ICs) should also be factored into cost. For IAST purposes, cost may be simply reflected using the following scale: $, $$, and $$$, and consistently applied across all alternatives.

Environmental Protection Agency (EPA) presumptive remedies should be included in the IAST as applicable for site-specific contaminants and/or conditions and flagged as presumptive remedies in the table. If a presumptive remedy is applicable to the contaminants, but site-specific conditions make it unable to be implemented, a justification/discussion should be included.

The preliminary IAST, along with the tables and figures discussed in the Planning Section (above) will be provided to DEQ for review prior to the FS scoping meeting. See attached IAST – example 4.

FS Scoping Meeting

The FS scoping meeting should ensure the potentially liable person (PLP) and DEQ are in agreement regarding the areas and contaminants to be addressed, as well as the universe of alternatives that may achieve the necessary cleanup. It provides an opportunity to systematically walk through the IAST to ensure a shared understanding of site conditions and the alternatives that will be evaluated moving forward. The FS scoping meeting also provides an opportunity to discuss the FS process, answer PLP questions, and ensure future deliverable formats and content meet DEQ expectations.

The FS scoping meeting is intended to be led by the PLP. The PLP should prepare a draft meeting agenda, be prepared to fully discuss the preliminary IAST (submitted before the meeting), answer or address (follow-up where needed) DEQ's comments or questions on the preliminary IAST, and capture meeting decisions/action items. The revised IAST, incorporating or addressing DEQ's comments, will be submitted to DEQ as part of the FS work plan.

Prepare Feasibility Study Work Plan (FSWP)

The FSWP includes the following information:

1. An identification of the existing SSCLs (calculated during the risk assessment/fate and transport evaluation) for all identified COCs. A review of current screening levels to ensure no additional COCs are present (this is of particular concern if screening levels have been revised since completion of the risk assessment). If contaminant toxicity data has changed, or changes in screening levels result in additional COCs, recalculate SSCLs. Also, review current land uses on or adjacent to the facility and facility conditions to identify any changes that have occurred since the risk assessment. If land use (present and reasonably anticipated future) or facility conditions have changed such that the assumptions in the risk assessment are no longer valid, recalculate the SSCLs using the new assumptions. If necessary, update the site conceptual model.
2. An identification of the areas and volume of contaminated media. This discussion should include the extent of contamination evaluated during the remedial investigation, as well as any contamination that remains after interim activities or pilot test studies. SSCLs will be used to identify areas and media requiring cleanup. The tables and figures associated with this discussion should be the same as, or build upon, those generated as part of the FS planning work described in the FS planning section above.
3. An identification of the preliminary remedial action objectives (PRAOs) specifying contaminants and media of concern, potential exposure pathways, and SSCLs.
4. An identification and description of any interim actions, pilot tests, or treatability studies that have occurred at the facility, supported by all available validated confirmation sampling, performance, and effectiveness data.
5. The revised IAST resulting from the FS scoping meeting (based on the preliminary IAST shown in example 4 and revised as needed based on the FS scoping meeting as discussed above in the FS scoping meeting section).
    a. Identification of the remaining potential remedy alternatives/technologies based on effectiveness, implementability, and cost, and the rationale for eliminating any remedy alternatives from further evaluation;
    b. Identification of remedial alternatives retained for further evaluation in the FS report; and
    c. Identification of all retained potential remedial alternatives that may require treatability studies.
6. A brief summary of the FS scoping process and procedures, and identification of the technologies and associated process options (e.g., chemical oxidation as a technology with ozone injection, persulfate, permanganate, etc. as process options) that have been retained for further evaluation in the FS report. In some instances, it may be appropriate to select one process option instead of multiple to move forward for full evaluation in the FS. Other process options might still be viable, and therefore retained, but would only be discussed or evaluated in detail if subsequent information indicates that the evaluated process option is less favorable.

7. An identification of any proposed or already implemented treatability studies or pilot studies. Include the objective(s) of the study and the expected or known outcomes that make the technology a viable option. Identify whether treatability or pilot studies will be needed early in the FS process to evaluate the technology/process option, or if the treatability or pilot study is more appropriately performed during remedial design. If treatability or pilot studies are to be implemented as part of the FS, include a treatability or pilot study work plan as an appendix in the FSWP. The treatability study/pilot test work plan should include:

    a. A project description (including a schedule) and background describing the facility and the type, concentration, and distribution of hazardous or deleterious substances.

    b. A remedial technology description describing the technology(ies) to be tested either in a bench scale or pilot scale test and the test(s) objective(s).

    c. If a bench scale test is planned, provide the rationale for the number and location of facility samples/media that will be collected and tested, and why those are representative of the overall facility conditions. If a pilot test is planned, provide the rationale for placement on the facility (e.g. in the source area location where technology can be tested for its effectiveness at remediating the target contaminant).

    d. A description of the specialized equipment and materials required for the treatability studies/pilot tests and sequential description of the experimental procedures to be performed, including identification of the variable and control conditions, and any baseline sampling needs.

    e. A description of equipment installation and start-up methods, operating conditions to be tested, and operation and maintenance procedures.

8. If sampling and analysis is needed as part of the FS (e.g., as part of a treatability/pilot test, etc.), then include a sampling and analysis plan, including a quality assurance section.

9. An identification and evaluation of potentially suitable remedial alternatives, including alternative treatment technologies and resource recovery technologies, based upon the revised IAST. The no action alternative also needs to be included as a baseline.

10. A discussion that each remedy alternative will be evaluated in the FS report in accordance with the criteria found in § 75-10-721(1) and (2), MCA, which requires:

    a. Attainment of a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment.

    b. Compliance with and cleanup consistent with the preliminary applicable and relevant state or federal environmental requirements, criteria, or limitations (ERCLs) identified by DEQ (including a discussion of the estimated time to meet ERCLs) (see example 5). DEQ will provide the PLP with preliminary ERCLs to include as an appendix in the FSWP.

    c. With consideration of present and reasonably anticipated future uses of the facility, giving due consideration to institutional controls, the evaluation will include how the alternative:

i. Demonstrates acceptable mitigation of exposure to risks to the public health, safety, and welfare and the environment;
ii. Provides long-term and short-term effectiveness and reliability;
iii. Is technically practicable and implementable;
iv. Uses treatment technologies or resource recovery technologies, if practicable, giving due consideration to engineering controls; and
v. Is cost effective.

11. A schedule that includes the following:

    a. The submittal of the revised/final FSWP that incorporates all DEQ comments made on the draft FSWP;

    b. Treatability studies or pilot tests if they are planned as part of the FS;

    c. The submittal of the draft FS Report; and

    d. The submittal of the revised/final FS Report that incorporates all DEQ comments made on the draft FS Report. Depending on public comments received on the Proposed Plan, revisions to the FS Report may be necessary, resulting in a third version of the FS Report. *The FS Report will not be approved by DEQ until after public comments on the Proposed Plan are received and considered, and the FS Report is revised, if necessary, based on public comments.*

FS Report

The FS Report includes the following information:

1. An introduction describing the purpose of the report.
2. General background information including:

    a. locational and operational information about the facility;

    b. property ownership (including illustrated in a figure); and

    c. nature and extent of contamination at the facility;

    d. SSCLs; and

    e. a description of areas requiring remediation (including illustrated on a figure), including volume of contaminated media.

    The FSWP will include most of the above information and it can be carried forward to the FS Report.

3. An identification and description of any interim actions that have occurred and how they meet the criteria of § 75-10-721(1) and (2), MCA.
4. A presentation and evaluation of the results of any investigations conducted after the remedial investigation (RI), including treatability or pilot studies conducted pursuant to the final FSWP approved by DEQ. Data validation and a discussion of quality assurance/quality control (QA/QC) results should be discussed prior to the evaluation of results and/or conclusions. Include all validated field and laboratory analytical results for

samples collected subsequent to the RI, including those collected during implementation of the FSWP, in an appendix. This may also include a tabular summary of RI data relied on in the FS.

5. A summary of any deviations from the final FSWP approved by DEQ, including an explanation of why the deviation was needed and any potential effect it had on the FS.

6. A presentation and discussion of remaining contamination, including estimated volumes of media impacted as they relate to areas above SSCLs. This section should include a discussion of the risk assessment, the review of current screening levels to ensure no additional COCs are present, the review of current contaminant toxicity data, the recalculation of SSCLs (if necessary), review of current land uses on or adjacent to the facility that have occurred since the risk assessment, and update to the site conceptual model (if necessary).

7. A presentation of the PRAOs for each media established in the FSWP.

8. A presentation and discussion of results of the detailed alternatives analysis including:

    a. Identify components that are common to all alternatives and present those once, prior to the discussion of other alternatives. The common elements typically include institutional controls needed to restrict land or groundwater use, engineering controls needed during implementation of the remedy (fencing, signage, etc.), and long-term monitoring (performance and compliance monitoring). One detailed cost estimate should be prepared for the common elements. For those alternatives that may require more robust performance monitoring, those additional costs should be included in the cost estimate for that specific alternative.

    b. A general description of each of the technologies and associated process options (e.g., chemical oxidation as a technology with ozone injection, persulfate, permanganate, etc. as process options) that are evaluated in the FS report. Clarify if one representative process option (instead of multiple options) is used for full evaluation. Clarify if other process options are viable, and therefore retained, but not discussed. Include any constraints associated with implementing the technology (needs to occur during low or high groundwater conditions, etc.). Clearly identify if there are RCRA listed or characteristic waste considerations at the facility, and if so, the alternatives and cost estimates should include specifics to address any special handling, disposal, or permit considerations.

    c. Identify if portions of the facility will be recontoured/graded, backfilled, and revegetated. Include sufficient detail regarding the type of fill (i.e., gravel, topsoil), seedbed preparation, amendments, type of vegetation, and a statement that the revegetation plan will be submitted to the county weed control board for approval and documentation of that approval will be provided to DEQ.

    d. For technologies/process options for which treatability/pilot tests were previously conducted, include an assessment of the success of the test(s) and an evaluation of the results as they pertain to the selection of the remedy.

    e. The FS does not need to combine alternatives into treatment trains. DEQ will combine appropriate alternatives as necessary when proposing its preferred remedy in the Proposed Plan. However, for alternatives that need to be combined (e.g., soils

need to be excavated before they can be disposed or treated ex situ, groundwater needs to be extracted before it can be treated ex situ) a statement should be added to clarify the combination. The appropriate costs for the combination should be included in the detailed cost estimate tables.

f. Clearly identified estimated timeframes for implementing the technology and achieving SSCLs and ERCLs for each alternative. This may include trend analysis or modeling.

g. Detailed cost estimates that clearly identify assumptions (assumptions can be included in the text), line item unit costs (rather than lump sum) when appropriate, capital costs separate from operations and maintenance costs, and use a 3% discount rate. Costs for institutional controls should include preparation, filing, periodic inspection, and enforcement costs. See examples 6a and 6b.

h. Clarify if all or a portion of the infrastructure already exists for a specific alternative and do not include the capital costs for these existing components in the detailed cost estimate tables. Include a footnote on the tables indicating the presence of existing infrastructure for clarity.

9. An evaluation of each individual alternative in accordance with the criteria found in § 75-10-721(1) and (2), MCA, which requires:

a. Attainment of a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment.

b. Compliance with and cleanup consistent with the preliminary applicable and relevant state or federal ERCLs identified by DEQ (including a discussion of the estimated time to meet them). Identify any permits that may be needed for a specific alternative. DEQ will provide the PLP with preliminary ERCLs to include as an appendix in the FSWP (see example 5 to assist with evaluating how a specific alternative may or may not comply with ERCLs).

c. With consideration of present and reasonably anticipated future uses of the facility, giving due consideration to institutional controls, an evaluation of how the alternative:

i. Demonstrates acceptable mitigation of exposure to risks to the public health, safety, and welfare and the environment;
ii. Provides long-term and short-term effectiveness and reliability;
iii. Is technically practicable and implementable;
iv. Uses treatment technologies or resource recovery technologies, if practicable, giving due consideration to engineering controls; and
v. Is cost effective. *Cost effective is not just a comparison of the cost of each alternative, but also includes an analysis of incremental risk reduction and other benefits of the alternatives (see § 75-10-721(5), MCA).*

It is likely that no one alternative will meet all §75-10-721, MCA cleanup criteria. In which case, include a statement that the alternative would need to be combined with another alternative or combination of alternatives to meet the criteria.

10. A comparative analysis of alternatives using the §75-10-721, MCA cleanup criteria. This should include both text and a summary table. Example comparative analysis text and tables are attached for clarification – see examples 7 and 8.

11. Figures including, but not limited to:

    - groundwater potentiometric surface and extent of contamination above SSCLs.
    - estimated areal extent of contamination in surface and subsurface soils above applicable SSCLs (separate surface and subsurface soil figures are acceptable and if combined should clearly differentiate the extent of surface versus subsurface soil contamination).
    - figures used to calculate soil or groundwater volumes for treatment/removal.
    - figures demonstrating property ownership and current uses.
    - figures showing utilities, etc.
    - figures showing conceptual designs, if needed, for cost estimation purposes – see example 9.

12. Appendices containing DEQ's analyses of preliminary ERCLs as well as the revised alternative screening table outlined in the FSWP discussion above.

13. Other pertinent information obtained during the FS.

14. A closing paragraph that describes the remaining steps for selection and implementation of the remedy.

Example 1

Kennedy/Jenks Consultants

Table (Insert #): Receptors with Risks Above DEQ's Acceptable Levels[a]

Human Health Risk Assessment Report (Insert Date)

Contaminated Media (below)	Exposure Areas (right)	Railyard	Park	Residential Area and City ROWs	River Slough
Surface Soil [b]		■ Residential[e] ■ Industrial Worker ■ Construction Worker ■ Leaching to Groundwater	■ Residential ■ Industrial Worker ■ Construction Worker ■ Leaching to Groundwater	■ Residential ■ Leaching to Groundwater	---
Subsurface Soil [c]		■ Construction Worker ■ Leaching to Groundwater	---	■ Construction Worker ■ Leaching to Groundwater	---
Sediment [d]		---	---	---	■ Child Recreational User
Groundwater		■ DEQ-7 ■ RSLs ■ 2018 RBSLs	■ DEQ-7 ■ RSLs ■ 2018 RBSLs	■ DEQ-7 ■ RSLs ■ 2018 RBSLs	---
Surface Water		---	---	---	■ DEQ-7
Free Product		■ Present	■ Intermittently Present	■ Intermittently Present	■ Entrained in Deep Sediment
Ecological Risk Assessment					
Contaminated Media (below)	**Exposure Areas (right)**	**Railyard**	**Park**	**Residential Area and City ROWs**	**River Slough**
Surface Water		---	---	---	■1,2
Sediment		---	---	---	■1,2

Notes:

This table shows the receptors with risks above the DEQ levels outlined in the RA Report.

(a) DEQ's acceptable level of 1E-5 for cancer risks and hazard index of 1 for non-cancer hazards.

(b) Surface soil is defined as soils collected between 0 and 2 feet below ground surface (bgs).

(c) Subsurface soil is defined as soils collected between 2 feet bgs and the groundwater table.

(d) Sediment samples were collected at depths less than 2 feet bgs.

(e) The current use of the Railyard is commercial/industrial; therefore, Residential risks were not calculated for this exposure area in the Risk Assessment, but this receptor is included as a potential future use.

1 = Pesticides and mercury > DEQ-7

2 = Chemicals > Ecological Receptor SSCLs

--- Either the media is not present in the exposure area or the concentrations did not pose an unacceptable risk.

Abbreviations:

DEQ-7 = Montana Department of Environmental Quality Circular DEQ-7: Montana Numeric Water Quality Standards

RSLs = Environmental Protection Agency Regional Screening Levels

RBSLs = Montana Department of Environmental Quality Risk-based Corrective Action Risk Based Screening Levels

Original table prepared by Kennedy/Jenks Consultants. DEQ modified the table to support this FS guidance.

Example 2

MW2A	Dissolved Lead
4/2/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/6/2016	0.240 U

MW7	Dissolved Lead
4/2/2015	2.00 U
9/16/2015	0.13 U
4/27/2016	0.240 U
9/6/2016	0.344 J

MW13	Dissolved Lead
4/2/2015	2.00 UB [2.00 U]
9/16/2015	0.13 U
4/27/2016	0.240 U [0.240 U]
9/7/2016	0.240 U

MW9	Dissolved Lead
4/2/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/7/2016	0.240 U

MW16	Dissolved Lead
9/7/2016	0.283 J

MW15	Dissolved Lead
9/8/2016	0.240 U

MW4	Dissolved Lead
4/3/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/6/2016	0.240 U [0.240 U]

MW6	Dissolved Lead
4/2/2015	2.00 U
9/16/2015	0.13 U
4/28/2016	0.240 U
917/2016	0.356 J

MW8	Dissolved Lead
4/3/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/6/2016	0.240 U

MW14	Dissolved Lead
9/7/2016	0.240 U

MW10	Dissolved Lead
4/2/2015	2.00 U
9/15/2015	0.13 U
4/27/2016	0.240 U
9/7/2016	0.240 U

MW5	Dissolved Lead
4/3/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/6/2016	0.473 J

MW3A	Dissolved Lead
4/2/2015	2.00 U
9/17/2015	0.13 U
4/27/2016	0.240 U
9/6/2016	0.419 J

MW1	Dissolved Lead
4/2/2015	2.00 U
9/17/2015	0.13 U
4/28/2016	0.240 U
9/6/2016	0.240 U

MW12	Dissolved Lead
4/2/2015	2.00 U
4/27/2015	2.00 U
9/17/2015	0.13 U
4/27/2016	0.240 U
9/7/2016	0,240 U

LEGEND

- TOTALADJUSTED LEAD SURFACE SOIL CONCENTRATIONS (mg/kg)

INTERPOLATED TOTAL ADJUSTED LEAD CONCENTRATIONS

- LJ <50mg/kg
- LJ 50-100mg/kg
- LJ 100 - 200 mg/kg
- CJ 200 - 600 mg/kg
- CJ >600mg/kg

- GROUNDWATER MONITORING WELL
- ABANDONED MONITORING WELL LOCATION
- [!]] EXPOSURE AREA
- P77,7,iJ CENTENNIAL TRAIL INTERIM ACTION AREA

Notes:

1) Soil is highly heterogeneous matrix and the proximity of one sample to another does not guarantee their concentrations will be similar. Thus, continuous interpolation of lead concentrations in soil should only be used as a general reference, not to identify specific lead concentrations in locations lacking lead samples.
2) Soil samples were either sieved prior to analysis for lead or adjusted to represent sieved sample results using a multiplier of 1.46.
3) Heat map created using the Nearest Neighbor Interpolation method in ArcGIS .
4) Methods for determining the coordinates of sample locations are available in historic reports.

LOCATION ID_____

DATE →

MW13	Dissolved Lead
4/2/2015	2.00 UB 1200 U
9/16/2015	0.13 U
4/27/2016	0.240 Uf 0.240 UI
9II/2016	0.240 U

DISSOLVED LEAD CONCENTRATION IN GROUNDWATER µg/L

UB = Analyte considered non-detect at the listed value due to associated blank contamination.
U = The analyte was non-detect at the reported concentration.
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
[ ] = Duplicate result in brackets
mg/kg = milligrams per kilogram
µg/L = micrograms per liter

T10N - R4W
Section 23
46.61402, -112.0633 (MW-11)
July 2017

0 200 400 Feet

SOURCE: WORLD IMAGERY, SERVICED BY ESRI ARCGIS ONLINE, ACCESSED ON 11/19/2019

BNSF RAILROAD COMPANY
JOSLYN STREET TAILINGS FACILITY
HELENA, MONTANA
FINAL FEASIBILITY REPORT

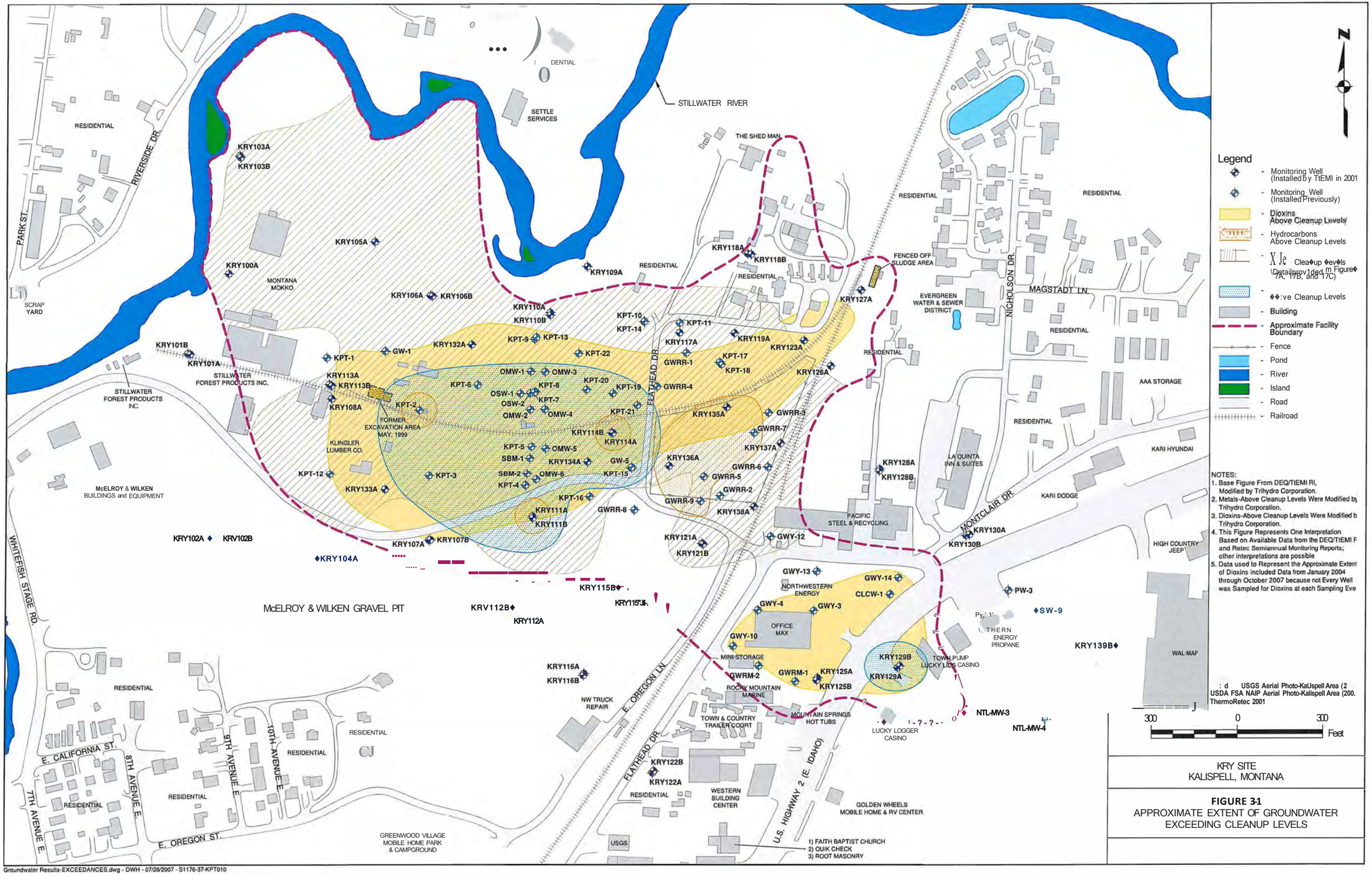
LEAD CONCENTRATIONS IN SURFACE SOIL (ISOCONTOURED) AND SHALLOW GROUNDWATER

ARCADIS Design&Consultonc)'I for natural and built assets

FIGURE
9

H:\GIS\ACTIVE\BNSF_JOSLYN\MXD\FIGURE 9 - LEAD CONCENTRATIONS IN SURFACE SOIL AND SHALLOW GROUNDWATER.MXD 11/19/2019 9:29:57 AM

Example 3



Groundwater Results-EXCEEDANCES.dwg - DWH - 07/26/2007 - S1176-37-KPT010

Example 4

Table 1. *EXAMPLE* Initial Alternative Screening Table (Comprehensive List of Potential Treatment Technologies)

This table is an example initial alternatives screening table. This table does not provide a comprehensive list of potential treatment technologies. Please provide a comprehensive list of technologies screened for each site, including technologies not retained.

General Response Action	Technology Type	Process Options	References	Evaluation Factors						Retained[5]	Treatability Study Needed?		
				Implementability[1, 2]		Effectiveness[3]		Cost[4]					
				Rank	Evaluation Comment	Rank	Evaluation Comment	Rank	Evaluation Comment	Yes/No	Yes/No	Type?	Timing?
												Pilot Test (PT), Bench Test (BT), bench, etc.	Timing = during FS or during remedial design
Soil (includes sludge if present)													
No Further Action	None	None	Inclusion of this option is required by DEQ as a baseline.	High	Easily implementable	Low	Will not remove contamination or reduce risk to human health and the environment.	$	No cost.	Yes	No	N/A	N/A
Institutional Controls	Land Use Controls	Zoning, Deed Notices, Environmental Control Easement	USEPA (2012)	Moderate	Easily implementable for properties owned by ABC Company, but low implementability for properties owned by other parties.	Moderate	Protects human health by limiting site uses and related exposures to contaminated soil. Not protective for the leaching to groundwater pathway. Requires long-term maintenance and enforcement of land use controls.	$	Cost is relatively low compared to other options, but does require long term maintenance/inspection and enforcement.	Yes	No	N/A	N/A
In Situ Soil Treatment	Immobilization	Solidification/Stabilization Cementing and/or stabilizing agents are mixed with impacted soils to bind contaminants and reduce their mobility (solidification). May also include a chemical amendment to transform contaminant to lower mobility/toxicity (stabilization).		High	Fully developed, moderate use. May not be compatible with all land uses.	High	Medium to High - can be highly effective a immobilizing inorganics. pH typically increased, which may increase the mobility of arsenic. Decreases potential exposure pathways.	$-$$	Cost is medium because of operation/maintenance. Capital cost is high.	Yes	Yes	BT	FS
	Extraction	Electrokinetic Separation Low-intensity direct current to desorb contaminants from the soil, then transport the charged particles toward electrodes for removal. Applicable to metals and polar organics in low permeability soils.		Moderate	Moderately developed, limited use. Most implementable in low permeability soils.	Moderate	Effectiveness is uncertain based on limited application of the technology.	$$$	Cost is high because of operation/maintenance. Capital cost is medium.	No (not retained based on implementability and effectiveness uncertainties due to highly permeable soils, and relatively high cost)	N/A	N/A	N/A
		Soil Flushing Water, or water containing an additive to enhance contaminant solubility, is applied to the soil or injected into the groundwater to raise the water table into the contaminated soil zone. Contaminants are leached into the groundwater, which is then extracted and treated.		Moderate	Fully developed, limited use for inorganics.	Moderate	Low to Medium - depends on site specific conditions and soils. May temporarily increase concentrations in groundwater.	$$	Cost is medium because of operation/maintenance. Capital cost is medium.	No (not retained based on potential to increase arsenic concentrations in groundwater)	N/A	N/A	N/A
Ex Situ Soil Treatment[6]	Bioremediation	Land Farming Contaminated soil is excavated and placed into lined beds; the soil is then mixed or tilled to stimulate aerobic degradation. Liners and other methods are used to control leaching of contaminants.	FRTR (2007), USDA (2002)	Moderate	Likely requires physical separation of stones and rubble prior to treatment. Requires use of a liner and leachate collection system for PCP treatment. Requires a large area and management to prevent offsite migration or contaminant transport.	Moderate	Applicable to PCP and petroleum constituents; limited applicability to dioxins and furans.	$$	Cost is relatively low compared to other options, but does require long term maintenance/inspection and enforcement.	Yes (retained for possible use in conjunction with other technologies)	Yes	PT	Remedial Design
		Biopiles A full-scale technology in which excavated soils are mixed with soil amendments and placed on a treatment area.	FRTR (2007)	Moderate	Requires leachate collection systems to control runoff.	Moderate	Applicable to PCP and petroleum constituents; limited applicability to dioxins and furans.	$$	Cost is relatively low compared to other options, but does require long term maintenance/inspection and enforcement.	Yes (retained for possible use in conjunction with other technologies)	Yes	PT	Remedial Design
	Chemical Reduction / Oxidation	Reduction / Oxidation Converts hazardous contaminant to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.		High	Fully developed. Limited use for inorganics.	Moderate	Depends on site specific conditions and soils.	$$	Cost is relatively high compared to other options, but does require long term maintenance/inspection and enforcement.	No (not retained based on implementability and effectiveness uncertainties for inorganics and relatively high cost)	No	N/A	N/A

Table 1. *EXAMPLE* Initial Alternative Screening Table (Comprehensive List of Potential Treatment Technologies)

This table is an example initial alternatives screening table. This table does not provide a comprehensive list of potential treatment technologies. Please provide a comprehensive list of technologies screened for each site, including technologies not retained.

NAPL and Groundwater													
No Further Action	None	None	Inclusion of this option is required by DEQ as a baseline.	High	Easily implementable	Low	Will not remove contamination or reduce risk to human health and the environment.	$	No Cost	Yes	No	N/A	N/A
Institutional Controls	Groundwater Use Restrictions	Controlled Groundwater Area	USEPA (2012)	Moderate	Easily implementable for properties owned by ABC Company, but low implementability for properties owned by other parties.	Moderate	Protects human health by limiting groundwater uses and related exposures to contaminated groundwater. Limited effectiveness for contaminant removal or treatment until residual source treated. Requires public outreach and long-term maintenance and enforcement of land use controls.	$	Cost is relatively low compared to other options, but does require long term maintenance/inspection and enforcement.	Yes	No	N/A	N/A
Monitored Natural Attenuation	Monitored Natural Attenuation/Long-Term Monitoring	Monitored Natural Attenuation	USEPA (2012)	Moderate - High	Easily implementable	Moderate	Effectiveness depends on site-specific conditions and completeness of source removal. Requires long-term monitoring to assess the progress of natural attenuation. Limited effectiveness for contaminant removal or reduction of risk to human health and the environment in the short term.	$ - $$	Cost is relatively low compared to other options, but term requires long term monitoring.	Yes (retained for possible use in conjunction with other technologies)	No	N/A	N/A
In Situ Treatment	Phytoremediation	Phytoremediation Use plants to reduce concentration of contaminants in groundwater through enhanced rhizosphere biodegradation, phyto-degradation, and phyto-volatilization. Plants can also provided hydraulic control through reducing infiltration and lowering the groundwater table.	USEPA (2012)	Moderate	Fully developed, limited use.	Low	Effectiveness depends on large tracts of land and shallow subsurface impacted.	$	Low operation/maintenance cost; low capital cost.	No (not retained because subsurface impacts are deep)	No	N/A	N/A
	Permeable Reactive Barrier	Permeable Reactive Barrier (PRB) Installed across the flow path of a contaminant plume, allowing the groundwater to be treated passively as it flows through the wall. PRB media consists of granular ZVI and/or organic material with permeable soils. Treatment can be achieved through sorption and/or co-precipitation with iron minerals as groundwater flows through the PRB media. Groundwater can be directed into the PRB by use of a funnel and gate configuration.	USEPA (2012)	Moderate	Fully developed, limited use.	Moderate	Effectiveness depends on groundwater flow being directed through the PRB and permeability and reactivity of the PRB can be maintained. Bench-scale testing is typically conducted.	$$	Medium operation/maintenance cost; low capital cost; may have to be replaced.	Yes (retained for possible use in conjunction with other technologies)	Yes	BT	FS
NAPL Collection, Reduction, and/or Treatment	Bioremediation	Bioventing/Biosparging Bioventing enhances the natural biological activity by supplying oxygen in the subsurface to reduce petroleum hydrocarbon mass in the vadose and smear zone.	ITRC (2009), USEPA (2005)	High	Easily implementable	Moderate	High for fuels and nonhalogenated SVOCs; however, less effective in low-permeability settings or heterogeneous settings where mass is not accessible to air flow. Low for inorganic constituents.	$$	Requires long term maintenance and inspection.	Yes (retained for possible use in conjunction with other technologies)	Yes	PT	depends

Table 1. *EXAMPLE* Initial Alternative Screening Table (Comprehensive List of Potential Treatment Technologies)

This table is an example initial alternatives screening table. This table does not provide a comprehensive list of potential treatment technologies. Please provide a comprehensive list of technologies screened for each site, including technologies not retained.

FOOTNOTES:

1 = If the technology is not implementable, do not fill out the information for the other evaluation factors.

2 = Implementability refers to how readily an alternative can be implemented at a site and includes availability, site conditions, permits required, etc. This section should also identify whether the technology is an EPA presumptive remedy and should include all applicable EPA presumptive remedies (only not included if site specific conditions make them not implementable). If presumptive remedy is not implementable, a written justification should be provided. Rankings are as follows: high = easily implemented and equipment/expertise readily available (use site-specific information to justify); moderate = some challenges to implementation but challenges can be overcome to allow implementation with proper planning/timing, etc.(use site-specific information to justify); and low = implementation is unlikely or impossible due to challenges that cannot be overcome (identify site-specific challenges in comments to justify). Implementability is also referred to as Developmental Status.

3 = Effectiveness refers to how well the alternative can address the contaminants of concern, taking into consideration site-specific conditions, as well as reliability, maintainability, etc. Rankings are as follows: High = highly effective at addressing contaminants of concern given site-specific conditions (use site-specific information to justify); moderate = can be effective for specific contaminants or under specific circumstances (site-specifics called out in comments to justify); low = not effective for specific contaminants or due to site-specific considerations (specifics called out in comments to justify).

4 = Cost refers to the capital and operation and maintenance costs of an alternative and are ranked based on relative costs as follows: technologies that are highest in cost relative to other process options are given a ranking of $$$; technologies that are lowest in cost relative to other technologies are given a ranking of $; and middle-range costs are ranked "$$." Keep in mind that institutional controls also have a cost (periodic inspection and enforcement, etc.) and these costs should be included.

5 = Some technologies may need to be combined with other technologies in order to meet cleanup goals. In this case, it is not appropriate to tie different technologies together; rather, identify the technology as follows: "Yes (retained for possible use in conjunction with other technologies)" and ensure that the site-specific circumstances are clearly identified in the evaluation criteria comments for the technology.

6 = For all ex situ soil treatment or disposal alternatives, excavation is assumed to be a part of the technology/option and need not be listed separately. Retained technologies will be further evaluated in the FSWP and FS Report.

OTHER NOTES:

Please include full references, as appropriate, to support rank and other information provided on this table.
Please define all acronyms used.

Example 5

	STANDARD / REGULATION (ERCL Citation)[1]	DESCRIPTION	*Please identify if each ERCL is* APPLICABLE OR RELEVANT	EXPLANATION OF COMPLIANCE *Please describe action to comply with each ERCL. (Text shown below is <u>example</u> text. Please conduct a facility--specific evaluation.)*
		ACTION-SPECIFIC ERCLS		
	***WATER QUALITY REQUIREMENTS**, generally found in the Montana Water Quality Act at §§ 75-5-101, et seq., MCA.*			
	33 USC §1342 Section 402; 40 CFR 122.26	Clean Water Act, Point Source Discharges Requirements, 33 USC § 1342: Section 402 of the Clean Water Act, 33 USC § 1342, *et seq*., authorizes the issuance of permits for the discharge of any pollutant. This includes storm water discharges associated with industrial activity. *See* 40 Code of Federal Regulations (CFR) 122.26(a)(ii). Industrial activity includes inactive mining operations that discharge storm water contaminated by contact with or that has come into contact with any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations, *see* 40 CFR 122.26(b)(14)(iii); landfills, land application sites, and open dumps that receive or have received any industrial wastes including those subject to regulation under Resource Conservation and Recovery Act (RCRA) subtitle D, *see* 40 CFR 122.26(b)(14)(v); and construction activity including clearing, grading, and excavation activities, *see* 40 CFR 122.26(b)(14)(x). Because the State of Montana has been delegated the authority to implement the Clean Water Act, these requirements are enforced in Montana through the Montana Pollutant Discharge Elimination System (MPDES).	*Applicable*	*A permit will be obtained prior to initiation of cleanup activities and the conditions of the permit will be met throughout the remediation. Therefore, the proposed remedy meets the requirements of this ERCL.*
	ARM 17.30.1342(4) and (5) ARM 17.30.1343 ARM 17.30.1344	ARM 17.30.1342-1344: The State of Montana has been delegated the authority to implement the Clean Water Act and these requirements are enforced in Montana through the MPDES. These regulations set forth the substantive requirements applicable to all MPDES and National Pollutant Discharge Elimination System permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control, are applicable requirements.	*Applicable*	*The tasks detailed in the ROD do not include wastewater discharges. Leachate will be collected and stored for either recirculation into the LTU or offsite disposal, depending on the properties of the leachate and the LTU irrigation needs. Excess leachate or groundwater collected during sampling activities will be used in the LTU or disposed offsite or discharged to the sanitary sewer system (if allowable) through a discharge permit.*
	§ 75-5-605(1)(a) and (c), MCA § 75-5-303(1) and (2), MCA	The Montana Water Quality Act, §§ 75-5-101, *et seq.*, MCA, prohibits causing pollution of any state waters. Section 75-5-605(1)(a), MCA. Pollution is defined as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards or the discharge, seepage, or drainage of any substances into state water that will likely create a nuisance or render the water harmful, detrimental or injurious to public health, recreation, safety, or welfare, or to livestock or wild animals. Section 75-5-103(30)(a), MCA. Also, it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters or to cause degradation of state waters without authorization pursuant to § 75-5-303, MCA. Sections 75-5-605(1)(a) and (c), MCA. Section 75-5-303, MCA, states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected, with certain limited exceptions. Section 75-5-317, MCA, provides an exemption from non-degradation requirements which allows changes of existing water quality resulting from an emergency action or reclamation that is designed to protect the public health or the environment and that is approved, authorized, or required by the department. Degradation meeting these requirements may be considered nonsignificant.	*Applicable*	*To protect state waters from degradation/pollution, wastes generated during remedial activities will be stored and treated or disposed in such a manner as to not impact groundwater quality. Soil excavated from contaminant of concern (COC)-impacted soil areas will be placed on liners to prevent contamination of surrounding surficial soil or contamination of the groundwater. If groundwater is collected during excavation or sampling activities, it will be disposed offsite. Contaminated soils and other contaminated media will be treated, recycled or disposed in accordance with solid and hazardous waste ERCLs in a manner that does not degrade water quality. This work plan addresses releases that may occur during COC-impacted soils excavation activities.*

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STANDARD / REGULATION (ERCL Citation)[1]	DESCRIPTION	*Please identify if each ERCL is* APPLICABLE OR RELEVANT	EXPLANATION OF COMPLIANCE *Please describe action to comply with each ERCL. (Text shown below is <u>example</u> text. Please conduct a facility--specific evaluation.)*
ARM 17.30.637 ARM 17.30.705(2)	ARM 17.30.637 prohibits certain discharges to surface waters including substances that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; or (e) create conditions which produce undesirable aquatic life. ARM 17.30.637 also states that no waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards. ARM 17.30.705(2) provides that for all state waters, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation of high quality waters is allowed under the non-degradation rules at ARM 17.30.708.	*Applicable*	*To prevent state waters from degradation, wastes generated during remedy implementation activities will be stored and treated or disposed of in such a manner as to not impact groundwater quality. Contaminated soil and other contaminated media will be treated, recycled or disposed of in accordance with solid and hazardous waste ERCLs in a manner that does not impact water quality.* *Best management practices (BMPs) will be implemented to prevent impact of surface waters from site contaminants or sediment. No samples will be collected within 200 feet of surface water and excavated areas will be backfilled with soils remaining after sample collection and regraded/reshaped to the same topography as the surrounding area. Therefore, the remedial activities will not impact surface water.*
ARM 17.30.1203(1), (3), (5), (8) ARM 17.30.1207(1)	ARM 17.30.1203(1), (3), (5), (8) and ARM 17.30.1207(1): If point sources of water contamination are retained or created by any remediation activity, applicable Clean Water Act standards would apply to those discharges. The State of Montana established state standards in conformity with the Clean Water Act, and these standards apply to point source discharges.	*Applicable*	*A permit will be obtained prior to initiation of cleanup activities and the conditions of the permit will be met throughout the remediation. Therefore, the proposed remedy meets the requirements of this ERCL.*
STORMWATER RUNOFF CONTROL REQUIREMENTS			
ARM 17.24.633	ARM 17.24.633, provides all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Sediment control through BTCA must be maintained until the disturbed area has been reclaimed, the revegetation requirements have been met, and the area meets state and federal requirements for the receiving stream.	*Relevant*	*A Storm Water Pollution Prevention Plan (SWPPP) has been prepared because the disturbed acreage is greater than 1 acre and is included as Appendix F to this work plan. MDEQ has exempted the liable party from the requirement for the procedural portions of a MPDES General Permit because the SWPPP addresses the substantive requirements contained in the storm water management regulations. BMPs that will be placed or followed include decontamination pads, stone covered driveway, and vehicle tracking pad placement along the traffic route. Spill kits will be placed in the exclusion zone and support zone. Water or spray-on chemical agents will be applied to control dust during excavation and loading. Live loading of trucks will minimize the use of stockpiles. Stockpiles will be covered by polyethylene sheeting and weighted tarps. Decontamination pads will be constructed and used to prevent the tracking of impacted soil from those areas. Impacted soil will be loaded into lined trucks and the loads will be covered by tarps during transit.*
ARM 17.30.1342(4) and (5) ARM 17.30.1343 ARM 17.30.1344	ARM 17.30.1342-1344: The State of Montana has been delegated the authority to implement the Clean Water Act and these requirements are enforced in Montana through the MPDES. These regulations set forth the substantive requirements applicable to all MPDES and National Pollutant Discharge Elimination System permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control, are applicable requirements.	*Applicable*	*A permit will be obtained prior to initiation of cleanup activities and the conditions of the permit will be met throughout the remediation. Therefore, the proposed remedy meets the requirements of this ERCL.*

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Example ERCLs

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	***AIR QUALITY STANDARDS**, generally found in the Clean Air Act of Montana at §§ 75-2-101, et seq.*, MCA. *The Clean Air Act (42 USC §§ 7401 et seq.), provides limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances. State emission standards are promulgated pursuant to section 109 of the Clean Air Act and are applicable to releases into the air from any cleanup activities. They are also enforceable under the Clean Air Act of Montana, §§ 75-2-101, et seq., MCA.*			
	§ 75-2-203, MCA	Section 75-2-203, MCA provides that state emission standards are enforceable under the Clean Air Act of Montana.	*Applicable*	*See examples below.*
	ARM 17.8.204(2)-(3) ARM 17.8.220	ARM 17.8.204(2)-(3) provides for ambient air monitoring and provides that, generally, all ambient air monitoring, sampling, and data collection, recording, analysis, and transmittal must be in compliance with the Montana Ambient Air Monitoring Program Quality Assurance Project Plan or a Quality Assurance Project Plan, depending on who is performing the monitoring. ARM 17.8.220 provides that no person shall cause or contribute to concentrations of particulate matter in the ambient air such that the mass of settled particulate matter exceeds a 30-day average of 10 grams per square meter. ARM 17.8.220(1)(a). Compliance is determined by the dust fall method or equivalent to measure large particulates. ARM 17.8.220(2).	*Applicable*	*BMPs implemented will include dust control measures such as spraying of water or other dust suppressant onto the surface of soils that are being disturbed to prevent particles or contaminants from becoming airborne and procedures for air monitoring to verify compliance with ambient air standards. Monitoring procedures are identified in the design report. Remedial actions will be halted if air monitoring indicates dust levels are approaching air quality limitations and will not resume until adequate dust control measures are in place.*
	ARM 17.8.308 and ARM 17.8.304(2)	ARM 17.8.308(1) and ARM 17.8.304(2) state that emissions of airborne particulate matter must be controlled so that they do not "exhibit an opacity of 20% or greater averaged over 6 consecutive minutes." Unless excluded by ARM 17.8.308(5), ARM 17.8.308(1)-(3) provides that no person shall cause or authorize the production, handling, transportation or storage of any material; or cause or authorize the use of any street, road, or parking lot; or operate a construction facility or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Other requirements are set forth in ARM 17.8.308(4) for any area designated nonattainment in 40 CFR 81.327 for PM, specifically.	*Applicable*	*Non-point source discharges may occur due to excavation, soil treatment, and other land disturbance activities. Dust control measures such as application to prevent particles or contaminants from becoming airborne, covers, fences, or spray-on chemical agents and procedures for air monitoring to verify compliance with ambient air standards may be necessary to meet air quality requirements. Excavation or backfill actions will be halted if air monitoring indicates dust concentrations are approaching air quality limitations and will not resume until adequate dust control measures are in place.*
	ARM 17.8.324	ARM 17.8.324 contains standards regarding hydrocarbon emissions and the treatment, storage, and handling of petroleum products.	*Applicable*	*The proposed remedy does not involve the treatment, storage or handling of petroleum products other than basic refueling of construction equipment.*
	ARM 17.8.604	ARM 17.8.604 contains requirements for a list of certain wastes that may not be disposed of by open burning, including but not limited to oil or petroleum products, RCRA hazardous wastes, chemicals and wood and wood byproducts that have been coated, painted, stained, treated or contaminated by foreign material. Any waste which is moved from the premises where it was generated, and any trade waste may be open burned only in accordance with the substantive requirements of ARM 17.8.611 or 612(4)(a) or (4)(b) or if DEQ makes a determination pursuant to ARM 17.8.604(2).	*Applicable*	*No open burning of wastes will be conducted as part of the remedial actions.*

Example ERCLs

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	ARM 17.8.802	ARM 17.8.802 incorporates by reference the air regulations in certain parts of CFR Title 40 regarding quality assurance requirements for prevention of significant deterioration air monitoring; standards of performance for new stationary sources; emission standards for hazardous air pollutants, and other standards and requirements.	*Applicable*	*BMPs implemented will include dust control measures such as spraying of water or other dust suppressant onto the surface of soils that are being disturbed to prevent particles or contaminants from becoming airborne and procedures for air monitoring to verify compliance with ambient air standards. Monitoring procedures are identified in the design report. Remedial actions will be halted if air monitoring indicates dust levels are approaching air quality limitations and will not resume until adequate dust control measures are in place.*
	ARM 17.8.805(1)	ARM 17.8.805(1) provides ambient air ceilings, and states that no concentrations of a pollutant shall exceed concentrations permitted under either the applicable secondary or the primary national ambient air quality standard, whichever concentration is lowest for the pollutant for a period of exposure.	*Relevant*	*The proposed remedy will not result in emissions of the specific compounds included in these regulations.*
	ARM 17.24.761	ARM 17.24.761 specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of the measures could be considered relevant to control fugitive dust emissions in connection with excavation, earth moving, and transportation activities conducted as part of the remedy at the facility. Such measures include, for example, paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands. *See* § 82-4-231(10)(m), MCA.	*Relevant*	*The proposed remedy does involve handling impacted soil. However, remedial actions at the facility will include wetting and other best management practices related to fugitive dust control. Remedial actions will be halted if significant dust is generated and will not resume until adequate dust control measures are in place. Dust control measures will ensure that air standards will not be exceeded during the proposed remedial action. Air monitoring is not a necessary component of the proposed remedial action.*
	WATER WELL REQUIREMENTS			
	§85-2-505(1), MCA	Section 85-2-505(1), MCA precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained to prevent waste, contamination, or pollution of groundwater. However, withdrawal or use of groundwater is not considered waste pursuant to § 85-2-505(1)(a)-(e), MCA.	*Applicable*	*A groundwater monitoring plan will be developed as part of long-term groundwater monitoring. New wells may be installed as part of the long-term groundwater monitoring program. Wells will be properly constructed to prevent further contamination or pollution of groundwater. Drilling subcontracts will require that drillers complete and file a well log report with the Montana Bureau of Mines and Geology. Compliance water quality monitoring will be conducted using methods approved by DEQ.*

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Example ERCLs

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	ARM 36.21.802-808 ARM 36.21.810	ARM 36.21.802-808 specifies requirements for constructing monitoring wells. ARM 36.21.810 specifies requirements that must be fulfilled when abandoning monitoring wells.	*Applicable*	*A licensed monitoring well constructor will abandon monitoring well(s) and install monitoring well(s) as part of the proposed remedy. The licensed monitoring well constructor will install/abandon the monitoring well(s) in accordance with the construction standards and will complete a well log report and file it with the Montana Bureau of Mines and Geology pursuant to § 85-2-516, MCA. These activities will be conducted in accordance with the requirements of these ERCLs.*
	***SOLID WASTE MANAGEMENT REQUIREMENTS**, generally found in the Solid Waste Management Act at §§ 75-10-201, et seq., MCA and its implementing administrative rules at ARM 17.50.101 et seq. Regulations promulgated under the Solid Waste Management Act, and pursuant to the federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq. (RCRA Subtitle D) specify requirements that apply to the to the transportation of solid wastes and the operation, closure, and post-closure care of solid waste facilities.*			
	ARM 17.50.523(1)	ARM 17.50.523(1) specifies that solid waste must be transported in such a manner as to prevent its discharge, dumping, spilling, or leaking from the transport vehicle.	*Applicable*	*Treated soils associated with implementation of this work plan will be disposed in an offsite licensed solid waste facility that is in compliance with applicable regulations. Non-hazardous waste generated during implementation of this work plan will be placed in an appropriate container and temporarily stored in a centralized storage area pending characterization and final disposition. All offsite disposal will occur in covered vehicles to prevent spilling, dumping, or leaking from the transport vehicle. Other solid waste (i.e., plastic wrapping, cardboard, etc.) will be contained in a plastic bag (if necessary), double-bagged (if necessary), and placed in a waste disposal dumpster for collection and appropriate disposal as solid waste.*
	ARM 17.50.1004 ARM 17.50.1005 ARM 17.50.1006 ARM 17.50.1007 ARM 17.50.1008 ARM 17.50.1009 ARM 17.50.1109 ARM 17.50.1110 ARM 17.50.1116 ARM 17.50.1204(1), (2) ARM 17.50.1205(1)-(3) ARM 17.50.1303	ARM 17.50.1004 addresses Class II landfills in floodplains. ARM 17.50.1005 prohibits placement of a Class II landfill in a wetland unless special conditions are met. ARM 17.50.1006 prohibits placement of a Class II landfill within 200 feet of a fault which has had displacement in Holocene time unless special conditions are met. ARM 17.50.1007 prohibits placement of a Class II landfill in a seismic impact zone (as defined in ARM 17.50.1002(35)) unless special conditions are met. ARM 17.50.1008 prohibits placement of a Class II landfill in an unstable area, which are defined in ARM 17.50.1002(40) as including locations that are susceptible to events or forces that are capable of impairing the integrity of the landfill structural components responsible for preventing releases from the landfill. ARM 17.50.1009 provides a list of general location requirements for a solid waste management facility, including but not limited to: it must be located where a sufficient acreage of suitable land is available for solid waste management, including adequate separation of wastes from underlying groundwater and adjacent surface water; facility may not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife or result in the destruction or adverse modification of critical habitat for those species; and the facility must manage solid waste, gas, and leachate.	*Applicable*	*Wastes generated during the remedial actions will not be disposed on-site. Waste generated during remedial actions will be transported off-site under appropriate manifest for disposal in an authorized permitted waste facility that meets these requirements.*

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Example ERCLs

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		ARM 17.50.1109 requires that Class II landfills be designed, constructed, and maintained with a run-on and run-off control system to address 25-year storm events, and sets requirements for handling run-off from the active portion of a landfill in accordance with ARM 17.50.1110(1). ARM 17.50.1110 prohibits a Class II landfill from causing a discharge of a pollutant into state waters, including wetlands, that violates the Montana Water Quality Act or cause the discharge from a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirement of an approved area-wide or statewide water quality management plan. ARM 17.50.1116 outlines operating criterial at a solid waste management facility and requires that it be designed, constructed, and operated in a manner to prevent harm to human health and the environment. ARM 17.50.1204(1), (2) sets design requirements for Class II landfills. ARM 17.50.1205(1)-(3) requires additional design requirements for Class II landfills. ARM 17.50.1303 identifies requirements for groundwater monitoring and corrective action at Class II landfill units, with the exception listed in ARM 17.501303(2).		
	ARM 17.50.1312	ARM 17.50.1312 identifies requirements for monitoring well abandonment.	*Applicable*	*Well abandonment activities at the Facility will be performed in accordance with ARM 17.50.1312, 36.21.670 to 678, and 36.21.810.*
	ARM 17.50.1403 ARM 17.50.1404	ARM 17.50.1403 sets forth the closure requirements for Class II landfills. Among other requirements, the landfill unit must be designed to minimize infiltration and erosion. The final cover system must be designed and constructed to: (a) have a permeability no greater than to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1W10<-5> cm/sec, whichever is less; (b) minimize infiltration through the closed Class II or Class IV landfill unit by the use of an infiltration layer that contains at least 18 inches of earthen material; and (c) minimize erosion of the final cover by the use of an erosion layer that contains at least six inches of earthen material that is capable of sustaining native plant growth. ARM 17.50.1404 sets forth post closure care requirements for Class II landfills. Among other requirements, post closure care requires maintenance of the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cover and comply with the groundwater monitoring requirements found at ARM Title 17, chapter 50, subchapter 13. ARM 17.50.1404(1).	*Applicable*	*Wastes generated during the remedial actions will not be disposed on-site. Waste generated during remedial actions will be transported off-site under appropriate manifest for disposal in an authorized permitted waste facility that meets these requirements.*

Example ERCLs

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§ 75-10-212, MCA	Section 75-10-212, MCA, prohibits dumping or leaving any garbage, debris, or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.	*Applicable*	*Non-hazardous waste from this facility will be transported and disposed of at [insert the name of the disposal facility], a licensed solid waste management facility, in accordance with these ERCLs. Transport vehicles will be tarped and tied down to avoid any leaking of waste during transport.*
***HAZARDOUS WASTE MANAGEMENT REQUIREMENTS**, generally found in the Resource Conservation and Recovery Act (RCRA) at 42 U.S.C. §§ 6901 et seq., (as incorporated by the Montana Hazardous Waste Act, § 75-10-402(3), MCA) and the Montana Hazardous Waste Act, §§ 75-10-401 et seq., MCA. Regulations under these acts establish a regulatory structure for the generation, transportation, treatment, storage, and disposal of hazardous wastes. These requirements are applicable to substances and actions at the facility which involve the active management of hazardous wastes.* *Wastes may be designated as hazardous by either of two methods: listing or demonstration of a hazardous characteristic. Listed wastes are the specific types of wastes determined by EPA to be hazardous as identified in 40 CFR Part 261, Subpart D (40 CFR 261.30 - 261.35) (applicable, as incorporated by the Montana Hazardous Waste Act). Listed wastes are designated hazardous by virtue of their origin or source, and must be managed as hazardous wastes regardless of the concentration of hazardous constituents. Characteristic wastes are those that by virtue of concentrations of hazardous constituents demonstrate the characteristic of ignitability, corrosivity, reactivity or toxicity, as described at 40 CFR Part 261, Subpart C (applicable, as incorporated by the Montana Hazardous Waste Act).*		
40 CFR Part 262 §§ 75-10-402(3) MCA	The RCRA regulations at 40 CFR Part 262 (as incorporated by the Montana Hazardous Waste Act) establish standards that apply to generators of hazardous waste. These standards include requirements for obtaining an EPA identification number and maintaining certain records and filing certain reports. These standards are applicable for any waste which will be transported offsite.	*Applicable*	*Based on past experience, it is not anticipated that the treatment of SVE effluent vapors using granular activated carbon (GAC) will generate hazardous waste. However, prior to transportation, disposal or regeneration, laboratory analysis of VOCs by EPA Method 1311, toxic characteristic leaching procedure (TCLP) will be performed on each GAC drum for characterization.* *The EPA ID Number for the liable party and the Facility is MT000000000, which will be used to file the necessary reports if needed. If hazardous waste needs to be transported for disposal outside the Facility, a spill prevention response plan will be in place prior to transport. Hazardous waste to be disposed of offsite at a permitted RCRA disposal facility will be transported by a hazardous waste transporter and will be manifested. No hazardous waste will be disposed onsite.*
40 CFR Part 263 § 75-10-402(3), MCA	The RCRA regulations at 40 CFR Part 263 (as incorporated by the Montana Hazardous Waste Act) establish standards that apply to transporters of hazardous waste. These standards include requirements for immediate action for hazardous waste discharges. These standards are applicable for any onsite transportation. These standards are independently applicable for any offsite transportation.		
40 CFR Part 264, Subpart B § 75-10-402(3), MCA	The regulations at 40 CFR 264, Subpart B (as incorporated by the Montana Hazardous Waste Act) establish general facility requirements. These standards include requirements for general waste analysis, security, and location standards.		
40 CFR Part 264, Subpart F § 75-10-402(3), MCA	The regulations at 40 CFR 264, Subpart F (as incorporated by the Montana Hazardous Waste Act) establish requirements for groundwater protection for RCRA-regulated solid waste management units (i.e., waste piles, surface impoundments, land treatment units, and landfills). The regulations at Subpart F establish monitoring requirements for RCRA-regulated solid waste management units (i.e., waste piles, surface impoundments, land treatment units, and landfills). Subpart F provides for three general types of groundwater monitoring: detection monitoring (40 CFR 264.98); compliance monitoring (40 CFR 264.99); and corrective action (40 CFR 264.100). Monitoring wells must be cased according to 264.97(c). Monitoring is required during the active life of a hazardous waste management unit. If hazardous waste remains, monitoring is required for a period necessary to protect human health and the environment.	*Applicable*	*A long-term monitoring plan will be developed during the remedial design phase and will comply with the groundwater monitoring requirements.*

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	40 CFR Part 264, Subpart G § 75-10-402(3), MCA	40 CFR Part 264, Subpart G (as incorporated by the Montana Hazardous Waste Act) establishes that hazardous waste management facilities must be closed in such a manner as to (a) minimize the need for further maintenance and (b) control, minimize or eliminate, to the extent necessary to protect public health and the environment, post-closure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff or hazardous waste decomposition products to the ground or surface waters or to the atmosphere and (c) complies with the closure requirements of this part, including, but not limited to, the requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601 through 264.603, and 264.1102. *See* 40 CFR § 264.111. Requirements for facilities requiring post-closure care include the following: the facilities must undertake appropriate monitoring and maintenance actions, control public access, and control post-closure use of the property to ensure that the integrity of the final cover, liner, or containment system is not disturbed. In addition, all contaminated equipment, structures, and soil must be properly disposed of or decontaminated unless exempt and free liquids are removed or solidified, the wastes stabilized, and the waste management unit covered.	*Applicable*	*No hazardous wastes will be generated during remedial actions.*
	40 CFR Part 264, Subparts I and J and § 75-10-402(3), MCA	40 CFR Part 264, Subparts I and J (as incorporated by the Montana Hazardous Waste Act) apply to owners and operators of facilities that store hazardous waste in containers, and store or treat hazardous waste in tanks, respectively. These regulations are applicable to any storage or treatment in these units at the facility. The related provisions of 40 CFR 261.7 regarding residues of hazardous waste in empty containers are also applicable.	*Applicable*	*Hazardous waste generated during implementation of the ROD will be placed in containers that meet RCRA requirements and temporarily stored onsite in an access-controlled outdoor location in a manner that meets RCRA requirements. Containers will be compatible with the wastes and secondary containment will be provided with sufficient capacity to contain leaks or spills.*
	40 CFR Part 264, Subpart L and § 75-10-402(3), MCA	40 CFR Part 264, Subpart L (Applicable, as incorporated by the Montana Hazardous Waste Act) applies to owners and operators of facilities that store or treat hazardous waste in piles. The regulations include requirements for the use of run-on and run-off control systems and collection and holding systems to prevent the release of contaminants from waste piles. These regulations apply to any storage in waste piles.	*Applicable*	*No waste piles will be used during remedial actions.*
	40 CFR Part 264, Subpart M, 40 CFR Part 264, Subpart S, and § 75-10-402(3), MCA	40 CFR Part 264, Subpart M (Applicable, as incorporated by the Montana Hazardous Waste Act) apply to owners and operators of facilities that treat hazardous waste in land treatment units. 40 CFR Part 264, Subpart S (Applicable, as incorporated by the Montana Hazardous Waste Act) provides special provisions for cleanup; 40 CFR 264.552 allows the designation of a corrective action management unit (CAMU) located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated and provides requirements for siting, managing, and closing the CAMU.	*Applicable*	*The LTU will minimize runoff of hazardous constituents during the active life of the LTU. The LTU recovery system has been designed to hold runoff from a 25-year, 24-hour storm event from the LTU.* *The LTU will be located within the designated CAMU. The LTU will be located within the facility on contiguous property under the control of the liable party. Closure specifics for the LTU are included in this work plan and closure of the LTU will be further discussed with DEQ after the start of treatment of the last lift in the LTU.*

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	40 CFR 264.554	40 CFR 264.554 sets forth the requirements for a staging pile. A staging pile must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the staging pile originated. 40 CFR 264.554(a). The staging pile must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate). 40 CFR 264.554(d)(1)(ii). Except under certain circumstances, the staging pile must not operate for more than two years and cannot be used for treatment. 40 CFR 264.554(d)(1)(iii).	*Applicable*	*Staging piles will not be used during remedial actions.*
	63 Fed. Reg. 65874 40 CFR 268.49(c)(1)(C) § 75-10-402(3), MCA	The Hazardous Waste Identification Rule (HWIR) Media Rule promulgated at 63 Fed. Reg. 65874 (November 30, 1998) (as incorporated by the Montana Hazardous Waste Act) allows listed waste treated to levels protective of human health and the environment to be disposed onsite without triggering land ban or minimum technology requirements for these disposal requirements. Treated soils containing hazardous waste will need to meet site-specific cleanup levels as well as the LDR treatment standards (applicable, as incorporated by the Montana Hazardous Waste Act) (40 CFR 268.49(c)(1)(C)), which requires that contaminated soil to be land disposed be treated to reduce concentrations of the hazardous constituents by 90 percent or meet hazardous constituent concentrations that are ten times the universal treatment standards (UTS) (found at 40 CFR 268.48), whichever is greater, to avoid triggering land ban.	*Applicable*	*Hazardous waste will be generated during remedial activities to be performed under this plan. F032 listed wastes will be treated to site-specific cleanup levels and universal treatment standards during remedial action prior to offsite disposal as nonhazardous waste. PCP will be treated to levels protective of human health and the environment and will not trigger a land ban. Hazardous waste will not be disposed of onsite. A confirmation sampling plan, which is described in this work plan, will provide for data collection and comparison to cleanup levels and universal treatment standards. DEQ must approve all confirmation sampling results prior to disposal offsite as nonhazardous waste.*
	40 CFR Part 270 § 75-10-402(3), MCA	40 CFR Part 270 (as incorporated by the Montana Hazardous Waste Act) sets forth the hazardous waste permit program. The requirements set forth in 40 CFR Part 270, Subpart C (permit conditions), including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements. For any management (i.e., treatment, storage, or disposal) or removal or retention, the RCRA regulations found at 40 CFR 264.116 (survey plats) and 264.119 (governing notice and deed restrictions), 264.228(a)(2)(i) (addressing de-watering of wastes prior to disposal), and 264.228(a)(2)(iii)(B)(C)(D) and 264.251 (c)(d)(f) (regarding run-on and run-off controls), are relevant requirements for any waste management units created or retained at the facility that contain non-exempt waste. A construction de-watering permit covers similar requirements.	*Applicable*	*Hazardous waste will be generated during the activities to be performed under this work plan. The EPA ID Number for the liable party and the Facility is MT000000000, which will be used to file the necessary reports. Substantive requirements will be met for the following permit types: Storm Water Pollution Prevention and Hazardous Waste Treatment. The liable party will provide a written request for exemption from the administrative parts of the Hazardous Waste Treatment permit under separate cover and will not begin work until receiving a permit or permit exemption. Exemptions from the administrative parts of the Storm Water Pollution Prevention permit was previously approved by DEQ. The SWPPP phasing sheets have been updated in this work plan, specific to the work proposed during this phase or remedial action.*
	ARM 17.53.501-502	ARM 17.53.501-502 adopts the equivalent of RCRA regulations at 40 CFR Part 261, establishing standards for the identification and listing of hazardous wastes, including standards for recyclable materials and standards for empty containers, with certain State exceptions and additions.	*Applicable*	*Excavated soils impacted with PCP and dioxin (F032 listed hazardous waste) will be treated using bioremediation in an onsite LTU. Soils will be treated to meet site-specific cleanup levels, will be protective of human health and the environment, and will not trigger a land ban.*
	ARM 17.53.601-604	ARM 17.53.601-604 adopts the equivalent to RCRA regulations at 40 CFR Part 262, establishing standards that apply to generators of hazardous waste, including standards pertaining to the accumulation of hazardous wastes, with certain State exceptions and additions.		*The EPA ID Number for the liable party and the Facility is MT000000000, which will be used to file the necessary reports. A hazardous waste transporter is not required to*

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	ARM 17.53.701-708	ARM 17.53.701-708 adopts the equivalent to RCRA regulations at 40 CFR Part 263, establishing standards that apply to transporters of hazardous waste, with certain State exceptions and additions.		*transport hazardous waste onsite from a work area to the LTU or a centralized storage area, provided transportation remains within the CAMU area to be designated by DEQ. The onsite haul route to be used is shown in Figure 4 of this work plan. If hazardous waste needs to be transported outside the Facility, a hazardous waste transporter will be used and the hazardous waste will be manifested. Hazardous waste generated during implementation of the ROD, other than the PCP-containing soil to be treated in the LTU, will be contained in appropriate containers that meet the requirements of RCRA and stored in an access-controlled location in a manner that meets RCRA requirements. Hazardous wastes will not be disposed of at the Facility.*
	ARM 17.53.801-803	ARM 17.53.801-803 adopts the equivalent to RCRA regulations at 40 CFR Part 264, establishing standards that apply to owners of hazardous waste treatment, storage and disposal facilities, with certain State exceptions and additions.		
	ARM 17.53.1101-1102	ARM 17.53.1101-1102 adopts the equivalent to RCRA regulations at 40 CFR Part 268, establishing land disposal restrictions, with certain State exceptions and additions.		
	§ 75-10-422, MCA	Section 75-10-422, MCA, prohibits the unlawful disposal of hazardous wastes.		
	ARM 17.53.1201-1202	ARM 17.53.1201-1202 adopts the equivalent to RCRA regulations at 40 CFR Part 270 and 124, which establish standards for permitted facilities, with certain State exceptions and additions.		
	ARM 17.53.1401-1402	ARM 17.53.1401 adopts the equivalent of RCRA regulations at 40 CFR Part 279 that set forth the standards for the management of used oil, except for 40 CFR 279.82(b), pertaining to the use of used oil as a dust suppressant.	*Applicable*	*Used oil will not be managed as part of the remedial actions.*
	TECHNOLOGY-BASED TREATMENT			
	ARM 17.30.1203	ARM 17.30.1203: Provisions of 40 CFR Part 125 for criteria and standards for the imposition of technology-based treatment requirements are adopted and incorporated in DEQ permits. For toxic and nonconventional pollutants treatment must apply the best available technology economically achievable (BAT) (ARM 17.30.1203(3)(d)); for conventional pollutants, application of the best conventional pollutant control technology (BCT) is required (ARM 17.30.1203(3)(b)). Where effluent limitations are not specified for the particular industry or industrial category at issue, BCT/BAT technology-based treatment requirements are determined on a case-by-case basis using best professional judgment (BPJ). ARM 17.30.1203(5)(b).	*Applicable*	*The VCP applicant will obtain the required permit which may impose a technology-based treatment requirement. The applicant will comply with all permit requirements. Therefore, the proposed remedy meets the requirements of these ERCLs.*
	UNDERGROUND INJECTION CONTROL PROGRAM			
	40 CFR Parts 144 and 146	The Underground Injection Control Program provided in 40 CFR Parts 144 and 146 sets forth the standards and criteria for the injection of substances into aquifers. Wells are classified as Class I through V, depending on the location and the type of substance injected. For all classes, no owner may construct, operate or maintain an injection well in a manner that results in the contamination of an underground source of drinking water at levels that violate maximum contaminant levels (MCLs) or otherwise adversely affect the health of persons. Each classification may also contain further specific standards, depending on the classification	*Applicable*	*No injection of substances will occur as part of the proposed remedy. Therefore, the proposed remedy meets the requirements of these ERCLs.*

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	UNDERGROUND STORAGE TANK REQUIREMENTS			
	40 CFR Part 280, Subpart F	40 CFR Part 280, Subpart F sets forth requirements for Release Response and Corrective Action for underground storage tank (UST) Systems Containing Petroleum or Hazardous Substances. These include initial response, initial abatement measures, facility characterization, free product removal, and investigations for soil and groundwater cleanup.	*Relevant*	*Information generated during the Remedial Investigation indicates that all known tanks have been removed from the Facility, but that underground piping associated with the tanks may remain. In addition, there is free product at the site. Therefore, certain storage tank regulations are applicable or relevant.*
	40 CFR 280.64(a), (c)	40 CFR 280.64 provides that where investigations in connection with leaking underground storage tanks reveal the presence of free product, owners and operators must remove free product to the maximum extent practicable as determined by the implementing agency. This regulation also requires that the free product removal be conducted in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the facility, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable local, state and federal regulations. Abatement of free product migration is a minimum objective for the design of the free product removal system provides that any flammable products must be handled in a safe and competent manner to prevent fires or explosions.	*Relevant*	
	40 CFR 280.64	40 CFR 280.64 provides that abatement of free product migration is a minimum objective for the design of the free product removal system provides that any flammable products must be handled in a safe and competent manner to prevent fires or explosions.	*Relevant*	
	40 CFR Part 280, Subpart D	40 CFR Part 280, Subpart D sets forth requirements for release detection.	*Relevant*	
	40 CFR 280.43 ARM 17.56.407	40 CFR 280.43 and ARM 17.56.407 specifies groundwater monitoring requirements for underground storage tanks. 40 CFR 280.43(a)(2), (b)(3) and ARM 17.56.407(1)(a)(ii), (1)(b)(iii) require continuous monitoring devices or manual methods used to detect the presence of at least 1/8 of an inch of free product on top of the groundwater in the monitoring wells.	*Relevant*	
	ARM Title 17, Chapter 56, Sub-Chapter 4	ARM Title 17, Chapter 56, Sub-Chapter 4 specifies release detection.	*Relevant*	
	ARM 17.56.407	ARM 17.56.407 specifies groundwater monitoring requirements for underground storage tanks and requires continuous monitoring devices or manual methods used to detect the presence of at least 1/8 of an inch of free product on top of the groundwater in the monitoring wells.	*Relevant*	
	ARM Title 17, Chapter 56, Sub-Chapter 6	ARM Title 17, Chapter 56, Sub-Chapter 6 specifies release response and corrective action for tanks containing petroleum or hazardous substances.	*Relevant*	
	ARM 17.56.602 through 605	ARM 17.56.602 through 605 requires certain mitigation measures including removal of as much of the regulated substance from the system as is necessary to prevent further release into the environment and prevention of further migration of the released substance into surrounding soil and groundwater. In particular, ARM 17.56.602(1)(c) requires that after a release from an underground storage tank system is identified in any manner, owners and operators must	*Relevant*	

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	investigate to determine the possible presence of free product, begin free product removal as soon as practicable, conduct free product removal in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable local, state and federal regulations. This regulation also provides that abatement of free product migration is a minimum objective for the design of the free product removal system and provides that any flammable products must be handled in a safe and competent manner to prevent fires or explosions.		
ARM 17.56.607(4)	ARM 17.56.607(4) outlines requirements that must be met before a release may be categorized as resolved. For example, ARM 17.56.607(4)(d) specifies that all free product must be removed to the maximum extent practicable before a release may be considered resolved.	*Relevant*	
ARM 17.56.702(2)	ARM 17.56.702(2) requires that all tanks and connecting piping which are taken out of service permanently must be removed from the ground. This applies if any remaining underground piping is encountered during remedial activities.	*Relevant*	
RECLAMATION AND REVEGETATION REQUIREMENTS			
ARM 17.24.501	ARM 17.24.501 gives general backfilling and final grading requirements.	*Relevant*	*See examples below.*
ARM 17.24.631(1), (2), (3)(a) and (b)	ARM 17.24.631(1), (2), (3)(a) and (b): Disturbances to the prevailing hydrologic balance will be minimized. Changes in water quality and quantity, in the depth to groundwater and in the location of surface water drainage channels will be minimized, to the extent consistent with the selected remedial action. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.	*Relevant*	*The soil/sludge/sediment and asphaltic removal activities are temporary actions. The SWPPP developed for the Facility identifies the BMPs that will be implemented to reduce the potential for impacts to streams or state surface waters from site contaminants or sediment. Final stabilization will be established once land disturbance activities have been completed. There are no streams or state surface water bodies present on the Facility under current site conditions. As part of the remedy implementation, site grading or filling will be completed as needed, to provide for positive stormwater drainage.*
ARM 17.24.633(1), (2) ARM 17.24.635 through 17.24.637 ARM 17.24.638 ARM 17.24.640 ARM 17.24.641 ARM 17.24.643 through 17.24.646 ARM 17.24.701 and 702	ARM 17.24.633(1) states that all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). ARM 17.24.633(2) provides that treatment must continue until the area is stabilized. ARM 17.24.635 through 17.24.637 set forth requirements for temporary and permanent diversions for different flows, drainageways, and streams. ARM 17.24.638 specifies sediment control measures to be implemented during remedial activities. ARM 17.24.640 provides that discharge from diversions must be controlled to reduce erosion and minimize disturbance of the hydrologic balance. ARM 17.24.641 indicates that practices to prevent drainage from acid or toxic forming spoil material into groundwater and surface water must be employed, and outlines how to do so.	*Relevant*	*A Storm Water Pollution Prevention Plan (SWPPP) has been prepared because the disturbed acreage is greater than 1 acre and is included as Appendix F to this work plan. MDEQ has exempted the liable from the requirement for the procedural portions of a MPDES General Permit. The SWPPP addresses the substantive requirements contained in the storm water management regulations. BMPs that will be placed or followed include decontamination pads, stone covered driveway, and vehicle tracking pad placement along the traffic route. Spill kits will be placed in the exclusion zone and support zone. Water or spray-on chemical agents will be applied to control dust during excavation and loading. Live loading of trucks will minimize the use of stockpiles. Stockpiles will be covered by polyethylene sheeting and weighted tarps. Decontamination pads will be constructed and used to prevent the tracking of impacted soil. Impacted soil will be loaded into lined trucks and the loads will be covered by*

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		ARM 17.24.643 through 17.24.646 provide provisions for groundwater protection, groundwater recharge protection, and groundwater and surface water monitoring. ARM 17.24.701 and 702 provide requirements for removal and redistributing and stockpiling of soil for reclamation. Also outline practices to prevent compaction, slippage, erosion, and deterioration of biological properties of soil. ARM 17.24.704(4)(b), (5).		*tarps during transit. Loads will be transported onsite using routes shown in Figure 4 of this work plan.*
	ARM 17.24.703 ARM 17.24.711 ARM 17.24.713 ARM 17.24.714 ARM 17.24.716 ARM 17.24.717 ARM 17.24.718 ARM 17.24.721 ARM 17.24.723 ARM 17.24.724 ARM 17.24.726 ARM 17.24.731	ARM 17.24.703 require that when using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM 17.24.701 and 702. ARM 17.24.711 requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety and utility as the vegetation native to the area of land to be affected must be established, in accordance with § 82-4-233, MCA. ARM 17.24.713 provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation but may not be more than ninety days after soil has been replaced. ARM 17.24.714 requires use of a mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions. ARM 17.24.716 establishes the required method of revegetation. ARM 17.24.717 relates to the planting of trees and other woody species if necessary, as provided in § 82-4-233, MCA, to establish a diverse, effective, and permanent vegetative cover. ARM 17.24.718 requires soil amendments if necessary to establish a permanent vegetative cover and includes management techniques and land use requirements. ARM 17.24.721 specifies that rills and gullies must be stabilized and the area reseeded and replanted if the rills and gullies are disrupting the reestablishment of the vegetative cover. ARM 17.24.723 requires periodic monitoring of vegetation, soils, water, and wildlife, and outlines certain uses of monitoring data. ARM 17.24.724 specifies how revegetation success is measured. ARM 17.24.726 sets the required methods for measuring vegetative success. ARM 17.24.731 provides if toxicity to plants or animals is suspected, comparative chemical analyses of the revegetated area(s) may be required.	*Relevant*	*Revegetation will be accomplished in cooperation with the County Weed District. A revegetation/weed management plan, approved by the County Weed District, and has been included as Appendix H to the Remediation Work Plan.*

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	§ 75-10-1404, MCA	Section 75-10-1404, MCA, requires minimum reclamation standards with respect to mine and smelter waste. Section 75-110-1404(3), specifically, provides that, except for provided in § 75-10-1411, MCA, lands where waste has been removed must be revegetated using plant species native to the area and must achieve a vegetative cover equal to 85 percent of the vegetative cover of adjacent lands that were not previously disturbed within three years of the initial seeding.	*Relevant*	
	***NOXIOUS WEED REQUIREMENTS**, generally found in the County Weed Control Act at §§ 7-22-2101, et seq., MCA, which establishes and authorizes weed control at the local level. "Noxious weeds" are defined at § 7-22-2101(9), MCA*			
	Section 7-22-2116(1), MCA Section 7-22-2152, MCA ARM 4.5.201 ARM 4.5.206 through ARM 4.5.210	Section 7-22-2116(1), MCA, prohibits allowing noxious weeds to propagate. Section 7-22-2116(1), MCA, provides for preparation and implementation of a weed control plan. Designated noxious weeds are listed in ARM 4.5.201 and 4.5.206 through 4.5.209 and must be managed consistent with weed management criteria developed under § 7-22-2109(2)(b), MCA, and in compliance with revegetation requirements pursuant to § 7-22-2152, MCA. In addition, ARM 4.5.210 identifies regulated plants that may not be used for revegetation.	*Relevant*	*As specified in Section ##, the county weed board will be notified of the impending cleanup activity and provided with a copy of the remedial design plan if requested. A revegetation plan meeting the requirements specified in Section ## and any other specific requirements of the board will be submitted to the board at least 15 days prior to initiation of the cleanup. A copy of the revegetation and approval letter will be provided to DEQ when available. Therefore, the proposed remedy meets the requirements of these ERCLs.*
		CONTAMINANT-SPECIFIC ERCLS		
	***GROUNDWATER STANDARDS**, generally found in the Safe Drinking Water Act, 42 U.S.C. § 300f et seq., and the National Primary Drinking Water Regulations at 40 CFR Part 141, which establish MCLs and maximum contaminant level goals (MCLGs) for contaminants in drinking water distributed in public water systems.* *EPA's guidance on Remedial Action for Contaminated Groundwater at Superfund Sites states that MCLs developed under the Safe Drinking Water Act generally are Applicable or Relevant and Appropriate Requirements [ARARs; the federal equivalent of ERCLs] for current or potential drinking water sources. EPA has also established MCLGs for contaminants in drinking water distributed in public water systems. MCLGs that are above zero are relevant under the same conditions (55 Fed.Reg. 8750-8752, March 8, 1990). See also, State of Ohio v. EPA, 997 F.2d 1520 (D.C. Cir. 1993), which upholds EPA's application of MCLs and non-zero MCLGs as ARARs for groundwater which is a potential drinking water source.*			
	40 Code of Federal Regulations (CFR) Part 141		*Applicable*	*The requirements were evaluated in this ERCLs analysis in conjunction with the groundwater classification standards promulgated by the State of Montana. The MCLs are identified because the groundwater at the facility is a source of drinking water.* *MCLs for the primary contaminants of concern in groundwater are listed below. However, compliance with all MCLs is required and remedial actions must meet the MCLs for all contaminants at the facility, including any breakdown products generated during remedial actions.*
	40 CFR Part 143.3	The Secondary Maximum Contaminant Levels (SMCLs) specified in 40 CFR Part 143.3 are relevant requirements which are ultimately to be attained by the remedy for the facility. This regulation contains standards for iron, manganese, sulfate, color, odor, and corrosivity that are relevant to the remedial actions.	*Relevant*	*Because groundwater in the vicinity of the site is used as a drinking water source, the Secondary Maximum Contaminant Levels (SMCLs) specified in 40 CFR Part 143.3 are relevant requirements which are ultimately to be attained by the remedy for the site. 40 CFR Part 143.3 contains standards for iron, manganese, color, odor, and corrosivity which are relevant to the remedial action.*

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	§ 75-5-605, MCA, § 75-6-112, MCA, and § 75-5-303, MCA	The Montana Water Quality Act, § 75-5-101, *et seq.*, MCA provides that it is unlawful to cause pollution of any state waters. Section 75-5-605(1)(a), MCA. Section 75-5-605(1)(a) and (c), MCA, state that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters or to cause degradation of state waters without authorization pursuant to § 75-5-303, MCA. Section 75-5-303(1), MCA states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected.	*Applicable*	*To protect state waters from degradation/pollution, wastes generated during remedial activities will be stored and treated or disposed in such a manner as to not impact groundwater quality. Soil excavated from contaminant of concern (COC)-impacted soil areas will be placed on liners to prevent contamination of surrounding surficial soil or contamination of the groundwater. If groundwater is collected during excavation or sampling activities, it will be disposed offsite. Contaminated soils and other contaminated media will be treated, recycled or disposed in accordance with solid and hazardous waste ERCLs in a manner that does not degrade water quality. This work plan addresses releases that may occur during COC-impacted soils excavation activities.*
	ARM 17.30.1006	ARM 17.30.1006, classifies groundwater into Classes I through IV based upon its specific conductance and establishes the groundwater quality standards applicable with respect to each groundwater classification. Class I is the highest quality class; Class IV the lowest. The lowest measured specific conductance generally dictates its classification. ARM 17.30.1006 sets the standards for the different classes of groundwater based on beneficial uses. Concentrations of dissolved substances in groundwater may not exceed the human health standards listed in the most current version of Montana DEQ Circular DEQ-7 (June 2019 or later), including narrative standards, which are promulgated pursuant to the state Water Quality Act, §§ 75-5-101, *et seq*., MCA. Concentrations of other dissolved or suspended substances (i.e., parameters for which human health standards are not listed in DEQ-7) must not exceed levels that render the waters harmful, detrimental or injurious to beneficial uses listed for that class of water. ARM 17.30.1006(1)(b)(ii), (2)(b)(ii), (3)(b)(ii). Compliance with DEQ-7 standards is required for all contaminants at the facility, including any breakdown products generated during remedial actions.	*Applicable*	*To protect state waters from degradation/pollution, wastes generated during remedial activities will be stored and treated or disposed in such a manner as to not impact groundwater quality. Soil excavated from COC-impacted soil areas will be placed on liners to prevent contamination of surrounding surficial soil or recontamination of the groundwater. If groundwater is collected during excavation or sampling activities, it will either be disposed offsite or discharged to the sanitary sewer system (if allowable) through a discharge permit. Contaminated soils and other contaminated media will be treated, recycled or disposed in accordance with solid and hazardous waste ERCLs in a manner that does not degrade water quality. This work plan addresses releases that may occur during COC-impacted soils excavation activities.*
	ARM 17.30.1011	ARM 17.30.1011 provides that any ground water whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the non-degradation rules at ARM 17.30.701 *et seq*.	*Applicable*	*To protect state waters from degradation/pollution, wastes generated during remedial activities will be stored and treated or disposed in such a manner as to not impact groundwater quality. Soil excavated from COC-impacted soil areas will be placed on liners to prevent contamination of surrounding surficial soil or recontamination of the groundwater. If groundwater is collected during excavation or sampling activities, it will either be disposed offsite or discharged to the sanitary sewer system (if allowable) through a discharge permit. Contaminated soils and other contaminated media will be treated, recycled or disposed in accordance with solid and hazardous waste ERCLs in a manner that does not degrade water quality. This work plan addresses releases that may occur during COC-impacted soils excavation activities.*

Example ERCLs

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	***SURFACE WATER QUALITY STANDARDS**, generally found in the Montana Water Quality Act at §§ 75-5-101, et seq., MCA, which establishes requirements for restoring and maintaining the quality of surface and ground waters. Also found in the federal Clean Water Act, 33 U.S.C. §§ 1251, et seq., which establishes requirements for restoring and maintaining the quality of surface waters. Under these Acts the state has authority to adopt water quality standards designed to protect beneficial uses of each water body and to designate uses for each water body. Montana's regulations classify state waters according to quality, place restrictions on the discharge of pollutants to state waters and prohibit the degradation of state waters.*			
	ARM 17.30.606-617	ARM 17.30.606-617 provides that the waters of the [***insert river name***] River drainage from [***insert stretch description***] are classified *"B-3"* for water use.	*Applicable*	*Best management practices (BMPs) will be implemented to prevent impact of surface waters from site contaminants or sediment. No samples will be collected within 200 feet of surface water and excavated areas will be backfilled with soils remaining after sample collection and regraded/reshaped to the same topography as the surrounding area. Therefore, the remedial activities will not impact surface water.*
	ARM 17.30.625	ARM 17.30.625 provides that concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in DEQ-7.	*Applicable*	
	ARM 17.30.637	ARM 17.30.637 prohibits certain discharges to surface waters including but not limited to substances that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter (mg/L)) or globules of grease or other floating materials; (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; (e) create conditions which produce undesirable aquatic life. ARM 17.30.637 also states that no waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards.	*Applicable*	
	ARM 17.30.641	ARM 17.30.641 provides standards for sampling and analysis of water to determine quality.	*Applicable*	*A groundwater monitoring plan will be developed as part of long-term groundwater monitoring. Compliance water quality monitoring will be conducted using methods approved by DEQ.*
	ARM 17.30.646	ARM 17.30.646 requires that bioassay tolerance concentrations be determined in a specified manner.	*Applicable*	*Bioassays will not be required as part of the tasks detailed in the ROD.*
	ARM 17.30.705	ARM 17.30.705 provides that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the non-degradation rules at ARM 17.30.708.	*Applicable*	*A Storm Water Pollution Prevention Plan (SWPPP) has been prepared for characterization and remedial activities to be conducted. There are no current data indicating that the Facility is impacting the River or other surface water. However, if information regarding the presence of or impact on surface water changes, DEQ will be notified and compliance with relevant and applicable standards will be investigated.*
	***AIR STANDARDS**, generally found in the Clean Air Act of Montana at §§ 75-2-101, et seq.*, MCA. *The Clean Air Act (42 USC §§ 7401 et seq.), provides limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances. State emission standards are promulgated pursuant to section 109 of the Clean Air Act and are applicable to releases into the air from any cleanup activities. They are also enforceable under the Clean Air Act of Montana, §§ 75-2-101, et seq., MCA.*			
	40 CFR Part 61	The National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61 establishes emission standards for specific air pollutants.		

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	§§ 75-2-101, *et seq*., MCA	Sections 75-2-203, MCA, provides that state emission standards are enforceable under the Clean Air Act of Montana.	*Applicable*	*The liable party has determined that an air permit is not required. BMPs implemented will include dust control measures such as spraying of water or other dust suppressant onto the surface of soils that are being disturbed to prevent particles or contaminants from becoming airborne and procedures for air monitoring to verify compliance with ambient air standards. Monitoring procedures are identified in the design report. Remedial actions will be halted if air monitoring indicates dust levels are approaching air quality limitations and will not resume until adequate dust control measures are in place.*
	ARM 17.74 Subchapter 3	ARM 17.74 Subchapter 3 addresses requirements related to persons or entities engaged in asbestos related occupations, in charge of asbestos projects, or engaged in facility demolition or renovation activities. Training requirements for persons engaged in asbestos-type occupations are specified.	*Applicable*	*The liable party has determined that asbestos containing materials are not present.*
	Sections 75-2-501 *et seq*., MCA	The Asbestos Control Act (§§ 75-2-501 *et seq*., MCA) establishes requirements for asbestos projects including permitting and inspection requirements. Section 75-2-502, MCA, defines an asbestos project to exclude a project that involves less than ten square feet in surface area or three linear feet of pipe.	*Applicable*	*The liable party has determined that asbestos containing materials are not present.*
	ARM 17.8.220 ARM 17.8.221 40 CFR 50.12 and ARM 17.8.222 ARM 17.8.223	ARM 17.8.220 provides that no person shall cause or contribute to concentrations of particulate matter in the ambient air such that the mass of settled particulate matter exceeds a 30-day average of 10 grams per square meter (gm/m^2). A measurement method is provided in ARM 17.8.220(2). ARM 17.8.221 provides concentrations of particulate matter in ambient air shall not exceed annual average scattering coefficient of 3×10^{-5} per meter for certain areas. A measurement method is provided in ARM 17.8.221(3). 40 CFR 50.12 and ARM 17.8.222 provides ambient air quality standards for lead. Lead concentrations in air shall not exceed the following 90-day average: 1.5 micrograms per cubic meter ($\mu g/m^3$) of air. ARM 17.8.223 provides PM-10 concentrations in ambient air shall not exceed a 24-hour average of 150 $\mu g/m^3$ of air and an annual average of 50 $\mu g/m^3$ of air. ARM 17.8.223(2) and (3) set how an exceedance is determined and measured.	*Applicable*	*The liable party has determined that an air permit is not required. BMPs implemented will include dust control measures such as spraying of water or other dust suppressant onto the surface of soils that are being disturbed to prevent particles or contaminants from becoming airborne and procedures for air monitoring to verify compliance with ambient air standards. Monitoring procedures are identified in the design report. Remedial actions will be halted if air monitoring indicates dust levels are approaching air quality limitations and will not resume until adequate dust control measures are in place.*
	ARM 17.8.210 through 17.8.214	Ambient air standards under section 109 of the Clean Air Act are also promulgated for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and ozone. If emissions of these compounds were to occur at the facility in connection with any cleanup action, these standards would also be applicable. See ARM 17.8.210, 17.8.211, 17.8.212, 17.8.213, and 17.8.214.	*Applicable*	*Activities to be conducted under this work plan are not expected to result in exceedances of ambient air quality standards for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, lead, or ozone.*

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	NATURAL STREAMBED AND LAND PRESERVATION ACT			
	§ 75-7-111, MCA	Section 75-7-111, MCA, provides that a person planning to engage in any activity that will physically alter or modify the bed or banks of a stream must give written notice to the Board of Supervisors of a Conservation District, the Directors of a Grass Conservation District, or the Board of County Commissioners if the proposed project is not within a district and must submit a "310 Permit" application to one of those entities.	*Applicable*	*As described in the ROD, there are no designated wetlands, floodplains, or other surface water bodies present at the Facility. If information regarding the presence of, or impact on, wetlands, floodplains, or surface water changes, DEQ may identify applicable or relevant ERCLs.*
	ARM 36.2.410§ 75-7-102, MCA	ARM 36.2.410 establishes minimum standards which would be applicable if a remedial action alters or affects a streambed, including any channel change, new diversion, riprap or other streambank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development. No such project may be approved unless reasonable efforts will be made consistent with the purpose of the project to minimize the amount of stream channel alteration, insure that the project will be as permanent a solution as possible and will create a reasonably permanent and stable situation, insure that the project will pass anticipated water flows without creating harmful erosion upstream or downstream, minimize turbidity, effects on fish and aquatic habitat, and adverse effects on the natural beauty of the area and insure that streambed gravels will not be used in the project unless there is no reasonable alternative. Soils erosion and sedimentation must be kept to a minimum. Such projects must also protect the use of water for any useful or beneficial purpose. See § 75-7-102, MCA.	*Applicable*	
	METHANE			
	ARM 17.50.1106	ARM 17.50.1106(1) specifies the owner or operator of a Class II landfill unit shall ensure that the concentration of methane gas generated by a solid waste facility cannot exceed 25 percent of the lower explosive limit (LEL) for methane in facility structures.	*Relevant*	*As described in this VCP, methane concentrations at the facility do not exceed 25 percent of the LEL and monitoring will be conducted during implementation of the remedy to ensure that level is not exceeded during cleanup. Therefore, the VCP meets the requirements of these ERCLs.*
		LOCATION-SPECIFIC ERCLS		
	***ENDANGERED SPECIES**, generally found in the Endangered Species Act at 16 U.S.C. §§ 1531, et seq., and its and implementing regulations (16 U.S.C. § 1531 et seq., 50 CFR Part 402, 40 CFR 6.302(h), and 40 CFR 257.3-2) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat.* *Also found in the Montana Nongame and Endangered Species Act, §§ 87-5-101, et seq., MCA, which provides that endangered species should be protected to maintain, and to the extent possible, enhance their numbers. These sections list endangered species, prohibited acts, and penalties.*		
	50 CFR Part 402 40 CFR 6.302 40 CFR 257.3-2	Compliance with this requirement involves consultation with the U.S. Fish and Wildlife Service (USFWS) and a determination of whether there are listed or proposed species or critical habitats present at the facility, and, if so, whether any proposed activities will impact such wildlife or habitat.	*Relevant*	*While activities proposed in this work plan will result in significant disturbance, no endangered or threatened species or critical habitats have been identified at this site. Therefore, the work will not impact threatened or endangered species. However, if threatened or endangered species or critical habitats are encountered during remedial actions, compliance with these ERCLs is required and consultation with the USFWS will occur.*
	§ 87-5-201, MCA ARM 12.5.201	Section 87-5-201, MCA, prohibits certain actions towards a number of wild birds, nests and eggs. ARM 12.5.201 prohibits certain activities with respect to specified endangered species.	*Applicable*	

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	MIGRATORY BIRD TREATY ACT			
	16 USC §§ 703 *et seq*.	This requirement (16 USC §§ 703 *et seq*.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the appropriate program within the USFWS during remedial design and remedial construction to ensure that the cleanup of the facility does not unnecessarily impact migratory birds.	*Relevant*	*Migratory birds are present near the facility. However, the facility does not provide the majority of habitat for these species relative to the surrounding area. There are no features of the facility that are particularly attractive to these species. Therefore, remedial actions at the facility are not expected to impact migratory birds. Thus, the proposed remedy meets the requirements of this ERCL.*
	BALD EAGLE PROTECTION ACT			
	16 USC §§ 668 *et seq*.	This requirement (16 USC §§ 668 *et seq*.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the appropriate program within the USFWS during remedial design and remedial construction to ensure that any cleanup of the facility does not unnecessarily adversely affect the bald and golden eagle.	*Relevant*	*Bald and golden eagles have not been observed at the facility. In addition, the facility does not provide the majority of habitat for these species relative to the surrounding area. There are no features of the facility that are particularly attractive to these species. Therefore, remedial actions at the facility are not expected to impact these species. Thus, the proposed remedy meets the requirements of this ERCL.*
	HISTORIC SITES, BUILDINGS, OBJECTS AND ANTIQUITIES ACT			
	16 USC §§ 461 *et seq*.	These requirements, found at 16 USC 461 *et seq*., provide that, in conducting an environmental review of a proposed action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts upon such landmarks.	*Relevant*	*Current data indicate that no landmarks are present on the facility. Thus, the proposed remedy meets the requirements of this ERCL.*
	MONTANA GREATER SAGE-GROUSE STEWARDSHIP ACT			
	§§ 2-15-243 and 76-22-101, *et seq*., MCA, and related Executive Orders 10-2014, 12-2015, and 21-2015	The Montana Greater Sage-Grouse Stewardship Act, §§ 2-15-243 and 76-22-101, *et seq*., MCA, and related Executive Orders 10-2014, 12-2015, and 21-2015 establishes a map of sage-grouse Core Areas, Connectivity Areas, and General Habitat (https://sagegrouse.mt.gov/ProgramMap) (Executive Order 21-2015), a Montana sage-grouse oversight team, and a Sage Grouse Habitat Conservation program. If a remedial action will occur within one of the designated areas on the map, consultation is required with the Sage Grouse Habitat Conservation program, which is housed within the Department of Natural Resources and Conservation (https://sagegrouse.mt.gov/). Certain activities are prohibited or limited within the designated areas on the map. See the Core Area Stipulations, General Habitat Stipulations, and Connectivity Habitat Stipulations in Attachment D of Executive Order 10- 2014, as amended by Executive Order 12-2015, including requirements/restrictions on surface disturbance; surface occupancy; seasonal use limitations; transportation limitations; pipelines; overhead power lines and communications towers; noise; vegetation removal; sagebrush eradication; wildfire and prescribed burns; monitoring; reclamation; conifer expansion; and rangelands. The industry-specific stipulations (for oil and gas, mining, coal mining, and wind energy industries) within Core Areas in Attachment D may be relevant, depending upon the type of facility and activities required for remedial action. A waiver of the various requirements is allowed through creation of a Special Management Area where a planned land use or activities associated with "valid rights" cannot be implemented. "Valid rights" are defined as "legal 'rights' or interest that are	*Applicable, substantive provisions only*	*Based on a review of designated areas on the sage grouse map, the facility is not with a sage grouse core area, connectivity area, or general habitat. Thus, the proposed remedy meets the requirements of this ERCL.*

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	associated with land or mineral estate and that cannot be divested from the estate until that interest expires, is relinquished, or acquired." (Executive Order 10- 2014, Attachment H). The procedures for Special Management Areas are outlined in Attachment E to Executive Order 10-2014, as amended by Executive Order 12-2015. Certain activities outlined in Attachment F of Executive Order 10-2014, as amended by Executive Order 12-2015, are exempt from these requirements.		
RESOURCE CONSERVATION AND RECOVERY ACT			
40 CFR 264.18	40 CFR 264.18 provides location requirements for owners and operators of hazardous waste management units. Portions of new management units must not be located within 200 feet of a fault which has had displacement in Holocene time and management units in or near a 100- year floodplain must be designed, constructed, operated, and maintained to avoid washout. Noncontainerized or bulk liquid hazardous waste must not be placed in any salt dome formation, salt bed formation, underground mine or cave with an exception for a New Mexico project.	*Relevant*	*All hazardous waste will be removed from the facility and no management units will be created. Thus, the proposed remedy meets the requirements of this ERCL.*
FISH AND WILDLIFE COORDINATION ACT			
16 USC § 661 *et seq*. and 40 CFR 6.302	These standards are found at 16 USC § 661 *et seq*. and 40 CFR 6.302 and require that federally funded or authorized projects ensure that any modification of any stream or other water body affected by a funded or authorized action provide for adequate protection of fish and wildlife resources.	*Relevant*	*As stated in section ##, the proposed remedy includes rerouting of the stream channel. Any fish caught in pools after the stream diversion will be collected and relocated into the active stream channel. No other wildlife species reside primarily at the facility and the proposed remedy is not expected to impact any other species. Therefore, the proposed remedy meets the requirements of these ERCLs.*
FLOODPLAIN MANAGEMENT ORDER			
Executive Order 11988 40 CFR Part 6	Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Implementing regulations for this executive order are found at 40 CFR Part 6.	*Relevant*	*No federal action is anticipated at the facility. Also, as stated in section 5.1 of the VCP, the proposed remedy includes reconstruction of a 100-year floodplain along the new stream channel which will comply with Montana's floodplain requirements. Therefore, the proposed remedy will not result in adverse impacts to the floodplain and will meet the requirements of this ERCL.*
PROTECTION OF WETLANDS ORDER			
40 CFR Part 6, Appendix A Executive Order No. 11,990 33 U.S.C. § 1344(b)(1)	This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,990) mandates that federal agencies and potentially responsible parties avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. 33 U.S.C. § 1344(b)(1), which is Section 404(b)(1) of the Clean Water Act, also prohibits the discharge of dredged or fill material into waters of the United States. Together, these requirements create a "no net loss" of wetlands standard.	*Relevant*	*There is one small designated wetland present at the facility. The VCP provides a detailed pre-construction drawing that reflects the location of this wetland. It is not anticipated that the excavation conducted under the VCP will impact the wetland. However, if the wetland is disturbed by the proposed remedy, this habitat will be re-established by reseeding with appropriate vegetation and ensuring the reconstructed stream channel will continue to support a wetland. Therefore, the proposed remedy will meet the requirements of this ERCL.*

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	STANDARD / REGULATION (ERCL Citation)[1]	DESCRIPTION	*Please identify if each ERCL is* APPLICABLE OR RELEVANT	EXPLANATION OF COMPLIANCE *Please describe action to comply with each ERCL. (Text shown below is example text. Please conduct a facility--specific evaluation.)*
	***SOLID WASTE MANAGEMENT REQUIREMENTS**, generally found in the Solid Waste Management Act, at §§ 75-10-201 et seq., MCA, specify requirements that apply to the location of any solid waste management facility.*			
	ARM 17.50.1004 ARM 17.50.1009(1)(h)	ARM 17.50.1004 specifies a solid waste facility located within the 100-year floodplain may not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste that poses a hazard to human health or the environment. *See also* ARM 17.50.1009(1)(h).	*Applicable*	*The remedy does not include the requirement to construct such a facility.* *All solid waste at the facility will be removed, transported, and properly disposed of at [insert the name of the facility], an appropriate permitted disposal facility. Therefore, the proposed remedy meets the requirements of these ERCLs.*
	ARM 17.50.1005	ARM 17.50.1005 specifies a solid waste facility may not be located in a wetland, unless there is no demonstrable practicable alternative.	*Applicable*	
	ARM 17.50.1006	ARM 17.50.1006 specifies a solid waste facility cannot be located within 200 feet (60 meters) of a fault that has had displacement in Holocene time without demonstration that an alternative setback will prevent damage to the structural integrity of the solid waste facility and will be protective of human health and the environment.	*Applicable*	
	ARM 17.50.1007	ARM 17.50.1007 specifies a solid waste facility may not be located in a seismic impact zone without demonstration, by a Montana licensed engineer, that the solid waste structure is designed to resist the maximum horizontal acceleration in lithified earth material for the site.	*Applicable*	
	ARM 17.50.1008	ARM 17.50.1008 specifies a solid waste facility may not be located in an unstable area (determined by consideration of local soil conditions, local geographic or geomorphologic features, and local artificial features or events, both surface and subsurface) without demonstration, by a Montana licensed engineer, that the solid waste facility is designed to ensure that the integrity of the structural components will not be disrupted.	*Applicable*	
	ARM 17.50.1009	ARM 17.50.1009 requires that Class II landfills be designed, constructed, and maintained with a run-on and run-off control system to address 25-year storm events.	*Applicable*	
	ARM 17.50.1110	ARM 17.50.1110 prohibits a Class II landfill from causing a discharge of a pollutant into state waters, including wetlands.	*Applicable*	
	ARM 17.50.1116	ARM 17.50.1116 requires that a solid waste management facility be designed, constructed, and operated in a manner to prevent harm to human health and the environment.	*Applicable*	
	ARM 17.50.1204(1)	ARM 17.50.1204(1) outlines two ways that a Class II landfill may be constructed, once of which requires utilizing a composite liner and leachate collection and removal system that is designed and constructed to maintain less than a 30-centimeter depth of leachate over the liner.	*Applicable*	
	ARM 17.50.1205(3)	ARM 17.50.1205(3) requires that the leachate system provide for accurate monitoring of the leachate level and provide a minimum slope at the base of the overlying leachate collection layer equal to at least two percent.	*Applicable*	

Example ERCLs

[1] This document identifies common environmental requirements, criteria, or limitations (ERCLs) at Comprehensive Environmental Cleanup and Responsibility Act sites. However, this document should be used as a starting point, and is subject to change, as ERCLs are identified on a site-specific basis. As different stages of the cleanup are completed and new ones arise, an ERCLs list may require detailed refinement.

	STANDARD / REGULATION (ERCL Citation)[1]	DESCRIPTION	*Please identify if each ERCL is* APPLICABLE OR RELEVANT	EXPLANATION OF COMPLIANCE *Please describe action to comply with each ERCL. (Text shown below is <u>example</u> text. Please conduct a facility--specific evaluation.)*
	ARM 17.50.1303	ARM 17.50.1303 identifies requirements for groundwater monitoring and corrective action at Class II landfill units, with the exception listed in ARM 17.501303(2)..	*Applicable*	
	ARM 17.50.1312	ARM 17.50.1312 identifies requirements for monitoring well abandonment.	*Applicable*	
	ARM 17.50.1403	ARM 17.50.1403 sets forth the closure requirements for Class II landfills. Among other requirements, the landfill unit must be designed to minimize infiltration and erosion. The final cover system must be designed and constructed to: (a) have a permeability no greater than to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1W10<-5> cm/sec, whichever is less; (b) minimize infiltration through the closed Class II or Class IV landfill unit by the use of an infiltration layer that contains at least 18 inches of earthen material; and (c) minimize erosion of the final cover by the use of an erosion layer that contains at least six inches of earthen material that is capable of sustaining native plant growth	*Applicable*	
	ARM 17.50.1404	ARM 17.50.1404 sets forth post closure care requirements for Class II landfills. Post closure care requires maintenance of the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cover and comply with the groundwater monitoring requirements found at ARM Title 17, chapter 50, subchapter 13. ARM 17.50.1404(1).	*Applicable*	
	§ 75-10-212, MCA	Section 75-10-212, MCA prohibits dumping or leaving any debris or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.	*Applicable*	
	FLOODPLAIN AND FLOODWAY MANAGEMENT ACT AND REQUIREMENTS			
	§ 76-5-401, MCA and ARM 36.15.601	Section 76-5-401, MCA and ARM 36.15.601 provide that residential, certain agricultural, industrial-commercial, recreational and other uses are permissible within the designated floodway, provided they do not require structures other than portable structures, fill, or permanent storage of materials or equipment.	*Applicable*	*As described in the ROD, there are no designated wetlands, floodplains, or other surface water bodies present at the Facility. If information regarding the presence of, or impact on, wetlands, floodplains, or surface water changes, DEQ may identify applicable or relevant ERCLs.*
	§ 76-5-402, MCA and ARM 36.15.701	Section 76-5-402, MCA and ARM 36.15.701 provide that in the flood fringe (i.e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, and floodproofing.	*Applicable*	

Example ERCLs

[1] This document identifies common environmental requirements, criteria, or limitations (ERCLs) at Comprehensive Environmental Cleanup and Responsibility Act sites. However, this document should be used as a starting point, and is subject to change, as ERCLs are identified on a site-specific basis. As different stages of the cleanup are completed and new ones arise, an ERCLs list may require detailed refinement.

	STANDARD / REGULATION (ERCL Citation)[1]	DESCRIPTION	*Please identify if each ERCL is* APPLICABLE OR RELEVANT	EXPLANATION OF COMPLIANCE *Please describe action to comply with each ERCL. (Text shown below is <u>example</u> text. Please conduct a facility--specific evaluation.)*
	ARM 36.15.602(6)	ARM 36.15.602(6) provides that domestic water supply wells may be permitted, even within the floodway, provided the well casing and well meets certain conditions.	*Applicable*	
	ARM 36.15.602(5)(b), 36.15.605(2)(c), (d), and 36.15.703	ARM 36.15.602(5)(b); 36.15.605(2)(c), (d); and 36.15.703 provide that solid and hazardous waste disposal and storage of toxic, flammable, hazardous, or explosive materials are prohibited anywhere in floodways, floodplains, or flood fringe.	*Applicable*	
	ARM 36.15.605(1)	ARM 36.15.605(1) states that the following are prohibited in a floodway: buildings for living purposes or place of assembly or permanent use by human beings; any structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway; and the construction or permanent storage of an object subject to flotation or movement during flood level periods.	*Applicable*	
	§ 76-5-406, MCA and ARM 36.15.216(2)	Section 76-5-406, MCA and ARM 36.15.216(2) contain substantive factors that address obstruction or use within the floodway or floodplain.	*Applicable*	
	ARM 36.15.604 ARM 36.15.602(1) ARM 36.15.603	ARM 36.15.604 (increase in upstream elevation or significantly increase flood velocities), ARM 36.15.602(1) (excavation of material from pits or pools), and ARM 36.15.603 (water diversions or changes in place of diversion) provide further conditions or restrictions that generally apply to specific activities within the floodway or floodplain.	*Applicable*	
	ARM 36.15.701(3)(c)	ARM 36.15.701(3)(c) requires that roads, streets, highways, and rail lines must be designed to minimize increases in flood heights.	*Applicable*	
	ARM 36.15.701(3)(d)	ARM 36.15.701(3)(d) provides that structures and facilities for liquid or solid waste treatment and disposal must be floodproofed to ensure that no pollutants enter flood waters and may be allowed and approved only in accordance with DEQ regulations, which include certain additional prohibitions on such disposal.	*Applicable*	
	ARM 36.15.702(2)	ARM 36.15.702(2) provides the standards applied to residential, commercial, and industrial structures.	*Applicable*	
	ARM 36.15.606	ARM 36.15.606 provides that flood control works comply with safety standards for levees, floodwalls, and riprap.	*Applicable*	
	ARM 36.15.901	ARM 36.15.901 requires electrical systems to be flood-proofed and conform to certain conditions.	*Applicable*	

Example ERCLs

[1] This document identifies common environmental requirements, criteria, or limitations (ERCLs) at Comprehensive Environmental Cleanup and Responsibility Act sites. However, this document should be used as a starting point, and is subject to change, as ERCLs are identified on a site-specific basis. As different stages of the cleanup are completed and new ones arise, an ERCLs list may require detailed refinement.

Example 6a

Table 3
Selected Remedy Cost Estimate
Chemical Oxidation
Groundwater
KRY Site

Item	Unit	Unit Costs	Quantity	Cost	Source
Geologist	hr	$75.00	928	$69,600.00	RACER
1-inch stainless steel well casing (vertical)	lf	$24.00	8,579	$205,884.00	Estimate from Casper distributor
1-inch stainless steel well screen (vertical)	lf	$36.00	3,677	$132,354.00	Estimate from Casper distributor
Swagelok Compression Fittings (3 per well)	ea	$57.00	1,044	$59,508.00	Vendor Quote
Rotary Drilling, 6-inch borehole (< = 100 ft)	lf	$32.00	12,255	$392,160.00	RACER
4-inch bentonite seal	ea	$20.16	348	$7,015.68	RACER
Ozone wellhead assembly	ea	$1,744.00	348	$606,912.00	Engineer's estimate from similar project
1-inch PVC piping (lateral connection)	lf	$1.00	14,925	$14,925.00	Harrington Plastics
Trenching	cy	$8.55	4,975	$42,536.25	RACER
Ozone System	ls	$74,685.00	25	$1,867,125.00	Vendor Quote (Calcon Systems)
SCADA System and radio telemetry	ls	$14,285.72	25	$357,143.00	Vendor Quote (Calcon Systems)
			Subtotal	**$3,755,162.93**	
Construction Contingencies		25%		$938,790.73	10% Scope, 15% bid
			Subtotal	**$4,693,953.66**	
Additional Tasks					
Electricity power pole drop to each system	ea	$2,500.00	25	$62,500.00	Engineer's estimate from similar project
Startup and troubleshooting	ea	$1,000.00	25	$25,000.00	Engineer's estimate from similar project
				$87,500.00	
Project Management		6%		$286,887.22	EPA Cost Guidance
Remedial Design including Pilot Testing		5% plus $100,000		$673,774.44	EPA Cost Guidance
Construction Management		8%		$382,516.29	EPA Cost Guidance
			Subtotal	**$1,430,677.95**	
		TOTAL CAPITAL COSTS		**$6,124,631.61**	

ANNUAL OPERATIONS AND MAINTENANCE COSTS

Item	Unit	Unit Cost	Quantity	Cost	Source
Site Operation and Maintenance	hr	$65.00	2000	$130,000.00	Engineer's estimate
Power	kwh	$0.08	1456350	$116,508.00	Bridger Valley Electric
Water	gal	$2.25	1000	$2,250.00	Laramie City
			Subtotal	**$248,758.00**	
O&M Contingencies		25%		**$62,189.50**	10% Scope, 15% Bid
		TOTAL YEARLY O&M COSTS		**$310,947.50**	

Present Value	3%
10 years	$8,777,080.00

Present value includes capital costs and O&M costs for 10 years

KRY Site Record of Decision, MDEQ June 2008

Table 8
Cost Estimate - Excavation and Offsite Disposal
Missoula White Pine Sash Facility

	Unit	Unit Cost	Quantity	Cost	Other Direct Cost Factor	Adjusted Cost	Source
Sheet Pile Installation in Treatment/AST Areas - see estimate by Muth Engineering							
Sheet pile contractor mobilization	LS	$1,970.00	2	$3,940	1.65	$6,501	Muth Engineering
Sheet Piling Costs - Area 1 Fomer Treating Area	CY		9908				
PZC 18 Sheet Pile (188 sheets)	LB	$0.65	379008	$246,355	1.65	$406,486	Muth Engineering
Wales (772 linear feet)	LB	$0.62	56356	$34,941	1.65	$57,652	Muth Engineering
Anchors	EA	$3,500.00	56	$196,000	1.65	$323,400	Muth Engineering
Thread & Drive	HR	$410.00	40	$16,400	1.65	$27,060	Muth Engineering
Build Template	HR	$360.00	32	$11,520	1.65	$19,008	Muth Engineering
Utility Move	LS	$13,750.00	1	$13,750	1.65	$22,688	Muth Engineering
Traffic Control	LS	$15,000.00	0	$0	1.65	$0	Muth Engineering
Sheet Piling Costs - Area 2 Across Scott Street	CY		9386				
PZC 18 Sheet Pile (188 sheets)	LB	$0.65	366912	$238,493	1.65	$393,513	Muth Engineering
Wales (772 linear feet)	LB	$0.62	55188	$34,217	1.65	$56,457	Muth Engineering
Anchors	EA	$3,500.00	56	$196,000	1.65	$323,400	Muth Engineering
Thread & Drive	HR	$410.00	16	$6,560	1.65	$10,824	Muth Engineering
Build Template	HR	$360.00	32	$11,520	1.65	$19,008	Muth Engineering
Utility Move	LS	$11,625.00	1	$11,625	1.65	$19,181	Muth Engineering
Traffic Control	LS	$30,000.00	1	$30,000	1.65	$49,500	Muth Engineering
				SUBTOTAL for two areas per Muth		$1,734,678.46	
					Cost per CY	$89.91	
Actual Volume to be excavated in former process and AST areas			11125	**Cost to Shore Impacted Soil**		$1,000,222.76	
Excavation and Backfill							
Excavation and loading ofTreatment/AST Area soil	CY	$5.50	11125	$61,188	1.00	$61,187.50	Muth Engineering
Excavation and loading of soil from other areas	CY	$5.50	43985	$241,918	1.00	$241,917.50	Engineering Estimate
Replace clean soil, haul, backfill compact - all soils	Ton	$5.00	51109	$255,545	1.00	$255,545.00	Ibey Nursery/Landscaping
Abandon Monitoring Wells	EA	$500.00	12	$6,000	1.00	$6,000.00	Engineering Estimate
Confirmation Sampling[3]	EA	$800.00	100	$80,000	1.00	$80,000.00	MWPS History
					SUBTOTAL	$644,650.00	
Disposal							
Transport and dispose of soils from other areas as non-hazardous solid waste[1]	Ton	$30.00	65978	$1,979,325	1.00	$1,979,325.00	Allied Waste
Transport and Incineration of Treatment/AST areas soil (hazardous waste)[1, 2]	Ton	$864.60	10686	$9,239,116	1.00	$9,239,115.60	Clean Harbors
					SUBTOTAL	$11,218,441	
Construction Contingencies		25%				$3,215,828.34	10% Scope, 15% Bid
					SUBTOTAL	**$16,813,597.40**	
Project Management		6%				$1,008,815.84	EPA Cost Guidance
Remedial Design		12%				$2,017,631.69	EPA Cost Guidance
Construction Management		8%				$1,345,087.79	EPA Cost Guidance
					TOTAL CAPITAL COSTS	**$21,185,133**	

Notes:
EA = each
LS = lump sum
LB = pound
CY = cubic yard
HR = hour

Present Value	No Discount
1 year	**$21,185,133**

[1] Soils from the AST and Treating Areas considered hazardous waste, soils from all other areas at the MWPS Facility are considered non-hazardous
[2] Cost per ton is based on price from Clean Harbors Environmental for 2011 disposal/incineration of soil removed from the former AST area +10% ($864.60/ton)
Excavation work is only expected to take one year
[3] Confirmation samples based on 8151 and 8290 for most, then final confirmation samples for EPH/VPH, 8270BNA, and 8260 long list

6.4 COMPARATIVE ANALYSIS

The alternatives were evaluated and compared against the seven cleanup criteria identified in § 75-10-721, MCA. Protectiveness and compliance with ERCLs are threshold criteria that must be met for any remedy. In the comparative analysis, the remaining criteria are weighed and evaluated to identify the best overall alternatives for each media. Each criterion is listed individually below.

6.4.1 Protection of public health, safety, and welfare and of the environment (Protectiveness):

Alternative 1, 2, and 3 would not provide adequate protection of public health, safety, and welfare and the environment in the short-term or long-term because people would continue to be exposed to unacceptable levels of contamination in the soil and contaminants would continue to leach to groundwater. However, alternatives 2 and 3, if combined with soil and groundwater alternatives, may provide adequate protection in the long-term. Alternatives 4 through 9 cannot provide adequate protection in the short-term and long-term unless they are combined with other alternatives to address the risks posed by all of the contaminated media at the KRY Site. For instance, alternatives 2 or 3 could be combined with alternatives 5 or 6 to be protective. It may also be possible to combine alternatives 2 or 3 with some combination of alternatives 4, 7, 8, and 9 to ensure protectiveness. Institutional controls would be necessary for short-term and long-term protectiveness no matter what alternatives are selected. Alternatives 1, 7, and 10 as stand alone options would not provide adequate protection for over 100 years. Alternatives 2, 3, 8, and 9 as stand alone options would likely not provide adequate protection for 40 to 100 years. Alternatives 4, 5, and 6 would likely not provide adequate protection for 10 years. However, the timeframe could be drastically reduced for some of these alternatives, specifically 2, 3, 8, and 9, if used in conjunction with other alternatives.

6.4.2 Compliance with ERCLs

Alternative 1 is not expected to reach groundwater cleanup levels for more than 100 years. However, when compared to other alternatives this is not a reasonable timeframe. Free product would also remain. Therefore, alternative does not meet ERCLs**.** Alternatives 2 through 9 will

comply with ERCLs when combined with other alternatives. Any combination of alternatives that would remove free-product to the maximum extent practicable, reduce groundwater concentrations to levels that meet Montana water quality standards, and treats PCP-contaminated soils that are banned from land disposal to site-specific cleanup levels, including leaching to groundwater numbers would comply with ERCLs. Alternatives 1, 7, and 10 as stand alone options would not meet ERCLs for over 100 years. Alternatives 2, 3, 8, and 9 as stand alone options would likely not meet ERCLs for 40 to 100 years. Alternatives 4, 5, and 6 would likely not meet ERCLs for 10 years. However, the timeframe could be drastically reduced for some of these alternatives, specifically 2, 3, 8, and 9, if used in conjunction with other alternatives.

6.4.3 Mitigation of Risk

Under Alternative 1, free-product, sludge in soil and contaminated soils and groundwater would remain at the KRY Site. Unacceptable risk would exist and would not be mitigated by this alternative. Alternatives 2 and 3 do not mitigate risk because residual sludge, soil, and groundwater contamination would remain. Some mitigation of risk would occur as a result of removing free-product that continues to release contaminants to groundwater. Alternative 4 mitigates some risks posed by groundwater contamination because it treats contaminated groundwater. However, it does not mitigate risk associated with sludge, free-product in the groundwater, or soil contamination. Alternative 5 mitigates some risks because it treats PCP and petroleum contamination in soil and groundwater. However, it is unlikely that this alternative would be effective at treating free-product, sludge, dioxins/furans or metals and therefore would not mitigate risk associated with those compounds. Alternative 6 mitigates some risks because it treats PCP, petroleum and may treat dioxins/furans. It would not effectively treat free-product, sludge or metals. Alternative 7 mitigates some direct exposure to contaminated soils but contamination would remain in soil and fluctuating groundwater would continue to mobilize contaminants from soil and free-product. Institutional controls and long-term maintenance would be needed to ensure the integrity of the barrier and prevent direct contact with contamination. Alternative 8 would mitigate risk posed by contaminated soils because they would be excavated and removed from the KRY Site. However, free-product and contaminated groundwater would remain and people may be exposed to contaminants. Alternative 9 would mitigate some risk because all contaminants in the soil would be removed and treated. However,

it is uncertain if this alternative will reduce dioxin/furan concentrations to acceptable levels. Free-product and contaminated groundwater would also remain and people may be exposed to contaminants. Unacceptable risk would exist and would not be mitigated under Alternative 10, as free-product, sludge, and contaminated soils and groundwater are not addressed. Alternatives 2 through 10 have the potential to mitigate risks when combined with other alternatives in the right combinations.

6.4.4 Effectiveness and Reliability in the Short-Term and Long-Term

Alternative 1 is not effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and contaminants would continue to be released to the environment. Alternative 2 and 3 are effective and reliable for removing free-product but other alternatives would be needed to address residual soil and groundwater contamination. Alternative 4 would be effective on some contaminants at the KRY Site, but is not expected to be effective on dioxins/furans or metals. Additional treatment would likely be required. A pilot study would be necessary to better evaluate the effectiveness of this alternative. Alternative 5 would be effective for PCP and petroleum, but is not expected to be effective for treating dioxins/furans or metals. Pilot testing would be needed to define reaction rates and identify enhancements that would be needed to improve efficiency. Site-specific tests demonstrate that ozonation, which could be a component of Alternative 6, is effective at treating dissolved petroleum, PCP and dioxins/furans. However, it is unlikely to be effective on metals contamination or free-product. It is also uncertain if this alternative would achieve dioxin/furan cleanup levels in soils. Pilot testing would be needed to determine the effectiveness of this alternative on soils at the KRY Site. Alternative 7 is somewhat effective at preventing people from directly contacting contaminated soils. Barriers are susceptible to weathering and may crack, reducing the effectiveness of the barrier in the long-term. Maintenance of the barrier in perpetuity would be required. Because contaminated soil would remain and fluctuating groundwater would continue to mobilize contaminants, this alternative is not effective on its own for free-product and site wide groundwater contamination. Alternative 8 is effective in the short-term and long-term at removing contaminated soil up to 30 feet below ground surface. Because contaminated soil would be disposed of at a licensed engineered offsite facility, regulatory requirements for the offsite facility would effectively control contaminants in the long-term. This alternative by itself is not effective for treating free-product or groundwater contamination. Alternative 9 is effective in the short-term and long-term at removing contaminated soil up to 30

feet below ground surface. Subsequent ex-situ treatment would reduce the toxicity and volume of some contaminants in the soil. The effectiveness of ex-situ treatment at reducing dioxin/furan concentrations to acceptable levels is uncertain. This alternative by itself is not effective for treating free-product or groundwater contamination. Alternative 10 is not effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and continue to be released to the environment.

6.4.5 Technically Practicable and Implementable

All the alternatives are technically practicable and implementable at the KRY Site.

6.4.6 Treatment Technologies or Resource Recovery Technologies (Giving due consideration to engineering controls)

Alternatives 1, 7, and 8 do not use treatment or resource recovery technologies. The remaining alternatives include some form of treatment or resource recovery technology. Any alternative that requires onsite treatment will likely require fencing of portions of the KRY Site to ensure protection of human health in the short-term.

6.4.7 Cost Effectiveness

Alternatives 1 through 4 are less costly than the other alternatives (see Table 6-2 and Appendix F). However, alternatives 1 through 4 by themselves do not sufficiently reduce risks associated with contaminated soils.

Alternative 5 or Alternative 6 combined with either free-product recovery alternative (2 and 3) provides substantial risk reduction and requires less long-term care than Alternative 7. Alternatives 5 and 6 are less expensive than Alternative 8 but require more care and provide less risk reduction.

Alternative 7 provides for risk reduction by preventing direct contact with contaminated soils. However, it does not reduce risk associated with free-product or contaminated groundwater. Long-term costs associated with Alternative 7 are included in the estimated cost. Aside from Alternatives 1 and 10, Alternative 7 is the least expensive alternative. However, with the exception of Alternatives 1 and 10, Alternative 7 also provides the least amount of risk reduction.

Alternative 8 combined with Alternative 4, or the groundwater component of Alternatives 5 or 6, and either free-product recovery alternative (2 and 3) provides greater risk reduction than other alternatives, but any of these alternatives combined with Alternative 8 are the most costly.

Alternative 9 combined with Alternative 4, or the groundwater component of Alternatives 5 or 6, and either free-product recovery alternative (2 and 3) provides substantial risk reduction and requires less long-term care than Alternative 7.

Alternative 10 is less costly than other alternatives, but does not reduce risks associated with contaminated soils, sludge, free-product on groundwater, or groundwater (as long as contaminant concentrations exceed cleanup levels). Alternative 10 combined with any combination of alternatives that removed source materials in soil and groundwater provides some risk reduction at a negligible increase in cost over the cost associated with the other alternatives.

Text based on Final Feasibility Study Report, Kalispell Pole & Timber, Reliance Refinery, and Yale Oil Facilities (June 2008). Prepared for MDEQ by Tetra Tech EM Inc.

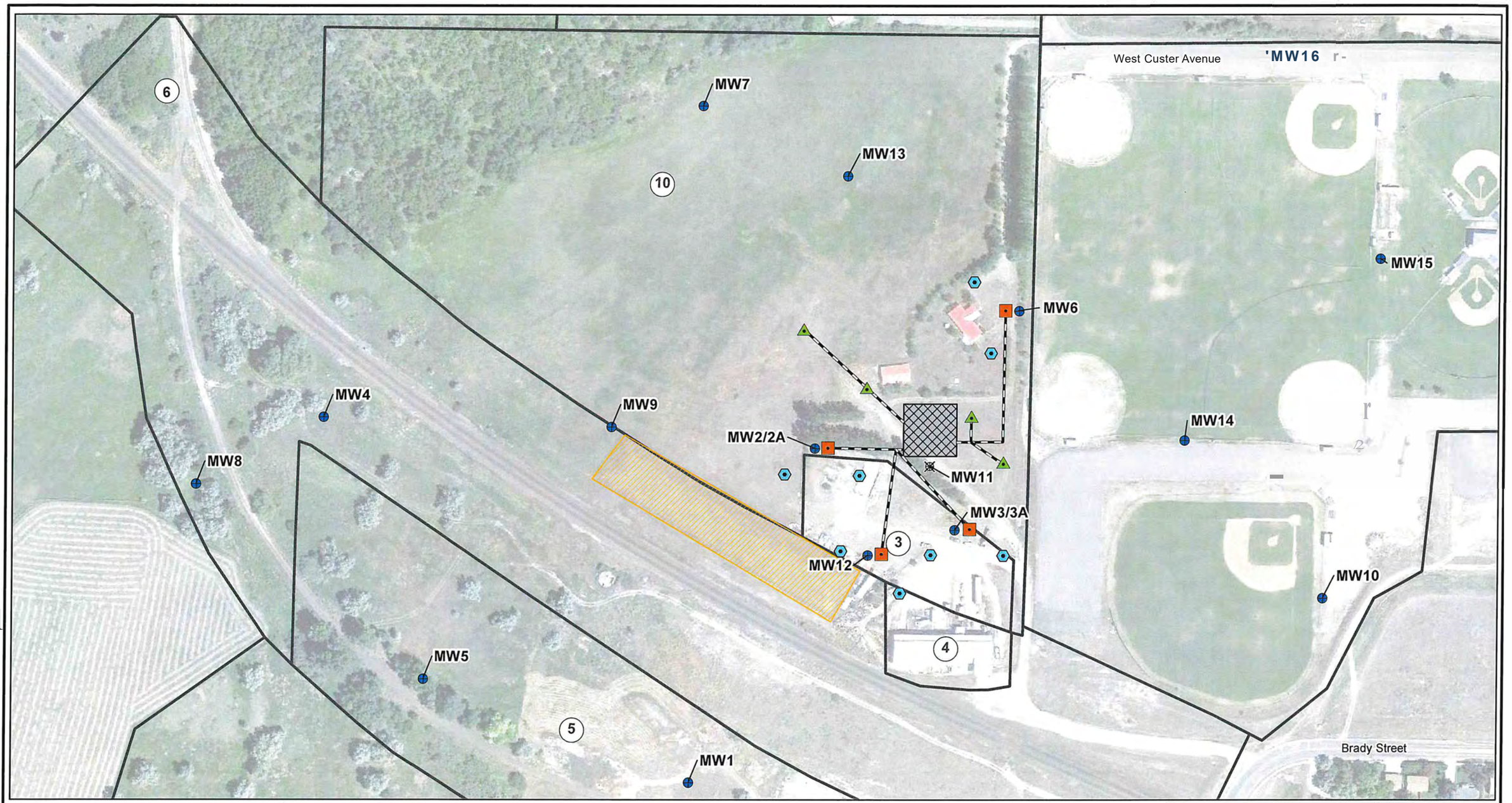
Example 8

Table 6-2
Analysis of Alternatives
KRY Site

Alternatives	Protectiveness	Compliance with ERCLs	Mitigation of Risk	Effectiveness and Reliability	Implementability and Practicability	Treatment or Resource Recovery Technologies	Present Cost at 3% Over 100 Years
1 - No Action	No	No	No	No	Yes	No	$ -
2 - Multi-Phase Extraction and Disposal	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (for LNAPL)	Yes	Yes	$ 9,910,800
3 - LNAPL Extraction and Disposal	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (for LNAPL)	Yes	Yes	$ 12,392,100
4 - Extraction, Ex-Situ Treatment, and Discharge of Groundwater	Yes (when combined)	Yes (when combined)	Yes (Groundwater contamination) No (LNAPL, sludge, soil contamination)	Yes (for petroleum and PCP) No (for dioxins/furans and metals)	Yes	Yes	$ 36,223,000
5 - In-Situ Bioremediation of Groundwater and Soil	Yes (when combined)	Yes (when combined)	Yes (PCP and petroleum) No (LNAPL, sludge, dioxin/furan and metals)	Yes (PCP and petroleum) No (dioxin/furans and metals)	Yes	Yes	$ 52,272,900
6 - In-Situ Chemical Treatment of Groundwater and Soil	Yes (when combined)	Yes (when combined)	Yes (PCP and petroleum) No (LNAPL, sludge, dioxin/furan, metals)	Yes (PCP and petroleum) No (metals) Maybe (dioxins/furans)	Yes	Yes	$ 14,211,400
7 - Soil Barriers	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes	No	$ 5,599,800
8 - Excavation, Off-Site Disposal	Yes (when combined)	Yes (when combined)	Yes (for soils) No (for LNAPL and groundwater)	Yes (for soils)	Yes	No	$120,950,900
9 - Excavation, Ex-Situ Treatment, and Backfill	Yes (when combined)	Yes (when combined)	Yes (for soils) No (for LNAPL and groundwater) Maybe (dioxin)	Yes (when combined)	Yes	Yes	$8,469,985.00

Table based on Alternatives Analaysis presented in Proposed Plan for Kalispell Pole & Timber, Reliance Refinery, and Yale Oil Corporation (KRY) State Superfund Facilities, MDEQ (December 2007).

Example 9



LEGEND

EXISTING FACILITY FEATURES

- ABANDONED MONITORING WELL LOCATION
- MONITORING WELL LOCATION
- REPOSITORY
- EXPOSURE AREA

REMEDIAL ALTERNATIVE COMPONENTS

- GROUNDWATER EXTRACTION WELL
- PIEZOMETERS
- TREATED GROUNDWATER INJECTION WELL
- GROUNDWATER TREATMENT SYSTEM
- TRENCHING AND PIPING

Notes:

- Performance and long-term monitoring locations will be identified in subsequent remedial design documents. The location and number of monitoring wells may change from this preliminary layout.
- Methods for determining the coordinates of sample locations are available in historic reports.
- This figure is provided as a conceptual illustration of the remedial alternative.

T10N-R4W
Section 23
46.61402, -112.0633 (MW-11)
July 2017

0 180 360 Feet

SOURCE: GOOGLE EARTH AERIAL, DATED ON 07/24/2014.

BNSF RAILWAY COMPANY
JOSLYN STREET TAILINGS FACILITY
HELENA, MONTANA
FINAL FEASIBILITY REPORT

CONCEPTUAL LAYOUT FOR GROUNDWATER ALTERNATIVE 5

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FIGURE **20**