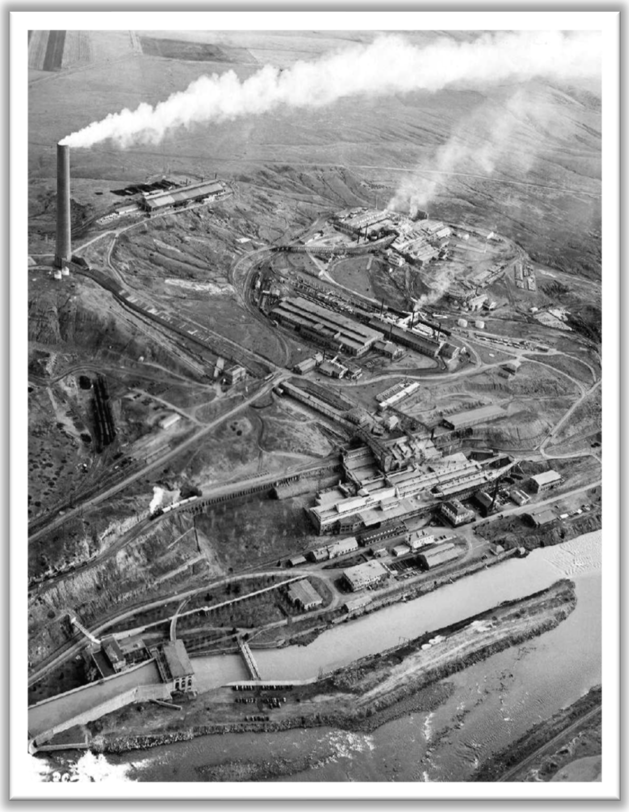
Record of Decision

ACM Smelter and Refinery
Community Soils Operable Unit
National Priorities Site

August 2021



Black Eagle, Cascade County, Montana

U.S Environmental Protection Agency
Montana Department of Environmental Quality

Part 1 - Declaration

Site Name and Location

ACM Smelter and Refinery Site, Community Soils Operable Unit, 01, CERCLIS ID Number: MTD093291599.

Statement of Basis and Purpose

This decision document presents the selected remedy for the Community Soils Operable Unit (OU1) of the ACM Smelter and Refinery Site in Black Eagle, Montana, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) Section 117(c), 42 U.S.C. Section 9617(c), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Section 300.435(c)(2)(ii).

This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency, in consultation with the State of Montana Department of Environmental Quality (MDEQ), the supporting agency. This decision is based on the administrative record for OU1 and will become part of the administrative record per the NCP Section 300.825(a)(2). The administrative record and copies of key documents are available for public review at the Black Eagle Community Center, 2332 Smelter Avenue, Black Eagle, Montana 59414.

Assessment of the Site

The response action set forth in this Record of Decision (ROD) is necessary to protect the public health, or welfare, or the environment, from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. Such release or threat of release may present an imminent and substantial endangerment to public health, welfare or the environment.

Description of the Selected Remedy

The selected remedy for the Community Soils OU1 is the first remedial action to be taken at the Site. This remedial action addresses: 1) human health risks from lead and arsenic in residential and non-residential soils within the community of Black Eagle and 2) human health risks from lead and arsenic in soils associated with the abandoned railroad corridor that runs through the community of Black Eagle.

Lead and arsenic contaminants in soil are from past releases, from the adjacent smelter and refinery facility and from fugitive dust from the abandoned railroad corridor, containing smelter-related materials. Although lead and arsenic may act as a source to surface water, sediment and groundwater contamination, these sources are not highly mobile and are not considered principal threat wastes.

The EPA is continuing to investigate potential groundwater and ecological risks from the Former Smelter Facility (Operable Unit 2) and potential risks to surface water and aquatic resources in the Missouri River (Operable Unit 3).

The selected remedy for OU1 will be implemented for the following areas:

- Northern Community Soils Area of Interest (CSAOI)
- Southern Community Soils Area of Interest

- Northern Outlying Area
- Railroad Corridor.

No remedial actions are required in the South Outlying Area.

Major components of the remedy to address current residential soils in the Northern and Southern CSAOI include:

- Step 1 - Remove soils in any yard component exceeding the "Not to Exceed" (NTE) action level of 250 mg/kg arsenic and 400 mg/kg lead to a maximum depth of 18 inches (maximum 24 inches in gardens)
- Step 2 – Calculate the residual risk that may be present after Step 1 and remove any additional soil to achieve a yard average concentration, in the top 6 inches, less than 54 mg/kg arsenic and 281 mg/kg lead.

Major components of the remedy for current non-residential soils in the Northern and Southern CSAOI and North Outlying Area include:

- Confirm that the property average soil concentration, in the top 6 inches, is below risk-based action levels for the current non-residential land use or remediate soils to achieve the risk-based action levels for current non-residential land use in the top 6 inches.
- To address a potential land use change to residential, one of the following must be completed:
  - Confirm that the property-specific 0-12-inch depth-weighted average soil concentration meets the remedial action objectives (RAOs) for residential soils, or
  - Place ICs on the property such as restricting future residential use or providing for additional remediation at the time of residential redevelopment, or
  - Remediate soils to further reduce soil concentrations to achieve a property average concentration in the top 12 inches that meets the remedial action objectives (RAOs) for residential soils.

Major components of the remedy for the Railroad Corridor include:

- Remove all visual waste materials plus one foot of underlying soil to a maximum depth of 4 feet.
- Regrade site to promote drainage and revegetate and/or stabilize remaining soils to reduce runoff and dust. Backfill soil is not required unless needed for drainage and/or soil revegetation/stabilization.
- Confirm that the average residual soil concentrations, after removal of waste materials, in the top 6 inches, is below risk-based action levels for the current land use.
- Alternatively, allow placement of engineered covers, consisting of either a minimum of 24-inch soil cover and/or other developed features (I.e., paved trails, streets, or parking areas).
- Provide future operation and maintenance to maintain the protectiveness of engineered covers.
- Place ICs on the property such as restricting future residential use or providing for additional remediation at the time of future residential development.

Common components include:

Excavated materials will either be consolidated on site within OU2, pending OU2 remedial decisions, or disposed at an off-site facility.

Statutory Determinations

The selected remedy meets the mandates of CERCLA Section 121 and the NCP. It is protective of human health and the environment and complies with all federal and state requirements that are applicable or relevant and appropriate to the remedial action; it is cost effective and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment as a principle element of the remedy. However, contaminated materials at the Community Soils OU1 do not represent a principal threat, and treatment would be significantly more expensive due to the large quantities of materials impacted. Although they are present in large volume, the solid materials within the OU are low in toxicity and can be reliably contained.

Because the remedy may result in hazardous substances, pollutants or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information supporting the EPA's decision can be found in the Administrative Record for this Site.

- Contaminants of Concern (COCs) and their respective concentrations (Sections CS and RC 5 and Sections CS and RC 7)
- Baseline risk represented by the COCs (Sections CS and RC 7)
- Cleanup levels established for COCs and the basis for those levels (Sections CS and RC 7)
- Whether source materials constituting principal threats are found at the Site and, if so, how the remedy will address them (Sections CS and RC 11)
- Current and reasonably anticipated future land use assumptions and groundwater use assumptions and current and potential future beneficial uses of ground water (if applicable) used in the baseline risk assessment and ROD (Sections CS and RC 6)
- Potential land and groundwater use (if applicable) that will be available at the Site as a result of the selected remedy (Sections CS and RC 6)
- Estimated capital, annual operation and maintenance (O&M) costs, total present-worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Sections CS and RC 9)
- Key factors that led to selecting the remedy (Sections CS and RC 12).

Additional information can be found in the administrative record for this ROD.

Authorizing Signatures

This Record of Decision documents the selected remedy for the Community Soils Operable Unit of the ACM Smelter and Refinery National Priorities List Site. The remedy was selected by EPA with the partial concurrence of the State of Montana, as authorized by the EPA signatory below and the attached Montana Department of Environmental Quality letter of partial concurrence.

BETSY SMIDINGER Digitally signed by BETSY SMIDINGER
Date: 2021.08.23 14:26:19 -06'00'

August 23, 2021

____ ______________

Betsy Smidinger
Director
Superfund and Emergency Management Division
United States Environmental Protection Agency, Region 8

Date

April 6, 2021

Deb Thomas, Regional Administrator (Acting)
US Environmental Protection Agency
Region 8
1595 Wyncoop Street
Denver, CO 80202-8917

Re: State Partial Concurrence to the ACM Smelter and Refinery Superfund Site OU1 Record of Decision

Dear Ms. Thomas,

The Montana Department of Environmental Quality (DEQ) concurs in part with the 2021 Record of Decision (ROD) for the Community Soils Operable Unit 1 of the ACM Smelter and Refinery Superfund Site (ACM OU1). DEQ believes the two-step cleanup approach designed to address arsenic and lead contamination in residential and non-residential soils throughout OU1 will address the majority of the contamination at the site and that the proposed remedial action for the railroad corridor will be protective of human health and the environment. DEQ can only partially concur with the selected remedy for the following reasons:

Remedial Action Levels do not meet State criteria for protectiveness

The "Not to Exceed" (NTE) Remedial Action Objective levels and cumulative excess cancer risk for arsenic, which were used to determine the cleanup criteria for residential and non-residential soils are not based on site-specific cleanup levels for the ACM site. The 250 mg/kg "not to exceed" (NTE) Remedial Action Objective (RAO) for arsenic has no relationship to this site and is based upon a site-specific cleanup level for Anaconda that is not appropriate for this site. DEQ proposes that the arsenic PRG of 175 mg/kg be used as the NTE RAO since it is actually based upon site-specific conditions. Additionally, the State of Montana considers the protective RAO for arsenic to be a cumulative excess cancer risk no greater than 1 in 100,000, rather than the cumulative cancer risk of 1.44 in 100,000 as included in the current ROD. To meet Montana CECRA requirements, the arsenic RAO should be 36 mg/kg, rather than the 54 mg/kg.

Depth of cleanup for residential soils is inadequate

The proposed remedial action does not address soils at an adequate depth to comply with State requirements because the proposed remedy only addresses the top 6 inches of soil. The remedy may in some cases result in exceedances in area-specific regions of residential yards, in residential soils to a depth of 18 inches consistent with Remedial Investigation Database. Montana considers surface soil is defined as the top 0-2 ft of soil, and therefore, the remedy for surface soil remediation should extend beyond the 0-6 in interval in order to be protective.

The selected remedy for Operable Unit 1 implicates an on-site repository within the boundaries of OU2, an OU that has yet to be fully evaluated through the Remedial Investigation/Feasibility Study process

The ROD states that "[e]xcavated materials will either be consolidated and managed with similar materials within OU2, pending a final remedy for OU2" or disposed of off-site. As the ROD acknowledges the agencies have yet to consider the final remedy at OU2, DEQ remains concerned, however, that the selected remedy for OU1 (consolidating OU1 materials within the boundary of OU2) favors the use of an on-site repository within OU2. DEQ wants to ensure that the future land use of OU2, as well as any limitations that may be imposed on the land, are fully and fairly vetted during the remedy investigation and selection process for OU2. This includes the solicitation and response to public comment around the remedy for OU2 and any land use restrictions that may require. The State continues to request that the repository language in this OU1 remedy be clarified to state that the soils will be disposed of off-site or that the soils will be temporarily staged on OU2 until a final remedy is chosen for that particular operable unit.

Further Institutional Controls are necessary to assure protectiveness of human health

Finally, Institutional Controls must be required for all currently non-residential properties to ensure that such properties remain non-residential unless they are remediated to the DEQ residential criteria if residential use is planned., As the chosen remedy does not comply with the State's residential use cleanup requirements for allowable lifetime cancer risks these Institutional Controls are necessary for the chosen remedy to be protective of human health.

DEQ appreciates the Environmental Protection Agency's (EPA's) willingness to consider our input as to the protectiveness of the overall remedy, as well as our comments and suggestions as to the scope of the remedy. DEQ offers our continued support as we move to the remedial design and implementation of these remedial action elements, as well as the long-term operations and maintenance of this remedy to protect human health and the environment.

Sincerely,

Christopher Dorrington
Director Department of Environmental Quality

Cc: Betsy Smidinger, Director Superfund and Emergency Management Division, EPA
Aaron Urdiales, Superfund Branch Chief, EPA
Joe Vranka, Superfund Unit Manager, EPA
Charlie Coleman, Remedial Project Manager, EPA
Jenny Chambers, Division Administrator, DEQ
Matt Dorrington, Bureau Chief, DEQ
Carolina Balliew, Section Supervisor, DEQ
Richard Sloan, Project Officer, DEQ
Jessica Wilkerson, Legal, DEQ
File

Part 2 – Decision Summary

Table of Contents

Appendices

Acronyms and Abbreviations List

µg/dL	micrograms per deciliter
µg/L	micrograms per liter
ACM Site	Anaconda Smelter and Refinery Superfund Site
AERL	ARCO Environmental Remediation, LLC
ALM	Adult Lead Methodology
AR	Atlantic Richfield Company
ARARs	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
bgs	below ground surface
BNSF	Burlington Northern Santa Fe Railway Company
BTV	Background Threshold Value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
COC	Contaminants of Concern
COIs	Contaminants of Interest
COPCs	Contaminants of Potential Concern
CSAOI	Community Soils Area of Interest
CS	Community Soils
CSM	Conceptual Site Model
ECDR	Electric City Dirt Riders
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
GRA	General Response Actions
HHRA	Human Health Risk Assessment
IC	Institutional Control
IEUBK model	Integrated Exposure, Uptake, and Biokinetic model
IVBA	in vitro bioaccessibility
MDEQ	State of Montana Department of Environmental Quality
mg/kg	milligrams per kilogram

NCP	National Oil and Hazardous Substances Pollution Contingency Plan (also called the National Contingency Plan)
NPL	National Priorities List
NTE	Not to Exceed
OA	Outlying Areas
O&M	Operation and Maintenance
OU	Operable Unit
ppm	parts per pillion
PRGs	preliminary remediation goals
PRP	Potentially Responsible Party
PSM	possible smelter material
RAGS	EPA's Risk Assessment Guidance for Superfund
RALs	remedial action levels
RAO	remedial action objectives
RBA	relative oral bioavailability
RBSL	Risk-Based Screening Level
RC	Railroad Corridor
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan
Settlement Agreement/CO	Administrative Settlement Agreement and Order on Consent
SWDA	Federal Solid Waste Disposal Act
TAG	Technical Advisory Group
TBC	To-Be Considered
UAO	Unilateral Administrative Order for Remedial Investigation/ Feasibility Study, CERCLA-08-2012-0001
UCL	upper confidence limit
UU/UE	unlimited use / unrestricted exposure

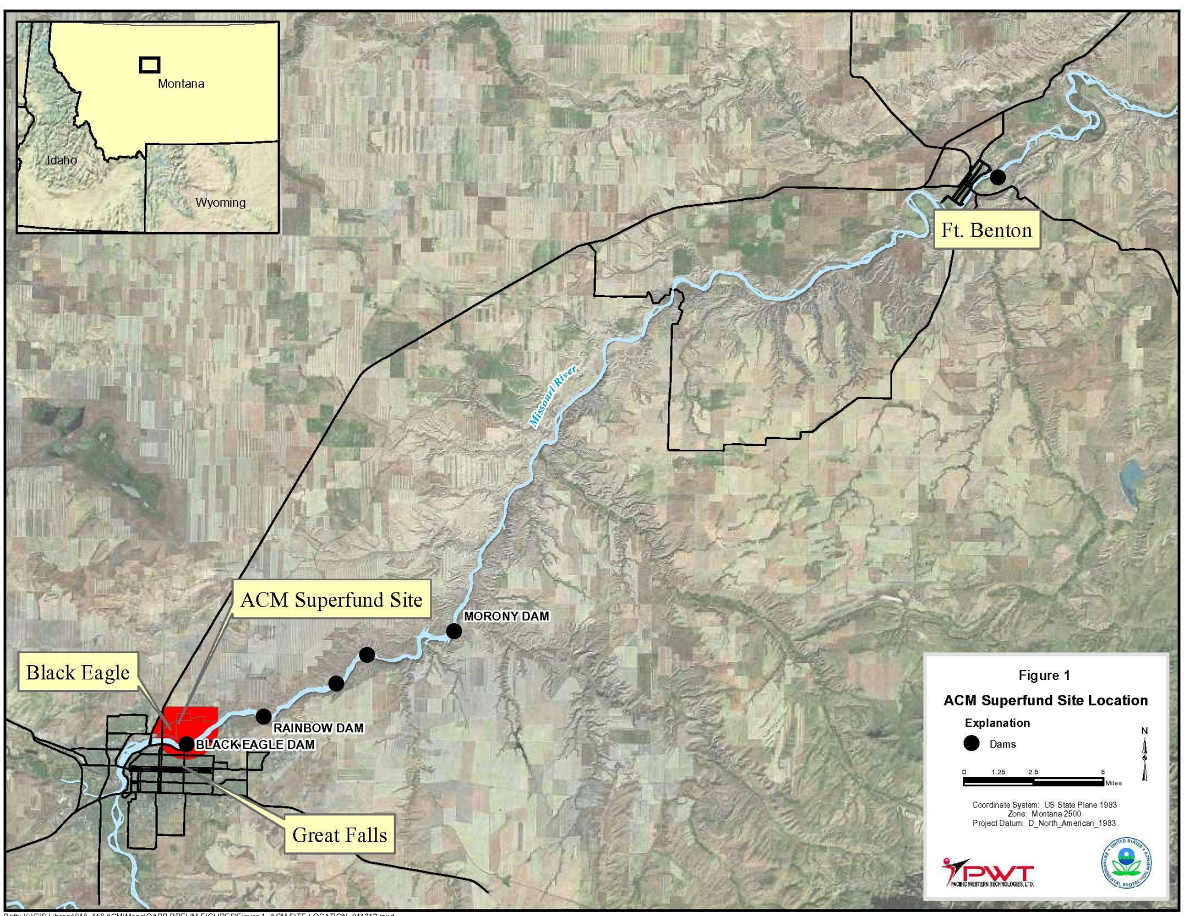
Part 2 – Decision Summary

Section 1: Site Name, Location, and Description

The ACM Smelter and Refinery Site (ACM Site or Site) is adjacent to the unincorporated community of Black Eagle along the Missouri River in Cascade County, Montana (Figure 1-1). The city of Great Falls is across the Missouri River south of the Site. Under this ROD, the EPA is addressing arsenic and lead contamination from smelting and refining waste in residential and non-residential areas of the community soils operable unit (OU1) of the Site.

OU1 includes approximately 500 homes in the community of Black Eagle, along with vacant properties, commercial businesses, a park, city-owned alleys and rights-of-way, and a historical railroad corridor with mixed ownership. For the purposes of the remedial investigation (RI) OU1 was divided into five areas of interest as follows: the Northern Community Soils Area of Interest (Northern CSAOI); the Southern Community Soils Area of Interest (Southern CSAOI); the Railroad Corridor; the Northern Outlying Area; and the Southern Outlying Area.

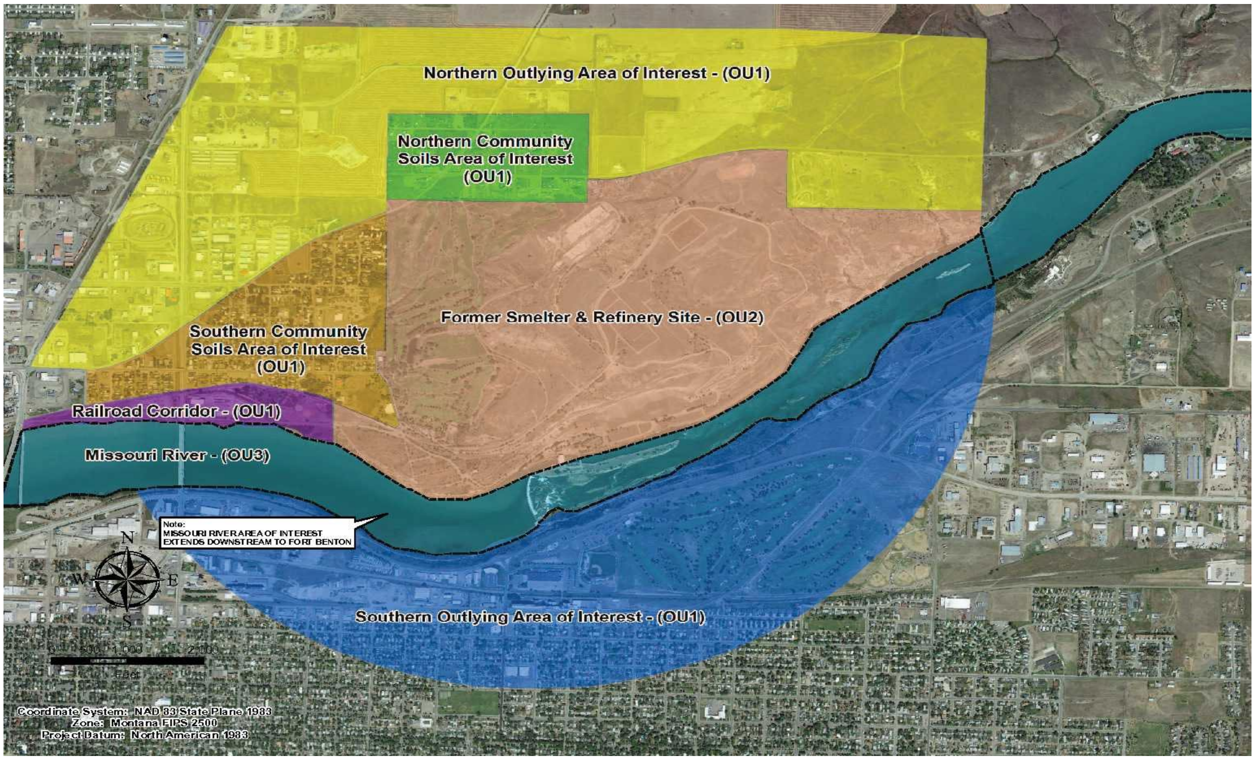
Figure 1-1 – ACM Superfund Site Location



Path: K:\GIS Library\018_118 ACM\Maps\QAPP PRELIM FIGURES\Figure 1_ACM SITE LOCATION_011312.mxd

The EPA Site Identification number is MTD093291599. The EPA Region 8 is the lead agency for the Site, with support from the Montana Department of Environmental Quality (MDEQ).

Figure 1-2 – ACM Site Operable Units

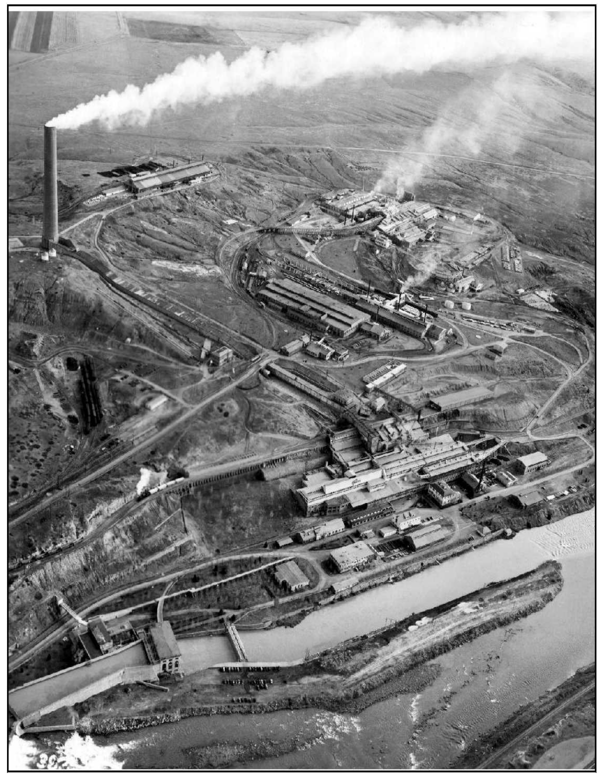


Section 2: Site History and Enforcement Activities

2.1 History of Contamination

From 1891 to 1893 the Boston and Montana Consolidated Copper and Silver Mining Company constructed a new smelter on the north bank of the Missouri River at Great Falls. In 1889 and 1890, rail lines were constructed to the Site through Black Eagle to provide access to the new facility prior to construction. Operations at the ACM smelter began in 1893 when copper ore mined in Butte was shipped to the Site and concentrated, smelted and refined. Smelting and refining of copper, as well as the production of other specialty metals, continued for more than 80 years. Primary products and wastes from activities at the ACM Site were copper, zinc, arsenic, lead, and cadmium.

A 501-foot-tall plant stack dispersed contaminants over a wide area near the facility. See Photograph 2-1 for a view of the smelter during operations. The large stack went into service in 1909 and continued operation until 1972. It was designed to eject a volume of 1,575,000 cubic feet of air per minute at a velocity of 450 feet per minute to entrain and remove from the smelter all the gases and dust generated during the smelting and refining process.



Photograph 1-1 – ACM Smelter

Wastes generated from the operations also involved tailings and slag that were dumped into the Missouri River. Between 1893 and 1915, when on-Site containment was instituted, the MDEQ estimates that between 27,500,000 and 31,000,000 cubic yards of waste were dumped into the river, including tailings, slag, smelter wastes and flue dusts. It is likely that dumping of waste into the Missouri River continued at a reduced rate after 1915 until the facility closed in the 1970s.

Demolition of plant facilities began in 1972, and the Atlantic Richfield Company (AR) acquired the property in 1977. All operations at the Great Falls Refinery ceased in September 1980. AR began closure in 1981 and completed the process in 1999. Closure activities included demolition and removal of buildings, backfilling of basement substructures, and salvaging and on-Site burial of flue dust, granulated slag, asbestos-containing material, demolition debris and other wastes. A soil cover ranging from six-inches to five-feet thick was placed over the wastes.

A post-closure inventory was conducted in 1981, and 27 areas of concern were identified. A preliminary assessment completed in 1982-1983 documented groundwater and surface water contamination at the ACM facility. AR submitted a voluntary cleanup plan for the Site to MDEQ in 2000. MDEQ found the plan to be incomplete and subsequently requested that the EPA review any cleanup activities.

MDEQ collected samples of Missouri River sediment in May 2002. These samples were collected from the Fort Benton area (38 to 40 miles downstream from the ACM Site). MDEQ concluded that the five samples it collected had elevated levels of antimony, arsenic, copper, lead and zinc and recommended additional investigations.

Between 2003 and 2008, the EPA conducted several Site investigations, including an expanded Site investigation in 2003 and Superfund Site Assessment in 2007, which focused on residential areas within Black Eagle and Great Falls. The results of the 2003 investigation identified 78 acres encompassing 375 residences in Black Eagle with arsenic and lead above screening levels. Subsequent investigations in 2007 and 2008 also identified a large area having soil with elevated arsenic and lead in Black Eagle. Requests from the community, local government and the Governor of Montana were made to the EPA to include the Site on the National Priorities List (NPL). On March 20, 2011, the Site was added to the NPL.

In 2011, the EPA conducted a removal action in the Southern CASOI at the then proposed Copper Basin subdivision to remove approximately 1,200 cubic yards of soils containing elevated arsenic and lead from portions of five residential lots. The EPA also coordinated with the Montana Department of Transportation to treat and dispose of waste materials encountered in the Railroad Corridor.

On September 8, 2011, the EPA and AR entered into the *Administrative Settlement Agreement and Order on Consent*, CERCLA Docket No. CERCLA-08-2011-0017 (Settlement Agreement) whereby AR agreed to conduct remedial investigations within OU1 of the ACM Site. On November 30, 2011, the EPA issued the *Administrative Order for Remedial Investigation/Feasibility Study*, CERCLA-08-2012-0001, (UAO) to Burlington Northern Santa Fe Company (BNSF) to conduct remedial investigations in the Railroad Corridor portion of OU1. In July 2014, BNSF conducted minor interim cleanup activities in Art Higgins Community Park.

2.2 Remedial Investigation/Feasibility Study (RI/FS)

AR conducted the Remedial Investigation (RI)/Feasibility Study (FS) investigation in the majority of OU1, while BNSF conducted the RI/FS investigation within the Railroad Corridor portion of OU1. AR sampling was conducted in accordance with the EPA approved sampling and analysis plan, as described in the AR *Final Remedial Investigation Report, ACM Smelter and Refinery Site Operable Unit 1 – Community Soils Areas of Interest and Outlying Areas* (Formation, 2015). AR sampling began in 2011 and was completed in 2013. The extensive soil investigation included detailed sampling at 422 residential yards, and collection of nearly 8,000 residential soil samples. An additional 752 soil samples were collected from various non-residential properties within OU1.

AR conducted a Feasibility Study using the data from the RI, and the EPA approved the final AR *ACM Smelter and Refinery Site Operable Unit 1 (OU1) – Community Soils Areas of Interest (CSAOI) and Outlying Areas (OA) Feasibility Study* dated October 2017 (Formation, 2017). The Feasibility Study (FS) summarizes appropriate response action options.

BNSF completed an RI/FS for the Railroad Corridor, and the EPA approved the *Final Remedial Investigation Report, Railroad Corridor Segment of OU1 ACM Smelter and Refinery Superfund Site*, dated May 2015, and the *Final Feasibility Study Report Railroad Corridor Segment of OU1 ACM Smelter and Refinery Superfund Site* dated September 25, 2017 (Kennedy/Jenks, 2015, 2017).

Following completion of the Feasibility Studies, the EPA prepared a Proposed Plan which identified the alternative that, based on the Feasibility Studies, best met the requirements of 40 CFR 300.430(f)(1). The EPA issued the Proposed Plan for public comment on June 3, 2019 (EPA, 2019), and conducted a public meeting with the community on June 19, 2019. After evaluating comments received on the Proposed Plan during the public comment period and community meeting, the EPA prepared this Record of Decision (ROD) which describes the remedial alternative the EPA has selected to address contamination within OU1 of the ACM Site.

2.3 Enforcement Activities

The EPA is the lead agency overseeing the investigations conducted by AR and BNSF. MDEQ is the support agency.

An enforcement timeline is as follows:

2011, September	Administrative Order on Consent for OU1 Remedial Investigation Feasibility Study between AR and the EPA, CERCLA Docket No. CERCLA-08-2011-0017
2011, November	UAO for Remedial Investigation/Feasibility Study, issued by the EPA to BNSF, CERCLA Docket No. CERCLA-08-2012-0001

Section 3: Community Participation

Since the Site was listed on the NPL in March 2011, the EPA, MDEQ and the Cascade County Health Department have been actively engaged with the community. Meetings with the community have involved the EPA, the MDEQ and the Agency for Toxic Substances and Disease Registry (ATSDR) as well as AR and BNSF. The EPA established a local information repository at:

Black Eagle Community Center
2332 Smelter Avenue
Black Eagle, MT 59414
406-453-4736

Site documents are also available online at the ACM Site webpage:
https://www.epa.gov/superfund/acm-smelter

Site records are also available at the EPA Superfund Records Center Montana Office, at 10 West 15th Street, Suite 3200, Helena, Montana 59626.

The initial Community Involvement Plan (CIP) interviews were conducted from January 24 to January 28, 2011. The interview summaries are included in the CIP, dated June 30, 2011. The CIP supports communication between the community in and around the Site, the EPA and MDEQ and encourages community involvement in Site activities.

Listing the Site on the NPL also provided support for the development of a community-led Technical Advisory Group (TAG), which hired a TAG consultant with the assistance of an EPA grant. The TAG publishes articles in the quarterly Water and Sewer newsletter that goes out to all households in Black Eagle providing information about the Site. Monthly TAG meetings are attended by interested community members, the TAG consultant, EPA and MDEQ representatives, and other stakeholders. These meetings provide updates on the project schedule, sampling and analysis progress, outreach materials/fact sheets, and redevelopment plans for OU2 of the Site. TAG members also provide feedback to the EPA and MDEQ regarding sampling and cleanup plans and the redevelopment goals/desires of the community.

The Proposed Plan for Record of Decision for Community Soils Operable Unit 1 (OU1) ACM Smelter and Refinery Superfund Site, Black Eagle, Montana, was issued on June 3, 2019 (EPA, 2019), and a public notice was placed in the Great Falls Tribune, which ran on June 2, 5, 9, 12, 16, 17, 18, and 19, 2019, announcing the Proposed Plan, the public comment period, and a community meeting. The initial public comment period was open from June 3, 2019, through July 31, 2019. No extensions to this comment period were requested. During the public meeting, which was held on June 19, 2019 from 6:30 to 8:00 pm at the Black Eagle Community Center, two residents gave comments on the plan. Subsequent to the public meeting, several other residents provided written comments on the Proposed Plan. No changes to the Proposed Plan were necessary as a result of public comments.

At the public meeting, the EPA answered questions about the Site and the remedial alternatives. The EPA also discussed that the reasonably anticipated future land use remains primarily residential. A transcript of the public meeting is included in the administrative record. Public comments and the EPA's responses to comments received during the public comment period are presented in the Responsiveness Summary, Part 3 of this ROD.

Section 4: Scope and Role of Operable Unit or Response Action

The ACM Site is comprised of three operable units: OU1, Community Soils; OU2, Former Facility; and OU3, Missouri River. OU1 consists of the five subareas: the Northern and Southern Community Soils Areas of Interest (CSAOI), the Railroad Corridor (RC), and the Northern and Southern Outlying Areas (Figure 1-2).

The community soils portion of OU1 contains approximately 500 parcels in the community of Black Eagle, 422 of which are residential properties sampled as part of the RI. Soil was also sampled from a public park, vacant lots, commercial properties, and dirt roads and alleys as part of the RI effort to characterize the nature and extent of smelter-related contamination.

The Railroad Corridor portion of OU1 runs from 10th Street to the former smelter facility and contains the Art Higgins Memorial Park.

This ROD describes in detail the final remedy selected by the EPA for OU1 of the ACM Site, including contaminated surficial soil on residential, non-residential, undeveloped, commercial and public property in OU1.

OU2 consists of the former facility property and includes potential impacts to ground water and surface water as well as potential ecological risks at the Site, including potential impacts from OU1. The historical footprint of the ACM Smelter and Refinery facility is bounded by the Missouri River to the South and Southeast, Wire Mill Road to the North, and Smelter Avenue to the West. The Northeast portion of OU2 of the Site borders lands owned by the Lewis and Clark foundation.

OU3 will address potential impacts to the Missouri River from previously discharged waste materials from the former smelter operations.

Sections 5 through 14:

The discussion that follows has been broken into two parallel parts, first addressing the Community Soils (CS) portion of OU1, then addressing Railroad Corridor (RC) portion of OU1.

Community Soils

Section CS 5: Community Soils Site Characteristics

CS 5.1 CSAOI Description and History

Both CSAOIs are on the north side of the Missouri River. The Southern CSAOI is located immediately west of the Former Smelter and Refinery and the Northern CSAOI is located on the north side of the Former Smelter and Refinery (Figure 1-2). The Southern CSAOI is primarily residential and includes the eastern portion of the community of Black Eagle, which was built as a company town for the copper smelter starting in 1891. Homes in the older, central part of Black Eagle were generally constructed before 1920, and the majority of homes within OU1 were constructed prior to 1950. These homes are a mix of brick and wood-frame structures typically set on 30-foot by 150-foot lots along the avenues and 40-foot by 150-foot lots on the streets. The Northern CSAOI is predominantly undeveloped land but also has commercial and residential properties.

The two Outlying Areas include the northern portion of the City of Great Falls and unincorporated areas of Cascade County that surround the CSAOIs and the former smelter and refinery (Figure 1-2). The southern outlying area is south of the Missouri River, partly within the City of Great Falls, and includes commercial, residential, and recreational properties. Most of the homes in this part of Great Falls were constructed prior to 1950, and they are a mix of brick and wood-frame structures set on 50-foot by 150-foot lots. The Northern Outlying Area is north of the Missouri River and outside of the Great Falls city limits. The northern outlying area includes commercial, industrial, agricultural and recreational properties, as well as undeveloped land. The primary recreational property in the Northern Outlying Area is the Electric City Dirt Riders (ECDR) off-road racetrack.

CS 5.2 CSAOI Characteristics

This section includes a description of the Conceptual Site Model (CSM) on which the investigations, risk assessment, and response actions are based. A CSM is a living document used to organize and communicate information about Site characteristics, potential exposure routes, that is regularly updated and reflects the best interpretation of available information about the Site at any point in time. The initial OU1 CSM was completed by EPA in 2011, and an updated CSM incorporating the information gathered during the RI, was provided by AR in the OU1 RI Report (Formation, 2015). The major characteristics of the Site, and the nature and extent of community soils property contamination as defined by the RI, are summarized below. More detailed information is available in the administrative record for the Site.

CS 5.3 CSAOI Conceptual Site Model (CSM)

Figure 5-1 presents a graphical representation of the CSM for the Site. The CSM identifies the primary sources of contamination and how residents can be exposed to contamination. A more detailed discussion of the CSM is provided in the Baseline Human Health Risk Assessment, ACM Smelter and Refinery Site Operable Unit 1 (Ramboll Environ, 2016).

CS 5.4 CSAOI Sources of Contamination

The primary sources of contamination at the Site identified in the Human Health Risk Assessment (HHRA) include:

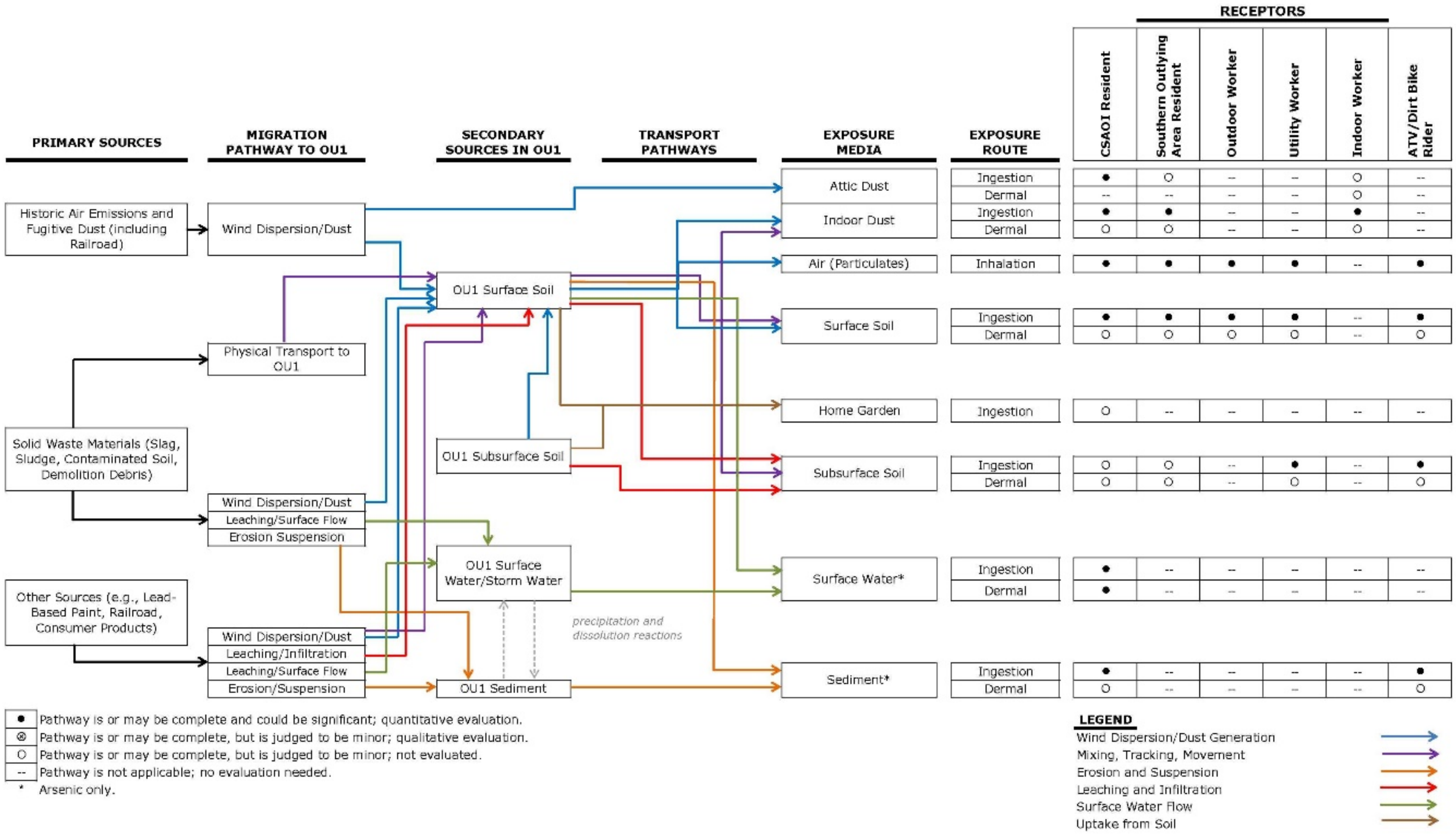
- Fugitive dust and releases associated with historical smelter/refinery operations,
- Solid wastes such as slag and slag-impacted soils,
- Liquid wastes such as process solutions, acids, and rinsate from historical facility operations.

Potential contaminant sources are summarized briefly and then discussed in more detail below. These include sources associated with copper and zinc smelting and refining; the zinc plant; the copper rod, wire, and cable mill; the cadmium plant; a lead plant; indium/iridium recovery; experimental germanium recovery; and the aluminum rod, wire and cable mill.

Table CS 5-1 Summary of ACM Processes, Raw Materials, and Wastes

Process Timeframe	Known or Suspected Raw Materials and/or Related By-Products	Potential Associated Wastes or Waste Streams
Smelter refining of copper ore 1893	Iron slag, sulfuric acid	Arsenic, cadmium, lead
Electrolytic refining of copper 1916	Copper ore, blister copper	Arsenic, antimony
Electrolytic refining of zinc 1916	Zinc ore, leaching and purification solutions	Cadmium, lead, zinc corrosives
Copper Rod, Wire, and Cable Mill 1918	Refined copper	Copper, process fluids
Cadmium Plant 1920s	Zinc by-products, leaching and purification solutions	Lead, corrosives
Zinc Plant 1920s	Leaching and purification solutions	Sulfur, sulfuric acid
Lead Plant	Copper ore, sulfuric acid solutions	Sulfur dioxide, sulfuric acid, slag
Indium processing 1930s to 1960s	Flue dust from zinc-lead processing	Waste acids and soda solutions
Iridium processing 1930s to 1960s	Decopperized slimes, soda-silica flux, lime flux, soda ash	Copper, selenium, tellurium, lead-lime slag, soda slag, spent acid solutions
Germanium processing 1950s	Filtrates and wash waters	Arsenic in wastewater, corrosives
Aluminum Rod, Wire, and Cable Mill 1950s	Refined aluminum	Aluminum, process fluids

Figure CS 5-1 – ACM Conceptual Site Model



CS 5.5 CSAOI Site Hydrologic Setting

Both CSAOIs are located on a plateau above the Missouri River, which flows eastward adjacent to the Site within a steeply cut but broad channel. The elevation of OU1 ranges from about 3,550 feet above mean sea level on the plateaus above the river to approximately 3,250 feet above mean sea level at the river's edge. Surface drainage from OU1 flows to the Missouri River. Urban runoff from impervious areas on either side of the Missouri River is routed to storm water systems that ultimately drain to the Missouri River. There are two natural stream drainages within OU1: the Black Eagle drainage and the ECDR drainage.

CS 5.6 CSAOI Nature and Extent of Contamination

Environmental data were collected in the CSAOIs and Outlying Areas from 2011 through 2013 as part of the OU1 RI. Environmental samples included soil samples from residential and non-residential locations in the CSAOIs and Outlying Areas, groundwater from water supply wells, surface water and sediment from the Black Eagle and ECDR drainages and storm water culverts, and indoor dust samples from homes in the CSAOIs. In addition, exterior paint tests for lead were conducted on selected homes in the CSAOIs. The soil investigation involved collecting soil samples from four separate depth intervals (0 to 2, 2 to 6, 6 to 12, and 12 to 18 inches) at 422 residential properties (nearly 8,000 samples total), as well as from multiple properties with diverse non-residential uses (e.g., commercial, agricultural, recreational, and vacant land) in both the CSAOIs and Outlying Areas (an additional 756 samples).

Environmental samples were analyzed for some or all of the 14 chemicals of interest (antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc) identified by the EPA for the OU1 RI. Chemical data collected throughout OU1 were analyzed to identify the contaminants of potential concern (COPCs) for each environmental media and describe the spatial distribution of COPCs in each of the media investigated. Arsenic was identified as a COPC in soil, sediment, and surface water. Lead was identified as a COPC in soil and surface water. No chemicals of interest were identified as COPCs in groundwater/drinking water.

Arsenic and lead in residential soil were reported at concentrations that exceeded risk-based screening levels for residential soil. Arsenic concentrations exceeded the risk-based screening level of 0.61 mg/kg[1] in nearly all the residential soil samples. The majority of lead concentrations in residential soil were less than the risk-based screening level of 400 mg/kg. Arsenic and lead concentrations in non-residential soil also exceeded risk-based screening levels. Arsenic concentrations were higher than the screening level of 0.61 mg/kg at all locations in the non-residential areas sampled in OU1. Lead concentrations were higher than the screening level of 400 mg/kg at some Outlying Area sample locations.

Compared to OU1 soil, the other environmental media investigated including groundwater, surface water, storm water, and sediment had relatively few locations where elevated arsenic and lead concentrations were reported. Arsenic and lead concentrations in groundwater samples collected from existing water wells were below drinking water standards. Surface water and storm water samples contained low concentrations of arsenic and lead primarily in suspended solids. Sediment arsenic

[1] This screening level was used in the Final RI Report. The current arsenic screening level is 0.68 mg/kg (U.S. EPA 2015b).

concentrations exceeded the risk-based screening levels for residential soil (lead concentrations did not), but arsenic concentrations in sediment were lower than concentrations in nearby soil.

CS 5.7 CSAOI Contaminant Fate and Transport

Historically, the primary pathways for transport of COPCs to environmental media in OU1 included wind dispersion of releases from operations of the former smelter/refinery, which resulted in deposition of particulate matter to soil in downwind areas and tracking or physical placement of source materials into OU1. Other sources of COPCs were historically present within OU1, including exterior lead-based paint, which may have also contributed COPCs to soil. The primary ongoing transport pathways within OU1 are air transport of fine soil particles disturbed by human activities (dust generation) and tracking and physical transport of soil by human activities. Wind transport of fine particles from surface soil is also possible but considered less significant in developed areas of OU1 where soil is typically covered by vegetation.

Leaching and migration of COPCs vertically downward from surface soil to deeper soil in OU1 appears limited to depths of 6 to 18 inches. Groundwater samples collected from existing water supply wells provided no evidence for transport of COPCs from soil to deeper groundwater. Contaminated soil remains a potential source of COPCs to surface water (including storm water) and sediment in OU1, but OU1 surface water and sediment data indicated that the transport of COPCs from soil to surface water and sediment by erosion and runoff is minimal.

CS 5.8 CSAOI Soil Sampling Results

Residential Soil Sampling

Residential soil sampling design for OU1 is outlined in the Black Eagle Residential Soils Sampling and Analysis Plan (SAP) and the RI SAP and described in the RI Report (Formation, 2015). These sampling plans identified comparable soil sampling design and sampling and analysis procedures. Yards were divided into components (i.e., Front Yard, Back Yard, Garden, Play Area). One subsample location was identified from front or back yards under 625 square feet total area, with additional subsample locations as necessary to ensure a sample density of at least one subsample per 625 square feet in these components. A minimum of two subsample locations were identified in other yard components (rock garden, vegetable garden, etc.) regardless of the area.

Soil was collected from each identified subsample location from the 0 to 2 inch, 2 to 6 inch, 6 to 12 inch, and 12 to 18 inch depth intervals. The number of individual soil samples collected from each property varied, typically between 12 and 24 samples.

Residential Soil Results from the Northern and Southern CSAOIs

Residential yard sampling was conducted at 391 yards in the Northern and Southern CSAOIs in 2011 and 2012. In total, more than 7,200 individual soil samples were analyzed for arsenic, cadmium, copper, lead, and zinc. Subsets of the samples were also analyzed for iron, chromium (hexavalent and/or total), and mercury. To facilitate COPC determination for the Site, in 2011 a representative subset of 295 samples were also analyzed for antimony, chromium, cobalt, manganese, nickel, selenium, and silver.

Results for arsenic and lead are discussed below. For data on other analytes and additional information on the COPC selection process, see Section CS 7.2.

Arsenic concentrations ranged from less than 0.1 mg/kg to 1,560 mg/kg, with a median arsenic concentration of 26.2 mg/kg which is above the Montana background threshold value (BTV) of 22.1 mg/kg. Lead concentrations ranged from less than 0.1 mg/kg to 6,270 mg/kg with a median concentration of 93.2 mg/kg. Lead concentrations generally exceeded the Montana BTV of 29.8 mg/kg lead, and occasionally exceeded the risk-based screening level of 400 mg/kg. For additional detail on residential soil sampling and results, refer to the RI Report (Formation, 2015).

Residential Soil Results from the Southern Outlying Area

In 2013, residential yard sampling was conducted at 31 yards in the Southern Outlying Area within the City of Great Falls. In total, 640 soil samples were collected and analyzed for arsenic, cadmium, chromium (total), copper, lead and zinc. For a subset of the samples, hexavalent chromium analysis was also performed. Results for arsenic and lead are discussed below. For data on other analytes and additional information on the COPC selection process, see Section CS 7.2.

Concentrations in the Southern Outlying Area were generally lower than those seen in the CSAOIs. Arsenic concentrations ranged from 3.5 mg/kg to 331 mg/kg, with a median arsenic concentration of 19.4 mg/kg, which is below the Montana background threshold value (BTV) of 22.1 mg/kg. Lead concentrations ranged from 6.3 mg/kg to 1,150 mg/kg with a median concentration of 57.5 mg/kg. Lead concentrations generally exceeded the Montana BTV of 29.8 mg/kg lead, and occasionally exceeded the risk-based screening level of 400 mg/kg. For additional detail on residential soil sampling and results, refer to the RI Report (Formation, 2015).

Non-Residential Soil Sampling

Non-residential soil sampling was conducted at properties within the CSAOIs and the Northern Outlying Area that currently have non-residential uses, including vacant lots, in accordance with the RI SAP. Five-point composite samples were collected at each non-residential soil sampling location. The same depth intervals were used for non-residential sampling as were used for the residential sampling (0 to 2 inches, 2 to 6 inches, 6 to 12 inches, and 12 to 18 inches). These non-residential soil samples were all analyzed for antimony, arsenic, cadmium, chromium (total), copper, lead, and zinc. 14 samples were also analyzed for hexavalent chromium. Results for arsenic and lead are discussed below. For data on other analytes and additional information on the COPC selection process, see Section CS 7.2.

Non-Residential Soil Sampling in the Northern and Southern CSAOIs

Over 200 non-residential soil samples were collected from 51 sample locations at 10 properties within the CSAOIs (three in the Northern CSAOI, seven in the Southern CSAOI). On properties in the Northern CSAOI, sampling locations were established on a 100-foot by 100-foot grid. In the Southern CSAOI, non-residential properties were smaller, and 2 to 4 sample locations were established on each property rather than using a grid.

Non-Residential Soil Sampling in the Northern Outlying Area

A total of 106 sample locations were established in and immediately adjacent to the Northern Outlying Area, most using a 400-foot by 400-foot grid. Exceptions to the grid included sample locations spaced at 1000-feet established along a transect line following the Missouri River, and samples collected outside of the eastern boundary of the Northern Outlying Area along Rainbow Dam Road.

Non-Residential Soil Sampling Results

The median arsenic concentration in soil from non-residential areas was 33.9 mg/kg. The maximum arsenic concentration was 756 mg/kg (in a sample from the ECDR track), and arsenic concentrations in 48% of the non-residential soil samples exceeded the Montana BTV of 22.5 mg/kg. In general, arsenic concentrations were higher at depths greater than 6 inches. The median lead concentration in non-residential soil was 38.9 mg/kg, which is above the Montana BTV of 29.8 mg/kg. The maximum lead concentration in the Northern and Southern CSAOIs was 644 mg/kg, and the maximum lead concentration in the Northern Outlying Area was 2,430 mg/kg. In general, lead concentrations were highest in the top 2 inches of soil, and concentrations above 400 mg/kg were limited to the northeast portion of the Northern Outlying Area (Formation, 2015).

Hexavalent chromium concentrations in all non-residential soil samples were below the residential risk-based screening level of 0.29 mg/kg. For additional detail on non-residential soil sampling and results, refer to the RI Report (Formation, 2015).

Soil Results from Unpaved Roads and Alleys in Black Eagle

Unpaved roads and alleys in Black Eagle were sampled as part of the OU1 RI. A total of 112 soil samples were collected from 28 unpaved roads and alleys. For each road or alley segment, four subsample locations were identified, and subsamples collected at each. The subsamples were composited to make one sample to represent the road or alley segment from each of the sampled depth intervals (0 to 2 inches, 2 to 6 inches, 6 to 12 inches, and 12 to 18 inches). The road and alley samples were analyzed for arsenic, cadmium, chromium (total), copper, lead, and zinc.

Arsenic concentrations ranged from 5 mg/kg to 751 mg/kg, with a median concentration of 21 mg/kg, which is below the Montana BTV of 22.5 mg/kg. All 112 samples exceeded the residential arsenic risk-based screening level of 0.61 mg/kg. Consistent with other non-residential soil samples, arsenic concentrations were highest in deeper samples. Lead concentrations ranged from 6 mg/kg to 3,880 mg/kg, with a median concentration of 120 mg/kg, which is above the Montana BTV of 29.8 mg/kg. Eight of the samples exceeded the lead risk-based screening level of 400 mg/kg. Unlike the pattern with residential soil samples, lead concentrations in the road and alley samples were highest in the deeper samples. None of the 0 to 2-inch samples exceeded the lead risk-based screening level (Formation, 2015).

Cadmium, chromium (total), copper and zinc concentrations did not exceed their respective residential risk-based screening level in any of the road and alley samples. For additional detail on unpaved road and alley soil sampling and results, refer to the RI Report (Formation, 2015).

CS 5.9 Indoor /Attic Dust

Indoor dust testing for lead was conducted at 30 homes (including 18 attics) in the study area (Formation, 2015). Attic dust was not collected at the remaining homes because they did not have attics, or the attics could not be accessed safely. Dust samples were analyzed for arsenic and lead. The average arsenic concentration measured in samples of dust from living areas of the home was 12.2 mg/kg, while the average lead value for these same samples was 156 mg/kg. The average arsenic concentration measured in attics was 110.7 mg/kg. The average lead concentrations measured in attic dust was 887 mg/kg.

The results of this sampling are included on Tables CS 5-2 and CS 5-3, below (Formation, 2015).

Table CS 5-2 Indoor Dust Sampling Results

	Sample ID	Property ID	Sample Date	Arsenic (mg/kg)	Lead (mg/kg)	Year Home Built
Interior Floor Samples	IBE-032-111813	BE-032	11/18/2013	15.1 J	232 J	1900
	IBE-042-112013	BE-042	11/20/2013	18.7 J	277 J	1905
	IBE-044-111413	BE-044	4/2/2014	15.3	229 J	2001
	IBE-047-120513	BE-047	11/13/2013	11.8 J	179 J	1902
	IBE-055-111213	BE-055	11/12/2013	22.1 J	204 J	1900
	IBE-062-111313	BE-062	11/13/2013	10.4 J	148 J	1900
	IBE-067-120513	BE-067	12/5/2013	12.1 J	121 J	1910
	IBE-076-111813 COMP 1-2-3	BE-076	11/18/2013	13.2 J	242 J	1892
	IBE-077-111813 COMP 1-2	BE-077	11/18/2013	9.94 J	158 J	1910
	IBE-079-111913	BE-079	11/19/2013	25.5 J	321 J	1915
	IBE-088-112513	BE-088	11/25/2013	16.1 J	115	1890
	IBE-094-121013	BE-094	12/10/2013	10.9 J	125 J-	1900
	IBE-203-120213	BE-203	12/2/2013	9.27 J	197 J	1901
	IBE-204A-120213	BE-204A	12/2/2013	13.9 J	244 J	1900
	IBE-217-120513	BE-217	12/5/2013	17.4 J	241 J	1912
	IBE-234-120213	BE-234	12/2/2013	8.53 J	161 J	1921
	IBE-248-111913 COMP 1-2	BE-248	11/19/2013	14.9 J	295 J	1896
	IBE-250A-111413	BE-250A	4/2/2014	12.5	167 J	1916
	IBE-253A-1-112013	BE-253A	11/20/2013	3.25 J	30.3 J	1895
	IBE-253A-2-112013	BE-253A	11/20/2013	5.3 J	119 J	1895
	IBE-258-121013	BE-258	12/10/2013	21.6 J	49.7 J-	1900
	IBE-316-111313 COMP 1-2-3	BE-316	11/13/2013	11.3 J	168 J	1919
	IBE-405-111913	BE-405	11/19/2013	3.63 J	20.3 J	2009
	IBE-438-111913	BE-438	11/19/2013	3.59 J	12.7 J	2007
	IBE-459-112613	BE-459	11/26/2013	8.02 J	84.3 J	1947
	IBE-506-112013	BE-506	11/20/2013	4.49 J	53.1 J	1915
	IBE-508-112113	BE-508	11/21/2013	16.9 J	79.7 J	1910
	IBE-514-111413 COMP 1-2	BE-514	11/14/2013	20.7 J	250 J	1928
	IBE-517-112013	BE-517	11/20/2013	9.95 J	223 J	1919
	IBE-546A-120513	BE-546A	12/5/2013	8.29 J	59.1 J	1910
	IBE-600-112613	BE-600	11/26/2013	2.58 J	32.4 J	--

Table CS 5-3 Attic Dust Testing Results

	Sample ID	Property ID	Sample Date	Arsenic (mg/kg)	Lead (mg/kg)	Year Home Built
Attic Samples	ATTIC-BE-032-111813	BE-032	11/18/2013	77.4	2800	1900
	ATTIC-BE-042-112013	BE-042	11/20/2013	42.1	500	1905
	ATTICBE-044-111413	BE-044	11/14/2013	8.52	91.6	2001
	ATTIC-BE-049-112013	BE-506	11/20/2013	84.3	859	1915
	ATTICBE-067-120513	BE-067	12/5/2013	14.6	144	1910
	ATTIC-BE-076-111813	BE-076	11/18/2013	182	2420	1892
	ATTIC-BE-079-111913	BE-079	11/19/2013	13.5	215	1915
	ATTICBE-094-121013	BE-094	12/10/2013	75.8	932 J-	1900
	ATTICBE-203-120213	BE-203	12/2/2013	204	1490	1901
	ATTICBE-217-120513	BE-217	12/5/2013	51.9	495	1912
	ATTIC-BE-248-111913	BE-248	11/19/2013	167	898	1896
	ATTICBE-250A-111413	BE-250A	4/2/2014	84.8	1310	1916
	ATTIC-BE-253A-112013	BE-253A	11/20/2013	695	298 J	1895
	ATTICBE-258-121013	BE-258	12/10/2013	129	456 J-	1900
	ATTICBE-459-112613	BE-459	11/26/2013	9.04	214	1947
	ATTIC-BE-508-112113 COMP 1-2	BE-508	11/21/2013	20.6	305	1910
	ATTICBE-514-111413	BE-514	11/14/2013	74	682	1928
	ATTICBE-546A-120513	BE-546A	12/5/2013	59.1	1850	1910

Note:

J Result qualifier indicating that the result is less than the Reporting Limit but greater than or equal to the Method Detection Limit. The concentration is an approximate value.

mg/kg Milligrams per kilogram

CS 5.10 Bioavailability

Bioavailability (sometimes referred to as bioaccessibility) is the degree and rate at which a substance (such as arsenic or lead) is absorbed into a living system, and which therefore may be available for a physiological effect. Both AR and BNSF performed Site-specific bioavailability/bioaccessibility testing. These Site-specific values were used in the HHRA instead of the default values of 60% for lead and arsenic.

In the community soils areas of OU1, a bioavailability analysis was performed for arsenic and lead in soil samples to determine how likely it was that an individual who ingested Site-specific lead and arsenic contaminants might be negatively affected. Soil testing to estimate the Site-specific relative oral bioavailability (RBA) of arsenic and lead was a data need identified to support development of the CSM and for the OU1 RI HHRA. Bioavailability samples were selected to represent a range of arsenic and lead concentrations and to provide a spatially representative group of samples for the OU1 residential community. Soil samples from different depths were included, even though residents are most likely to come into contact with surface soil. Soil samples were selected to represent a range of different locations relative to potential ACM sources. The average RBA in residential yards for lead is 64% for shallow samples (0 – 6 inches) and for deeper samples (deeper than 6 inches) is 58%. The average RBA for arsenic is 40%.

Table CS 5-4 Community Soils Arsenic and Lead Bioaccessibility Results

Sample ID	Arsenic in Soil			Lead in Soil		
	Concentration (mg/kg)	In Vitro Bioaccessibility (%)	Relative Bioavailability[1] (%)	Concentration (mg/kg)	In Vitro Bioaccessibility (%)	Relative Bioavailability[2] (%)
BE-014-FY-0612	104	64	59	95.2	70	58
BE-021B-DZ-0002	21.4	22	33	1098	73	61
BE-031-DZ-0206	30.2	27	36	1041	79	67
BE-039-FG-1218	157	50	50	657	80	68
BE-046-FY-0002	90.2	36	42	1158	83	70
BE-055-FY-0002	546	22	33	1890	51	42
BE-057-DZ-0002	31.1	30	38	1389	77	65
BE-064-BY-0206	142	38	43	630	65	54
BE-064-FY-0612	244	30	38	613	55	45
BE-088-FY-0612	127	22	33	1127	24	19
BE-205-ED-0204	17.4	25	35	727	69	58
BE-206B-BY-0206	42.7	32	40	1166	99	84
BE-216-DZ-1218	79.6	37	43	1489	89	75
BE-236B-BA-0206	145	50	51	507	78	66
BE-248-ED-0206	141	32	39	257	70	58
BE-253A-BY-0206	144	47	49	531	80	68
BE-253B-FY-1218	241	48	49	213	68	56
BE-324-BA-0612	109	44	47	170	79	66
BE-335-DZ-1218	121	40	44	48.5	62	52
BE-335-RG-0002	24.6	27	36	1539	88	74
BE-411-VG-0002	104	46	48	32.7	61	51
BE-429-ED-1218	28.6	19	31	27.5	53	44
BE-429-FG-0612	17.4	19	31	310	75	63
BE-430-BY-0002	16.3	21	33	529	88	74
BE-430-FY-0206	53.8	32	39	162	73	61
BE-447-BY-0206	42.9	34	41	167	73	61
BE-447-FG-1218	149	48	50	36.5	75	63
BE-506-FY-0206	39.4	29	37	244	65	55
BE-508-RG-0206	158	53	53	728	73	62
BE-514-FG-0002	20.9	19	31	310	79	67
BE-514-FY-0612	175	35	41	57.7	61	51
BE-516A-BA-0002	20	21	33	667	78	65
BE-527B-FY-0002	17.5	17	30	145	69	58
BE-702-BY-0206	94	35	41	47.2	44	36
BE-702-DZ-0002	21	12	27	149	59	49

Notes:

[1]Arsenic relative bioavailability (%) = 0.62 x in vitro bioaccessibility (%) + 19.7 (Brattin et al., 2013)

[2]Lead relative bioavailability (%) = 0.878 x in vitro bioaccessibility (%) – 0.028 (Drexler and Brattin, 2007)

Section CS 6: Current and Potential Future Land Uses in the CSAOIs

The CSAOIs include a portion of the unincorporated community of Black Eagle, a portion of the City of Great Falls, and areas of unincorporated Cascade County. There are a range of land uses across OU1. All of the parcels comprising the CSAOIs are under the jurisdiction of the Cascade County Zoning Regulations adopted in 2005 and revised in 2007, 2009, and 2012 (Cascade County Commission, 2012).

Land within the Southern CSAOI is largely urban residential with scattered parcels of commercial land. Land within the Northern CSAOI is zoned for residential use but most of the privately owned properties are vacant or are developed for commercial use. Most of the property in the Northern Outlying Area is zoned for industrial use, including one parcel owned by the City of Great Falls, or open space. The predominant current land uses of the Northern Outlying Area are associated with agricultural production, recreation, and ranching. Adjacent parcels are also used for commercial or industrial purposes, including a small property used for dirt bike and all-terrain vehicle riding and racing (the ECDR track), and a former city municipal landfill. Current land uses in the Southern Outlying Area are predominantly residential in the northern portion of the city of Great Falls. A former landfill and a golf course are present east of the residential area in incorporated Great Falls on land zoned for park and open space use. Commercial and vacant properties lie just above the Missouri River on both the north and south banks, and these areas are zoned for mixed, industrial, or open space land uses.

Residences are present in unincorporated Cascade County to the east, north, and west of OU1 along with numerous heavy industrial facilities, including an operating oil refinery, two operating hydroelectric dams and power facilities, and former railroad lines.

The primary recreational use area in the vicinity of the ACM Site is the River's Edge Trail, as well as dirt bike and all-terrain vehicle riding and racing at the ECDR track. The River's Edge Trail is located along the south side of the Missouri River and consists of an asphalt and gravel trail developed on abandoned portions of the Great Northern and Milwaukee Railroad lines that starts in Great Falls and parallels the river for 25 miles. A single-track mountain bike trail is also present along the south bank of the Missouri River. The western portion of the trail is within the Great Falls city limits and the eastern portion is on Cascade County land, both of which are zoned for open space use. The ECDR is directly northeast of Former Great Falls Refinery Site (OU2) and south of Rainbow Dam Road. The ECDR was originally constructed in the 1960s and consists of a 35-acre dirt track that is used for both dirt bike and all-terrain vehicle riding and racing. The ECDR is within Cascade County and is zoned for industrial use.

Section CS 7: Summary of CSAOI Risk

Summary of Baseline Human Health Risks

The Community Soils Baseline HHRA focused on people living, working, and recreating within OU1 and their potential exposures to the COPCs in OU1 soil, dust, air, sediment and surface water. The HHRA presented estimates of typical and upper end risks for a hypothetical receptor exposed to environmental media in different areas within OU1 based on a range of reasonable exposure scenarios.

CS 7.1 Contaminants of Potential Concern

Metals that were assessed in the RI included: antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver and zinc.

Data from 295 soil samples collected at 70 residential properties during 2011 was statistically evaluated for comparison to risk-based screening levels to determine whether the measured concentrations of each metal of interest required further investigation. It was determined that arsenic and lead were COPCs for the Site but chromium and mercury as contaminants of interest (COIs) were unable to be eliminated based on the data available at that time.

A summary is included below on Table CS 7-1.

Within the data used for the initial COPC determination, total chromium concentrations were all well below the risk-based screening level for total chromium. The maximum measured total chromium concentration in this dataset was 50.6 mg/kg, and the risk-based screening level for total chromium is 120,000 mg/kg. However, all the total chromium concentrations exceeded the much lower risk-based screening level of 0.29 mg/kg for hexavalent chromium. Additional sampling and analysis for total and hexavalent chromium was subsequently conducted on 105 soil samples. The results of this analysis indicated that hexavalent chromium could be eliminated as a Site COPC. Additional information regarding hexavalent chromium in OU1 soil is available in the AR OU1 RI Report (Formation, 2015).

Mercury analysis was done on 371 samples, and the resulting data was used to determine that mercury need not be retained as a COPC for OU1. For additional information on mercury concentrations in OU1 soil, refer to AR OU1 RI Report (Formation, 2015).

For this ROD, arsenic and lead are the only COIs retained as COPCs based on Site-specific risk calculations for residential and recreational exposure scenarios.

CS 7.2 Identification of Media of Concern

Based on Site characterization, exposures to lead and arsenic in soils and soil-derived dust are the primary contributors to risks estimated for people living, working and recreating in the CSAOI. Exposure to attic dust, sediment and surface water were minor contributors to overall risks estimated for all receptor groups, including residents. The estimated risk from exposure to arsenic and lead in attic dust did not exceed levels of potential concern. Based on this supplemental analysis, attic dust is not a media of potential concern.

The contribution of indoor dust to residential risk was included when evaluating cleanup levels for soil. It was determined that residential cleanups of exterior soil in accordance with the selected remedy will sufficiently reduce exposure so that interior cleanups are not necessary to ensure the protectiveness of the remedy.

During planning for the Baseline HHRA, the groundwater exposure pathway was evaluated and determined to be incomplete for the CSAOI based on consideration of available groundwater data and other information suggesting groundwater is not used for drinking water within the OU1 boundaries.

Table CS 7-1 Summary Statistics for Concentrations of Contaminants of Interest in Residential Soil and Comparison to Risk-Based Screening Levels

Summary Statistics	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Nickel	Selenium	Silver	Zinc
	Concentrations in mg/kg (dw)												
N (number of samples)	295	295	295	295	295	295	295	295	295	295	295	295	295
Minimum	0.38	16.2	0.52	8.3	3.3	40	8,020	3.6	176	9	0.48	<0.38	90.8
Maximum	14.2	398	129	50.6	20.1	2,600	44,600	2,150	3,200	73.6	4.9	24.2	18,100
Median	1.5	39.8	7.2	25.1	9.2	246	23,400	330	516	23.9	1.6	1.7	1,370
Mean	1.75	47.2	12.5	24.9	9.2	277	23,787	364	575	24.8	1.8	2.1	2,056
Standard Deviation	1.15	30.9	15	6.7	2.6	197	5,037	262	318	9.1	0.6	1.9	2,126
Data distribution type	not normal	not normal	log normal	not normal	not normal	not normal	not normal	not normal	not normal	log normal	log normal	not normal	log normal
99th percentile	6	201	72.3	48.1	19.6	991	38,000	1,170	2,330	64.3	3.8	7	10,800
95LCL on percentile [1]	4.4	**114**	63	**39**	15	675	35,800	**948**	1,380	48.8	3.6	6.6	9,660
Risk Based Screening Level (residential soil) [2]	31	0.39	70	Cr(III) 120,000 [3] Cr(VI) 0.29	23	3,100	55,000	400	1,800	1,500	390	390	23,000

Notes:

[1] For data sets with "not normal" distribution type, the 99th percentile and lower confidence limit (95LCL) on the percentile were determined as the 293rd ranked and 289th ranked values, respectively. For data sets with log normal distributions (Cd, Ni, Se, Zn), the 95LCL was computed based on distribution assumptions. 95LCL values for arsenic, chromium, and lead are above the RBSLs.

[2] EPA Regional Screening Levels for Residential Soil (refer to http://www.epa.gov/region9/superfund/prg/)

[3] Total chromium concentrations were measured in soil. Trivalent chromium [Cr(III)] has an RBSL of 120,000 mg/kg, and hexavalent chromium [Cr(VI)] has RBSLs of 0.29 mg/kg based on carcinogenic risks and 230 mg/kg based on non-cancer hazards.

Given these findings, the environmental condition to be addressed by the remedy is soil in areas of CSAOI. No actions are needed to address arsenic and lead in other environmental media in CSAOI (i.e., surface water, sediment, groundwater, or attic dust).

CS 7.3 Exposure Scenarios

The Baseline HHRA included quantitative evaluation of the following potential receptors and potential exposure scenarios:

- A resident (child/adult) within the CSAOIs exposed to arsenic and lead from residential soils (0 to 6 inches), indoor dust originating from residential surface soils (0 to 2 inches), and dust from community-wide surface soils (0 to 2 inches). The resident was also assumed to be exposed to arsenic in surface water and sediment from the Black Eagle drainage, and arsenic and lead in attic dust (adult only)
- A resident (child/adult) within the Southern Outlying Area (Great Falls) exposed to arsenic and lead in residential surface soils, indoor dust originating from residential surface soils, and dust from community-wide surface soils
- An outdoor worker within the CSAOIs and the Northern Outlying Area exposed to arsenic and lead primarily in non-residential surface soils and surface soil-derived dust
- A utility worker within the CSAOIs and the Northern Outlying Area exposed to arsenic and lead in non-residential surface and subsurface soils and soil-derived dust
- An indoor worker within the CSAOIs and the Northern Outlying Area exposed to arsenic and lead in indoor dust within a commercial building that originates from non-residential surface soil
- An all-terrain vehicle (ATV)/dirt bike) rider exposed to arsenic and lead in ECDR surface and subsurface soils (0 to 18 inch depth interval) and soil-derived dust and arsenic in sediment and sediment-derived dust from the ECDR drainage.

For arsenic exposure, pathway-specific intake estimates were combined with toxicity information to characterize arsenic risks. Equations for estimating arsenic intake as an average daily dose for non-cancer endpoints or lifetime average daily dose for the cancer endpoint were based on the EPA's *Risk Assessment Guidance for Superfund (RAGS)* (EPA, 1989).

For residential lead exposure, the EPA's Integrated Exposure, Uptake, and Biokinetic (IEUBK) model was used to evaluate lead risks for children and to predict the risk, as a probability, that a young child (0 to 6 years of age) will have a blood lead level greater than 10 micrograms per deciliter (µg/dL) when exposed to a combination of lead concentrations in specific media (EPA, 2002). For non-residential lead exposure, the EPA's Adult Lead Methodology (ALM) was used to assess risks to the fetus of a worker exposed to lead and to estimate the probability that non-residential exposures to lead by an outdoor worker, indoor worker, utility worker, and ATV/dirt bike rider will increase fetal blood lead above 10 µg/dL.

CS 7.4 Development of Risk-Based Preliminary Remediation Goals

A range of risk-based preliminary remediation goals (PRGs) for arsenic and lead in residential and non-residential soil were developed and presented in the Baseline HHRA. For arsenic in soil, PRGs were calculated for each exposure scenario for different risk levels within the EPA's target risk range for the cancer endpoint (1E-06 to 1E-04) and also based on a hazard index of 1 for non-cancer effects. For lead in soil, both IEUBK-model default and alternate soil intake rate assumptions were used to calculate PRGs for a child. The PRGs were also calculated for lead in soil for the other exposure scenarios. The arsenic cancer risk estimates corresponding to all receptor groups' exposures to attic dust, sediment and surface water were less than 1E-06, the low end of the EPA's target risk range; therefore, PRGs were not developed for those media in the Baseline HHRA.

Arsenic PRGs - Residential soil PRGs for arsenic account for a resident's incidental ingestion of surface soil (0 to 6 inches) and surface-soil-derived, indoor dust, as well as inhalation of windblown soil particulate resuspended in air. Non-residential soil arsenic PRGs were calculated for soil-derived exposure pathways specific to each exposure scenario/receptor. For the outdoor worker, utility worker, and ATV/dirt bike rider receptors, PRGs included incidental ingestion of soil and inhalation of re-suspended soil particulate in air. For the indoor worker, the PRG was calculated based on incidental ingestion of soil-derived indoor dust in commercial buildings.

Soil arsenic PRGs presented in the Baseline HHRA for the cancer risk range of 1 in 1,000,000 to 1 in 10,000 (1E-06 to 1E-04) and non-cancer hazard quotient of 1 are presented in Table CS 7-2.

Table CS 7-2 Arsenic Soil Preliminary Remediation Goals

Exposure Scenario	Arsenic Preliminary Remediation Goals (mg/kg)			
	Risk = 1E-06	Risk = 1E-05	Risk = 1E-04	HQ=1
Resident - OU1 Soil	4	36	360	175
Outdoor Worker - OU1 Soil	12	120	1,204	1,566
Utility Worker - OU1 Soil	767	7,670	76,697	1,312
Indoor Worker - OU1 Soil	58	577	5,772	9,276
All-Terrain Vehicle/Dirt Bike Rider - Electric City Dirt Riders Soil	20	200	1,996	979

Note:
HQ Hazard quotient

Lead PRGs - Residential soil lead PRGs presented in the Baseline HHRA were based on the probability that no more than 5 percent of exposed children or an exposed fetus will have a blood lead level that exceeds 10 µg/dL. Residential and non-residential soil lead PRGs were developed using the same model inputs and assumptions used to estimate corresponding lead risks in the Baseline HHRA.

Soil lead PRGs presented in the Baseline HHRA included:

- Child Resident (alternate soil intake rate) – 768 ppm lead
- Child Resident (default soil intake rate) – 500 ppm lead
- Outdoor Worker – 1,766 ppm lead
- Indoor Worker – 3,172 ppm lead
- ATV/Dirt Bike Rider – 3,087 ppm lead

CS 7.5 Identification of Areas of Concern

Areas of Concern are the locations within CSAOI where, based on current zoning and reasonably anticipated future land use of the property, soil concentrations for arsenic or lead are greater than either the lead or arsenic PRG. Areas of Concern include the Southern and Northern CSAOIs and the eastern portion of the Northern Outlying Area, as shown on Figures 7-1 through 7-4. Based on the Supplemental Risk Evaluation of existing residences within the Southern Outlying Area, none of the properties have a lead or arsenic risk that exceeds the PRGs. In addition, the Southern Outlying Area is predominantly upwind of the ACM smelter and refinery, and therefore, it is unlikely that arsenic and lead concentrations in the Southern Outlying Area are due to releases from the former smelter/refinery operation. For these reasons, the Southern Outlying Area is not included as an Area of Concern.

Based on available soil data for lead and arsenic in the Northern Outlying Areas, property-specific risks for outdoor or indoor workers exposed to surface soil do not exceed the PRGs. The Northern Outlying Area is currently zoned for industrial use, but current land uses are distinct in the western and eastern portions of the Northern Outlying Area. The western portion of the Northern Outlying Area is currently developed for industrial and commercial land uses. The few undeveloped properties in this area are owned by the City of Great Falls and Cascade County. Because existing development within the western portion of the Northern Outlying Area is consistent with the zoned land uses, future changes in land use are not reasonably anticipated. In contrast, the current land use in the eastern portion of the Northern Outlying Area is predominantly agricultural. Two exceptions include: (1) a large parcel owned by the City of Great Falls, which is the location of a former city landfill, now closed; and (2) a property owned by ECDR, which is currently used for recreation. Future land use is not reasonably anticipated to change at these two properties.

Figure CS 7-1 – Southern Community Soils Area of Interest PRG Exceedances

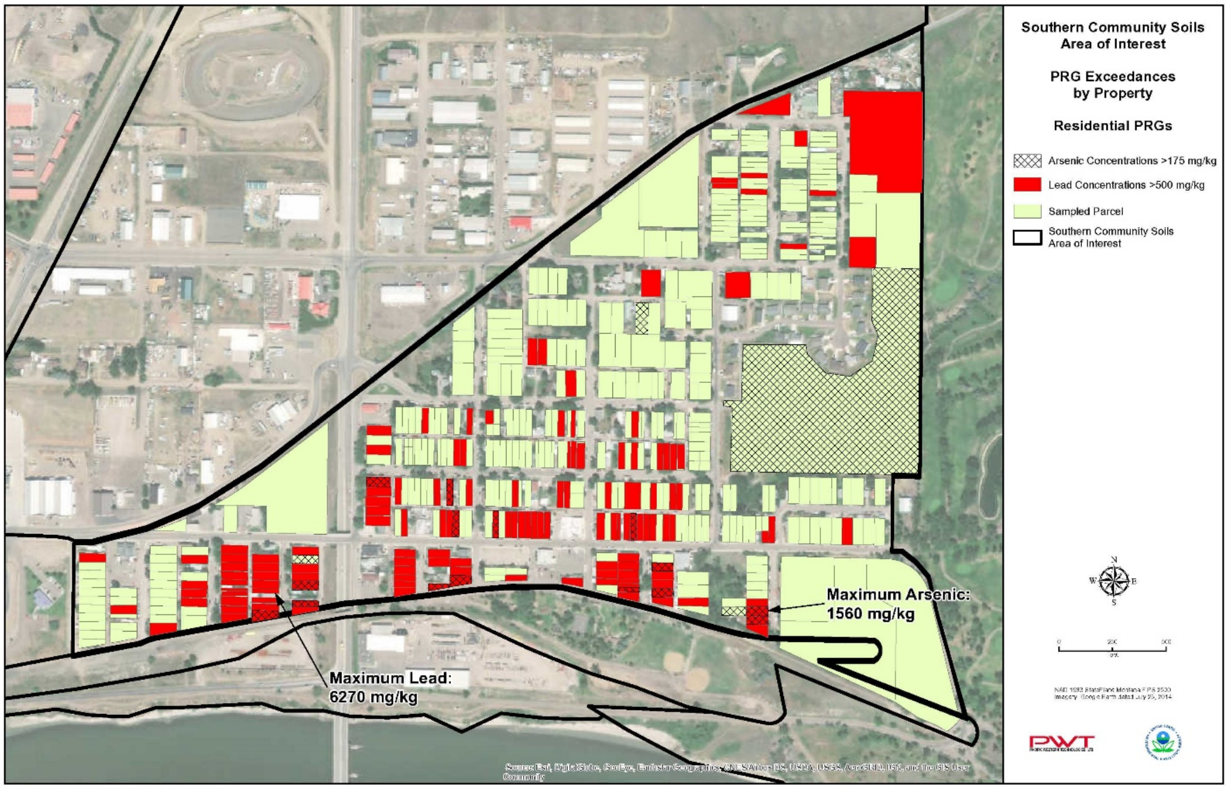


Figure CS 7-2 – Northern Community Soils Area of Interest PRG Exceedances

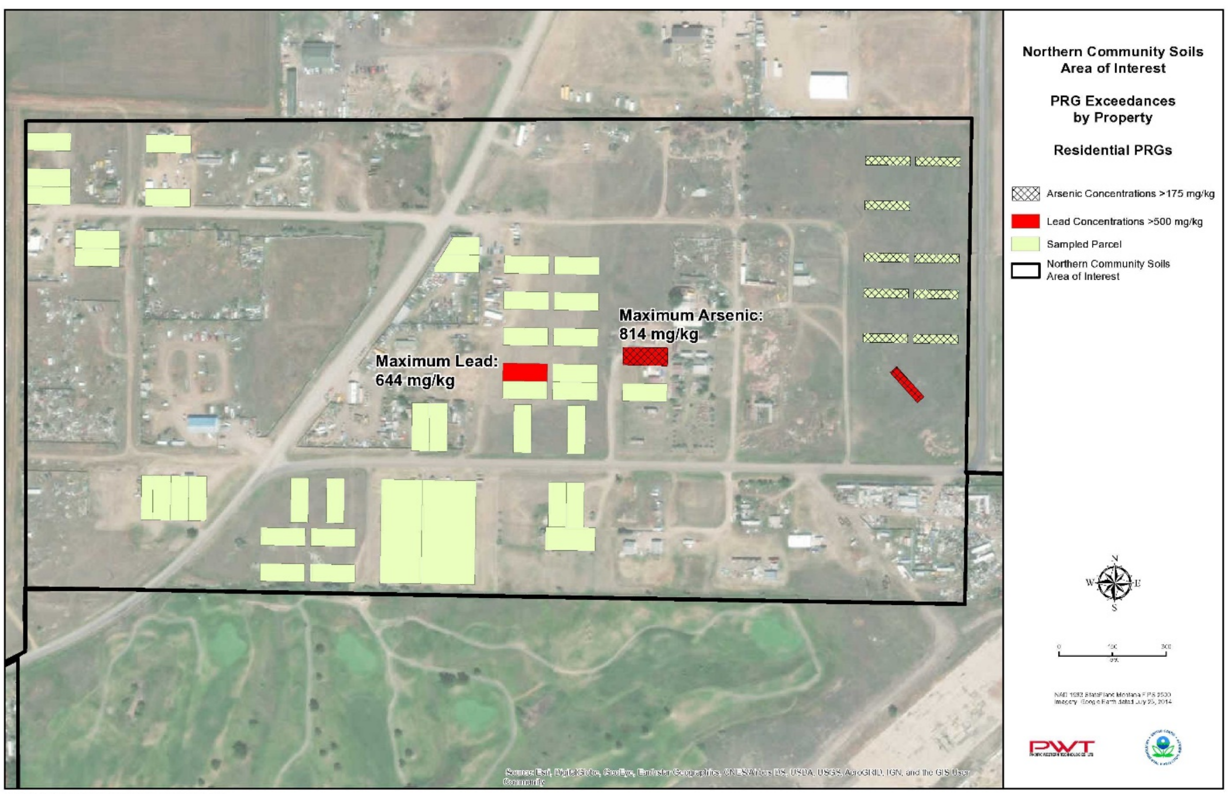


Figure CS 7-3 – Northern Outlying Area of Interest PRG Exceedances

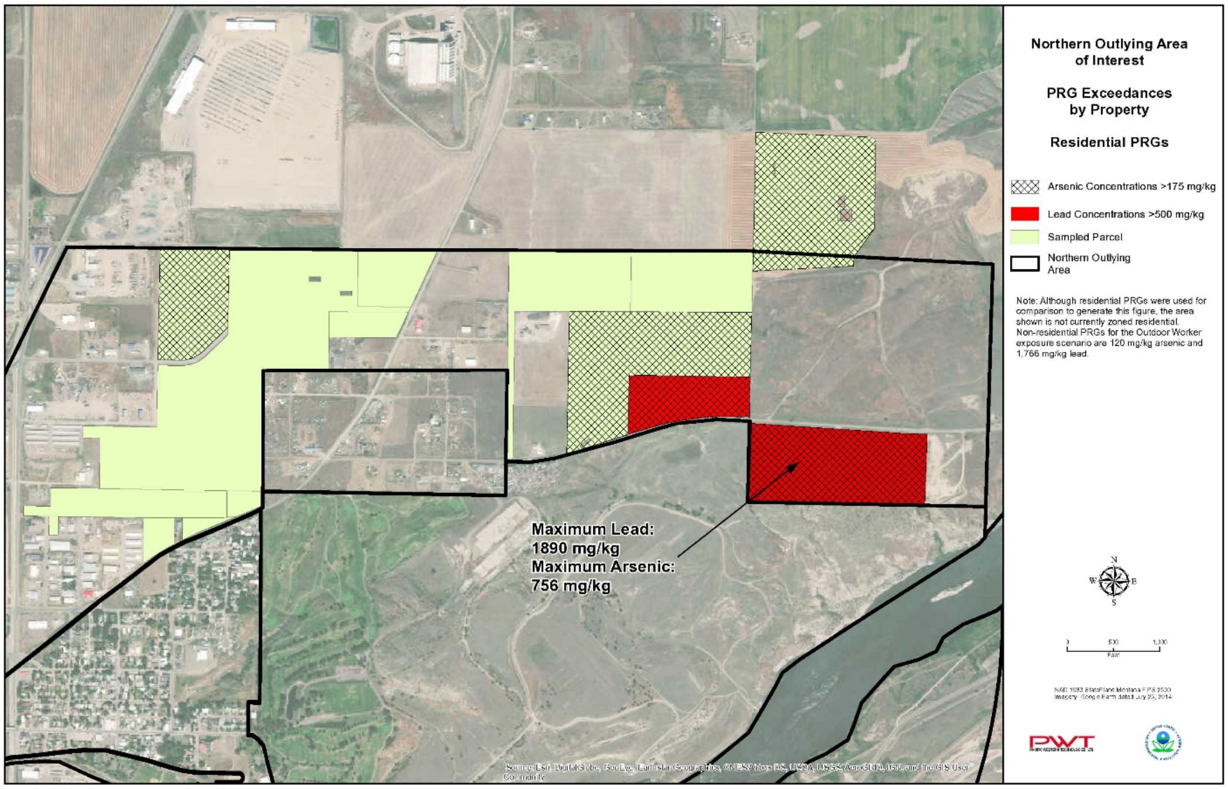
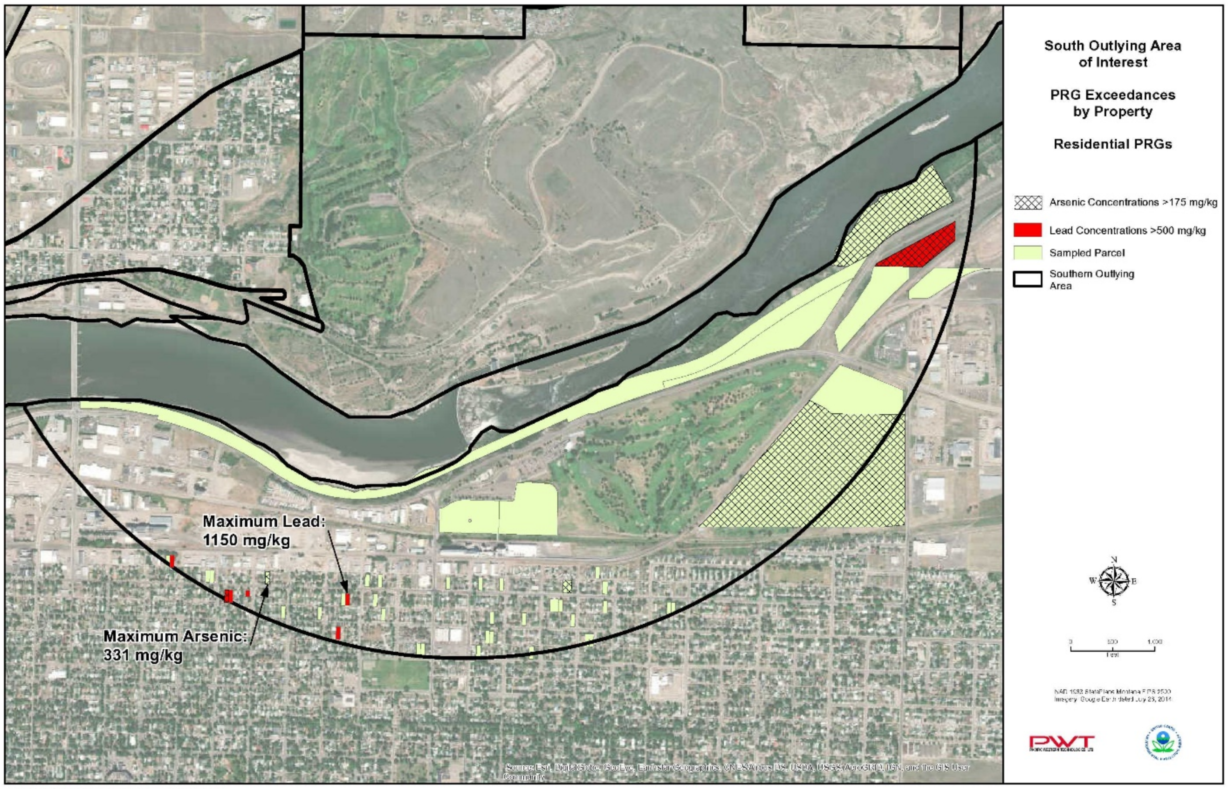


Figure CS 7-4 – Southern Outlying Area of Interest PRG Exceedances



The eastern and western portions of the Northern Outlying Area are also distinct with respect to the distribution of arsenic and lead in soil within these areas. Arsenic and lead concentrations are relatively low in the western portion of the Northern Outlying Area compared to the eastern portion of the Northern Outlying Area. This is likely due to the eastern portion of the Northern Outlying Area being predominantly in the upwind direction from the former smelter/refinery. None of the sampled properties in the western portion of the Northern Outlying Area had arsenic or lead concentrations in soil representing risks greater than the PRGs for existing uses (i.e., potential worker exposures), and as noted above, future changes in land use are not anticipated in this area. For these reasons, the western portion of the Northern Outlying Area has been excluded from the Areas of Concern.

The southernmost portion of the Northern Outlying Area located between the former railroad bed and the Missouri River overlaps with the Railroad Corridor subarea of OU1 as shown on Figure 7-1. Arsenic and lead concentrations in this portion of the Northern Outlying Area are relatively low outside of the Railroad Corridor subarea of OU1. In addition, the majority of this area is currently commercially developed including buildings, parking lots, and other surface features which limit exposure to arsenic and lead in the soil. Therefore, this portion of the Northern Outlying Area is not included in the Areas of Concern as shown on Figure 7-3.

CS 7.6 Ecological Risks

The evaluation of ecological risks for OU1 has not been completed. This evaluation was deferred to the OU2 remedial investigation and will be considered in conjunction with the OU2 Screening Level Ecological Risk Assessment and Baseline Ecological Risk Assessment.

CS 7.7 Basis of Action

Based on the exceedance of arsenic and lead PRGs, the response actions selected in this ROD are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Section CS 8: Community Soils Remedial Action Objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs)

Section 300.430(e) of the 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires that the remedial alternative development process be initiated by developing RAOs, identifying general response actions (GRAs) that address the RAOs, and performing an initial screening of applicable remedial technologies. The overarching goal of the remedy evaluation process is to provide the basis for selecting a remedy that is protective of human health and the environment, and also addresses applicable or relevant and appropriate requirements (ARARs). This section provides the RAOs, identifies the media and Areas of Concern, and summarizes ARARs for OU1 of the ACM Site.

CS 8.1 Remedial Action Objectives

Before developing cleanup alternatives for a site, the EPA establishes RAOs to protect human health and the environment. RAOs are based on available information and standards, such as ARARs, to-be considered (TBC) guidance and Site-specific risk-based levels. The EPA used 1 in 100,000 cancer risk as the point of departure determining RAOs for arsenic because 1 in 1,000,000 is below background.

CS 8.1.1 Community Soils RAOs

RAOs for soil contamination at residential properties in the Northern and Southern Community Soils Areas of Interest were developed to attain a degree of cleanup that ensures the protection of human health and the environment to:

- Achieve an excess cancer risk no greater than 1 in 100,000 or non-cancer hazard index no greater than 1, whichever is more stringent
- Achieve a probability of less than 5 percent that an individual child would have a blood lead level exceeding 5 µg/dL.

These protective RAOs were selected for soil in consideration of other contributions of Site risk (i.e., interior and attic dust, and the minor contributions from surface water and sediment), uncertainties with data collection and risk assumptions, and the potential contributions of contamination from adjacent non-Site industrial sources and lead paint.

CS 8.1.2 Proposed Cleanup Levels for Residential Soils

To achieve the RAOs, the EPA has selected as cleanup levels for residential soils within the Southern and Northern Community Soil Areas of Interest. The following levels apply to the average concentration for a residential property.

- 54 mg/kg Arsenic
- 281 mg/kg Lead

Section CS 9: Description of Alternatives for Community Soils

The primary actions for the CSAOIs are containment, physical treatment, removal, and ICs to minimize contact with contaminated soil and soil-derived dust. Three remedial alternatives have been assembled by combining technologies and process options retained after the initial evaluation for effectiveness, implementability and cost.

The No Action alternative will also be evaluated as required by the NCP.

The alternatives include:

- Alternative 1 – No Action
- Alternative 2 – Soil Removal and Replacement (Risk-Based Remedial Approach)
- Alternative 3 – Soil Removal and Replacement (Area-Weighted Average Arsenic/Lead Handbook Remedial Approach)
- Alternative 4 – Soil Removal and Replacement (Component-Specific Not to Exceed/Risk-Based Remedial Approach).

The alternatives are summarized in Table CS 9-1.

Table CS 9-1 Alternatives Retained for Detailed Analysis Summary

		Alternative 2 Soil Removal and Replacement (Risk-Based Remedial Approach)		Alternative 3 Soil Removal and Replacement (Area-Weighted-Average Arsenic / Lead Handbook Remedial Approach)		Alternative 4 Soil Removal and Replacement (Component-Specific Not to Exceed / Risk-Based Remedial Approach)	
		Residential	**Non-Residential**	**Residential**	**Non-Residential**	**Residential**	**Non-Residential**
Remedial Action (RA)	**Approach to Meet Remedial Action Objectives (RAOs)**	Step #1: RA based on property-specific, average, surface soil risk estimates that exceed the RAOs for the resident. Risks for each property would be assessed against the RAOs based on the average lead or arsenic concentration in the 0- to 6-inch depth interval for all yard components within the property. Step #2: At all properties, regardless of whether property-specific risks exceed one or more RAOs, an additional decision step would employ component-specific NTE soil concentrations for arsenic and lead to address concerns regarding potential exposures to "hot spot" concentrations in yard components up to the 18-inch depth interval within the property.	RA based on property-specific, average, surface soil (0- to 2-inch) risk estimates that exceed the RAOs for the worker scenario. In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds the RAOs to achieve unlimited use.	Arsenic: RA based on arsenic concentrations in soil computed using a property-wide, area-weighted average (AWA) concentration for each depth-interval. Lead: RA based on component-specific and depth-interval basis, consistent with guidance in the Lead Handbook.	Both arsenic and lead RA based on property-average concentration in the surface soil (0- to 2-inches below ground surface). In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds the RAOs to achieve unlimited use.	Step #1: RA would employ component-specific NTE soil concentrations for arsenic and lead to address concerns regarding potential exposures to "hot spot" concentrations in yard components up to the 18-inch depth interval within the property. Step #2: An additional decision step would employ RA based on property-specific, average, surface soil risk estimates that exceed the RAOs for the resident. Risks for each property would be assessed against the RAOs based on the average lead or arsenic concentration in the 0- to 6-inch depth interval for all yard components within the property following the NTE RA.	Step #1: RA based on subarea-specific NTEs for non-residential properties. Step #2: An additional decision step would employ RA based on property-specific, average, surface soil (0- to 2-inch) risk estimates that exceed the RAOs for the worker scenario following the NTE RA. In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds the RAOs to achieve unlimited use.
	RA Depths	RAO: 0- to 6-inch depth interval NTE: 0- to 18-inch depth interval Vegetable Garden Units: Removed on a depth-interval basis if RAOs or NTE screening results are exceeded to a maximum depth of 24 inches.	0- to 6-inch depth interval	0- to 12-inch depth interval Vegetable Garden Units: Removed on a depth-interval basis if RAOs are exceeded to a maximum depth of 24 inches.	0- to 6-inch depth interval	NTE: 0- to 18-inch depth interval RAO: 0- to 6-inch depth interval Vegetable Garden Units: Removed on a depth-interval basis if RAOs or NTE screening results are exceeded to a maximum depth of 24 inches.	0- to 6-inch depth interval
	RA Description	Remove and replace soil in the highest concentration yard component until the property-specific average surface soil risk no longer exceeds the RAOs. Or If the component-specific NTEs are exceeded by NTE screening results.	Soil tilling, soil cover, other cover type, and/or soil removal and replacement until the property-specific average, surface soil risk no longer exceeds the RAOs.	Remove and replace soil in each yard component on a component-specific and depth-interval basis for yard components with arsenic or lead concentrations exceeding the RAOs.	Soil tilling, soil cover, other cover type, and/or soil removal and replacement for the entire property if the property-average arsenic and/or lead concentration exceed the RAOs.	Remove and replace soil if the component-specific concentration of either arsenic or lead is greater than the relevant NTE concentration. or If the average surface soil risk still exceeds the RAOs following the NTE RA, remove the highest concentration yard component until the property-specific average surface soil risk no longer exceeds the RAOs.	Soil tilling, soil cover, other cover type, and/or soil removal and replacement if the component-specific NTEs are exceeded by the NTE screening results. or If the property-specific average, surface soil risk exceeds the RAOs for the protection of workers following the NTE RA.
	Arsenic RAO	Property-specific surface soil risk estimates exceed 1E-05 cancer risk for child and adult resident.	Surface soil risk estimates exceed 1E-05 cancer risk for adult worker. In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 1E-05 arsenic excess cancer risk.	PRG corresponding to a residential cancer risk of 1.44E-05 based on arsenic concentrations in soil computed using a property-wide, AWA concentration for each depth-interval.	PRG corresponding to an outdoor worker cancer risk of 1.44E-05 based on arsenic concentrations in soil computed using property-average concentration in the surface soil. In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 1.44E-05 arsenic excess cancer risk.	Property-specific surface soil risk estimates exceed 1E-05 cancer risk for child and adult resident.	Surface soil risk estimates exceed 1E-05 cancer risk for adult worker. In addition, ICs (and/or selective removal and replacement of surface soil or soil tilling at sample locations with the highest arsenic concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 1E-05 arsenic excess cancer risk.

		Alternative 2 Soil Removal and Replacement (Risk-Based Remedial Approach)		Alternative 3 Soil Removal and Replacement (Area-Weighted-Average Arsenic / Lead Handbook Remedial Approach)		Alternative 4 Soil Removal and Replacement (Component-Specific Not to Exceed / Risk-Based Remedial Approach)	
		Residential	**Non-Residential**	**Residential**	**Non-Residential**	**Residential**	**Non-Residential**
Remedial Action (RA)	**Lead RAO**	Greater than 5% probability that a 5 µg/dL blood lead level will be exceeded for child resident based on property-specific estimate.	Greater than 5% probability that 5 µg/dL blood lead level will be exceeded for the fetus of an adult worker. In addition, ICs (and/or selective removal and replacement of surface soil at sample locations with the highest lead concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 5% probability that a 5 µg/dL blood lead level will be exceeded for child resident.	PRG based on 8 µg/dL blood lead cutoff for the residential soil exposure scenario.	PRG based on 8 µg/dL blood lead cutoff for the outdoor worker soil exposure scenario. In addition, ICs (and/or selective removal and replacement of surface soil at sample locations with the highest lead concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 5% probability that a 8 µg/dL blood lead level will be exceeded for child resident.	Greater than 5% probability that a 5 µg/dL blood lead level will be exceeded for child resident based on property-specific estimate.	Greater than 5% probability that 5 µg/dL blood lead level will be exceeded for the fetus of an adult worker. In addition, ICs (and/or selective removal and replacement of surface soil at sample locations with the highest lead concentration) will be evaluated for properties not currently used for commercial purposes if the property-specific, 0- to 12-inch depth-weighted average risk estimate based on residential exposure assumptions exceeds a 5% probability that a 5 µg/dL blood lead level will be exceeded for child resident.
	Not to Exceed (NTE) Concentration	Arsenic: 797 mg/kg Lead: 800 mg/kg	Not included in alternative.	Not included in alternative.	Not included in alternative.	Arsenic: 250 mg/kg Lead: 400 mg/kg	Arsenic: 250 mg/kg Lead: 400 mg/kg
	NTE Screening Depth	Component-specific 0- to 2-inch or 2- to 6-inch depth intervals. Or Component-specific 0- to 12-inch and 0- to 18-inch depth-weighted average.	Not included in alternative.	Not included in alternative.	Not included in alternative.	Component-specific 0- to 2-inch, 2- to 6-inch, 6- to 12-inch, or 12- to 18-inch depth intervals. NTE screening does not include depth-weighted average evaluation.	Component-specific 0- to 2-inch depth intervals. NTE screening does not include depth-weighted average evaluation.
	NTE Action Depth	0- to 6-inch, 0- to 12-inch, or 0- to 18-inch depth interval dependent upon NTE screening results.	Not included in alternative.	Not included in alternative	Not included in alternative	0- to 6-inch, 0- to 12-inch, or 0- to 18-inch depth interval dependent upon NTE screening results.	0- to 6-inch dependent upon NTE screening results.
Risk Management	**Area of Concern (AOC)**	The AOC locations within OU1 where selected to address areas where the risk is greater than the RAOs using assumptions applied in the Baseline HHRA and Supplemental Risk Evaluation. The AOC was based on current zoning and reasonably anticipated future land use of the property. The AOC is the same for all alternatives.					
	Risk Management	ICs for educational purposes, to improve the overall effectiveness of the remedy, and to support a successful risk management for the Site by increasing overall public awareness.	ICs would complement the engineering controls and effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated changes in future land use.	ICs for educational purposes, to improve the overall effectiveness of the remedy, and to support a successful risk management for the Site by increasing overall public awareness.	ICs would complement the engineering controls and effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated changes in future land use.	ICs as an extra protective measure and to improve the overall effectiveness of the remedy.	ICs would complement the engineering controls and effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated changes in future land use.
	Institutional Controls	Alternative 2 and Alternative 3 could include one or more of the following ICs: • Public health program. • Support for Cascade-County run blood lead screening program. • Proprietary ICs, which may include restrictive covenants, conservation easements, or deed restrictions. • Deed restrictions to require proper handling of soil excavated in the future from beneath the clean replacement soil.				ICs are not required to address the RAOs, but one or more of the following ICs could be included as an extra protective measure(s): • Proprietary ICs, which may include restrictive covenants, conservation easements, or deed restrictions. • Deed restrictions to require proper handling of soil excavated in the future from beneath the clean replacement soil.	
	Unlimited Use	Achieved	Will be achieved if meets residential RAO. or Would be remediated based on 0- to 12-inch depth-weighted average for unlimited use.	Achieved	Will be achieved if meets residential RAO. or Would be remediated based on 0- to 12-inch depth-weighted average for unlimited use.	Achieved	Will be achieved if meets NTE screening results and residential RAO. or Would be remediated based on 0- to 12-inch depth-weighted average for unlimited use.

Table CS 9-2 Detailed Analysis of Remedial Alternatives Summary

	Alternative 1 No Action	**Alternative 2** Soil Removal and Replacement (Risk-Based Remedial Approach)	**Alternative 3** Soil Removal and Replacement (Area-Weighted Average Arsenic/Lead Handbook Remedial Approach)	**Alternative 4** Soil Removal and Replacement (Component-Specific Not to Exceed/Risk-Based Remedial Approach)
Additional Soil Sampling and Analysis				
Additional Soil Sampling and Data Analysis	Not Required	Additional soil sampling and data analysis as shown on Figure 5-1.	Additional soil sampling and data analysis as shown on Figure 5-1.	Additional soil sampling and data analyses as shown on Figure 5-1.
Residential Remedial Action				
Residential Properties with Remedial Action	0	61	144	174
Undeveloped Residential Properties with Remedial Action	0	10	11	10
Residential Soil Removal and Replacement (SF)	0	51,000	475,000	205,000
Open Area Remedial Action (AC)	0	11	12	11
Non-Residential Remedial Action				
Non-Residential Properties with Remedial Action	0	0	2	1
Open Area Remedial Action (AC)	0	0	27	12
Operation and Institutional Controls				
Institutional Controls	None	Educational and/or proprietary	Educational and/or proprietary	Proprietary
Cost Estimate (2017 dollars)				
Institutional Controls Capital Cost	$0	$200,000	$200,000	$100,000
Annual Institutional Controls Operating Cost	$0	$10,000	$10,000	$10,000
Remedial Alternative Capital Cost	$0	$754,000	$2,504,000	$1,745,000
Life-Cycle Cost Analysis (2017 dollars)				
Estimated Project Present Value, 50-Year LCCA (Low Range, -30%)	$0	$977,000	$2,204,000	$1,600,000
Estimated Project Present Value, 50-Year LCCA	**$0**	**$1,395,000**	**$3,148,000**	**$2,286,000**
Estimated Project Present Value, 50-Year LCCA (High Range, +50%)	$0	$2,093,000	$4,722,000	$3,429,000

Note:

For properties where insufficient data was available, the existing RI data was used for the detailed analysis and these areas may require additional data collection during the remedial design phase.

Section CS 10: Comparative Analysis of Community Soils Alternatives

Each individual remedial alternative is described and evaluated against the seven threshold and balancing criteria (Table CS 10-1) in accordance with EPA guidance (EPA, 1988).

Table CS 10 -1 Criteria for the Individual Analysis of Alternatives

Threshold Criteria		
1.	Overall Protection of Human Health and the Environment	Describes how the alternative achieves and maintains protection of human health and the environment.
2.	Compliance with ARARs	Describes how the alternative complies with ARARs, or if a waiver is required and how it is justified. The assessment also addresses other information from advisories, criteria, and guidance that the lead and support agencies have agreed is "to be considered."
Balancing Criteria		
3.	Long-term Effectiveness and Permanence	Evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met.
4.	Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluates the anticipated performance of the specific treatment technologies an alternative may employ.
5.	Short-term Effectiveness	Examines the effectiveness of alternatives in protecting human health and the environment during construction and implementation of a remedy until response objectives have been met.
6.	Implementability	Evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.
7.	Cost	Evaluates the capital and O&M costs of each alternative.
Modifying Criteria		
8.	State Acceptance	Reflects the state's apparent preferences among or concerns about alternatives.
9.	Community Acceptance	Reflects the community's apparent preferences among or concerns about alternatives.

Source: (EPA, 1988)

The comparative analysis evaluates the relative performance of the four remedial alternatives in relation to the NCP evaluation criteria. The relative performance of each remedial alternative is quantified using a score of 0 to 4. An alternative with a score of 4 is defined as fully meeting the criteria with a distinct advantage when compared to other alternatives while a score of 0 is defined as not attaining the criteria. Alternatives are scored between 0 and 4 relative to the other remedial alternatives. The relative performance of each remedial alternative is described in the following sections.

CS 10.1 Overall Protection of Human Health and the Environment

All the remedial alternatives, with the exception of Alternative 1 (No Action), are protective of human health and the environment. Alternative 1 (No Action) would not be protective of human health or the environment as it would leave soil with concentrations of arsenic and lead at levels that pose potential risks to human health and the environment. Alternative 2 (Risk-Based Remedial Approach), Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach), and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) address risks associated with arsenic and lead in soil by removing the exposure pathway and meet the RAOs for protectiveness of human health and the environment based on current land use as well as reasonably expected future land uses. These remedial alternatives meet the RAOs and are assigned a score of 4.

CS 10.2 Compliance with ARARs

All the remedial alternatives, with the exception of Alternative 1 (No Action), meet the State and Federal ARARs identified in Appendix A. For these reasons, Alternative 1 (No Action) is assigned a score of 0 while Alternative 2 (Risk-Based Remedial Approach), Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach), and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) are assigned a score of 4.

CS 10.3 Long-term Effectiveness and Permanence

Alternative 1 (No Action) does not include any remedial action or long-term management measures to improve the long-term effectiveness or permanence criterion. All soil removal and replacement remedial alternatives achieve the RAOs and meet the long-term effectiveness and permanence criterion. Alternative 2 and Alternative 3 (soil removal and replacement alternatives) are protective of human health and the environment and include ICs to effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated future land use with informational devices and proprietary ICs where required within the Areas of Concern. Whereas Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) does not rely on ICs to meet the RAOs and instead includes more extensive engineered controls with lower NTE concentrations and evaluation of the property-specific, depth-weighted average to manage future land use changes and residual site risks. For these reasons, Alternative 2 (Risk-Based Remedial Approach) and Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach) are given a score of 3 while Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) is given a slightly higher score of 4.

CS 10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the remedial alternatives use treatment to reduce toxicity, mobility, or volume of arsenic and lead contaminated soils. However, all of the remedial alternatives, with the exception of Alternative 1 (No Action), include removal of arsenic and lead contaminated soils with soil disposal at a soil management area located on-Site or soil re-use as fill at OU2. The soil disposal area would be designed and engineered to protect human health and nearby groundwater and surface water resources, which would reduce the mobility and exposure to arsenic and lead contaminated soils in the CSAOIs. No treatment of soil is included in any of the remedial alternatives, and therefore, none of the alternatives will attain the goal to reduce toxicity, mobility, or volume through treatment. For these reasons, Alternative 1 (No Action) is assigned a score of 0 while Alternative 2 (Risk-Based Remedial Approach), Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach), and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) are given a score of 4.

CS 10.5 Short-term Effectiveness

Standard engineered controls, including traffic control measures, dust suppression and selecting appropriate equipment are highly effective at reducing risks during implementation of the respective remedial actions. Alternative 1 (No Action) does not attain the criterion because it does not meet the RAOs and is therefore given a score of 0. It is anticipated that, subject to obtaining landowner access, all soil removal and replacement remedial alternatives can be implemented in a single construction season based on the relatively low number of properties requiring remedial action. Therefore, all soil removal and replacement alternatives are given a score of 4.

CS 10.6 Implementability

All the remedial alternatives are based on response actions that are technically feasible and have been successfully implemented at other similar NPL sites. The soil removal and replacement portion of the remaining alternatives are rated equivalent in respect to implementability. Alternative 2, Alternative 3, and Alternative 4 (soil removal and replacement remedial alternatives) require implementation of ICs, which would require additional coordination with local government in addition to the soil removal and replacement remedial action. Implementation of ICs is technically and administratively feasible, and similar ICs programs have been successfully implemented at other similar NPL sites. Because Alternative 1 (No Action) does not require any remedial action, this remedial alternative is assigned the highest score of 4. Because Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) is similar to remedies that have successfully been implemented at similar NPL sites and has fewer ICs, it is given a score of 3. Alternative 2 (Risk-Based Remedial Approach) and Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach) are rated lower and given a score of 2 because of the additional coordination required during the CERCLA process to implement their more extensive ICs program.

CS 10.7 Cost

The estimated capital cost for the Alternative 1 (No Action) is $0, and this remedial alternative is assigned the highest score of 4 for this reason. The estimated capital cost for Alternative 2 (Risk-Based Remedial Approach) is estimated to be less than Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach) and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach); however, all removal and replacement alternatives require a high initial capital cost. Because Alternative 2 (Risk-Based Remedial Approach) is estimated to have a lower cost to implement the alternative when compared to Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach) and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach), Alternative 2 (Risk-Based Remedial Approach) is rated slightly higher with a score of 3 while Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach) is given a score of 2 and Alternative 3 (Area-Weighted Average/Lead Handbook Remedial Approach) is given a score of 1.

CS 10.8 Summary

The relative performance of each remedial alternative is summarized in Table CS 10-2. The remedial alternatives with the highest rating, the sum of the NCP evaluation criteria scores, are Alternative 2 – Soil Removal and Replacement (Risk-Based Remedial Approach) and Alternative 4 (Component-Specific Not to Exceed/Risk-Based Remedial Approach). All soil removal and replacement alternatives meet the RAOs and are protective of human health; however, Alternative 2 (Risk-Based Remedial Approach) had a higher rating because it was estimated to be implemented at a lower cost and Alternative 4

(Component-Specific Not to Exceed/Risk-Based Remedial Approach) had a higher rating because it was estimated to be easier to implement.

Table CS 10 - 2 Comparative Analysis of Remedial Alternatives

NCP Criteria	**Alternative 1** No Action	**Alternative 2** Soil Removal and Replacement (Risk-Based Remedial Approach)	**Alternative 3** Soil Removal and Replacement (Area-Weighted Average Arsenic/Lead Handbook Remedial Approach)	**Alternative 4** Soil Removal and Replacement (Component Specific Not to Exceed/Risk-Based Remedial Approach)
Threshold Criteria				
Overall Protection of Human Health and the Environment	0	4	4	4
Compliance with ARARs	0	4	4	4
Balancing Criteria				
Long-term Effectiveness and Permanence	0	3	3	4
Reduction of Toxicity, Mobility, or Volume through Treatment	0	1	1	1
Short-term Effectiveness	0	4	4	4
Implementability	4	2	2	3
Cost	4	3	1	2
Comparative Analysis Rating	8	21	19	22
Comparative Analysis Rank	4	2	3	1

Section CS 11: Principal Threat Waste Versus Low Level Threat Waste

The NCP establishes an expectation that EPA will use treatment to address principal threats at a site wherever practicable (NCP 300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or will present a significant risk to human health if exposure occurs. Conversely, low level threat wastes are those source materials that generally can be reliably contained and present a low risk to human health in the event of exposure according to OSWER Publication 93803.3-06FS, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* (EPA, 1991). The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principle element is satisfied.

No threshold level of risk has been established to identify principal threat waste. A general rule of thumb is to consider as a principal threat those source materials with toxicity and mobility characteristics that combine to pose a risk several orders of magnitude greater than the risk level that is acceptable for the current or reasonably anticipated future land use, given realistic exposure scenarios (EPA, 1997).

The secondary source material identified at this Site is contaminated soil. Residential soils and soils of undeveloped lands became contaminated by releases and redistribution due to human disturbances associated primarily with operations of the former smelter/refinery. These source materials are neither highly toxic nor highly mobile, and do not pose a risk several orders of magnitude greater than acceptable risk levels. The contaminated soils are considered low level threat waste and do not constitute a principal threat waste.

Some residual concentrations of lead and arsenic remain in and around Black Eagle and some exceed health-based concentrations. These soils form the basis for the selected remedial action. These wastes, being neither highly mobile nor highly toxic, can be readily excavated and reliably contained within an engineered repository.

In summary, no principal threat wastes have been identified in OU1.

Section CS 12: Community Soils Selected Remedy

The selected remedy for achieving RAOs for residential properties with lead and arsenic contaminated soil is the Removal and Replacement alternative. EPA's preferred Removal and Replacement alternative from the FS is Alternative 4 with some modifications. Alternative 4 is protective of human health and the environment, meets ARARs and provides the best balance of criteria among other removal and replacement alternatives.

The selected remedy will remove and replace approximately 14,200 cubic yards of contaminated soils from 175 current residential properties in the Southern and Northern CSAOIs, and in the eastern portion of the Northern Outlying Area of Interest. Contaminated materials will be consolidated with similar waste within OU2 for remediation under OU2 or disposed of at a permitted off-Site facility. This ROD does not require remedial action in the Southern Outlying Area.

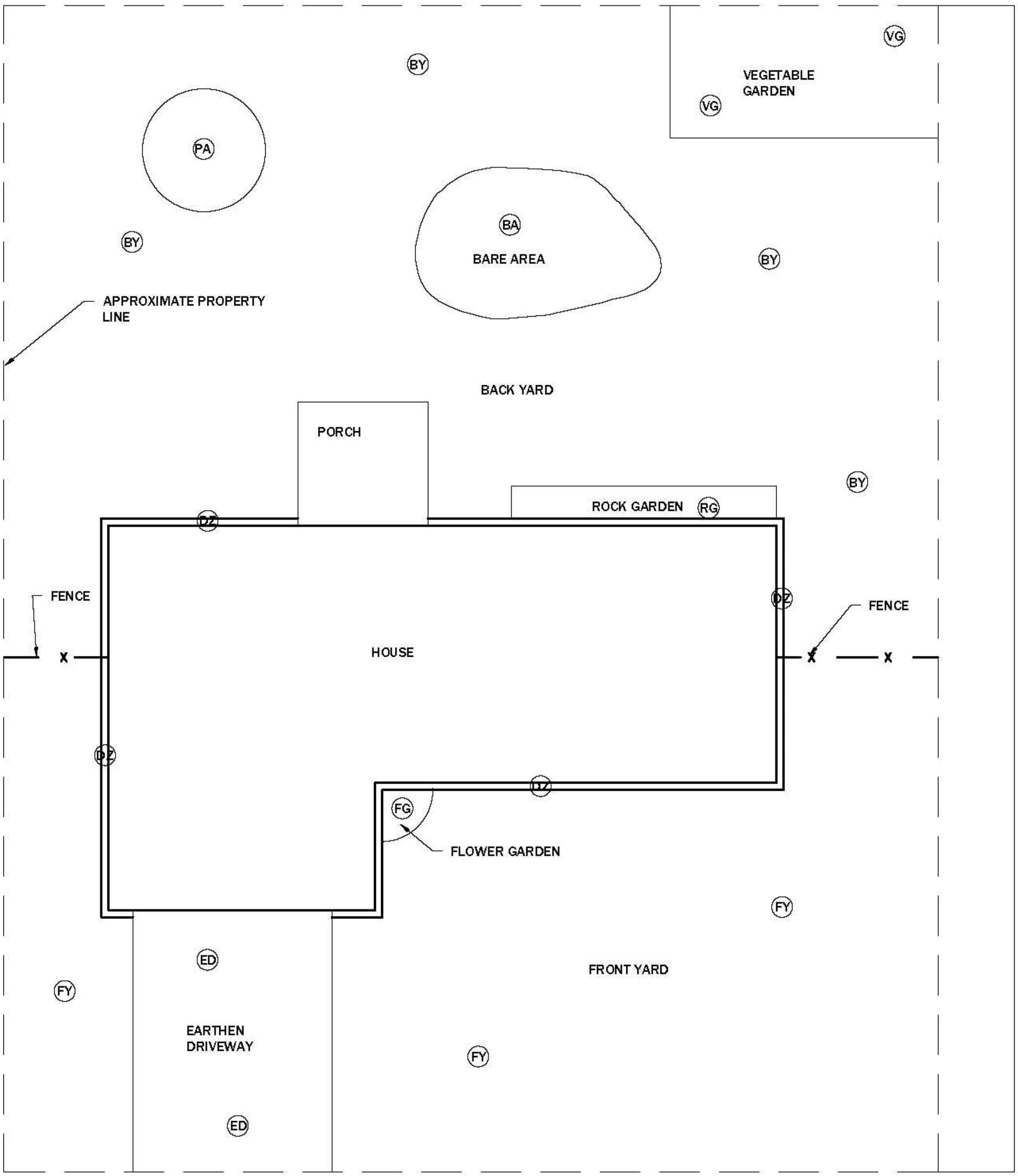
Alternative 4 - Soil Removal and Replacement (Component-Specific Not to Exceed/Risk-Based Remedial Approach)

The selected remedy uses a combination of a component-specific NTE and risk-based approach to address risks on a property-specific basis. In addition, ICs may be implemented to effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated future land use. The ICs for the Areas of Concern are intended to improve the overall effectiveness of the remedy and to support a successful risk management for the Site in the event of changes in current zoning or to address potential risks associated with properties for which no soil data are currently available.

CS 12.1 Residential Properties in the CSAOIs

For existing residential properties in the CSAOIs, as well as properties within the Areas of Concern that are zoned residential but currently undeveloped, a multi-step approach will be used to: 1) identify properties for remedial action; and 2) define the extent of soil removal at each of those properties. Several decision points would be associated with this multi-step, risk-based remedial approach. A typical yard component layout is shown on Figure CS 12-1 and the remedial action decision process for residential properties is described below and illustrated with the flow chart shown on Figure CS 12-2.

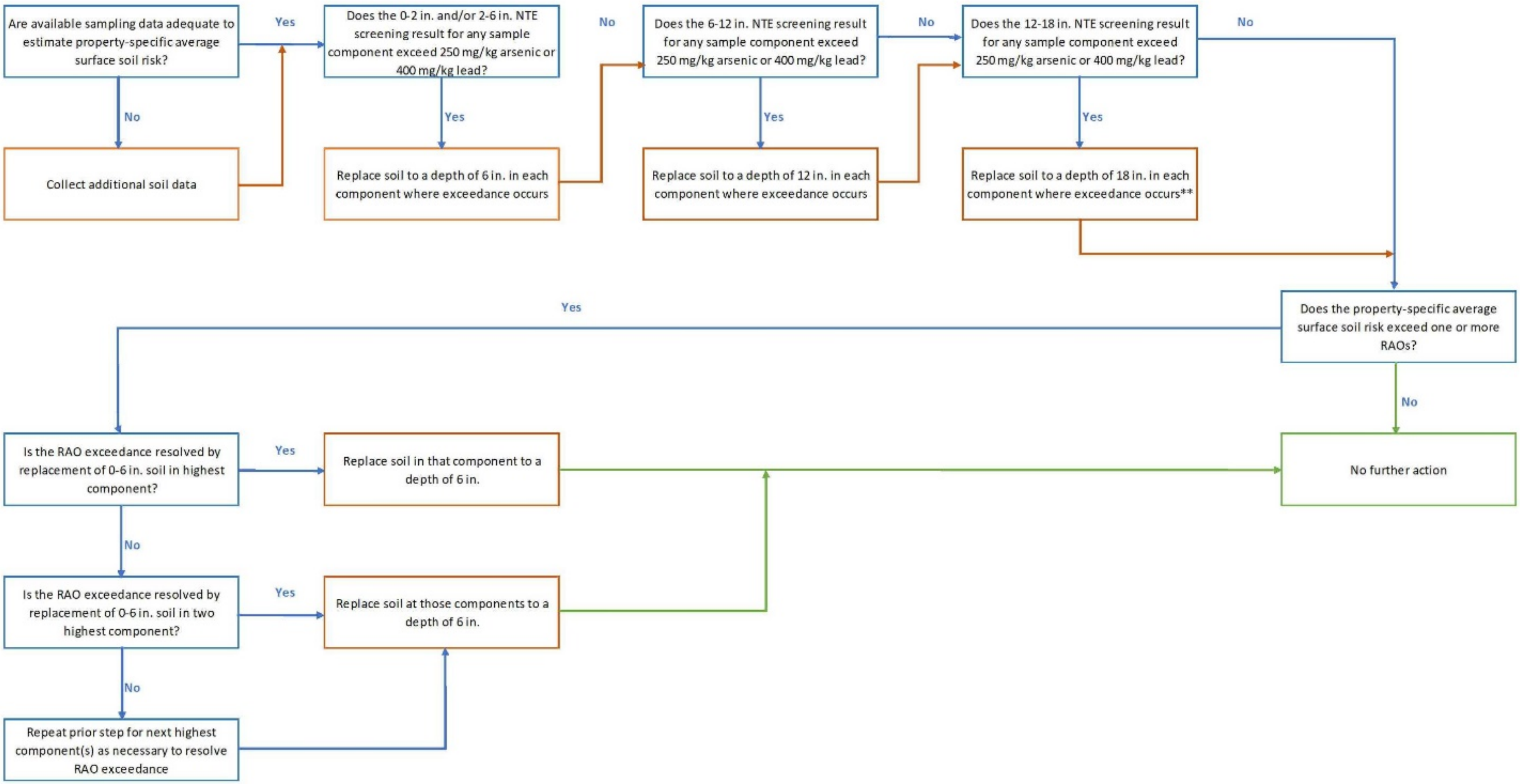
Figure CS 12-1 Typical Yard Component Diagram



LEGEND

FY	FRONT YARD SUBSAMPLE	RG	ROCK GARDEN SUBSAMPLE	ED	EARTHEN DRIVEWAY SUBSAMPLE
BY	BACK YARD SUBSAMPLE	VG	VEGETABLE GARDEN SUBSAMPLE	BA	BARE AREA SUBSAMPLE
FG	FLOWER GARDEN AREA SUBSAMPLE	PA	PLAY AREA SUBSAMPLE	DZ	ROOF DRIP ZONE SUBSAMPLE

Figure CS 12-2 Residential Remedial Action Decisions for As and Pb Component-Specific NTE/Risk-Based Approach



Notes:
RAO = Remedial Action Objective
NTE = Not to Exceed
in. = inch
**Vegetable Gardens will be removed on a depth interval basis if the RAOs or NTE are exceeded to a maximum depth of 24 inches.

Figure CS 12-2 assumes that soil data collected from the property are available for use in the process. At properties zoned residential, but currently undeveloped, available soil data may be limited and additional data would need to be collected prior to evaluating the property via this remedial action decision process. Note that the NTE step is applied to all residential properties regardless of the property risk.

- The initial decision step is to employ NTE soil concentrations for arsenic (NTE = 250 mg/kg[2]) and lead (NTE = 400 mg/kg[3]) to address concerns regarding potential exposures to "hot spot" concentrations in yard components of a property (including locations of current and future play areas and gardens) at any of the depth intervals up to 18 inches (24 inches in gardens). This element of the remedial action addresses deeper soil intervals and thereby eliminate the need for intensive ICs to manage future soil excavation that could result in exposure to these deeper soils. For example, a property could include 1 or 2-yard components that have distinctly higher arsenic and/or lead concentrations than the property-specific average concentration. If an NTE concentration is exceeded in any component based the arsenic or lead concentration, then the soil with the NTE exceedance(s) would be addressed by removing and replacing soil at that component to the depth necessary to eliminate the exceedance.
- The second decision step is to identify properties where, based on property-specific average, surface-soil risk estimates that exceed a 1E-05 arsenic excess cancer risk and/or have a greater than 5 percent probability that a 5 µg/dL blood lead level will be exceeded. Risks for each residential property would be assessed against the RAOs (54 mg/kg arsenic and 281 mg/kg lead) based on the average lead or arsenic concentration in the 0 to 6-inch depth interval for all yard components within the property following the NTE remedial action identified in the initial decision step.
- Property-specific risks that exceed RAOs would be subject to further evaluation, by yard component (e.g., front yard, back yard, earthen driveway). Possible yard components at a typical residential property are shown on Figure CS 12-1. If the RAO exceedance is resolved by removing and replacing surface soil in the yard component with the highest concentration of arsenic and/or lead, then no additional removal-replacement action would be necessary at that property. If the RAO exceedance is not resolved by removing and replacing soil in the highest concentration component, then the next highest yard component would be addressed by removing and replacing soil, and the same decision process, as described above, would continue until the property-specific average, surface-soil risk no longer exceeds RAOs (refer to Figure CS 12-2, above).

Implementing this alternative would consist of removing soil from residential yards that are identified as exceeding an NTE and/or not meeting the RAOs and thus posing unacceptable risks to residents. Soil in yard components that exceed NTE concentrations for arsenic and/or lead would be removed and replaced to a maximum depth of 18 inches (24 inches in gardens). Additionally, soil removal would occur to a depth of 6 inches in the highest yard component to address property-specific average, surface-soil risk estimates that exceed a 1E-05 arsenic excess cancer risk and/or have a greater than 5 percent probability that a 5 µg/dL blood lead level will be exceeded. Excavated soil would be consolidated with

---

[2] Arsenic NTE – Based on the Site-specific exposure assumptions used in the Baseline HHRA, this value corresponds to an arsenic cancer risk of 5E-05, which is higher than the highest risk reported in the Baseline HHRA and more conservative than the arsenic RAO for this Site.

[3] Lead NTE – Based on the Site-specific exposure assumptions used in the Baseline HHRA, this value corresponds to a predicted child geometric mean blood lead of 2.9 µg/dL and a 1.5% probability that a blood lead would exceed 8 µg/dL.

similar materials at OU2. The consolidated materials would be addressed in the OU2 remedy. Soil could also be disposed off-Site.

For residential properties where soil removal is conducted to address risk levels that exceed the RAOs (or NTEs), clean soil, with arsenic and lead concentrations that would not result in exceedance of the RAOs (or NTEs), would be used to replace the excavated soil. Implementing this alternative would require identifying a source of clean soil for fill. The replacement soil at each property would be graded to restore near original elevations and to blend with surrounding and undisturbed ground. The clean soil would be revegetated either by seeding or through the addition of sod to restore grass lawn areas; other landscaping materials would also be re-installed or replaced to restore the property to pre-removal condition.

CS 12.2 Non-Residential Properties

Non-residential properties in the Northern Outlying Area would be identified for remedial action based on whether the property-specific average soil concentration, in the top 6 inches, is below risk-based action levels for the current non-residential land use. The property-specific average soil concentration exceeds risk-based action levels, then soils shall be remediated to achieve the risk-based action levels for current non-residential land use in the top 6 inches.

- To address exposure associated with future zoning changes from commercial/industrial to residential, one of the following must be completed:
    - Confirm that the property-specific 0-12-inch depth-weighted average soil concentration meets the remedial action objectives (RAOs) for residential soils; or
    - Place ICs on the property such as restricting future residential use or providing for additional remediation at the time of residential redevelopment; or
    - Remediate soils to further reduce soil concentrations to achieve a property average concentration in the top 12 inches that meets the remedial action objectives (RAOs) for residential soils.

CS 12.3 Institutional Controls (ICs)

The extensive engineering controls that would be implemented as part of this alternative are expected to be effective in achieving the RAOs at most locations within the Areas of Concern (CSAOIs and Northern Outlying Area). However, ICs may be implemented to complement the engineering controls and to effectively manage residual Site risks associated with changes in current zoning and reasonably anticipated changes to future land use. The ICs are included to improve the overall effectiveness of the remedy and to support a successful risk management for the Site in the event of changes in current zoning. For example, ICs for the Areas of Concern may include the following:

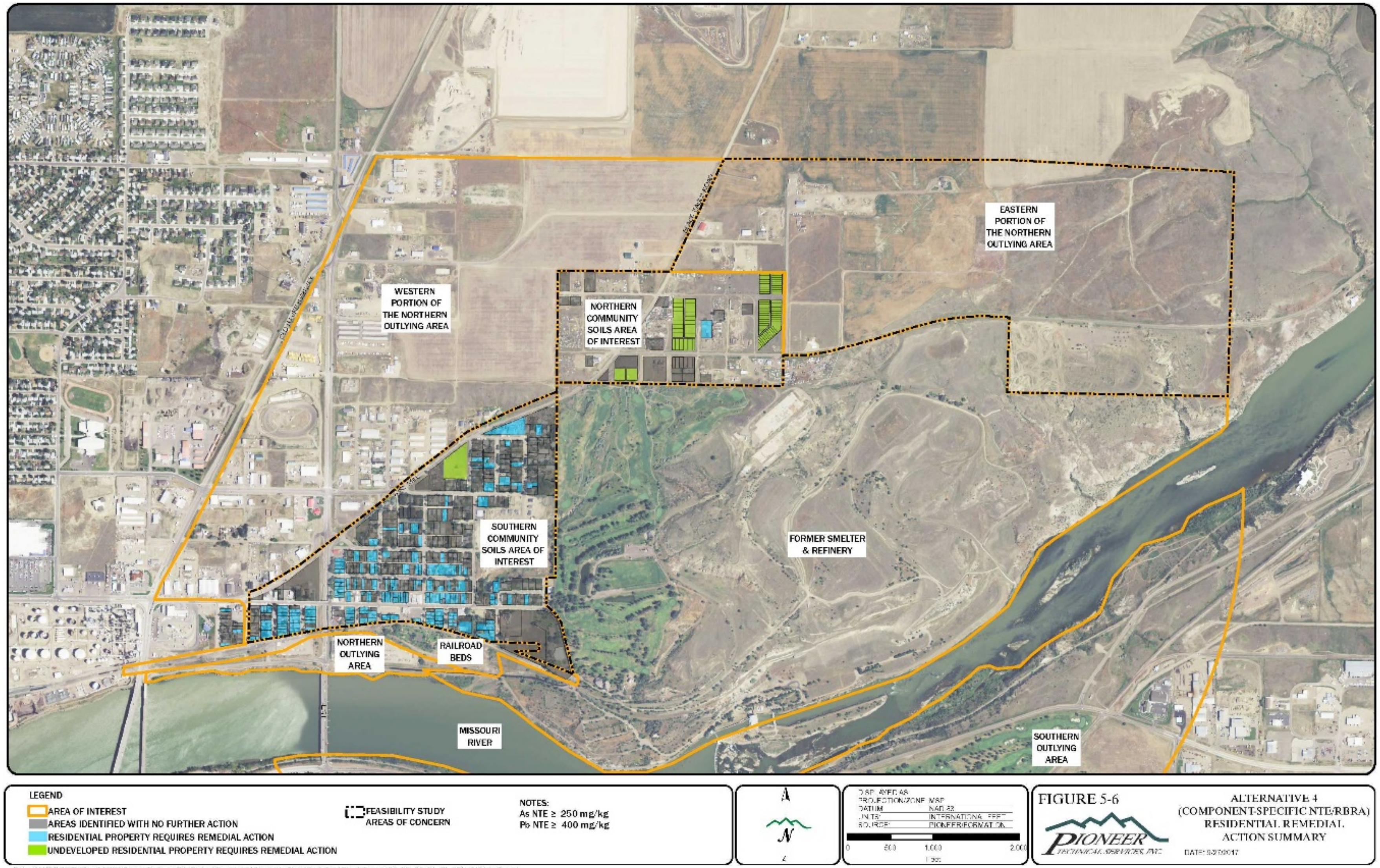
- Proprietary ICs, which may include restrictive covenants, conservation easements, or deed restrictions, that prohibit or restrict future residential land use at non-residential properties where soil arsenic and/or lead concentrations would not achieve the RAOs.
- Deed restrictions to require proper handling of soil excavated in the future from beneath the clean replacement soil (e.g., excavation of a foundation for a new home or garage).

The selected remedy results in remedial action at approximately 174 residential properties as shown on Figure CS 12-4. Non-residential properties that are not currently developed and existing data are insufficient to calculate a property-specific risk estimate that can be evaluated against the RAOs; therefore, these properties will be assessed during the remedial design phase and potentially remediated.

It was estimated that implementing the selected remedy will include removing and replacing approximately 14,200 cubic yards of soil and remediating 23 acres of impacted soil to address the risks associated with arsenic and lead in soil. Further evaluation of the appropriate extent of removal and regrading, reclamation, revegetation requirements, and disposal would be completed during remedial design.

The estimated capital cost for the remedial action is $1,745,000 and the estimated ICs capital cost is $100,000. The annual operating costs are estimated at $10,000 per year for the ICs. The estimated present worth of the remedial alternative and ICs over 50 years at a 0.5% discount rate is $2,286,000 with an expected accuracy of -30 percent to +50 percent in accordance with EPA guidance (EPA, 2000).

Figure CS 12-3 Component-Specific NTE/Risk Based Approach Residential Remedial Action Summary



Section CS 13: Community Soils Statutory Determinations

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions to the extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principle element and a bias against off-Site disposal of untreated wastes.

The selected remedy satisfies the statutory requirements of CERCLA (EPA, 1980), notably Section 121, subsection (b), and:

- Is protective of human health and the environment;
- Complies with ARARs;
- Is cost-effective;
- Utilizes permanent solutions and alternative technologies to the maximum extent practicable.

Protection of Human Health and the Environment – The selected remedy, through soil removal and replacement, addresses risks associated with arsenic and lead in soil by removing the exposure pathway. The selected remedy is protective of human health and the environment by targeting residential properties with hotspots that exceed Site-specific NTE concentrations for arsenic and lead and/or surface soils that exceed the RAOs based on risk and by removing contaminated soil that poses risks to human health. The selected remedy is protective of human health and the environment by reducing or eliminating exposure to soils and reducing soil-derived dusts containing lead and/or arsenic above the RAOs.

Compliance with ARARs – The selected remedy meets all State and Federal ARARs identified in Appendix A, in particular those associated with disposal requirements.

Cost Effectiveness – The selected remedy is cost effective as cost is reasonable in achieving a high degree of protectiveness. The estimated capital cost for the remedial action is $1,745,000 and the estimated ICs capital cost is $100,000. The annual operating costs are estimated at $10,000 per year for the ICs.

Utilization of Permanent Solutions – The selected remedy provides a permanent solution for current and future residential properties by reducing exposure through the removal of contaminated soils and replacement with clean backfill. The selected remedy will have minimal reliance on ICs. The selected remedy will reduce the overall extent and mobility of contamination by consolidating contaminated soils within a designated soil management area or re-used as fill or cover material within OU2.

Preference for Treatment as a Principle Element – Since there are no principal threat wastes, the selected remedy does not utilize treatment as a principle element of the remedy.

Five -Year Review Requirements – A Five-Year review would be required for any anticipated residential properties that would not be remediated to the residential cleanup level and any on-Site consolidations areas.

Section CS 14: Significant Changes from the Proposed Plan for Community Soils

Based on recent changes with county zoning, portions of the North Outlying Area require action to address future residential development. Alternative 4, selected as the remedy, already provides the actions for this area to address future residential development.

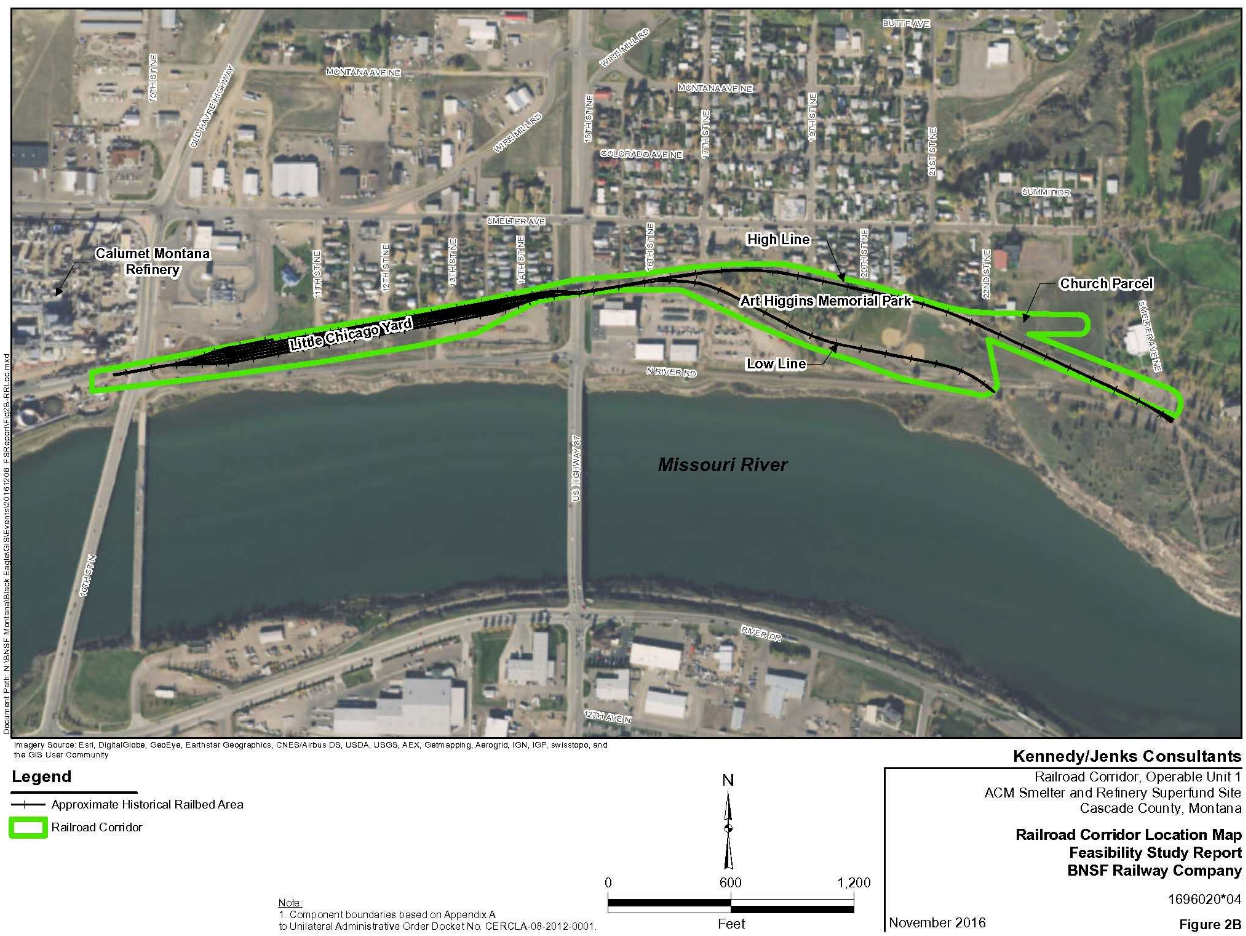
Railroad Corridor

Section RC 5: Site Characteristics

RC 5.1 RCOU1 Description and History

The Railroad Corridor portion of Operable Unit 1 (RCOU1) is located on a south-facing slope on the northern side of the Missouri River. Ground surface generally slopes from north to south, with a steepening grade from the western end near 10th Street North to the east near Art Higgins Memorial Park (Park) and the Former ACM Smelter and Refinery. Figure RC 5-1 shows RCOU1.

Figure RC 5-1 Railroad Corridor Portion of OU1



The former railroad tracks were constructed on a compacted railbed. At the western end of the Site, the former railbed material is approximately 2.5 to 3 feet thick and generally increases in thickness to the east, as the former tracks gained elevation to enter the smelter complex on the former High Line. Based on soil borings, fill above native soil ranges from 1.2 to 23 feet thick, with an average thickness of about 9.5 feet (PWT 2011).

Streets cross RCOU1 from north to south at 10th Street North, Highway 87/15th Street, and Smelter Avenue at its eastern end. Highway 87 passes through RCOU1 beneath a concrete former railroad bridge across a cut that is about 15 feet deep. Smelter Avenue and 10th Street North cross the former tracks at grade. North River Road separates RCOU1 from the Missouri River, and unnamed neighborhood streets adjacent to the former railbed on the northern edge.

Walking trails are present within RCOU1. The Park is generally landscaped and contains a variety of recreational features, including a baseball field, play area, paved basketball court, several pavilions/picnic areas, and a gravel parking lot.

RC 5.2 RCOU1 Interim Action – Park

BNSF implemented mitigation actions at the Park in response to a letter from the ATSDR to EPA. In the letter dated 1 August 2013, ATSDR recommended measures to mitigate the potential acute pica (soil swallowing) child exposure to arsenic.

Park mitigation field activities were conducted under EPA oversight and were completed in July 2014. The following summarizes the activities:

- The mitigation activities removed the material associated with a composite of surface soil samples collected from the horseshoe pits and swing set footprints. A geotextile material was placed within the horseshoe pits and swing set footprints and covered with clean material (clean sand or wood bark).
- An engineered cover was placed on the former High Line and southern facing embankment from the divergence from the former High and Low Lines for approximately 210 feet in length.

An engineered cover was placed on the former Low Line and northern facing embankment from the divergence from the former High and Low Lines for approximately 375 feet in length and 120 feet in length, respectively.

RC 5.3 RCOU1 Interim Action – Utility Project

The Black Eagle Water and Sewer District completed a utility project in the Fall of 2020. In coordination with this effort, the EPA removal program conducted the following actions:

- Excavation of the contaminated soils within the railroad corridor including, but not limited to, the area delineated by the water district. Soils were excavated to a depth of approximately three feet.
- Transportation of contaminated soils to an approved location for waste consolidation and interim management. Soils were treated with an amendment to stabilize contamination prior to disposal, as necessary.
- Provision and transportation of non-contaminated fill to replace the excavated contaminated material. The fill was provided upon completion of the water district's sewer and water line replacement. The water district placed, compacted and graded the fill along the sanitary sewer easement.

RC 5.4 Railroad Corridor Surface Water Hydrology

The only major perennial surface water body near the Railroad Corridor portion of OU1 is the Missouri River, which is being addressed as a separate Operable Unit (OU3). The only stream believed to be perennial within OU1 (including the Railroad Corridor portion of OU1) is the main drainage which runs through Black Eagle and passes under the Railroad Corridor through a culvert.

Periodic surface water generated from storm and snowmelt events at upgradient locations within OU1 and within the Railroad Corridor generally flows overland from north to south toward the Missouri River.

A seep zone is located near the ball field at the eastern end of the Park. Based on field observations collected during the RI, the seep appears to be seasonal, with assumed surface water infiltration intersecting bedrock, including from the Community Soils portion of OU1 or another upgradient area outside the Railroad Corridor, and then seeping to the ground surface.

Several drainage areas have been identified within the Railroad Corridor. Five surface water outfalls, ranging from 20 to 36 inches in diameter, are located south of RCOU1 and discharge to the Missouri River. The stormwater conveyance system related to these outfalls is not known, but it is believed these outfalls may discharge surface water generated both within and outside the Railroad Corridor.

Based on field observations, intermittent seasonal stream flow passes beneath the Railroad Corridor near the eastern end of the Park. Water has been observed to enter a stone culvert on the northern side of the Railroad Corridor and discharge from two 36-inch-diameter corrugated metal pipes. No inlets to the culvert system have been observed within the Park.

RC 5.5 Conceptual Site Model

This section presents potential sources, release mechanisms, and exposure pathways for the Railroad Corridor portion of OU1.

RC 5.5.1 Potential COPC Sources

Based on the RI data, current historical information, and knowledge of Site conditions, potential sources of arsenic and lead in the Railroad Corridor are the following:

- PSM (likely originating at the Former ACM Smelter and Refinery) that may have historically been used in some locations for track ballast or other former railbed fill on former BNSF and/or ACM railbeds.
- PSM that may have been released or placed incidental to the Former ACM Smelter and Refinery operations in the area and been transported across the historical railbed area of the Railroad Corridor.
- Historical smelting and refining activities, and other wind-borne particulates from the Former ACM Smelter and refinery operations which discharged lead, arsenic, and other metals into the atmosphere as fine-grained particles for approximately 79 years.
- Surface water from areas upgradient of the Railroad Corridor.
- Seepage of groundwater from Community Soils portion of OU1 or other sources upgradient of the Railroad Corridor.

Natural sources of metals and anthropogenic sources (e.g., leaded gasoline, lead based paint) may have contributed to the concentrations of lead and arsenic in soil.

RC 5.5.2 Possible Release Mechanisms

Possible release mechanisms for arsenic and lead within the Railroad Corridor include direct contact, leaching, runoff (seep and surface water drainage), erosion, and air entrainment/redeposition. These possible release mechanisms and associated transport pathways are discussed below.

Direct contact: PSM and other potential sources of arsenic and lead, to the extent present, have the potential to migrate to adjacent surface and subsurface soils through physical processes such as mixing.

Leaching from smelter/refinery material: Infiltration of rain or snowmelt may potentially cause leaching of arsenic and lead vertically through the soil column.

Surface water runoff as seep water: A seasonal seep east of the ball field area of the Park (see Figure 7 of the Final RI Report), between the former High Line and former Low Line may possibly contain arsenic and lead from contact with arsenic and lead-containing soil. Arsenic and lead-containing groundwater may potentially interact with surface water in the area of the seep and associated sediment. The seasonal persistence and discharge rate of the seep is unknown (Kennedy Jenks, 2015).

Runoff and erosion at surface water drainages: An intermittent surface water drainage ditch and culvert located along the approximate projected path of 21st Street North intersects the railroad beds and the eastern side of the Park (see Figure 7 of the Final RI Report). Intermittent surface water discharge from the upgradient metals-containing residential and possibly industrial areas of OU1 to the north of RCOU1 enters the culvert along the northern side of the former High Line and likely incorporates runoff from such areas upgradient of the culvert entrance. This channel is a potential transport pathway of arsenic and lead for both surface water and sediments.

Air entrainment and deposition: Through the mechanisms of air entrainment and deposition, arsenic and lead from atmospheric sources including releases by former smelter/refinery operations, and to a lesser degree other atmospheric sources such as leaded gasoline, had the potential to impact surface soil, surface water (seeps), and sediments in the Railroad Corridor. Deposits from the releases associated with operations of the former smelter/refinery cover a broad area throughout OU1. Airborne dust associated with human activity or wind may still result in entrainment and/or deposition of particulates within the Railroad Corridor.

RC 5.5.3 Possible Transport Pathways

Various transport pathways could potentially influence the movement of COPCs from the Railroad Corridor to media including soil, surface water, sediment, and air. The potential transport pathways include the following and are discussed in greater detail in the following sections:

- Soil mixing
- Leaching and infiltration
- Surface water runoff and erosion
- Air dispersion (particulates, dust).

RC 5.6 Railroad Corridor (RCOU1) Sampling

All Railroad Corridor samples were analyzed for antimony, arsenic, cadmium, cobalt, copper, iron, lead, and zinc. Subsets of the samples were analyzed for grain size distribution, hexavalent chromium, volatile organic compounds, semi-volatile organic compounds, total organic carbon, leachability, and acid base accounting analysis. Arsenic and lead results are discussed in this section. Other analyses are discussed along with COPC selection, described in Section RC 7.2.

RC 5.6.1 Historical Railbeds (High Line and Low Line)

The historical railbed area includes the former Little Chicago railyard located between 10th and 15th Streets Northeast and the former right-of-way that splits the former High Line from the former Low Line track segments.

Soil samples in the area of the former High Line and Low Line railbeds and Little Chicago railyard were collected along transects cut perpendicular to the historical railway alignments. These transects were generally spaced 200 feet apart along the entire length of the historical railbeds. At each transect, drilling and sampling started at the centerline of the historical railbed alignment. Then lateral step-out borings were located at 10-foot intervals north and south of the centerline. Additional 10-foot step-out borings were drilled and sampled until one of the following occurred: a step-out boring did not encounter any visually identifiable smelter/refinery material, a physical barrier such as a building or paved parking lot was encountered, or the next step-out would have been located on a residential lot. The historical railbeds and sampling locations are shown on Figure RC 5-2.

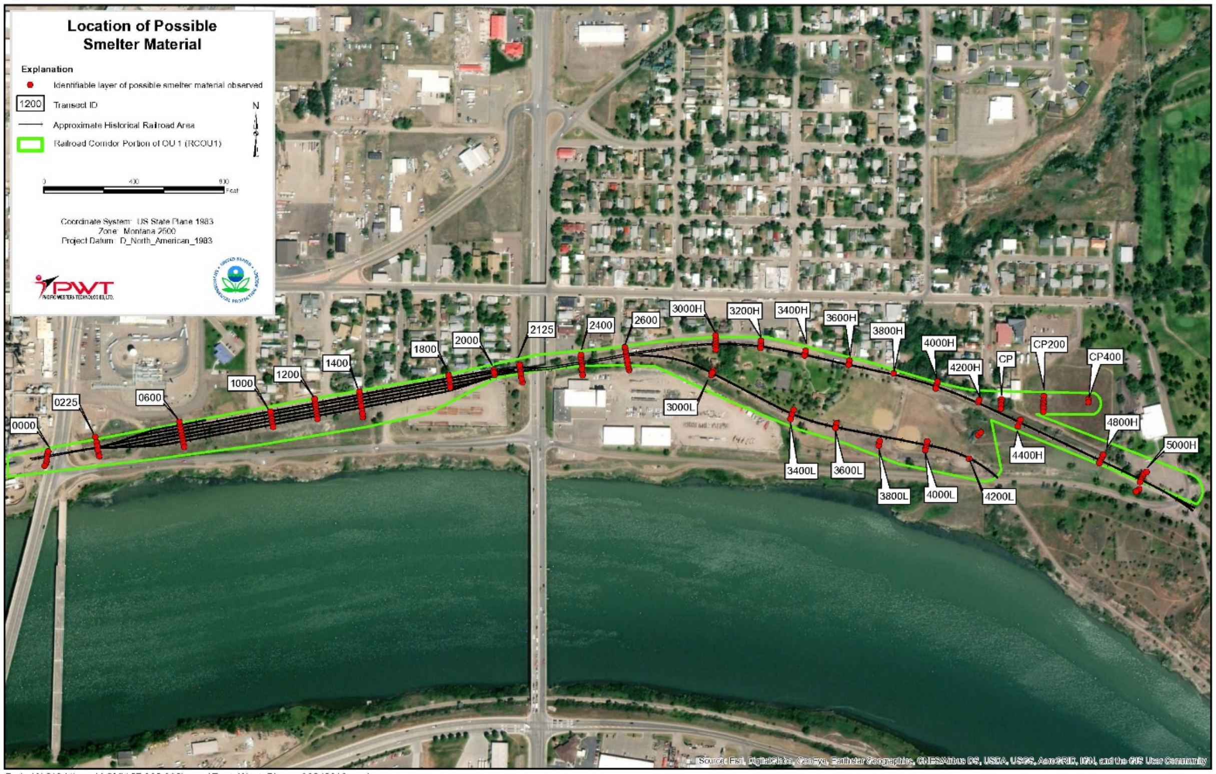
If smelter/refinery materials were visually identified, then samples were collected from ground surface to a minimum of 2 feet below the last visual evidence of smelter/refinery impact. Centerline and step-out borings with visually identified possible smelter/refinery material were sampled over the same four general depth intervals, identified as A, B, C, and D layer samples. The A layer samples were collected from the ground surface to the top of visually identified possible smelter/refinery material (if present). The B layer samples were collected from the top to the bottom of the visually identified possible smelter/refinery material. The C layer samples were collected from the bottom of visually identified possible smelter/refinery material, if present, to the bottom of visibly affected soil (i.e. staining/discoloration or other evidence of contamination). The D layer samples were collected in the interval immediately below the deepest stained soil. The total depth of step-out borings was based on field observations of the depth of possible smelter/refinery material in adjacent borings.

Step-out borings without visually identified possible smelter/refinery material were sampled to a depth of 2 feet below ground surface. Figure RC 5-3 shows the distribution of visually identified possible smelter material (PSM).

Figure RC 5-2 – Railroad Corridor Sample Locations

Path: K:\GIS Library\ACM\127.006.006\maps\RailroadCorridorSamplingLocations_20190917.mxd

Figure RC 5-3 – Railroad Corridor Locations of Possible Smelter Material



Path: K:\GIS Library\ACM\127.006.006\maps\East_West_Phase_08242018.mxd

Observed thicknesses of overburden material covering PSM varied from a few inches to over 10 feet. In general, where PSM was encountered, it typically formed a single layer near the top of the former railbed. Figures showing the distribution of overburden thicknesses are included in the Railroad Corridor RI Report (Kennedy Jenks, 2015). Multiple layers of PSM were encountered in some cases near the edges of the railbed fill placement areas. The thickness of the PSM is typically between 1 and 3 feet across the historical railbed areas.

RC 5.6.2 Church Parcel

A historical railroad switching spur may have been located off the High Line, on property currently owned by Immaculate Heart of Mary Church (Church Parcel). Historical evidence suggests that the artificial fill placed behind a newer retaining wall in the area may be between 12 and 17 feet thick and was placed by the church. Sampling locations are shown on Figure RC 5-2.

Most of the soil borings in the Church Parcel encountered more than a trace of possible smelter/refinery material, although there was not a universally present B layer. If PSM was encountered during drilling, then the Church Parcel boring was sampled for A, B, C, and D layer samples similar to the High Line and Low Line borings. If PSM was not encountered, then the boring was sampled at four designated depths (0 to 2 inches, 2 to 6 inches, 6 to 12 inches, and 12 to 18 inches below the base of imported fill).

Observed thicknesses of overburden varied from 1.0 to 1.7 feet east of the retaining wall and were between 16.2 and 17.7 feet thick west of the retaining wall. PSM was observed between 1 foot and 2.25 feet below ground surface in all four locations west of the retaining wall.

RC 5.6.3 Art Higgins Memorial Park (Park)

Lateral step-out sampling was conducted in the Park located between the historical High Line and Low Line rail beds. This sampling was completed on 50-foot step-outs from the last step out boring in the historical railbed to the north (or south) of the park area. Sampling locations are shown on Figure RC 5-2. If no PSM was encountered, then the boring was sampled from 0 to 2 inches, 2 to 6 inches, 6 to 12 inches, and 12 to 18 inches below ground surface. If a layer of PSM was encountered, then the boring was sampled in accordance with the depth intervals established for the historical railbed sampling (A, B, C, and D layers).

RC 5.6.4 Railroad Corridor Soil Sampling Results

Arsenic concentrations in surficial soils ranged from 2.6 mg/kg to 650 mg/kg. The median arsenic concentration in surficial soil is 26.5 mg/kg, which is above the Montana BTV of 22.5 mg/kg. Considering only those locations where PSM was not encountered, the maximum arsenic concentration was 458 mg/kg, and the median arsenic concentration at locations where PSM was not encountered was 15.8 mg/kg, which is below the Montana BTV. Statistical analysis confirmed that surficial arsenic concentrations were significantly higher at sample locations where PSM was encountered. In general, the highest arsenic concentrations were found near the centerline of the historical railbed alignment, with concentrations decreasing with distance away from the centerline (Kennedy Jenks, 2015).

Lead concentrations in surficial soils ranged from 3.3 mg/kg to 6,100 mg/kg. The median lead concentration in surficial soil is 120 mg/kg. Considering only those locations where PSM was not encountered, the maximum lead concentration was 2,330 mg/kg, and the median lead concentration at locations where PSM was not encountered was 48.6 mg/kg, which is above the Montana BTV of 29.8 mg/kg. As with arsenic, surficial lead concentrations were significantly higher at sample locations where PSM was encountered, as confirmed by statistical analysis. In general, the highest lead concentrations were found near the centerline of the historical railbed alignment, with concentrations decreasing with distance away from the centerline. Additional detail regarding sample analysis and results is available in the Final RI Report (Kennedy Jenks, 2015).

RC 5.7 Nature and Extent of Arsenic and Lead in Surface Soil

For purposes of the nature and extent evaluation, surficial soil is defined as the uppermost sample at a given boring location. The following were general observations for arsenic in surficial soil:

- Arsenic concentrations in surficial samples ranged from 2.6 mg/kg to 650 mg/kg. The median of arsenic surficial soil concentrations is 26.5 mg/kg.
- The highest surficial arsenic concentrations are found near the former track centerline with concentrations decreasing with distance from the centerline.
- Surficial arsenic concentrations were found to be higher in areas where PSM was encountered relative to areas where PSM was not encountered.

The following were general observations for lead in surficial soil:

- Lead concentrations in surficial samples ranged from 3.3 mg/kg to 6,100 mg/kg. The median of lead surficial soil concentrations is 120 mg/kg.
- Like surficial arsenic concentrations, the highest lead concentrations are found near the former track centerline with concentrations decreasing with distance from the centerline.
- Surficial lead concentrations were found to be higher in areas where PSM was encountered relative to areas outside of where PSM was encountered.

RC 5.8 Nature and Extent of Arsenic and Lead in Soil by Depth Interval

The following observations are based on the arsenic and lead concentrations in soil at depth:

- In areas outside the historical railbed area (or sample locations where PSM was not encountered), arsenic concentrations are lower than where PSM was encountered and generally do not vary appreciably by depth interval.
- In areas where PSM was encountered, arsenic concentrations are generally higher within the PSM relative to the overlying soil and decrease below the base of the PSM.
- In areas where PSM was encountered, lead concentrations are generally higher in the soil overlying the PSM. Lead concentrations in the PSM are higher relative to the bottom of the PSM (i.e., at the contact between PSM and underlying soil). Lead concentrations decrease below the base of the PSM.
- In areas where PSM was encountered, arsenic and lead concentrations are generally higher in the upper two feet than at greater depths.

RC 5.9 Railroad Corridor Surface Water

Total arsenic surface water concentrations ranged from 2.5 micrograms per liter (µg/L) to 5.2 µg/L. Dissolved arsenic surface water concentrations ranged from 2.3 µg/L to 4.3 µg/L. These arsenic data indicate arsenic is mostly present in surface water in the dissolved phase rather than sorbed to sediment particles. Total lead surface water concentrations ranged from 0.20 µg/L to 2.5 µg/L. Dissolved lead surface water concentrations ranged from non-detect to 0.14 µg/L. These lead data indicate lead present in surface water is mostly sorbed to sediment particles rather than in the dissolved phase.

Higher surface water concentrations of arsenic and lead were detected in samples collected at the seep located east of the ball fields in the Park between the former High Line and former Low Line. The seep may be impacted by infiltration of surface water from the Community Soils portion of OU1 or another area upgradient of the Railroad Corridor (some of the highest metals concentrations found to date have been in the upgradient Community Soils portion of OU1).

The arsenic and lead concentrations in the culvert inlet samples are similar to those in the culvert outlet samples, indicating that RCOU1 is not impacting the surface water concentrations.

RC 5.10 Railroad Corridor Sediment

Arsenic concentrations in the culvert sediment samples ranged from 21.7 mg/kg to 48.3 mg/kg. Lead concentrations in the culvert samples ranged from 50.8 mg/kg to 135 mg/kg. The detected arsenic and lead concentrations in the sediment sample collected from the seep were 39.9 mg/kg and 39.8 mg/kg, respectively.

The highest arsenic and lead concentrations were detected in the sediment samples collected from the eastern culvert outlet south of the former Low Line on the southern side of North River Road. The arsenic concentrations in the eastern culvert outlet (48.3 and 31.8 mg/kg during the October 2012 and April 2014 sample events, respectively) are higher than those in the single culvert inlet (22.3 and 24.3 mg/kg during the October 2012 and April 2014 sample events, respectively).

The lead concentrations in the eastern culvert outlet (135 and 83.8 mg/kg during the October 2012 and April 2014 sample events, respectively) are also higher than those in the single culvert inlet (53.5 and 50.8 mg/kg during the October 2012 and April 2014 sample events, respectively). In the western culvert outlet, the arsenic concentration (21.7 mg/kg) was less than that in the culvert inlet while the lead concentration (61.9 mg/kg) was higher than that in the culvert inlet during the April 2014 sample event. The sediment data indicate that RCOU1 is not significantly impacting sediment in the culvert.

RC 5.11 Railroad Corridor Bioavailability Analysis

In-vitro bioaccessibility (IVBA) testing was conducted to provide Site-specific relative bioavailability (RBA) values for arsenic and lead. The following general observations are based on the arsenic and lead RBA values:

- RBA results for arsenic ranged from 21 percent to 40 percent, and RBA results for lead ranged from -2.5 percent to 64 percent. The average arsenic and lead RBAs were 28 percent and 29 percent, respectively.
- The lead RBA results from the PSM are significantly different than the lead RBA results in the non-PSM samples.
- In contrast, the arsenic RBA results from the PSM are not significantly different than the arsenic RBA results in the non-PSM samples.

Site-specific RBA values were developed for use in the HHRA. Because the RBA values for PSM are significantly different than the other data, RBA values were derived separately for the PSM and for other soils.

Table RC 5-1 Site-Specific Relative Bioaccessibility Analysis Results

	Relative Bioaccessibility Analysis (RBA) (%)		
	West of 15th Street	East of 15th Street	Potential Smelter Material
Arsenic	27	34	24
Lead	33	45	2.4

RC 5.12 Railroad Corridor Leaching Analysis

The toxicity characteristic leaching procedure (TCLP) is a chemical analysis process used to determine whether hazardous elements present in a waste, like metals, have the potential to be transported out of the waste by means of leaching. The test involves a simulation of leaching through a landfill and can determine where the waste may be disposed and whether treatment may be required prior to disposal.

Results of TCLP analyses completed on behalf of the EPA in 2010 indicated that some of the material in the historical railroad beds is characteristically hazardous. Twelve of the 62 samples which were analyzed by TCLP exceeded the TCLP limit for cadmium and six for lead, indicating that these sample intervals represent areas of characteristically hazardous material contained within the railroad beds (PWT, 2011).

BNSF assessed the potential for leaching to groundwater to occur for metals using results from Site-specific synthetic precipitation leaching potential (SPLP) analysis, which relate soil concentrations to aqueous leachate concentrations following application of mildly acidic water (with a pH designed to mimic that of natural rainfall).

RC 5.13 Railroad Corridor Contaminant Fate and Transport

The concentrations of arsenic detected in the PSM, at the bottom of the PSM, and below the base of the PSM demonstrate that arsenic has not migrated from the PSM into the soil below the PSM at the majority of the sample locations. As with arsenic, the concentrations of lead detected in the PSM, at the bottom of the PSM, and below the base of the PSM demonstrate that lead is not migrating from the PSM into the soil below the PSM.

Section RC 6: Current and Potential Future Land Use in the Railroad Corridor

The Railroad Corridor portion of OU1 includes the Park, located between the former High Line and former Low Line, and two segments of a paved walking trail located on the former right-of-way. The eastern segment of the walking trail overlies the former High Line directly east of the Park. The western segment of the walking trail extends westward from the former railroad bridge over Highway 87 at 15th Street North to a point between 12th and 13th Streets North, where it curves southward to North River Road. Land use within the Railroad Corridor is commercial/industrial and recreational. It is zoned for commercial or open space land use.

The former railroad bed is partially developed with two segments of a walking trail as described above. NorthWestern Energy owns and operates electrical power-related facilities on both sides of 15th Street North/Highway 87 at 1501 North River Road, Black Eagle, Montana. Part of the NorthWestern Energy property is fenced, and part of the fenced area lies within the former BNSF right-of-way that was sold to Montana Power Company in 1996.

The easternmost portion of the Railroad Corridor consists of parts of two parcels, one owned by ARCO Environmental Remediation, LLC (AERL) (the narrow area extending to the southeast, which presently includes part of a trail) and the other owned by the Church (Church Parcel). The Black Eagle Civic Club owns a parcel located between the AERL parcel and Smelter Avenue, outside the investigation boundary. The southern portion of the Church Parcel, which is within the Railroad Corridor, is currently undeveloped.

CMR operates a petroleum refinery on the western side of 10th Street North, including a truck-loading rack located north of the former railroad right of-way between 10th and 11th Streets North.

Approximately 21 residential properties outside the Railroad Corridor portion of OU1 are located adjacent to the right-of-way north and uphill of the Railroad Corridor between 11th and 22nd Streets North in the unincorporated community of Black Eagle. All such residential properties are being addressed by the Community Soils portion of OU1, as described in Section CS 5 through CS 14 of this ROD.

Section RC 7: Summary of Railroad Corridor Risk

A Baseline HHRA (which included a toxicity assessment) was conducted to determine if contaminants within the Railroad Corridor might be harmful to human health. Ecological risk assessment for this area is deferred to OU2. Additionally, the eastern-most portion of the High Line is deferred to OU2.

This Baseline HHRA focused on people working and recreating on the Railroad Corridor and their potential exposures to arsenic and lead in soil, dust, air, sediment and surface water. This Baseline HHRA focused on the following major human health pathways: incidental ingestion; dermal contact and inhalation of soils and dust.

Arsenic

For this evaluation, arsenic risks were calculated for the east and west portions of the Railroad Corridor and Community Park using the maximum soil arsenic concentration from that area. Maximum arsenic concentration from soils in the west and east portions of the Railroad Corridor were 2,580 mg/kg and 1,850 mg/kg, respectively. Based on these concentrations, there is a risk to people working and recreating on the Railroad Corridor as well as to adjacent residents and, therefore, remedial action is required. Based on the maximum arsenic concentration in soil in the park (220 mg/kg), risks are acceptable, and no remedial action is required within the park.

Lead

In accordance with the EPA's risk assessment approach for lead, potential health risks to children were evaluated using the IEUBK model. The model estimates the probability that exposure to soil in the Railroad Corridor may result in child blood lead levels greater than 8 µg/dL.

Based on the maximum soil lead concentrations from the west and east portion of the Railroad Corridor (11,200 mg/kg and 5,760 mg/kg, respectively), there is a probability of more than 90% that a child exposed to this soil would have a blood lead level greater than 8 µg/dL, and therefore, remedial action is warranted. Based on the maximum soil lead concentration from the park (388 mg/kg), no remedial action is required within the park.

Basis for Action

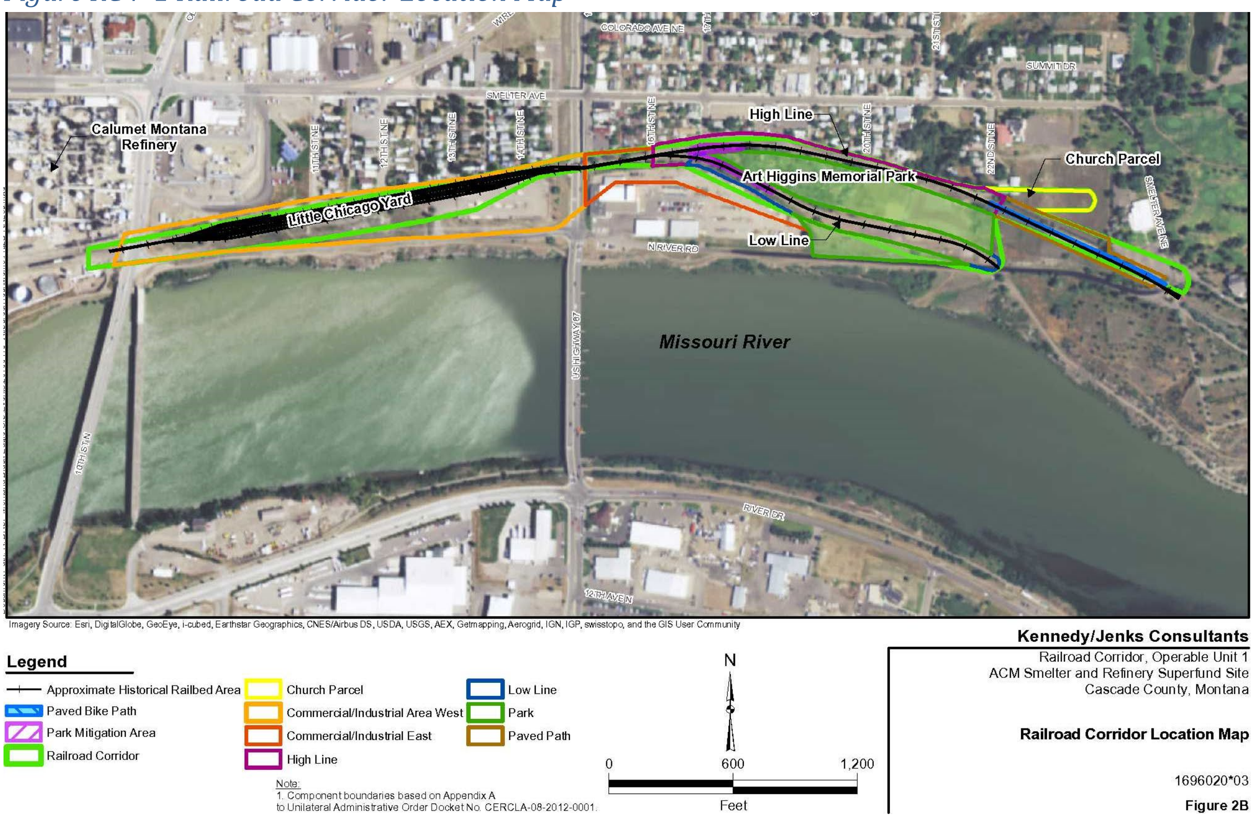
Based upon current and reasonably expected potential future land uses, remedial action is necessary for the Railroad Corridor to protect public health, welfare or the environment from actual or threatened releases of hazardous substances that may present an imminent and substantial endangerment to public health or welfare. No remedial action is required in the park except for removal of smelter materials associated with the railroad bed.

RC 7.1 Summary of Human Health Risk Assessment

The Baseline HHRA was completed to characterize the potential risks to human health that may be posed by chemicals present in or entering into environmental media. The HHRA evaluated potential exposures to arsenic and lead in surficial soil by outdoor workers, hypothetical adolescent trespassers, and recreational users (heavy user/Black Eagle resident; typical user/Great Falls or other area resident) and to arsenic and lead in both surficial and subsurface (i.e., to 5 feet below ground surface [bgs]) soil by utility workers.

The areas that were considered for potential exposures by respective populations include the Commercial/Industrial Area West, Commercial/Industrial Area East, High Line and the Church Parcel, Low Line, Paved Path, and Park as shown on Figure RC 7-1. These areas were evaluated as individual exposure areas in the HHRA. Potential future exposures by utility workers were evaluated for utility corridors that could be developed in all these exposure areas. The receptors evaluated for each exposure area were identified based on the current and likely future use of the exposure area.

Figure RC 7-1 Railroad Corridor Location Map



The results of the baseline HHRA completed for RCOU1 provided risk estimates that were derived using standard EPA risk assessment methodology, currently available toxicity values, and protective, conservative assumptions to model potential exposures. The cancer risk estimates from arsenic for some of the scenarios evaluated in the HHRA fall within the EPA's target risk range (1 in 1,000,000 to 1 in 10,000); however, individual elevated concentrations at some locations may pose a risk. While the results of the HHRA indicate that the areawide average risks from arsenic and lead are acceptable for current risk scenarios, individual elevated concentrations of arsenic and lead may pose a risk to adjacent residential properties that are generally downwind of the railroad corridor.

Based on the current and likely future use of exposure areas and most sensitive receptors identified through the results of the HHRA, the following receptors were considered in evaluating remedial alternatives for each of the exposure areas:

- Commercial Areas East and West: Outdoor workers
- High Line (including the Church Parcel), Low Line, Paved Path, and Park: Recreational users (heavy use).

RC 7.2 Development of PRGs

PRGs are numeric expressions of the RAOs that are expected to meet acceptable risk levels required under the RAOs. PRGs were calculated using the methodology and exposure assumptions from the baseline HHRA. The arsenic PRG represents an increased cancer risk of 1×10^{-5}. The lead PRG represents no more than a 5 percent probability of exceeding a target blood lead level of 5 µg/dL. The calculated arsenic and lead PRGs for each of the exposure areas are summarized in Table RC 7-2.

Table RC 7-2 Preliminary Remediation Goals (PRGs) for Arsenic and Lead in Surface Soil

RCOU1 Exposure Area	Arsenic PRG[a,b] (mg/kg)	Lead PRG[a,c] (mg/kg)
Commercial Area West	160	2700
Commercial Area East	150	2000
Low Line	50	580
High Line	50	580
Park	50	580
Church Parcel	50	580
Paved Path	50	580

Notes:

(a) PRGs were calculated using the exposure assumptions from the baseline HHRA.
(b) The arsenic PRG represents an increased cancer risk of 1×10^{-5}
(c) The lead PRG represents no more than a 5 percent probability of exceeding a target blood lead level of 5µg/dL.

The PRGs were developed to be protective of the most sensitive receptor in a given exposure area based on the current and likely future use of that exposure area. In the Commercial Area West and Commercial Area East exposure areas, the PRGs are based on protection of an outdoor worker. In the High Line (including Church Parcel), Low Line, Paved Path, and Park exposure areas, the PRGs are based on protection of a recreational user (heavy use). While it is anticipated that commercial/industrial uses will continue in the Commercial Area West and Commercial Area East exposure areas, PRGs based on protection of a recreational user (heavy use) were also calculated for the Commercial Area West and Commercial Area East to evaluate conservative remedial scenarios that would be protective of any future land use. The PRGs for a recreational user (heavy use) are used for purposes of unrestricted use calculations in the Railroad Corridor FS.

A summary of the most sensitive receptors evaluated to develop the PRGs by exposure area is provided in Table RC 7-3, below:

Table RC 7-3 RCOU1 Exposure Areas and Receptors for PRG Calculations

RCOU1 Exposure Area	Most Sensitive Receptor for PRG Calculation
Commercial Area West	Outdoor Worker
	Recreational User (Heavy)[a]
Commercial Area East	Outdoor Worker
	Recreational User (Heavy)[a]
Low Line	Recreational User (Heavy)
High Line	Recreational User (Heavy)
Park	Recreational User (Heavy)
Church Parcel	Recreational User (Heavy)
Paved Path	Recreational User (Heavy)

Note:

PRGs were developed to evaluate conservative remedial scenarios. Receptor not included in HHRA for given exposure area.

RC 7.3 Impacted Soil and Waste Areas and Volumes

The RCOU1 FS focused on locations where PSM was observed and used remedial action levels (RALs) to identify the “areas of concern” for further evaluation. The “areas of concern” are within certain areas of the former railbed and address the presence of “waste material” within RCOU1 (i.e., areas where RALs are exceeded). RALs were calculated such that arsenic and lead concentrations in soils from 0 to 2 feet bgs (i.e., surface soils) would meet the PRGs (see Table RC 7-2) on an exposure area basis. Within the Commercial Area West and Commercial Area East exposure area, areas of concern for current and likely future use were identified based on protection of an outdoor worker. Areas of concern were identified for unrestricted land use for both the commercial and other areas using the PRGs based on protection of a recreational user (heavy use) and based on the presence of PSM.

RALs were developed for each exposure area in accordance with the EPA’s draft *Guidance on Surface Soil Cleanup at Hazardous Waste Sites: Implementing Cleanup Levels* dated May 2004 (EPA 2004). As defined in the draft guidance, the RAL is the maximum concentration that may be left in place within an exposure area such that the 95UCL within the exposure area is at or below the cleanup level (i.e., the PRG for the exposure area). The RAL was determined iteratively for each exposure area by removing and replacing the highest concentrations in the dataset until the 95UCL was equal to or less than the PRG. In sample locations where multiple discrete samples were collected from 0 to 2 feet bgs, each of the samples was removed from the dataset. The replacement concentrations were assumed to be at background levels: 22.5 mg/kg was used for arsenic and 29.8 mg/kg was used for lead, based on the

Montana Background Threshold Values from Table 4-4 of the Hydrometrics *Project Report: Background Concentrations of Inorganic Constituents in Montana Surface Soils* dated September 2013 (MDEQ 2013).

Upon determination of the RALs for each exposure area, the extents for areas of concern were plotted using soil data collected between 0 and 2 feet bgs. The extents for the areas of concern were plotted by grouping the samples that exceed the RALs and extrapolating halfway between the closest samples that are below the RALs. These areas of concern were the focus of the Railroad Corridor FS.

RALs were only calculated for arsenic, as arsenic was the only chemical warranting further evaluation based on the results of the HHRA. After removing the samples with arsenic concentrations exceeding the RALs, the 95UCL concentrations were re-calculated for lead for the exposure areas. As shown in Table RC 7-2, the residual lead concentrations are below the PRGs for each of the exposure areas, indicating that remedial actions addressing arsenic will also result in acceptable risks from lead.

The areal extent and volume of PSM was also calculated based on the interpreted lateral and vertical extent of PSM presented in the Railroad Corridor FS (Kennedy Jenks, 2017). The estimated volume of PSM, including overburden above the PSM, is presented in Table RC 7-4, below.

Table RC 7-4 Preliminary Impacted Surface Soil Volume Estimates

RCOU1 Exposure Area	Remediation Area	Area (square feet)	Depth[a] (feet)	Volume Arsenic Impacted Surface Soils (cubic yard)	Overburden[b] (cubic yard)	Additional PSM[c] (cubic yard)
Commercial Area West (CAW) (Figure 3)	Area to meet Arsenic RAL for Commercial/Industrial Use	31,292	2	2,318	-	-
	Area to meet Arsenic RAL for Unrestricted Use	120,998	2	8,963	-	-
	Area to remove PSM	168,000	0.25 - 5.5	-	3,500	3,500
Commercial Area East (CAE) (Figure 4)	Area to meet Arsenic RAL for Commercial/Industrial Use	5,199	2	385	-	-
	Area to meet Arsenic RAL for Unrestricted Use	18,321	2	1,357	-	-
	Area to remove PSM	29,000	0 - 2.5	-	300	300
High Line (HL) and Church Parcel (Figure 5 and 7)	Area to meet Arsenic RAL for Unrestricted Use	42,505	2	3,149	-	-
	Area to remove PSM	107,000	0 - 19	-	10,300	5,600
Low Line (LL) (Figure 6)	Area to meet Arsenic RAL for Unrestricted Use	22,799	2	1,689	-	-
	Area to remove PSM	55,000	0.25 - 20	-	5,700	1,700
Park (Figure 8)	Area to meet Arsenic RAL for Unrestricted Use	-	-	-	-	-
	Area to remove PSM	2,000	1.25 - 1.75	-	100	100
Paved Path (PP) (Figure 7)	Area to meet Arsenic RAL for Unrestricted Use	-	-	-	-	-
	Area to remove PSM	59,000	1.5 - 17	-	9,800	3,800

Notes:
(a) Depth ranges shown indicate the top and bottom depths below ground surface PSM is observed in the exposure area.
(b) Additional Overburden volume required to be excavated to get to PSM beyond the volume of arsenic impacted soils to meet the unrestriced RALs.
(c) Additional PSM volume beyond the PSM/impacted surface soils to meet the unrestricted arsenic RALs.
PSM = Possible Smelter Material
RCOU1 = Railroad Corridor Segment of Operable Unit 1
RAL = remedial action level

Section RC 8: Railroad Corridor RAOs and ARARs

Section 300.430(e) of the 1990 NCP requires that the remedial alternative development process be initiated by developing RAOs, identifying GRAs that address the RAOs, and performing an initial screening of applicable remedial technologies. The overarching goal of the remedy evaluation process is to provide the basis for selecting a remedy that is protective of human health and the environment, and also addresses ARARs. This section provides the RAOs, identifies the media and Areas of Concern, and summarizes ARARs for the Railroad Corridor portion of OU1 of the Site.

RC 8.1 Remedial Action Objectives

Before developing cleanup alternatives for this Site, the EPA establishes RAOs to protect human health and the environment. RAOs are based on available information and standards, such as ARARs, to-be considered (TBC) guidance and Site-specific risk-based levels. The EPA used 1 in 100,000 cancer risk as the point of departure determining RAOs for arsenic because 1 in 1,000,000 is below background.

RC 8.1.1 Railroad Corridor RAOs

RAOs for contamination within the Railroad Corridor were developed to attain a degree of cleanup that ensures the protection of human health and the environment to:

- Achieve an excess cancer risk no greater than 1 in 100,000 or non-cancer hazard index no greater than 1, whichever is more stringent
- Achieve a probability of less than 5 percent that an individual child would have a blood lead level exceeding 5 µg/dL.

These protective RAOs were selected for the Railroad Corridor in consideration of risk contribution to, and protection of, adjacent residential soils. Areas within the Railroad Corridor which need to be addressed to meet these RAOs are shown on Figure RC 8-5.

Figure RC 8-1 – Railroad Corridor Area of Concern

Path: K:\GIS Library\ACM\127.006.006\maps\AreaofConcern_20190916.mxd

Section RC 9: Description of Railroad Corridor Alternatives

The remedial alternatives for soil within the Railroad Corridor are described in Sections RC 9.1 through RC 9.6. A more detailed description of the alternatives is presented in the Railroad Corridor FS (KJ 2017).

RC 9.1 Alternative 1: No Action

This alternative is retained for comparison with other remedial alternatives listed below.

RC 9.2 Alternative 2: Institutional and Engineering Controls

RC 9.2.1 Alternative 2IC: Institutional Controls (ICs)

This alternative includes implementation of ICs, in the form of signage and deed restrictions including a soil management plan, as well as considerations for maintenance and/or repair of existing infrastructure (e.g., water and sanitary sewer lines) that may encounter impacted material. Certain ICs in the form of signage and perpetual deed restrictions requiring routine inspection/maintenance and development in a manner that preserves the integrity of selected protective remedies, including an agency approved soil disturbance/management plan (collectively “Institutional Controls” or “ICs”) are applicable to each alternative other than no action and full closure and therefore, the associated costs will not be repetitively included as part of the cost comparison of the other alternatives below.

RC 9.2.2 Alternative 2EC: Engineering Controls

This alternative includes implementation of engineering controls, such as fencing, to restrict access to areas of the Site. Impacted soils are not removed and given the Site contaminants, it is reasonable to assume minimal degradation will occur. As such, it will be necessary to implement ICs to administratively preserve and inhibit use of the impacted areas and to keep the public informed.

RC 9.3 Alternative 3: Capping

This alternative includes capping of impacted soils exceeding applicable RALs using imported clean soil/gravel, pavement, or other engineered cap (e.g., possible addition to paved path or other protective engineered capping such as the capping previously done in the park area mitigation) to prevent direct contact with or migration of impacted soil. Impacted soils are not removed via capping and given the Site contaminants (i.e., arsenic and lead), it is reasonable to assume minimal degradation will occur. As such, it will be necessary to implement ICs to preserve the integrity of the remedial capping and keep the public informed. Coordination with property owners, the County, and the Black Eagle community will occur during the design and implementation of this alternative to reasonably account for possible future uses of the Site.

RC 9.4 Alternative 4: Excavation and Off-Site Disposal

This alternative includes the complete removal of impacted soils exceeding applicable RALs from the Site to a licensed landfill. Depending on the waste characterization, the soil would be disposed of in a Subtitle D or C facility. Alternatively, hazardous waste could be treated to non-hazardous conditions (e.g., through stabilization) prior to disposal in a Subtitle D landfill. Following excavation, the Site would be backfilled with clean soil/gravel or re-graded using existing Site soil. It will be necessary to implement ICs to preserve the integrity of the backfilled areas which serve as capping for the underlying impacts and keep the public informed. Separation techniques could be used to separate rock and debris from the impacted soil, reducing the amount of material disposed in a landfill. ICs will be required. A sub-alternative has also been evaluated which includes the removal of the full extent of PSM in the RCOU1 area and would not require ICs.

RC 9.5 Alternative 5: Excavation and On-Site Disposal

This alternative includes excavation of impacted soil exceeding applicable RALs and consolidating the soil in an on-Site repository outside of the Railroad Corridor but within OU2. Depending on waste designation, the soil would be treated to non-hazardous conditions (e.g., through stabilization) prior to disposal, if necessary. Alternatively, hazardous waste, if any, could be disposed of off-Site in a Subtitle C landfill with the remaining soil placed in the on-Site landfill. Separation technologies could be used to separate rock and debris from impacted soil, reducing the amount of material disposed beneath the repository cap. It will be necessary to implement ICs to preserve the integrity of the backfilled areas which serve as capping for the underlying impacts and keep the public informed. Routine, long-term repository cap maintenance inspections will also be necessary in perpetuity. Coordination with property owners, the County, and the Black Eagle community will be conducted to reasonably account for possible future uses of the Site.

RC 9.6 Alternative 6: Focused Excavation and Off-Site/On-Site Disposal Combined with Focused Capping, Engineering Controls and Institutional Controls

This alternative includes excavation of impacted soil exceeding applicable RALs for off-Site or on-Site disposal and capping remaining areas of impacted soil. Depending on waste designation, the soil would be treated to non-hazardous conditions (e.g., through stabilization) prior to disposal at an off-Site landfill or on-Site repository. This alterative would also include implementation of engineering controls, such as fencing to restrict access to areas of the Site, and ICs. Routine, long-term cap and fence maintenance inspections will be necessary in perpetuity. Figures 34A and 34B show the locations of the proposed remedial technologies presented in this alternative. A more detailed description of this alternative is presented in Section 6.

This alternative includes both primary, stand-alone remedial technologies (capping and excavation) with engineering controls and ICs to provide flexibility in the remedial approach. Varying remediation scenarios may be developed and evaluated within Alternative 6, including incorporation of existing pavement and engineered covers that may serve as a protective cap. Ongoing coordination with property owners, the county, and the Black Eagle community will occur during the design and implementation of this alternative to reasonably account for possible future uses of the Site.

Section RC 10: Comparative Analysis of Alternatives

The retained alternatives described in Section 9 are analyzed below. Alternatives 3, 4, and 5 were each evaluated using two distinct receptor assumptions (i.e., an "A" and "B" sub-alternative). Alternative 4 was also evaluated assuming all PSM would be excavated and disposed of off Site to achieve full closure (i.e., sub-alternative "C"). The "A" sub-alternative includes implementation of the proposed remedy to be protective of the current and most likely future use of the impacted areas. This includes implementation of the remedial alternative to meet commercial/industrial use RALs at the Commercial Area West and East exposure areas (See "Area of Concern to Meet RALs for Commercial and Industrial Use" shading on Figures 3 and 4) and the unrestricted use RALs at the Low Line, High Line, and Church Parcel exposure areas (Figures 5 and 6). The "B" sub-alternative involves the proposed remedial alternative being implemented to meet the unrestricted use RALs at all the exposure areas, including the Commercial Areas West and East, even though those areas are anticipated to continue to be used for industrial/commercial purposes. Although detailed analyses were completed for the "B" remedial sub-alternatives that conservatively included expanded remediation areas to be protective of unrestricted use in the Commercial Area West and Commercial Area East, they are not included in the comparative analysis in Section 7 as they do not represent a likely future use in RCOU1. The full closure "C" sub-alternative includes implementation of the proposed remedy to meet the unrestricted use RALs, as well as remove the underlying PSM at all exposure areas.

Comparison of Alternatives

The alternatives were evaluated and compared against the criteria outlined in Section 1. Protectiveness and compliance with ARARs are threshold criteria that must be met for any remedy. The comparison of alternatives will include each alternative being compared to other alternatives for each of the five balancing criteria. The comparative analysis serves as the basis for selecting the recommended soil remedial alternative. The results of alternatives comparison are summarized in Table RC 10-1.

Current and reasonable anticipated future uses of the Site and institutional and engineering controls have been considered when evaluating and selecting a recommended remedy. The retained remedial alternatives address the potential for direct human exposure with surface soil containing lead or arsenic to be protective of the most sensitive receptor in a given exposure area based on the current and likely future use of that exposure area. A summary of the comparison of these retained remedial alternatives is provided in Table RC 10-1. Detailed analyses were also completed for remedial alternatives that were expanded in areal extent to be protective of unrestricted use in the Commercial Area West and Commercial Area East (i.e., Alternatives 3B, 4B, and 5B), as and of full closure Alternative 4C. Please refer to the Final FS for more detail (KJ 2017).

Table RC 10-1 Comparative Analysis of Railroad Corridor Remedial Alternatives

NCP Criteria	**Alternative 1** No Action	**Alternative 2IC** Institutional Controls	**Alternative 2EC** Engineering Controls	**Alternative 3A** Capping	**Alternative 4A** Excavation & Offsite Disposal	**Alternative 5A** Excavation & On-Site Disposal	**Alternative 6** Focused Excavation & Off-site Disposal w/Cap & Access Restrictions
Threshold Criteria							
Overall Protection of Human Health and the Environment	1	-	3	5	5	5	4
Compliance with ARARs	No	Yes	Yes	Yes	Yes	Yes	Yes
Balancing Criteria							
Long-term Effectiveness and Permanence	1	-	2	4	5	4	3
Reduction of Toxicity, Mobility, or Volume through Treatment	1	-	1	1	2	1	1
Short-term Effectiveness	1	-	3	5	4	4	4
Implementability	1	-	2	4	4	3	4
Cost	5	-	4	3	2	3	3
Comparative Analysis Rating	10	-	15	22	22	20	19
Comparative Analysis Rank	5		4	1	1	2	3

Section RC 11: Principal Threat Waste Versus Low Level Threat Waste

The NCP establishes an expectation that the EPA will use treatment to address principal threats at a site wherever practicable (NCP 300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or will present a significant risk to human health if exposure occurs. Conversely, low level threat wastes are those source materials that generally can be reliably contained and present a low risk to human health in the event of exposure according to OSWER Publication 93803.3-06FS (EPA, 1991). The manner in which principal threats are addressed will generally determine whether the statutory preference for treatment as a principle element is satisfied.

No threshold level of risk has been established to identify principal threat waste. A general rule of thumb is to consider as a principal threat those source materials with toxicity and mobility characteristics that combine to pose a risk several orders of magnitude greater than the risk level that is acceptable for the current or reasonably anticipated future land use, given realistic exposure scenarios (EPA, 1997).

The secondary source material identified at this Site is contaminated soil. Residential soils and soils of undeveloped lands became contaminated by means of releases from the former smelter operation and redistribution due to human disturbances. These source materials are neither highly toxic nor highly mobile and do not pose a risk several orders of magnitude greater than acceptable risk levels. The contaminated soils are considered low level threat waste and do not constitute a principal threat waste.

Some residual concentrations of lead and arsenic remain in and around Black Eagle and some exceed health-based concentrations. Most of these wastes, being neither highly mobile nor highly toxic, can be readily excavated and reliably contained within an engineered repository. However, TCLP results indicate that at least some of the waste is mobile enough under probable landfill disposal conditions to be considered characteristically hazardous and to require treatment prior to disposal. These soils and wastes form the basis for the selected remedial action.

In summary, no principal threat wastes have been identified in OU1.

Section RC 12: Selected Remedy

The selected remedy for the Railroad Corridor is a hybrid of Alternatives 3, 4 and 5. Major components of the remedy for the Railroad Corridor include:

- Remove all visual waste materials (PSM and visually impacted soil) plus one foot of underlying soil to a maximum of 4 feet
- Regrade the Site to promote drainage and revegetate and/or stabilize remaining soils to reduce runoff and dust. Backfill soil is not required unless needed for drainage and/or soil revegetation/stabilization.
- Confirm that residual soil concentrations in the top 6 inches, after removal of waste materials, are below risk-based action levels for the current land use.

- Alternatively, allow placement of engineered covers, consisting of either a minimum of 24-inch soil cover and/or other developed features (I.e., paved trails, streets, or parking areas).
- Provide future operation and maintenance to maintain the protectiveness of engineered covers.
- Place ICs on the property such as restricting future residential use or providing for additional remediation at the time of future residential development.

Excavated materials will either be consolidated and managed with similar materials within OU2, pending a final remedy for OU2, or disposed of at a permitted off-Site facility.

Section RC 13: Railroad Corridor Statutory Determinations

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions to the extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principle element and a bias against off-Site disposal of untreated wastes.

The selected remedy satisfies the statutory requirements of CERCLA, notably Section 121, subsection (b), and:

- Is protective of human health and the environment
- Complies with ARARs
- Is cost-effective
- Utilizes permanent solutions and alternative technologies to the maximum extent practicable.

13.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by:

- Preventing unacceptable exposure risks to current and future human populations posed by ingestion of or direct contact with contaminated soils
- Implementation of ICs and maintenance to ensure the existing remedial features are protected and maintained, and that undeveloped lands, if developed, will be required to meet the same standard of protection previously implemented for residential soils.

The selected remedy includes components to address human health and environmental risks associated with contaminated soils in residential and non-residential areas. The selected remedy addresses elevated lead and arsenic in the railroad corridor. For the railroad corridor, the selected remedy protects human health and the environment by removal and backfill or capping of contaminated soils and PSM exceeding cleanup standards. The EPA believes that the comprehensive sampling and remediation program ensures that all properties within OU1 that exceed risk-based concentrations will ultimately be addressed.

The selected remedy will be monitored and maintained through comprehensive programs using ICs and monitoring. There are no short-term threats associated with the selected remedy that cannot be readily controlled through applicable health and safety requirements, monitoring, and standard construction practices. In addition, no adverse cross-media impacts are expected from the selected remedy.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions attain a degree of cleanup that ensures protection of human health and the environment and that those remedial actions comply with or appropriately waive ARARs. There are three types of ARARs: contaminant-specific, action-specific, and location-specific. The ARARs for the remedy are identified in Appendix A. The selected remedy will comply with federal and state ARARs that have been identified. No waiver of any ARAR is being sought for the selected remedy.

13.3 Cost-Effectiveness

The selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: “A remedy shall be cost-effective if its costs are proportional to its overall effectiveness” [NCP § 300.430(f)(1)(ii)(D)].

Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs, and hence, this alternative represents a reasonable value for the money to be spent.

Net present worth costs for each alternative were compared (see Table RC 10-1). The cost of the selected remedy for the Railroad Corridor is expected to be approximately $4,089,000, which will include excavation of over 99% of the contaminated soils which exceed 250 mg/kg arsenic or 400 mg/kg lead and waste located in the main Railroad Corridor area (excluding the contaminated materials identified deeper at the Church Parcel and under the paved portion of the bike path). For comparison, Alternative 4B (Soil Excavation and Off-Site Disposal) as described in the Feasibility Study, is expected to cost approximately $3,159,000, while removing 89% of the contaminated soil and waste which exceed 250 mg/kg arsenic or 400 mg/kg lead. For comparison, Alternative 3A is expected to cost only $1,269,000. However, because all the contamination would remain on Site, this alternative scores lower than the selected remedy for long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, and short-term effectiveness.

13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

This determination looks at whether the selected remedy provides the best balance of trade-offs among the alternatives with respect to the balancing criteria set forth in NCP §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this Site. NCP §300.430(f)(1)(ii)(E) provides that the balancing shall emphasize the factors of “long-term effectiveness” and “reduction of toxicity, mobility, or volume through treatment,” and shall consider the preference for treatment and bias against off-Site disposal.

The EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principle element and bias against off-Site treatment and disposal and considering State and community acceptance. The selected remedy for the Railroad Corridor may include treatment of waste as necessary to meet disposal requirements. It is anticipated based on results of prior leaching analysis that at least some of the material will require treatment.

13.5 Preference for Treatment as a Principle Element

The selected remedy does not satisfy the statutory preference for treatment as a principle element of the remedy. Available treatment technologies evaluated were effective for lead or arsenic contaminated soils but not for soils with both lead and arsenic present.

For example, the use of soil amendments was considered for the Site; however, the use of amendments to reduce the toxicity, bioavailability, or mobility of lead (such as lime or phosphorus) in some cases can increase the mobility of arsenic. No treatments were identified in the feasibility studies which were effective for both arsenic and lead without also creating ancillary hazards through undesirable chemical reactions.

13.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

Section RC 14: Significant Changes from the Proposed Plan for the Railroad Corridor

Although the selected remedy still utilizes excavation of PSM and either on-Site or off-Site disposal, the cleanup approach was modified to better represent the preferred alternatives four and five presented in the feasibility study. Specifically, the selected remedy will achieve the current land use PRGs and require ICs to limit future land use. The selected remedy also continues to allow engineered covers where such developments are managed and maintained.

Section 15: Selected Bibliography

Cascade County Commission. 2012. Cascade County Zoning Regulations. Adopted April 26, 2005 Resolution #05-018 by Board of Cascade County Commissioners. Revised Version Adopted December 18, 2012 Resolution #12-71

EPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (EPA/540/G-89/004).

EPA. 1989. Risk Assessment Guidance for Superfund (RAGS): volume 1. Human Health Evaluation Manual (part A), Interim Final. EPA/540/I-89/002. US Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

EPA. 1991. Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions OSWER Directive 9355.0-30. US Environmental Protection Agency, Office of Soil Waste and Emergency Response, Washington, D.C. April.

EPA. 1997. Rules of Thumb for Superfund Remedy Selection. EPA 540-R-97-013, OSWER 9355.0-69. August 1997.

EPA. 2000. A Guide to Developing and Documenting Cost Estimates during the Feasibility Study. EPA 540-R-00-002, OSWER 9355.0-75. July 2000

EPA. 2002. Short Sheet: Overview of the IEUBK Model for Lead in Children. EPA #PB 99-9635- 8; OSWER 9285.7-31. Office of Solid Waste and Emergency Response, US Environmental Protection Agency. Online at: http://www.epa.gov/superfund/lead/products/factsht5.pdf

EPA. 2004. Guidance on Surface Soil Cleanup at Hazardous Waste Sites: Implementing Cleanup Levels (Draft). EPA 9355.0-91. May 2004.

EPA. 2011a. In the Matter of: ACM Smelter and Refinery Site, Cascade County, Montana, Operable Unit 1, Atlantic Richfield Company and ARCO Environmental Remediation, LLC, Respondents, Administrative Settlement Agreement and Order on Consent for Operable Unit 1 Remedial Investigation Feasibility Study (Settlement Agreement/CO), U.S. EPA Region 8, CERCLA Docket No. CERCLA-08-2011-0017. September 8, 2011.

EPA. 2011b.Unilateral Administrative Order for Remedial Investigation/Feasibility Study, CERCLA-08-2012-0001.

EPA. 2019. Proposed Plan for Record of Decision Community Soils Operable Unit (OU1) ACM Smelter and Refinery Superfund Site, Black Eagle, Montana. June.

Formation. 2015. Final Remedial Investigation Report, ACM Smelter and Refinery Site Operable Unit 1 – Community Soils Areas of Interest and Outlying Areas. August 2015. Prepared for Atlantic Richfield Company, Butte, Montana, by Formation Environmental, LLC, Boulder, Colorado.

Formation. 2017. Revision 1 ACM Smelter and Refinery Site Operable Unit 1 (OU1) Community Soils Areas of Interest (CSAOI) and Outlying Areas (OA) Feasibility Study. (EPA Approved Draft Final Report). October 2017.

Kennedy/Jenks. 2015. Final Remedial Investigation Report. Railroad Corridor Segment of OU1 ACM Smelter and Refinery Superfund Site. 8 May 2015. Prepared for BNSF by Kennedy/Jenks Consultants, Federal Way, Washington.

Kennedy/Jenks. 2017. Final Feasibility Study Report Railroad Corridor Segment of OU1 ACM Smelter and Refinery Superfund Site dated September 25, 2017. Prepared for BNSF by Kennedy/Jenks Consultants, Federal Way, Washington.

MDEQ. 2013. Background Concentrations of Inorganic Constituents in Montana Surface Soils dated September 2013. Prepared by Hydrometrics, Inc. for MDEQ, Remediation Division/Site Response Section, Helena, Montana.

PWT. 2011. Pacific Western Technologies, Ltd. (PWT). 2011. Black Eagle Railroad Bed Subsurface Investigation Final Data Summary Report. 7 March 2011. Prepared for EPA by PWT.

Ramboll Environ. 2016. Baseline Human Health Risk Assessment, ACM Smelter and Refinery Site Operable Unit 1. Intended for Atlantic Richfield Company, Butte, Montana. Final Report. January 2016. Prepared by Ramboll Environ, Seattle, WA.

UOS. 2007. Superfund Technical Assessment and Response Team (START) 3 – Region 8. Analytical Results Report for CERCLA Site Assessment, AMC Great Falls Refinery, Great Falls, Cascade County, Montana. November 15, 2007. Prepared for USEPA by URS Operating Services, Inc., Denver, Colorado.

Appendix A

Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable or Relevant and Appropriate Requirements (ARAR)
for ACM Smelter and Refinery Superfund Site Great Falls, Montana

Federal Location-Specific ARARs			
Location	**Requirements**	**Prerequisite**	**Citation(s)**
The Endangered Species Act (Applicable)			
Potential habitat for federally endangered or threatened species in OU1	This statute and implementing regulations provide that federal activities do not jeopardize the continued existence of any threatened or endangered species. 16 U.S.C. 1536(a) of the Endangered Species Act (ESA) requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species. Substantive compliance with the ESA means that the lead agency must identify whether a threatened or endangered species, or its critical habitat, will be affected by a proposed response action. If so, the agency must avoid the action or take appropriate mitigation measures so that the action does not affect the species or its critical habitat. If, at any point, the conclusion is reached that endangered species are not present or will not be affected, no further action is required. If threatened or endangered species, listed in 50 CFR 17, are identified during remedial design and remedial action, activities must be modified and conducted to conserve the species and their habitat, following the substantive applicable requirements outlined in 15 USC 1536 and 50 CFR 17.21, 17.31, 17.61, 17.71 and 17.82.	Actions that may negatively impact the species and their habitat.	Endangered Species Act 16 U.S.C. § 1536, and Implementing Regulations 50 CFR §§ 17.21, 17.31, 17.61, 17.71, 17.82
National Historic Preservation Act (Applicable)			
Presence of cultural resources on or eligible for the National Register of Historical Places	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). A cultural resource survey must be conducted to determine if cultural resources are present. If cultural resources on or eligible for the national register are present, a technical assessment must be conducted to make a determination of no effect, no adverse effect, or determination of adverse effect. If adverse effects are identified, the project planning and design must avoid, minimize, or mitigate the effects. The substantive provisions of the National Historic Preservation Act implementing regulations are applicable to the remedial action.	Identification of cultural resources by surveys.	National Historic Preservation Act (NHPA) 16 U.S.C. § 470 and Implementing Regulations 36 C.F.R. §§ 800.4, 800.5. 800.6, and 800.10(a)

Federal Location-Specific ARARs			
Location	**Requirements**	**Prerequisite**	**Citation(s)**
Archeological and Historic Preservation Act (Applicable)			
Presence of eligible scientific, prehistorical, or archaeological data discovered during site activities.	Presence of eligible scientific, prehistorical, or archaeological data discovered during site activities.	Presence of eligible scientific, prehistorical, or archaeological data discovered during site activities.	Presence of eligible scientific, prehistorical, or archaeological data discovered during site activities.
Migratory Bird Treaty (Applicable)			
Potential habitat for migratory birds	Potential habitat for migratory birds	Potential habitat for migratory birds	Potential habitat for migratory birds
Bald Eagle Protection Act (Applicable)			
Potential habitat for bald and/or golden eagles	This statute makes it unlawful for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any bald or golden eagle, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. In addition to immediate impacts, this requirement also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment. If bald or golden eagles are identified during remedial design and remedial action, activities must be modified and conducted to conserve the species and their habitat. The actions that must be avoided through planning and design are applicable and are outlined in this statute.	Identification of bald or gold eagles and actions that could impair the species and their habitat.	16 U.S.C. § 668(a)

Federal Location-Specific ARARs			
Location	**Location**	**Location**	**Location**
Bald Eagle Protection Act (Applicable)			
Disposal of solid waste in a 100-year floodplain	Any discrete solid waste units created or actively managed by the OU1 or RCOU1 site cleanup must comply with RCRA siting restrictions and conditions.	This requirement establishes the requirements for management units to be designed, constructed, operated, and maintained to avoid washout, if they are within or near the current 100-year floodplain	Criteria for Classification of Solid Waste Disposal Facilities and Practices 40 C.F.R. §§ 257 257.2, and 257.3-1

State Location-Specific ARARs			
Location	**Requirements**	**Prerequisite**	**Citation(s)**
Solid Waste Management Statutes and Regulations (Potentially Relevant and Appropriate)			
Potential on-site solid waste disposal location at OU2 located within a 100-year floodplain	ARM 17.50.1004 (Relevant and Appropriate) 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).	For any solid waste disposed of on-site in a 100-year floodplain.	Solid Waste Management Statutes and Regulations, ARM 17.50.1004
Potential on-site solid waste disposal location at OU2 located within a wetland	ARM 17.50.1005 (Relevant and Appropriate) specifies a solid waste facility may not be located in a wetland, unless there is no demonstrable practicable alternative.	For any solid waste disposed of on-site in a wetland.	Solid Waste Management Statutes and Regulations, ARM 17.50.1005
Potential on-site solid waste disposal location at OU2 located within 200 feet of a fault that has had displacement in Holocene time	ARM 17.50.1006 (Relevant and Appropriate) 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.	For any solid waste disposed of on-site within 200 feet (60 meters) of a fault that has had displacement in Holocene time.	Solid Waste Management Statutes and Regulations, ARM 17.50.1006
Potential on-site solid waste disposal location at OU2 located within a seismic impact zone	ARM 17.50.1008 (Relevant and Appropriate) 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 that the solid waste facility is designed to ensure that the integrity of the structural components will not be disrupted.	For any solid waste disposed of on-site 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).	Solid Waste Management Statutes and Regulations, ARM 17.50.1008

State Location-Specific ARARs			
Location	**Requirements**	**Prerequisite**	**Citation(s)**
Solid Waste Management Statutes and Regulations (Potentially Relevant and Appropriate)			
Potential on-site solid waste disposal location at OU2	Under ARM 17.50.1009 (Relevant and Appropriate), a facility for the treatment, storage or disposal of solid wastes: (1) must be located where a sufficient acreage of land is suitable for solid waste management, including adequate separation of wastes from underlying ground water or adjacent surface water; (2) must be located where local roads are capable of providing access in all weather conditions and local bridges are capable of supporting vehicles with maximum rated loads; (3) must be located in a manner that does not allow the discharge of pollutants in excess of state standards for the protection of state waters, public water supply systems, or private water supply systems; (4) drainage structures must be installed where necessary to prevent surface water runoff from entering waste management areas, and (5) must be located to allow for closure, post-closure, and planned uses of the land.	For any solid waste disposed of on-site	Solid Waste Management Statutes and Regulations, ARM 17.50.1009

State Location-Specific ARARs			
Location	**Requirements**	**Prerequisite**	**Citation(s)**
Montana Nongame and Endangered Species and Wildlife Act (Applicable)			
Potential habitat for endangered or threatened species in OU1	Sections 87-5-101 et seq., MCA, states that endangered species should be protected in order to maintain and to the extent possible enhance their numbers. Sections 87-5-106, 107 and 111, MCA, (Applicable), and ARM 12.5.201 (Applicable) list endangered species and certain acts that are prohibited in areas where such species are found. Section 87-5-201, MCA, describes prohibited activities around certain wild bird, nests, and eggs.	Actions that may negatively impact the species and their habitat.	Montana Nongame and Endangered Species and Wildlife Act, Sections 87-5-101 et seq., MCA

State Action-Specific ARARs			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Stormwater Discharge Requirements (Relevant and Appropriate)			
On-site construction activities which may result in stormwater discharge.	ARM 17.24.633 (Relevant and Appropriate), provides that all surface drainage from disturbed areas that have been graded, seeded or planted must be treated by the best technology currently available (BTCA) before discharge. Sediment control through BTCA practices 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.	For on-site construction activities which may result in the discharge of storm water.	Montana Pollutant Discharge Elimination System (MPDES), ARM 17.24.633
Air Quality Requirements (Relevant and Appropriate)			
On-site operations which may generate fugitive dust.	ARM 17.8.220 (Relevant and Appropriate) Settled particulate matter shall not exceed a thirty (30) day average of 10 grams per square meter.	For operational activities generating fugitive dust.	ARM 17.8.220
On-site operations which may generate fugitive dust.	ARM 17.8.308 (Relevant and Appropriate) 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 site or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Normally, emissions of airborne particulate matter must be controlled so that they do not "exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes."	For operational activities generating fugitive dust.	ARM 17.8.308

State Action-Specific ARARs			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
On-site operations which may generate fugitive dust.	ARM 17.8.221 (Relevant and Appropriate) State law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the annual average scattering coefficient of particulate matter of 3 x 10-5 per square meter. Whenever this standard is exceeded, the activity resulting in such exceedance shall be suspended until such time as conditions improve.	For operational activities generating fugitive dust.	ARM 17.8.221
On-site operations which may generate fugitive dust.	ARM 17.24.761 (Relevant and Appropriate) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of these measures could be considered relevant and appropriate to control fugitive dust emissions in connection with excavation, earthmoving and transportation activities conducted as part of the remedy at the site. 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.	For operational activities generating fugitive dust.	ARM 17.24.761
Solid Waste Run-on and Runoff Controls (Relevant and Appropriate)			
Potential on-site solid waste disposal at OU2	Specific operational and maintenance requirements specified in ARM 17.50.1116 (Relevant and Appropriate) are requirements for run-on and runoff control systems, requirements that sites be fenced to prevent unauthorized access, prohibitions of point source and nonpoint source discharges which would violate Clean Water Act requirements, and that sites be designed, constructed, and operated in a manner to prevent harm to human health and the environment.	For any on-site solid waste disposal in an engineered repository	ARM 17.50.1116

State Action-Specific ARARs			
Action	**Requirements**	**Prerequisite**	**Citation(s)**
Noxious Weed Requirements (Applicable)			
Performance of response activities in an area with noxious weeds	Section 7-22-2101(8)(a), MCA, and ARM 4.5.201 et seq. (Applicable) require the control and/or avoidance of certain plants classified as noxious weeds during revegetation and monitoring activities.	Applicable to any response activities conducted in an area where noxious weeds are known to be present	Section 7-22-2101(8)(a), MCA, and ARM 4.5.201 *et seq.*
Performance of response activities in an area with noxious weeds	Designated noxious weeds are listed in ARM 4.5.201 and ARM 4.5.206 through 4.5.210 (Applicable) and must be managed consistent with criteria developed under §7-22-2109(2)(b), MCA (Applicable).	Applicable to any response activities conducted in an area where noxious weeds are known to be present	Section 7-22-2101(8)(a), MCA, and ARM 4.5.201 *et seq.*

Appendix B

Part 3 – Responsiveness Summary

Part 3 – Responsiveness Summary

Table of Contents

Part 3 – Responsiveness Summary

Commenters on the Proposed Plan included the Cascade County Commission, Atlantic Richfield (AR), Burlington Northern Santa Fe Railroad Company (BNSF), the Montana Department of Environmental Quality (Montana DEQ), the Black Eagle Technical Advisory Group (BETAG), and several citizens. The original submitted comments are included as an appendix to this Responsiveness Summary.

Numerous comments were similar, and comments were focused on a limited number of topics. In addition, it was recognized that the comments required comprehensive responses. Rather than respond to each comment individually (which would have resulted in repetitive responses), or respond by referring back to the first comment/response on a particular topic (which would have resulted in undue emphasis on that first comment or response), comments were grouped into the subjects shown in the table of contents. Many of these subjects are interrelated and readers are urged to review the Responsiveness Summary in its entirety.

For ease of reading, the comments are presented in normal text and EPA's responses are in italics.

Community Soils Areas

1) Support for the Proposed Remedy

Comments

Atlantic Richfield

Community Soils Comment 1: AR agrees with EPA's selection of the Feasibility Study's Alternative 4 as the Preferred Alternative for the Northern and Southern Community Soils Areas of Interest in CSOU. *See* Proposed Plan at 12.

The Preferred Alternative was developed by AR, with input from EPA and DEQ, to provide an extent of soil removal and replacement beyond that required to meet the Remedial Action Objectives (RAOs). The scope of soils removal under the Preferred Alternative minimizes the need for longer term risk-reduction measures, such as deed restrictions that prescribe future land uses or community-health programs to monitor residents' exposure to contaminants. AR remains supportive of this approach and is committed to working with the agencies and the community to obtain community cooperation to complete soil remediation in a timely manner within the Community Soils Areas of Interest.

BETAG

BETAG fully supports the remedy described in the Proposed Plan.

EPA Response to Comments Pertaining to Support for the Proposed Plan

Every effort has been made throughout the course of the project to pursue data collection and remedy planning that would ultimately be acceptable to stakeholders. The Selected Remedy, as presented in this ROD and as modified in response to public comments represents the culmination of these efforts.

2) Excavation Depth in Garden Areas

Comments

BETAG

BETAG fully supports the remedy described in the Proposed Plan. However, the brevity of the Proposed Plan seems to have led to the omission of one detail described within the supporting feasibility study. Extensive investigations were conducted on produce gardening and garden soil contamination within the Community Soils. The Feasibility Study proposed excavation of existing contaminated garden soil to a depth of 24 inches and replacement with garden quality soil. While recognizing that this detail can be captured within remedial design, we would be more comfortable seeing this detail specifically identified as part of the remedy within the EPA's Record of Decision.

Cascade County Commission

It is noted in the ATSDR Health Consultation that Black Eagle residents are concerned about metals contamination on their homegrown produce. Is any specific or special sampling of gardens proposed in the plan? EPA's Lead Sites Handbook recommends specific sampling of gardens up to a 24" inch depth and replacement of garden soils if elevated metals are present.

Montana DEQ

In the Proposed Plan, it was not specified if Vegetable Gardens will be removed on a depth interval basis if the RAOs are exceeded to a maximum depth of 24 inches. Please add language to the Record of Decision specifically stating this is a required remedy.

EPA Response to Comments Pertaining to Excavation Depth in Garden Areas

Excavation of existing vegetable garden areas to a depth of 24 inches is a required component of the remedy. This has been explicitly stated in the ROD Declaration, as well as in Sections CS 9 and CS 12 of the ROD.

3) Proposed Disposal on Operable Unit 2 (OU2) Former Facility Area of Soils Excavated from Operable Unit 1 (OU1)

Comments

Montana DEQ

Permanent disposal of contaminated soils on OU2 of the Site represents predetermination of the remedy for OU2. The ROD should state that the soils will be disposed of at an appropriate repository.

Cascade County Commission

Cascade County requests that it be informed of the location and required institutional controls for any site within the County used in the consolidation or landfilling of contaminated material from the OU-1 remediation. The Board of Cascade County Commissioners prefers the OU2 site not become the permanent repository for storage of OU1 contaminants, and instead the contaminants are deposited in a certified landfill site.

EPA Response to Comments Pertaining to Proposed Disposal on OU2 Former Facility Area of Soils Excavated from OU1

Sections CS 12 and RC 12 state that the excavated contaminated soils/wastes "will either be consolidated with similar materials within OU2, to be addressed under the OU2 remedy, or disposed of at a permitted off-site facility."

4) Additional Detail Regarding Institutional Controls (IC)

Comments

Montana DEQ

Please provide clarification on the anticipated institutional controls and plans for further remediation should land use change in the future (namely, in the Electric City Dirt Riders property and the Northern Outlying Areas of Interest).

Cascade County Commission

More details on the specific required institutional controls for this proposed remedy should be included in the remedial plan.

Atlantic Richfield

Community Soils Comment 3: The areas of OU1 where institutional controls (ICs) may be required or what those ICs may look like as part of the Preferred Alternative need to be more clearly and definitively described in the ROD in order to guide the remedial design process. The description of the Preferred Alternative for the Community Soils portion of OU1 includes the following two statements regarding ICs:

> "Institutional controls would be required for residential development of non-residential properties in Black Eagle." Proposed Plan at 11.
>
> "Institutional controls (ICs) will ensure that future residential properties are remediated at the time of development, if necessary." Proposed Plan at 12.

Neither of these statements clearly identifies an area of OU1 where EPA may require ICs as part of the remedy implemented to manage human health risk or what those controls may look like for such areas. Although some flexibility is warranted, AR requests that EPA more clearly indicate in the ROD where ICs may be required and what those ICs may look like as part of the OU1 remedy, as discussed in more detail below. *See* Community Soils Comments 5 & 6.

Atlantic Richfield

Community Soils Comment 6: AR believes private ICs could be used as a strategy to protect current and future residents within the Community Soils Areas of Interest. Private ICs, such as covenants voluntarily agreed to by landowners that restrict the future use and development of properties, can be an appropriate and protective option for certain properties within the Community Soils Areas of Interest. AR is evaluating strategies for minimizing the locations where an ICs program would be warranted, and those strategies include soil removal or treatment (i.e., tilling with amendment addition) at locations with no current residential use but future residential use would be allowed and at vacant properties where residential use is allowed or may be allowed following recently proposed amendments to the Cascade County zoning regulations. *See* Exhibit A.

AR does not support implementation of a development permit system or other ordinance-based ICs program administered by local government, due to the inefficiencies involved in developing and implementing such a program and the limited scale of potential future residential development within the Community Soils Areas of Interest in OU1. AR requests that EPA indicate in the ROD that the ICs program will be limited to public education and health initiatives, supported by private ICs (the specifics of this approach would be fully developed during remedial design).

EPA Response to Comments Pertaining to Additional Detail Regarding ICs

Additional detail on proposed Institutional Controls has been included in this ROD, Section CS 12.3. Institutional controls (ICs) will be established for the Northern and Southern Community Soils Areas of Interest, the Northern Outlying Areas (including the Electric City Dirt Riders property), and the Railroad Corridor. ICs will ensure that future residential properties are remediated at the time of development, if necessary. In addition to informational devices, private ICs, such as covenants voluntarily agreed to be landowners, will be utilized to the maximum extent practicable; ordinance-based ICs will be established as necessary.

5) The Northern and Southern Outlying Areas

Comments

Cascade County

The Plan proposal does not require remediation of the Northern Outlying Area. Some of this area is zoned I-1 which also allows commercial uses including educational facilities (ages pre-school and higher). Are there any plans for sampling and remediation of properties that may be used in this way to ensure protection of public health, especially children? If facilities are planned in this location sometime in the future, will the location be tested and remedial cleanup conducted as part of the Institutional Controls?

BETAG

The Proposed Plan proposes Institutional Controls to address future potential residential use of currently contaminated non-residential soils. While recognizing Institutional Controls as an option that can be protective of human health, the BETAG strongly favors a comprehensive remedy that does not rely upon Institutional Controls. Cascade County has experience with Institutional Controls OU1 (Neihart) of the Carpenter-Snow Creek Superfund Site. BETAG considers the degree and extent of contamination is such that active remediation is a far less complex and protective remedy that will not burden local government and citizens with long-term program requirements. Ongoing, near-term residential development is anticipated within Black Eagle and the Northern Outlying Area. Any additional burden placed on property owners and real estate transactions is likely to complicate and possibly constrain needed development.

Atlantic Richfield

Community Soils Comment 2: AR agrees with exclusion of the Northern and Southern Outlying Areas from required remedial actions for OU1. AR also requests removal of the Southern Outlying Area from OU1 and the ACM Site.

As noted in the Proposed Plan, in the Southern Outlying Area arsenic was not found in soil at levels representing a potential health risk, and relatively high lead concentrations in soil, where present, are not related to the former smelter/refinery operations. Accordingly, EPA determined that remedial action is not warranted for the Southern Outlying Area. *See* Proposed Plan at 9 ("Because arsenic in the South Outlying Area was not found to pose a risk, it was concluded that the maximum lead concentrations of 1150 mg/kg is not related to the smelter and does not require remedial action."). AR agrees that elevated lead levels in the Southern Outlying Area are not attributable to ACM Site operations and that no remedial action is warranted in this area. Due to the lack of ACM Site-related impacts in the Southern Outlying Area—which was arbitrarily included in the boundary of OU1 because it fell within a 1.2-mile radius of the historical smelter stack *(see* Proposed Plan at 8)—AR believes that no further investigation or remediation is required for this area now or in the future, and therefore this geographic area should be removed from the ACM Site entirely. Exclusion of the Southern Outlying Area from the ACM Site going forward is supported by the administrative record for OU1 and the Proposed Plan. If the Southern Outlying Area is removed from OU1 (and the larger ACM Site), it would not be included in the ecological risk assessment for OU1, which was deferred to the OU2 RI/FS. *See* Proposed Plan at 9 ("Ecological risk assessment for [OU1] will be conducted and included in the OU2 remedial investigation."). Accordingly, AR requests that EPA adjust the OU1 and ACM Site boundary in the ROD to exclude the Southern Outlying Area.

Although not specifically stated in the Proposed Plan, site investigation and risk assessment findings for the Northern Outlying Area were similar to the Southern Outlying Area, as neither arsenic nor lead were found at levels representing a potential health risk for non-residential receptors. *See* Proposed Plan at 7 (indicating that maximum values in the Northern Outlying Area did not exceed commercial or recreational preliminary remediation goals (PRGs)). Accordingly, AR requests that EPA expressly indicate in the ROD that remedial action is not required for the Northern Outlying Area.

Atlantic Richfield

Community Soils Comment 5: An ICs program for the Northern Outlying Area is not necessary or appropriate because existing and planned land uses are non-residential. The current land uses and zoning in the Northern Outlying Area are industrial, agricultural, or open space, and Cascade County has not proposed any changes to residential or mixed use in the near future. *See* Exhibit A. Thus, based on the most current information available from Cascade County, future residential use of parcels in the Northern Outlying Area is not expected. Accordingly, AR requests that EPA indicate in the ROD that an ICs program is not required for the Northern Outlying Area.

Similarly, an ICs program as an element of any selected remedy for the Southern Outlying Area is not indicated because the former ACM smelter/refinery is not a source of contamination in that area. *See* Community Soils Comment 2. As discussed above, AR requests that the Southern Outlying Area be removed from the Site, and that no further investigation or remedial action be required for that area. If Southern Outlying Area remains part of the OU1 and the ACM Site, at a minimum AR requests that EPA make clear in the ROD that an ICs program is not required for this area.

EPA Response to Comments Pertaining to the Northern Outlying Area

The remedy has been modified to require remedial action for non-residential soils in the North Outlying Area where future residential development is allowed. Section 12 of the ROD states that remedial action is required in the eastern portion of the Northern Outlying Area, and minimal ICs are required in that area to ensure that if land use changes in the future (e.g. construction of a preschool, as suggested by one comment) additional testing or remediation can be completed if necessary to ensure the protectiveness of the remedy for potential future residents of that area.

No remedial actions are required in the Southern Outlying Area. The Southern Outlying Area cannot be removed from the ACM Site at this time, as the Ecological Risk Assessment has not yet been completed in that area. This request is inconsistent with the following statement from the approved HHRA prepared by AR: "The scope of the HHRA and its findings are not intended to supersede USEPA's consideration of ecological risks for OU1 that has been deferred for evaluation in conjunction with OU2."

6) Requests for Additional Remediation in Lieu of ICs

Comments

BETAG

BETAG considers the degree and extent of contamination is such that active remediation is a far less complex and protective remedy that will not burden local government and citizens with long-term program requirements. Ongoing, near-term residential development is anticipated within Black Eagle and the Northern Outlying Area. Any additional burden placed on property owners and real estate transactions is likely to complicate and possibly constrain needed development.

Atlantic Richfield

Community Soils Comment 4: AR supports potential additional soil removal or soil treatment (e.g. tilling) for currently vacant locations in the Community Soils Areas of Interest that are not currently zoned residential but are likely to have residential use in the future pursuant to Cascade County's pending zoning amendments. Flexibility in the ROD that provides for additional soil remediation as part of the OU1 remedial action will further limit the areas within OU1 where long-term ICs would be necessary to protect residential receptors.

Based on the findings of the Remedial Investigation and human health risk assessment conducted for OU1 and statements in the OU1 Proposed Plan, soil remediation is only warranted when the land use is residential. The Preferred Alternative soil removal remedy described in the Proposed Plan will address potential risk in areas of current residential use. *See* Proposed Plan at 10-12.

AR has reviewed the City of Great Falls and Cascade County zoning regulations, including Cascade County's 2019 proposed changes to zoning within OU1, and understands that both current and planned future land uses in the Community Soils Areas of Interest include both residential and commercial uses. If the County's proposed zoning changes are adopted, the current residential and commercial zones within these two areas will be updated to "Mixed Use," which will allow for both residential and commercial uses, as shown on the map attached hereto as Exhibit A. Assuming the County's mixed-use regulations are adopted for these areas, AR likely will evaluate, and may elect to perform, additional soil remediation at currently vacant properties within the Community Soils Areas of Interest in order to eliminate the need for long-term ICs at such properties. Therefore, AR requests that the ROD provide for potential additional soil remediation, as determined necessary by AR, on certain non-residential properties in the Community Soils Areas of Interest where future residential use will or may occur.

EPA Response to Comments Requesting Additional Remediation in Lieu of ICs

In the Northern Outlying Areas, to address future land use change to residential, the remedy for non-residential soils requires that these soils be addressed through additional testing, remediation or IC's. The PRP may engage in additional soil remediation in lieu of long-term ICs which would otherwise be necessary to protect human health and the environment. Once properties receiving soil remediation have a property average soil concentration in the top 12 inches which meets the residential RAOs, long-term ICs will no longer be necessary for these specific properties. This has been stated explicitly in Section 12 of the ROD.

7) Indoor Dust Contamination

Comments

Cascade County Commission

In 2013/14, indoor dust sampling was conducted in 18 Black Eagle home attics. Elevated metals were detected in multiple older homes, especially those built before 1930 and in proximity to the railroad corridor. Eighteen samples does not seem adequate representation of the many older homes in the community, and assessment of the public health concerns of elevated metals in attics should be mitigated. Is there any plan for further attic sampling to define the extent of the problem? Is there any plan to remediate attics that exceed the cleanup level?

EPA Response to Comments Pertaining to Indoor Dust Contamination

A discussion of indoor and attic dust sampling and results are presented in Section CS 5.9 of the ROD. Indoor dust was sampled in 30 homes as a representative subset of the community. Within this group of homes, 18 attics were available for sampling, all of which were sampled. Attic dust was not collected at the remaining 12 homes because they did not have attics, or the attics could not be accessed safely.

The contribution of indoor dust to residential risk was included when evaluating cleanup levels for soil. It was determined that residential cleanups of exterior soil in accordance with the selected remedy will sufficiently reduce exposure so that interior cleanups are not necessary to ensure the protectiveness of the remedy.

Railroad Corridor Area Comments

8) Capping as Part of the Railroad Corridor Remedy

BNSF

The approved FS provides additional alternatives, including capping, that are comparable when evaluated using the nine criteria, and those alternatives should be included as potential alternatives in the Record of Decision. Revising the description of USEPA's Preferred Alternative in the Proposed Plan to "a modification of Railroad Corridor Alternatives 3/4/5" and describing the option to incorporate a capping strategy in the remedy for a given property would provide clear flexibility in consideration of incorporating alternatives that have been demonstrated comparable when evaluated using the nine criteria. Without revision, USEPA's Proposed Plan is arbitrary and capricious for each of the following reasons.

EPA Response to Comments Pertaining to Capping as part of the Railroad Corridor Remedy

Section RC 12 of the ROD specifically states that placement of engineered covers, in conjunction with institutional controls and future operation and maintenance, is retained as an option for properties where development and long-term management of the property is preferred by the landowner.

9) Cost and the Proposed Excavation Depth in the Railroad Corridor

Comments

Atlantic Richfield

Railroad Corridor Comment 5: Based on information known to AR at this time, it appears a remedy similar to the Capping/Institutional Controls Alternative (Alternative 3A/2IC) evaluated in BNSF's Final Feasibility Study Report would be a protective remedy for the existing industrial, commercial, or recreational use of the former railbed segments, and this alternative would cost significantly less than EPA's Preferred Alternative. AR therefore generally supports more limited removal of soil and waste material in RCOU I combined with capping of the wastes that remain along the former rail line and utilization of long-term ICs. Based on currently available information, it appears this approach would be protective of human health, more cost-effective, and is consistent with and supports the community's desired development of these parcels for long-term recreational use.

As EPA and DEQ acknowledged through approval of BNSF's Final Feasibility Study Report, capping provides other advantages over removal:

> "EPA and DEQ agree that no appreciable benefits are obtained from excavation when [potential smelter material] is left in place. Capping provides a more timely/implementable and substantially more cost-effective remedy than Excavation and Offsite Disposal. Capping is also more protective in the short-term as excavation, unlike capping, poses risks such as dust and fugitive emissions exposure during implementation. Capping is also protective in the long-term because the capping barrier will eliminate and control exposure to receptors and both alternatives require a long-term monitoring and maintenance program and Institutional Controls."

Atlantic Richfield

Railroad Corridor Comment 3: Alternative 3A/21C (Capping/Institutional Controls), with an estimated cost of $1,244,000, was the Preferred Alternative recommended for RCOU1 in BNSF's Final Feasibility Study Report (Kennedy/Jenks Consultants 2017). However, the Preferred Alternative identified by EPA in the Proposed Plan is a modification of Alternatives 4/5 and includes, among other things, excavation and removal of soil to a depth of 24 inches and, after additional sampling, excavation and further removal to a maximum depth of 48 inches. The estimated cost of this remedial action is $4,089,000, which is more than double the cost of any of the alternatives evaluated in the Feasibility Study, which was reviewed and approved by EPA. The Proposed Plan does not adequately explain EPA's rationale for selection of the Preferred Alternative over all the Feasibility Study alternatives, as required under the National Contingency Plan.

Atlantic Richfield

Railroad Corridor Comment 4: The anticipated extent of soil removal associated with the Preferred Alternative for RCOU I goes beyond that necessary to achieve the RAOs for RCOU1, regardless of future land uses within RCOU I. Soil removal in RCOU I will extend to a depth of 24 inches, with "waste" removal as deep as 48 inches, whereas soil removal in the Community Soils areas, where land use is residential, will not extend to a depth beyond 18 inches (outside of existing vegetable gardens where maximum soil removal depth is limited to 24 inches). Neither the Proposed Plan nor the RCOU1 administrative record provides a justification for soil or waste removal at depths of 24 to 48 inches.

BNSF

Comment 3: USEPA's Preferred Alternative for RCOU1 lacks a reasonable basis because it has a much higher cost than other alternatives developed in the approved FS but compares similarly to the nine evaluation criteria. The Proposed Plan recommends a modified alternative including removal of about 21,000 cubic yards (cy) of material extending down to a depth of 48 inches versus the FS that contemplates removal of about 15,000 cy to a depth of 24 inches as a conservative unrestricted use scenario. There is no basis for removal to a depth of 48 inches. USEPA guidance (2002) limits direct soil exposure to a depth of 24 inches for residential/recreational use. The RI/FS demonstrated that the lead and arsenic are not mobile and are not leaching to groundwater. Removing soil to a depth of 48 inches versus 24 inches increases the cost but otherwise does not change the evaluation of the alternative relative to the nine criteria as smelter material will remain within RCOU1. Furthermore, capping also has a similar evaluation relative to the nine criteria. The cost of USEPA's preferred alternative is over $4 million, which is more than double the cost of capping and does not change the long-term effectiveness or need for institutional controls (ICs) as smelter material deeper than 48 inches will remain within RCOU1. The Proposed Plan is inconsistent with CERCLA requirements concerning evaluation of cost relative to the other criteria.

EPA Response to Comments Pertaining to Cost and the Proposed Excavation Depth in the Railroad Corridor

The remedy retains capping as a possible alternative to soil removal and replacement in some areas and has included capping as part of the railroad corridor remedy described in Section RC 12 of the ROD.

As stated in BNSF's Final Feasibility Study Report, at the end of the same paragraph quoted in AR Railroad Corridor Comment 5, "However, in specific areas where the lateral and vertical extent of PSM is limited (e.g. less than 2 to 4 feet), some excavation may be a cost effective remedy substitute for capping." (KJ 2017).

Subsequent to the approval of the Final Feasibility Study Report for RCOU1, the EPA conducted a detailed analysis of the total quantities and locations of contaminated soils and wastes in order to determine the depth of excavation which best balanced the removal of as much waste as possible with the desire to be cost effective in the cleanup. As stated in Section 13 of the ROD, the cost of the selected remedy for the Railroad Corridor is expected to be approximately $4,089,000, which will include excavation of over 99% of the contaminated soils which exceed 250 mg/kg arsenic or 400 mg/kg lead and waste located in the main railroad corridor area (excluding the contaminated materials identified deeper at the church parcel and under the paved portion of the bike path). For comparison, without adjusting the maximum excavation depth from 2 feet to 4 feet, Alternative 4B (Soil Excavation and Offsite Disposal) as described in the Feasibility Study is expected to cost approximately $3,159,000, while removing only 89% of the same contaminated soil and waste.

The agencies have determined that excavation to a maximum of 48 inches over much of the railroad corridor is cost effective and generates valuable reductions in both the quantity of waste left in place and community risk and reduces long-term operation and maintenance cost. In the church parcel and below the paved section of the trail on the eastern end of the railroad corridor, contaminated soils and waste are located further below the surface, and additional excavation in these areas is not expected to result in a reduction in risk great enough to justify the additional costs of excavation.

Section RC 12 of this ROD also clarifies that excavation will apply to both waste (possible smelter materials) and visually impacted (e.g. stained) soils.

10) Use of Residential Risk Levels to Establish Railroad Corridor Cleanup Levels

Atlantic Richfield

Railroad Corridor Comment 2: The cleanup levels for RCOU1 soil are the same as the cleanup levels identified for residential yards in CSOU. *See* Proposed Plan at 10, 16. The stated goal in the Proposed Plan for the RCOU1 portion of OU1 is protection of human health assuming "unrestricted use" of the area. *See* Proposed Plan at 16. Based on the cleanup levels selected for RCOU1, "unrestricted use" would presumably include residential use. There is no current residential use of any of the parcels in RCOU1, and no future residential use is expected. Therefore, the RCOU1 cleanup levels are lower than necessary to protect human health in OU 1. Further, the administrative record for RCOU1 does not support adoption of residential soil cleanup levels for this part of OU 1. The human health risk assessment conducted for RCOU1 did not include evaluation of an exposure scenario for residential receptors, and no site-specific remediation goals were developed for soil assuming residential use of the RCOU1.

BNSF

Comment 2: The cleanup levels for RCOU1 lack a reasonable basis because they are unnecessary for and are inconsistent with current and anticipated uses and site-specific information as detailed in the USEPA-approved RCOU1 FS. The current and anticipated uses of the Commercial areas within RCOU1 do not justify the same cleanup levels as residential yards/unrestricted use. The Proposed Plan allows for higher concentrations of arsenic and lead in industrial and recreational areas within the Community Soils Areas of Interest. As detailed in the approved RCOU1 FS, a similar approach should be used for RCOU1, which does not have residential uses. Applying cleanup levels for unrestricted/residential use to depths greater than 24 inches below ground surface is not justified based on potential exposure and is contrary to USEPA guidance (2002). The site-specific bioavailability data for RCOU1 justify higher cleanup levels as USEPA acknowledged in approving the RCOU1 FS. Applying unadjusted cleanup levels for unrestricted/residential use that is not anticipated and consistent with future land use lacks a reasonable basis and will lead to additional costs without any reasonably based risk reduction benefits when compared to the PRP's proposed remedy.

EPA Response to Comments Pertaining to the Use of Residential Risk to Establish Railroad Corridor Cleanup Levels

The remedy has been modified to achieve the remedial action goals for the anticipated land use rather than for residential land use.

11) Use of Maximum Values in Evaluating Railroad Corridor Risk Levels

BNSF

Comment 1: A cancer risk threshold of $1x10^{-4}$ and noncancer hazard quotient threshold of 1 should be used to determine whether a remedial action is warranted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (USEPA 1991). The USEPA-approved HHRA demonstrated that risks to human health are less than the risk thresholds. Inexplicably, in the Proposed Plan, maximum detected concentrations were used to show risks greater than the thresholds; however, the unjustified use of maximum detected concentrations is in direct conflict with the USEPA-approved HHRA work plan and is contrary to USEPA risk guidance (USEPA 1989).

EPA Response to Comments Pertaining to the Use of Maximum Values in Evaluating Railroad Corridor Risk Levels

The results of the baseline HHRA completed for RCOU1 provided risk estimates that were derived using standard EPA risk assessment methodology, currently available toxicity values, and protective, conservative assumptions to model potential exposures. The cancer risk estimates from arsenic for some of the scenarios evaluated in the HHRA fall within EPA's target risk range (1 in 1,000,000 to 1 in 10,000), however, individual elevated concentrations at some locations may pose a risk. While the results of the HHRA indicate that the areawide average risks from arsenic lead are acceptable for current risk scenarios, individual elevated concentrations of arsenic and lead may pose a risk to adjacent residential properties which are generally downwind of the railroad corridor.

Additional Comments

The remaining comments were on topics not repeated by multiple commenters, and the EPA has responded to each comment individually. These comments are arranged in alphabetical order by commenter. The EPA is not able to respond to comments or portions of comments which are beyond the scope of this ROD and remedial action.

12) Additional Atlantic Richfield Comments

- AR Railroad Corridor Comment 1: The Proposed Plan states that "the former rail bed appears[sic] was constructed of smelter materials that are approximately 2.5 to 3 feet thick." Proposed Plan at 14. Although the record supports the fact that the railbeds were constructed with processing waste materials, the assertion that it was constructed with "smelter materials" is misleading because it implies that the rail lines were constructed using materials from the ACM Site. Such a suggestion is factually inaccurate.

  The railroad line from Great Falls through Black Eagle to the Boston and Montana Consolidated Copper and Silver Company (an Anaconda Company and Atlantic Richfield predecessor) property, including the Low Line and High Line on the property, was constructed in 1889 and 1890 by a predecessor of the Burlington Northern Santa Fe Railway (BNSF). The former rail lines within RCOU1 were constructed "to provide access to the Former ACM Smelter and Refinery prior to smelter construction." RCOU1 Remedial Investigation (RI) Report, § 1.1 (May 8, 2015). BNSF's RCOU I RI Report supports both that the rail line was constructed prior to construction and operation of the ACM Site and that its predecessor built up the line with several feet of waste material. *See, e.g.,* RCOU1 Remedial Investigation (RI) Report, §§ 1.1, 5.2 (May 8, 2015). These historical railroad activities, among others, form the basis for why BNSF was identified as a PRP for the Site and was ordered to perform the RI/FS for RCOU 1. *See* Proposed Plan at 3, 4.

  Boston and Montana broke ground for the copper reduction works in 1891 and began facility operations in 1893, nearly four years after the tracks were laid. *See* Proposed Plan at 3. Because the railbed predates the refinery and smelter by four years, material from Boston and Montana's operations could not have been used to construct the railbed. The source of the "smelter material" has not been confirmed, Therefore, AR requests that the ROD refer to the material used to construct the railbed as "possible smelter material" or "possible processing waste" (or something similar) and make clear that the railbed material is from an unknown source.

EPA Response

Section 2 of the ROD clarifies that the tracks were initially constructed starting in 1889 prior to construction of the new ACM facility. However, there are records that indicate that materials from the former smelter and refinery site were used in the maintenance of the railroad beds. Additionally, records also indicate that spillage of smelter and refinery materials occurred in the railroad corridor.

- AR Detailed Comment 1: Page 1, Paragraph 2: The Proposed Plan states: "This Proposed Plan identifies the preferred alternative for the first action at the site to remediate residential properties in Black Eagle, including the abandoned railroad corridor north of the Missouri River." AR comments that prior response actions have been performed at the OU1 portion of the ACM Site, including capping of the eastern portion of the railroad corridor, soil removal at the Art Higgins Memorial Park, and soil removal prior to residential development of a portion of the Moose Lodge property.

EPA Response

Sections RC 5.2 and RC 5.3 discuss completed Interim actions in the railroad corridor.

- AR Detailed Comment 2: Page 1, Paragraph 4: The Proposed Plan states: "This Proposed Plan describes the remedial alternatives evaluated to address soil contamination from historical smelting activities and presents the rationale for EPA's preferred alternative." AR comments that ACM site operations included smelting and refining.

EPA Response

Throughout the ROD, care has been taken to refer to activities at the former facility as "smelting and refining," rather than only smelting.

- AR Detailed Comment 3: Page 3, Paragraph **1:** The Proposed Plan states: "Primary products from activities at the ACM Site were copper, zinc, arsenic, and cadmium." AR comments that although copper, zinc, and cadmium were primary products, arsenic was not one of the primary products from the historical smelting and refining activities at the ACM Site. AR requests that the reference to arsenic in the above-quoted sentence be removed.

EPA Response

The EPA agrees that arsenic was not a primary product from activities at the ACM Site. A statement similar to that mentioned in the comment above is included in Section 2 of the ROD. It has been revised for accuracy and states that "Primary products and wastes from activities at the ACM Site were copper, zinc, arsenic, lead and cadmium."

- AR Detailed Comment 4: Page 3, Paragraph 4: The Proposed Plan states: "A preliminary assessment completed in 1982 recommended that investigations be conducted at the site, and in 1983 a screening level site investigation conducted by [AR] documented both on-site and off-site ground and surface water contamination." AR believes that the references to "on-site and off-site" areas are confusing in the context of these historical investigations and that "ground" contamination refers to groundwater contamination. The referenced 1983 Screening Study report only documented investigations at the ACM refinery; no investigations were conducted to evaluate contamination outside of the facility area. Therefore, AR requests that findings of the 1983 screening investigation be more accurately described in the ROD as "...documented groundwater and surface water contamination at the ACM refinery."

EPA Response

The EPA agrees that there is potential for confusion from the way the screening study was discussed in the Proposed Plan. For clarity, Section 2 of the ROD states "A preliminary assessment completed in 1982-1983 documented groundwater and surface water contamination at the ACM facility."

- AR Detailed Comment 5: Page 3, Paragraph 4: Discussion of the history of the ACM Site in the third paragraph of the "Site Background and History" section should identify that significant reclamation was completed following closure of the facility. Reclamation and closure of the ACM Site facilities, which occurred at various times between approximately 1980 and 1999, consisted of demolition and removal of buildings; backfilling of building substructures; salvaging; on-site burial of flue dust, granulated slag, asbestos-containing material, demolition debris, and other wastes in a secure manner; capping of waste management and other areas throughout the Site; employment of erosion and stormwater controls; and revegetation. AR requests that a description of such activities be included in the ROD.

EPA Response

The EPA appreciates that significant earth moving work was completed on the former facility property (Operable Unit 2 of the ACM Site) between 1980 and 1999. However, the focus of this ROD is on Operable Unit 1, Community Soils. For this reason, the operational history of the Site is somewhat abbreviated in the OU1 ROD. The reclamation work referred to in the comment was performed under an unapproved work plan, without EPA or DEQ oversight. As such, inclusion of considerable additional information would be necessary to provide appropriate context to any mention of this reclamation work in the OU1 ROD. Therefore, the EPA determined that it would be more appropriate to postpone discussion of these activities to OU2, where they are more relevant and do not add unnecessary complexity to the discussion of the OU1 preferred alternative/selected remedy.

- AR Detailed Comment 6: Page 4, Text Box at Bottom of Page: The description included under "What are the Contaminants of Concern?" overstates the potential health effects that can realistically take place due to exposure to arsenic and lead in soil at the ACM Site. In addition, the maximum concentrations of arsenic and lead reported in this description are considerably higher than typical concentrations in OU1 soils. Finally, the statement in the last paragraph of the text box, that other contaminants (i.e., beyond arsenic and lead) "were not present at levels hazardous for human health and are not contaminants of concern for the site" might be misinterpreted as a finding for the ACM Smelter and Refining Site as a whole rather than just to OU1. AR requests that EPA qualify the language included in the text box in line with this comment.

EPA Response

A text box similar to that referenced from the Proposed Plan is not included in the ROD. The EPA has noted the preference expressed by AR that some measure of typical concentrations also be provided in those locations where maximum concentrations are given. Accordingly, Sections CS 5 and RC 5 of the ROD provides median values along with maximum values (where appropriate) when discussing Site characterization.

- AR Detailed Comment 7: Page 4, Text Box at Bottom of Page: The maximum concentrations of 1,850 mg/kg for arsenic and 7,200 mg/kg for lead identified in the text box are inconsistent with the maximum values for RCOU1 soils referenced on page 15 of the Proposed Plan (i.e., 2,580 mg/kg arsenic and 11,200 mg/kg lead). If the maximum values identified in the text box were referring to residential yard data only then that should be clarified and the maximum value for lead should be corrected to 6,270 mg/kg to match Table 4-5 of the RI report. This correction to the maximum residential property lead concentration is also applicable to paragraph 2 of page 5.

EPA Response

A text box similar to that referenced from the Proposed Plan is not included in the ROD. The ROD has been structured to prevent confusion as to which discussions apply to the community soils areas and which are specific to the railroad corridor.

- AR Detailed Comment 8: Page 6 (and throughout): The naming conventions for terms identified in the Proposed Plan, particularly in relation to the CSOU1, is inconsistent throughout the Proposed Plan. For clarity, starting on page 5, AR suggests that at least the Southern Community Soils Area of Interest, Northern Community Soils Area of Interest, Southern Outlying Area of Interest, and Northern Outlying Area of Interest be defined and then referred to in a consistent manner through the ROD.

EPA Response

Areas are identified in the Declaration and in Section 1 of the ROD, and are referred to consistently throughout.

- AR Detailed Comment 9: Pages 6-8, Figures 2-5: The figures / maps depicting areas of soil where arsenic or lead concentrations exceed PRGs are misleading because they are based on exceedances of PRGs calculated for soil in residential areas. Most of the areas within OU1 are not currently zoned for residential use. The non-residential parcels marked on Proposed Plan Figures 4 and 5 are not areas where arsenic and lead concentrations in soil represent potential health risks to people under their current and expected future land uses. At a minimum, AR requests that EPA expressly include this clarification in the ROD.

EPA Response

The EPA determined that a comparison of soil concentrations to residential cleanup levels was the most appropriate way to display soil data for the Southern Community Soils Area of Interest (CSAOI) as most of these properties are currently developed for residential use. Two of the three properties in the Northern CSAOI which exceed PRGs are vacant lots with current residential zoning, and the EPA believed that comparison to residential PRGS was most appropriate in this case as well. The Southern Outlying Area had exceedances of residential PRGs on 7 total properties, 6 of which are currently residential. The EPA acknowledges that the two properties in the Northern Outlying Area shown with residential PRG exceedances are not currently zoned residential, and a note to this effect has been added to the figure in *the ROD. However, for consistency with the other three figures, the EPA has decided to leave the Northern Outlying Area figure otherwise unchanged.*

- AR Detailed Comment 10: Page 10, Last Paragraph: The Proposed plan states: "The first step is to evaluate soil concentrations of arsenic and lead against not to exceed (NTE) concentrations of 250 mg/kg arsenic or 400 mg/kg lead on a yard component basis down to a maximum of 18 inches." For clarification, AR assumes that the NTE evaluation extends to a depth of 24" in current garden areas. AR requests that EPA indicate in the ROD the required depth for NTE evaluations in current garden areas in the ROD.

EPA Response

Section CS 9 of the ROD clarifies that in existing garden areas the NTE evaluation extends down to 24 inches for all community soils remedial alternatives. Section CS 12 of the ROD clarifies that the NTE evaluation extends down to 24 inches in existing vegetable gardens for the selected remedy.

- AR Detailed Comment 11: Page 10, Last Paragraph: AR suggests that EPA include the definition of "Principal Threat Wastes" in this section. *See* U.S. EPA, *A Guide to Principal Threat and Low Level Threat Wastes, at 1* (Pub. No. 9380.3-06FS Nov. 1991).

EPA Response

Sections CS 11 and RC 11 of the ROD provide the following definition of Principal threat wastes: "In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or will present a significant risk to human health if exposure occurs."

13) Additional Cascade County Commission Comments

- Coordination of railroad corridor remedial activities and Black Eagle sewer and water system infrastructure upgrades is important to this community and specific requirements for this coordination should be specified in the proposed plan to ensure the timing requisites are met.

EPA Response

Section CS 5 of this ROD describes work completed by the EPA Removal Program in coordination with the Black Eagle Water and Sewer District fall 2020 utility project.

14) Additional Montana DEQ Comments

- The State's risk levels for arsenic and lead should be clearly identified along with EPA's target risk range. Please address consistency with units of measurement for arsenic and lead or clarify conversions or usage of different units based on identified goals or objectives.

EPA Response

Acceptable risk levels for the site are defined as Remedial Action Objectives (RAOs) in Section 8 of the ROD. The RAOs for the Site are to achieve an excess cancer risk no greater than 1 in 100,000 or a non-cancer hazard index no greater than 1, and to achieve a probability of less than 5 percent that an *individual child will have a blood lead level exceeding 5 µg/dL. For consistency, concentrations in soil are expressed in milligrams per kilogram (mg/kg) throughout the ROD. Some project documents which are referenced in the ROD use parts per million (ppm) as another way to express concentration. 1 mg/kg is equivalent to 1 ppm. Blood lead concentrations are expressed in terms of micrograms of lead per deciliter of blood (µg/dL).*

- DEQ is concerned that due to averaging, the results in the top 6 inches of Community Soils step 2 may not provide a long-term protective remedy based on the State's <1E -05 risk clean up value for arsenic (36 ppm).

EPA Response

EPA believes this remedy will be protective through its use of maximum values to identify areas of concern, within which risk was evaluated on a property-specific basis, and through the two-tiered remedial action approach utilizing both cleanup levels (which are compared to area average soil concentrations to trigger soil removal) and not to exceed concentrations (which are compared to individual soil concentration results to trigger soil removal).

- The Proposed Plan does not adequately explain the relationship between the preliminary remediation goals (PRGs) and the remedial action objectives (RAOs) and the ultimate remediation decision. Further, the basis of the PRG calculations is not clear (i.e., risk levels, hazard indices, and blood lead concentrations) and should be provided. DEQ proposes that the arsenic PRG of 175 mg/kg be used as the Not to Exceed RAO since it is actually based upon site-specific conditions.

EPA Response

Additional detail regarding the process of establishing PRGs to achieve the RAOs has been included in Sections CS 8 and RC 8 of the ROD.

- DEQ accepts cumulative excess cancer risk no greater than 1 in 100,000, not 1.44 in 100,000 and a non-cancer hazard index of 1. In addition, DEQ determines lead cleanup levels based upon an individual child having less than a 5 percent probability of having a blood lead level exceeding 5 ug/dL. The arsenic RAO of 54 mg/kg does not meet this requirement and DEQ has consistently stated that the RAO for arsenic should be 36 mg/kg. The statement on page 9 of the Proposed Plan regarding the blood lead level of 8 ug/dL is not consistent with the basis of the lead RAO of 281 mg/kg. The cumulative risk levels and blood lead levels should also apply to the non-residential exposures at the site.

EPA Response

In accordance with EPA's Risk Assessment Guidance, Part D, calculated excess cancer risk is expressed in whole number (i.e., the risk range of 1 in 10,000 to 1 in 1, 000,000). DEQ's calculated excess cancer risk of 1.44 in 100,00 is correctly expressed as 1 in 100,000 which meets EPA's remedial action objective of 1 in 100,000 excess cancer risk.

- The proposed remedy is not well described in the Proposed Plan and should be outlined more specifically in the ROD. DEQ considers the top 24 inches to be surface soil. DEQ does not consider 6 inches of clean material to be a permanent remedy. Based on the State's definition of surface soil, the proposed remedy will result in exceedances in area-specific regions of residential yards, in residential soils deeper than 6 inches and in areas evaluated for recreational and commercial uses. Please modify step 2 of alternative 4 for excavation to a depth of 18 inches consistent with Remedial Investigation database.

EPA Response

RI data suggests that the majority of contamination in residential soils is in the top 18 inches of the surface. The proposed clean up strategy is based on specific assumptions about people's behavior and exposure to soil contamination. The Not to Exceed (NTE) concentrations for arsenic and lead represent concentrations at which there is an unacceptable risk with a brief, acute exposure. The NTEs are also generally with EPA's acceptable risk range and are applied down to 18 inches (24 inches in gardens). The final conservative cleanup standards are applied to the top 6 inches of soil and will be protective of the community by removing soils at concentrations above which chronic exposures may present an unacceptable risk.

The Not to Exceed (NTE) concentrations for arsenic and lead represent concentrations at which there is an unacceptable risk with a brief, acute exposure. Calculations supporting the selected PRG and NTE concentrations for community soils and railroad corridor areas are presented in the respective HHRAs (Formation 2015, KJ 2015). While people are likely to be exposed to the top few inches of soil frequently, making the most representative surface soil exposure scenario long-term (i.e. chronic) exposure, this is less likely with deeper soils. It is believed that exposure to deeper soils is likely to happen less frequently and for shorter durations. NTE concentrations were established to address potential hotspots within deeper intervals. Further, in order to be exposed to deeper soils, a resident will have to dig down through shallower soils. This physical reality means that mixing can be assumed to occur, and that there is not a pathway by which residents can be exposed only to the soils located 6-12 or 12-18 inches below ground.

15) Additional Comments From Area Residents

Sarah Carter

So, in reading the documents, it's scary to think I live and recreate in an area contaminated with lead and arsenic. My home is located in the Southern community soil area of interest. My home is highlighted in red as having a lead concentration higher than 500 ppm. I have not received any notice and frankly, I'm concerned about the health risks of such contamination.

In regard to the Superfund site, just make it safe and usable. Rivers edge trail and the dam area is nice for walking, running. If all the recreational places in this area could connect with a walking path it would be such a benefit and would make each area more user friendly.

EPA Response

Residents who live at properties where soil concentrations exceed the Site PRGs will be contacted during the Remedial Design/Remedial Action stage of the project to coordinate for residential cleanups.

Dana L Olsen

[page one] Introduction

Every law book, I've ever read says on should do their own work. I claim Charlie Coleman did not identify the landowner of refinery site, when the ash became problematic. I required a rebuttal.

Noting a company can sell contaminated property, but unless it documented normally no liability transfers. That is presumptuous and in law no presumption are ignored.

I said in a phone call on July 23, 2019 why wasn't the landowner present. He said an oil company was present, without having them identify themselves.

A controversy exists, because EPA refuses to recognize the Black Eagle contamination occurred from engineering too small a stack. Liability may attach to engineers. No time line for conspiracy.

A remedy: re-open public meeting. Get the owners on record. Instead of investigating our President again, assign a federal prosecutor?

[page two] I said at the public meeting (June 2019) trespass on private property cannot be infered*[sic]* by local governments. One can buy title insurance. When you buy insurance, you don't do legal work: they do it for you!

In my opinion EPA has not done legal; the work. I know EPA has attorneys.

Remedy: this should wo under a legal review and pertainent*[sic]* information given out. (disclosure) or referral to Interior Dept.

A controversy exists whether an abandon line (railroad) is subject to negotiations before the public comments.

I believe this is unlawful, when the county (Cascade) is negotiating terms, before public comment occurs. If EPA is using the Commerce clause, and the Supremacy clause then it violate OPEN Meeting Act Requirement in some states (like Alaska). Atlantic Richfield operates in Alaska.

[page 3] I filed at the Nineth*[sic]* Circuit (2002) a petition regarding: the law of several states Federal jurisdiction being eliminated by Congress. Told I had no lower court decision.

Why does EPA use the law of several states, yet an individual cannot. This seems biased with prejudice. The Bill of rights is against states.

In seeking to address my home damage from the National Guard blowing up military bombs in Alaska why is it that I can be held to the Federal tort Claim Act, and others not? I filed with Governor Murkowski office. It is a Federal record. I claim denial of equal protection.

I said the seller of the homes has a duty to disclose contamination. (State Law Realty license) If he didn't disclose; yet it was public knowledge (I gave testimony) at June 2019 Public Meeting about engineering failure. Yet EPA document says they have the record. I claim they do not have the records yet. They must depose others.

[page 4] EPA hand-out action plan says the Montana Governor requested the clean-up. This infers that this is state action and may confuse commenters in representing their interests.

Remedy: re-open public meeting after EPA deposes on engineering failure. A Finding of Fact would signify that the issue was administrative. [We] as oppose to a NEPA challenge. One cannot proceed before the other is settled.

Clustering of industrial sites has been a favorite tactic of industrial activities. This way since the burden of proof is on the plaintiff, they get their case dismissed under Federal Civil Rule 12(b)(6). One must have facts.

EPA human health risk assessment is flawed. Dioxin is produced burning at high temperatures. An oil company can't support the oil refinery, by using a false real party in interest. Dioxin can cause Parkinson Disease. A real nasty, fatal disease.

[page 5] Mr. Coleman wanted to substitute his judgement for that of the VA. Dioxin. Noting that President Trump and Montana U.S Senator spent over his VA nominee. The issue may rise in hot tempers. I appreciate my President, Donald Trump; because he signed in executative*[sic]* order to screen for mental issues on exiting veterans. Parkinson's causes hallucinations. And some states refuse to recognize Veteran health issues, even the VA ignored pleas for assistance.

The issue of EPA human risk assessment is flawed because my sister Lori speaks of a relative and a close friend that had high arsenic (blood) levels. For EPA too*[sic]* ignore the fact that Great Falls was affected is with bias, without legal merit and dubious to the integrity of the Environmental Protection Agency.

[page 6] The VA inspect homes near dioxin sources for veterans. EPA ignores dioxin, why? If the VA can be sued on guarantee of a home, and realators*[sic]* get state licences*[sic]* to sell, even to Federal government.

The issue of gallium arsenide being used for veteran micro-chip implants[4] so adrenalin*[sic]* would flow for better soldier, precludes movement to tribalize, or NEPA challange*[sic]*-raise status. Minority business jobs to displace contaminants, causing harm to others.

Praceleus (1527) said, like things react greater than unlike things. Father of Pharmacology & Mining book expert (100 years).

[page seven] Elana Freeland recently said on Coast to Coast A.M 975 FM that Testla*[sic]* Science journals confiscated upon his death went to Trump's uncle. The Montana Governor is still arguing for Paris Climate Accord, despite Executive Privilige*[sic]*. Some still disbelieve technology is being used to harm U.S interests.

Why is ash a spill if its engineering failure for the railroad?

One of the distinctions about writing about science is that it is observed and written as such. Even in Candide Voltaire speaks of sheep flying in quantum mechanics. I love the part when he says 300 mathematicians and 3,000 engineers won't get it. He *[sic]* talking about anti-gravity not soil science.

[page eight] If a group of people keep trying for tribal status arriving from Canada. I have nothing in common with them. My grandpa (dad side) immigrant from Canada Mother side – cousins of her dad living in Canada.

French Canadians – might use French common law, yet U.S Federal law uses English Common law. The Malpasset Tragedy – dam broke engineering faulted in Malpasset tragedy p.166 "Why buildings/structures fall down. Individual sue for criminal liability, English use tort.

Since the Montana Attorney General is elected. Remedy – sent inquiry for opinion. EPA sponsored.

[page 9] Fluoride collects inside of stacks of combustion. EPA requires stack cleaning. This substance is natural in the water. The fluoride model is flawed because of re-active chemicals, and radiation from 100 nuclear bomb tests that made Cascade County a hot spot. The prevailing winds brought Nevada mushroom cloud particles to Montana.

Instead of real trials on fluoride values [dubbed a protector of teeth]. Sort of like putting potassium chloride on dirts*[sic]* roads to make them hard. Since teeth have pouricity*[sic]* (air spaces) the fluoride is reactive and is pulled into the reactive oxygen air pockets. It cements the pocket into a non-flexible teeth. So as one ages the air pockets collapse from natural aging. If one has a square jaw, he will break off this teeth.

---

[4] Under an Ionized Sky (p321) 2019. Elana Freeland.

The reason for no dentures is that the adhensive*[sic]* is a lot like gallium arsenside*[sic]*. It is made up of zinc, which triggers the immune function. Dental adhensives*[sic]* used zinc, and it can cause problems in hyperbolic-metabolic process.

[page 10] The crystalline properties cause neuro-transmitters to activate the immune function. Water flowing across cells [northern people] keeps them from freezing. Also found in plants and animals. In fact salmon process this, and they use this enzyme to keep [heart] organs vital for organ transplants. So, irregardless*[sic]* of the County position fluoride is bad, it comes from stacks and came from the one in Great Falls.

I don't think you can ignore the other problems with stack liabilities. EPA, and the County health department, have a legal problems separate from clean-up.

My front teeth, only a crown and two others remain. Even a non-cavity front tooth cracked and broke off. It abcessed*[sic]* and was removed.

I wanted you to see while local parties are not good parties, and should be striken*[sic]* from the record. Ignorance is bliss is not going to work. The County health center might care for Black Eagle residents; but not me!

[page 11] Stem cell and titanium posts are for me in Seattle. I need sympanthy*[sic]*: not criticism. They refuse to pay, except for dentures.

Being a horticulturalist, I've helped researchers in Montana understand sugars knowledge could be used to make wheat make two heads; instead of just one. (polarity and reversals). Apparently, they thought it was worth researching, as the Montana Legislature funded it.

In looking at Black Eagle, aggressive soil ground covers should be utilized. But since water is charged for, the more suitable ground covers, might not work. If your cheap, then what? Digging ash out of the ground in soil means it will be burned, giving others health problems. Incineration is biomediation*[sic]* and one can't stop it.

To me, planning and zoning are more important than social programs.

[page 12] Hill 57 residents bought cheap housing and isn't that what everyone needs. I think they kept the housing to cover the engineer flaw! But the company should have demolitionized*[sic]* Company housing. The Company wanted profit and the takers cheap housing. EPA blissfully not doing a NEPA at the appropriate time. Doing one now won't help anyone. Industry is necessary. Mining is necessary. Engineering needs to explore.

Even as a young child, I played with mud. Exploring why it sticks together. How much fluid would support my berry mud pie. I saw fluidicity*[sic]*, movement and marveled.

I melted snow on my grandma free-standing furnace. She knew I was inquisitive and let me learn on my own. Thank you, Grandma Marie. Perhaps the County can re-invent curosity*[sic]*.

EPA Response

Most of the comments or commentary are not relevant to the proposed plan or pertain to information provided in the administrative record