RECORD OF DECISION AMENDMENT

COMMUNITY SOILS OPERABLE UNIT

Anaconda Smelter National Priorities List Site
Anaconda, Montana

SEPTEMBER 2013

U.S. Environmental Protection Agency

and

Montana Department of Environmental Quality

Part I - Declaration

Site Name and Location

Anaconda Company Smelter Superfund Site (the Site), Anaconda-Deer Lodge County (ADLC), Montana 59711. EPA ID: MTD093291656. SSID: 0818. Community Soils Operable Unit (Community Soils OU).

Statement of Basis and Purpose

This document amends the 1996 record of decision (ROD) (EPA 1996) for the remedial action to clean up mining-related contamination at the Community Soils OU. The amended remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP).

This document is issued by the EPA Region 8, the lead agency, and the Montana Department of Environment Quality (DEQ), the supporting agency. Both the EPA and DEQ concur on the selected remedy presented herein.

This ROD amendment is based on the administrative record for the Site and will become part of the administrative record per the NCP, Section 300.825(a)(2). The administrative record (on microfilm) and copies of key documents are available for public review at the joint Deer Lodge County/Arrowhead Foundation Superfund document Repository at 118 East Seventh Street in Anaconda. The complete written administrative record is maintained at the EPA-Montana Office, 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed during normal business hours.

Assessment of the Site

The Site is located in the Deer Lodge Valley in southwestern Montana, in and around the city of Anaconda. Milling and smelting activities conducted for nearly 100 years resulted in the contamination of soils, surface water, and ground water, primarily through airborne emissions and disposal practices from smelting operations. The primary contaminants of concern are arsenic, cadmium, copper, lead, and zinc. The remedial action selected in this ROD amendment is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances at the Site.

Description of the ROD Amendment

The ROD amendment changes only those provisions of the 1996 Community Soils OU ROD which deal with residential soils. Remedial decisions for commercial/industrial properties and active railroad beds remain unchanged. The amended remedy differs from the 1996 ROD with the addition of a cleanup level for lead in soils and cleanup levels for arsenic and lead in accessible interior dust, as well as the expansion of the

institutional controls as implemented through the Community Protective Measures Program (CPMP) to provide for a health education program. All other components of the 1996 ROD remain unchanged.

Changes are due primarily to concentrations of lead in residential soils being significantly higher than those originally reported in the remedial investigation/feasibility study (RI/FS). Additionally, there is also a better understanding of the site conceptual model based on the large amount of remedial action and other sample data collected since 1996. Although smelter emissions remain the primary source of contamination, it is now clear that some properties contain other sources of contamination (such as imported waste material).

Statutory Determinations

The selected remedy meets the mandates of CERCLA §121 and the NCP. It is protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to the remedial action, 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 principal element of the remedy. However, contaminated soils present at the Community Soils OU do not represent a principal threat, and treatment would be significantly more expensive due to the very large quantities of materials impacted. Although they are present in large volumes, the soils within the Community Soils OU are low in toxicity and can be reliably contained.

Because this amended remedy will continue to result in mining contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews have been initiated at the Site and will continue to ensure that remedies remain protective of human health and the environment. The five-year reviews will continue to focus on areas where waste has been left in place or where remaining concentrations do not allow for unlimited use of the property.

Authorizing Signatures

This 2013 ROD Amendment documents the selected remedy for the Anaconda Smelter Community Soils OU. This remedy was selected by EPA with concurrence of the State of Montana.

Martin Hestmark

Date: 9/30/2013

Martin Hestmark
Assistant Regional Administrator, Ecosystems Protection and Remediation
U.S. Environmental Protection Agency, Region 8

Date: September 27, 2013

Tracy Stone-Manning, Director
Montana Department of Environmental Quality

Record of Decision Amendment

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Acronyms and Abbreviations

ADLC	Anaconda-Deer Lodge County
Atlantic Richfield	Atlantic Richfield Company
ARARs	applicable or relevant and appropriate requirements
ARWW&S	Anaconda Regional Water, Waste & Soils
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPMP	Community Protective Measures Program
Community Soils OU	Community Soils Operable Unit
cy	cubic yards
DEQ	Montana Department of Environmental Quality
DIAR	Data Interpretation and Analysis Report
DPS	Development Permit System
EPA	U.S. Environmental Protection Agency
FFS	focused feasibility study
FS	feasibility study
GIS	geographic information system
HHRA	baseline human health risk assessment
I90	U.S. interstate 90
IC	institutional control
ug/dL	micrograms per deciliter
mcy	million cubic yards
MSL	mean sea level
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OW/EADA	Old Works/East Anaconda Development Area
ppm	parts per million
PRP	potentially responsible party
RAOs	remedial action objectives
RI	remedial investigation
ROD	record of decision
TAG	Technical Assistance Grant
the Site	Anaconda Smelter Superfund Site
surficial	0 to 2 inches
TCRA	time-critical removal action

Part II Decision Summary

Anaconda Company Smelter Site

Community Soils Operable Unit

Anaconda-Deer Lodge County

- EPA ID: MTD093291656
- Superfund Site ID: 0818
- Lead Agency: U.S. EPA
- Support Agency: MT DEQ

Exhibit 1. Site Identification.

1.0 Introduction

This amendment to the original ROD (EPA 1996) for the Community Soils OU at the Anaconda Smelter Site (Exhibit 1) adds to the existing requirements for residential soils by including soil lead as a cleanup criterion and by addressing arsenic and lead in interior dust. The EPA and DEQ have determined that these changes are necessary to protect human health, based on information obtained through implementation of the remedial action and other studies.

Since the 1996 ROD was issued, over 1,700 residential properties have been sampled as part of the remedial action. This has generated significant data on shallow and subsurface soils throughout Anaconda. The data have raised questions about original assumptions made in the 1996 ROD with regard to the site conceptual model, which was based on the data available at the time. Because of concerns expressed by the EPA, DEQ, and local community representatives, additional studies and investigations have been conducted by the potentially-responsible party (PRP) the Atlantic Richfield Company (Atlantic Richfield), and by the EPA. This work has led to the conclusion that an amendment to the 1996 ROD was required to include lead for soil cleanup and to include both arsenic and lead for interior dust cleanup.

This ROD amendment presents a brief overview of the Site and enforcement activities, the basis for amendment, changes in the Community Soils OU based on new information, evaluation of alternatives, description of the selected remedy, and statutory determinations. This ROD amendment does not change existing components of the 1996 ROD (e.g., arsenic cleanup levels) although it does include additions to the original remedy.

The EPA is the lead agency and DEQ is the support agency. The EPA is issuing this ROD amendment as part of its responsibilities under of Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Reauthorization Act of 1986, and the National Contingency Plan (NCP) Section 300.435 (c)(2)(ii). This ROD amendment is based on the administrative record for the Site and will become part of the administrative record per NCP, Section 300.825(a)(2). The administrative record (on microfilm) and copies of key documents are available for public review at the joint Deer Lodge County/Arrowhead Foundation Superfund document Repository at 118 East Seventh Street in Anaconda. The complete written administrative record is maintained at the EPA-Montana Office, 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed during normal business hours.

1.1 Site Description

The Site is located in southwestern Montana, in and around the city of Anaconda (Exhibit 2). Anaconda is the county seat of Deer Lodge County and has a population of 9,300 people at an elevation of 5,335 feet above mean sea level (MSL). The closest city is Butte, Montana (Silver Bow County) located 25 miles to the southeast with a population of 34,200. The town of Deer Lodge (population 3,130) is 25 miles north of the Site in Powell County.

The Anaconda Smelter was built at this location in the early 1880s because the area offered close proximity to the ore producing mines of Butte, rail transport, a steady water source, a flat valley floor, timber to feed the furnaces, and a valley configuration that helped to disperse smelter emissions. The former smelter was demolished in the 1980s, but the brick stack built to discharge exhaust gases from roasting and smelting furnaces at the smelter in 1919 remains. It is located between the communities of Anaconda and Opportunity and is the most visible landmark for miles. It is the largest, freestanding masonry structure ever constructed at 585 feet tall and 75 feet wide.

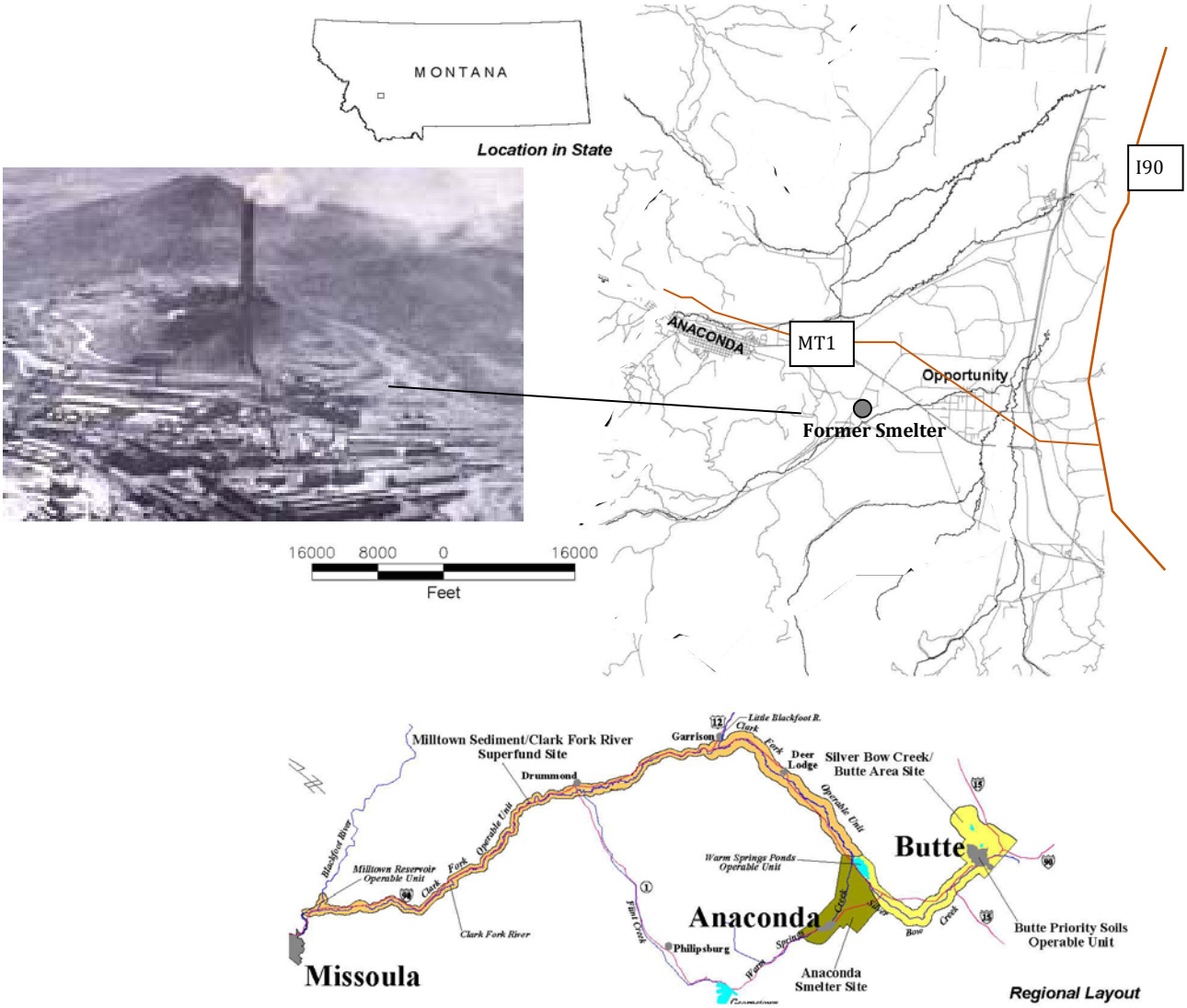

Exhibit 2. Site Location and Layout.

The Site encompasses approximately 77,000 acres of mostly open space and agricultural land (Appendix A). It is made up of five OUs, including the Community Soils OU which is the subject of this ROD amendment. The Community Soils OU is comprised of the residential areas within the Site. This includes Anaconda and

the communities of Opportunity (population 545) and Crackerville (population 451) as well as rural residences scattered across the Site.

In Anaconda, water is provided by municipal wells that extract uncontaminated groundwater west of town. In the rural areas of the Site, including the communities of Opportunity and Crackerville, water is primarily obtained from individual wells. Much of the groundwater in the former smelter facilities portion of the Site is impacted with metals and use is restricted.

Anaconda and Opportunity were "company towns" that were developed to support the employees of the former smelter and its ancillary operations. Properties decrease in age with distance from the former smelter. As is common in company towns, residential properties in the older sections of Anaconda are typically very small (i.e., less than 1/8 of an acre). When they were first developed, landscaping was not common and these properties were often primarily bare areas used to support activities such as raising chickens, gardening, or parking. Lawns were a later development, generally beginning in the late 1940s. Today, the lots in the older sections of town generally have a mixture of vegetative areas with grass, shrubs, trees, and gardens, as well as unvegetated areas including driveways and parking areas that may have gravel, asphalt concrete, or bare earthen covers.

1.2 Community Participation

The following community participation activities were conducted as part of the ROD amendment process:

- EPA prepared and distributed a 4-page fact sheet that summarized the proposed plan for cleanup and the need for a ROD amendment.
- The fact sheet was distributed as an insert to the local newspaper, the *Anaconda Leader*, on September 28, 2012. A total of 3,850 copies of the fact sheet were provided for insertion.
- The proposed plan for the Community Soils OU ROD amendment was released on September 28, 2012.
- An electronic version of the proposed plan was posted on EPA's Anaconda website on September 28, 2012.
- 280 copies of the proposed plan were mailed to individuals on the site mailing list on October 1, 2012, and an additional 200 copies were made available at the Community Soils OU public meeting.
- The Community Soils OU public meeting was held on October 24, 2012 from 6:30 to 8:30 at the Metcalf Memorial Senior Citizen's Center, 115 East Pennsylvania Avenue in Anaconda. EPA presented the details of the plan and distributed additional copies. A stenographer was present to capture oral comment from attendees. Approximately 50 people attended the meeting, and eight provided oral comment. The transcript from the public meeting is part of the Administrative Record for the site and can be obtained from EPA's Record Center.
- A 30-day public comment period ran from October 1 through 31, 2012. That comment period was extended until December 31, 2012.

- Formal written comments were received from Anaconda-Deer Lodge County, Atlantic Richfield, the local Technical Assistance Grant (TAG) group – the Arrowhead Foundation, DEQ, and one private citizen of Anaconda. The comments received are addressed in the Responsiveness Summary.

2.0 Site History and Enforcement Activities

2.1 Site History

Milling and smelting activities conducted for nearly 100 years resulted in the contamination of soils, surface water, and ground water, primarily through airborne emissions and disposal practices from smelting operations. The primary contaminants of concern are arsenic, cadmium, copper, lead, and zinc. Exhibit 3 shows the timeline for mining activities at the Site.

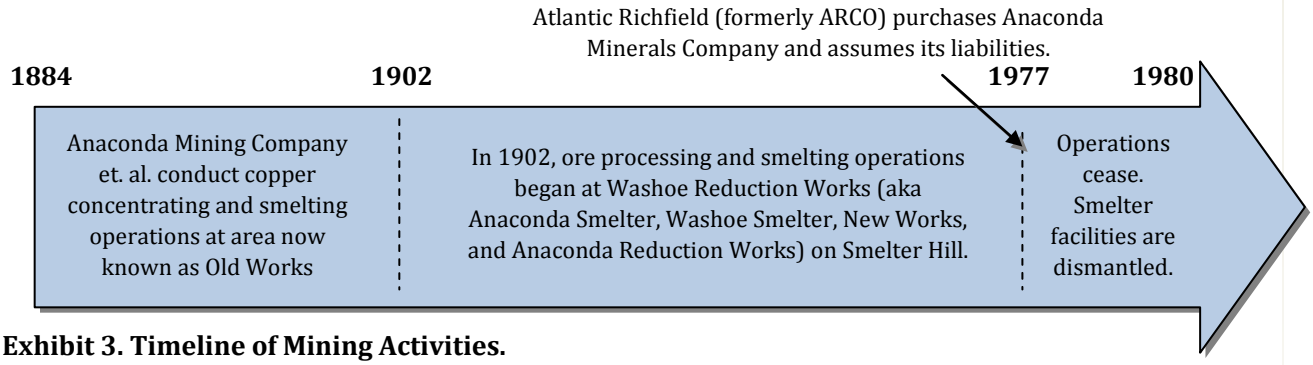

Exhibit 3. Timeline of Mining Activities.

Smelter emissions dispersed contaminants elevated in arsenic and metals over more than 300 square miles. Large amounts of slag and tailings were also produced. Current estimated waste volumes on the Site include 230 million cubic yards (mcy) of tailings, 30 mcy of slag, and 0.5 mcy of flue dust. Approximately 20,000 acres of soil were severely impacted by airborne emissions and millions of gallons of ground water were polluted. The milling and smelting contaminants pose well documented risks to human health and the environment.

Enforcement actions, removals, RODs, and other milestones for the Site are shown in Exhibit 4. The Site was added to the NPL in 1983, under Superfund authority, and Atlantic Richfield was identified as the primary potentially responsible party. Since then, Atlantic Richfield has been actively involved in the investigation and cleanup of the following five Anaconda Smelter OUs:

- Mill Creek OU. This first clean-up action involved relocating residents from Mill Creek and other soil stabilization and removal efforts.
- Flue Dust OU. The second clean-up action addressed flue dust on Smelter Hill through removal, treatment, and containment. At the same time, Atlantic Richfield removed the Arbiter and beryllium wastes and contaminated residential yard materials from portions of Anaconda.
- Old Works/East Anaconda Development Area (OW/EADA) OU. The third clean-up action addressed waste sources adjacent to the community of Anaconda.

- Community Soils OU. The fourth clean-up action provided for cleanup of remaining residential, commercial and industrial soils contaminated with arsenic in Anaconda.
- ARWW&S OU. The fifth and final OU provides for cleanup of all remaining contamination at the Site, including large volumes of wastes, slag, tailings, debris, and contaminated soil, groundwater, and surface water that are spread over 300 square miles of agricultural, pasture, rangeland, forests, and riparian and wetland areas.

The Community Soils OU is the only OU impacted by this ROD amendment.

2.2 Implementation of the 1996 ROD

The 1996 Community Soils OU ROD addressed all remaining residential and commercial/industrial soils of the Site, and brought closure to previous actions conducted at residential properties therein (i.e., Community Soils time-critical removal action, and actions taken to date through Anaconda – Deer Lodge County's (ADLC's) Development Permit System [DPS], as well as commercial/industrial properties).

Major components of the remedy for residential soils as specified in the 1996 ROD are:

- Clean up current residential soils exceeding the residential action level of 250 ppm arsenic, through removal, replacement with clean soil, and placement of a vegetative or other protective barrier.
- In areas where site conditions dictate that soil removal is not implementable, treatment or other measures (e.g., capping, tilling, institutional controls [ICs]) will be taken to reduce arsenic concentrations to below 250 ppm or to prevent exposure.
- Clean up all future residential soils, at the time of development, that exceed the residential action level of 250 ppm soil arsenic concentration through the DPS.
- Implement ICs to provide educational information to all residents describing potential risks, and recommendations to reduce exposure to residual

Exhibit 4. Superfund Timeline.

contaminants in soils, and to ensure the long-term viability of the remedy.

Major components of the remedy for commercial/industrial soils are:

- Clean up current commercial or industrial areas that exceed the commercial/industrial action level of 500 ppm soil arsenic concentration through a combination of revegetation techniques and/or engineered covers.
- Clean up all future commercial or industrial areas at the time of development that exceed the action level of 500 ppm soil arsenic concentration through the ADLC DPS.

Major components of the remedy for the Anaconda railroad beds are:

- Construct an engineered cover over all contaminated railbed material within the community of Anaconda to prevent direct contact with, and reduce potential for erosion and transport of, contaminated materials to residential and commercial/industrial areas.
- Separate the railbed from residential and commercial/industrial areas with a barrier to restrict access to the railbed and to control surface runoff from the railbed through the use of retaining walls and/or curbing.
- Maintain existing ICs to restrict access.

2.2.1 2002 to 2005 – Remedial Design/Remedial Action

Using data collected during the remedial design investigation (Atlantic Richfield 1997), the *Residential Soils Remedial Action Work Plan/Final Design Report (RAWP/FDR)* was finalized in 2002 (Atlantic Richfield 2002). The RAWP/FDR was approved in 2002, and the focus area for Anaconda was expanded to include all yards east of Main Street. The cleanup strategy used a two-phase sampling approach shown in Exhibit 5. This approach was based on findings in the site characterization that fallout from smelter emissions was the primary source of contamination and that contaminant levels would be higher at the surface and decrease at depth. Soil and/or aggregate covers were used over portions of the residential yards where concentrations exceeded 250 ppm to minimize the potential risk of human exposure. The treatment type selected for each residential yard was based on the supplemental remedial action data collection activities. Individual site work plans were developed for specific areas requiring remedial action. The extent of soil removal and soil cover or aggregate cover placement for residential yards was determined through the supplemental data collection activities.

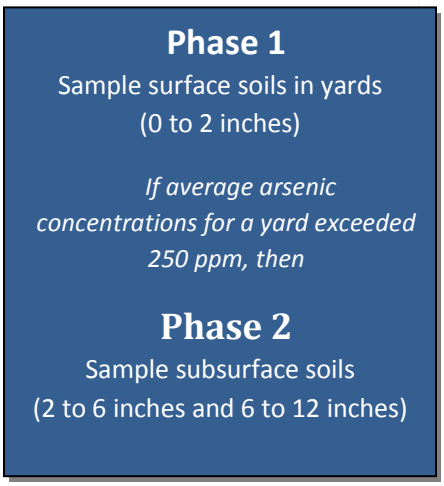

Exhibit 5. Two-phased Sampling Approach.

In 2002, Atlantic Richfield began sampling residential yards in Anaconda and the rural area under an approved remedial design. Of 1,740 sampled yards, 350 had calculated average arsenic concentrations that exceeded the cleanup action level of 250 ppm. Those yards were cleaned up. This number of yard cleanups was significantly more than the 10 to 50 yards estimated in the 1996 ROD, and the results of the remedial design sampling, especially in subsurface soil, conflicted with the RI site characterization.

After the 1996 ROD was issued, the EPA became aware of several historic abandoned railroad beds within the community of Anaconda. These railroads often were constructed out of mining and smelting waste materials, and contained high concentrations of arsenic. Consistent with the 1998 Anaconda Regional Water, Waste and Soils OU ROD, known historic railroad beds have been removed, waste materials have been transported to designated waste management areas for disposal, and the remediated areas have been reclaimed commensurate with existing land use under the *Final Historic Railroads and Commercial/Industrial Areas Remedial Action Work Plan/Final Design Report* (Atlantic Richfield 2005).

2.2.2 2006 – Five Year Review

The 3rd 5-year review for the Site (EPA 2006) cited issues related to finding arsenic concentrations that were significantly higher than anticipated based on previous remedial investigation/feasibility study (RI/FS) data. At the request of the EPA and DEQ, Atlantic Richfield analyzed archived soil samples from Anaconda residential yards where weighted average concentrations were below 250 ppm arsenic. 142 Anaconda yards were selected (approximately 10 percent of the yards evaluated in remedial action Phase 1) from which lead concentrations were determined in surface soils.

Atlantic Richfield also conducted additional sampling and analysis of interior (living space), exterior, and attic dusts in 52 Anaconda and regional residences. Houses were located in Anaconda (east and west of Main Street), Opportunity, and rural areas. Samples were also collected from newer houses (e.g., those built after 1975).

Additionally, the Agency for Toxic Substances and Disease Registry (ATSDR) received a request from a local resident to evaluate the arsenic residential soil cleanup level from the 1996 ROD.

2.2.3 2007 – Data Collection

Atlantic Richfield provided the lead data set from the 2006 activities and a memorandum *Analysis of Lead in Anaconda Community Soils* (Atlantic Richfield 2007) to the EPA in 2007. In September and October, the EPA conducted a subsurface soil characterization study in Anaconda. Crews collected 221 subsurface soil samples from 107 residential yards under an EPA-approved sampling and analysis plan (CDM 2007) with the following objectives:

- Arsenic. Identify residential properties that were previously tested and were not scheduled for further sampling or remediation to evaluate subsurface soil arsenic concentrations.
- Lead. Quantify lead concentrations in subsurface soils and evaluate any relationship between arsenic and lead concentrations.

EPA focused on building a new data set of subsurface soil analytical results from residential yards where no remediation occurred (e.g., those where the area weighted average arsenic concentrations for surface soils were less than 250 ppm) and remediated properties with individual yard components (front yards, back yards, earthen driveways, gardens, play areas, etc.) with surface soil results less than 250 ppm. The results of this sampling were reported in *Community Soils OU Residential Subsurface Soil Characterization Data Summary Report* (CDM 2007).

ATSDR completed their health evaluation from 2006 based on a review of available literature and made the following conclusions in their draft report *Evaluation of Residential Soil Arsenic Action Level* (ATSDR 2007):

- Exposure and bioavailability assumptions in EPA's 1996 baseline human health risk assessment (HHRA) for Anaconda are reasonable in estimating risk. However, ATSDR recognizes the potential for uncertainty in the bioavailability factors chosen for soil and dust in Anaconda.
- Chronic exposure to soil at the residential cleanup level of 250 ppm arsenic would not be expected to result in adverse health effects for resident children or adults, regardless of anticipated uncertainties of bioavailability or other exposure assumptions from the HHRA.
- Children who exhibit soil pica behavior could experience adverse health effects if they ingest gram quantities of soil containing arsenic, and areas with soil arsenic concentrations high enough to cause adverse health effects could remain after cleanup.
- Changing conditions at the soil surface due to activities such as excavation could increase the risk and may require further evaluation.

ATSDR also made the following recommendations to prevent potentially harmful exposures:

- EPA and Atlantic Richfield should continue cleanup of residential properties.
- The Community Protective Measures Program (CPMP) should include education of parents about risks associated with soil pica behavior in children.
- The CPMP should include measures to protect against potential recontamination of residential surface soils with arsenic-contaminated subsurface soils.

ADLC has developed an interim CPMP under their interim institutional controls plan. A final CPMP is currently being developed cooperatively by ADLC, Atlantic Richfield, EPA and DEQ.

2.2.4 2008 - Data Interpretation and Analysis Report

Atlantic Richfield provided the Agencies with the results of their 2007 dust study in the *Draft Final Community Soils Interior and Attic Dust Characterization Study Data Summary Report* (Atlantic Richfield 2008). The Agencies evaluated theses data, the soil lead data set provided by Atlantic Richfield, and the results from the additional sampling in 2007 and drew the following conclusions in *Residential Soils Data Interpretation and Analysis Report (DIAR)* (CDM 2008):

- Lead in soils. 95 of the 142 yards (67 percent) that were sampled but not cleaned up had area weighted average lead concentrations above 400 ppm. 125 of the 142 yards (88 percent) evaluated had surface soil lead concentrations above 400 ppm in at least one yard component. 33 of the 142 yards (23 percent) had surface soil lead concentrations in at least one yard component greater than 1,200 ppm. The actual average concentration of lead in surface soils was 507 ppm, which is much higher than the calculated 290 ppm average from the 1996 HHRA.
- Arsenic in subsurface soils. Some portions of about one third of yards sampled but not cleaned up exceed 250 ppm arsenic in the subsurface. Soils with elevated arsenic generally also have elevated lead and vice versa. Correlations are weaker in subsurface soils than surface soils.
- Attic dust. Attic dust concentrations in the Anaconda focus area are significantly higher than interior dust concentrations and show no correlation, suggesting that attic dust does not influence interior dust.

- Rural areas. In most rural areas, smelter emissions appear to be the only site-related source of contamination. The exception is part of South Opportunity/Crackerville where tailings were deposited by Silver Bow Creek flooding events and irrigation practices.

2.2.5 2010 - FYR

The 4th 5-year review for the Site was completed in September 2010 (EPA 2010). For the Community Soils OU, the 5-year review noted that Atlantic Richfield had cleaned up over 300 yards in Anaconda and 47 in the nearby communities. The remedial action completed to date has addressed the surficial (0 to 2 inch) arsenic in residential soils. Interim controls include ADLC's CPMP to communicate to residents risk/protectiveness information related to remaining contaminants. However, there is still concern that the remaining contaminants (especially lead) may pose an unacceptable risk. Therefore, a protectiveness statement was deferred. Additionally, the 5-year review noted that for the remedy to be protective in the long-term, final ICs must be completed.

3.0 Basis for Amendment

The original Community Soils OU RI/FS primarily addressed human health risks from contact with contaminated soils and resulted in the development of a residential soil action level for arsenic. Areas of concern included yards and other areas frequented by children. Potential source areas within the communities, including railroad beds and imported waste/fill areas, were also to be addressed. Based on the findings of the original RI/FS, the 1996 ROD specified cleanup of contaminated residential soils having arsenic concentrations above an action level of 250 ppm in the upper 18 inches of the soil profile.

In 2002, EPA and DEQ approved the *Residential Soils Remedial Action Work Plan/Final Design Report for the Community Soils OU* (Atlantic Richfield 2002). Since then, approximately 1,740 residences in Anaconda and the surrounding rural area have been sampled and 350 yards where the average arsenic concentration for the yard exceeded the 250 ppm residential use action level in the surface soil (0 to 2 inches) have been cleaned up. Data collected during cleanup show that some of the assumptions used to develop the site characterization need to be updated. Although smelter emission fallout remains the primary source of arsenic and lead contamination, it is now clear that at some properties within the Site, other sources of contamination are also present.

After examination of the data, EPA conducted additional studies to determine the significance of the findings. Three main concerns were identified from these studies:

- Elevated arsenic and lead concentrations are present in deeper soils.
- Elevated lead is present in yards that were not cleaned up.
- Elevated arsenic and lead are present in indoor dust.

Based on these concerns, EPA has identified the need for fundamental additions to the original remedy to ensure protection of human health. The amended remedy differs from the 1996 ROD in the addition of a cleanup level for lead in soils and cleanup levels for arsenic and lead in accessible interior dust, and expansion of the ICs as implemented through the CPMP to include a lead health education program. All

other components of the original remedy remain unchanged. Note that concerns with remaining elevated arsenic concentrations at depth will be addressed during remedial design.

Changes are due primarily to the finding of higher lead concentrations in residential soils than anticipated compared to the RI/FS data, and a better understanding of the site conceptual model based on the large amount of remedial action and other sample data collected since 1996. The original model of contaminant deposition at the Site was evenly dispersed smelter emissions in shallow soils (Exhibit 6). However, data collected since 1996 have caused the model to be changed to include:

- Covered over historic emissions. Most yards in East Anaconda were not constructed or landscaped until the 1940s and 50s (after nearly 60 years of smelter operations). This is believed to have resulted in cleaner surface soils being placed over contaminated soils in some locations.
- Imported mining-related waste. Property owners reported that previous residents may have brought in mining and smelting wastes as fill material for yards in low spots or for driveways. This material was also used as fill for streets and trolley lines.
- Lead paint contamination in soils. Many houses were painted with lead-based paint that can or has deteriorated and contaminated surrounding soils. Sometimes this paint has been scraped and the house repainted at least once. In some instances, workers at the smelter were reported to have painted the exterior of their homes with leftover industrial paint from the smelter that contained high concentrations of lead.

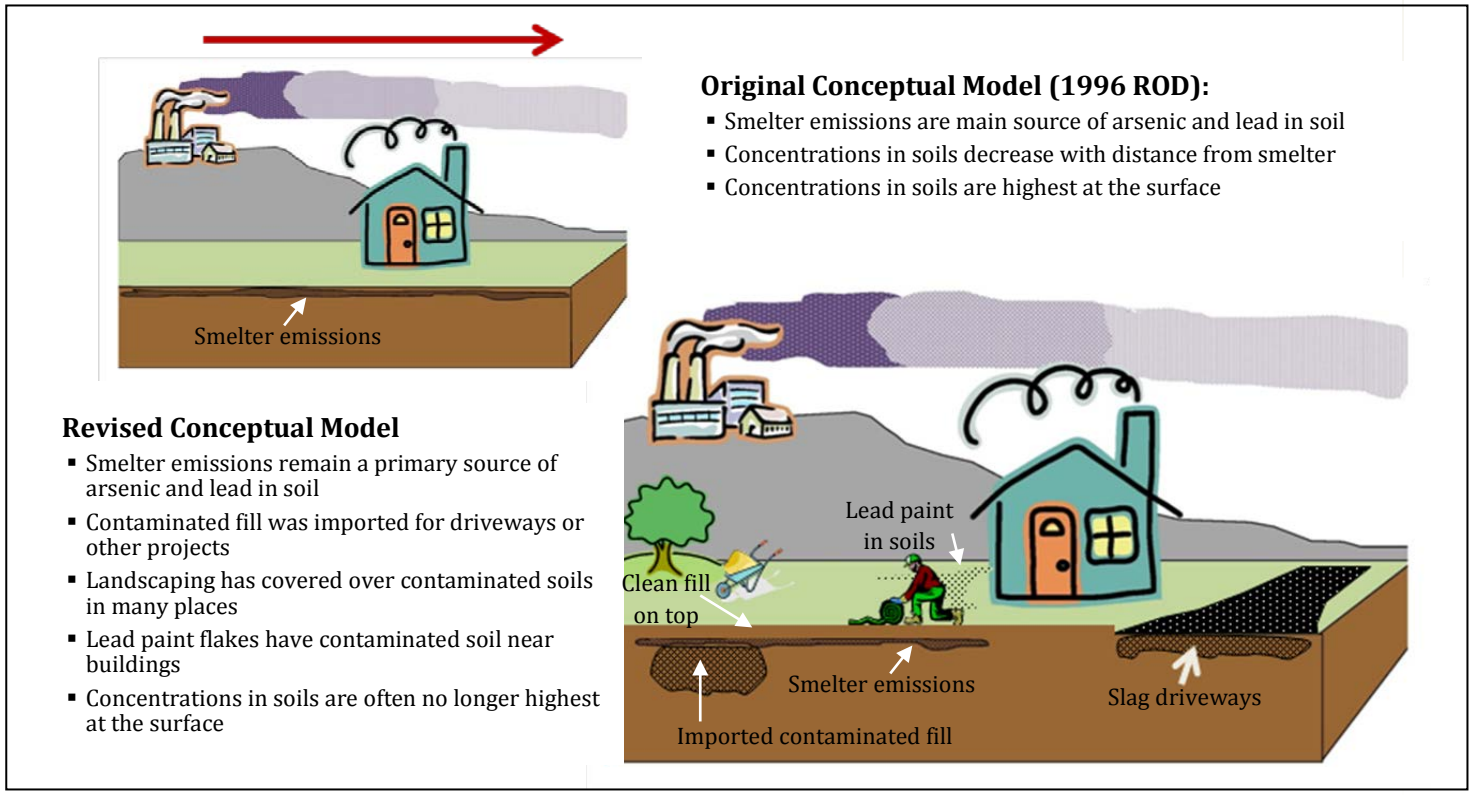

Exhibit 6. Modifications to Original Conceptual Model that Drive the ROD Amendment.

4.0 Development of Remedial Alternatives

4.1 Summary of Site Risks

Human health risk was evaluated in a site-specific HHRA in the original RI/FS. New information obtained during implementation of the remedial action since 1996 has identified potential unacceptable risks to human health that are addressed in this ROD amendment.

The main source of excess concentrations of arsenic and lead in residential soils at the Community Soils OU was long believed to be fallout from the copper smelters which operated in Anaconda from 1884 to 1980. However, mining and smelting wastes that were imported to individual properties, generally for use as fill in driveways and under structures, have also contributed. This material was readily available, easy to transport, and had characteristics that made it desirable for these uses. Another source of lead, which is not necessarily addressed by Superfund law, is lead-based paint. Nationwide, about two-thirds of the homes built before 1940 and half of homes built from 1940 to 1960 contain heavily-leaded paint.

The contaminants of concern identified in 1996 (arsenic, lead, cadmium, copper and zinc) remain unchanged. In the HHRA, risk from lead was determined to be acceptable, thus the 1996 ROD established the need for cleanup based on arsenic only. Soil cleanup levels developed for arsenic included: 250 ppm for residential properties, 500 ppm for commercial/industrial properties, and 1,000 ppm for open space/recreational/agricultural areas (EPA 1996).

The changes in the EPA's understanding of the Community Soils OU's characteristics highlight the need for changes to the 1996 ROD to ensure protectiveness, especially in regard to lead. These changes have resulted in the following risk conclusions:

- Because arsenic and lead concentrations in interior dust (particularly attic dust) are higher than projected in the HHRA, protocols to address dust in living spaces should be developed. Under this amendment, the EPA is selecting a cleanup level for arsenic and lead in residential interior dust.
- Because lead concentrations in residential soils are higher than the levels projected in the HHRA, protocols to address lead in soils should be developed. Under this amendment, the EPA is selecting a cleanup level for lead for residential soils.
- The EPA has determined that the concentrations of lead generally found in soils at the Site do not pose an unacceptable risk to commercial/industrial workers or recreational users. However, designated waste management areas, which contain the highest levels of lead, have been remediated with engineered covers to prevent contact with waste materials.

4.2 Remediation Goals

In a 2010 technical memorandum to the 2012 focused feasibility study (FFS) (CDM Smith 2012), the EPA developed a range of Preliminary Remediation Goals (PRGs) for lead based on combinations of factors such as the bioavailability of lead in soil, soil to indoor dust transfer, and soil ingestion rates. The range of PRGs for lead calculated from this evaluation was 418 to 1,941 ppm. This range was based on the use of default values versus site-specific values for the maximum level of lead in the blood that is considered to be acceptable (10 micrograms per deciliter ([µg/dL]) in the Integrated Exposure Uptake Biokinetic (IEUBK)

model. Using the model's default values, the IEUBK model result was calculated to be 418 ppm. When site-specific data for lead bioavailability, soil to dust transfer factor, and soil ingestion rates is input to the model, the model output gave the upper estimate of 1,941 ppm. However, as noted in the 2010 technical memorandum, the higher estimate is subject to a greater level of uncertainty associated with the soil ingestion rates. When considering the site-specific inputs for bioavailability and the soil to dust transfer factor, the IEUBK model outputs lead PRG values of 449 and 548 ppm.

In addition to the calculated PRG values, the following information was also considered:

- In 2012, the Center for Disease Control and Prevention (CDC) established a new reference concentration of 5 ug/dL of blood in place of the current 10 ug/dL.
- The current screening threshold (based on 10ug/dL) in the Lead Sites Handbook (EPA 2003) is 400 ppm.
- The lead action levels preferred and used by the State of Montana at other Montana sites is 400 ppm.

Based on the risk analysis, including uncertainties, as well as other considerations discussed above, EPA is selecting 400 ppm as the lead cleanup action level for residential land use at the Community Soils OU.

4.3 ARARs

Applicable or relevant and appropriate requirements (ARARs) have not changed as a result of the ROD amendment as the ARARs set forth in the 1996 Community Soils ROD remain protective. ARARs were recently updated for the entire Site as part of the Anaconda Regional Water, Waste and Soils OU ROD Amendment (EPA 2011) and these continue to be protective as well.

4.4 Area of Concern

The 1996 ROD specified sampling of yards within "the Focus Area" as an initial starting point, with removal of residential soil exceeding 250 ppm arsenic. Opportunistic sampling (sampling by request) was conducted in areas outside the Focus Area. As more data was collected under the RA, the Focus Area was expanded to include all residential areas in Anaconda east of Main Street. Additionally, all rural residences were sampled within the Community Soils regional area of concern.

For this amendment, the EPA considers the area of concern for lead contaminated residential soils and interior dust to be the Anaconda-Deer Lodge County Superfund Planning District. The Superfund Planning District boundary is shown in Appendix A. The EPA is eliminating the need to define a Focus Area, as all previously sampled residences under the arsenic residential soils remedial action will be addressed under this action. All residences with unremediated yard components exceeding the 400 mg/kg cleanup level will be addressed, with prioritization given to yards where existing data indicate that surficial soils are present that exceed the 400 mg/kg lead cleanup level. All other residences in Anaconda and within ADLC's Superfund Planning District boundary will continue to be sampled on an opportunistic basis (e.g., sampling by request).

4.5 Remedial Action Objectives

Because this ROD amendment only adds to the components of the existing 1996 ROD, the EPA's decisions in the 1996 ROD for commercial, industrial, and open space soils within the community of Anaconda remain protective.

As such, the following 1996 ROD remedial action objectives (RAOs) are still applicable:

- Reduce surface soil arsenic concentrations in residential/commercial areas to acceptable levels.
- Reduce direct human contact with mining and smelting waste materials exceeding acceptable levels of arsenic.

New RAOs to address issues with residential soils and interior dust are:

- Reduce human exposure to levels of lead in soils above the action level.
- Reduce direct human contact with interior dust exceeding acceptable levels of arsenic and lead.

4.6 Description of Alternatives

Three alternatives were developed and evaluated in the 2012 Focused Feasibility Study (FFS) using a range of cleanup levels (400, 500, and 700 ppm lead). These levels were determined by the EPA to be protective of human health based on the preliminary remediation goals evaluation. In the proposed plan, FFS Alternative 2 was modified to use a cleanup level of 700 ppm, and Alternative 3 used a cleanup level of 400 ppm, in order to further differentiate these alternatives.

The main components of each alternative are shown in Exhibit 7 and a comparison between them follows.

- **Alternative 1 - No Further Action**. This alternative acknowledges that soil cleanup based on arsenic risk has been completed and that ICs required under the 1996 ROD have been implemented or are currently under development. The ICs are implemented through the DPS and the CPMP.
- **Alternative 2 (modified) - Limited Soil Remediation with Enhanced ICs**. This alternative emphasizes ICs over extensive yard cleanup. All soils exceeding 700 ppm lead would be cleaned up to a depth of 12 inches. The existing ICs program would be expanded by the addition of a multi-pathways program (such as in Butte, Montana) which cleans up or otherwise

Exhibit 7. Remedy Components by Alternative.

Remedy Component	Alternative		
	1	2 (modified)	3
Soil Excavation and Removal	No	**0 to 12 inches:** Remove all soils with Pb >700 ppm **171 yards**	**0 to 12 inches:** Remove all soils with Pb >400 ppm **720 yards**
Interior Dust Cleanup	No	Clean up accessible interior dust that exceeds proposed levels: • As (250 ppm) • Pb (700 ppm)	• As (250 ppm) • Pb (400 ppm)
Institutional Controls	No change	• Expanded DPS • Expanded CPMP • Multi-pathway Program*	• Expanded DPS • Expanded CPMP
Years to Complete	0	9	6
Cost	$0	$4,405,000	$4,470,000

*Addresses non-CERCLA sources of lead (lead paint)
DPS – Development Permit System
CPMP – Community Protection Measures Program

addresses non-mining lead contamination (e.g., lead-based paint) prior to the cleanup of mining-related lead contamination. This prevents recontamination of previously cleaned areas. Blood lead monitoring would also be conducted. It should be noted that parts of the multi-pathways program cannot be required under CERCLA.

- **Alternative 3 - Soil Remediation with Limited ICs.** This alternative requires cleanup of all soil having lead concentrations exceeding 400 ppm of lead to a depth of 12 inches. ICs would stay the same, except that the CPMP would be expanded to provide information about lead and the DPS to address dust from future interior remodeling.

All excavated soils would be disposed in one of the designated waste management areas. Alternatives 2 and 3 would address residential interior dust in a similar manner. This dust can be impacted by the presence of contaminants in soils or by smelter emissions. Accessible interior dust would be tested and remediated if arsenic or lead cleanup levels are exceeded. Attic dust and other inaccessible dust would be addressed under the DPS if remodeling or other home renovation opened an exposure pathway.

The capital cost is estimated at $4,405,000 for modified Alternative 2 and $4,470,000 for Alternative 3. This is based on Atlantic Richfield's database for all yards sampled in Anaconda where the average arsenic concentration was below the 250 ppm cleanup level and consequently did not require yard removal under the 1996 ROD.

Under Alternative 2, an estimated 171 yards in Anaconda would be remediated to a depth of 12 inches. Under Alternative 3, the number of yards increases to 720 yards estimated to require cleanup. Both alternatives assume the same number of interior dust cleanups under the remedy. These interior dust cleanups are primarily based on arsenic concentrations.

Alternative 2 includes costs for a blood lead monitoring program as part of the multi-pathways program. Alternative 2 also includes non-Superfund components (such as lead paint abatement) in the annual cost for ICs as part of a multi-pathways program. The multi-pathways program would require a separate agreement between Atlantic Richfield and ADLC to fund the portions of the program that are not part of the Superfund cleanup due to lack of EPA's authority under CERCLA to require Atlantic Richfield to implement lead paint abatement and other portions of the multi-pathways program.

5.0 Comparative Analysis of the Remedial Alternatives

The remedial alternatives from the FFS were evaluated in detail with respect to seven of EPA's nine evaluation criteria (Exhibit 8). The criteria fall into three groups: threshold, primary balancing, and modifying. For an alternative to be chosen, it must meet the threshold criteria. The primary balancing criteria are used to weigh major trade-offs among alternatives. The modifying criteria are state and public acceptance and are evaluated after public comment is received on the proposed plan.

The performance of each alternative against these nine criteria is illustrated in Exhibit 9. The 1996 ROD selected remedy was not included in the evaluation as this amendment does not change the existing remedy for arsenic, but merely adds additional components, as previously discussed.

5.1 Threshold Criteria

5.1.1 Overall Protection of Human Health and the Environment

Alternatives 2 and 3 are protective of human health. Alternative 2 remediates yards exceeding the proposed 700 ppm lead cleanup level to a depth of 12 inches, while providing for ICs to manage future risk and evaluate current protectiveness. The ICs include the multi-pathways program, which has non-Superfund components (e.g., lead paint abatement). Alternative 3 cleans up all yards over the 400 ppm lead cleanup level to a depth of 12 inches, thus reducing the need for more comprehensive ICs.

5.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 1 does not comply with applicable or relevant and appropriate requirements (ARARs). Both Alternatives 2 and 3 will meet all ARARs.

Exhibit 8. FS Evaluation Criteria.

Criterion	Description
Threshold	
Overall protection of human health and the environment	Alternative eliminates, reduces, or controls threats to health and environment through ICs, engineering controls, or treatment?
Compliance with ARARs	Alternative meets federal, state, and tribal ARARs or waiver justified?
Balancing	
Long-term effectiveness and permanence	Alternative maintains protection of human health and the environment over time?
Reduction of toxicity, mobility, or volume via treatment	Alternative uses treatment to reduce harmful effects, ability to move, and the amount of contamination left after clean up?
Short-term effectiveness	How much time is needed to implement and what risk is posed in that time?
Implementability	What is feasibility of implementing alternative (e.g., availability of materials and services)?
Cost	What are estimated capital, annual O&M, and present value costs?
Modifying	
State acceptance	State agrees with EPA's analyses and recommendations?
Community acceptance	Community agrees with EPA's analyses and preferred alternative?

5.2 Balancing Criteria

5.2.1 Long-Term Effectiveness and Permanence

Alternative 1 is not protective of human health, as it would allow yards with elevated lead concentrations to remain. Because Alternative 1 does not meet this threshold criterion, it is dismissed from further analysis. Alternatives 2 and 3 are protective of human health. Alternative 2 remediates yards exceeding the proposed 700 ppm lead cleanup level to a depth of 12 inches, while providing for ICs to manage future risk and evaluate current protectiveness. The ICs include the multi-pathways program, which has non-Superfund components (e.g., lead paint abatement). Alternative 3 cleans up all yards over the 400 ppm lead cleanup level to a depth of 12 inches, thus reducing the need for more comprehensive ICs.

5.2.2 Reduction of Toxicity, Mobility, and Volume through Treatment

None of the alternatives utilize treatment, so each rank low for reducing toxicity, mobility and volume through treatment. Both alternatives use removal to address potential exposure pathways.

5.2.3 Short-term Effectiveness

Alternatives 2 and 3 both present short-term risks to workers, the community, and the environment. Alternative 2 has the lesser disturbance (excavation and replacement) and risk from the transport of contaminated and fill materials. Trucks used to haul contaminated soils to one of the designated waste management areas for disposal and offsite borrow for replacement slightly increases short-term risks to the community. Transport and placement of borrow has potential environmental impacts from equipment emissions and disturbance of borrow locations. Because Alternative 2 requires less soil to be removed and replaced than Alternative 3, it has a slightly lowered short-term risk.

5.2.4 Implementability

The construction portions of Alternatives 2 and 3 are equally implementable. But, adding non-CERCLA components to Alternative 2 for ICs would require non-CERCLA funding (e.g., from an enforceable agreement between Atlantic Richfield and ADLC). This is not needed for Alternative 3, so Alternative 3 ranks higher for implementability.

5.2.5 Cost

The ICs (e.g., DPS and CPMP) under Alternatives 2 and 3 have been identified under the existing 1996 Community Soils OU ROD. Thus, no additional costs for those components are required. For the remaining activities, Alternative 2 is slightly lower in cost than Alternative 3 in terms of net present value. Although Alternative 3 remediates many more yards than Alternative 2 (720 compared to 171), Alternative 2 includes the estimated cost of a multi-pathways program (estimated cost of $2,125,000 based on the similar Multi-Pathway Residential Metals Abatement Program Plan at the Silver Bow Creek/Butte Area NPL site – Priority Soils OU currently being implemented by Butte – Silver Bow County).

Exhibit 9. Summary of Focused FS Evaluation Criteria.

Criteria	Alternative	
	2	3
Threshold Criteria		
Protection of human health and the environment	Yes	Yes
Compliance with ARARs	Yes	Yes
Balancing Criteria		
Long-term effectiveness and permanence	◑	◑
Reduction of toxicity, mobility, or volume of contaminants through treatment	○	○
Short-term effectiveness	●	◑
Implementability	◑	●
Cost	◑	◑
Modifying Criteria		
State acceptance	◑	●
Community acceptance	●	●

● Meets or exceeds criteria
◑ Meets criteria with some stipulations
○ Does not meet criteria

5.3 Modifying Criteria

5.3.1 State Acceptance

DEQ prefers Alternative 3 over Alternative 2, because the cleanup level of lead (700 ppm) in Alternative 2 was not consistent with lead cleanup levels they require at other Montana sites, and because they did not believe that Atlantic Richfield and ADLC could reach an agreement over the details of implementing the multi-pathways program proposed by Atlantic Richfield.

5.3.2 Community Acceptance

EPA's assessment of community acceptance is based on conversations with community members and on comments received during the formal public comment period. The nature of community support regarding the preferred alternative presented in the Proposed Plan (Alternative 2) is summarized below:

- Local government: ADLC indicated that they support a remedy that included sampling and remediation or soils and interior and attic dust, a multi-pathway lead abatement program, and a biomonitoring (i.e., blood lead) program. They also believed that focus area should be extended because the "geographic area of the remedy should be determined utilizing data from depth, rather than assumptions and limited data." Their concerns with Alternative 2, as it was presented in the proposed plan, were primarily that they did not believe the capital costs were accurate and that they were concerned with the State's non-concurrence with the alternative. They indicated that, although they supported a multi-pathway program, if they could not come to a satisfactory agreement with Atlantic Richfield regarding the multi-pathways program, they would "be forced to rescind support of Alterative 2 in favor of Alternative 3."

- The Technical Assistance Group (Arrowhead): Arrowhead stated that they fully support the amendment to add lead remediation to the existing ROD. However, they were concerned about the source of long-term funding for the multi-pathways program and the higher cleanup level for lead (700 ppm) under Alternative 2. They were also concerned that there was not a "not to exceed" cleanup level for lead.

- Local citizen: The citizen who submitted a written response during the comment period expressed a preference for Alternative 3 because the concentrations of lead in soils would be lower after cleanup (400 vs. 700 ppm).

6.0 Selected Remedy

EPA has chosen ***Alternative 3 (Soil Remediation with Limited ICs)*** as the selected remedy. EPA has determined that this alternative meets the threshold criteria and provides the best balance among the alternatives with respect to the balancing and modifying criteria. EPA expects the preferred alternative to satisfy the following statutory requirements of CERCLA §121:

- Protect human health and the environment
- Comply with ARARs (or justify a waiver)
- Be cost-effective
- Use permanent solutions to the maximum extent practicable

Amending the remedy to address lead in soils and lead and arsenic in interior dust is a *fundamental* change to the 1996 ROD. Additionally, the amended remedy expands the current ICs to address residual contamination that will remain at the site. Differences between the 1996 ROD remedy and EPA's selected remedy are shown in Exhibit 10.

Exhibit 10. Comparison of Major Components of 1996 ROD vs. 2013 ROD Amendment.

	1996 Community Soils OU ROD	2013 ROD Amendment
Residential Soil	• Clean up As >250 ppm to 18 inches • No action level for Pb	• No change for As • Clean up Pb>400 ppm to 12 inches
Interior Dust	• Not addressed	• Clean As>250 ppm • Clean Pb>400 ppm
Institutional Controls	• Apply DPS to future residential development • Create a CPMP	• Expand DPS to include lead • Expand CPMP to provide lead health education program
Industrial/ Commercial Soil	• Clean up As>500 ppm	• No change
Railroad Beds	• Engineered covers over active rail beds and rail yards	• No change

6.1 Residential Soils

Residential soils include yards; parks; school grounds, including daycares and preschools; and all other play areas; and barren driveways, alleys, or other common areas adjacent to yards that may contribute to the contamination of yards and may be frequented by children within the Anaconda-Deer Lodge County Superfund Planning District.

The selected remedy will address lead contamination in residential soils through the following:

1. Clean up all remaining residential soils that exceed the residential action level of 400 ppm lead, through removal and replacement with clean soil and a vegetative (e.g., new sod or seed) or other protective barrier (e.g., asphalt pavement or concrete sidewalks). Yard components previously remediated (soil removed) to 12 inches below ground surface (bgs) during the Community Soils OU remedial action will not require further remediation.

    - Direct cleanup activities toward, or initiate cleanup activities in, residential areas previously sampled under the CSOU Remedial Action.
    - Make cleanup activities available to residential areas not previously sampled through the ADLC institutional controls program.
    - Determine residential soils to be cleaned up (>400 ppm lead) by sampling using yard sampling components developed during the previous remedial design/ remedial action (to a depth of 12 inches).
    - Remove all yard sampling components exceeding 400 ppm lead (to a maximum of 12 inches).
    - Give consideration to the adequacy and permanence of existing barriers and ICs (e.g., use restrictions, maintenance, development permits, etc.) in determining which residential soils will be remediated.
    - Where site-specific conditions dictate that removal is not implementable (e.g., topography, rocks, trees, etc.), take other measures (e.g., capping, tilling, ICs) to reduce lead concentrations to below 400 ppm or to otherwise prevent exposure.

- Dispose of removed soils in a designated on-site soil management area.

2. Clean up future residential use areas.

   - Clean up all future residential soil areas within the ADL Superfund Planning District that exceed the soil lead concentrations of 400 ppm, at the time of development, through the ADL DPS. The DPS will continue to require soil sampling at all new residential construction within the Superfund Planning District (Appendix A). Soils exceeding the 400 ppm soil lead cleanup level from 0 to 12 inches will be cleaned up through the DPS with preference given to removal.

   - Revise the current ADLC Superfund Planning District, where necessary. The current Superfund Planning District is shown in Appendix A. With EPA approval, ADLC may revise the boundaries of this district as more data becomes available under this action and associated ICs programs.

   - In areas where removal cannot be implemented due to site conditions, take other measures (i.e., capping, tilling, ICs, etc.) to reduce soil lead concentrations to below 400 ppm or to prevent exposure.

3. Expand the CPMP to reduce exposure to remaining (residual) lead contaminants.

   - Provide for a health education program to inform residents within the Superfund Planning District of the potential risks to lead and recommendations for reducing exposure to lead in their environment.

   - Track information and data on lead concentrations/locations in the ADLC data base/GIS for public access to be used by regulators, prospective home buyers, lenders, contractors, and other interested parties.

   - Prior to soil remediation, coordinate with ADL and landowners to address deteriorating exterior lead paint from homes/garages/fences that may have the potential to recontaminate remediated soil areas.

   - Provide for a “soil swap” program to provide clean soil to residents for gardens and play areas.

6.2 Interior Dust

The selected remedy will address accessible contaminated interior dust through the following components:

1. Develop an interior dust abatement program to sample and cleanup interior dust exceeding the lead and arsenic concentrations of 400 ppm and 250 ppm, respectively in all living spaces.

   - Sample interior dust along with yard soil when residential sampling is conducted under the program.

   - Address lead, and/or arsenic in non-living areas of a residence (e.g., attics, crawl spaces and walls) under the program, with removal conducted only if an exposure pathway is identified.

2. Expand the CPMP to reduce exposure to remaining (residual) interior dust contamination within the Superfund Planning District.

- Provide for sampling and/or other assessments of properties to determine if residual arsenic and lead contamination is present and the need for remedial action, where necessary.
- Provide dust control and removal services as requested by home owners planning a remodeling effort that could cause dust in the seldom-accessed living areas to be released to the regularly used portions of the home.

7.0 Statutory Determinations

EPA has determined that the remedy, as it is amended herein, is protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to this remedial action, meets the remedial action objectives, is cost effective, utilizes permanent solutions and alternative technologies to the extent practicable, and satisfies the requirements in Section 121 of CERCLA.

The remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. However, contaminated soils present at the Community Soils OU do not represent a principal threat, and treatment would be significantly more expensive due to the very large quantities of materials impacted. Although they are present in large volumes, the soils within the Community Soils OU are low in toxicity and can be reliably contained.

Because implemented remedies have resulted in mining contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews have been initiated at the Site and will continue to ensure that remedies remain protective of human health and the environment. The five-year reviews will continue to focus on areas where waste has been left in place or where remaining concentrations do not allow for unlimited use of the property.

8.0 Documentation of Significant Changes

The proposed plan to amend the 1996 ROD was released for public comment in September 2012. In that document, EPA identified a modified version of Alternative 2 as its preferred alternative for clean up. This alternative included a higher cleanup level for lead (700 ppm) coupled with a multi-pathways program for addressing lead from Superfund and other sources (e.g., lead-based paint).

Although it cannot be required under CERCLA, the multi-pathways lead program could have been implemented through an enforceable agreement between the PRP and the county (Atlantic Richfield and ADLC, respectively), and those parties indicated that they might be willing to implement the program. EPA believed that the modified Alternative 2 could be more effective than Alternative 3, as non-Superfund sources of lead contamination (such as lead-based paint and lead pipes) would be addressed. However, the proposed plan stated that, if the multi-pathways program was not adopted, EPA would reconsider its preferred alternative in the ROD amendment. Negotiations between Atlantic Richfield and ADLC were not successful in reaching agreement regarding the scope and other details of a multi-pathways program. Thus, after re-analyzing the alternatives, Alternative 3, with its 400 ppm cleanup level for lead, became EPA's selected alternative.

The proposed plan identified an estimated cost of $4,470,000 for Alternative 3 based on the Focused Feasibility Study. The estimated cost for the Selected Remedy in this ROD Amendment is $8,290,000 (Appendix B). There are two primary reasons for the increase in the cost estimate. First, the Focused Feasibility Study was based on an extrapolation of the estimate of the number of homes requiring remediation. Previously, sampling results were only available for ten percent of the unremediated yards in Anaconda. Since the proposed plan was issued in September 2012, Atlantic Richfield has had archived samples analyzed for lead for all residential soil samples collected under the previous remedial action. Second, the proposed plan assumed a focus area limited to homes east of Main Street. Under this Selected Remedy, all homes in Anaconda and the Superfund Planning District would be eligible for cleanup if lead concentrations exceed the 400 ppm action level in the upper 12 inches of soil. These two factors increased the estimate of the number of yard components requiring cleanup from 1,905 in the proposed plan to 3,788 under the Selected Remedy.

9.0 References

Atlantic Richfield 1996. *Remedial Investigation/Feasibility Study for the Community Soils Operable Unit of the Anaconda Smelter NPL Site, Anaconda, Montana*, prepared for Atlantic Richfield by Advanced Geoservices Corporation.

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Atlantic Richfield 2005. *Final Historic Railroad Beds and Commercial/Industrial Areas Remedial Action Work Plan/Final Design Report (RAWP/FDR)*. Prepared for Atlantic Richfield by Pioneer Technical Services, Inc.

Atlantic Richfield 2007. *Memorandum: Analysis of Lead in Anaconda Community Soils.* Prepared for Pamela Kaye of Atlantic Richfield by Roz Schoof of Integral Consulting. September 7.

Atlantic Richfield. 2008. *Draft Final Community Soils Interior and Attic Dust Characterization Study Data Summary Report (DSR)*. Prepared for the Atlantic Richfield Company by Pioneer Technical Services, Inc. January 4.

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CDM. 2007. *Community Soils OU Residential Subsurface Soil Characterization Data Summary Report. Anaconda Smelter NPL Site, Community Soils Operable Unit*. Prepared for EPA by CDM. September.

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CDM Smith 2012. *Focused Feasibility Study; Lead in Residential Soils and Lead and Arsenic in Residential Dust; Community Soils Operable Unit, Anaconda Smelter NPL Site*. Prepared for EPA by CDM Smith. February.

EPA 1996. *Record of Decision for the Community Soils Operable Unit, Anaconda Smelter Superfund Site, Anaconda, Montana.*

EPA 2006. *Third Five Year Review, Anaconda Smelter Superfund Site, Anaconda, Montana.*

EPA 2010. *Fourth Five Year Review, Anaconda Smelter Superfund Site, Anaconda, Montana.*

EPA 2011. *Record of Decision Amendment for the Anaconda Regional Water, Waste & Soils Operable Unit, Anaconda, Montana.*

Part III – Responsiveness Summary

Written comments to the Proposed Plan for the Community Soils Operable Unit (OU) Record of Decision (ROD) Amendment were received from Anaconda – Deer Lodge County (ADLC), the Arrowhead Foundation, the Montana Department of Environmental Quality (DEQ), Atlantic Richfield Company, and one individual from the general public. Each comment is addressed by the U.S. Environmental Protection Agency (EPA) in the following subsections. A synopsis of the comment is provided, followed by EPA's response in italic font. Complete comments, as received by EPA, are part of the Administrative Record of the Site and can be obtained from EPA's Record Center (see Section 2 of the Declaration Summary).

1.0 Comments from ADLC

A. **Focus Area.** "The geographic area of the remedy should be determined utilizing data from depth, rather than assumptions and limited data. Any contamination that had its roots in mining activities should continue to be eligible for remediation, as has been past practice. Remedy eligibility should not be limited to focus areas."

EPA Response: *The Superfund Planning District is designated to initiate sampling and remedial activities. All residences within the Superfund Planning District will be eligible for testing, and cleanup will be required when action levels are exceeded.*

B. **Previously Remediated Yard Components.** ADLC comments that they "understand that the agencies do not intend to require AR to implement an additional lead remedy in yard components that received a six-inch arsenic remedy. The County concurs that this limited six-inch remedy can be effective when coupled with the County's ICs program. However, the County agrees that yard components that have a remedy less than six inches deep may not be adequate to protect against lead exposure, and lead data should be evaluated in those components to determine if additional remediation is necessary."

EPA Response. *The comment refers to previously remediated residential yard components that were completed during the 2002 to 2010 residential soils remedial action. Soils were sampled in depth increments of 0 to 2 inches, 2 to 6 inches, and 6 to 12 inches. If the average arsenic concentration in the 0- to 2-inch soil increment exceeded the soil action level of 250 ppm, the underlying 2- to 6-inch soil increment was sampled. Thus, all remediated yard components have at least 6 inches of soil with arsenic concentrations less than 250 mg/kg.*

ADLC's concern is that the 2- to 6-inch soil increment may have lead concentrations greater than the action level, and this remedy may not be protective. In response to ADLC's request, EPA analyzed the existing lead data set, and found that 10 percent of yard components that were remediated to a depth of 2 inches have lead concentrations that exceed 400 ppm when the arsenic concentrations are less than 250 ppm. This represents 1 percent of all yard components that have been sampled in Anaconda. EPA believes that all previously remediated yard components are protective of human health, and that the small percentage of previously remediated yard components that have lead concentrations exceeding the cleanup level in the 2- to 12-inch depth increment can be addressed through ADLC's Development Permit System if these areas are disturbed during future landscaping or development activities. If the Development Permit System identifies a component exceeding the lead cleanup level of

400 mg/kg in the top 12 inches of soil, then the component must be cleaned up as provided in the ROD Amendment.

C. Rural Residences. ADLC "concurs that flexibility should be allowed in the implementation of rural CSOU remedy design, when evaluating the choice between removal/replacement and treatment, or a combination of the two. This could be in the best interest of residents."

EPA Response. *EPA concurs.*

D. Interior and Attic Dust. ADLC comments that they "are very pleased that Atlantic Richfield and the Agencies are proposing sampling and remediation of interior and attic dust. The lack of this remediation component has long been an issue for the County and ADLC residents."

EPA Response. *Note that under this ROD Amendment, only interior dust and accessible attic dust would be sampled and remediated. Inaccessible attic dust would be continued to be addressed under the Development Permit System. It would be sampled and remediated only if planned home repairs or remodeling activities would create an exposure route to residents.*

E. Multi-Pathways Program. ADLC addresses the multi-pathways lead abatement program that was a key component to Alternative 2 presented in the Proposed Plan. ADLC notes that the greatest lead risk to families is from peeling and flaking lead-based paint.

EPA Response. *EPA agrees that lead paint presents a significant risk to the community. However, the agencies do not require abatement of all lead paint under the Superfund program. EPA encourages ADLC to look for other sources of funding to develop a multi-pathways program to assist homeowners in addressing lead paint issues.*

F. Bio-monitoring Program. ADLC expressed their support for the blood lead testing program for children in the smelter area of concern.

EPA Response. *Comment noted. This may be conducted by ADLC under the Community Protective Measures Program*.

G. Proposed Plan Alternative Costs. ADLC disagrees with the cost estimates for Alternatives 2 and 3, noting that while Alternative 2 estimated the remediation of 171 yards and Alternative 3 estimated the remediation of 720 yards, the cost only increased by $65,000.

EPA Response. *The statement in the Proposed Plan on page 8 under the cost section (i.e., that the multi-pathways program was not included in the Alternative 2 cost estimate) is in error. The earlier statement on page 7 ("Alternative 2 also includes non-Superfund components (such as lead paint abatement) in the annual cost for ICs as part of a multi-pathways program") is correct. The text has been revised in the ROD amendment.*

EPA estimated the cost of the multi-pathways lead abatement program for Alternative 2 to be $2,125,000 based on costs incurred to date for a similar multi-pathways program being administered by adjacent Butte – Silver Bow County. The Proposed Plan cost estimates, with some slight adjustments, was based on the previous detailed estimates provided in the February 2012 Focused Feasibility Study (Appendix B), which estimated the cost for Alternative 2 with a cleanup level of 700 ppm with no multi-pathways program to be $2,915,000 and Alternative 3 with a cleanup level of 400 ppm to be

$4,960,000. With modifications to the Alternatives under the Proposed Plan, the cost for Alternative 2 minus the multi-pathways program is $2,474,500 and to remediate 720 yards under Alternative 3 is $4,470,000. Both alternatives had a similar base cost to develop work plans and to sample all of the estimated 1,170 homes east of Main Street of approximately $1,500,000. This Selected Remedy under this ROD Amendment now has an estimated cost of $8,290,000, which assumes sampling of 2,020 residences.

H. Montana DEQ Non-concurrence. ADLC comments "It is concerning to the County that the Montana Department of Environmental Quality does not concur with the proposed plan. We have had some communications with the State and were informed that a robust, well funded Multi-pathway program may assure the State of the efficacy of this plan. The County is currently negotiating the scope and cost of this plan. It is possible that the negotiations may not result in a plan that is satisfactory to the County. In this case, although the County supports a Multi-pathway program as the best alternative, it would be forced to rescind its support for Alternative 2 in favor of support of Alternative 3."

EPA Response. *Alternative 3, slightly modified to address the Superfund Planning District, has been chosen as the selected remedy under this ROD amendment. DEQ concurs with this remedy.*

I. Arsenic Remedy Modifications. ADLC comments "Lastly, we support modifications to the way the arsenic remedy is implemented. Modifications could come about through reassessing the merits of the weighted average concept, or eliminating Phase I/Phase II sampling and instituting a not-to-exceed level for arsenic, as is proposed for lead. Over the past few years as we have routinely reviewed soil sample information for residents as they submit development permits, we have discovered many yards with yard components over 500 ppm. This can be very disconcerting for homeowners and parents."

EPA Response. *The Community Soils OU ROD Amendment only addresses lead in soils and arsenic and lead in interior dust. The residential soils remedial action (2002 through 2010) has addressed arsenic under the 1996 ROD. However, the arsenic cleanup level of 250 ppm remains in effect for residential soils, and additional arsenic cleanup will be addressed concurrently with lead remedial action during remedial design.*

2.0 Comments from Arrowhead Foundation

A. **Limited Focus Area**. Arrowhead Foundation commented that the focus areas should be expanded west of Main Street or a mechanism should be set up that would allow homeowners west of Main Street to request sampling and cleanup, if necessary.

EPA Response. *All previously sampled homes in Anaconda, including homes west of Main Street, are eligible for sampling (and cleanup if necessary). Priority will be given to previously sampled homes that exceed action levels. Residences in other areas within the Superfund Planning District will be tested on request. Prioritization in those areas will be given to homes where mine wastes materials may be present (e.g., areas where historic fluvially-deposited tailings deposits and historic railroad beds may be present).*

B. **Funding of the Multi-pathway Program.** Arrowhead Foundation was concerned about the scope of the multi-pathway program proposed under Alternative 2.

EPA Response. *The multi-pathway lead abatement program is no longer part of the remedy, as EPA has selected Alternative 3 as the Selected Remedy.*

C. **High Action Level for Lead and Lack of Not-to-Exceed Level**. Arrowhead Foundation was concerned over the area-weighted average approach being applied for lead and the 700 ppm action level proposed under Alternative 2.

EPA Response. *As previously noted, EPA has selected Alternative 3 as the Selected Remedy for lead in soils and arsenic in soils in dust. This remedy includes cleanup of all soil having lead concentrations exceeding 400 ppm in the upper 0 to 12 inches of soil in previously unremediated yard components in Anaconda.*

3.0 Comments from Atlantic Richfield

1. **Impact of TRW's Forthcoming Re-evaluation of the Integrated Exposure Uptake Biokinetic (IEUBK) Model on Cleanup.** Atlantic Richfield recommended that EPA defer the ROD Amendment until EPA's Technical Review Workgroup (TRW) completes their re-evaluation of the lead risk model default input parameters in light of the Center for Disease Control's recommendation to lower the blood lead risk value from 10 to 5 micrograms per deciliter (μg/dL).

   EPA Response. *EPA's TRW has not yet completed its review of the CDC recommendations, and there is not a final timeline for completion of this process. Lead in residential yards represents a current risk that needs to be addressed under CERCLA, and EPA has determined that it is appropriate to move forward with the ROD amendment.*

2. **Remedial Action Objective of Reducing Child Blood Lead Levels Below 5 μg/dL.** The source of Atlantic Richfield's objection to the proposed remedial action objective is that: (1) it fails to account for statistical distribution of blood lead testing results that is based on a reference level for the 97.5th percentile of data; and (2) it would not take into account children's exposure to non-Superfund sources of lead, such as lead-based paint.

   EPA Response. *Comment noted. EPA has not included the referenced Remedial Action Objectives (RAO) as an RAO.*

3. **Arsenic in Deeper Soils.** Atlantic Richfield believes that no further action is required to address arsenic in subsurface (2 to 12 inches) soils.

   EPA Response. *No additional cleanup will be required for yard components remediated to 12 inches bgs under the previous arsenic cleanup. Arsenic concentrations in subsurface soils in unremediated yard components will be addressed during remedial design and as part of the Development Permit System.*

4. **Alternative Cost Analysis.** Atlantic Richfield makes a similar comment as ADLC concerning the cost difference between Alternatives 2 and 3 is only $65,000.

   EPA Response. *Refer to the response to Comment 1.G.*

5. **Flexibility in Soil Remediation Methodology.** Atlantic Richfield requests flexibility to allow other soil remediation methodologies, such as soil treatment and capping, to be considered, especially in rural areas.

   EPA Response. *This flexibility has been included in the ROD Amendment.*

4.0 Comments from DEQ

1. **Proposed Soil Cleanup Level**. DEQ disagrees with the Proposed Plan's cleanup level for Alternative 2 of 700 ppm lead, stating that the cleanup level should be 400 ppm.

   EPA Response. *This ROD Amendment selects Alternative 3 with a cleanup level of 400 ppm.*

2. **Yard Component versus Yard Average.** DEQ states that the Proposed Plan is not clear about whether cleanup will be required based on individual yard component lead concentrations or averages of lead concentrations for the entire yard. DEQ notes that they will not concur with a remedy based on average yard lead concentrations triggering cleanup.

   EPA Response. *The ROD Amendment clarifies that all yard components exceeding the action level will be cleaned up to a depth of 12 inches.*

3. **Yards Cleaned Up for Arsenic But Not Lead**. DEQ requests that a data gap analysis be conducted to a depth of 24 inches to analyze arsenic and lead, and states their preference for cleanup to be based on arsenic and lead cleanup levels of 250 ppm and 400 ppm, respectively.

   EPA Response. *Cleanup requirements have been clarified in the ROD amendment. All unremediated yard components will be sampled to a depth of 12 inches, and remediated if necessary. Previously remediated yard components that were remediated to 12 inches bgs under the previous action will not be re-sampled. Arsenic concentrations in subsurface soils in unremediated yard components will be addressed during remedial design or as part of the Development Permit System.*

4. **Statement of State's Disagreement with the Proposed Plan**. DEQ reiterates their reasons for not concurring with the Proposed Plan. DEQ does not concur with the Alternative 2 approach that relies on an unenforceable multi-pathways program. DEQ has not seen a multi-pathways program work plan. DEQ comments that the proposed cleanup level of 700 ppm is not protective for residential use.

   EPA Response. *Alternative 3, with a cleanup level of 400 ppm, has been chosen as the Selected Remedy.*

5. **Multi-pathway Program**. DEQ states their issues with the multi-pathways program.

   EPA Response. *The issues are moot, as a different alternative has been selected.*

6. **Use of Blood Lead Level Studies to Establish Cleanup levels**. DEQ has concerns that blood lead level studies recently conducted in Anaconda were used as a basis to establish cleanup levels.

EPA Response. *The cleanup level of 400 ppm has been selected based on the PRG range developed from site-specific and default parameters from the IEUBK model while using 10 µg/dL as a blood lead reference value in children.*

7. **Cost Estimate**. Similar to ADLC and Atlantic Richfield, DEQ has concerns over the cost estimates for Alternatives 2 and 3.

   EPA Response. *Refer to the response to Comment 1.G and 3.D. A revised cost estimate for the Alternative 3 based on sampling within the Superfund Planning District is provided in the ROD Amendment.*

8. **Depth of Remediation**. DEQ requests that the text be edited to indicate that yards will be remediated to a depth to 12 inches, not the 2 to 12 inches as indicated in the cited text.

   EPA Response. *The text has been revised in the ROD Amendment per DEQ's request.*

9. **Multi-pathway Program Schedule and Enforceability**. DEQ reiterates concerns over the schedule for a multi-pathways program and questions EPA's legal authority over such a program under Superfund.

   EPA Response. *Modified Alternative 3, with an application to the entire Superfund Planning District, has been adopted as the Selected Remedy, thus the multi-pathways issues are moot.*

5.0 Comments from Valerie Kime

1. **Support for Alternative 3.** Ms. Kime expresses her support for Alternative 3, noting that the results of 2009 soil sampling conducted by ADLC in her yard "out of the 9 areas and 36 depths, 16 of the samples contained 542 to 2,620 ppm lead. Unfortunately the 'average' amount of lead only amounts to 484 ppm" which would result in her yard being ineligible for cleanup under Alternative 2.

   EPA Response. *A modified Alternative 3 has been selected by EPA as the Selected Remedy.*

2. **Length of time of cleanup.** Ms. Kime is concerned over the continued exposure of children to lead, especially over the projected 9 year cleanup time for Alternative 2.

   EPA Response. *Alternative 3 is projected to take 6 years to complete. The 9 year estimate for Alternative 2 included time for the multi-pathways program. EPA notes that from 2009 to 2011, ADLC tested 90 to 100 children per year enrolled in the Head Start program for blood lead. The results indicated approximately 3 to 4 detections per year, or 3 to 4 percent of children tested exceeded 3.3 µg/dL. This is significantly lower than the 10 percent expected based on the U.S. population as tested by CDC's 2007 to 2008 National Health and Nutrition Examination Survey (*http://www.cdc.gov/nchs/nhanes/nhanes2007-2008/pbcd_e.htm).

Appendix A

Superfund Planning District

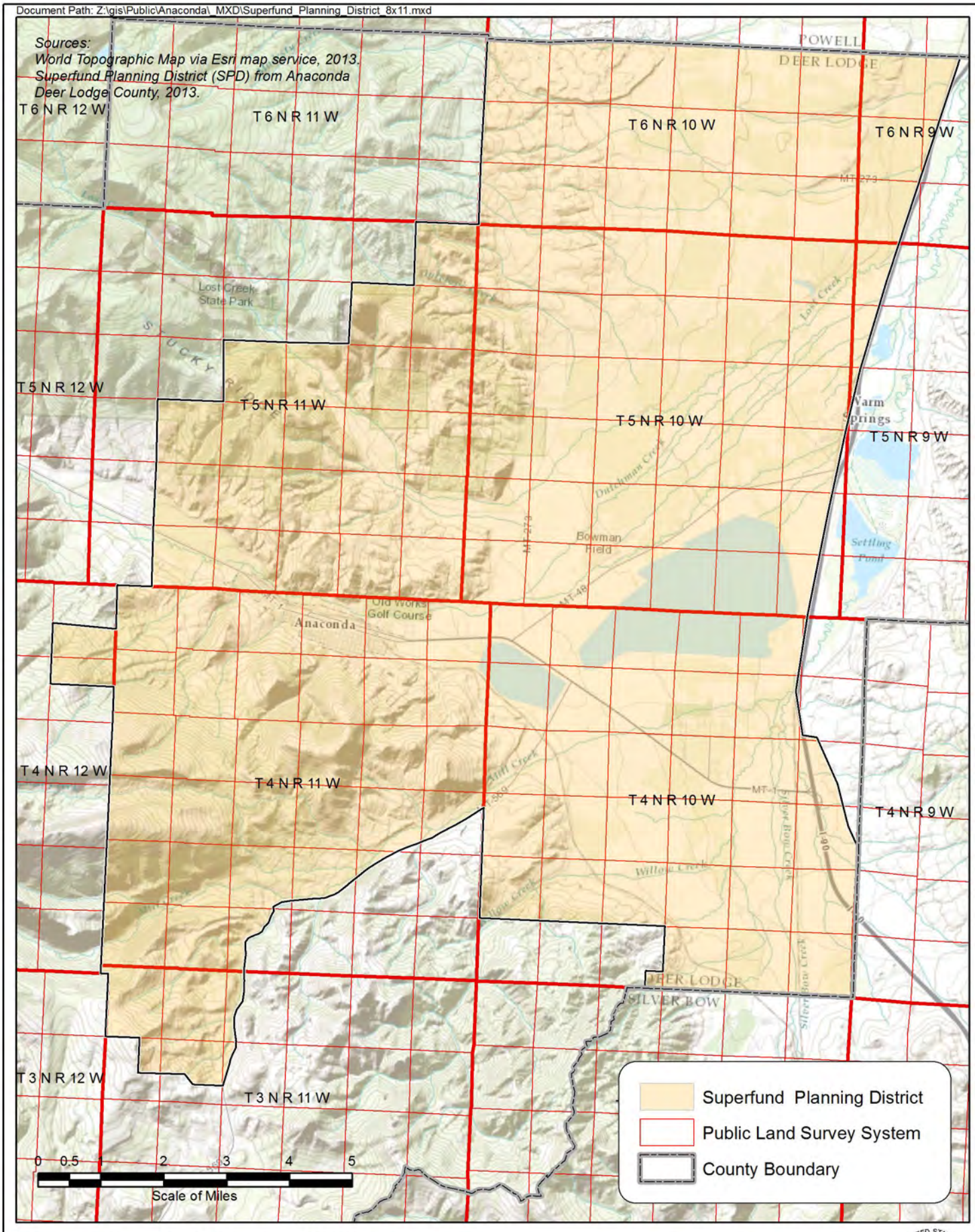

Figure 1. Superfund Planning District Boundary

Anaconda Regional Water, Waste and Soils OU - Anaconda Smelter NPL Site, Montana

Appendix B
Estimated Cost

RECORD OF DECISION AMENDMENT
COMMUNITY SOILS OPERABLE UNIT
SELECTED REMEDY COST ESTIMATE*
LEAD ACTION LEVEL = 400 mg/kg
MAXIMUM REMOVAL DEPTH = 12 inches

Activity	Quantity	Units	Unit Cost	Total Cost	Comment
Soil Sampling / Data Management					
Sample Yards to depth of 12 inches for lead analyses.	2,020	Yards	$800.00	$1,616,000.00	Number of residential yards based on counting lots in Anaconda.
Develop Individual Site Work Plans (ISWPs) for residential yards subject to Remedial Action for soil lead (≥400 mg/kg).	1515	Yards	$200.00	$303,000.00	Assumes 2.5 components per yard subject to RA. Assumes 2.5 hours/ISWP @ $80.00/hour.
SUBTOTAL - SAMPLING / DATA MANAGEMENT				$1,919,000.00	
Soils Remedial Action					
Remediate residential soils for lead (≥400 mg/kg lead) at 0 - 2 inch depth interval.	2526	Yard Components	$1,200.00	$3,031,200.00	Assumes an average yard component size of 530 SF, and unit cost of $2.12/SF (AR cost estimate)
Remediate residential soils for lead (>400 mg/kg lead) at 0 - 6 inch depth interval.	842	Yard Components	$1,325.00	$1,115,650.00	Assumes an average yard component size of 530 SF, and unit cost of $2.50/SF (AR cost estimate)
Remediate residential soils for lead (>400 mg/kg lead) at 0 - 12 inch depth interval.	422	Yard Components	$1,625.00	$685,750.00	Assumes an average yard component size of 530 SF, and unit cost of $3.07/SF (AR cost estimate)
SUBTOTAL - REMEDIAL ACTION				$4,832,600.00	
ENGINEERING / OVERSIGHT				$724,890.00	Assumes 15% of Construction Cost.
Interior Dust Remedial Action					
Sampling for Accessible Interior Dust	20	Res	$400.00	$8,000.00	Assumes 20 residences per year would request to be sampled for accesible interior dust.
Accessible Interior Dust Remediation	2	Res	$4,000.00	$8,000.00	Assumes two residences per year would be identified as requiring interior dust remediation.
Engineering / Oversight Support (for RA and Reporting)	1	Lump Sum	$4,800.00	$4,800.00	Assumes 30% of Construction Cost.
Estimated Annual Cost				$20,800.00	
Present Worth Value of Annual Cost (0.01 Discount Rate, 50 Years)				$815,278.88	
TOTAL ESTIMATED COST				**$8,291,768.88**	

*Does not include the cost of additional institutional controls.