RECORD OF DECISION

OLD WORKS/EAST ANACONDA DEVELOPMENT AREA
OPERABLE UNIT
ANACONDA SMELTER NPL SITE
ANACONDA, MONTANA

March 8, 1994

United States Environmental Protection Agency
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Document Control Number: 7760-037-DD-CZVB

RECORD OF DECISION

OLD WORKS/EAST ANACONDA DEVELOPMENT AREA
OPERABLE UNIT
ANACONDA SMELTER NATIONAL PRIORITIES LIST SITE

The U.S. Environmental Protection Agency (EPA) and the Montana Department of Health and Environmental Sciences (MDHES) present this Record of Decision (ROD) for the Old Works/East Anaconda Development Area (OW/EADA) operable unit (OU) of the Anaconda Smelter National Priorities List (NPL) site. This ROD also addresses the final remedy for the Mill Creek OU as presented in the Proposed Plan. The ROD is based on the Administrative Record for the site, the Remedial Investigation/Feasibility Study (RI/FS), the Proposed Plan, the public comments received, including those from the potentially responsible parties (PRPs), and EPA responses. The ROD presents a brief outline of the RI/FS, actual and potential risks to human health and the environment, and the Selected Remedy. EPA guidance[1] was used in preparation of the ROD. The three purposes of the ROD are to:

1. Certify that the remedy selection process was carried out in accordance with the requirements of the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP);

2. Outline the engineering components and remediation requirements of the Selected Remedy; and

3. Provide the public with a consolidated source of information about the history, characteristics, and risk posed by the conditions at the OW/EADA and Mill Creek OUs, as well as a summary of the cleanup alternatives considered, their evaluation, and the rationale behind the Selected Remedy.

The ROD is organized into three distinct sections:

1. The **Declaration** section functions as an abstract for the key information contained in the ROD and is the section of the ROD signed by the EPA Regional Administrator and the MDHES Director;

2. The **Decision Summary** section provides an overview of the site characteristics, the alternatives evaluated, and the analysis of those options. The Decision Summary also identifies the Selected Remedy and explains how the remedy fulfills statutory requirements; and

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[1] Guidance on Preparing Superfund Decision Documents: The Proposed Plan, the Record of Decision, Explanation of Differences, the Record of Decision Amendment, Interim Final, EPA/540/G, July 1989.

3. The **Responsiveness Summary** section addresses public comments received on the Proposed Plan, the RI/FS, and other information in the Administrative Record.

DECLARATION

DECLARATION

SITE NAME AND LOCATION

Anaconda Smelter NPL Site
Anaconda, Deer Lodge County, Montana
Old Works/East Anaconda Development Area Operable Unit

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for the Old Works/East Anaconda Development Area (OW/EADA) operable unit (OU) of the Anaconda Smelter Site in Deer Lodge County, Montana. Also included as part of the Selected Remedy is the final response action for the Mill Creek OU. The EPA, in consultation with the Montana Department of Health and Environmental Sciences (MDHES), selected the remedy in accordance with Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP).

This decision is based on the administrative record for the OW/EADA and Mill Creek OUs of the Anaconda Smelter Site. The Administrative Record Index and copies of key documents are available for public review at the Hearst Free Library located on the corner of Fourth and Main in Anaconda, Montana. The complete Administrative Record may be reviewed at the EPA Record Center at 301 South Park, Federal Building, Helena, Montana.

The State of Montana concurs with the Selected Remedy, as indicated by cosignature.

ASSESSMENT OF THE SITE

There may be an imminent and substantial endangerment to public health, welfare, or the environment because of an actual or threatened release of a hazardous substance from the OW/EADA OU. Because of this, EPA and MDHES have determined that the response action selected in this ROD is necessary.

DESCRIPTION OF THE SELECTED REMEDY

The OW/EADA OU is the third remedial action to be taken at the Anaconda Smelter site. The first action, taken at the Mill Creek OU, involved the relocation of residents from the community of Mill Creek. The second action was the Flue Dust OU, which addressed one of the principal threat wastes (flue dust) remaining on the Anaconda Smelter site. That action addressed flue dust at the site through removal, treatment, and containment. In addition to these remedial actions, several removal actions have been taken, including permanent removal and disposal of Arbiter and beryllium wastes and the removal of contaminated residential yard materials.

The principal contaminant of concern at the OW/EADA and Mill Creek OUs is arsenic, which is contained in the large quantities of milling and smelting wastes and in surficial soils from past aerial emissions. This ROD establishes action levels for arsenic at the OW/EADA OU. Major components of the remedy include the requirement to:

- Construct engineered covers over waste materials in recreational and potential commercial/industrial areas exceeding arsenic levels of 1,000 parts per million (ppm);
- Treat soils exceeding arsenic levels of 1,000 ppm in recreational and potential commercial/industrial areas using innovative revegetation treatment techniques;
- Cover or treat soils exceeding arsenic levels of 500 ppm in current commercial/industrial areas;
- Provide for future remediation of potential residential or commercial/industrial areas, at the time of development, to the appropriate arsenic action levels through the Anaconda-Deer Lodge County (ADL) Development Permit System (DPS);
- Construct surface controls to manage surface water runoff from Stuckey Ridge, Smelter Hill, and throughout the site to minimize discharge to Warm Springs Creek;
- Upgrade or repair levees adjacent to Warm Springs Creek to contain the 100-year peak flood event and prevent erosion of waste materials into Warm Springs Creek;
- Replace bridges or culverts, as necessary, to safely pass the 100-year peak flood event;
- Implement institutional controls to protect the above engineering controls and manage future land and water use;
- Implement long-term monitoring; and
- Preserve, to the extent practicable, historic features in the Old Works Historic District.

This Selected Remedy will achieve the following:

- Reduction of risk to human health through:

- Reduction of surface soil arsenic concentrations to acceptable levels, and
- Prevention of direct human contact with waste materials exceeding acceptable levels.

- Reduction of risk to the environment through:
  - Minimization of infiltration and deep percolation of metal-laden pore water to ground water, and
  - Minimization of erosion and metal loading via transport of waste and contaminated soil to Warm Springs Creek.
- Preservation, to the extent practical, of historic features at the site.

STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. Given the type of waste present at this site, this remedy uses permanent solutions (e.g., engineered covers) and alternative treatment technologies (i.e., innovative revegetation techniques) to the maximum extent practicable and satisfies the preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy may result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. This remedy is acceptable to both the State of Montana and the community of Anaconda.

Wm Yellowtail

William P. Yellowtail, Regional Administrator
U.S. Environmental Protection Agency
Region VIII

Date 3/8/94

Robert J. Robinson

Robert J. Robinson, Director
Montana Department of Health and Environmental Sciences

Date 3/4/94

DECISION SUMMARY

TABLE OF CONTENTS

LIST OF TABLES . . . . . DS-iv

LIST OF FIGURES . . . . . DS-vi

LIST OF ACRONYMS AND ABBREVIATIONS . . . . . DS-viii
I. SITE NAME, LOCATION, AND DESCRIPTION DS-1
II. SITE HISTORY DS-3
Enforcement Actions DS-4
III. HIGHLIGHTS OF COMMUNITY PARTICIPATION DS-6
IV. SCOPE AND ROLE OF OPERABLE UNIT DS-8
V. SUMMARY OF SITE CHARACTERISTICS DS-10
Primary Contaminants of Concern DS-10
Arsenic DS-10
Cadmium DS-11
Lead DS-11
Zinc DS-12
Copper DS-12
Site Characterization Summary - OW/EADA OU DS-12
Air DS-12
Waste DS-13
Soil DS-14
Ground Water DS-16
Surface Water DS-17
Vadose Zone DS-18
Vegetation DS-20
Discussion of Fate and Transport DS-21
Estimated Volumes of Contaminated Materials DS-23
Site Characterization Summary - Mill Creek Operable Unit DS-23
Air DS-23
Soil DS-23
Surface and Ground Water DS-24
VI. SUMMARY OF SITE RISKS DS-25
Chemicals of Potential Concern DS-25
Human Health Risk Assessment DS-26
Exposed Populations DS-26
Exposure Pathways DS-26
Human Exposure Assumptions DS-27
Exposure Point Concentrations DS-27
Quantification of Non-Cancer Risks DS-27
Quantification of Cancer Risks DS-28
Cancer Risks from Arsenic in Surface Soils DS-29
Cancer Risks from Arsenic in Ground Water DS-29
Cancer Risks from Cadmium in Surface Materials DS-29

TABLE OF CONTENTS (continued)

Uncertainties DS-30
Summary/Conclusions DS-31
Action Levels DS-31
Ecological Risk Assessment DS-32
Identification of Potential Ecological Receptors DS-32
Contaminants of Potential Concern DS-33
Exposure Assessment DS-33
Ecological Risk Characterization DS-33
VII. DESCRIPTION OF ALTERNATIVES DS-36
Summary of Alternatives DS-36
Common Elements of All Alternatives DS-36
Institutional Controls DS-36
Historic Preservation DS-37
Surface Controls DS-37
Stream Channel Controls DS-37
Monitoring DS-37
Description of Alternatives Considered for OW/EADA OU DS-38
Alternative 1 . . . . . DS-38
Alternative 2 . . . . . DS-38
Alternative 3 . . . . . DS-39
Alternative 4 . . . . . DS-39
Alternative 5 . . . . . DS-40
Preferred Alternative DS-40
Proposed Alternative for Mill Creek Operable Unit DS-41
Description of Alternatives Considered for Mill Creek Operable Unit DS-42
Alternative 1 . . . . . DS-42
Alternative 2 . . . . . DS-42
Alternative 3 . . . . . DS-43
Preferred Alternative DS-43
VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES DS-44
Evaluation and Comparison Criteria DS-44
Threshold Criteria DS-44
Primary Balancing Criteria DS-44
Modifying Criteria DS-45
Comparative Analysis of Alternatives for OW/EADA Operable Unit . DS-45
Overall Protection of Human Health and the Environment . . . DS-45
Compliance with Applicable or Relevant and Appropriate Requirements DS-46
Long-term Effectiveness and Permanence DS-46
Reduction of Toxicity, Mobility, and Volume Through Treatment DS-46
Short-term Effectiveness DS-47
Implementability DS-47

TABLE OF CONTENTS (continued)

Cost DS-48
State Acceptance DS-48
Community Acceptance DS-48
Comparative Analysis of Alternatives for Mill Creek Operable Unit . DS-48
Overall Protection of Human Health and the Environment . . . DS-48
Compliance with Applicable or Relevant and Appropriate Requirements DS-49
Long-term Effectiveness and Permanence DS-49
Reduction of Toxicity, Mobility, and Volume Through Treatment DS-49
Short-term Effectiveness DS-49
Implementability DS-50
Cost DS-50
State Acceptance DS-50
Community Acceptance DS-50
IX. SELECTED REMEDY DS-51
Remedy for Waste Sources DS-51
Remedy for Soils DS-52
Surface Controls DS-53
Stream Channel Controls DS-53
Institutional Controls DS-54
Historic Preservation DS-55
Compliance Monitoring Program DS-55
Cost DS-56
Remediation Requirements DS-56
Contingency Measures DS-59
X. STATUTORY DETERMINATIONS DS-60
Protection of Human Health and the Environment DS-60
Compliance with Applicable or Relevant and Appropriate Requirements DS-61
Cost Effectiveness DS-61
Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Possible DS-61
Preference for Treatment as a Principal Element DS-62
XI. DOCUMENTATION OF SIGNIFICANT CHANGES DS-63
XII. REFERENCES DS-64

APPENDIX A - ARARS

LIST OF TABLES

Table 1	PM-10 Mass Concentration and Metals Analysis: Teressa Ann Terrace Station
Table 2	PM-10 Mass Concentration and Trace Element Analysis: Kortem Storage Station
Table 3	National and State of Montana Ambient Air Quality Standards/Guidelines
Table 4	Settled Particulate Matter Results
Table 5	Summary of Metal Concentrations in Waste Material at the OW/EADA Operable Unit
Table 6	TCLP Results for Old Works/East Anaconda Development Area Operable Unit Waste Materials
Table 7	Summary of Metal Concentrations in Soil Samples, Subsurface Soil Samples, and Subsurface Soil Samples Below Waste Material at the OW/EADA Operable Unit
Table 8	Exceedances of EPA Ambient Water Quality Criteria for the OW/EADA Operable Unit
Table 9	Soil Sample Analytical Results for the Red Sands and Old Works Tailings Pond Lysimeter Locations
Table 10	Pore Water Analytical Results for Target Metals at the Red Sands and Old Works Tailings Pond Lysimeter Locations
Table 11	Comparison of Metals Concentrations in Vegetation from the Old Works/East Anaconda Development Area Operable Unit with Regional Data
Table 12	Chemical-Specific Recommendations for Mineral Tolerances for Domestic Animals
Table 13	Summary of Old Works/East Anaconda Development Area Waste Volumes and Areas

LIST OF TABLES (continued)

Table 14	Human Exposure Assumptions
Table 15	Summary of Information About Dirt Bike Riding in the Vicinity of the Anaconda Smelter
Table 16	Summary of Noncancer Effects and Reference Doses
Table 17	Summary of Carcinogenic Effects and Cancer Slope Factors
Table 18	Comparison of Surface Waste Concentrations to General Threshold Soil Concentrations
Table 19	Comparison of Alternatives for the OW/EADA Operable Unit
Table 20	Comparative Analysis of Alternatives
Table 21	Comparison of Alternatives for Mill Creek
Table 22	Cost Estimate for OW/EADA Operable Unit Selected Remedy

LIST OF FIGURES

Figure 1	Anaconda Superfund Site Operable Unit Locations
Figure 2	Old Works/East Anaconda Development Area Operable Unit Dedicated Development/Urban Design
Figure 3	Old Works/East Anaconda Development Area Operable Unit Subareas
Figure 4	Old Works & Washoe Reduction Works
Figure 5	Anaconda Old Works
Figure 6	Risk Conceptual Site Model
Figure 7	Air Monitoring and Dustfall Station Locations
Figure 8	Old Works/East Anaconda Development Area Operable Unit Waste Areas
Figure 9	Old Works/East Anaconda Development Area Operable Unit Arsenic Isoconcentrations
Figure 10	Old Works/East Anaconda Development Area Operable Unit Sample Stations for Ground Water, Surface Water, and Vadose Zone
Figure 11	Old Works/East Anaconda Development Area Operable Unit MCL Exceedances in the Ground Water
Figure 12	Soil Moisture at Site VZ-2 (Old Works)
Figure 13	Old Works/East Anaconda Development Area Operable Unit Vegetation
Figure 14	Town of Mill Creek Soil Arsenic Levels
Figure 15	Noncancer Risks to Workers from Arsenic in Surface Materials
Figure 16	Cancer Risks to Workers from Arsenic in Surface Materials
Figure 17	Cancer Risks to Dirt Bike Riders from Arsenic in Surface Materials
Figure 18	Conceptual Site Model for Ecological Assessment

LIST OF FIGURES (continued)

Figure 19	Old Works/East Anaconda Development Area Operable Unit Land Ownership
Figure 20	Old Works/East Anaconda Development Area Operable Unit Preferred Alternative
Figure 21	Mill Creek Area
Figure 22	Old Works/East Anaconda Development Area Operable Unit Selected Remedy

LIST OF ACRONYMS AND ABBREVIATIONS

ADL	Anaconda-Deer Lodge County
AM	Arithmetic Mean
AMC	Anaconda Minerals Company
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
ARCO	Atlantic Richfield Company
ARTS	Anaconda Revegetation Treatability Study
ARWW	Anaconda Regional Water and Waste
CDM	Camp Dresser & McKee Inc.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
DI	Daily Intake
DPS	Development Permit System
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
HI	Hazard Index
IRIS	Integrated Risk Information System
MCL	Maximum Contaminant Level
MDHES	Montana Department of Health and Environmental Sciences
mg/kg	milligrams per kilogram
mph	miles per hour
NATICH	National Air Toxics Information Clearinghouse
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOEC	No Observed Effects Concentration
NPL	National Priorities List
O&M	Operation & Maintenance
OW/EADA	Old Works/East Anaconda Development Area
OU	Operable Unit
PbB	Blood Lead
pH	hydrogen ion concentration
PM-10	10 micron particle size
ppm	parts per million
PRP	Potentially Responsible Party
RfD	Reference Dose
RHPP	Regional Historic Preservation Plan
RI	Remedial Investigation

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SF	Slope Factor
SPE	Simulated Precipitation Event
SPM	Settled Particulate Matter
State	State of Montana
TCLP	Toxicity Characteristic Leaching Procedure
UBK	Uptake/Biokinetic
µg/L	micrograms per liter
U.S.C.	United States Code

I. SITE NAME, LOCATION, AND DESCRIPTION

Anaconda Smelter NPL Site
Old Works/East Anaconda Development Area Operable Unit
Anaconda, Montana

The Old Works/East Anaconda Development Area (OW/EADA) operable unit (OU) is located in southwestern Montana, immediately adjacent to the town of Anaconda (Figure 1). The OW/EADA OU encompasses approximately 1,300 acres and is bounded by Highway 1 and the East Anaconda Yard to the south, Highway 273 to the east, Stuckey Ridge to the north, and Cedar Street in Anaconda to the west. Warm Springs Creek, the area's principal drainage, flows east through the site. Also, since the anticipated land uses, site characteristics, and contaminants of concern are similar to areas in the OW/EADA OU, the Mill Creek OU was included in the Selected Remedy for the OW/EADA OU. The Mill Creek OU is approximately 140 acres in size and is located approximately two miles southeast of the OW/EADA OU, adjacent to the Anaconda Smelter (formerly known as the Washoe Reduction Works) (Figure 1).

The OW/EADA OU contains large volumes of milling and smelting wastes, fallout from smelter emissions, and other debris that originated from the operation of smelters at the Upper and Lower Works from 1884 to 1902, and the Washoe Reduction Works from 1902 to 1980. Remnants of six brick flues on the hillside to the north of Warm Springs Creek and various deteriorated brick foundations, demolition debris, and railroad grades are all that remain of the original Old Works facilities. The Red Sands, a major Old Works site feature, consists of tailings and slag generated from the Lower Works smelter. Although there are no wastes in the Mill Creek OU, soils in that area are contaminated as a result of smelter emissions fallout and re-entrainment of contaminated materials, primarily flue dust.

The Mill Creek OU has been identified as a potential commercial/industrial area and has been zoned as such in the *Anaconda-Deer Lodge County Comprehensive Master Plan* (Peccia & Associates 1992). Current land uses within the OW/EADA OU are a mixture of industrial and recreational (Figure 2). Current industrial uses within the OW/EADA OU include the Anaconda Industrial Park, the Arbiter Plant, a municipal landfill, and the Anaconda municipal sewage treatment plant. The sewage treatment plant, the municipal landfill, and the black slag pile near the drag strip are located within the boundary of the OW/EADA OU; but are not within the scope of the Remedial Investigation/Feasibility Study (RI/FS) or this ROD, and will be addressed in a future ROD or RODs.

The OW/EADA OU is divided into six subareas, based on the similarity of waste characteristics and present or future land uses (Figure 3). The RI/FS focused on the characterization and evaluation of the following areas of the OU:

- **Subarea 1** - Old Works structural areas;
- **Subarea 2** - Heap Roast Slag, Miscellaneous Waste Piles, and a portion of the Warm Springs Creek floodplain;
- **Subarea 3** - Extension of the Warm Springs Creek floodplain and the industrial park;
- **Subarea 4** - Red Sands, Arbiter Plant, and the Anaconda Industrial Park;
- **Subarea 5** - East Anaconda Yard and Benny Goodman Park; and
- **Subarea 6** - Drag strip.

II. SITE HISTORY

The OW/EADA OU contains large volumes of various wastes and debris that originated from copper ore milling, smelting, and refining operations at the Old Works site (Upper and Lower Works) from 1884 to 1902. Additionally, the site contains some wastes and fallout from smelter and emissions originating from the Washoe Reduction Works (later known as the Anaconda Reduction Works) which replaced the Old Works in 1902 and operated until 1980. Figure 4 provides a general layout of the original Old Works and Washoe Reduction Works facilities.

The Upper and Lower Works were the first copper smelting facilities built in Anaconda to process copper ore mined in nearby Butte. Although the source of copper ore was over 30 miles away, the smelters were built in Anaconda because of the dependable water supply from Warm Springs Creek.

The Upper Works structural area was constructed between 1883 and 1884 and, to expand capacity, the Lower Works structural area was completed in 1888, approximately one mile east of the Upper Works. Old Works structures included a concentrator, boiler house, "slum" houses, and other facilities (Figure 5). The smelters were connected to brick stacks atop adjacent hills by masonry flues. Dismantling started in 1902 and was completed about 1906. Structural remains today consist primarily of massive sandstone blocks and brick rubble.

The smelting process consisted of several steps that generated different types of waste materials. Lower grade ore was crushed and screened and then jigged (agitated) to concentrate the ore material. The Jig Tailings were discharged onto the floodplain area. The Heap Roast Slag are composed of partially vitrified slag generated by processing efforts to recover target metals from discarded tailings. A combination of jig tailings and slag produced at the Lower Works were sluiced across Warm Springs Creek between 1890 and 1901 to form the Red Sands. Portions of the Red Sands were reworked on several occasions between 1913 and 1943.

During Old Works operations, a portion of the Warm Springs Creek channel within the site was realigned and straightened, and levees were installed. All operations ceased at the Old Works when, in 1902, the much larger and more modern Washoe Works (later known as the Anaconda Reduction Works) began production across the valley on Smelter Hill, south of Warm Springs Creek.

The Arbiter Plant was a hydrometallurgical copper refining plant erected by the Anaconda Minerals Company (AMC) in the 1970s to produce copper cathodes from copper sulfide concentrate produced at the Weed Concentrator in Butte. The Arbiter Plant operated from August 1974 to February 1975 and from September 1976 to November 1977. An ammonia leaching and solvent-extraction process was used to solubilize and refine flotation

concentrates of 25-percent copper sulfide. The plant was permanently closed in November 1977. The site is currently used as a storage area for various equipment and surplus materials. Most of the buildings have been cleaned and are either vacant or used for storage by local businesses.

The East Anaconda Yard area contained the Washoe Works acid and brick plants and the Bradley Ponds flue debris material. The acid and brick plants were both constructed in the 1910s. The brick plant produced both building bricks and high grade silica fire bricks used in the reverberatory furnaces. The acid plant produced sulfuric acid used in the flotation and leaching processes and the treatment of phosphate rock at the phosphate plant. The Bradley Ponds were used for the disposal of flue debris generated at the smelter and have since been removed and stabilized under the Flue Dust OU remedial action.

Several of the structures within the Old Works area are eligible for inclusion on the National Register of Historic Places, including two former lumber company buildings, various Old Works structural areas, the Heap Roast Slag, and the Red Sands. The Anaconda Old Works Historic District is considered significant not only to Anaconda's growth into an important turn-of-the-century Montana city, but also to the development of the Butte/Anaconda area as one of the largest copper producers in the world for over 30 years. Remnants of the original Old Works structures are historically significant for their relationship to the refinements in copper metallurgy developed at the site. The Heap Roast Slag and Red Sands are a significant part of the Old Works structures and are included in a Regional Historic Preservation Plan.

Enforcement Actions

The history of pollution problems associated with heavy metal releases at the Anaconda Smelter site led to listing the site on the National Priorities List (NPL) in September 1983 under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). In October 1984, the Atlantic Richfield Company (ARCO) entered into an Administrative Order on Consent (AOC) to conduct Remedial Investigations (RIs) for the Anaconda Smelter site. Draft RI reports generally indicated wide-scale contamination and a need for more in-depth study.

In the initial stages of the Anaconda area investigations, it became apparent that the community of Mill Creek, located two miles east of Anaconda, was being severely impacted by contamination. Children in Mill Creek had elevated urinary arsenic levels indicating an excess exposure to arsenic in their environment. The U.S. Environmental Protection Agency (EPA) redirected the sequencing of the RIs on the site to focus on Mill Creek. Young children, the population at greatest risk, were temporarily relocated from the community in May 1986. At this time, control measures were initiated on flue dust, the most concentrated arsenic and heavy metal contaminant source on the site.

In July 1986, EPA entered into an AOC with ARCO to conduct an expedited RI/FS for Mill Creek. The *Record of Decision* (ROD) for Mill Creek was completed in October 1987. The Selected Remedy was permanent relocation of Mill Creek residents. This remedy was selected in part because the area had the potential to become recontaminated from surrounding waste sources. EPA successfully negotiated a consent decree with ARCO concerning the implementation of the relocation remedy for Mill Creek residents on January 7, 1988. The permanent relocation of residents was completed in the fall of 1988.

In September 1988, EPA entered into an AOC with ARCO to conduct an RI/FS for the Flue Dust OU. The ROD was completed in September 1991. The remedy selected was treatment and disposal of all flue dust located on Smelter Hill. Also in September 1988, EPA entered into a consent order with ARCO to conduct an Engineering Evaluation/Cost Analysis (EE/CA) for the Old Works OU. The Final EE/CA Report addressing these areas was approved by EPA in July 1991. The actions taken as a result of the EE/CA have included stabilizing the Red Sands adjacent to Warm Springs Creek, repair of breaks in Warm Springs Creek levees, and the installation of fencing to limit access to certain areas of the Old Works site. Further cleanup actions relating to the Red Sands, as well as the remainder of the Old Works OU, are included in this OU.

A focused investigation of wastes within the ponds and bunkers at the Arbiter Plant site was conducted for the Accelerated Removal EE/CA in 1991. The waste materials within the Arbiter ponds and bunkers were removed as part of the Accelerated Removals response action in 1992. In May 1992, as a part of the *Anaconda Smelter NPL Site Conceptual Site Management Plan* (EPA 1992a), OUs at the site were reorganized. This plan formed the OW/EADA OU from those formerly referred to as the Old Works and Arbiter Plant OUs and portions of the Smelter Hill OU. The OW/EADA RI/FS, initiated in 1992, was completed in September 1993. This ROD sets forth the remedy for the OW/EADA OU of the Anaconda Smelter Site.

ARCO has been identified as the potentially responsible party (PRP). ARCO purchased AMC in 1977. AMC owned and operated the smelters from approximately 1884 to 1977. The Cleveland Wrecking Company was also identified as a PRP for their involvement with transportation and disposal of wastes during demolition activities.

EPA has issued both general and special notice letters to ARCO on several occasions. ARCO has been actively involved in conducting investigations at the site since September 1983, when the site was placed on the NPL. EPA, the Montana Department of Health and Environmental Sciences (MDHES), and ARCO entered into agreement to conduct the OW/EADA RI/FS in September 1992 under AOC, Docket No. CERCLA VIII-88-16.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation is required by CERCLA Sections 113 and 117. These sections require that before adoption of any plan for remedial action to be undertaken by the President (EPA), by a State (MDHES), or by an individual (PRP), the lead agency shall:

1. Publish a notice and brief analysis of the Proposed Plan and make such plan available to the public; and

2. Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the site regarding the Proposed Plan and any proposed findings relating to cleanup standards. The lead agency shall keep a transcript of the meeting and make such transcript available to the public. The notice and analysis published under item #1 shall include sufficient information to provide a reasonable explanation of the Proposed Plan and alternative proposals considered.

Additionally, notice of the final remedial action plan adopted must be published and the plan must be made available to the public before commencing any remedial action. Such a final plan must be accompanied by a discussion of any significant changes to the preferred remedy presented in the Proposed Plan along with the reasons for the changes and a response (Responsiveness Summary) to each of the significant comments, criticisms, and new data submitted in written or oral presentations during the public comment period.

EPA has conducted the required community participation activities through presentation of the RI/FS and Proposed Plan, a 30-day public comment period, an informational meeting, a formal public hearing, and presentation of the Selected Remedy in this ROD. Specifically included with this ROD is a Responsiveness Summary that summarizes public comments and EPA responses.

The RI/FS and Proposed Plan for the OW/EADA OU were released for public comment on September 23, 1993. The RI/FS and Proposed Plan were made available to the public in both the Administrative Record located at the EPA Record Center in Helena and the Hearst Free Library in Anaconda. The Proposed Plan was distributed to the parties on the EPA Anaconda mailing list. The notice of availability of the RI/FS and Proposed Plan was published in the Anaconda newspaper, *The Anaconda Leader*, on September 22 and 24, 1993, and in the Butte newspaper, *The Montana Standard*, on September 23, 1993. A formal public comment period was designated from September 23, 1993 through October 22, 1993.

EPA held an informational meeting in Anaconda on September 29, 1993 to explain the RI/FS process, outline the Proposed Plan and preferred alternative, and answer questions regarding the alternatives. A formal public hearing was held in Anaconda on October 14, 1993. At

this hearing, representatives from EPA answered questions about remedial alternatives under consideration, as well as the preferred remedy. A portion of the hearing was dedicated to accepting formal oral comments from the public. A court reporter transcribed the formal oral comments and EPA made the transcript available by placing it in the Administrative Record. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this ROD. Also, community acceptance of the Selected Remedy is discussed in Section VIII, Summary of Comparative Analysis, of this Decision Summary.

IV. SCOPE AND ROLE OF OPERABLE UNIT

The Anaconda Smelter site covers a wide area (Figure 1) and is currently organized into the following OUs:

Anaconda Smelter Demolition (Smelter Hill)
Mill Creek Children Relocation
Anaconda Yards Time Critical Removal Action
Arbiter/Beryllium & Repository Construction
Old Works Stabilization
Mill Creek Relocation
Flue Dust
Old Works/East Anaconda Development Area
Community Soils
Anaconda Regional Soils
Anaconda Regional Water and Waste

The OUs were prioritized based on their potential risk to human health and the environment. Mill Creek was considered the highest priority and EPA relocated residents in 1988. Since then, EPA has also taken action at several other OUs, including Flue Dust, Arbiter, Beryllium, Community Soils, and Old Works. The OW/EADA OU is considered the next priority because of the potential exposure of the nearby population to elevated metal concentrations and the potential for economic development within the area.

The purpose of the OW/EADA OU RI/FS was to gather sufficient information to support an informed risk management decision on which remedies are the most appropriate for the OW/EADA OU. The RI/FS was performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, and CERCLA Section 104, 42 U.S.C. § 9604.

The objectives of the RI/FS were to:

- Determine the nature and extent of metals in source areas and other affected areas within the OW/EADA OU;
- Define the potential pathways along which metals can migrate, as well as the physical processes and, to the extent necessary, the chemical processes that control these pathways;
- Determine risk assessment information, including potential receptors, exposure patterns, and food chain relationships; and

- Develop, screen, and evaluate remedial alternatives and predict the consequences of each remedy.

Based on the findings of previous investigations and the results of the OW/EADA OU RI/FS, the sources and areas of environmental contamination at the OW/EADA OU have been adequately delineated.

The Mill Creek OU was previously assessed under an RI/FS completed in September 1987 by ARCO. Volume VI (Mill Creek Addendum) of the OW/EADA RI/FS summarizes the current status of the Mill Creek OU, including sample results from data collected in 1993.

The remedy outlined in this ROD represents the final remedial action only for contaminated soil and waste materials within the OW/EADA and Mill Creek OUs. The purpose of the remedy presented in this ROD is to prevent human and environmental exposure, by inhalation and ingestion, to contaminated soil and smelter waste materials. Remedial actions for other media (e.g., ground water) and areas specifically excluded (e.g., black slag pile) are deferred to other OUs. Remedial actions undertaken at the OW/EADA OU are intended to be consistent with the remedial action objectives and goals identified for the Anaconda Regional Water and Waste (ARWW) OU and other investigations.

V. SUMMARY OF SITE CHARACTERISTICS

The OW/EADA OU contains large quantities of milling and smelting wastes, contaminated soils caused by smelter emissions, and other debris that originated from the Upper and Lower Works structural areas. Approximately 1.4 million cubic yards of Jig Tailings, Heap Roast Slag, Red Sands, and other wastes remain on site. The estimated volume of Heap Roast Slag is approximately 298,000 cubic yards. The volume of the Red Sands is estimated to be approximately 607,000 cubic yards. With the exception of the Red Sands, most wastes within the site have remained essentially undisturbed since the turn of the century. Although there are no waste materials located within the Mill Creek OU, soils in that area have been contaminated by smelter emissions fallout and re-entrainment of contaminated materials, primarily flue dust.

Existing pathways for potential migration of metals of concern include air, surface water, infiltration of precipitation, and ground water. These are summarized on Figure 6 and discussed below.

The following section discusses the primary contaminants of concern, summarizes the nature and extent of contamination, provides a brief discussion of contaminant fate and transport, and provides estimated volumes of contaminated materials.

Primary Contaminants of Concern

Arsenic

Arsenic occurs in either a trivalent or pentavalent oxidation state. The most common inorganic trivalent arsenic compounds are arsenic trioxide, sodium arsenate, and arsenic trichloride. Pentavalent inorganic compounds are arsenic pentoxide, arsenic acid, and arsenates, such as lead arsenate and calcium arsenate.

Inorganic arsenic is released into the environment from a number of anthropogenic sources, including primary copper smelters. Airborne arsenic is largely trivalent arsenic oxide, but disposition in airways and absorption from lungs are largely dependent on particle size and chemical form. It has long been recognized that trivalent compounds of arsenic are the principal toxic forms. The pH of aqueous solutions appears to be a major factor in the stability of either valency form of arsenic. Trivalent arsenic in alkaline solutions is more rapidly oxidized than at acidic pH. Pentavalent inorganic arsenic is relatively stable at neutral or alkaline pH, but undergoes reduction with decreasing pH.

There is evidence that chronic arsenic inhalation exposure increases the risk of lung cancer. Other concerns noted from long-term exposure to arsenic include lymphomas and leukemia, renal adenocarcinoma, and nasopharyngeal. EPA has classified arsenic as a human carcinogen via inhalation.

Cadmium

Cadmium is a metal that is often a byproduct of lead, zinc, and copper mining and smelting activities. Cadmium is more readily taken up by plants than other metals such as lead. It is an important metal due to its use in electroplating or galvanizing and because of its non-corrosive properties.

Long-term effects of low-level exposure to cadmium include chronic obstructive pulmonary disease and emphysema, and renal tubular disease. Inhalation exposure to high levels of cadmium may cause tracheobronchitis, pneumonitis pulmonary edema, and may ultimately lead to pulmonary fibrosis. There have been numerous epidemiological studies intended to determine a relationship between occupational (inhalation) exposure to cadmium, and lung cancer and prostatic cancer. The conclusions of these and other studies indicate long-term exposure to cadmium may contribute to lung cancer; however, confounding exposures to arsenic, nickel, and cigarette smoking prevent definitial conclusion. Risks of prostatic cancer due to long-term exposure to cadmium are also uncertain. EPA has classified cadmium according to its weight of evidence criteria in Group B1 (probable human carcinogen) via the inhalation pathway based on animal and human health studies.

Lead

Because of its extensive use and its widespread distribution, human exposure to lead is common. The principal route of human exposure to lead is food, but it is usually environmental sources that produce excess exposure and toxic effects. Common environmental sources include lead-based paint, lead in air from combustion of lead-containing auto exhaust or industrial emissions, hand-to-mouth activities of young children living in or near polluted environments, and lead dust brought home by workers. Nearly all environmental exposure to lead is to inorganic compounds. Route of absorption (inhalation, ingestion) does not affect distribution of lead in the body. Lead is distributed among several physiological compartments which include blood, soft tissue (particularly brain, kidney and liver), and bone. Infants retain approximately 30 percent of the absorbed lead, whereas adults retain approximately 1 percent of absorbed lead. Increase in blood pressure is the most sensitive adverse health effect from lead exposure occurring in adult populations. At higher levels of exposure, gastrointestinal symptoms such as colic, abdominal pain, constipation, and anorexia are typical. Kidney damage may occur with both acute and chronic exposure to lead. Several studies have demonstrated a statistical decrement in children's IQ due to environmental exposure to lead. Pregnancy is regarded as a period of increased risk because blood levels of lead are the same for both the mother and fetus (the fetus exhibiting a greater sensitivity to lead exposure). Maternal blood-lead levels have been correlated to birth weight and neurobehavioral deficits or delays in infants.

Studies on the association of occupational exposure to lead with increased cancer risk are insufficient to determine the carcinogenicity of lead in humans. Lead has been classified by

the EPA as a 2B carcinogen, indicating evidence for carcinogenicity in animals is adequate but inadequate in humans.

Zinc

Zinc may be released to the atmosphere as dust and fumes resulting from zinc production facilities, lead and copper smelters, brass works, automobile emissions, fuel combustion, incineration, and soil erosion. Urban runoff, mine drainage, and municipal and industrial effluents are common sources of zinc that pollute ground water and surface water resources.

Zinc is a nutritionally essential metal and deficiency results in severe health consequences. Zinc is present in most food, water, and air. Approximately 20 to 30 percent of ingested zinc is absorbed. Acute toxicity of ingested zinc results in gastrointestinal distress and diarrhea. Inhalation of zinc fumes in an industrial setting has resulted in metal fume fever. Zinc is classified in Group D (not classifiable as to human carcinogenicity) by EPA, based on inadequate evidence in humans and animals as to the carcinogenic effects of zinc.

Copper

Copper may be released to the environment as a result of metal plating, industrial and domestic wastes, and mining and smelting wastes. Because copper is a nutritionally essential element in animals and humans, environmental accumulations are considered less important routes of excess exposure than occupational exposure or exposures resulting from accidents. Most copper ingested into the body is stored in liver and bone marrow. Infants are thought to exhibit increased susceptibility to copper toxicity because homeostatic mechanisms (storage mechanisms) are not fully developed at birth. Copper is also more toxic to plants and fish than animals; thus, its occurrence and ability to load into surface water systems at the site is a primary concern.

Site Characterization Summary - OW/EADA OU

As reported in the *Final RI Report* (ARCO 1993a), six media and/or pathways were characterized during the remedial investigation for the OW/EADA OU. These media/pathways included air, waste, soil (surface and subsurface), vadose zone, ground water, and surface water. As discussed in the RI Report, final decisions related to remediation of ground water and surface water will be addressed upon completion of the investigations under the ARWW OU.

Air

Two air monitoring stations, located at Teressa Ann Terrace and Kortem Storage equipped with high volume PM-10 samplers and two dustfall stations, were utilized in the OW/EADA OU from August 1989 to June 1992 to determine the maximum levels of particulates and

metals in ambient air at the site (Figure 7). A meteorological station was also installed and operated during the investigation at Teressa Ann Terrace to characterize air flow at the site. The results of this investigation were used to determine the potential health and environmental risk from inhalation of constituents of concern at the OW/EADA OU.

Meteorological information, including wind speed, wind direction, and the standard deviation of the horizontal wind direction, were collected at the OW/EADA OU for three annual periods (August 1989-June 1990, July 1990-June 1991, and July 1991-June 1992). Results indicate that the predominant wind direction is from the west and the average wind speed is approximately 8-9 miles per hour (mph).

PM-10 sample filters collected at Teressa Ann Terrace and Kortem Storage stations were analyzed every sixth day for PM-10 mass and trace metals (total arsenic, beryllium, cadmium, copper, lead, and zinc). The highest 24-hour concentration of PM-10 mass observed was 46 $\mu g/m^3$ (Tables 1 and 2), the highest 24-hour arsenic concentration was 0.0890 $\mu g/m^3$, and the highest arsenic annual mean concentration was 0.0077 $\mu g/m^3$. The analytical results were compared to the National and State of Montana Ambient Air Quality Standards/Guidelines (Table 3). The analytical data collected indicate applicable federal and state air quality standards and health guidelines were not exceeded during the 3-year monitoring period at the OW/EADA OU.

Table 4 shows dustfall bucket samples collected at two stations (DF-8 and DF-9) in the OW/EADA OU which were analyzed for settled particulate matter (SPM) and trace metals (arsenic, beryllium, cadmium, copper, lead, and zinc). Three exceedances of the State of Montana Ambient Air Quality Standard for SPM (10 g/m^2/month) were measured during the monitoring periods in June 1991 (22.53 g/m^2/month), April 1992 (18.2 g/m^2/month), and May 1992 (18.5 g/m^2/month). All three of the exceedances were observed at Station DF-8, and the results are considered questionable due to sample contamination by bird and insect residues.

Results of air resource monitoring conducted at the OW/EADA OU from 1989 to 1992 indicate that PM-10 trace metal concentrations in air are below state and federal health standards.

Waste

Waste materials identified at the OW/EADA OU consist of Upper and Lower Works demolition debris, flue debris, Miscellaneous Waste Piles (including Waste Piles 1-8), Heap Roast Slag, Floodplain Wastes (Jig Tailings), Red Sands, Mixed Wastes (primarily Red Sands and Jig Tailings mixed with soil), and railroad beds. The locations of waste material within the OW/EADA OU are presented on Figure 8.

Activities characterizing waste materials at the OW/EADA OU were completed during four investigations: *Master Investigation* (TetraTech 1987), *Solid Matrix Screening Study* (CDM 1987), *Old Works EE/CA* (ARCO 1991a), and the *Remedial Investigation* (ARCO 1993a). More than 300 waste samples were collected from one of three types of sampling stations (hand excavated pits, backhoe pits, and auger boreholes) to determine the magnitude and extent of metals in waste materials, to determine physical and chemical properties of waste, and to provide necessary data to determine potential health and environmental risks from ingestion of waste material at the OW/EADA OU.

A summary of the analytical results from sampling activities at the OW/EADA OU is provided in Table 5. The maximum concentration of arsenic measured from all waste material at the OW/EADA OU was 10,400 mg/kg observed from a sample of flue debris. The maximum concentrations of other metals observed from waste material were 398 mg/kg cadmium (flue debris), 59,200 mg/kg copper (Heap Roast Slag), 2,900 mg/kg lead (Floodplain Wastes), and 62,100 mg/kg zinc (Upper Works demolition debris).

Mean concentrations of arsenic ranged from 508 mg/kg (Upper Works waste) to 1,200 mg/kg (Red Sands). Mean concentrations for cadmium, copper, lead, and zinc ranged from 1.6 mg/kg (Floodplain Waste-Subarea 2) to 7.7 mg/kg (flue debris); 571 mg/kg (Floodplain Waste-Subarea 3) to 6,250 mg/kg (Waste Piles 1-8); 136 mg/kg (flue debris to 437 mg/kg (Red Sands); and 313 mg/kg (Floodplain Waste-Subarea 3) to 5,170 mg/kg (Heap Roast Slag), respectively.

Toxicity Characteristic Leaching Procedure (TCLP) analysis was performed on samples collected from Waste Piles 2, 5, and 6; flue debris; and Red Sands. The results presented in Table 6 indicate that none of the contaminants present in the waste materials characterized by TCLP exceeded EPA regulatory limits (40 C.F.R. Part 261). These limits apply to the characterization of a material as a hazardous waste.

Soil

Characterization of soil in the OW/EADA OU was conducted during five investigations: *Master Investigation* (TetraTech 1987), *Solid Matrix Screening Study* (CDM 1987), *Old Works EE/CA* (ARCO 1991a), *Smelter Hill Data Summary/Data Validation/Data Usability Report* (ARCO 1991b), and *Remedial Investigation* (ARCO 1993a).

More than 800 surface (0-2 inch depth) and subsurface (2-24 inch depth) soil samples were collected and analyzed from the OW/EADA OU from hand excavated pits, backhoe pits, or auger boreholes, to determine the magnitude and extent of metals in soil, and to determine physical and chemical properties of metal-laden soil. The information collected was used to determine potential health and environmental risk posed through ingestion of metal-laden soil at the site.

A summary of the analytical results of metal concentrations for surface soil samples, subsurface soil samples, and subsurface soil samples below waste material at the OW/EADA OU is provided in Table 7. Approximate surface arsenic concentrations determined geostatistically are shown on Figure 9.

The maximum arsenic concentration observed in surface soil in the OW/EADA OU was 3,050 mg/kg at a sample location in Subarea 6. The maximum concentrations of cadmium, copper, lead, and zinc observed in surface soil were 68.8 mg/kg (Subarea 4), 27,200 mg/kg (Subarea 3), 3,310 mg/kg (Subarea 2), and 16,600 mg/kg (Subarea 4), respectively. The mean concentration of arsenic in surface soil ranged from 81.7 mg/kg (Subarea 5) to 897 mg/kg (Subarea 6). Mean concentrations of cadmium, copper, lead, and zinc in surface soil ranged from 1.6 mg/kg (Subarea 5) to 13.5 mg/kg (Subarea 5); 126 mg/kg, (Subarea 5) to 4,500 mg/kg (Subarea 6); 72.3 mg/kg (Subarea 5) to 490 mg/kg (Subarea 1); and 349 mg/kg (Subarea 1) to 2,300 mg/kg (Subarea 4), respectively.

The maximum arsenic concentration observed in subsurface soil was 2,220 mg/kg at a sample location in Subarea 3. The maximum concentrations of cadmium, copper, lead, and zinc observed in subsurface soil samples were 16.5 mg/kg (Benny Goodman Park), 14,400 mg/kg (Subarea 5), 8,440 mg/kg (Subarea 5), and 8,760 mg/kg (Subarea 2), respectively. Mean concentrations of arsenic in subsurface soil samples ranged from 92.1 mg/kg (Subarea 1) to 257 mg/kg (Benny Goodman Park). Mean concentrations of cadmium, copper, lead, and zinc in subsurface soil samples ranged from 1.1 mg/kg (Subarea 3) to 4.3 mg/kg (Benny Goodman Park), 68.6 mg/kg (Subarea 6) to 502 mg/kg (Subarea 2), 20.8 mg/kg (Subarea 6) to 213 mg/kg (Benny Goodman Park), and 98.2 mg/kg (Subarea 1-Upper Works) to 723 mg/kg (Subarea 1-Lower Works), respectively.

The maximum arsenic concentration observed in subsurface soil below waste material was 6,260 mg/kg below reclaimed waste in the East Anaconda Yard. The maximum concentrations of cadmium, copper, lead, and zinc observed in subsurface soil below waste material were 67 mg/kg (below Floodplain Waste-Subarea 2), 55,600 mg/kg (below Heap Roast Slag), 60,000 mg/kg (below reclaimed waste East Anaconda Yard), and 5,500 mg/kg (below Heap Roast Slag), respectively. The mean concentration of arsenic in subsurface soil below waste material ranged from 29.5 mg/kg (below flue debris) to 194 mg/kg (below Floodplain Waste-Subarea 2). Mean concentrations of cadmium, copper, lead, and zinc in soil below waste material ranged from 0.7 mg/kg (below flue debris) to 3.1 mg/kg (below reclaimed waste East Anaconda Yard), 162 mg/kg (below flue debris) to 2,960 mg/kg (below Red Sands), 15.7 mg/kg (below Heap Roast Slag) to 184 mg/kg (below reclaimed waste-Subarea 5), and 73.8 mg/kg (below flue debris) to 807 mg/kg (below Red Sands), respectively.

Results of the soil investigation at the OW/EADA OU indicate that elevated metal concentrations attributable to aerial deposition are generally found in the upper few inches of soil. Subsurface samples collected from 2-24 inches below grade in these areas (portions of

Subareas 3, 4, and 6) consistently exhibit decreasing metal concentrations compared to surface soil concentrations. A good example is Subarea 6, which demonstrates the highest mean arsenic concentration for surface soil samples, but the lowest mean arsenic concentration for subsurface soil samples collected at the site (Table 7).

Soil below waste materials commonly showed elevated concentrations of copper and zinc, and to a lesser extent lead and arsenic, compared to soil located within the same subarea. Elevated geometric mean concentrations of copper were found below the Waste Piles 1-8 (2,390 mg/kg), Heap Roast Slag (1630 mg/kg), Floodplain Waste (782 mg/kg), the Red Sands (2,960 mg/kg), and the reclaimed waste in Subarea 5 (350 mg/kg). The highest geometric mean zinc concentration was found below the Red Sands (807 mg/kg), and in reclaimed waste in Subarea 5 (662 mg/kg).

Ground Water

A ground water monitoring well network consisting of 21 water quality monitoring wells and 13 additional water-level monitoring wells was installed in the OW/EADA OU to characterize ground water quality, estimate physical characteristics of ground water flow, and to collect data in support of a baseline risk assessment (Figure 10). Ground water quality and water level elevations were monitored quarterly for a period of at least one year for all wells in the OW/EADA ground water network. In addition, continuous water level recorders were installed in monitoring wells at the T1 and T2 transects located on Warm Springs Creek to observe fluctuations in ground water levels in conjunction with stage and discharge measurements of the creek to determine stream-aquifer interactions in the OU.

Ground water investigations in the OW/EADA OU indicate that an unconfined alluvial aquifer underlies a majority of the OU's approximately 1,300-acre surface area. The thickness of the alluvial aquifer ranges from approximately 20 feet in the western portion of the study area to greater than 100 feet near the OU's eastern boundary. Estimates of the aquifer's hydraulic conductivity, based on numerous slug test results and a constant discharge pump test at the T2 transect, range from 50 feet per day to greater than 500 feet per day. Depth to ground water in the area ranges from approximately 15 feet in the west to approximately 70 feet in the eastern portion of the OU. The principal direction of ground water flow is from west to east along the axis of the Warm Springs Creek valley. The hydraulic gradient is approximately 0.015 ft/ft. The alluvial aquifer continues laterally beyond the east and west boundaries of the OW/EADA OU. However, near the OU's north and south boundaries, the alluvial aquifer is truncated by bedrock aquifers located beneath Smelter Hill (to the south) and Stuckey Ridge (to the north). The bedrock aquifers adjacent to the OW/EADA OU consist of a fractured Tertiary volcanic tuff and consolidated sedimentary deposits. Although the hydraulic gradient of the bedrock aquifers is approximately one order of magnitude greater than that of the alluvial aquifer, the hydraulic conductivity of the bedrock aquifer is considerably less than that of the alluvial aquifer. The

interaction of the bedrock and alluvial aquifers within the OW/EADA OU is not well documented.

Ground water quality within the OW/EADA OU is based on data collected during eight sampling events conducted between November 1990 and June 1992. Ground water samples were analyzed for total and dissolved metals (arsenic, cadmium, copper, zinc, iron, lead, manganese, mercury, silver, and selenium), selected anions, nitrates, temperature, pH, specific conductance, and redox potential. Ground water in the alluvial aquifer is predominantly a calcium bicarbonate water type. A calcium sulfate water type is exhibited in the alluvial aquifer in the vicinity of the Old Works Tailings Ponds (MW-203) and in the extreme northeastern portion of the study area (MW-209). A calcium sulfate water is also exhibited in the bedrock aquifer at the base of Smelter Hill (A2BR). A sulfate water type has often been identified throughout the ARWW OU in association with elevated metal concentrations.

Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) were exceeded in the alluvial aquifer at several locations in the OW/EADA OU. The MCL for cadmium (5 μg/L) was exceeded in the vicinity of the Red Sands and Arbiter Plant located in Subarea 4 and area east of the Draft Strip in Subarea 6. The MCL for arsenic (50 μg/L) was exceeded in the alluvial and bedrock aquifers beneath the East Anaconda Yard in Subarea 5 (Figure 11). Elevated concentrations of copper and zinc persist throughout most of the alluvial aquifer beneath the interior portion of the OW/EADA OU. Possible sources of cadmium loading to ground water in areas where the MCL is exceeded include the Red Sands and the now-excavated Old Works Tailings and Arbiter Ponds. Possible sources of copper and zinc loading to ground water include Heap Roast Slag, floodplain tailings, Red Sands, Old Works Tailings Ponds, and Arbiter Ponds. Possible sources of arsenic loading to ground water in the East Anaconda Yard include recharge to the alluvial aquifer from the contaminated bedrock aquifer, contaminated runoff from Smelter Hill, and reclaimed waste in the East Anaconda Yard.

Surface Water

Continuous stage monitoring was conducted at three sites along Warm Springs Creek in the OW/EADA OU. Station WS-2 is located at the OU's upstream boundary, T-2 is located within the OU, and WS-3 is located near the OU's downstream boundary (Figure 10). Data from stations equipped with continuous water-level recorders were reported in quarterly data summary reports for the ARWW OU. Intermittent (direct) discharge and stage measurements were made to establish a rating curve for each station.

Ground and surface water data collected from the OW/EADA OU ground water monitoring well and surface water monitoring network indicate that ground water does not discharge to Warm Springs Creek within the boundary of the OU. During baseflow conditions, the

ground water elevation at Station T-2 was approximately 15 feet below the surface water elevation of Warm Springs Creek. When the maximum rise in ground water elevation at the site was observed in July 1991, the ground water elevation at Station T-2 was approximately 10 feet below the stream surface. Results of both continuous streamflow monitoring and direct discharge measurement indicate no discernable net gains or losses of surface water flow within the OU along Warm Springs Creek. However, ground water mounding observed beneath Warm Springs Creek at Transects T1 and T2 suggests that Warm Springs Creek may lose water through seepage to the underlying alluvial aquifer within the OW/EADA OU. During the 1992 reporting period (ending June 30, 1992), the mean discharge for WS-2, T-2, and WS-3 was 59, 55, and 55 cubic feet per second (cfs), respectively.

Water quality sampling and analysis at the site was conducted during 13 sampling events during the period of April 1985 through June 1992. Water quality entering and exiting the OW/EADA OU is characterized as a calcium bicarbonate water type, low in total dissolved solids, low in suspended solids, and generally low in total and dissolved metals. Total and dissolved median metal concentrations of arsenic, copper, zinc, and lead were compared and found to be different at Station WS-2 (water entering the OU) vs. Station WS-3 (water exiting the OU). Median total copper and zinc concentrations were observed to increase in Warm Springs Creek from Station WS-2 to WS-3, while median total arsenic and lead concentrations generally remained constant. With the exception of zinc which increased slightly at Station WS-3, dissolved metal concentrations remained stable in Warm Springs Creek within the OU. Cadmium concentrations were not compared because concentrations of cadmium were generally below detection limits (0.2-3.9 μg/L) during the reporting period.

A list of water quality exceedances of Ambient Water Quality Criteria for the OW/EADA OU is presented in Table 8. General primary SDWA standards were not exceeded in samples collected from Warm Springs Creek from April 1985 to June 1992. Furthermore, arsenic and zinc concentrations did not exceed chronic and acute water quality criteria during the reporting periods. Chronic and acute aquatic water quality criteria for copper, lead, mercury, and silver were exceeded in several samples collected at the site. One exceedence for mercury and silver and two exceedances for copper and lead were observed at Station WS-3 (exiting the OU) which did not occur at WS-2 (entering the OU).

Vadose Zone

Vadose zone investigations at the OW/EADA OU were initiated in December 1990 in an attempt to determine the amount of precipitation that is available for the recharge of the alluvial aquifer and to predict the vertical movement of solutes through the vadose zone at the site.

Soil moisture monitoring occurred at Station VZ-2 from December 1990 through September 1991 (Figure 10). Soil moisture samples were manually collected at 6-inch intervals using a bucket auger to a depth of 30 inches. Twelve sampling events occurred from December

1990 through September 1991. Results are presented graphically on Figure 12 and suggest infiltration and percolation of precipitation occurred to a depth of at least 30 inches at the VZ-2 site under normal conditions of precipitation.

In June 1992, two suction lysimeters were installed beneath the Red Sands and Old Works Tailings Ponds (Subarea 4). Soil samples were collected at approximately 2-foot intervals to a depth of 23 feet at the Red Sands, and 18 feet at the Old Works Tailings Ponds during installation of the lysimeters and were analyzed for arsenic, cadmium, copper, lead, and zinc. Analytical results are presented in Table 9. Elevated concentrations of copper and zinc were observed throughout the soil profile at both locations. Depth to ground water in the vicinity of the Red Sands and Old Works Tailings Ponds is approximately 30 feet. A suction lysimeter at the Red Sands station was installed at a depth of 7 feet, below the soil/waste interface. A lysimeter in the tailing ponds was installed at a depth of 4.5 feet. Pore water samples were collected at both sites in June 1992 and September 1992. A third pore water sample was collected from the Red Sands lysimeter in November 1992. Pore water samples were analyzed for arsenic, cadmium, copper, lead, and zinc and results are presented in Table 10. High concentrations of copper (5,300 to 267,000 μg/L), zinc (12,000 to 180,000 μg/L), and cadmium (28.5 to 322 μg/L) were exhibited in pore water collected from directly below waste material at the Red Sands and Old Works Tailings Ponds. Ground water monitoring in Subarea 4 has exhibited elevated levels of copper, zinc, and cadmium downgradient of these two potential source areas.

A simulation of two 24-hour, 100-year successive storm events occurring within a 56-hour period of time was conducted at two sites located in the Jig Tailings (Subarea 2), and the Heap Roast Slag (Subarea 2). Four suction lysimeters and two pan lysimeters were installed at 2- to 4-foot depth intervals to a maximum depth of 6 feet at the Jig Tailings site, and 12 feet at the Heap Roast site to monitor pore water chemistry during the experiment. Two neutron access ports were installed at each location, a shallow port to a depth of 3 to 4 feet and a deeper port installed to a depth of 16 feet at the Heap Roast site and 31 feet at the Jig Tailings site. Neutron probe readings were obtained periodically during a 54-day period to monitor advancement of the wetting front generated by the simulated precipitation event (SPE) and displacement of pre-existing pore water at each site. The results of the SPE experiment demonstrate that applied precipitation generated movement of pore water to a depth of at least 15 feet at the Jig Tailings site and at least 12 feet at the Heap Roast Slag site. Copper and zinc exhibited greater mobility during infiltration and percolation of precipitation during the study. Cadmium was less mobile than copper and zinc although pore water concentrations of cadmium were observed at depth beneath Jig Tailings. Arsenic concentrations in pore water generally decreased with depth at both sites, suggesting relatively low mobility compared to other metals observed.

The evaluation of vadose zone monitoring results at Station VZ-2, Red Sands, Old Works Tailings Ponds, and the SPE site in conjunction with ground water monitoring results indicate recharge to the alluvial aquifer does occur in the OW/EADA OU under normal

conditions of precipitation. Furthermore, infiltration of precipitation provides a pathway for loading copper and zinc, and in local areas, cadmium and arsenic, to ground water at the site.

Vegetation

Vegetation within the OW/EADA OU is composed almost entirely of secondary growth consisting of weedy forbs, grasses, and shrubs that have revegetated the drier disturbed areas. Large portions of the OW/EADA OU are bare or lack appreciable vegetation because of conditions limiting root development, repeated disturbances to soil, and adverse soil conditions. The riparian zone appears to revegetate rapidly due to remnant vegetation and adequate supply of available moisture.

Three vegetation surveys were conducted which provided the necessary data to identify plant communities and species in the study area, estimate concentrations of metals in plant tissue of selected plant species, compare metal concentrations of selected plants to concentrations of metals in plants at uncontaminated sites, and compare metal concentrations to the recommended mineral tolerances for domestic animals.

A regional vegetation survey was conducted under the ARWW investigation which is presented in the *1991 Preliminary Site Characterization for the ARWW OU* (ARCO 1992a). More than 80 plant species were identified in the vicinity of the OW/EADA OU as a result of this survey.

A phytotoxicity study was conducted at the Smelter Hill OU in 1989 and 1990, at which time 23 sites located in the East Anaconda Yard (Subarea 5) were sampled. Results of the study are reported in the *Smelter Hill RI/FS Phytotoxicity, Surface Water and Ground Water Investigations Data Summary/Data Validation/Data Usability Report* (ARCO 1990).

Finally, a vegetation survey was completed as part of the OW/EADA OU RI/FS in August 1992. Twenty-four vegetation samples were collected at nine stations located in Subareas 2 and 3 representing five different vegetation types: riparian, grassland, weedy/grassland, undisturbed soil, and shrub/grassland. Delineation of vegetation-type areas in Subareas 2, 3, and 5 as a result of the 1989 and 1990 phytotoxicity study and the 1992 vegetation survey is presented on Figure 13.

Results of tissue analysis for each of the vegetation-type areas indicate that except for arsenic, levels of metals concentrations are similar to levels throughout the western United States (Table 11).

The potential for contaminated vegetation in this OU to have an adverse effect on the environment was determined by comparing the results of the plant tissue to the mineral tolerances for cattle, sheep, and horses. Chemical-specific recommendations for mineral

tolerances for domestic animals are presented in Table 12. Exceedances of cadmium, copper, and zinc concentrations recommended by the National Academy of Sciences were observed in the three subareas. The exceedances were generally less for the grasses and forbs than for the shrubs and trees.

Discussion of Fate and Transport

Historical release mechanisms and transport pathways for metals of concern at the OW/EADA OU included:

- Operational procedures including discarding waste materials;
- Aerial deposition from stack emissions;
- *In situ* leaching of the Red Sands to extract metals;
- Fluvial erosion and redeposition of wastes in Warm Springs Creek floodplain; and
- Demolition of structures.

Each of the transport pathways listed above are either no longer active or, in the case of fluvial redeposition within the floodplain, the current migration rate along the pathway is greatly diminished.

Existing pathways for potential migration of the metals of concern include air, surface water, infiltration, and ground water. The air pathway, which historically was the predominant pathway for the stack emissions that affected surface soil in all areas, is currently not a significant pathway for the transfer of metals. The air quality results for the air monitoring stations within the OW/EADA OU also indicate that dust re-suspension and transport is not a significant pathway. Although fugitive dust movement has been observed and continues to be a potential transport mechanism of concern, metals concentrations in dust samples do not exceed federal or state standards. For these reasons, the air transport pathway is not considered further in the fate and transport evaluation, and is not included in the remedial alternatives evaluated.

Fluvial deposition of metals occurred historically from overland runoff from Subareas 1 and 2, and from flooding of Warm Springs Creek. Engineering controls designed to prevent overland runoff from Subareas 1 and 2 from entering Warm Springs Creek during the 10-year precipitation event have been recently implemented. In addition, levees and other stream bank improvements along Warm Springs Creek generally prevent overflow from a 100-year design flood event. Although overland runoff for certain storm events is currently

contained, runoff from larger storm events, runoff to other areas, or runoff over the long term continue to be transport mechanisms of concern.

Bioaccumulation is a potential pathway for the transfer of metals from waste materials or metals-laden soil to receptors. This pathway was evaluated via plant collection. For the majority of plants, metals concentrations are not elevated over applicable literature values. Several cadmium, copper, and zinc plant concentrations were found to exceed levels recommended by the National Academy of Sciences.

The remaining pathways evaluated were infiltration and ground water transport. Infiltration of water is generally not limited at the OW/EADA OU by high evapotranspiration potential relative to available precipitation because most of the area is unvegetated. It is likely that precipitation infiltrates and accumulates beneath the depth of effective evapotranspiration during average precipitation events at the OW/EADA OU, and over time advances to the saturated zone by additional moisture fronts. During precipitation events at the OW/EADA OU, water can percolate downward beneath the root zone, displacing pore water through the unsaturated zone. This process may continue as subsequent precipitation events occur, generating percolation below the root zone. Depending upon the concentration and solubility of metals present in soil and waste material, pore water chemistry, attenuation/sorption capacity of the underlying soil and contact time, metals may mobilize and migrate to ground water during percolation of precipitation through the vadose zone at the OW/EADA OU. Once in the ground water system, contaminants migrate with the ground water.

Potential human and ecological receptors may be exposed to waste sources and soil exhibiting elevated metals concentrations, as well as metals redistributed to plants, the vadose zone, ground water, and surface water, by the transport pathways discussed previously. Exposure pathways at the OW/EADA OU include direct contact, ingestion of soil, surface and ground water, and inhalation of respirable soil particles.

The Baseline Risk Assessment conducted by the EPA (Section VI of the RI/FS) indicates that the potential exists for increased cancer and/or non-cancer risks from human exposure to the metals of concern (arsenic, cadmium, copper, lead and zinc) at the OW/EADA OU. In addition, elevated concentrations of the metals of concern could potentially impact terrestrial and/or aquatic organisms at the site.

Based on the results of media specific investigations, it is apparent that air and surface water are not significant pathways for transport of the metals of concern at the OW/EADA OU. Metals of concern were observed at various concentrations in waste materials, soil, the vadose zone, ground water, and vegetation throughout the OU suggesting that these transport pathways do pose a potential threat to human health and the environment. This ROD addresses remedial actions for waste materials and soil.

Estimated Volumes of Contaminated Materials

A summary of the aerial extent of wastes and waste volumes in the OW/EADA OU is presented in Table 13. Figure 8 illustrates the present location of waste material within the OU. The largest volume of waste material at the OW/EADA OU occupies the Red Sands which is estimated at 606,700 cubic yards. Floodplain Wastes in Subareas 2 and 3 contain approximately 440,000 cubic yards of tailings. Heap Roast Slag in Subarea 2 contains 298,390 cubic yards of waste material, and the eight miscellaneous waste piles located in Subareas 1 and 2 contain a total of approximately 31,780 cubic yards of waste material. Approximately 285,000 cubic yards of waste were removed from the Arbiter Ponds and Old Works Tailings Ponds during the Old Works Expedited Removal Action in 1992.

An estimated volume of ground water contamination at the OW/EADA OU has not been determined because a decision concerning remediation of contaminated ground water at the OW/EADA OU was deferred to investigations under the ARWW OU. Furthermore, due to the nature of soil contamination as a result of aerial deposition of stack emission (shallow, widespread, low-level metal contamination), the removal option for contaminated soil was eliminated during Phase I (ARCO 1993b) of the OW/EADA OU FS. As a result, a volume estimate for contaminated soil is not provided.

Site Characterization Summary - Mill Creek Operable Unit

As part of the previous *Mill Creek RI* (ARCO 1987), data were collected to characterize the soil, surface water, and ground water systems. These data were analyzed and used in the calculation of the risks to the previous residents of Mill Creek. Additional soil data was collected by ARCO in July 1993. The results of these investigations are summarized below.

Air

Airborne particulate concentration data collected during the previous Mill Creek RI indicated that contaminated materials were being re-entrained. Re-entrainment of contaminated materials, primarily flue dust, was a significant concern during the Mill Creek investigation and remedy selection decision. Flue dust remediation was started in 1993 and will be completed in 1994.

Air monitoring data collected from the Mill Creek station over a three-year period showed no exceedances of federal or state ambient air quality standards, indicating that air quality is not adversely affected by contaminated soil/wastes present at the site.

Soil

A compilation of surface and profile soil metals data from the 1987 Mill Creek RI is found in Attachment A of the Mill Creek Addendum (OW/EADA RI/FS Volume VI, ARCO

1993a). The geometric mean surficial concentrations (mg/kg) for arsenic, cadmium, and lead in the study area were 638, 25, and 508, respectively.

Soil profile data provided a vertical distribution of soil concentrations for the area. Summary statistics and frequency distributions indicated that arsenic concentrations were below 100 mg/kg at 18 inches and approached background concentrations at 24 inches in most of the profiles. Cadmium and lead concentrations were elevated in the top 6 inches, but decreased rapidly with depth. Cadmium concentrations were generally below detection limits beneath 9 inches and lead concentrations were generally at background levels beneath 6 inches.

In addition to previous sample collection efforts, soil samples were collected in the Mill Creek area in July 1993 and analyzed for total arsenic, cadmium, and lead. A total of 25 soil samples were collected and analyzed. Individual arsenic results are shown on Figure 14. Arsenic, lead, and cadmium results for the 1993 soil investigation were similar to the 1986 Mill Creek RI/FS soil results.

Surface and Ground Water

Arsenic is the only trace metal consistently present in the surface water of Mill Creek in concentrations above analytical detection limits (4 μg/L). Arsenic concentrations ranged between 12 and 32 μg/L. Zinc has been detected with values ranging up to 18 μg/L.

Quaternary alluvial deposits underlie Mill Creek and supply domestic well water for the area. Several older, hand-dug wells in the area were found to have arsenic concentrations above detection limits. Two wells (Figure 14) sampled in May 1986 were found to have arsenic concentrations above the federal primary SDWA MCL of 50 μg/L. Cadmium and lead concentrations were generally at or below detection limits.

Water table elevations for five domestic wells in the area show the ground water gradient under Mill Creek to be 140 feet per mile. The gradient at the mouth of Mill Creek Valley is approximately 50 feet per mile.

VI. SUMMARY OF SITE RISKS

The Baseline Risk Assessment provides the basis for taking action and indicates the exposure pathways to be addressed by the remedial action. It serves as the baseline for indicating risks that would exist if no action were taken at the site. This section of the ROD reports the results of the Baseline Risk Assessment for the OW/EADA OU.

As part of the RI/FS, a human health and ecological Baseline Risk Assessment was developed to assist EPA and MDHES in developing actions necessary to reduce actual and potential risks from hazardous substances at the site. The Baseline Risk Assessment was conducted at the site with the following objectives:

- Provide an analysis of baseline risk (potential risk if no remedy occurs) and help determine the need for action;
- Provide a basis for determining cleanup or action levels (concentrations) that are protective of public health and the environment;
- Provide a basis to compare potential public health and ecological impacts of various cleanup alternatives; and
- Provide a consistent process to evaluate and document potential public health and ecological threats at the site.

Chemicals of Potential Concern

Although mine wastes contain a number of metals, experience at other mining and smelting sites and through previous Anaconda risk assessments (i.e., Mill Creek, Flue Dust) has shown that risks to humans and the environment are dominated by the presence of arsenic, cadmium, copper, lead, and zinc. Although some studies did collect data on other metals that might conceivably contribute to risk (e.g., antimony, radium, barium, beryllium, manganese, mercury), the relative contribution of these other chemicals to total risk is believed to be sufficiently small compared to the risks from the primary chemicals of concern that they were not considered further.

Therefore, arsenic, cadmium, copper, lead, and zinc were the main focus of sampling, and the analytical efforts performed at the site were selected for evaluation in the risk assessment.

Human Health Risk Assessment

Exposed Populations

Under current site conditions, there are no human populations residing within the confines of the OW/EADA OU. However, there are residential neighborhoods adjacent to the site, and nearby residents may visit the site during activities such as dirt bike riding, hiking, exploring, or fishing in Warm Springs Creek. In addition, there are several businesses which operate within the site boundaries of the OW/EADA OU and workers at these businesses may also be exposed. In the future, it is possible that some areas of the site may be developed for residences, but it is most probable that the OW/EADA OU will be developed mainly for recreational and/or commercial land use. Based on these considerations, this risk assessment evaluated the potential risks to the following human populations:

- Current or future recreational site visitors (dirt bike riders were selected to represent the maximally exposed recreational visitor); and
- Current or future on-site workers (e.g., shopkeepers, business professionals, office staff).

As noted above, it is also possible that some portions of the OW/EADA OU might be developed for residential land use in the future. However, this population is not considered in this risk assessment for the following reasons:

- The likelihood of residential development is relatively low, at least for most locations in the OW/EADA OU.
- Future RIs will address risk to the residential population for the entire Anaconda Smelter site.

Exposure Pathways

Visitors or workers could be exposed to contaminants in the OW/EADA OU by a number of pathways. These are summarized on Figure 6. Based on screening level calculations, the following exposure pathways were judged most likely to be of health concern:

- Direct ingestion of dust, soil, or surface wastes (on-site workers and recreational visitors).
- Inhalation exposure to respirable particulate matter (PM-10) resulting from mechanical erosion of surface materials (recreational visitors only).

- Ingestion of contaminants in ground water used for drinking (workers only).

Human Exposure Assumptions

In general, it is expected that different people living or working in an area may have different levels of contact with various contaminated media and, thus, result in different levels of exposure. Therefore, it is appropriate to think of exposure of a population as a range or distribution of values, rather than as a single value. In order to account for this, EPA calculates exposure both for an average person and for someone at the upper end of the distribution (approximately the 95th percentile). The latter is termed the Reasonable Maximum Exposure (RME). Both estimates are useful in understanding exposures and risks which can exist at a site.

Tables 14 and 15 list parameters needed to calculate average and RME daily intake levels for each of the contaminated media for each of the populations of potential concern at the site. Some of these values are reasonably well established (e.g., body weight, water intake, exposure frequency of workers), but other values are based on limited data (e.g., soil intake by workers, exposure frequency of dirt bike riders, averaging time for workers). Other values (e.g., soil intake by dirt bike riders) are based mainly on professional judgment. Thus, there is uncertainty in exposure estimates based on these values.

Exposure Point Concentrations

An exposure point is an area within the site where humans are expected to come into contact with one or more contaminated media. Typically, the boundaries of an exposure point are selected to represent an area over which exposure of an individual is expected to be approximately random. Based on this, the exposure point concentration for a chemical is defined as the upper 95th confidence limit of the arithmetic mean (AM-95) of the measured values for that chemical within the exposure area (calculated based on the assumption of log normal distribution of measured values). A somewhat different approach was taken at this site because the OW/EADA is so large and workers or site visitors could conceivably be exposed nearly anywhere on site. Rather than selecting specific exposure points for evaluation, exposure and risk were assessed over the entire site.

Generally, environmental data were used to estimate the exposure point concentration (i.e., soil, waste, ground water). Other exposure point concentrations (e.g., indoor dust, dirt bike dust) were calculated using models or equations.

Quantification of Noncancer Risks

Noncancer risks from a chemical are usually described in terms of the Hazard Index (HI). The HI is the ratio of the estimated daily intake (DI) of a chemical received by a human

exposed at the site, compared to a Reference Dose (RfD) that is believed to be without appreciable risk of adverse noncancer health effects.

If the value of HI is equal to or less than one, it is concluded that the chemical does not pose a noncancer risk. If the value of HI is greater than one, then there may be a risk of noncancer effects. In general, the likelihood of effect increases as HI increases, but HI values greater than one do not imply an effect will necessarily occur.

Table 16 lists the characteristic noncancer effects of the chemicals of concern at this site, and gives available RfD values for subchronic and chronic oral exposure. No inhalation RfDs are available.

Figure 15 shows locations within the OW/EADA OU where chronic exposure of workers would yield HI values greater than 1.0 for arsenic. As shown, there are two locations in Subarea 2 where the HI value reaches a value of 2.0 under RME conditions (top panel), with the remainder of the site being below a level of concern (HI $\leq$ 1.0). For dirt bike riders, there are no areas of the site where arsenic yields an HI value above 1.0.

Cadmium, copper, and zinc do not appear to pose unacceptable noncancer risks to either workers or dirt bike riders at any location on site.

Risks from lead are assessed by using an uptake/biokinetic (UBK) model to predict blood lead (PbB) levels in exposed humans. To date, the model is only applicable to residential children, and there is no standard method for evaluating risks to workers or site visitors. However, it is currently believed that levels of up to 500 parts per million (ppm) in soil are acceptable to residential children under default conditions. It is concluded that the levels of lead on site (most below 500 ppm, nearly all below 1,000 ppm) are very unlikely to be of significant health concern to these populations because workers and dirt bike riders are believed to be less sensitive than children.

There are no locations on site where measured levels of cadmium, copper, or zinc in ground water pose a noncancer risk to workers. Arsenic is also below a level of concern in all areas of the site except for the southern portion near Smelter Hill. In this area, the estimated RME HI values for a worker range from 2.0 to 30.0.

Quantification of Cancer Risks

Cancer risk is described in terms of the probability that a person exposed under a specified set of conditions will develop a tumor before the age of 70 as a result of that exposure. For example, if the probability were one out of one million (1/1,000,000), this is expressed as 1E-06. Typically, EPA considers remedial action at a site when excess cancer risk to any current or future population falls within or exceeds a risk range of 1E-04 (1/10,000) to 1E-06 (1/1,000,000).

When data permit, EPA derives numeric values useful in quantifying the toxicity and carcinogenity of a compound. Slope factors (SF) are route-specific estimates of the slope of the cancer dose response curve at low doses.

Table 17 lists the carcinogenic effects of the chemicals of concern at this site and presents available SF values.

Cancer Risks from Arsenic in Surface Soils

For workers, RME cancer risks range between 2E-05 to 4E-04. Cancer risks to workers and dirt bike riders are summarized in Figures 16 and 17, respectively.[1] Under average exposure conditions, cancer risks to workers range between 2E-06 and 6E-05. RME arsenic risks to dirt bike riders range from 7E-05 to less than 1E-04 over most of the site (Figure 17), with several zones (located in Areas 1, 2, 4, and 6) where RME risks exceed 1E-04 (maximum of 3E-04). Under average exposure conditions risks to the dirt bike riders range from less than 1E-06 up to 1E-05. These risks to dirt bike riders are due mainly to the ingestion pathway, with only a small contribution from the inhalation of PM-10s.

Cancer Risks from Arsenic in Ground Water

As noted above, concentrations of arsenic in shallow ground water vary somewhat across the site, but a level of about 4 μg/L is typical for most areas. This concentration is well below current regulatory limits for arsenic in drinking water and is probably natural in origin. A concentration of 4 μg/L corresponds to risk levels of 1E-06 (average) to 3E-05 (RME) for workers. However, wells in and east of Subarea 5 have clearly elevated levels of arsenic. The highest risk level is associated with Well A2BR, located in the southeast corner of Subarea 5. The AM-95 concentration of arsenic detected in this well is 1,040 μg/L, corresponding to an RME cancer risk level of 7E-03 for workers. Levels in two other wells in Subarea 5 are 94.6 μg/L and 50.3 μg/L corresponding to RME cancer risks to workers of 3E-04 to 6E-04. A well east of Subarea 5 has a concentration of 62.9 μg/L. The source of these high arsenic values is not known, but could be due to leaching from flue dust or other wastes on Smelter Hill.

Cancer Risks from Cadmium in Surface Materials

Cadmium is considered to be carcinogenic only by the inhalation route and not by ingestion. As noted earlier, screening level risk calculations based on measured levels of cadmium in air (0.0005-0.0015 μg/m^3) indicated that risk levels were of little concern (< 1E-06) even under residential exposure conditions. However, dirt bike riders may be exposed to elevated levels of particles displaced into air by mechanical disturbance of soil or waste. However,

[1]Because cancer risks are expressed to only one significant figure (USEPA 1989a), the concentration values used to define the boundaries between risk levels are the lowest which round up to the risk values shown. For example, the concentration corresponding to a risk of 0.95E-05 was used to define the edge of the 1E-04 cancer risk contour.

even these risks appear to be minor, with a maximum RME risk level of 1E-06 occurring in Subarea 5 near Smelter Hill.

Uncertainties

There are a number of data limitations which introduce uncertainty into these risk estimates. The most important of these are as follows:

- Not all exposure pathways were evaluated. This could result in an underestimate of total risk, but the underestimate is probably small and is not a major source of uncertainty.

- Not all chemicals were evaluated. This too could result in an underestimate of total risk, but it is believed that the five chemicals evaluated account for the majority of risk at the site.

- Data are on the frequency and extent of some exposure pathways are limited or absent. For example, there is considerable uncertainty regarding the amount of soil ingested by workers and recreational visitors. The intake estimates employed in the risk assessment probably tend to be conservative, but true exposure levels are not known.

- The precise relationship between dose of a chemical and likely health effect is often uncertain. To account for this, EPA typically uses conservative assumptions when quantifying these dose-response relationships. This means that estimated risks are usually more likely to be high than low. In the case of arsenic (the primary contaminant of concern at this site), there is an extensive data base on the effects in humans, but there is still debate regarding the true dose-response relationships. For example, data on the detoxification of arsenic by methylation suggest the cancer SF could be too high, while data on the occurrence of internal cancers suggest the SF may be too low. This is an important source of uncertainty in this assessment because arsenic is the primary source of cancer risk at this site.

- The metals present in mine wastes may sometimes occur in forms that are not well absorbed from the gastrointestinal tract. Based on data from a single study of arsenic absorption from soil near the OW/EADA, it was assumed that arsenic in on-site surface materials is absorbed 50 percent as well as soluble arsenic compounds. It is not known if this assumption leads to an overestimate or an underestimate of exposure and risk.

Summary/Conclusions

As discussed above, the dominant contributor to cancer risk at the OW/EADA OU is arsenic in surface materials. The contribution of cancer risk from other sources such as cadmium (inhalation route) was determined to be insignificant (less than 1/1,000,000). Ground water concentrations of metals at the site are typically below MCLs, except for arsenic in portions of Subarea 5 and cadmium in Subarea 4. Cadmium is considered to be carcinogenic only through the inhalation route and not by ingestion. Institutional controls will prohibit the use of ground water as a drinking water source throughout the OW/EADA OU; thus, human exposure is unlikely. A municipal drinking water supply is already available in the East Anaconda Yard and Arbiter plant portion of the OW/EADA OU. No exceedances of MCLs were observed in surface water of Warm Springs Creek. Therefore, analysis of total cancer risk for each population at the site is defined as cancer risk from arsenic in surface materials.

Arsenic could pose RME cancer risks above 1E-04 to hypothetical future workers over some portions of the site. Under average conditions, risks to workers are expected to be less than 1E-04. Only a few small areas of the site would be of possible noncancer concern, and this only under RME conditions. Therefore, future development of the site for occupational land use will require remedial actions in some locations.

For dirt bike riders, none of the chemicals appear to be of noncancer concern and only a few small areas of the site pose cancer risks exceeding 1E-04 under RME conditions. These risk values should only be viewed as approximate because these risk estimates for dirt bike riders are based mainly on estimated oral and inhalation exposure rates. Other types of recreational visitors (e.g., hikers, fishermen) are likely to have somewhat lower risks.

The OW/EADA Baseline Risk Assessment also addresses risk at the Mill Creek OU. Risk calculated for recreational and commercial/industrial exposure would be the same at Mill Creek OU. Therefore, future development at Mill Creek for occupational land use also will require actions in some locations.

Action Levels

Arsenic action levels for surficial soil and waste material have been determined to be 1,000 ppm for recreational land use areas and 500 ppm for areas identified for an occupational land use. These correspond to an excess cancer risk of 7E-05 and 6E-05 for recreational and occupational use, respectively. These levels are within EPA's acceptable risk range of 1E-04 to 1E-06.

These action levels have been developed based on evaluation of the risk assessment for this site. These action levels also consider the following risk management issues:

- Currently, no individuals reside within the confines of OW/EADA OU. In the future, it is possible that some areas could be developed for residences, but it is more likely that the OW/EADA OU will be developed primarily for recreational and/or commercial use. Residential action levels will be determined under the Community Soils OU.

- It is likely that recreational visitors (i.e., golfers, fishermen) would have lower exposure and, therefore, lower risks as compared to the dirt bike riders used in the risk assessment.

- There is greater uncertainty with exposure factors for recreational and commercial/industrial users.

- The action levels approach 1E-06 under average exposure conditions.

- Technical and cost limitations would be significant to achieve an incremental risk benefit.

Ecological Risk Assessment

The waste materials present in the OW/EADA OU pose a potential risk not only to humans, but also to other species. This includes plants, soil invertebrates, various terrestrial species (mammals, birds, etc.), and aquatic organisms living in Warm Springs Creek. Most of the Warm Springs Creek corridor is outside this OU, but is included in the ARWW OU. Therefore, aquatic ecological resources in Warm Springs Creek are only evaluated qualitatively for the OW/EADA OU. Full ecological assessments for ecological resources potentially impacted by releases from the OW/EADA OU are planned for Warm Springs Creek under the ARWW OU and for terrestrial habitats in the Anaconda Smelter NPL sites under the Anaconda Soils OU.

Identification of Potential Ecological Receptors

Terrestrial Vegetation. Six types of plant communities have been described for the Deer Lodge Valley: disturbed, crop land, meadow/pasture, riparian woodland shrub, rangeland, and forest. The waste piles and surrounding land are largely devoid of vegetation, a pattern that has been observed around other copper smelters.

Wildlife. Endangered wildlife species such as the bald eagle, the peregrine falcon and the Rocky Mountain wolf are occasionally observed in the vicinity of the OW/EADA OU, but the area is not believed to be a critical habitat for these species. Bald eagles winter downstream from the site near the Warm Springs Ponds. Other animal species considered as potential residents of this region include mule and white-tailed deer, elk, moose, pronghorn (antelope), Rocky Mountain bighorn sheep, mountain goats, mice, voles, rabbit, grizzly

bears, small birds, and various raptors. Insects and other invertebrate organisms living in soil and in above-ground habitats are also ecologically important receptors, since they represent food organisms for terrestrial vertebrates.

Recreationally important terrestrial species which utilize the OW/EADA OU or adjacent areas display specific habitat preferences. Foothills and high elevation habitats are occupied by mule deer, while white-tailed deer are encountered at lower elevations in land adjacent to Warm Springs Creek. Elk are found at higher altitudes to the south, east, and north of Anaconda.

Warm Springs Creek. Warm Springs Creek is a tributary to the upper Clark Fork River and constitutes one of the principal drainages of the Deer Lodge Valley. The creek originates west of Anaconda in a narrow, mostly forested, valley. As the creek flows towards the confluence with Mill, Willow, and Silver Bow Creeks, the watershed becomes less vegetated with the dominant vegetation being riparian willows and cottonwoods associated with the creek. The distance between the mouth of Warm Springs Creek and Cedar Street at the western edge of Anaconda is slightly more than 11 miles. Approximately 2.8 miles of Warm Springs Creek is within the boundaries of the OW/EADA OU and was channelized and confined by levees during the 1880s.

Sampling surveys indicate that Warm Springs Creek supports both a fishery and a diverse aquatic invertebrate community.

Contaminants of Potential Concern

For purposes of consistency, contaminants of potential concern for the screening-level ecological assessment for the OW/EADA OU are the same as those selected for the human health evaluation (arsenic, cadmium, copper, lead, and zinc).

Exposure Assessment

The exposure pathways likely to be of concern for both terrestrial and aquatic populations for the OW/EADA OU are presented in Figure 18. Direct contact, ingestion, and inhalation are likely exposure routes for terrestrial animals. Plants may be exposed by direct root uptake or uptake of metals from dust deposited on leaves. Food chain transport is also a route of exposure for higher tropic levels. If metal contaminants enter the stream, exposure routes such as direct uptake, bioconcentrations, and ingestion may affect aquatic populations. Bioavailability in water is affected by metal speciation and water hardness.

Ecological Risk Characterization

Terrestrial Plants and Soil Invertebrates. Table 18 presents general threshold soil concentrations that have been identified from studies at other sites either as causing toxicity

to terrestrial plants, or as no observed effects concentrations (NOECs) for soil invertebrates, and compares these values to concentration values measured in surface materials in the OW/EADA OU and background soil levels. While nearby background soil concentrations are well below threshold levels, it is apparent that on-site levels greatly exceed reported phytotoxicity values and soil invertebrate NOECs in essentially all cases. This is consistent with the direct observation that plant growth is sparse or absent over much of the site.

It can be speculated that several physical characteristics of microenvironments created by waste materials within the OU may limit growth and survival of terrestrial organism directly, or in combination with substrate toxicity. Waste materials at the surface are likely to have poor water-holding capacity, resulting in drought effects on plants and animals. Organic content and nutrients may be low enough to limit plant growth. Waste materials are likely to be unstable or, in some areas where surface materials harden, hard enough to prevent root penetration. The absence of vegetation further enhances extreme temperature fluctuations, which are likely to be harmful to native plant and animal species.

Terrestrial Wildlife. Although physical disturbance of the terrain by human activities and the lack of vegetative cover have not allowed establishment of an on-site terrestrial ecosystem typical for this region, it can be speculated that any terrestrial wildlife species that enter the OW/EADA OU would likely be exposed to toxic metals in surface wastes. However, the absence of data on tissue concentrations of metals in animals within the OW/EADA OU prevents quantitative evaluation of terrestrial impacts associated with metal contamination. Also of potentially lower concern are terrestrial species living downwind of the site, which could be exposed via airborne transport and deposition of contaminated dust particles under a future "no-action" alternative. Future site development could also result in mechanical erosion of contaminated material, and this could also be of concern to downwind species in the future.

Aquatic Species. Information on the aquatic organisms in Warm Springs Creek indicate that a healthy, reproducing trout population is present. The brown trout population continues to have local recreational value in spite of the disturbance in the OW/EADA OU. Similarly, a qualitative evaluation of the aquatic invertebrate community indicates that Warm Springs Creek supports a diverse food base for the fishery.

Given the importance of Warm Springs Creek as a spawning habitat for Clark Fork River brown trout and potential exposure of progeny during egg incubation (November to April) and rearing stages (spring), elevated metal concentrations during the April to June period appear to be the single largest risk to the biota of Warm Springs Creek. No evidence is available documenting any fish kills within Warm Springs Creek, but it is important to note that the most susceptible fish would be small and therefore their deaths might go unnoticed. Reported fish kills in another Clark Fork River drainage (Mill-Willow Bypass) were associated with precipitation runoff from mine tailings. In this instance, the runoff was both acidic (near pH 4.5) and contained copper concentrations two orders of magnitude greater

than the acute toxicity criterion. Given the proximity to Warm Springs Creek of both the Floodplain Wastes in Subareas 2 and 3 and the Red Sands wastes, as well as their highly acidic character, these areas appear to pose a threat to the aquatic biota in the event of catastrophic failure of interim engineering controls. In such a scenario, acidic runoff could contain high concentrations of copper and zinc, capable of causing localized, acutely toxic effects.

Under current conditions, containment levees lining Warm Springs Creek apparently prevent transport of toxic metals to the stream during typical runoff events. However, under the "no action" alternative, deterioration of these structures could be expected to occur over time, and future ecological risks to the aquatic community in Warm Springs Creek could occur via increased runoff due to overland flow and flooding.

VII. DESCRIPTION OF ALTERNATIVES

Summary of Alternatives

A brief description of the site cleanup alternatives that were considered in the OW/EADA Feasibility Study (FS) report (ARCO 1993a) is provided below. As discussed in Section IV, Scope and Role of Operable Unit, the remedy in this ROD covers only contaminated soils and wastes at the OU. Final remedial actions for ground and surface water will be developed under the ARWW OU.

Alternatives for soils and wastes were developed from potentially applicable technologies and process options that were identified and screened in the *Remedial Action Objectives, Treatment Technology Scoping, and Development of Alternative Report, Phase I FS* (ARCO 1993b). Based on the technologies and options presented in this document, the *Initial Alternatives Screening Document* (ARCO 1993c) presented seven alternatives to be evaluated for the OW/EADA OU. Evaluation of these alternatives, based on their effectiveness, implementability and cost, screened two alternatives from further consideration. One alternative, which relied solely on surface and institutional controls, was eliminated as not being effective in protecting human health or the environment as waste would remain exposed at the site. The other alternative, which proposed large scale removal of wastes, was eliminated because of implementability and cost concerns. The remaining five alternatives underwent a detailed analysis in the FS report prepared by ARCO in September 1993 (ARCO 1993a).

In addition to the five alternatives evaluated in the FS report, EPA and MDHES developed a Preferred Alternative which was presented and evaluated in EPA's Proposed Plan in September 1993. The five FS alternatives and the Preferred Alternative proposed different combinations of engineered covers, revegetation, and surface and institutional controls (Table 19) and are summarized in this section.

Common Elements of All Alternatives

Institutional Controls

Institutional controls include items such as public land use and ground water controls, controls through private land ownership, dedicated developments, historic preservation, and restrictions of on-site access. Different types of institutional controls may be combined to provide strict control of the site, alternative methods of enforcement, and assurance of long-term effectiveness and enforceability. For example, Anaconda-Deer Lodge County (ADL) has adopted a Land Use Master Plan and regulations in the form of the Development Permit System (DPS) which will institute controls over future actions (e.g., well drilling) throughout the entire site. Institutional controls, such as deed restrictions, covenants, and/or easements

to limit future land uses by any party, will be instituted on private property. ARCO is the major property owner at the site (Figure 19).

Institutional controls may also include dedicated developments (Figure 2). Pursuant to agreements being negotiated among ARCO, ADL, and the Anaconda Local Development Corporation on use restrictions, certain existing dedicated developments will likely continue permanently and new dedicated developments may be created or allowed on the site. These may include a golf course and the Old Works Historic Trail. Dedicated developments would institute certain controls to manage use of the land to be protective of human health and the environment. Also, if constructed, these developments may require the use of a variety of special engineering controls, such as multi-media covers, to protect human health and the environment.

Historic Preservation

All of the proposed alternatives, except the "no action" alternative (Alternative 1), include preservation of historic features which would minimize potential impacts to the Old Works structures, flues, and railroad beds, all or portions of the Heap Roast Slag and Red Sands, and the Interstate Lumber buildings. An historic trail system, created to mitigate unavoidable impacts to some of the historic features, would restrict access to contaminated materials in these areas of the site.

Surface Controls

Surface controls include erosion, drainage, and dust control and would be implemented under all the alternatives to manage surface water runoff from Stuckey Ridge through the Old Works areas, Heap Roast Slag, Red Sands, and other areas as required. Drainage would be directed to containment areas on site. Control of runoff would prevent contaminants from reaching surface waters and erosion of remediated areas.

Stream Channel Controls

With stream channel controls, the Warm Springs Creek flood levees would be replaced, upgraded, or repaired as necessary to safely route the 100-year peak flood event. This work would also include replacement, upgrade, or repair of the existing Landfill Road bridge and culverts. Control of the stream channel would prevent contaminants from being remobilized by flooding.

Monitoring

A monitoring program would be formulated during the remedial design phase. Routine visual inspection of engineered covers would detect any areas requiring maintenance in

advance of failure. Strategic ground water monitoring wells and surface water stations would continue to be sampled under the remedial action for the ARWW OU.

Description of Alternatives Considered for OW/EADA OU

Alternative 1: No Action
Estimated present worth cost: $0
Implementation time: Not applicable

This is the "no action" alternative required under CERCLA and is used as a baseline against which other alternatives are evaluated. Under Alternative 1, no new engineering or institutional controls would be undertaken. The potential for direct human and environmental contact with waste materials would not be reduced from present conditions. Development activities on the site would be regulated by the ADL's adopted land use Master Plan and land use regulations of the DPS already in place.

Alternative 2
Estimated present worth cost: $8.9 million
Implementation time: 2 years

In addition to the common components listed previously, this alternative would include the use of revegetation treatment techniques from the Anaconda Revegetation Treatability Study (ARTS) (e.g., chemical and physical soil amendments, such as lime additions and deep tilling) to reduce arsenic concentrations to below the appropriate action level and to establish productive and self-sustaining vegetation.

A total of 415 acres would be revegetated in the following areas:

- The area north of the ball fields, Teressa Ann Terrace and floodplain tailings south of the inactive railroad spur near Warm Springs Creek;
- The area north and northwest of the Arbiter Plant, the Old Works and Arbiter ponds;
- Unreclaimed areas adjacent to the East Anaconda Yards area, adjacent to the railroad tracks, including the former Acid Plant site; and
- Areas along the highway (Subarea 5).

An engineered cover would be constructed over the Miscellaneous Waste Piles and Heap Roast Slag (Subarea 2). Prior to cover placement, the wastes would be consolidated as practicable. After placement, the covers would be revegetated. The total engineered cover area would be about 60 acres.

The surface of the Red Sands (Subarea 4) would receive minimal grading, excavating, and backfilling needed to control surface runoff (i.e., most surface features would remain).

Alternative 3
Estimated present worth cost: $9.9 million
Implementation time: 3 years

This alternative includes the actions described in Alternative 2, as well as the following additional actions:

Revegetation treatment techniques would be extended along Warm Springs Creek and would include the waste between the Arbiter Plant and the sewage treatment ponds (Subareas 2, 3, and 4).

The total estimated area revegetated under this Alternative would be approximately 470 acres.

The engineered cover would be extended to include the unreclaimed area around the former Acid Plant (Subarea 5). The total engineered cover area would be about 75 acres.

Depressions in the Red Sands (Subarea 4) would be covered with fine grained soil and crushed limestone. Other areas of the Reds Sands and the drag strip grandstands area would be covered with crushed limestone. The total area covered with crushed limestone would be approximately 20 acres.

Alternative 4
Estimated present worth cost: $10.8 million
Implementation time: 3 years

This alternative is similar to the actions described in Alternative 3, except for the following modifications:

Revegetation treatment techniques would be extended to include areas around the sewage treatment pond and drag strip areas (Subareas 4 and 6). The total estimated area revegetated would be approximately 660 acres.

The engineered cover would be extended to include the exposed Red Sands material south of the railroad spur (Subarea 4). The total engineered cover area would be approximately 85 acres.

A crushed limestone cover would be placed over the Red Sands pile and material north of the railroad spur (Subarea 4). Prior to limestone placement, the surface of the Red Sands pile

would be graded, excavated, and filled as required to construct a smooth surface to control surface runoff. The estimated area for crushed limestone would be approximately 35 acres.

Alternative 5
Estimated present worth cost: $14.4 million
Implementation time: 3 years

This alternative is similar to the actions described in Alternative 4, except for the following modifications:

Revegetation treatment techniques would be extended to include all Red Sands material south of the railroad spur (Subarea 4). In addition, revegetation would be utilized around the sewage treatment pond and drag strip areas (Subareas 4 and 6). The total estimated area revegetated under this Alternative would be approximately 675 acres.

The engineered cover would be extended to the Red Sands north of the railroad spur and areas adjacent to the active railroad bed near the Acid Plant (Subarea 5), as well as areas around the Interstate Lumber buildings, Teressa Ann Terrace, the ball fields, and the Industrial Park (Subarea 3). The total engineered cover area would be about 240 acres.

No crushed limestone covers would be used in this Alternative.

Preferred Alternative
Estimated present worth cost: $11.4 million
Implementation time: 3 years

EPA's Preferred Alternative is a modification of Alternative 3 (Figure 20). The primary difference between the Preferred Alternative and Alternative 3 is the inclusion of an engineered cover over portions of the Red Sands piles and the use of revegetation treatment techniques for the area west of Mill Creek.

The Preferred Alternative includes the following actions:

Revegetation treatment techniques will be used to reduce soil arsenic concentrations to below 1,000 ppm, with some exceptions, in current and potential recreational areas within the site. This generally includes the following areas:

- Applicable portions of Subareas 1 and 2;
- The waste between the Arbiter Plant and the sewage treatment ponds and along the highway in Subarea 4;
- Unreclaimed areas in the East Anaconda Yards in Subarea 5; and

- The area along the public highway and Warm Springs Creek in Subarea 6 as shown on Figure 20.

The total estimated area to be revegetated is approximately 500 acres.

Exceptions include portions of Subarea 1 (i.e., historic structures and steep hillsides) and Subarea 6 where construction-related impacts to existing vegetation may outweigh cleanup benefits. Remediation of these areas will rely primarily on the use of surface and institutional controls.

Revegetation treatment techniques will also be used to reduce soil arsenic concentrations to below 1,000 ppm, with some exceptions, in future or potential commercial or industrial areas. This generally includes the following areas:

- The area north of the ball fields, Teressa Ann Terrace, and floodplain tailings south of the inactive railroad spur in Subarea 3;

- The area north and northwest of the Arbiter Plant, the Old Works Tailings Ponds, and the Arbiter Waste Ponds in Subarea 4; and

- The area west of the highway in the Mill Creek area (Figure 21).

Upon development of these areas, additional cleanup will be required through the DPS to attain a level of 500 ppm. The total estimated area for additional revegetation is approximately 40 acres. Additionally, any current commercial or industrial area will require immediate reduction of soil arsenic concentrations to below 500 ppm.

An engineered cover will be constructed over portions of the Waste Piles 1-8, Jig Tailings and Heap Roast Slag in Subareas 1 and 2, and portions of the Red Sands in Subarea 4. Prior to cover placement, the waste materials will be consolidated as practical. Also crushed limestone would be placed near the drag strip grandstands in Subarea 6. The total engineered cover area is approximately 110 acres.

Proposed Alternative for Mill Creek Operable Unit

The Mill Creek area was identified by ADL as a potential commercial/industrial area and has been zoned as such in the Anaconda-Deer Lodge Master Plan. A portion of the Mill Creek OU was proposed for inclusion in the Preferred Alternative for the OW/EADA OU since the anticipated land uses and site characteristics of this OU are similar to areas in the OW/EADA OU (Figure 21). EPA is proposing to remediate a portion of the Mill Creek area along with the OW/EADA OU.

The Mill Creek OU was previously assessed under a RI/FS completed in September 1987 by ARCO. The ROD directed that Mill Creek residents be permanently relocated and that the buildings and structures be razed. This action occurred in 1988.

A decision to remediate flue dust located on Smelter Hill, thought to provide a primary source of contamination to the Mill Creek area, has been finalized and the remedial action is currently underway. The Mill Creek site is currently fenced and patrolled with use restricted until a final response action is taken at the site.

Included with the OW/EADA RI/FS is the Mill Creek Addendum (Volume VI) (ARCO 1993a). This addendum summarizes the status of the Mill Creek OU, including sample results from data collected in July 1993. Unlike the previous FS, which addressed only remedial alternatives for residential land use, this addendum provides an analysis of three remedial alternatives for recreational and commercial/industrial land uses for approximately 40 acres west of Highway 274 (Figure 21). Residential land use would not be permitted under any of the alternatives.

The three alternatives considered were: (1) no action; (2) revegetation treatment techniques; and (3) construction of engineered soil cover. Institutional controls, surface controls, and monitoring (as previously described) were included with each of these alternatives.

Description of Alternatives Considered for Mill Creek Operable Unit

Alternative 1: No Action
Estimated present worth cost: $0
Implementation time: 0 years

Superfund law requires that agencies consider the "no action" alternative. This alternative is used as a baseline against which to compare the other alternatives. Under Alternative 1, no further action would be undertaken at the Mill Creek site. The potential for direct human and environmental contact with contaminated soils and waste materials would not be reduced from present conditions. The existing potential for metals migration to surface and ground water and fugitive emissions from wastes and contaminated soils would also remain unchanged. Only the fence already installed would limit trespasser access to the site. Development activities on the site would be regulated by the ADL's adopted land use Master Plan and land use regulations of the DPS.

Alternative 2
Estimated present worth cost: $0.4 million
Implementation time: 2 years

This alternative uses revegetation treatment techniques that utilize soil amendments (lime, reducing agent, neutralizing agent, or other material), deep tilling as necessary, and

revegetation to limit the mobility and direct exposure to inorganic constituents in the impacted soils media. Although soils/waste would remain in place, protection of human health would be achieved by the use of these techniques to provide a vegetation cover to create a barrier to soils/wastes and to reduce the toxicity and/or mobility of metals at the surface. Protection of the environment would be accomplished by the same barriers in combination with surface controls to reduce potential infiltration, erosion, and sedimentation runoff from the site.

Alternative 3
Estimated present worth cost: $0.7 million
Implementation time: 2 years

This alternative would involve installation of an engineered vegetated soil cover to create a barrier to contaminated soils and wastes, thus reducing toxicity and/or mobility of metals at the surface and minimizing human exposure to these materials. Protection to the environment would be accomplished by the same barriers in combination with surface controls to reduce potential infiltration, erosion, and runoff from the site.

Preferred Alternative
EPA's Preferred Alternative for Mill Creek is Alternative 2, the use of revegetation treatment techniques to revegetate the site.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 300.430(e)(9) of the NCP requires that the agencies evaluate and compare the remedial cleanup alternatives based on the nine criteria listed below. The first two criteria, (1) overall protection of human health and the environment and (2) compliance with applicable or relevant and appropriate requirements (ARARs), are threshold criteria that must be met for the Selected Remedy. The Selected Remedy must then represent the best balance of the remaining primary balancing and modifying criteria.

Evaluation and Comparison Criteria

Threshold Criteria

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how potential risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with applicable or relevant and appropriate requirements addresses whether or not a remedy will comply with identified federal and state environmental laws and regulations.

Primary Balancing Criteria

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time.

4. Reduction of toxicity, mobility and volume through treatment refers to the degree that the remedy reduces toxicity, mobility, and volume of the contamination.

5. Short-term effectiveness addresses the period of time needed to complete the remedy and any adverse impact on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

7. Cost evaluates the estimated capital costs, operation and maintenance costs, and present worth costs of each alternative.

Modifying Criteria

8. State acceptance indicates whether the State (MDHES) concurs with, opposes, or has no comment on the preferred alternative.

9. Community acceptance is based on whether community concerns are addressed by the Selected Remedy and whether or not the community has a preference for a remedy.

Comparative Analysis of Alternatives for OW/EADA Operable Unit

The following is a summary of the agencies' evaluation and comparison of alternatives. Additional detail evaluating the alternatives is presented in the FS. This comparative analysis is summarized in Table 20.

Overall Protection of Human Health and the Environment

All the alternatives, except Alternative 1 (no action), would provide adequate protection of human health and the environment. Because the "no action" alternative is not protective of human health and the environment, it is not considered further in this analysis as an option for this site.

Although waste materials and contaminated soils would remain on site, residual risks would generally be reduced under all action alternatives to achieve protection of human health via:

- The use of engineered covers to provide a barrier to wastes; and/or
- The use of revegetation treatment techniques to reduce the surface concentrations; and/or
- The use of institutional controls to restrict access to contaminated materials.

Risks under all alternatives would be reduced for recreational and occupational users at the site to within EPA's acceptable risk range by isolating waste sources and reducing soil contaminant concentrations to levels determined not to pose a health or environmental risk or by restricting human contact with untreated waste.

Environmentally, covers and vegetation would also reduce runoff and infiltration and thereby improve plant coverage and terrestrial wildlife populations. Protection of Warm Springs Creek would be achieved through on-site control of runoff and sediment. The site would be protected against flooding by upgrading the levees along Warm Springs Creek and replacing the Landfill Road culvert to safely route flows up to the 100-year peak flood event.

The primary difference between the alternatives is the increased protectiveness provided by a progressively greater application of revegetation treatment and engineered covers (Table 19). Alternative 5 provides the greatest overall protection to human health and the environment with respect to the total areas revegetated and covered (675 and 205 acres, respectively). Alternative 4 provides the next greatest total area with 660 acres revegetated and 50 acres covered. However, the Preferred Alternative provides greater protection than Alternatives 2, 3, and 4 by covering the Red Sands which contain some of the highest contaminant concentrations at the site. Alternatives 2 and 3 are also less protective since smaller areas are revegetated and covered.

Compliance with Applicable or Relevant and Appropriate Requirements

All of the action alternatives would comply with applicable or relevant and appropriate federal and state environmental laws and regulations for the site. Although Alternative 5 would meet ARARs, it would have the greatest impact on historical resources by covering all Red Sands and Heap Roast Slag.

Long-term Effectiveness and Permanence

All alternatives are expected to achieve a permanent reduction of soil concentrations through the use of revegetation treatment techniques and/or provide long-term permanence through the effective use of engineered covers. In addition to engineering controls, all alternatives would utilize a long-term maintenance and monitoring program, supplemented by institutional controls, to ensure reliability, long-term effectiveness, and permanence. Institutional controls would include public and private land use controls, ground water controls, dedicated developments, historic site preservation, restricted site access, and deed restrictions.

The Preferred Alternative, together with Alternatives 3, 4, and 5, have a distinct advantage over Alternative 2 for long-term effectiveness because Alternative 2 leaves more waste unremediated.

Reduction of Toxicity, Mobility, and Volume Through Treatment

All of the action alternatives utilize treatment to reduce the toxicity and mobility of contaminants in soil. Revegetation treatment utilizes techniques such as lime additions, soil amendments, and deep tilling to reduce the toxicity and mobility of contaminants in surface soil. None of the alternatives would reduce the volume of soil or waste materials.

Since the most extensive use of revegetation treatment techniques would be conducted in Alternatives 4 and 5, these alternatives have an advantage over the remaining action alternatives (Table 19).

Short-term Effectiveness

All of the action alternatives will result in potential short-term risks to the community from increased truck traffic during the transport of cover, treatment, and other materials as well as incidental increases in dust generated during construction of surface controls and engineered and vegetation covers. Fugitive dust will be monitored and controlled.

For all action alternatives, exposure of workers would be controlled through the use of appropriate engineering controls, such as dust suppression, protective equipment as necessary and work health and safety training programs. Other risks to workers will be limited to standard construction risks associated with similar projects.

Environmental impacts for all alternatives are expected to be limited. Any existing vegetation or riparian habitat removed during construction would be replaced. The potential for discharge of waste materials to Warm Springs Creek during construction would be minimized through the use of sedimentation basins, silt fences, and other appropriate protective measures as necessary.

The time required to complete construction and reclamation activities is expected to be 2 years for Alternatives 2 and 3, and 3 years for the Preferred Alternative and Alternatives 4 and 5.

All alternatives will utilize surface and institutional controls in Subarea 1 to minimize impacts to historical structures and reduce erosional impacts to the hillside caused by construction activities. Similarly, in Subarea 6, with the exception of Alternative 5, surface and institutional controls will be utilized to reduce impacts to trees and shrubs which might otherwise be damaged by construction activities.

Alternatives 2 and 3 have an advantage over the Preferred Alternative and Alternatives 4 and 5 in the time needed to complete construction. Alternative 5 is also less effective due to potential environmental impacts to trees and shrubs in Subarea 6.

Implementability

All action alternatives are technically feasible and would utilize standard construction techniques and materials. Adequate quantities of suitable soil material for covers would have to be identified, particularly for Alternative 5. The Preferred Alternative may also require significant amounts of soil for covers.

Institutional controls would also need to be sufficiently funded in order to be properly implemented for each of the alternatives. ADL is already actively developing the necessary controls to supplement and protect engineering controls proposed under the Preferred Alternative. Therefore, EPA believes that the institutional control component of the

Preferred Alternative is implementable. EPA will monitor this closely and implement additional active measures if any institutional controls fail.

The Preferred Alternative and Alternatives 4 and 5 are rated slightly lower than Alternatives 2 and 3 because of the uncertainty regarding the availability of sufficient soil cover.

Cost

Cost figures in Table 18 represent the total cost of the remedy over time, including operation and maintenance (O&M), at today's prices. This is referred to as present worth cost. Cost estimates for the alternatives range from $9.0 million (Alternative 2) to $14.0 million (Alternative 5). The Preferred Alternative is estimated to cost $11.4 million.

State Acceptance

MDHES has been consulted throughout this process and is in agreement with EPA on the selection of the Preferred Alternative.

Community Acceptance

Public comment on the RI/FS and Proposed Plan was solicited during a formal public comment period extending from September 23, 1993 to October 22, 1993. Comments received from the community indicate widespread support for the Preferred Alternative. Responses to the community comments are found in the Responsiveness Summary. ARCO generally supported the Preferred Alternative, although they did not support an engineered cover on the Red Sands.

Comparative Analysis of Alternatives for Mill Creek Operable Unit

The following is a summary of the agencies' evaluation and comparison of alternatives for the Mill Creek Site. A comparative matrix is provided in Table 21 to summarize the evaluation of the performance of the alternatives for each of the evaluation criteria.

Overall Protection of Human Health and the Environment

Alternatives 2 and 3 would provide adequate protection of human health and the environment. Because the "no action" alternative is not protective of human health and the environment, it is not considered further in this analysis as an option for the site.

Although contaminated soils would remain on site under both alternatives, residual risks would be greatly reduced through the creation of a protective barrier and/or reduction of toxicity at the surface. Protection of the environment would be accomplished by the same

protective barriers in combination with surface controls to reduce infiltration, erosion, and runoff from the site.

The primary difference between Alternatives 2 and 3 is the increased protectiveness provided by an engineered vegetative cover constructed of clean fill material (Alternative 3) versus the protectiveness provided by soil amendments, deep tilling, and a vegetative cover provided by Alternative 2.

Compliance with Applicable or Relevant and Appropriate Requirements

Alternatives 2 and 3 would comply with applicable or relevant and appropriate federal and state environmental laws and regulations for the site.

Long-term Effectiveness and Permanence

Long-term effectiveness and permanence of Alternatives 2 and 3 would be achieved through the establishment of a self-sustaining cover of vegetation. A long-term maintenance program would be necessary under both alternatives to maintain adequate vegetation cover and surface controls. Institutional controls would provide necessary limitations on land use, development and access. Alternative 3 provides increased long-term effectiveness and permanence over Alternative 2 since the potential for failure resulting in an increased risk to human health and/or the environment is considered less for an engineered cover than revegetation treatment.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 2 would provide limited reduction in the toxicity and mobility of metals in contaminated soils. Although volume would not be reduced under this alternative, the toxicity and mobility of metals in contaminated soils treated by the addition of soil amendments and/or deep tilling methods would be reduced to levels supporting healthy and sustainable plant growth. Alternative 3 would not utilize treatment.

Short-term Effectiveness

Alternative 2 provides greater short-term protectiveness than Alternative 3 due primarily to the time needed for implementing revegetation treatment techniques at the site versus the time required for construction of an engineered cap. Furthermore, Alternative 3 demonstrates greater short-term risk due to increased truck traffic on public roadways during the transport of cover materials. Risks would be minimized under both alternatives by the implementation of an appropriate site-specific health and safety plan. The potential for a temporary increase in risk due to the particulate emissions during grading, soil cover placement and reclamation activities would be controlled through the use of appropriate dust suppression techniques under both alternatives.

Implementability

Alternatives 2 and 3 are technically feasible and would utilize standard construction techniques and materials. Adequate quantities of suitable soil material for covers would have to be identified for Alternative 3, a disadvantage compared to Alternative 2.

Cost

A comparison of alternatives presented in Table 20 indicates the present worth cost for Alternative 2 is $0.4 million, and the present worth cost for Alternative 3 is $0.7 million.

State Acceptance

MDHES has been consulted throughout this process and is in agreement with EPA on the selection of Alternative 2 as the preferred remedy.

Community Acceptance

Public comment on the Mill Creek Addendum to the RI/FS and Proposed Plan was solicited during a formal public comment period extending from September 23, 1993 to October 22, 1993. Comments received from the community indicate overwhelming support for the preferred remedy. Responses to the community comments are found in the Responsiveness Summary.

IX. SELECTED REMEDY

Based upon consideration of CERCLA requirements, the detailed analysis of alternatives, and public comments, EPA and MDHES have determined that the Preferred Alternative as presented in the Proposed Plan, with modifications, is the appropriate remedy for the OW/EADA OU, including the Mill Creek OU. This Selected Remedy will achieve the following:

- Reduction of risk to human health through:
  - Reduction of surface soil arsenic concentrations to acceptable levels, and
  - Prevention of direct human contact with waste materials exceeding acceptable levels.
- Reduction of risk to the environment through:
  - Minimization of infiltration and deep percolation of metal-laden pore water to ground water, and
  - Minimization of erosion and metal loading via transport of waste and contaminated soil to Warm Springs Creek.
- Preservation, to the extent practical, of historic features at the site.

While certain other alternatives may better satisfy certain individual selection criteria, the Selected Remedy best meets the entire range of selection criteria and achieves, in the determination of both EPA and MDHES, the appropriate balance considering site-specific conditions and criteria identified in CERCLA and the NCP, as provided in Section X, Statutory Determinations. The Selected Remedy is generally illustrated in Figure 22. Final areas of remediation will be determined in Remedial Design. The Selected Remedy provides the following:

Remedy for Waste Sources

The Selected Remedy will address all remaining waste sources within the site, including the following:

Red Sands
Floodplain Wastes (Jig Tailings)
Heap Roast Slag
Miscellaneous Waste Piles (including Waste Piles 1-8)

Upper and Lower Works Demolition Debris
Flue Debris
Railroad Beds
Mixed Wastes

Engineered covers and/or revegetation treatment techniques will be used to reduce surface arsenic concentrations to below the recreational action level of 1,000 ppm in current and potential recreational use areas and potential commercial/industrial use areas. Wastes generally exceeding 1,000 ppm arsenic include the Red Sands, Jig Tailings, Miscellaneous Waste Piles, Heap Roast Slag, Mixed Wastes, and Railroad Beds.

An engineered cover, generally soil, will be used to prevent direct human contact with waste sources in areas where revegetation treatment techniques alone will not reduce arsenic concentrations to below the recreational action level (1,000 ppm). Revegetation treatment techniques such as deep tilling, lime additions and soil amendments will be used if proven effective to reduce arsenic concentrations to below 1,000 ppm, stabilize waste material, and promote a permanent vegetative cover. Wastes will be consolidated and graded as necessary to reduce infiltration and control runoff (minimize erosion).

Portions of the Red Sands and Heap Roast Slag will remain uncovered to preserve historic integrity at the site. Also, wastes associated with historic structures in Subarea 1 will be left in place and uncovered because of inaccessibility and limited land use. Institutional controls, discussed below, will be used when wastes are left uncovered to minimize human contact by restricting access and regulating land use at the site. Drainage controls will be used to minimize runoff in Subarea 1.

All current commercial/industrial areas will be remediated to the 500 ppm arsenic action level. Future remediation of arsenic contamination to the 500 ppm level in potential commercial/industrial use areas will be implemented through the ADL DPS (see institutional controls below) at the time development occurs, except as otherwise determined by EPA, MDHES, in consultation with the affected landowner.

Remedy for Soils

Revegetation treatment techniques have been selected as the remedy to reduce arsenic concentrations in contaminated soils exceeding 1,000 ppm in current and potential recreational areas. Revegetation treatment techniques will also be used, as appropriate, in potential commercial/industrial areas, including Mill Creek. Revegetation treatment techniques, such as deep tilling with lime and soil amendments, will be used to reduce surface concentrations to below the recreational action level of 1,000 ppm arsenic, stabilize contaminants, and create a suitable growth medium for a permanent vegetative cover. Revegetation treatment techniques and/or engineered covers will be used to reduce arsenic concentrations in contaminated soils exceeding 500 ppm in current commercial/industrial

areas. Final remediation of arsenic contamination in commercial/industrial areas to the action level of 500 ppm will be implemented through the ADL DPS (see institutional controls below) at the time development occurs, except as otherwise determined by EPA, MDHES, in consultation with the affected landowner.

Surface Controls

Surface controls will be implemented to manage surface water runoff from Stuckey Ridge (drainage through Old Works areas), Smelter Hill (drainage through East Anaconda Yard area), and within the site (drainage from Heap Roast Slag, Red Sands and other waste sources). Surface controls will be implemented in conjunction with site grading and revegetation to prevent contaminated runoff from degrading the existing water quality of Warm Springs Creek and minimize the migration of contaminated soils and/or metal-laden pore water. Surface controls include three primary components (erosion control, drainage control, and dust control):

- Erosion control will consist of erosion protection (e.g., riprap, lined ditches, and vegetation), waste consolidation or isolation, sedimentation containment (e.g., check dams, basins), and runoff management (e.g., runoff routing);

- Drainage controls will be implemented to control storm water runoff, minimize water ponding to reduce infiltration, and control sediment transport. In addition to the erosion controls above, existing and man-made drainage systems for Stuckey Ridge and the East Yard Area will be upgraded as necessary to safely route the appropriate design storm event. Open pits and depressions that are subject to water ponding will be backfilled and/or drainage routed away; and

- Dust control in disturbed or barren areas will be addressed through the use of vegetation and other dust suppression techniques as necessary.

Stream Channel Controls

The Warm Springs Creek flood levees will be replaced, upgraded, or repaired as necessary to safely route the 100-year peak flood event. Contaminated material susceptible to erosion will be covered or moved where necessary. This work will also include replacement, upgrade, or repair of the existing Landfill Road bridge and culverts. The Warm Springs Creek stream channel controls will be implemented to prevent the washout of waste material at the site.

Institutional Controls

A number of institutional controls will be used in conjunction with the above engineering controls, primarily public land use and ground water controls, controls through private land ownership, dedicated developments, and restricted access.

ADL has adopted a land use Master Plan and the DPS to control future actions at the site including the drilling of wells. Any proposed new development activity or land use anywhere on the site, such as drilling wells, excavation, or new construction, will be regulated by the County under the DPS, irrespective of land ownership. The DPS will:

- Assure that future land and water use at the site is consistent with EPA's determination of the health and environmental risks posed by contaminants left on site;
- Provide for the preservation and maintenance of Superfund remedial structures on the site, including but not limited to caps, berms, waste repositories and vegetated areas;
- Require that future development at the site employ construction practices that are consistent with the protection of public health and the environment, as determined by Superfund remedial actions;
- As development occurs at the site, implement the remediation of soil arsenic contamination to levels appropriate for the intended use, as determined by Superfund remedial actions; and
- Provide for implementation of other laws applicable to development, such as subdivision and floodplain requirements.

Institutional controls will also be imposed by means of deed restriction within the site. Deed restrictions, covenants, and/or easements will be implemented to limit future uses by any party to those consistent with the Selected Remedy. In addition to imposing requirements similar to those in the DPS, deed restrictions shall provide for access for remedial purposes to ARCO, EPA, and MDHES. Subsequent conveyances of the property shall impose the same deed restrictions.

Temporary ground water use restrictions will be imposed to prevent its use for drinking purposes. Other uses will be granted only by EPA and MDHES if deemed protective. Ground and surface water restrictions promulgated pursuant to the OW/EADA remedial action will be subject to revision based upon the EPA ROD for the ARWW OU. Additional institutional controls, such as establishment of State controlled ground water areas, may be imposed at that time.

Dedicated developments may also be used to ensure that land and water development is consistent with the OW/EADA remedy. Such developments may include a golf course. To ensure that dedicated developments do not interfere with Superfund remedial actions at the site, design approval shall be obtained from EPA and MDHES. Other developments will be regulated through the DPS.

Historic Preservation

The Regional Historic Preservation Plan (RHPP), developed by a variety of parties, including EPA, MDHES, the State Historical Preservation Officer, ARCO, and local historic groups, has identified and designated uses for certain cultural historic resources within the site. These resources include the remains from the Upper and Lower Works, the Interstate Lumber buildings, Red Sands, and Heap Roast Slag. Consistent with the RHPP the Selected Remedy will provide for the protection of certain resources to the maximum extent possible and mitigate the loss or impact to others.

Foundations and remains in the Upper and Lower Works along with certain waste piles will be avoided where practicable, as well as the Interstate Lumber buildings. However, the majority of the Red Sands and Heap Roast Slag will be consolidated, graded, and covered. A portion of these features will remain uncovered in order to preserve the historic integrity of the site.

To mitigate the loss of some historic features, including impacts to the Red Sands and Heap Roast Slag, a historic interpretive trail will be constructed on the site to provide controlled access to remaining historic features, as well as interpretive signs explaining the significance of these features to the mining and smelting history of the area. Access will be restricted to covered trails through the area. Access to other areas, including areas not fully remediated, will be restricted through the use of fencing, barriers, security systems, or other means.

Compliance Monitoring Program

A program for monitoring the remedial actions and determining compliance with the performance standards will be implemented during the remedial action. Based on the fact that the soil cleanup levels established in this ROD are health-based standards for recreational and occupational land use (and do not provide for unlimited use with unrestricted exposure because waste materials will remain on site) and due to the fact that the cleanup is expected to take several years to complete, the Selected Remedy will require a five-year review under Section 121(c) of CERCLA and Section 300.430(f)(4)(ii) of the NCP, as well as applicable guidance to assure the long-term effectiveness of the remedy.

Design testing demonstration plots and/or confirmation sampling will be necessary to verify that soil arsenic levels have been reduced to acceptable levels. Inspection of areas of revegetation will be required to ensure that adequate and sustainable vegetative cover is

maintained upon completion of the remedy to minimize the effect of erosion, as well as to minimize infiltration and mobilization of metals capable of percolating to ground water. Routine visual inspection of engineered covers and other remedial structures will be necessary to detect any areas requiring maintenance in advance of failure. Strategic ground water monitoring wells and surface water stations will continue to be monitored under O&M or the ARWW OU investigation to determine whether degradation of ground and surface water resources at the site is occurring during implementation and upon completion of the Selected Remedy.

Institutional controls will be reviewed by EPA and/or MDHES on a routine basis to ensure that development at the site is occurring in a protective manner.

Cost

The total present worth cost of the Selected Remedy in the OW/EADA OU was estimated at $14.2 million (Table 22). The estimated present worth cost of the Selected Remedy for the Mill Creek site was estimated to be $0.4 million.

Remediation Requirements

The remediation requirements for soils and waste material is to reduce surface arsenic concentrations to below health standards for existing or designated future land use. Since no federal or state ARARs exist for arsenic in soils or waste material, action levels were determined based upon the site-specific baseline risk assessment. Arsenic action levels for surficial soils and waste materials have been determined to be 1,000 ppm for recreational land use and 500 ppm for industrial/commercial land use. These levels are within EPA's acceptable risk range of 1E-04 to 1E-06.

As noted previously in this document, final remediation requirements for surface and ground water at the OW/EADA OU are not within the scope of this action, but rather will be determined under the ARWW OU. However, remediation goals for this project do include (1) minimizing infiltration and deep percolation of soil moisture through contaminated waste material which may cause degradation of existing ground water quality in the shallow alluvial aquifer; and (2) minimizing erosion and transport of contaminated soil and waste material which may cause degradation of existing surface water quality of Warm Springs Creek.

The specific remediation requirements for the Selected Remedy are:

- **Reduce arsenic concentrations at the surface to below 1,000 ppm using a combination of revegetation treatment techniques and/or engineered covers.**

- Revegetation techniques, which may include deep tilling, lime additions and soil amendments, shall reduce surface soil arsenic concentrations to below 1,000 ppm and establish a diverse, effective, and permanent vegetative cover.

- Engineered covers shall be designed to provide an effective and permanent barrier to waste materials. Soil covers shall be stabilized with revegetation that provides a diverse, effective, and permanent cover.

- Waste sources associated with structures in Subarea 1 are excluded in order to preserve the historic integrity at the site.

- **Reduce arsenic concentrations at the surface to below 500 ppm in current industrial or commercial areas using a combination of revegetation techniques and/or engineered covers.**

  - Revegetation techniques, which may include deep tilling, lime additions, and soil amendments, shall reduce surface soil arsenic concentrations to below 500 ppm and establish a diverse, effective, and permanent vegetative cover.

  - Engineered covers shall be designed to provide an effective and permanent barrier to waste materials. Soil covers shall be stabilized with revegetation that provides a diverse, effective, and permanent cover.

- **Minimize any discharge, seepage, infiltration, or flow from waste sources (i.e., Miscellaneous Waste Piles, Heap Roast Slag, Jig Tailings, and Red Sands) to prevent the degradation of existing water quality by consolidating and grading wastes, surface controls and using a combination of vegetative and/or engineered covers.**

  - Consolidation and grading shall reduce areas of infiltration and promote drainage off of or away from waste materials while minimizing sedimentation, erosion, and instability of waste materials.

  - Surface controls shall be designed using Best Management Practices, such as described in *Montana Sediment and Erosion Control Manual*, MDHES, May 1993 (MDHES 1993), to control storm water runoff from the site to Warm Springs Creek.

- Vegetative covers shall be designed to stabilize soil covers and reduce infiltration through evapotranspiration.

- **Minimize washout of waste materials from the Warm Springs Creek 100-year peak flood event through the upgrade or repair of levees adjacent to Warm Springs Creek and the replacement of existing culverts as necessary to safely pass the 100-year flood event.**

  - Stream channel controls shall be designed and constructed to minimize potential erosion from a flood of 100-year frequency as well as safely withstand up to a flood of 100-year frequency.

  - Stream channel controls shall be designed to not increase the elevation of the 100-year frequency flood, increase erosion upstream, downstream, or across stream.

- **Institutional controls shall be developed to restrict and manage future land and ground water use.**

  - Assure that future land and water use at the site is consistent with EPA's determination of the health and environmental risks posed by contaminants left on site;

  - Provide for the preservation and maintenance of Superfund remedial structures on the site, including but not limited to caps, berms, waste repositories, and vegetated areas;

  - Require that future development at the site employ construction practices that are consistent with the protection of public health and the environment, as determined by Superfund remedial actions;

  - As development occurs at the site, implement the remediation of soil arsenic contamination to levels appropriate for the intended use, as determined by Superfund remedial actions; and

  - Provide for implementation of other laws applicable to development, such as subdivision and floodplain requirements.

- **Preserve, to the extent practicable, historic features in the Old Works Historic District and/or mitigate loss of historic features pursuant to the approved historic resource mitigation agreements.**

- Design and construction shall avoid, to the extent practicable, historic features or design to maintain historic integrity.

- An Historic Trail System shall be designed and constructed to mitigate the unavoidable loss of or impact to historic features.

Contingency Measures

In the event institutional controls fail to meet remediation requirements identified in the ROD, additional measures (e.g., engineering controls or other institutional controls which may prohibit access and/or development) will be taken to assure protection of the remedy and protection of public health and the environment.

Treatment of soils, via revegetation treatment techniques, is fully expected to meet remediation requirements. However, if the remedial design or action phase indicates that this treatment will not reduce soil arsenic levels to below the appropriate action level, additional measures (e.g., soil removal, covers) will be taken as necessary to meet this requirement.

In the event the Old Works golf course is selected as a dedicated development, the golf course will be constructed to incorporate engineering controls required by the Selected Remedy to meet the remediation requirements. In addition to these engineering controls, impermeable or drainage layers may be required to prevent irrigation water from contacting waste materials. Monitoring will be designated in the O&M plan to evaluate impacts of golf course irrigation.

X. STATUTORY DETERMINATIONS

Under CERCLA Section 121, EPA must select a remedy that is protective of human health and the environment, complies with ARARs, is cost-effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that include treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element. The following sections discuss how the Selected Remedy meets these statutory requirements.

Protection of Human Health and the Environment

The Selected Remedy protects human health and the environment through reduction of toxicity and mobility of contaminants at the site. The Selected Remedy balances the use of engineered covers, revegetation treatment technology, and institutional controls to effectively reduce direct contact, ingestion, and inhalation of all contaminants, but particularly arsenic, to reduce risk to less than 7E-05, which is within EPA's acceptable risk range of 1E-04 to 1E-06.

Engineered covers will be used to prevent contact with the highest concentrated wastes at the site, including Red Sands, Jig Tailings, and Miscellaneous Waste Piles. Risks at these sources will be effectively reduced to close to 1E-06 with the use of clean cover material. Although some of these wastes will remain uncovered (for historic integrity), access to and use of the area will be actively managed through institutional controls and/or dedicated developments to effectively reduce contact with these wastes.

Revegetation treatment technology will be used to reduce the toxicity of arsenic and other contaminants in contaminated soils to at least a risk level of 7E-05 through the use of deep tilling, soil amendments, and lime. Deep tilling demonstrated contaminant reductions of 30 to 86 percent in the Mill Creek RI report (ARCO 1987). Soil amendments and lime will not only reduce the toxicity of contaminants in the soil, but will also reduce the mobility of contaminants and stabilize the soil such that a permanent vegetative cover can be achieved.

Environmentally, engineered covers and revegetation will significantly reduce infiltration and minimize the loading of contaminants to ground water as well as reduce erosional effects and the release of contaminants through surface water runoff. In addition to covers and revegetation, other surface controls (i.e., sedimentation controls and runoff routing) will further minimize contaminants from impacting Warm Springs Creek. Stream channel controls (i.e., dikes, levees) will prevent flood waters from eroding contaminants into Warm Spring Creek.

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.

Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy will comply with all ARARs identified in Appendix A to this ROD and as clarified in the RI/FS. No waiver of ARARs is expected to be necessary. Final Performance Standards and compliance points will be determined in Remedial Design.

Cost Effectiveness

EPA and MDHES have determined that the Selected Remedy is cost effective in mitigating the principal risks posed by contaminated wastes and soils. Section 300.430(f)(ii)(D) of the NCP requires evaluation of cost effectiveness. Overall effectiveness is determined by the following three balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective. The Selected Remedy meets the criteria and provides for overall effectiveness in proportion to its cost. The estimated cost for the Selected Remedy is $14.6 million.

To the extent that the estimated cost of the Selected Remedy exceeds the cost for other alternatives, the difference in cost is reasonable when related to the greater overall effectiveness achieved by the Selected Remedy.

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

EPA and MDHES have determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at the OW/EADA OU. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and MDHES have determined that the Selected Remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

While the Selected Remedy does not provide revegetation treatment to the extent that of Alternative 5, it will significantly reduce risks to within EPA's acceptable risk range. The Selected Remedy will have less short-term impact to areas already supporting vegetation, trees, and shrubs which would be eliminated under Alternative 5. Furthermore, these areas, if developed, would be remediated under ADL's DPS. The Selected Remedy will also not

cover portions of waste features in order to preserve some historical integrity of the site in compliance with ARARs. Any soils or waste material not covered or revegetated will be actively managed through the use of institutional controls.

The Selected Remedy includes treatment of contaminated soils which will permanently and significantly reduce the toxicity and mobility of contaminants contained in the soil. Engineered covers, particularly where used in conjunction with a dedicated development, will also permanently prevent contact with the waste materials that pose a principal threat. The Selected Remedy provides for the most effective use of engineered covers in consideration of potential dedicated developments which provide a greater degree of certainty and effectiveness. The use of engineered covers under the Selected Remedy may exceed the use of engineered covers proposed under Alternative 5.

Preference for Treatment as a Principal Element

By treating contaminated soils through revegetation treatment techniques, the Selected Remedy addresses one of the principal threats posed by the site through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

XII. REFERENCES

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U.S. Environmental Protection Agency references can be found under EPA.

TABLES

TABLE 1 PM-10 MASS CONCENTRATION AND METALS ANALYSIS: TERESSA ANN TERRACE STATION

Analyte	Highest (24-hr) Concentration	Highest (24-hr) Date	Second Highest (24-hr) Concentration	Second Highest (24-hr) Date	Annual Mean Concentration
Aug. 1989–June 1990					
PM-10	39	--[a]	39	--[a]	12
Arsenic	0.0281	12/24/89	0.0269	02/28/90	0.0038
Beryllium	0.0017	10/19/89	0.0015	09/01/90	0.0006
Cadmium	0.0178	11/30/89	0.0116	12/18/89	0.0015
Copper	0.1097	12/24/89	0.1091	10/19/89	0.0362
Lead	0.0294	11/30/89	0.0191	03/24/90	0.0066
Zinc	0.1636	11/30/89	0.1250	12/24/89	0.0349
July 1990–June 1991					
PM-10	42	12/25/90	34	12/07/90	11
Arsenic	0.0284	06/29/91	0.0283	12/07/90	0.0022
Beryllium	0.0018	01/12/91	0.0018	02/05/91	0.0009
Cadmium	0.0070	01/06/91	0.0031	06/29/91	0.0005
Copper	0.2301	06/29/91	0.2103	09/20/90	0.0306
Lead	0.0364	01/06/91	0.0155	12/07/90	0.0049
Zinc	0.0821	06/29/91	0.0791	01/06/91	0.0206
July 1991–June 1992					
PM-10	30	02/04/92	29	12/30/91 and 02/06/92	12
Arsenic	0.0170	02/06/92	0.0064	05/06/92	0.0021
Beryllium	0.0006	09/15/91	0.0005	--[b]	0.0003
Cadmium	0.0056	01/19/92	0.0040	04/12/92	0.0006
Copper	0.1558	11/02/91	0.0647	02/06/92	0.0236
Lead	0.0139	11/02/91	0.0135	02/06/92	0.0046
Zinc	0.0703	09/21/91	0.0673	02/06/92	0.0221

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

All concentrations reported as $\mu g/m^3$.

[a] 39 $\mu g/m^3$ was measured on 9/15/89, 9/17/89, 11/22/89, and 1/19/90.

[b] Beryllium concentration of 0.0005 $\mu g/m^3$ was recorded for three samples during the monitoring period.

TABLE 2 PM-10 MASS CONCENTRATION AND TRACE ELEMENT ANALYSIS: KORTEM STORAGE STATION

Analyte	PM-10 "A" (Primary) Sampler					PM-10 "B" (Collocated) Sampler				
	Highest		Second Highest		Annual Mean	Highest		Second Highest		Annual Mean
	Concentration	Date	Concentration	Date	Concentration	Concentration	Date	Concentration	Date	Concentration
August 1989–June 1990										
PM-10	38	08/02/89	29	11/30/89	13	39	08/02/89	25	08/08/89 and 06/04/90	13
Arsenic	0.0879	05/17/90	0.0437	02/28/90	0.0077	0.0890	05/17/90	0.0536	02/28/90	0.0070
Beryllium	0.0018	10/19/89	0.0015	10/25/89	0.0006	0.0018	10/25/89	0.0016	10/19/89	0.0007
Cadmium	0.0180	11/30/89	0.0105	12/18/89	0.0018	0.0105	12/18/89	0.0067	04/17/90	0.0013
Copper	0.3611	12/18/89	0.1772	05/17/90	0.0624	0.2488	12/18/89	0.1857	05/17/90	0.0610
Lead	0.0909	11/30/89	0.0352	05/17/90	0.0117	0.0378	12/24/89	0.0354	02/28/90	0.0093
Zinc	0.1645	11/30/89	0.1477	05/17/90	0.0405	0.1504	05/17/90	0.1491	12/24/89	0.0390
July 1990–June 1991										
PM-10	42	07/16/90	33	01/06/91	13	39	07/16/90	35	01/06/91	13
Arsenic	0.0344	06/29/91	0.0284	01/30/91	0.0041	0.0337	06/29/91	0.0333	01/30/91	0.0042
Beryllium	0.0016	--[a]	0.0016	--[a]	0.0009	0.0016	--[b]	0.0016	--[b]	0.0009
Cadmium	0.0082	01/06/91	0.0038	06/29/91	0.0008	0.0081	01/06/91	0.0039	06/29/91	0.0008
Copper	0.2409	06/29/91	0.2054	12/13/90	0.0483	0.4885	12/13/90	0.2628	06/29/91	0.0621
Lead	0.0519	01/30/91	0.0259	01/06/91	0.0071	0.0520	01/30/91	0.0251	01/06/91	0.0073
Zinc	0.1109	06/29/91	0.0641	01/30/91	0.0229	0. 376	06/29/91	0.0673	01/30/91	0.0196
July 1991–June 1992										
PM-10	46	12/26/91	33	09/21/91	14	46	12/26/91	33	09/21/91	14
Arsenic	0.0108	02/06/92	0.0075	10/15/91	0.0027	0.0082	02/06/92	0.0081	04/30/92	0.0029
Beryllium	0.0006	07/05/91	0.0005	--[c]	0.0003	0.0005	--[d]	0.0005	--[d]	0.0003
Cadmium	0.0052	01/19/92	0.0041	04/12/92	0.0007	0.0070	01/19/92	0.0041	04/12/92	0.0007
Copper	0.2213	11/02/91	0.0813	02/24/92	0.0357	0.2050	11/02/91	0.0799	02/24/92	0.0391
Lead	0.0149	10/03/91	0.0135	02/18/92	0.0055	0.0136	11/02/91	0.0134	12/26/91	0.0055
Zinc	0.0547	08/22/91	0.0542	10/09/91	0.0205	0.0507	01/19/92	0.0501	11/02/91	0.0192

(footnotes on following page.)

TABLE 2 (cont.)

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

All concentrations reported as $\mu g/m^3$

[a] The beryllium concentration of 0.0016 $\mu g/m^3$ (taken by the primary sampler) was measured for eight of the samples collected from December 7, 1990, through February 11, 1991.

[b] The beryllium concentration of 0.0016 $\mu g/m^3$ (taken by the collocated sampler) was measured for seven of the samples collected from December 13, 1990, through February 11, 1991.

[c] The beryllium concentration of 0.0005 $\mu g/m^3$ (taken by the primary sampler) was measured for six of the samples collected throughout the annual period.

[d] The beryllium concentration of 0.0005 $\mu g/m^3$ (taken by the collocated sampler) was measured for five of the samples collected throughout the annual period.

TABLE 3 . NATIONAL AND STATE OF MONTANA AMBIENT AIR QUALITY STANDARDS/GUIDELINES

	National Ambient[a] Air Quality Standards			State of Montana[b] Ambient Air Quality Guidelines		
Substance	24-hr	Annual	Other	24-hr	Annual	Other
PM-10	150	50	NA	(150)[c]	(50)[c]	--
Arsenic	NA	NA	NA	0.39	0.07	NA
Beryllium	NA	NA	NA	0.016	0.003	NA
Cadmium	NA	NA	NA	0.39	0.07	NA
Copper	NA	NA	NA	1.57	0.26	NA
Lead	NA	NA	1.50	NA	NA	(1.50)[c]
Zinc	NA	NA	NA	39.3	6.55	NA
SPM[c]	NA	NA	NA	NA	NA	10

Note: Concentrations reported as $\mu g/m^3$ for PM-10 and metals and as g/m^2-month for SPM.

-- - no guideline recommended
NA - not applicable
SPM - settled particulate matter

[a] EPA's National Ambient Air Quality Standards (40 CFR Part 50) for 24-hour and annual exposure. The annual standard for PM-10 is the annual arithmetic mean. The standard for lead is the arithmetic mean averaged quarterly (90-day average).

[b] State of Montana Ambient Air Quality Standards exist for lead (ARM 16.8.815) and PM-10 (ARM 16.8.821). The standard for lead is the arithmetic mean average quarterly (90-day average). State of Montana Ambient Air Quality Guidelines are obtained from the National Air Toxics Information Clearinghouse (NATICH) Database Report on State, Local, and EPA Air Toxics Activities (U.S. EPA July 1990) for arsenic, cadmium, copper, and zinc. The ambient air quality guideline for beryllium is calculated using threshold limit values as described in the NATICH report (U.S. EPA July 1990).

[c] Value in parentheses is a State of Montana Air Quality Standard.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 4 SETTLED PARTICULATE MATTER RESULTS

Annual Period	DF-8	DF-9
August 1989–June 1990	2.6	1.4
June 1990–June 1991	4.5	1.5
July 1991–June 1992	4.7	2.4

Note: Concentrations reported as g/m^2-month.

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

TABLE 5 SUMMARY OF METAL CONCENTRATIONS IN WASTE MATERIAL AT THE OW/EADA OPERABLE UNIT

Location	No. of Samples	Maximum Arsenic	Geometric Mean Arsenic	Maximum Cadmium	Geometric Mean Cadmium	Maximum Copper	Geometric Mean Copper	Maximum Lead	Geometric Mean Lead	Maximum Zinc	Geometric Mean Zinc
Upper Works	35	2360	508	20.0	5.6	19800	4540	2640	189	62100	889
Lower Works	21	3720	773	23.1	5.6	12400	3570	1200	299	2990	614
Flue Debris	36	10400	1030	398	7.7	37100	5830	639	136	2140	334
Railroad Bed	11	2310	1060	7.0	3.4	13300	4150	973	392	7270	645
Waste Piles 1-8	23	8110	934	11.2	1.9	32100	6250	990	209	1660	513
Heap Roast Slag	53	7120	578	13.4	2.0	59200	4720	1200	354	18100	5170
Floodplain Waste (Subarea 2)	94	8070	1010	172	5.7	19000	1480	2900	328	1900	441
Floodplain Waste (Subarea 3)	39	1940	526	17.3	1.6	6700	571	1200	254	3910	313
Red Sands	20	2640	1200	13.3	2.1	7180	2920	1010	437	10700	3640

NOTE: All concentrations in mg/kg

Information for this table compiled from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 6 TCLP RESULTS FOR OLD WORKS/EAST ANACONDA DEVELOPMENT AREA WASTE MATERIALS

Sample Station Location	Type Waste Material	Number of Samples		Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Silver	Zinc
FL5-3	Flue debris	1		1,850	59.1	6.7	6.7	13,900	40	1.3	8.0	1,460
WP2	Waste piles	2	MIN	0.53	0.20	0.01	0.003	NA	0.02	0.001	0.004	NA
			MAX	1.49	0.247	0.03	0.003	NA	0.03	0.002	0.004	NA
WP5	Waste piles	2	MIN	30	0.38	0.003	0.003	NA	0.02	0.0002	0.004	NA
			MAX	41.4	0.42	0.04	0.003	NA	0.02	0.0002	0.004	NA
WP6	Waste piles	2	MIN	0.04	0.16	0.004	0.003	NA	0.02	0.0002	0.004	NA
			MAX	0.22	0.35	0.06	0.003	NA	0.02	0.0002	0.004	NA
RS1	Red Sands	2	MIN	0.03	0.247	0.009	0.003	NA	0.02	0.0002	0.004	NA
			MAX	0.03	0.295	0.04	0.004	.	0.136	0.0002	0.004	NA
RS2	Red Sands	2	MIN	0.03	0.24	0.009	0.003	NA	0.02	0.0002	0.004	NA
			MAX	0.03	0.29	0.04	0.004	NA	0.13	0.0002	0.004	NA
TCLP Standard[a]	NA	NA		5,000	100,000	1,000	5,000	NA	5,000	200	5,000	NA

Note: Concentrations reported in µg/L.

NA - not applicable
TCLP - toxicity characteristic leaching procedure

[a] Source: 40 CFR Part 261.

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

TABLE 7 SUMMARY OF METAL CONCENTRATIONS IN SOIL SAMPLES, SUBSURFACE SOIL SAMPLES AND SUBSURFACE SOIL SAMPLES BELOW WASTE MATERIAL AT THE OW/EADA OPERABLE UNIT (Units in mg/kg)

Location	No. of Samples	Maximum Arsenic	Geometric Mean Arsenic	Maximum Cadmium	Geometric Mean Cadmium	Maximum Copper	Geometric Mean Copper	Maximum Lead	Geometric Mean Lead	Maximum Zinc	Geometric Mean Zinc
Surface Soils											
Subarea 1	6 43	380 2000	277 411	9.6 7.6	6.0 ---	2340 9120	1240 2330	200 662	95.1 490	842 1630	349 1020
Subarea 2	10	1330	151	10.0	3.5	3250	742	3310	226	9260	639
Subarea 3	23	2070	335	10.2	5.3	27200	1970	633	165	4530	695
Subarea 4	13	2700	678	68.8	8.0	9100	3030	783	337	16600	2300
Subarea 5	87	769	81.7	30	1.6	4780	126	651	72.3	3170	405
Subarea 6	12	3050	897	26.5	13.5	12400	4550	1270	465	5210	1730
Subsurface Soils											
Subarea 1	6 3	405 139	105 92.1	2.6 9	1.4 --	2400 1100	895 1040	61.3 185	31.4 122	36.6 1310	98.2 72.3
Subarea 2	12	1150	102	7.5	1.9	2500	841	2720	346	8760	329
Subarea 3	38	2220	64	4	1.1	11600	1450	372	53.4	2920	190
Subarea 4	16	862	60.6	14.7	1.3	2840	721	251	52.5	1770	225
Subarea 5	163	744	95	18	1.4	14400	382	8440	204	1830	376
Benny Goodman Park Subarea 6	14 6	640 75	257 26.8	16.5 7	4.3 1.4	2700 1730	1150 319	851 30	299 21.5	2200 698	602 101
Subsurface Soils Below Wastes											
Subarea 1	5	39.9	29.5	3	0.7	6730	162	27.8	23.4	359	73.8
Subarea 2 (Waste Piles 1-8)	18	1300	83.1	5.7	1.1	28000	2390	423	27.7	972	237
Subarea 2 (Heap Roast)	20	1670	45.9	18.8	1.2	55600	1630	209	27.7	5550	374
Subarea 2 (Floodplain)	59	4900	194	67	2.4	22000	782	2100	15.7	1700	128
Subarea 3 (Floodplain)	19	1640	137	14.3	0.8	1440	285	398	26.1	1280	92.3
Subarea 4 (Red Sands)	8	1400	48.1	13	2.7	25000	2960	550	37.9	5100	807
Subarea 5 (Reclaimed wastes)	35	6260	176	11.2	3.1	2310	350	60000	184	2110	662

NOTE: Information for this table compiled from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 8 EXCEEDANCES OF EPA AMBIENT WATER QUALITY CRITERIA FOR THE OW/EADA OPERABLE UNIT

Analytical Parametrs	Sampling Location	Date Sampled	Hardness(mg/L)	AWQC to protect Fresh water Aquatic Life Chronic (μg/L)	AWQC to protect Fresh water Aquatic Life Acute (μg/L)	Water Sampling Results Totals (μg/L)
Copper	WS–2	Jun. 5, 1991	71*	8.8	12.8	16.1
Copper	WS–3	Oct. 28, 1985		14.62(a)		24
Copper	WS–3	Jun. 5, 1991	71*	9.2	13.4	23.5
Copper	WS–3	Jun. 16, 1992	91	10.9	16.2	22
Lead	WS–2	Jun. 5, 1991	71*	2.1	52.7	3.2
Lead	WS–2	Mar. 16, 1992	130	4.4	114	10
Lead	WS–2	Jun. 16,1992	100	3.2	8.2	3.8(j)
Lead	WS–3	April 29, 1986		3.93(a)		6
Lead	WS–3	June 5, 1991	71*	2.2	55.7	3.2
Lead	WS–3	June 14, 1992	112	3.1	79	7(j)
Lead	WS–3	June 16, 1992	91	2.8	72	9.2(j)
Mercury	WS–1	July 24,1985		0.012(b)	2.4(b)	0.5
Mercury	WS–1	Oct. 28, 1985		0.012(b)	2.4(b)	1.6
Mercury	WS–2	July 24, 1985		0.012(b)	2.4(b)	1.0
Mercury	WS–3	July 24, 1985		0.012(b)	2.4(b)	0.5
Mercury	WS–3	Oct. 28, 1985		0.012(b)	2.4(b)	0.8
Mercury	WS–3	June 8, 1992		0.012(b)	2.4(b)	1.8**
Silver	WS–1	April 17, 1985		1.9(b)		5.8
Silver	WS–2	April 17, 1985		1.9(b)		6.1
Silver	WS–3	April 17, 1985		1.9(b)		5.5
Silver	WS–3	May 26, 1991		1.9(b)		4.2

a = water hardness, mg/L CaCO3
b = criteria not based on hardness
* = historical mean
** = contamination from nitric acid samle preserevative
j = qualified as estimated

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

TABLE 9 . SOIL SAMPLE ANALYTICAL RESULTS FOR THE RED SANDS AND OLD WORKS TAILINGS POND LYSIMETER LOCATIONS

Sample Station Results	Depth Interval (in.)	Concentration				
		Arsenic	Cadmium	Copper	Lead	Zinc
RSLY	0-24	2,610	3 *U*	2,790	838	4,240
RSLY	84-108	20	3 *U*	1,110	15	181
RSLY	168-185	8 *U*	3 *U*	7,750	78	559
RSLY	252-276	14	3 *U*	3,320	20	541
TPLY	0-12	4,010	3 *U*	5,240	1,900	318
TPLY	12-24	2,400	3 *U*	889	14 *U*	138
TPLY	84-108	238	3 *U*	408	23	98
TPLY	120-144	168	3 *U*	441	28	91
TPLY	156-180	18	3 *U*	373	23	103
TPLY	192-216	8 *U*	3 *U*	1,230	40	301

Note: Metals concentrations reported as parts per million.

RSLY - Red Sands lysimeter
TPLY - Old Works tailings pond lysimeter

Qualifer: *U* - undetected

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

TABLE 10 PORE WATER ANALYTICAL RESULTS FOR TARGET METALS AT THE RED SANDS AND OLD WORKS TAILINGS POND LYSIMETER LOCATIONS

Station	Date	Arsenic	Cadmium	Copper	Lead	Zinc
RSLY	06/26/92	5.3	28.5	5,300	1.0 *U*	12,100
RSLY	09/04/92	6.0	75.8	39,800	3.0	35,100
RSLY	11/18/92	8.5	322.0	267,000	1.1	180,000
TPLY	06/26/92	54.8	67.8	82,900	1.0 *U*	19,000
TPLY	09/04/92	21.6	58.5	58,500	1.0 *U*	17,100

Note: Metals concentrations reported as µg/L

RSLY - Red Sand lysimeter
TPLY - Old Works tailings pond lysimeter

Qualifer: *U* - undetected

Source: **Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)**

TABLE 11 COMPARISON OF METALS CONCENTRATIONS IN VEGETATION FROM THE OLD WORKS/EAST ANACONDA DEVELOPMENT AREA OPERABLE UNIT WITH REGIONAL DATA

Analyte	Concentration Range		
	OW/EADA Operable Unit	Smelter Hill Operable Unit	Western United States
Arsenic	0.3–23	0.5–239	<0.05–20.0
Cadmium	0.1–3.5	0.2–14	<0.009–80
Copper	5–137	3.0–1,500.00	0.34–1,000
Lead	0.3–14	0.4–239	0.20–700
Zinc	18–369	11.6–1,570.0	5.7–2,400

Note: Concentrations reported as mg/kg dry weight.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 12 CHEMICAL-SPECIFIC RECOMMENDATIONS FOR MINERAL TOLERANCES FOR DOMESTIC ANIMALS[a]

Element	Species		
	Cattle	Sheep	Horse
Arsenic (inorganic)	50	50	50
Cadmium[b]	0.5	0.5	0.5
Copper	100	25	800
Lead[b]	30	30	30
Zinc	500	300	500

Note: Concentration report in mg/kg
Information for this table was from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

[a] Information from *Mineral Tolerance of Domestic Animals*, National Academy of Sciences, Washington, D.C. 1980.

[b] Levels based on human food residue considerations.

TABLE 13 SUMMARY OF OLD WORKS/EAST ANACONDA DEVELOPMENT AREA WASTE VOLUMES AND AREAS

Site	Feature	Surface Area (acres)	Volume (yd^3)
Waste piles	Waste Pile No. 1	0.19	3,950
	Waste Pile No. 2	0.44	2,850
	Waste Pile No. 3	0.09	640
	Waste Pile No. 4	0.11	920
	Waste Pile No. 5	2.88	19,970
	Waste Pile No. 6	0.05	310
	Waste Pile No. 7	0.22	2,320
	Waste Pile No. 8	0.15	820
	Total	4.13	31,780
"Heap roast" slag	Northern heap roast slag pile	7.04	174,830
	Southern heap roast slag pile	6.43	123,560
	Total	13.47	298,390
Floodplain wastes	Wastes in modified 100-year floodplain	NC	NC
	Total wastes in study area[a]		
	– Jig tailings	71.8	NC
	– Heap roast slag[b]	8.3	NC
	– Mixed waste and soil	20.3	NC
	Total	100.40	440,000
Red Sands	Above ground level	21.0	283,700
	Below ground level	NC	323,000
	Total	21.00	606,700
Old Works waste ponds	West and East ponds	0[c]	0[c]
Flues	Flue Nos. 1–6	NC	NC
Arbiter ponds	Pond I[c] (waste removed in 1985)	0[c]	0[c]
	Pond II[c]	0[c]	0[c]
	Pond III[c]	0[c]	0[c]
	Total	0[c]	0[c]
Arbiter bunkers	Bunkers A through D[c]	0[c]	0[c]

Note: NC - not calculated

[a] Includes the southern "heap roast" slag pile and adjacent dispersed surface slag.

[b] Includes the area between Cedar Street and the city dump road; excludes waste piles.

[c] Removed during Arbiter Plant Accelerated Removal; remedial investigation and feasibility study activities have included waste removal confirmation.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 14 HUMAN EXPOSURE ASSUMPTIONS

Medium	Pathway	Parameter	Dirt-Bike Rider		Worker	
			Avg	RME	Avg	RME
All	General	Body weight (kg)	70[a]	70[a]	70[a]	70[a]
		Exposure duration (yr)	9[a]	30[a]	7[d]	25[c]
		Averaging time (noncancer) (yr)	9[a]	30[a]	7[d]	25[c]
		Averaging time (cancer) (yr)	70[a]	70[a]	70[a]	70[a]
Flood plain tailings, soils	Ingestion	Intake rate (mg/day)	50[d]	100[d]	25[d,f]	50[c,f]
		Exposure frequency (days/yr)	13[e]	26[e]	250[c]	250[c]
	Veg. Ingestion	Total intake (g/day)	--	--	--	--
		Fraction home-grown	--	--	--	--
Waste Piles, Hillside Flues	Ingestion	Ingestion rate (mg/event)	50[d]	100[d]	--	--
		Exposure frequency (events/yr)	13[e]	26[e]	--	--
	PM_{10} Inhalation	Inhalation rate (m^3/hr)	0.8[b]	2.5[b]	--	--
		Exposure time (hr/day)	2[e]	5[e]	--	--
Drinking Water	Ingestion	Ingestion rate (L/day)	--	--	0.5[d]	1.0[c]
		Exposure frequency (days/yr)	--	--	250[c]	250[c]

(a) Default value recommended in USEPA 1989a
(b) Default value recommended in USEPA 1989b
(c) Default value recommended in USEPA 1991
(d) Value based on professional judgement
(e) Based on responses to survey of activity patterns of residents in Anaconda
(f) Total intake from soil plus dust. Assumed to be 50% soil, 50% dust.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 15 SUMMARY OF INFORMATION ABOUT DIRT BIKE RIDING IN THE VICINITY OF THE ANACONDA SMELTER[a]

Parameter	Average (Range)
Age Now (Years)	30 (13-65)
Age Started (Years)	20 (4-47)
Rides/Week (Total	2.2 (0.5-4.0)
Hours/Ride	2.2 (0.5-6.0)
Hours/Week (Total)[b]	4.8 (<0.5-18.0)
Rides/Week at Old Works [c]	0.8 (0.25-2.0)
Hours/Week at Old Works[d]	2.2 (0.25-7.0)

NOTE: Information for this table compiled from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

(a) Information compiled from interviews with residents of Anaconda into who rides dirt/mountain bikes at present or in the past.

(b) Calculated as hours/ride multiplied by rides/week.

(c) Average and range for only three respondents. Others did not provide sufficient quantitative data to estimate rides/week at Old Works.

(d) Average and range for two respondents. Others did not provide sufficient quantitative data to estimate hours/week at Old Works.

TABLE 16 SUMMARY OF NONCANCER EFFECTS AND REFERENCE DOSES

Chemical	Characteristic Noncancer Effects	Oral Reference Dose (mg/kg-day)	
		Subchronic	Chronic
Arsenic	Skin lesions (keratosis, hyperpigmentation)	3.0×10^{-4}	3.0×10^{-4}
Cadmium	Renal injury; proteinuria	NA	1.0×10^{-3}[a]
Copper	Gastrointestinal irritation	3.7×10^{-2}	3.7×10^{-2}
Lead	Neurological effects	--[b]	--[b]
Zinc	Hematological effects	3.0×10^{-1}	3.0×10^{1}

Note: NA - not available

[a] Value applies to cadmium in food. It is assumed the same value applies to cadmium in soil. A value of 5.0×10^{-4} is used for cadmium in water.

[b] Risks from lead are evaluated using an uptake biokinetic model developed by the U.S. Environmental Protection Agency.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 17 SUMMARY OF CARCINOGENIC EFFECTS AND CANCER SLOPE FACTORS[a]

Chemical	Weight of Evidence	Oral Exposure		Inhalation Exposure	
		Tumor Type	SF $(mg/kg/d)^{-1}$	Tumor Type	SF $(mg/kg/d)^{-1}$
Arsenic	A	Skin	1.8E+00	Lung	1.5E+01[b]
Cadmium	B1	--[c]	--	Lung	6.1E+00
Copper	--	--	--	--	--
Lead	B2	Kidney	NA[d]	--	--
Zinc	--	--	--	--	--

(a) All values are from IRIS database (USEPA 1993), current through April 1993.
(b) Calculated from inhalation unit risk value assuming inhalation of 20 m^3/day by a 70-kg adult.
(c) No evidence for carcinogenicity.
(d) Not available.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 18 COMPARISON OF SURFACE WASTE CONCENTRATIONS TO GENERAL THRESHOLD SOIL CONCENTRATIONS[a]

Parameter	Location	Arsenic			Cadmium			Copper			Lead			Zinc		
		Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Phytotoxic Concentration (mg/kg)	NA[b]	15	NA	50	3	NA	8	60	NA	125	180	NA	400	270	NA	400
Soil Invertebrate Toxicity (mg/kg)	NA		NA		0.97	NA	154	12.5	NA	1,304	170	NA	1,667	72.7	NA	1,120
Maximum Average Background Soil Conc., mg/kg[c]			4.5			0.13			ND			11			42	
Measured On-site Conc. (mg/kg)	Area 1, Upper Works	26.1	636	1,340	0.9	8.8	20	60.9	7,590	19,800	25.9	336	1,740	26.7	4,380	39,800
	Area 1, Lower Works	184	796	2,000	1.1	9	23.1	754	3,830	12,400	20	456	1,200	112	819	2,990
	Area 1, Flue Debris	68	2,430	10,400	0.9	27.6	398	184	10,500	37,100	17	180	639	46	456	2,140
	Area 1, Railroad Bed	452	1,040	1,800	1.7	3.9	7	1,110	5,330	13,300	173	472	973	250	2,230	7,270
	Area 2, "Heap Roast" Slag	75	853	2,330	0.6	4	13.4	1,410	5,290	8,510	40	499	1,200	1,170	6,900	18,100
	Area 2, Floodplain Wastes	45	1,440	8,070	0.6	11.7	172	260	2,130	16,000	16	474	2,200	14	1,060	19,000
	Area 3, Floodplain Wastes	10.8	788	1,940	0.4	2.8	17.3	27.6	1,090	6,700	9.7	468	1,200	55.4	651	3,910
	Area 4, Red Sands	326	1,350	2,610	0.4	3.8	13.3	1,440	3,050	7,190	78.6	472	942	1,440	3,610	10,700
	Area 5, Railroad Bed	110	1,220	4,290	NA	NA	NA	139	7,170	20,000	122	833	6,190	647	8,440	57,800
	Waste Piles 1-8(d)			934			1.9			6,250			209			513

(a) Source: Phytotoxicity-Kebata-Pendias and Pendias 1989; Invertebrate No observed effects concentrations (NOECs) - Van Straalen 1993; Waste Concentration - Section 4.
(b) Not available.
(c) Source: USEPA 1992b. Values are mean concentrations from Table 31. ND = Not Detected.
(d) Geometric mean plus one standard deviation. Only this value is shown for purposes of comparison.

Source: Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 19 COMPARISON OF ALTERNATIVES FOR THE OW/EADA OPERABLE UNIT

Item	Alt. 1	Alt. 2	Alt. 3	**Preferred Alternative**	Alt. 4	Alt. 5
Institutional controls	No new ICs	Yes	Yes	**Yes**	Yes	Yes
Preservation of historic features	Possible	Yes	Yes	**Yes**	Yes	Yes
Allow golf course & historic trail construction	No	Yes	Yes	**Yes**	Yes	Yes
Surface controls	No	Yes	Yes	**Yes**	Yes	Yes
Stream channel controls	No	Yes	Yes	**Yes**	Yes	Yes
Monitoring	No	Yes	Yes	**Yes**	Yes	Yes
Revegetation Treatment Techniques at OW/EADA	None	415 acres	470 acres	**500 acres**	660 acres	675 acres
Engineered soil cover (excluding Red Sands piles)	None	60 acres	75 acres	**75 acres**	85 acres	205 acres
Red Sands remediation	None	Drainage	Drainage	**Soil Cover**	Limestone Cover	Soil Cover
Engineered soil cover (total)	None	60 acres	75 acres	**110 acres**	85 acres	240 acres
Revegetation Treatment Techniques at Mill Creek	None	None	None	**40 acres**	None	None
Cost	Minimal	$8.9 million	$9.9 million	**$11.4 million**	$10.8 million	$14.4 million

NOTE: Information for this table compiled from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 20 COMPARATIVE ANALYSIS OF ALTERNATIVES

Criteria	Alternative 1	Alternative 2	Alternative 3	Preferred Alternative	Alternative 4	Alternative 5
Overall Protection of Human Health and the Environment	-	-	0	+	+	+
Compliance with ARARs	-	+	+	+	+	+
Long-Term Effectiveness and Permanence	-	-	+	+	+	+
Reduction of Toxicity, Mobility, or Volume Through Treatment	-	0	0	+	+	+
Short-Term Effectiveness	+	+	+	0	0	-
Implementability	+	+	+	0	0	0
Cost	N/A	+	0	0	0	-
State Acceptance	--	0	0	+	0	+
Community Acceptance	--	0	0	+	0	0
Net Rating	-4	+2	+4	+6	+4	+3

TABLE 21 COMPARISON OF ALTERNATIVES FOR MILL CREEK

Criteria	Alternative 1	Alternative 2	Alternative 3
Overall Protection of Human Health and the Environment	-	0	+
Compliance with ARARs	-	+	+
Long-Term Effectiveness and Permanence	-	0	+
Reduction of Toxicity, Mobility of Volume Through Treatment	-	+	0
Short-Term Effectiveness	+	+	0
Implementability	+	+	0
Cost	+ $0	0 $0.4 million	0 $0.7 million
Net Rating	-1	+4	+3

Note: Costs per acre and other information for this table were obtained from the Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

TABLE 22 COST ESTIMATE FOR OW/EADA OPERABLE UNIT SELECTED REMEDY

Subarea	Revegetation Treatment Techniques (Acres)	Soil Cover (Acres)	Revegetation Treatment Technique or Soil Cover (Acres)	Costs for Revegetation Treatment Techniques ($)	Soil Cover Costs ($)	Costs for Revegetation Treatment Techniques or Soil Cover ($)	Additional Costs ($)	Total Costs ($)
1	5.0	0.0	0	50,000	0	0	1,670,000[1]	1,720,000
2	125.0	100.0	0	1,250,000	2,863,700	0	855,500[2]	4,968,500
3	10.0	30.0	0	100,000	858,900	0	0	958,900
4	65.0	35.0	125	1,800,000	1,002,050	2,414,375	90,000[3]	4,156,425
5	35.0	30.0	0	650,000	858,900	0	0	1,208,900
6	115.0	0.0	0	350,000	0	0	10,000[4]	1,160,000
Subtotal	**355.0**	**195.0**	**125**	**1,150,000**	**5,582,850**	**2,414,375**	**2,265,500**	**14,172,725**
Mill Creek	40.0	0.0	0	400,000	0	0	0	400,000
Total	**395.0**	**195.0**	**125**	**3,950,000**	**5,582,850**	**2,414,375**	**2,801,500**	**14,572,725**

Note: Unit Costs for revegetation treatment techniques $10,000/acre
Unit Costs for soil cover $28,630/acre
Unit Costs for revegetation treatment techniques or soil covers $19,315/acre
Information for this table compiled from Draft Final Anaconda Smelter NPL Site, OW/EADA Operable Unit Remedial Investigation Report (ARCO 1993a)

1 Interpretive trail, preservation of historic structures, bridge removal, drainage control
2 Stormwater ponds, improvements to Warm Springs Creek
3 Grading to control drainage
4 Crushed limestone

FIGURES

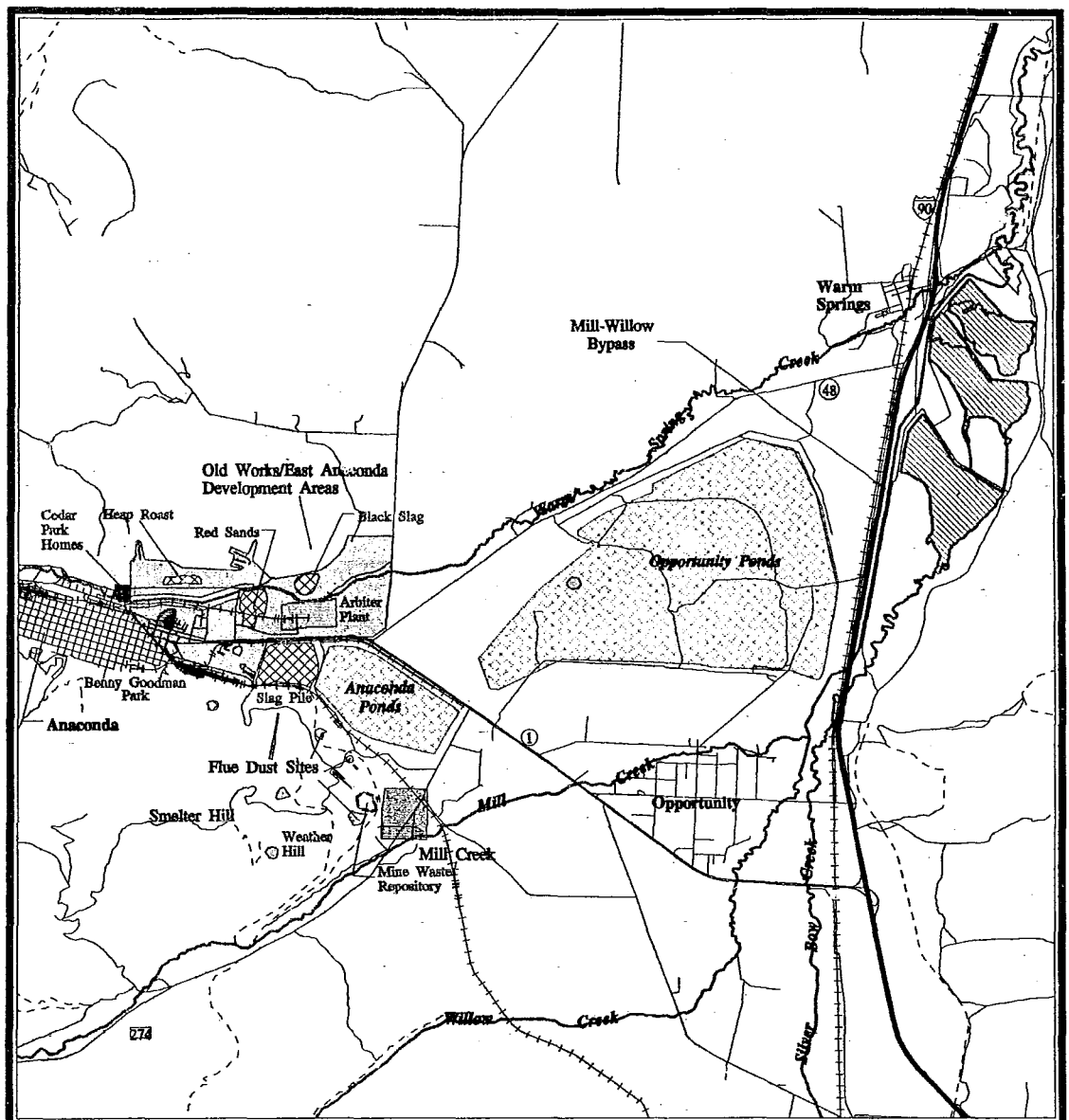

Figure 1. Anaconda Area Superfund Operable Unit Locations

Legend

- Pond
- Tailings
- Slag Pile
- Highway
- Other Road
- Other Road
- Railroad
- Stream

N

0 1 2 3 4 5

Scale of Miles

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Record of Decision OW/EADA OU
030894/owrod8.fin/dd-czvb

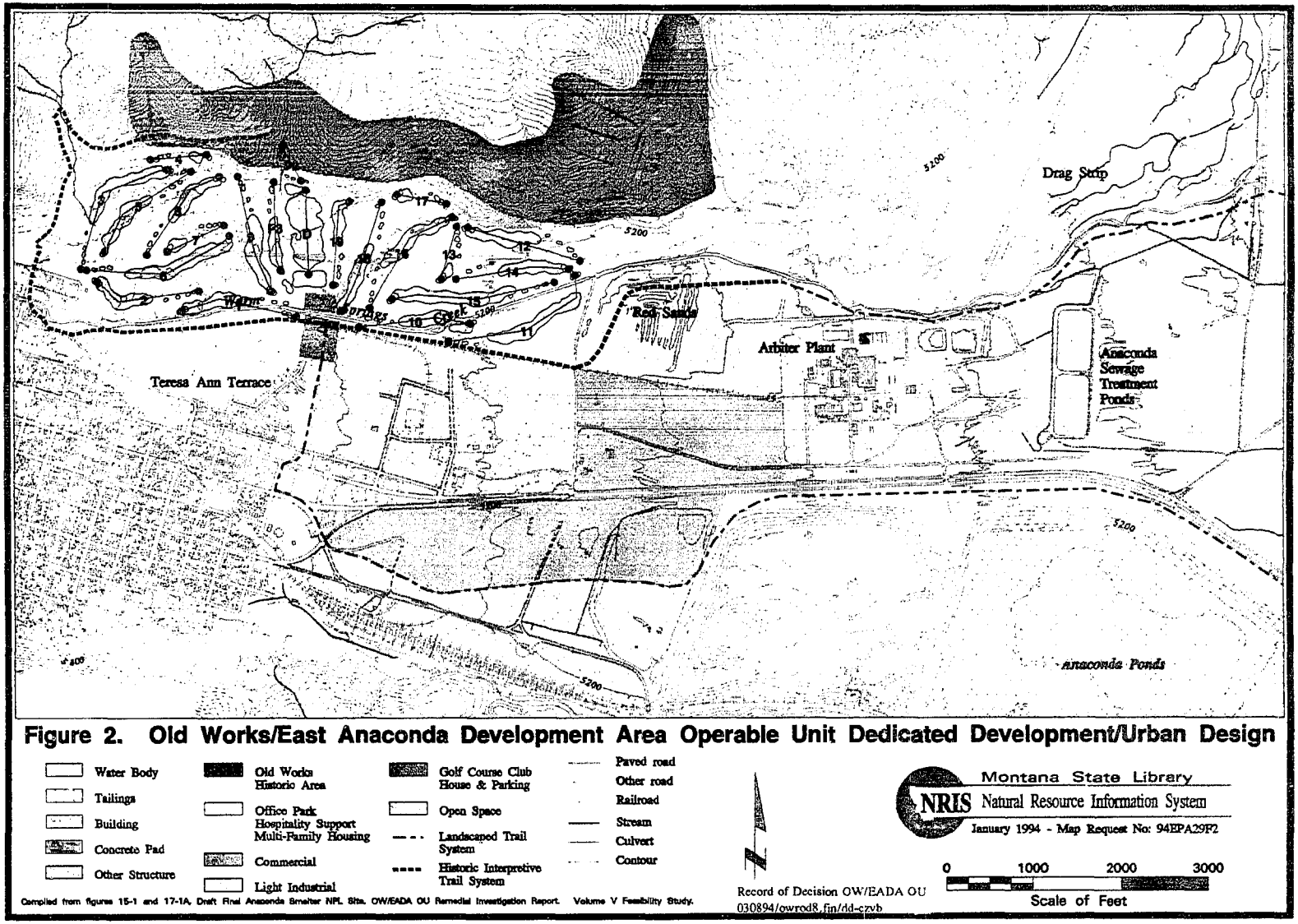

Figure 2. Old Works/East Anaconda Development Area Operable Unit Dedicated Development/Urban Design

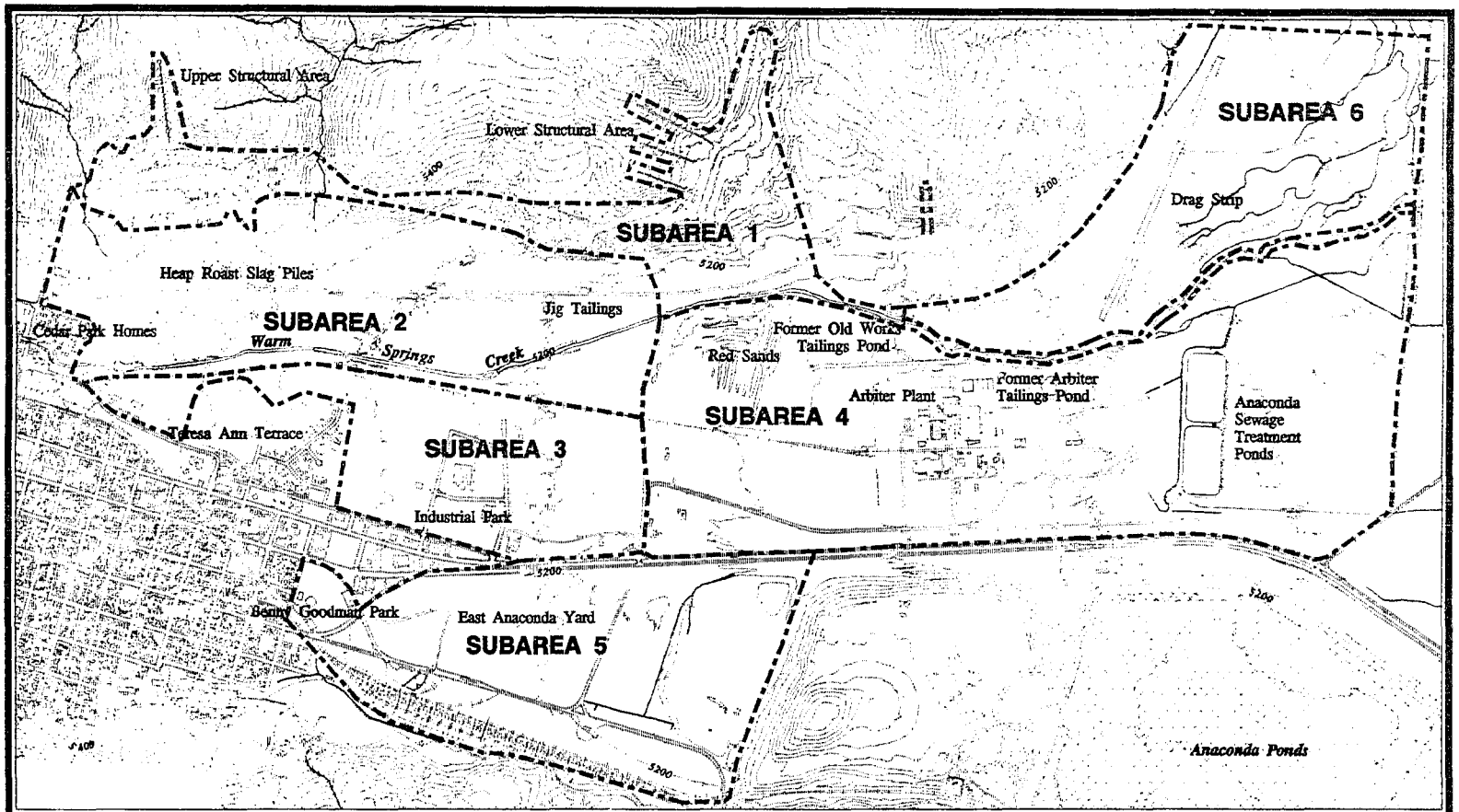

Figure 3. Old Works/East Anaconda Development Area Operable Unit Subareas

Water Body
Tailings
Building
Concrete Pad
Other Structure

Subarea Boundary
Paved road
Other road
Railroad

Stream
Culvert
Contour

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0 1000 2000 3000
Scale of Feet

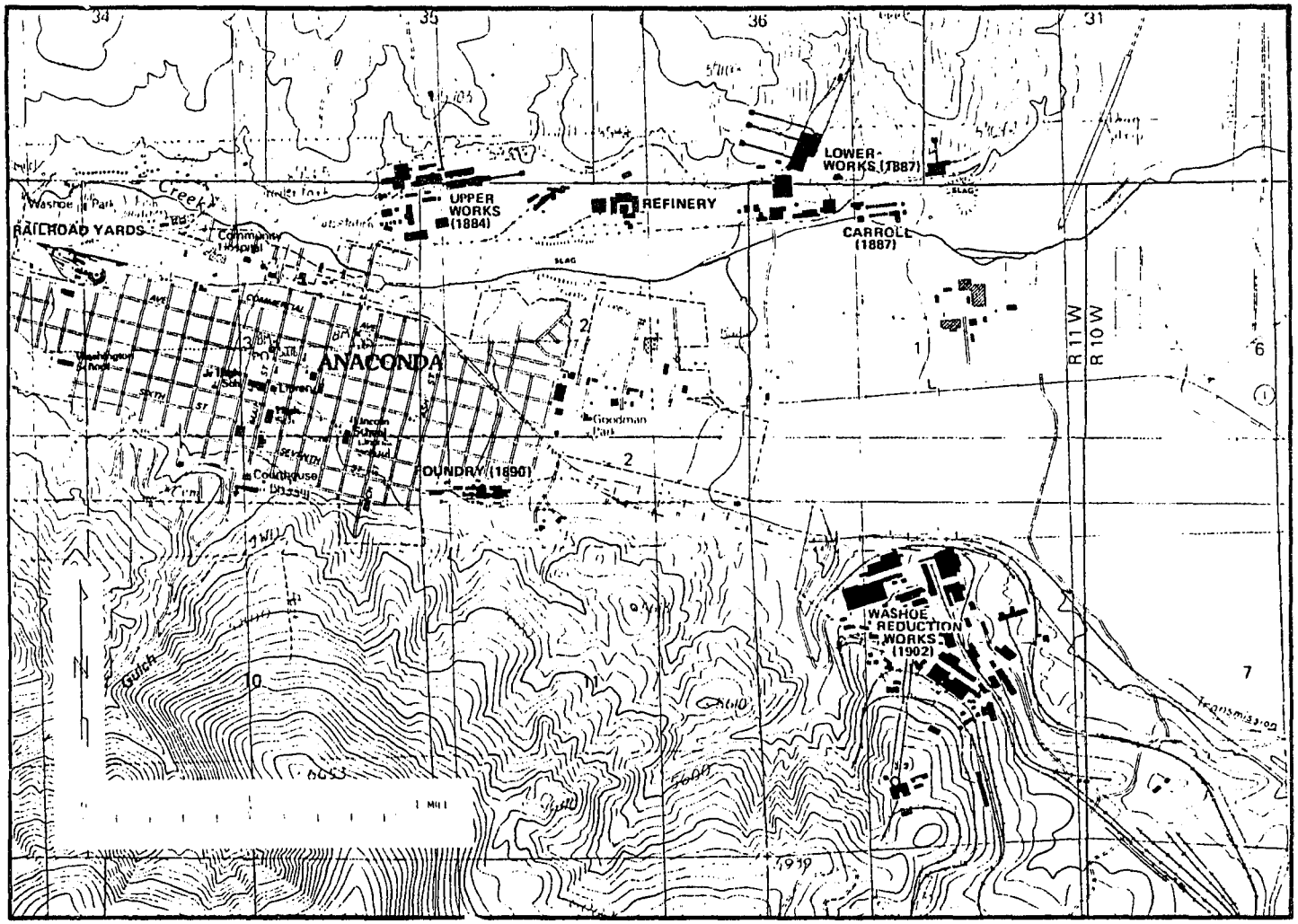
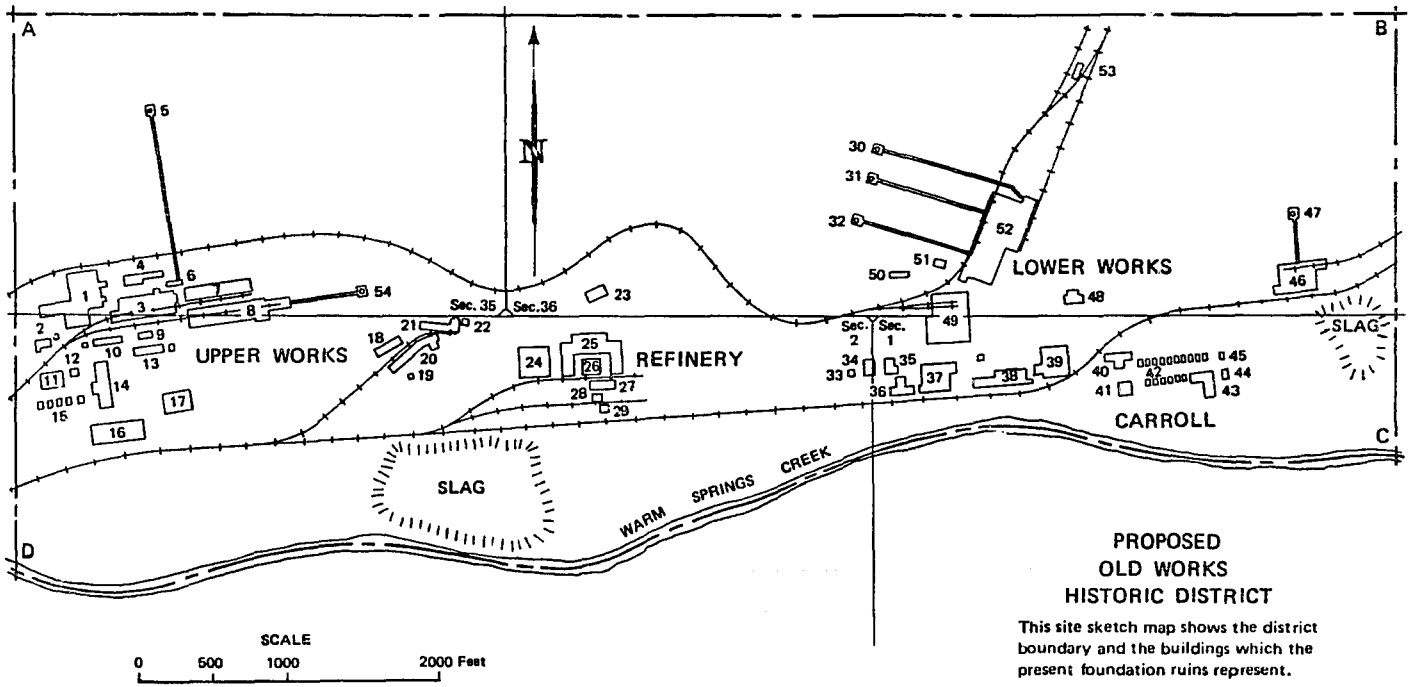


Figure 4 Old Works & Washoe Reduction Works



ANACONDA OLD WORKS
Key to National Register Site Sketch Map

1. Concentrator
2. Boiler House
3. Smelter #1
4. Ore Bins
5. Stack
6. Ore House
7. Smelter #3
8. Smelter #2
9. Unknown
10. Unknown
11. Unknown
12. Unknown
13. Matte House
14. Concentrator
15. Dwellings
16. Tank House
17. Slum House
18. Unknown
19. Unknown
20. Converter
21. Converter
22. Unknown
23. Sampling House
24. New Refinery
25. Old Refinery
26. Engine & Boiler House
27. Boiler House
28. Office
29. Silver Mill
30. Stack
31. Stack
32. Stack
33. Oil House
34. Office
35. Assay Office
36. Machine Shop
37. Engine & Boiler House
38. Tank House
39. Tank House
40. Boarding House
41. C.C.C.Co. Store
42. Dwellings
43. Boarding House
44. Dwelling
45. Dwelling
46. Converter
47. Stack
48. Matte House
49. Concentrator
50. Tank House
51. Boiler House
52. Smelter
53. Sampler
54. Stack

Figure 5 Anaconda Old Works

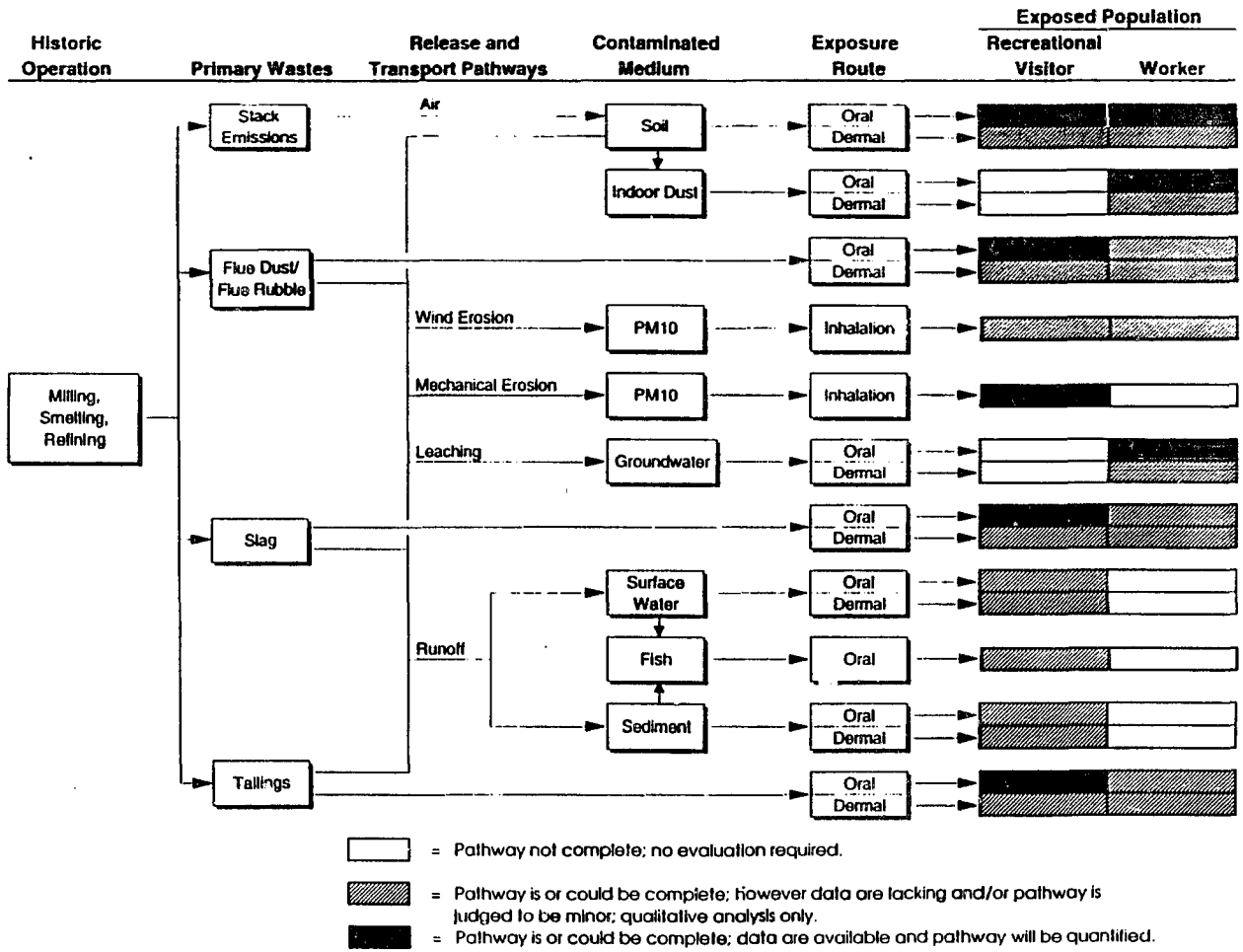


Figure 6 Risk Conceptual Site Model

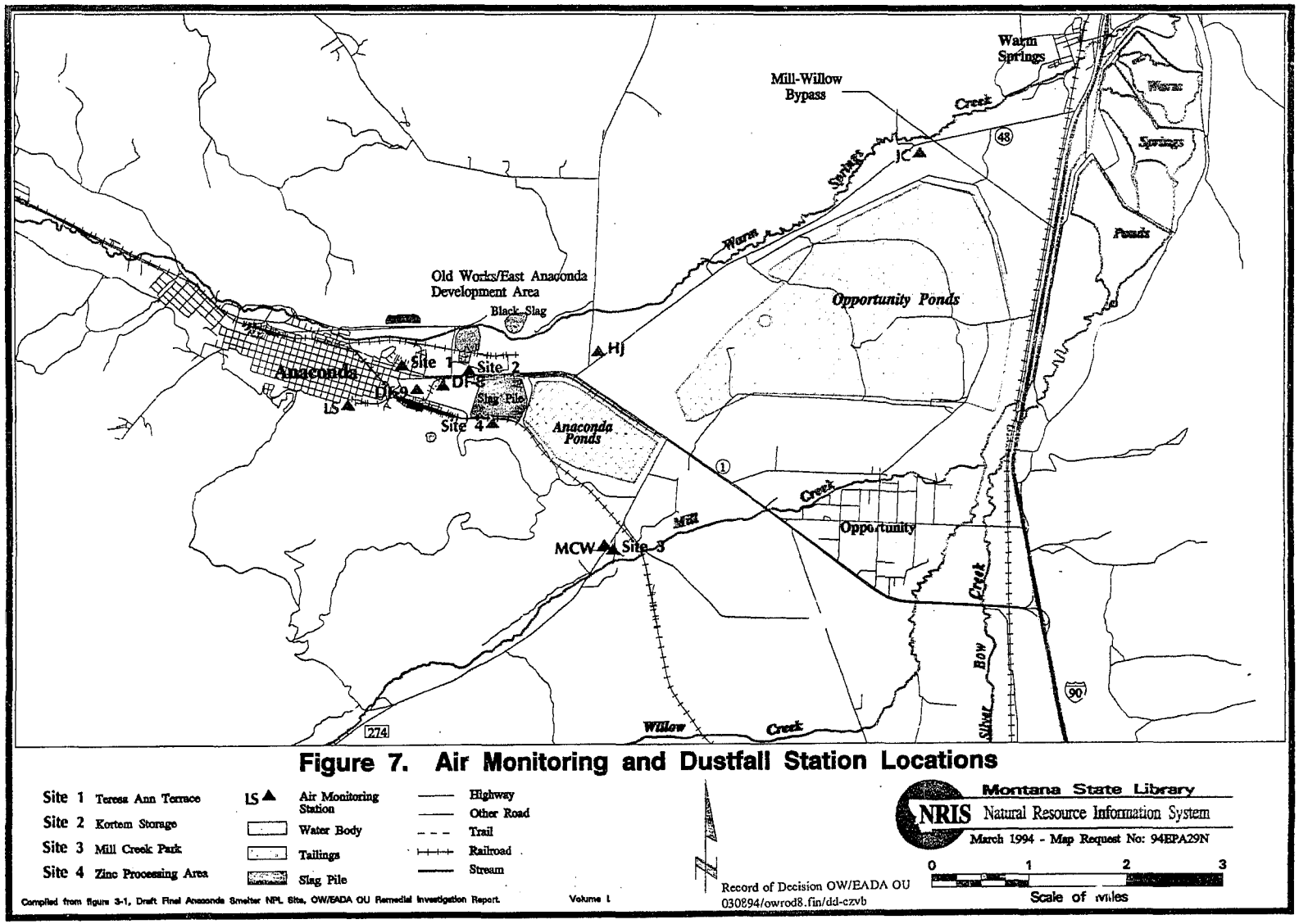


Figure 7. Air Monitoring and Dustfall Station Locations

Site 1 Teresa Ann Terrace
Site 2 Kortem Storage
Site 3 Mill Creek Park
Site 4 Zinc Processing Area

LS ▲ Air Monitoring Station
Water Body
Tailings
Slag Pile
Highway
Other Road
Trail
Railroad
Stream

Compiled from figure 3-1, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report. Volume I

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0 1 2 3
Scale of Miles

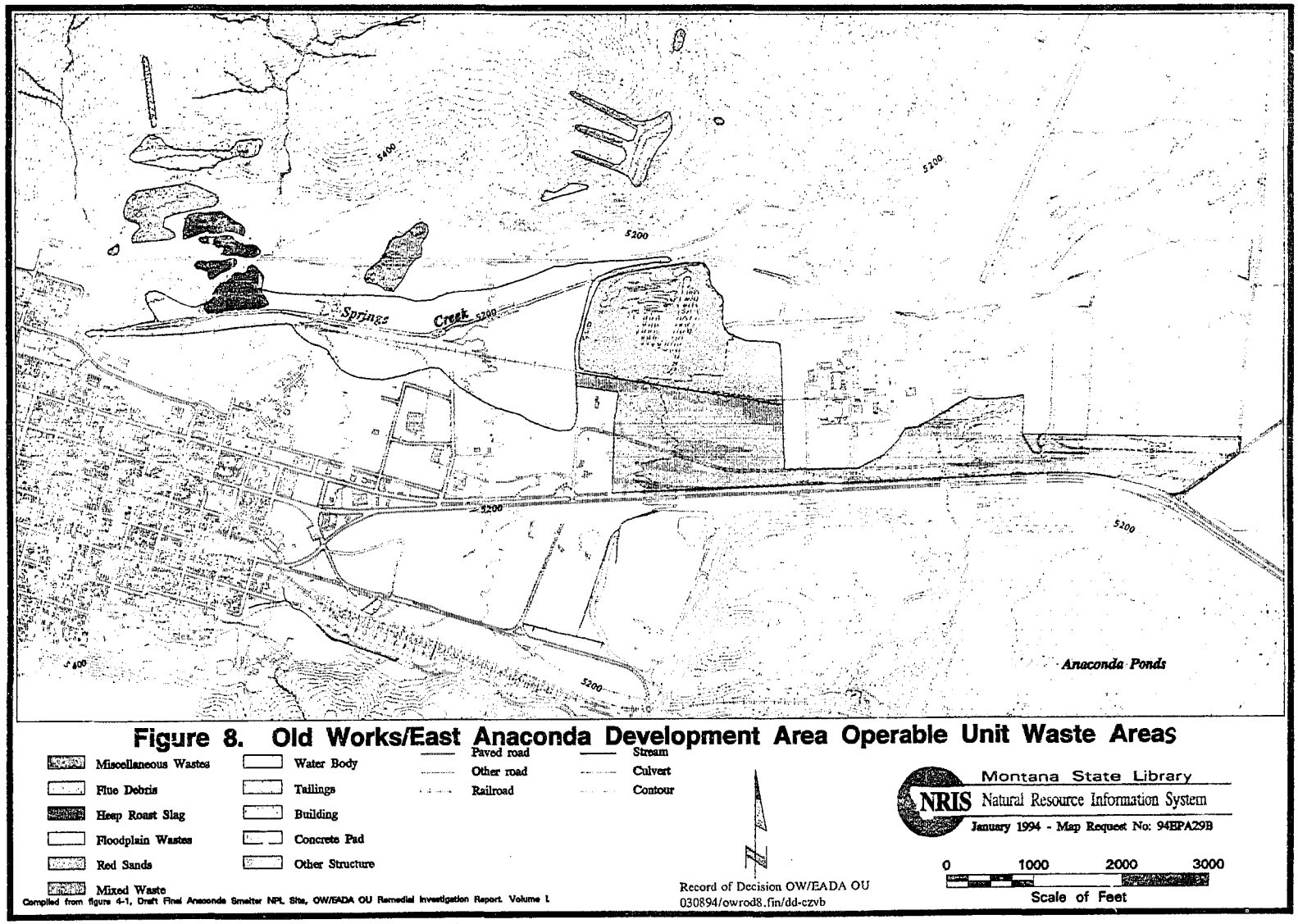

Figure 8. Old Works/East Anaconda Development Area Operable Unit Waste Areas

Miscellaneous Wastes
Flue Debris
Heap Roast Slag
Floodplain Wastes
Red Sands
Mixed Waste

Water Body
Tailings
Building
Concrete Pad
Other Structure

Paved road
Other road
Railroad

Stream
Culvert
Contour

Compiled from figure 4-1, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report. Volume 1.

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Scale of Feet

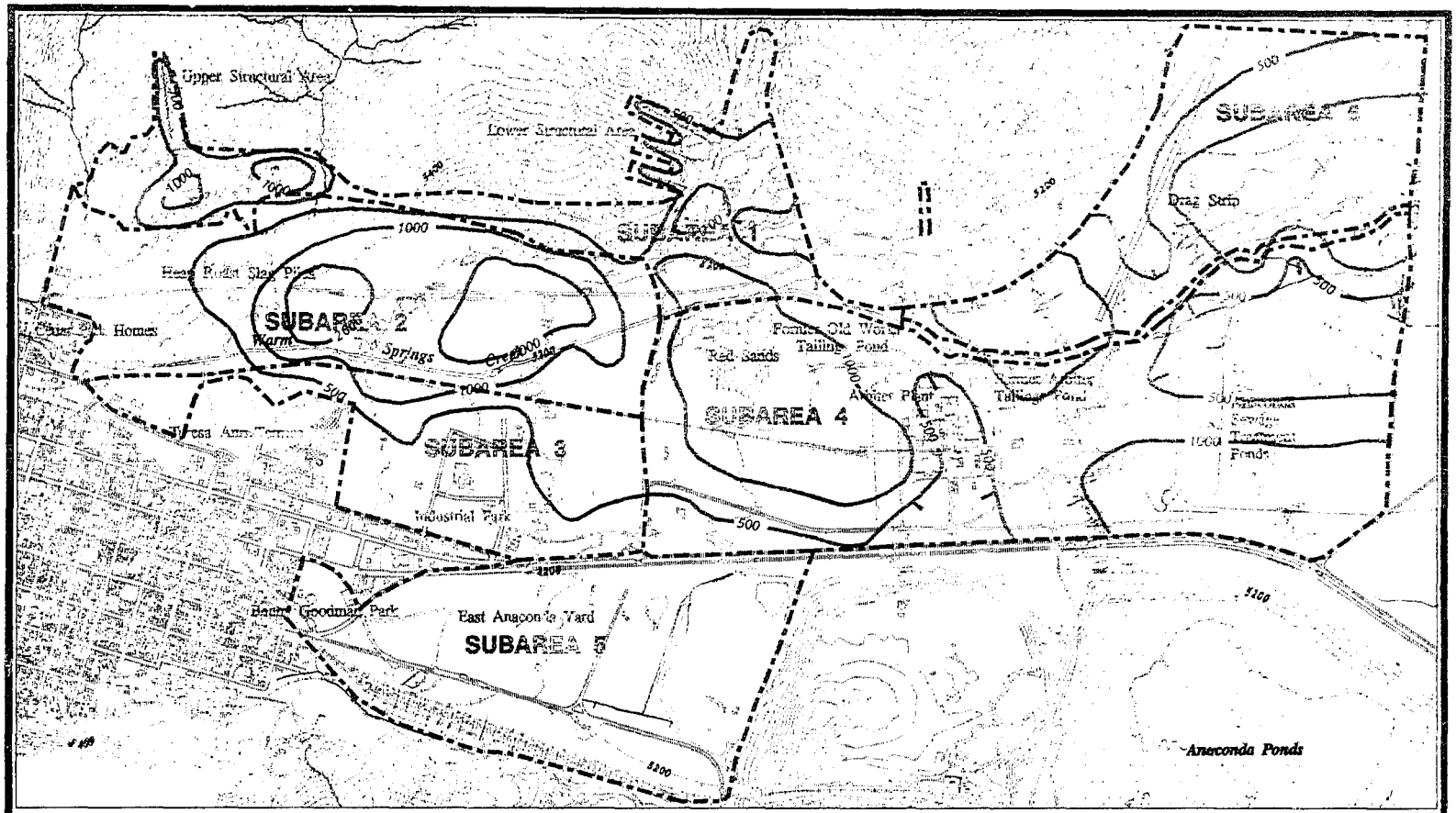

Figure 9. Old Works/East Anaconda Development Area Operable Unit Surface Arsenic Isoconcentrations

Water Body
Tailings
Building
Concrete Pad
Other Structure

Arsenic Line of Isoconcentration
Subarea Boundary
Paved road
Other road
Railroad

Stream
Culvert
Contour

Compiled from Plate 3, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report, Volume II.

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Scale of Feet

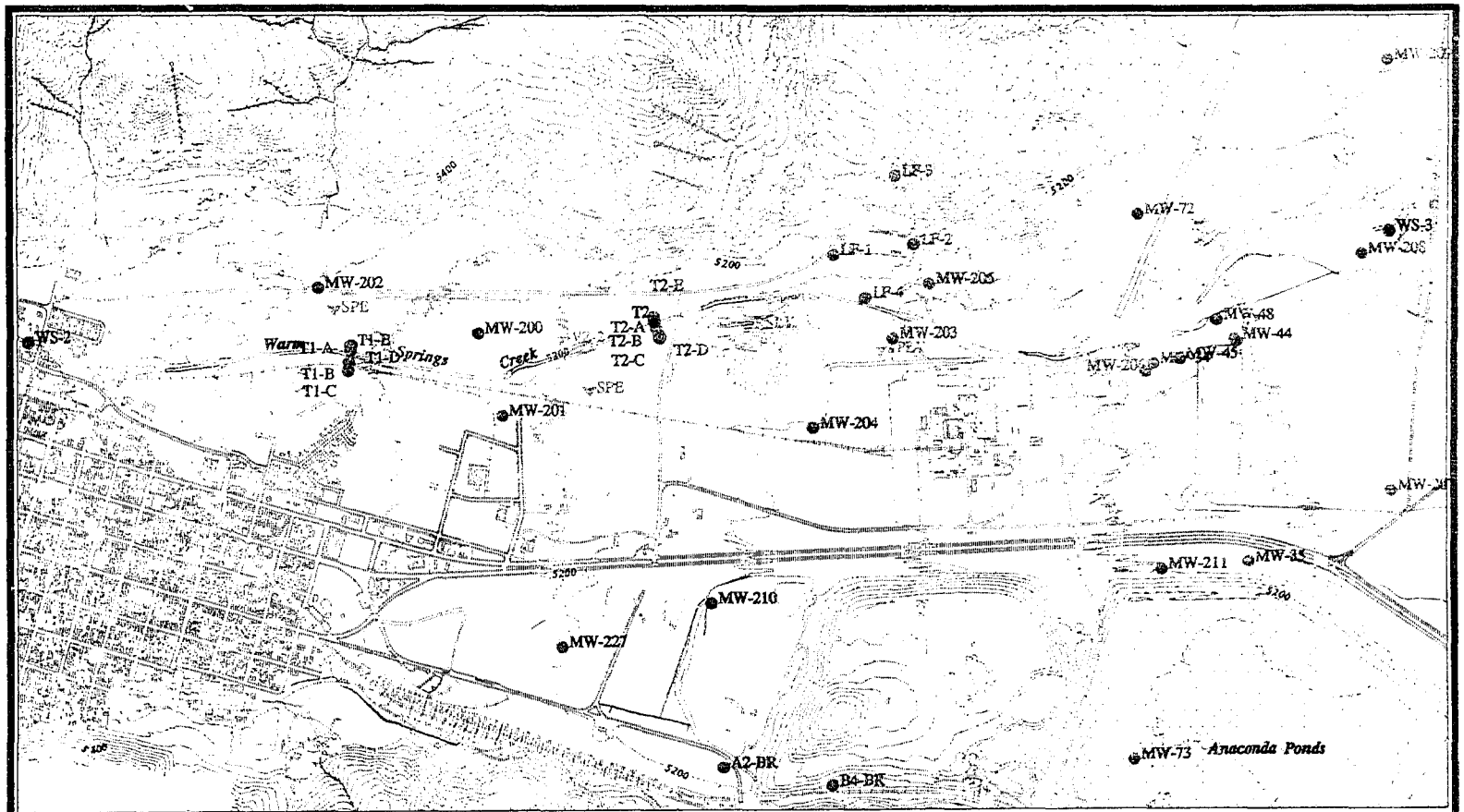

Figure 10. Old Works/East Anaconda Development Area Operable Unit Sample Stations for Ground Water, Surface Water, and Vadose Zone

- Ground Water Monitor Well Location
- Surface Water Gaging Station
- Vadose Zone Monitor Station
- Water Body
- Tailings
- Building
- Concrete Pad
- Other Structure
- Paved road
- Other road
- Railroad
- Stream
- Culvert
- Contour

Compiled from figures 6-1, 7-2, and 8-1, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report Volume I

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Scale of Feet

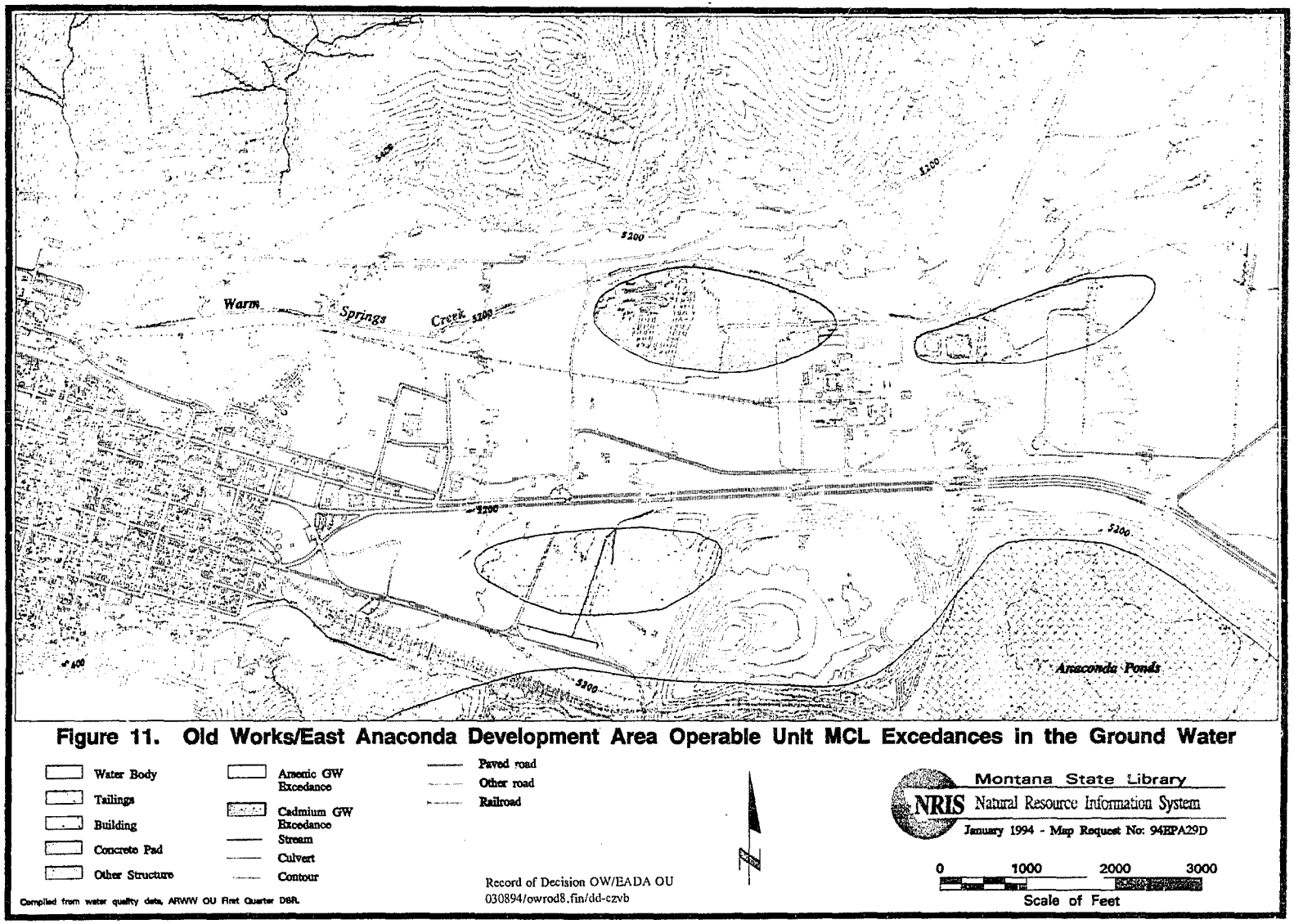

Figure 11. Old Works/East Anaconda Development Area Operable Unit MCL Excedances in the Ground Water

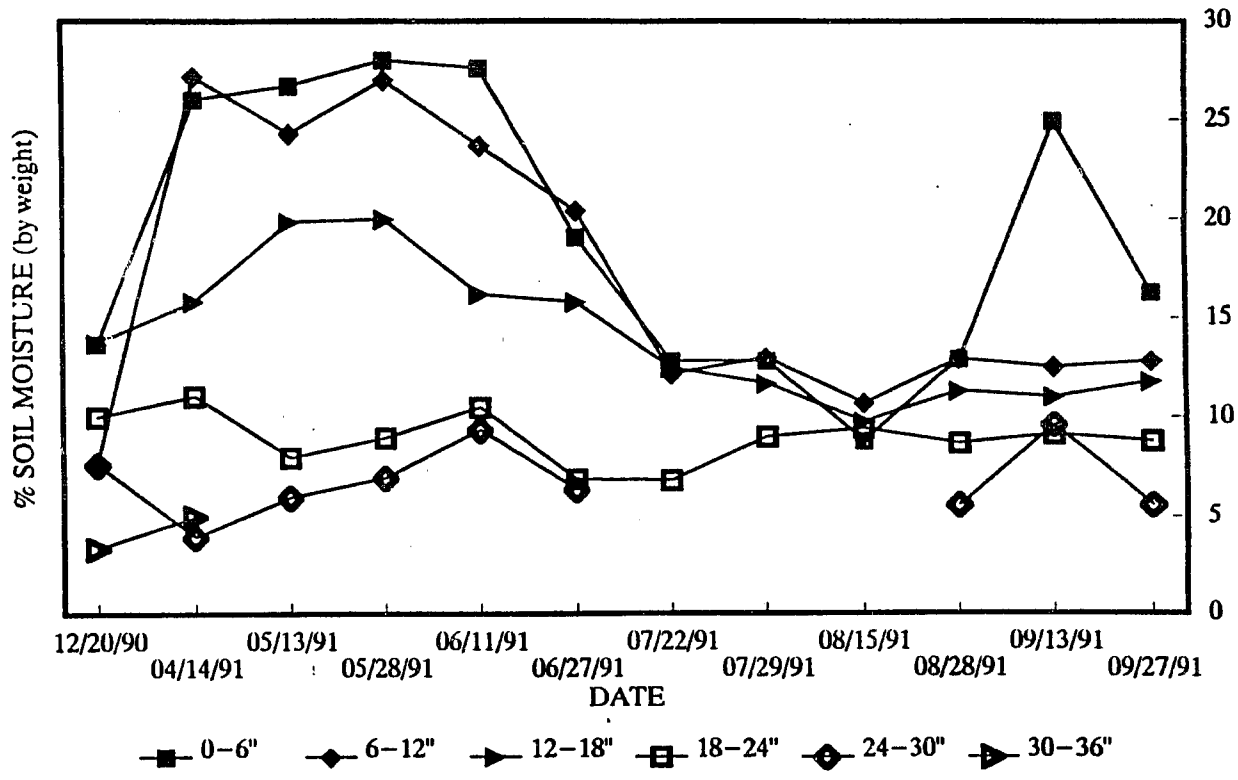

Figure 12 Soil Moisture at Site VZ-2 (Old Works)

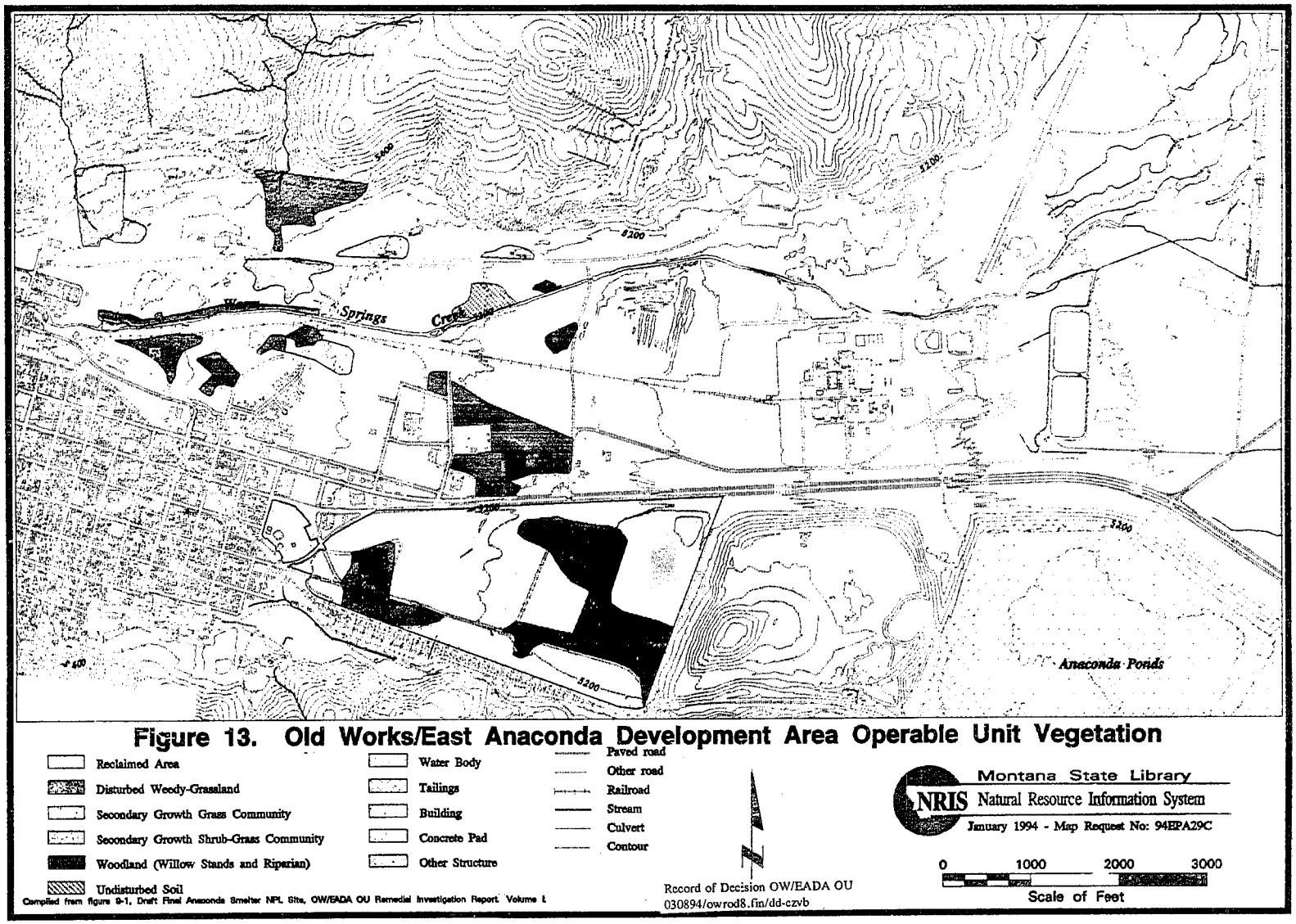

Figure 13. Old Works/East Anaconda Development Area Operable Unit Vegetation

Compiled from figure 9-1, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report Volume I.

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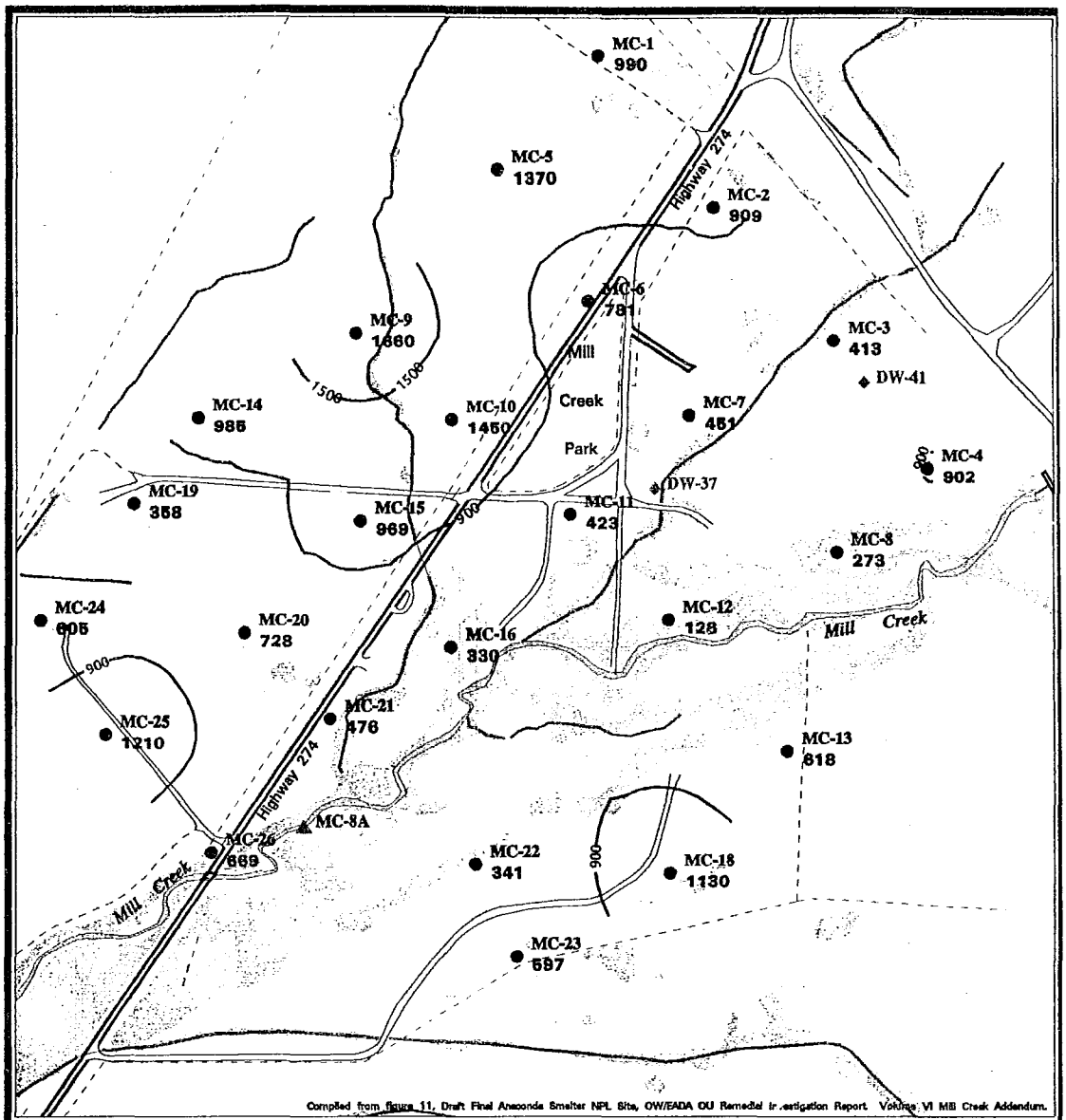

Figure 14. Town of Mill Creek Soil Arsenic Levels
(Samples of July 15 & 16, 1993)

MC-4 902 — Approximate Sample Location, with ID and Arsenic Concentration (ppm)

900 — Estim. Arsenic Concentration Isoline

DW-37 — Domestic Well with Arsenic Concentration in Ground Water above the MCL (May 93 sample date)

MC-8A — Surface Water Gaging Station

Base map digitized by Horizons, Inc, Rapid City. Northwest half of map digitized from 1:6400 scale aerial photos of 10/29/88. Southeast half from 1:24,000 scale aerial photos of 11/8/84. Soil sample locations and arsenic levels provided by ARCO. Isolines interpolated from the 4 nearest samples within 300 meters, with the influence of each sample inversely proportional to the cube of its distance. Other interpolation methods produce isolines up to 150 feet away from those shown here.

NRIS does not guarantee this data for functionality, accuracy, or being free from errors. The data was not designed to be used in applications beyond that for which they were formatted or originally collected. A user assumes responsibility to verify usability for their purposes.

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0 500 1000 1500
Scale of Feet

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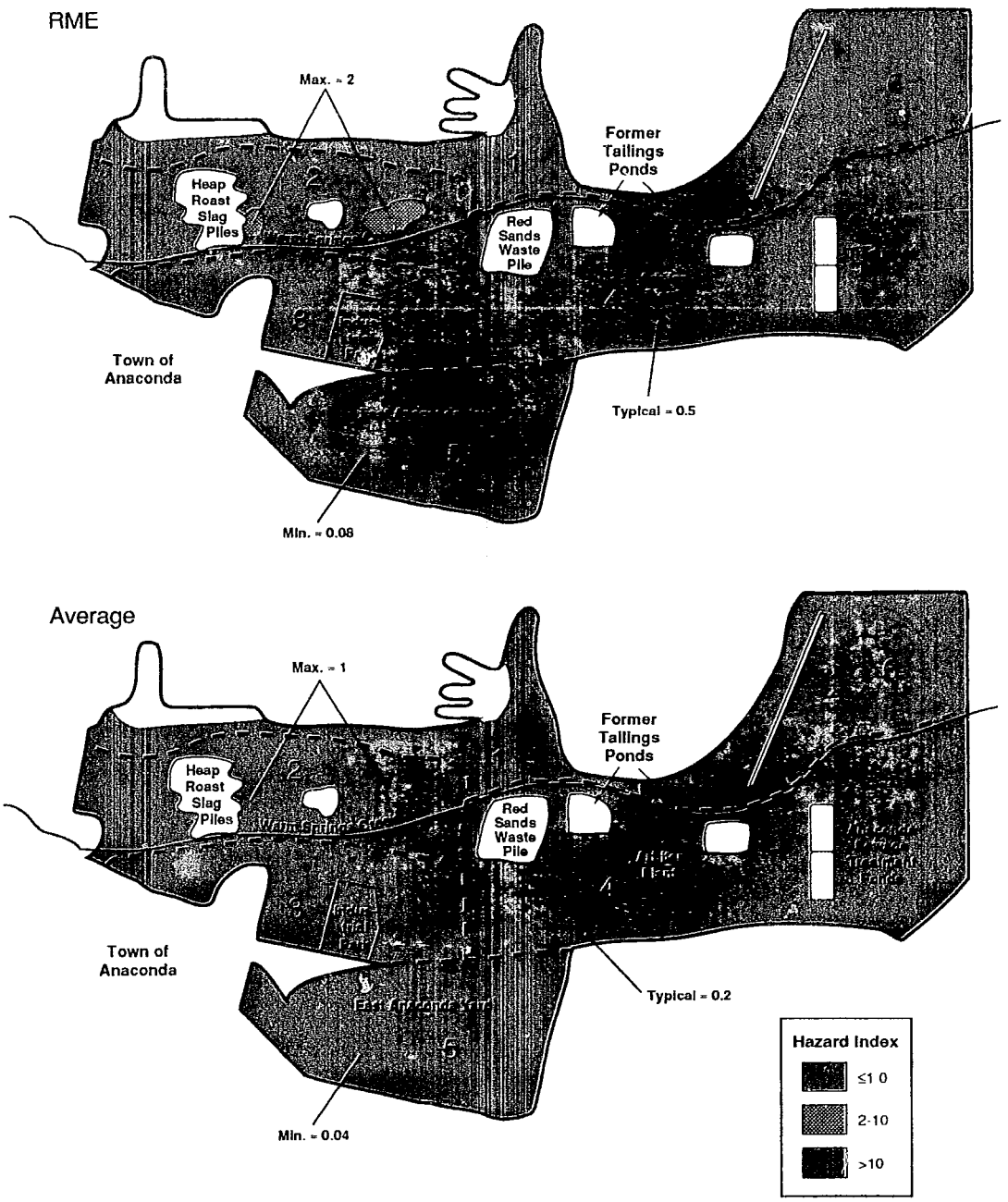

Figure 15 Noncancer Risks to Workers from Arsenic in Surface Materials

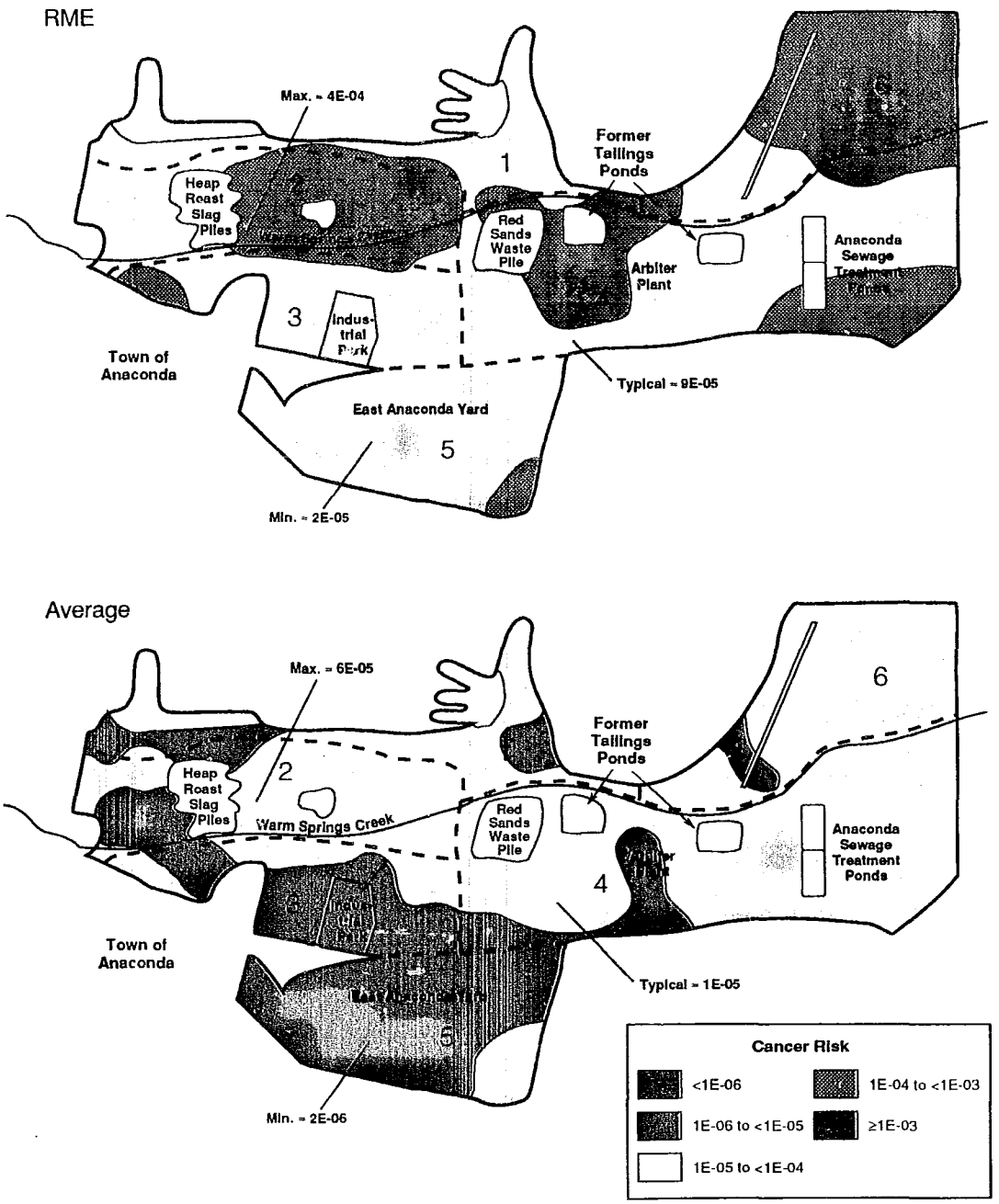

Figure 16 Cancer Risks to Workers from Arsenic in Surface Materials

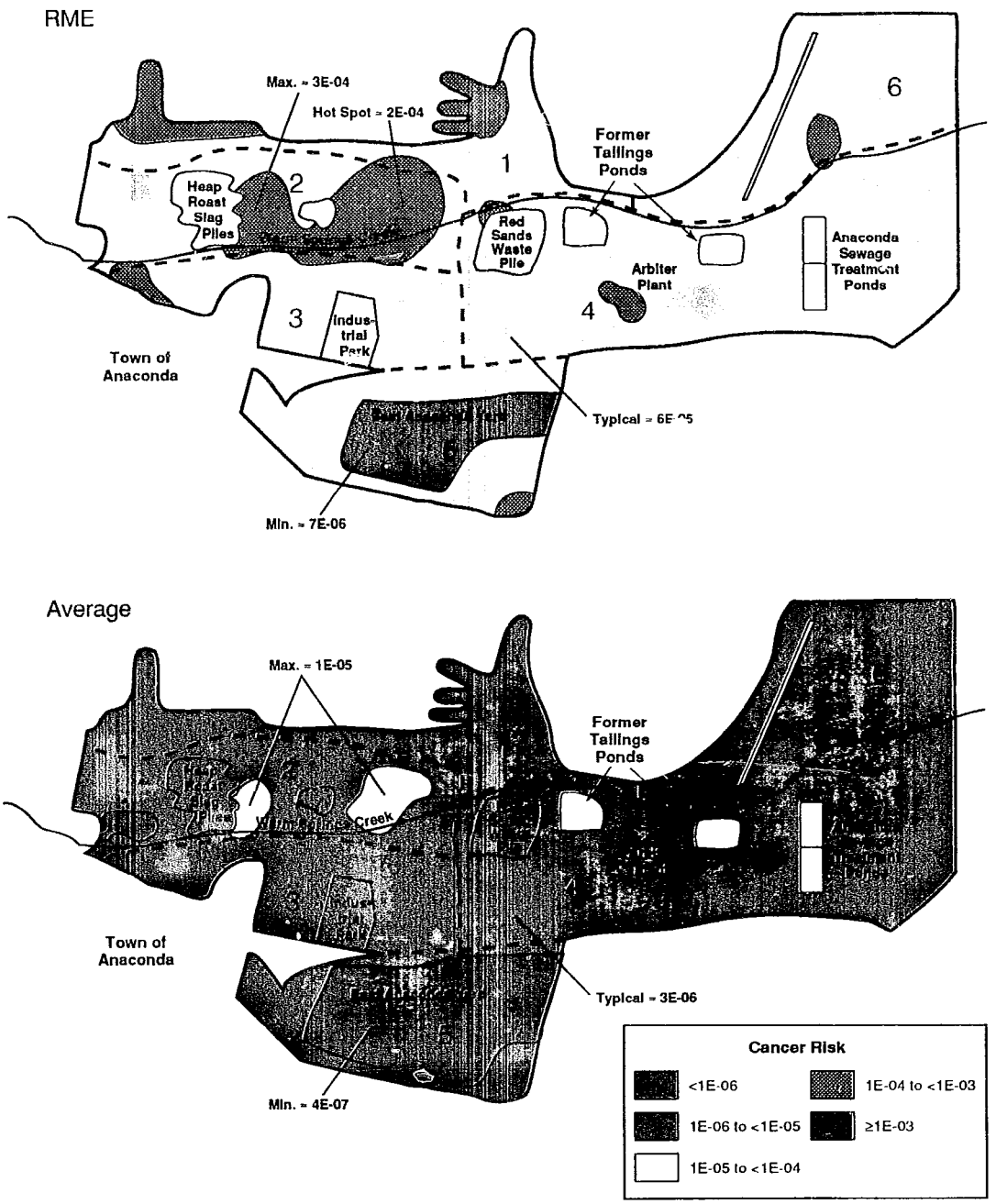

Figure 17 Cancer Risks to Dirt Bike Riders from Arsenic in Surface Materials

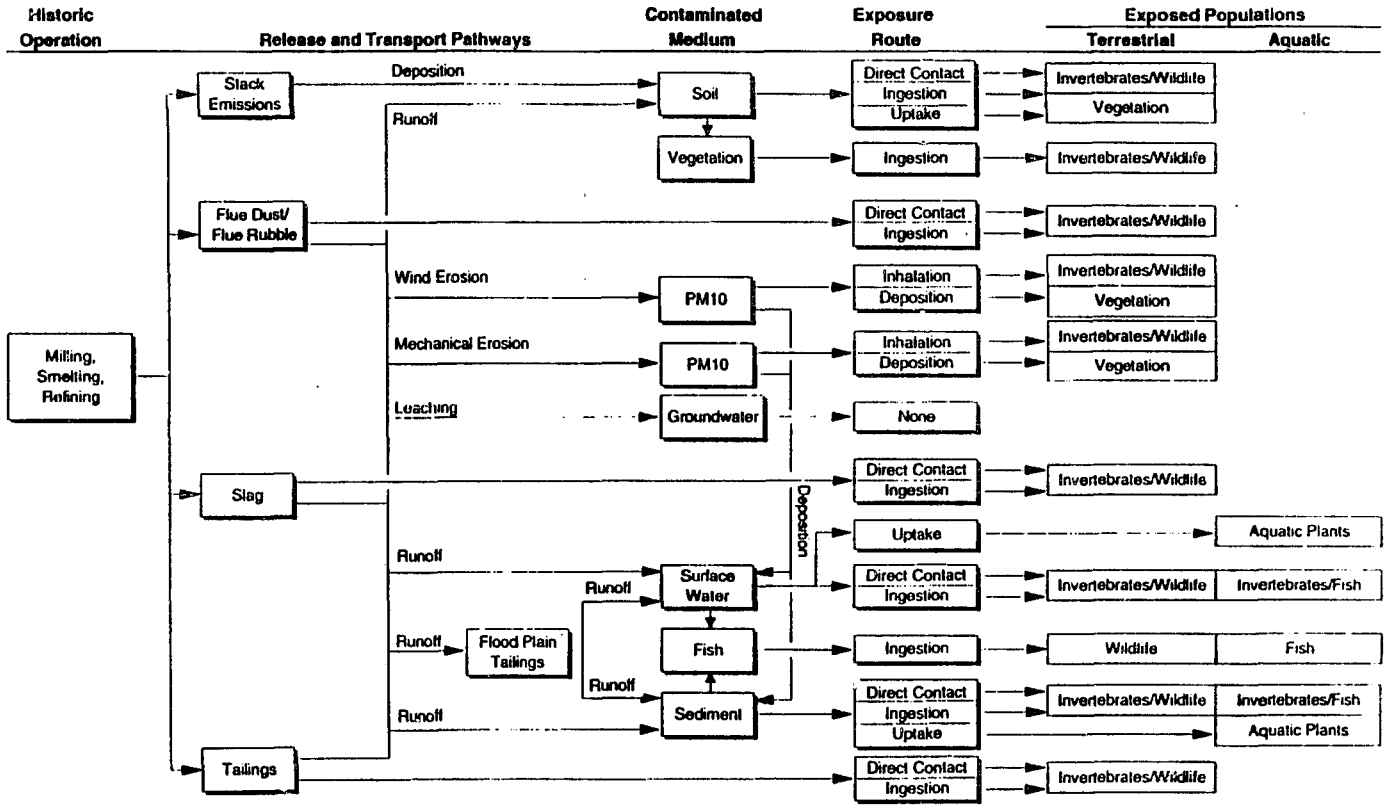

Figure 18 Conceptual Site Model for Ecological Assessment

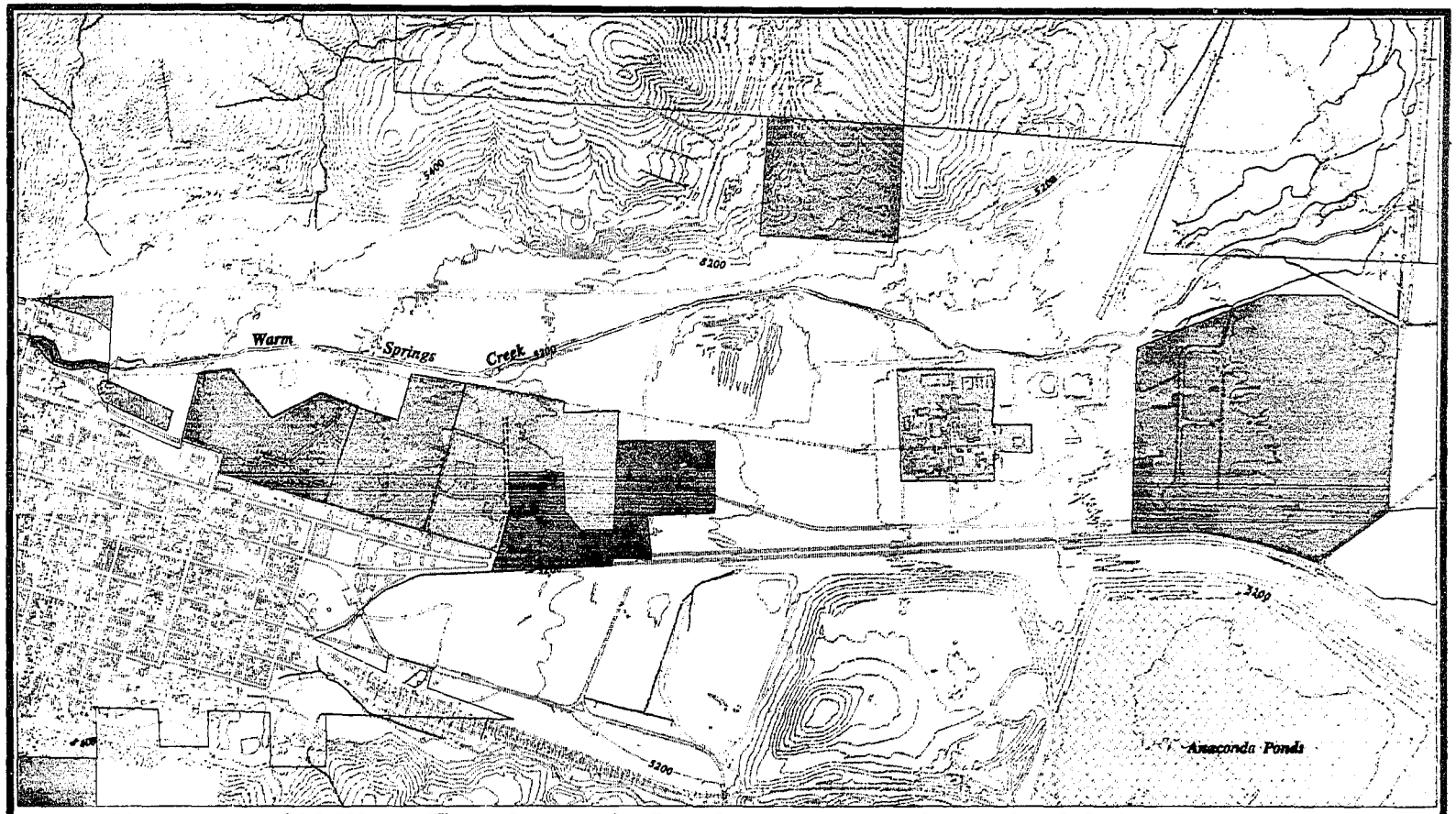

Figure 19. Old Works/East Anaconda Development Area Operable Unit Land Ownership

Water Body
Tailings
Building
Concrete Pad
Other Structure
Anaconda/ Deer Lodge Co.
ARCO
State of Montana
Upland
V. Galle
Anaconda Local Development
Teresa Ann Terrace
Various Owners
Interstate Lumber Co.
Drag Strip
Paved road
Other road
Railroad
Stream
Culvert
Contour

Compiled from figure 15-2, Draft Final Anaconda Smelter NPL Site, OW/EADA OU Remedial Investigation Report Volume V Feasibility Study.

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Scale of Feet

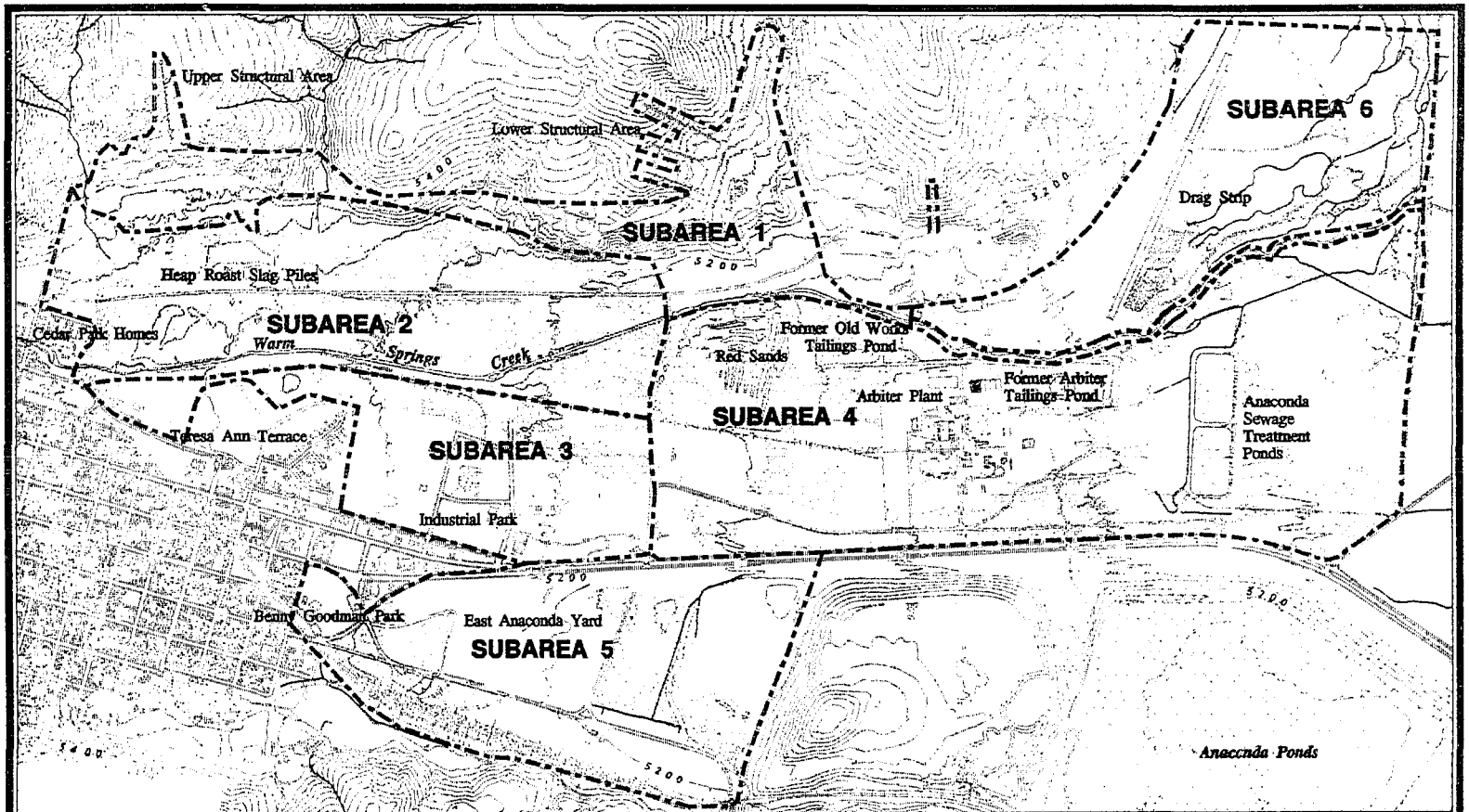

Figure 20. Old Works/East Anaconda Development Area Operable Unit Preferred Alternative

Water Body
Tailings
Building
Concrete Pad
Other Structure

ARTS
Crushed Limestone Cover
Engineered Cover
Subarea Boundary

Paved road
Other road
Railroad
Stream
Culvert
Contour

Compiled from figure 4, OW/EADA OU Proposed Plan.

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Scale of Feet

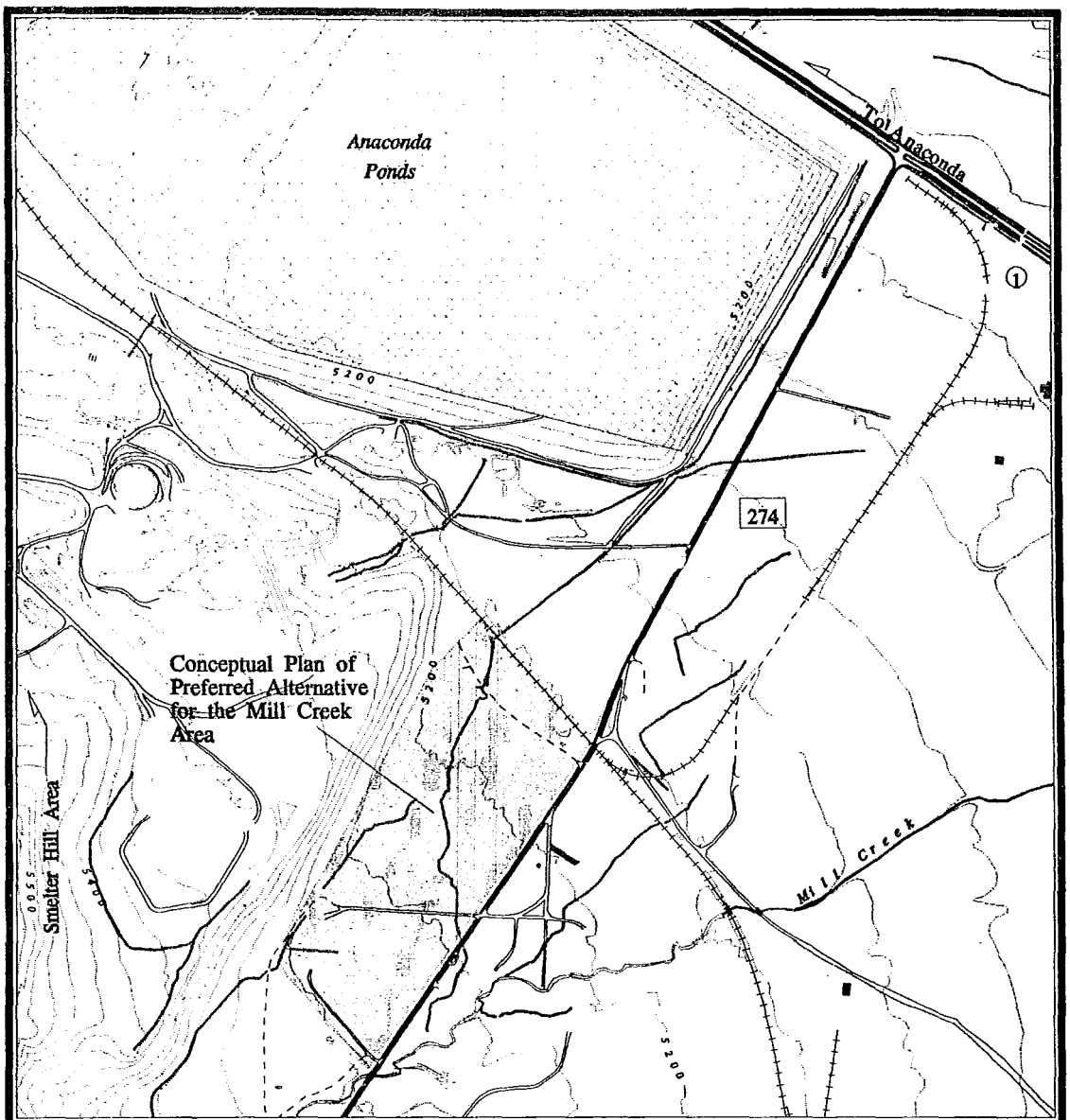

Figure 21. Mill Creek Area

Legend

- Revegetation Treatment Techniques
- Tailings
- Building
- Other Structure
- Paved road
- Other road
- Bridge
- Trail
- Railroad
- Stream
- Contour

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Scale of Feet

Record of Decision OW/EADA OU
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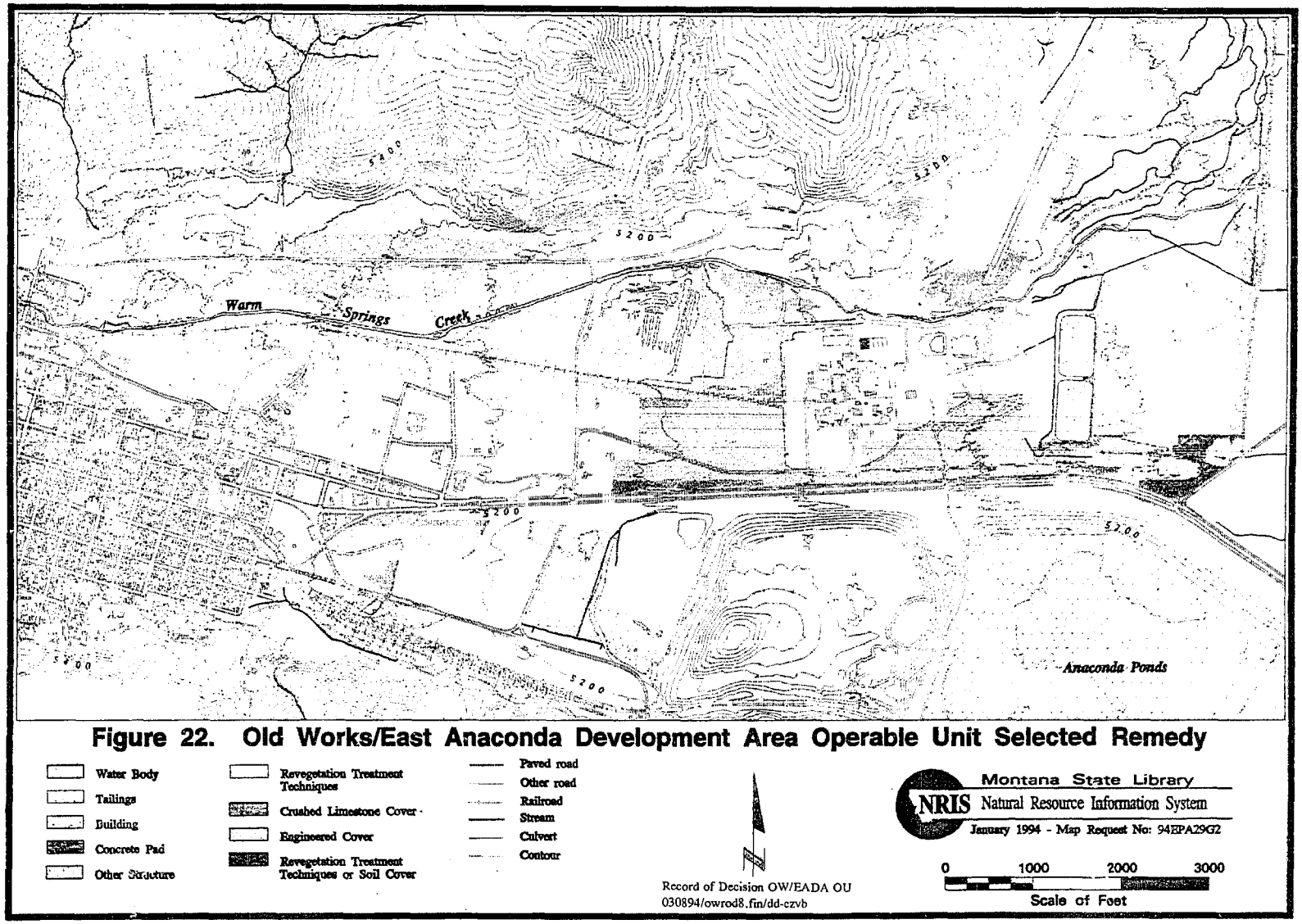

Figure 22. Old Works/East Anaconda Development Area Operable Unit Selected Remedy

APPENDIX A

ARARs

REMEDIAL PLANNING ACTIVITIES AT SELECTED
UNCONTROLLED HAZARDOUS SUBSTANCES DISPOSAL
SITES IN EPA REGIONS VI, VII, AND VIII

U.S. EPA CONTRACT NO. 68-W9-0021

FINAL DRAFT

IDENTIFICATION AND DESCRIPTION OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

OLD WORKS/EAST ANACONDA DEVELOPMENT AREA OPERABLE UNIT
ANACONDA SMELTER NPL SITE
ANACONDA, MONTANA

March 23, 1993

Work Assignment Number.: 37-8P18
Document No.: 7760-037-RT-CPSC

United States Environmental Protection Agency
Region VIII, Montana Office
Federal Building, Drawer 10096
301 South Park
Helena, Montana 59626-0096

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
1.1 OBJECTIVES 1

1.2 SCOPE OF THIS DOCUMENT 1

1.3 SITE LOCATION AND HISTORY 1

2.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS 5
2.1 ARARS FOR REMEDIAL ACTIONS 6

2.2 DEFINITIONS 6

2.3 ARARS APPLICABLE TO OW/EADA REMEDIAL ACTION 8

2.4 SCOPE OF ARARS ANALYSIS FOR OW/EADA REMEDIAL ACTION 9

3.0 FEDERAL ARARS 10
3.1 FEDERAL CHEMICAL-SPECIFIC ARARS 10
3.1.1 Safe Drinking Water Act (Relevant and Appropriate) 10
3.1.2 Clean Water Act (Relevant and Appropriate) 11
3.1.3 Clean Air Act (Applicable) 12

3.2 FEDERAL ACTION-SPECIFIC ARARS 15
3.2.1 Surface Mining Control and Reclamation (Relevant and Appropriate) 15
3.2.2 Clean Air Act (Applicable) 15
3.2.3 Clean Water Act (Relevant and Appropriate) 15
3.2.3.1 Clean Water Act - Dredged or Fill Material Applicable 16
3.2.4 Resource, Conservation, and Recovery Act, Subtitle D (Relevant and Appropriate) 16

3.3 FEDERAL LOCATION-SPECIFIC ARARS 16
3.3.1 National Historic Preservation Act (NHPA) (Applicable) 16
3.3.2 Archaeological and Historic Preservation Act (Applicable) 17
3.3.3 Historic Sites, Buildings and Antiquities Act (Applicable) 17
3.3.4 Fish and Wildlife Coordination Act (Applicable) 17
3.3.5 Floodplain Management (Applicable) 18
3.3.6 Protection of Wetlands (Applicable) 18

TABLE OF CONTENTS (continued)

PAGE

3.3.7 Endangered Species Act (Applicable) 18
3.4 TO BE CONSIDERED (TBC) 19

4.0 STATE OF MONTANA ARARS 24
4.1 OVERVIEW 24

4.2 MONTANA CHEMICAL-SPECIFIC ARARS 24
4.2.1 Water Quality 24
4.2.1.1 Water Quality Statutes (Applicable) 24
4.2.1.2 Surface Water Quality Standards (Applicable) 25
4.2.1.3 Nondegradation of Water Quality (Applicable) 25
4.2.1.4 Well Standards (Applicable) 26
4.2.1.5 Montana Ground Water Pollution Control System (Applicable) 26
4.2.2 Air Quality 26
4.2.2.1 Clean Air Act of Montana (Applicable) 26
4.2.2.2 Montana Air Quality Emissions Standards 27

4.3 MONTANA ACTION-SPECIFIC ARARS 27
4.3.1 Water Quality 27
4.3.1.1 Water Quality Statutes (Applicable) 27
4.3.1.2 Surface Water Quality Regulations (Applicable) . . 28
4.3.1.3 Nondegradation of Water Quality (Applicable) . . . 28
4.3.1.4 MPDES Permit Regulations (Relevant and Appropriate) 28
4.3.1.5 Well Standards (Applicable or Relevant and Appropriate) 28
4.3.1.6 Montana Ground Water Pollution Control System (Applicable) 28
4.3.2 Air Quality 28
4.3.2.1 Air Quality Regulations (Applicable) 28
4.3.2.2 Montana Air Quality Emissions Standards 29
4.3.3 Natural Streambed and Land Preservation Act (Applicable) 29
4.3.4 Solid Waste Management Act (Applicable) 29
4.3.4.1 Solid Waste Management Regulations (Applicable) 29
4.3.5 Mining and Reclamation Requirements 30
4.3.5.1 Strip Mining and Underground Mine Reclamation Act (Relevant and Appropriate) 30

TABLE OF CONTENTS (continued)

PAGE

4.3.5.2 Rules and Regulations Governing the Opencut Mining Act (Relevant and Appropriate) 35

4.4 MONTANA LOCATION-SPECIFIC ARARS 36
4.4.1 Natural Stream Bed and Land Preservation Act (Applicable or Relevant and Appropriate) 36
4.4.2 Floodplain and Floodway Management Act (Applicable or Relevant and Appropriate) 37
4.4.3 Floodplain Management Regulations (Applicable or Relevant and Appropriate) 37
4.4.4 Cultural Resources 40
4.4.4.1 Antiquities Act (Relevant and Appropriate) 40
4.4.4.2 Cultural Resources Regulations (Relevant and Appropriate) 40

LIST OF TABLES

		Page
TABLE 1	FEDERAL AND STATE OF MONTANA WATER QUALITY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION	13
TABLE 2	FEDERAL AND STATE OF MONTANA AIR QUALITY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION	14
TABLE 3	FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION	20
TABLE 4	LIST OF FEDERAL POLICIES, CRITERIA, ADVISORIES OR GUIDANCE TO BE CONSIDERED IN SETTING REMEDIATION LEVELS OR OTHER REQUIREMENTS, STANDARDS OR LIMITATIONS TO BE MET FOR THE OW/EADA REMEDIAL ACTION	22
TABLE 5	MONTANA APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OW/EADA REMEDIAL ACTION	41

LIST OF FIGURES

		Page
Figure 1-1	Anaconda Smelter NPL Site	2
Figure 1-2	Old Works/East Anaconda Development Area Site	5

LIST OF ACRONYMS

A/DLHPO	Anaconda/Deer Lodge Historic Preservation Officer
ALDC	Anaconda Local Development Corporation
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
ARCO	Atlantic Richfield Company
ARM	Administrative Rules of Montana
ATSDR	Agency of Toxic Substances and Disease Registry
BTCA	Best Technology Currently Available
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DNRC	Department of Natural Resources and Conservation (Montana)
EPA	U.S. Environmental Protection Agency
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDHES	Montana Department of Health and Environmental Sciences
MGWPCS	Montana Ground Water Pollution Control System
MPDES	Montana Pollutant Discharge Elimination System
NCP	National Contingency Plan
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
OSWER	Office of Solid Waste and Emergency Response
OW/EADA	Old Works/East Anaconda Development Area
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer (Montana)
SIP	State Implementation Plan
TBC	To Be Considered
TU	Turbidity Unit

1.0 INTRODUCTION

1.1 OBJECTIVES

The purpose of this document is to identify and describe potential applicable or relevant and appropriate requirements (ARARs) for the Old Works/East Anaconda Development Area activities. These activities will occur in the Old Works/East Anaconda Development Area Operable Unit (OW/EADA) of the Anaconda Smelter National Priorities List (NPL) site. This document is intended for use by the Potentially Responsible Party (PRP) and the U.S. Environmental Protection Agency (EPA), in consultation with the Montana Department of Health and Environmental Sciences (MDHES).

This description and identification of potential ARARs focuses on contaminated soil material (i.e., soils, tailings, and other smelting related wastes), groundwater, surface water and air pathways in the OW/EADA Operable Unit, and the effect this contamination has or may have on human health and the environment. These ARARs address the areas and materials described herein, the implementation of potential remedial actions, the identification of source areas, and the final disposition of contaminated soil media.

1.2 SCOPE OF THIS DOCUMENT

This document identifies and discusses Federal and State of Montana (State) ARARs. These ARARs are discussed in a narrative text, which is divided into chemical-specific, action-specific, and location-specific ARARs. Tables are included at the end of both the Federal and State ARARs sections which identify those Federal and State ARARs that are either applicable or relevant and appropriate for the OW/EADA remedial action. Any further determinations based upon the ARAR waiver provision of Section 121(d)(4) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9621(d)(4), will be made prior to the development of the Record of Decision (ROD).

1.3 SITE LOCATION AND HISTORY

The Anaconda Smelter NPL Site (Figure 1-1) is located in southwestern Montana, at the southern end of the Deer Lodge valley, approximately 25 miles northwest of Butte, Montana, adjacent to and east of Anaconda, Montana. The ore processing facilities at the site were developed to remove copper from ore mined in Butte from 1884 until the Anaconda Minerals Company closed the smelter in September 1980.

The smelting processes produced wastes that have elevated concentrations of metals and metalloids such as arsenic, copper, cadmium, lead, and zinc. These contaminants pose potential risks to human health and the environment. The Anaconda Minerals Company

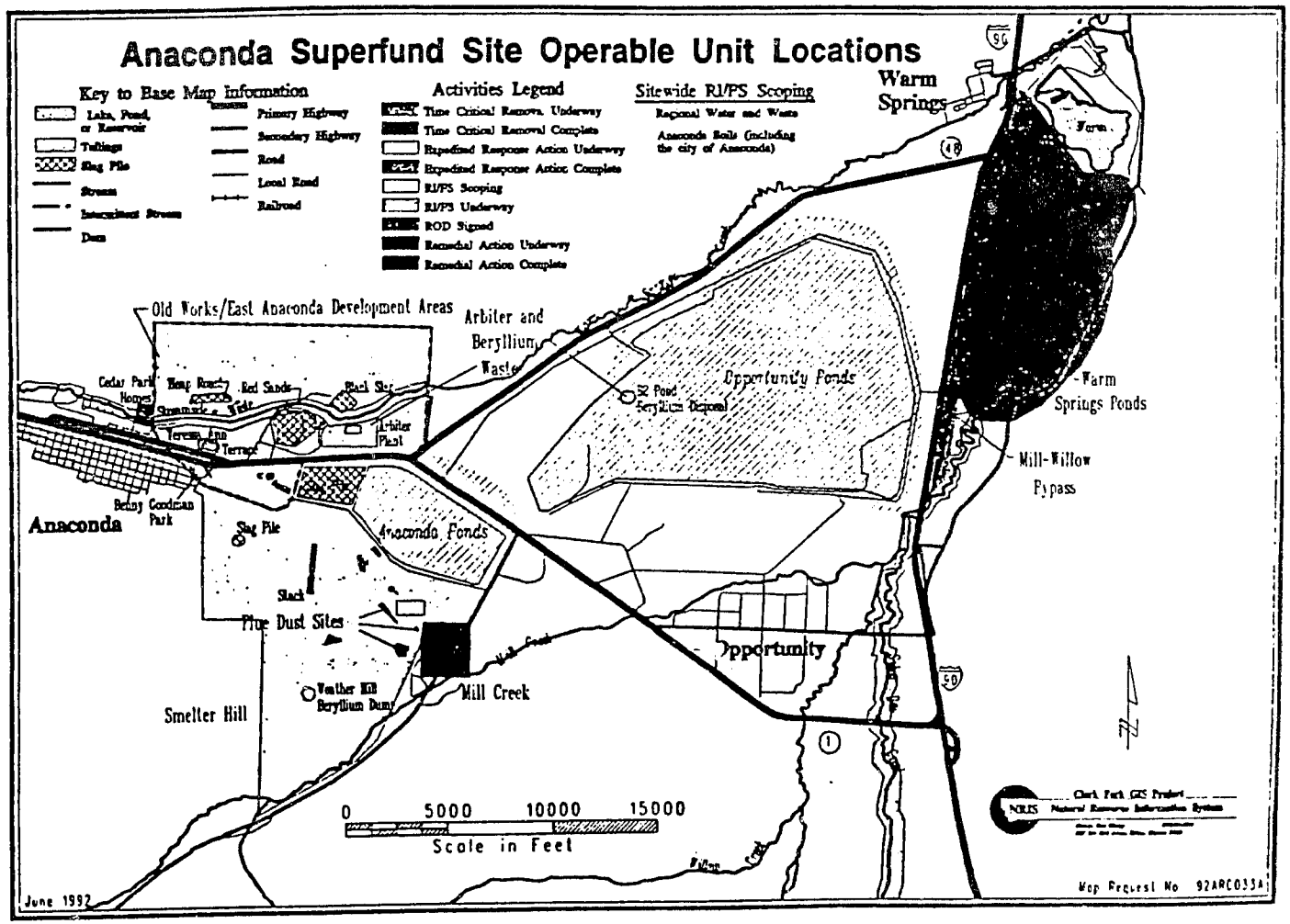
Anaconda Superfund Site Operable Unit Locations
Key to Base Map Information
Lake, Pond, or Reservoir
Tailings
Slag Pile
Stream
Intermittent Stream
Dam
Primary Highway
Secondary Highway
Road
Local Road
Railroad
Activities Legend
Time Critical Remova. Underway
Time Critical Removal Complete
Expedited Response Action Underway
Expedited Response Actioc Complete
RI/FS Scoping
RI/FS Underway
ROD Signed
Remedial Action Underway
Remedial Action Complete
Sitewide RI/FS Scoping
Regional Water and Waste
Anaconda Soils (including the city of Anaconda)
Warm Springs
Farm
Old Works/East Anaconda Development Areas
Arbiter and Beryllium Waste
Opportunity Ponds
Warm Springs Ponds
Mill-Willow Bypass
Cedar Park Homes
Hemp Ranch
Red Sands
Black Sky
Streamside Tailings
Arbiter Plant
Anaconda
Slag File
Anaconda Ponds
Slack
Five Dust Sites
Opportunity
Mill Creek
Smelter Hill
0 5000 10000 15000
Scale in Feet
June 1992
Map Request No 92ARC033A

Figure 1-1

estimated that the wastes include about 185 million cubic yards of concentrated tailings, about 27 million cubic yards of furnace slags, about 316,000 cubic yards of flue dust and tens of square miles of contaminated soils. Due to the size of the processing facilities, the 100 year period of operation, the volume of wastes produced, and the dispersion of wastes via mechanical operations, slurry ditches and aerial deposition, the Anaconda Smelter site is composed of diverse wastes spread over an extensive area.

The history of pollution problems associated with heavy metal releases at the Anaconda Smelter site led to the listing of the site on the NPL in September 1983. In October 1984, the Atlantic Richfield Company (ARCO) entered into an administrative order on consent (AOC) to conduct thirteen remedial investigations for the Anaconda Smelter site. The draft Stage 1 remedial investigation reports generally indicated wide scale contamination and a need for more in-depth study.

In July 1986, EPA entered into an AOC with ARCO to conduct an expedited remedial investigation/feasibility study (RI/FS) for Mill Creek. The ROD for Mill Creek was completed in October 1987. In October 1988, EPA entered into an AOC with ARCO to conduct additional remedial and removal activities on the Anaconda Smelter site. A general work plan was developed to address site wide issues such as protected resources, air sampling, and institutional controls and to provide criteria for identifying additional operable units for the Remedial Investigation/Feasibility Study (RI/FS) process.

Currently, EPA is active in the following operable units:

- Anaconda Soils
- Regional Water and Waste
- Old Works/East Anaconda Development Area
- Arbiter/Beryllium
- Flue Dust
- Smelter Hill
- Community Soils Removal

The Anaconda Smelter NPL Site Conceptual Management Plan (May 1992) describes the current status of the operable units and the coordination of operable unit activities with site-wide and regional activities. Each operable unit will be addressed in separate but interrelated RI/FSs.

EPA and ARCO are working to complete RI/FSs for the OW/EADA and Smelter Hill operable units and to conduct screening studies for the Anaconda Soils and Regional Water and Waste operable units. Remedial activities are being conducted for the Flue Dust operable unit and removal activities are underway at the Old Works, Community Soils, and Arbiter/Beryllium operable units.

These ARARs apply to the Old Works/East Anaconda Development Area Operable Unit (Figure 1-2). This area includes the historic Red Sands and Old Works areas around the Teresa Ann Terrace and Cedar Park Homes Subdivisions (but excludes the subdivisions themselves), the county drag strip, the sewage treatment ponds, the East Anaconda Yard, the Arbiter Plant site, the Anaconda Local Development Corporation (ALDC) industrial park, the flood corridor of Warm Springs Creek through the Old Works and Arbiter Plant areas, and Benny Goodman Park. The OW/EADA operable unit also extends north to the top of Stuckey Ridge.

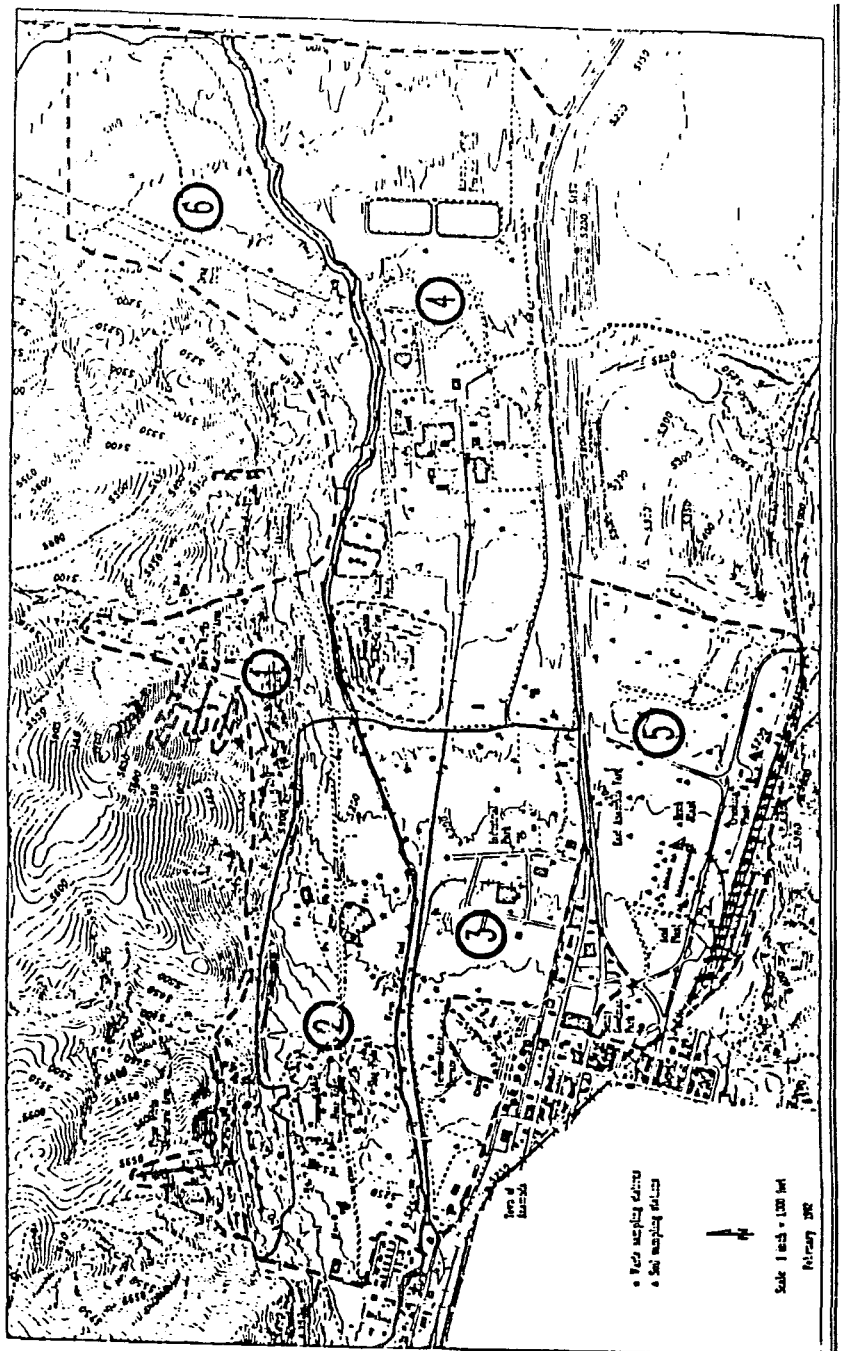

Figure 1-2

2.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

2.1 ARARS FOR REMEDIAL ACTIONS

Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d)(2), requires EPA to ensure that cleanup actions conducted under CERCLA meet "any standard, requirement, criteria or limitation under any Federal environmental law ... or any (more stringent) promulgated standard, requirement, criteria or limitation under a State environmental or facility siting law ... (which) is legally applicable to the hazardous substance concerned or is relevant and appropriate under the circumstances of the release of such hazardous substance, pollutant, or contaminant ... ." EPA calls standards, requirements, criteria or limitations identified pursuant to this section, ARARs, or applicable or relevant and appropriate requirements.

Remedial actions implemented pursuant to CERCLA must attain all ARARs identified at the time of the ROD[1]. A remedial action need not address all environmental problems at a particular location if it is an intermediate action, but only the ARARs for the specific environmental problems addressed by the action. Final cleanup or remedial decisions must comply with all ARARs, unless specific ARAR waivers are invoked.

2.2 DEFINITIONS

ARARs are either "applicable" or "relevant and appropriate." Both types of requirements are mandatory under CERCLA guidance.[2]

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.[3]

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those

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[1] 40 C.F.R. § 300.430(f)(1)(i)(A) and (f)(1)(ii)(B).

[2] CERCLA § 121(d)(2)(A), 42 U.S.C. § 6921(d)(2)(a). See also, 40 C.F.R. § 300.430(f)(1)(i)(A).

[3] 40 C.F.R. § 300.5.

encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.[4]

The determination that a requirement is relevant and appropriate is a two-step process: (1) the determination if a requirement is relevant and (2) the determination if a requirement is appropriate. In general, this involves a comparison of a number of site-specific factors, including an examination of the purpose of the requirement and the purpose of the proposed CERCLA action; the medium and substances regulated by the requirement and the proposed requirement; the actions or activities regulated by the requirement and the remedial action; and the potential use of resources addressed in the requirement and the remedial action. When the analysis results in a determination that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable.[5]

ARARs are divided into chemical-specific, action-specific and location-specific requirements. Chemical-specific requirements govern the release to the environment of materials possessing certain chemical or physical characteristics or containing specific chemical compounds. Chemical-specific ARARs generally set human or environmental risk-based criteria and protocol which, when applied to site-specific conditions, result in the establishment of numerical action values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

Action-specific ARARs are usually technology- or activity-based requirements, or are limitations on actions taken with respect to hazardous substances. A particular remedial activity will trigger an action-specific ARAR. Unlike chemical-specific and location-specific ARARs, action-specific ARARs do not, in themselves, determine the remedial alternative. Rather, action-specific ARARs indicate how the selected remedy must be achieved.

Location-specific ARARs relate to the geographic or physical position of the site, rather than to the nature of site contaminants. These ARARs place restrictions on the concentration of hazardous substances or the conduct of cleanup activities due to their location in the environment.

Only substantive portions of these requirements are ARARs. Administrative requirements are not ARARs, and need not be attained during or after site cleanups. Administrative requirements are those which involve consultation, issuance of permits, documentation, reporting, recordkeeping, and enforcement. The CERCLA program has its own set of

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[4] 40 C.F.R. §300.5.

[5] CERCLA Compliance with Other Laws Manual, Vol. I, OSWER Directive 9234.1-01, August 8, 1988, p. 1-11.

administrative procedures which assure proper implementation of CERCLA. The application of additional or conflicting administrative requirements could result in delay or confusion.[6] Provisions of statutes or regulations which contain general goals that merely express legislative intent about desired outcomes or conditions but are non-binding are not ARARs.[7]

ARARs must be attained both during the conduct of on-site cleanup activities and at the conclusion of the cleanup activity, unless specifically exempted.[8]

In addition to applicable or relevant and appropriate requirements, there are advisories, criteria, and guidance documents which are To Be Considered (TBC). This means that they can be identified by the lead and support agencies and considered, as appropriate, in selecting and developing cleanup actions. Often these documents are tied to the consideration of whether a particular cleanup action is protective of human health and the environment.[9] Federal TBCs are discussed in Section 3.4.

2.3 ARARS APPLICABLE TO OW/EADA REMEDIAL ACTION

This document constitutes EPA's final draft ARARs for the OW/EADA remedial action. The PRP shall use this document in analyzing various remedial alternatives. Federal ARARs are discussed herein and are summarized in Table 3. Table 4 lists Federal policies, criteria, advisories, or guidance to be considered in setting cleanup levels or other requirements, standards, or limitations to be met for the OW/EADA remedial action. Table 4 also lists other requirements To Be Considered (TBCs) which may be used by EPA to determine the appropriate remedial action, or to prepare or evaluate work plans and other documents during the OW/EADA remedial action. State ARARs are also discussed herein and summarized in Table 5. Final ARARs/Performance Standards will be developed for the ROD.

This ARARs analysis is based on Section 121(d) of CERCLA, 42 U.S.C. § 9621(d); the memorandum *Consideration of RCRA Requirements in Performing CERCLA Responses at Mining Waste Sites*, Henry L. Longest III, Director, Office of Emergency and Remedial Response, EPA (August 19, 1986); *CERCLA Compliance with Other Laws Manual, Volume I*, OSWER Dir. 9234.1-01 (August 8, 1988); *CERCLA Compliance with Other Laws Manual, Volume II*, OSWER Dir. 9234.1-02 (August, 1989); the Preamble to the Proposed National

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6 CERCLA § 121(e), 42 U.S.C. § 9621(e); Preamble to the Final NCP, 55 Fed. Reg. 8756-8757 (March 8, 1990); Compliance with Other Laws Manual, Vol. I, pp. 1-11 through 1-12.

7 Preamble to Final NCP, 55 Fed. Reg. 8746 (March 8, 1990).

8 Preamble to the Proposed NCP, 53 Fed. Reg. 51440 (December 21, 1988); Preamble to the Final NCP, 55 Fed. Reg. 8755-8757 (March 8, 1990).

9 40 C.F.R. § 300.400(g)(3); 40 C.F.R. § 300.415(i); Preamble to the Final NCP, 55 Fed. Reg. 8744-8746 (March 8, 1990).

Contingency Plan, 53 Fed. Reg. 51394, *et. seq.* (December 21, 1988); the Preamble to the Final National Contingency Plan, 55 Fed. Reg. 8666-8813 (March 8, 1990); and the Final National Contingency Plan, 40 C.F.R. Part 300 (55 Fed. Reg. 8813-8865, March 8, 1990) (hereinafter referred to as the final NCP); *Compendium CERCLA of ARARs Fact Sheets and Directives*, EPA Publication 9347.3-15 and DOE Publication OEG (CERCLA) 005/1091 (October 1991). All references to 40 C.F.R. Part 300 contained in this document refer to the final NCP, unless noted.

2.4 SCOPE OF ARARS ANALYSIS FOR OW/EADA REMEDIAL ACTION

The OW/EADA remedial action will address contaminated soil material (i.e., soils, tailings, slag, and other smelting-related wastes), groundwater, surface water, and air pathways at the site. Final remediation of air, groundwater, and surface water within the OW/EADA Operable Unit is not within the scope of the anticipated response action. Though this document does not provide ARARs for final cleanup of air and water media, it does specify ARARs which prohibit degradation of existing air and water quality. Further, this document specifies that remedial actions under the OW/EADA shall be consistent with the final response action. This consistency will be achieved through minimization of releases from surface sources to air and water media. See: *Remedial Action Objectives, Treatment Technology Scoping and Development of Alternatives Report, Anaconda Smelter NPL Site, Old Works/East Anaconda Development Area Operable Unit*, January 1993. Toward this end, contaminant specific air and water quality ARARs are identified in this document for the limited purpose of aiding in the identification of sources of contamination to air, groundwater, and surface water.

Potential cleanup actions address a wide variety of on-site activities, from the creation of disposal units to capping. Therefore, all applicable or relevant and appropriate Federal and State standards for chemical-, action-, and location-specific ARARs are presented herein.

3.0 FEDERAL ARARS

Potential Federal applicable or relevant and appropriate requirements for the OW/EADA remedial action are discussed below and are summarized in Table 3. Though final remediation of air and water media is not within the scope of the OW/EADA Operable Unit response action, this document does specify ARARs which prohibit degradation of existing air and water quality. Further, this document requires that remedial actions taken shall be consistent with the Regional Water and Waste Operable Unit, which will be the final response action. Consistency will be achieved through minimization of releases from surface sources to air and water media. Toward this end, federal contaminant specific air and water quality ARARs are identified below for the limited purpose of aiding in the identification of sources of contamination to air, groundwater, and surface water.

3.1 FEDERAL CHEMICAL-SPECIFIC ARARS

3.1.1 Safe Drinking Water Act (Relevant and Appropriate)

CERCLA Section 121(d)(2)(A)(i) requires on-site CERCLA remedies to attain standards or levels of contact created under the Safe Drinking Water Act (SDWA).

The National Primary and Secondary Drinking Water Regulations established under the SDWA (40 C.F.R. Parts 141 and 143) establish maximum contaminant levels (MCLs) for chemicals in drinking water distributed in public water systems. Safe Drinking Water Act MCLs are not applicable to OW/EADA remedial action because the aquifer at the OW/EADA Operable Unit is not a public water supply. Currently there is no known public use of groundwater underlying, or coming into contact with contaminants from the OW/EADA Operable Unit. These standards may be applicable in the future should EPA detect an exceedance at a public water outlet.

These drinking water standards are, however, relevant and appropriate because groundwater in the area is a potential source of drinking water, and because the aquifer feeds Warm Springs Creek, which is designated as a potential drinking water source.

The determination that the drinking water standards are relevant and appropriate for portions of the OW/EADA remedial action is fully supported by the regulations and guidance. The Preamble to the NCP clearly states the MCLs are relevant and appropriate for groundwater that is a current or potential source of drinking water (55 Fed. Reg. 8750 (March 8, 1990)), and is further supported by requirements of the NCP, 40 C.F.R. § 300.430(e)(2)(i)(B). MCLs developed under the SDWA generally are ARARs for current or potential drinking water sources. See, *EPA Guidance On Remedial Action For Contaminated Groundwater at Superfund Sites*, OSWER Dir. #9283.1-2, December 1988.

The MCL standards are:

Arsenic	.05 (mg/L)
Cadmium	.005[a] (mg/L)
Chromium	.1[b] (mg/L)
Lead	.015[c] (mg/L)

[a] F = final
[b] State MCL is .01 mg/L.
[c] 40 C.F.R. 141.62, State MCL is still .05 mg/L
[d] 40 C.F.R. 141.80; this is an "action level" rather than an MCL. Effective December 7, 1992 (See 57 Fed. Reg 28788, 9/29/92, correcting effective date in § 141.80). State MCL is still .05 mg/L.

3.1.2 Clean Water Act (Relevant and Appropriate)

The Federal Clean Water Act (33 U.S.C. §§ 1251-1376) as amended by the Water Quality Act of 1987 (Public Law 100-4 § 103) provides the authority for each state to adopt water quality standards (40 C.F.R. Part 131) designed to protect beneficial uses of each water body and requires each state to designate uses for each water body. EPA regulation requires states to establish antidegradation requirements. EPA has provided guidance to the states for this purpose, the latest version of which is *Quality Criteria for Water 1986* (i.e., the Gold Book). Pursuant to this authority and the criteria established by Montana water quality regulations (A.R.M. § 16.20.623), Montana has established the Water-Use Classification system which specifies discharge limitations for Warm Springs Creek. The B-1 Classification standards are presented in the section on State ARARs.

These B-1 classification standards reflect consideration and adoption of the federal water quality criteria numeric standards found in the Gold Book. At this time, EPA is relying on the State standards. EPA reserves the right to identify federal water quality criteria as ARARs for this action if appropriate.

40 C.F.R. Part 122 establishes the National Pollutant Discharge Elimination System (NPDES). Section 122.1(b)(1) requires permits for the discharge of "pollutants" from any "point source" into "waters of the United States." Section 122.26 provides that any "storm water discharge associated with industrial activity" be permitted. The permitting procedures themselves are not substantive and are not considered ARARs. However, substantive requirements such as those at 40 C.F.R. § 122.4, which outlines situations in which permits for discharges are prohibited, 40 C.F.R. § 122.41-.51, which sets forth permit conditions, and 40 C.F.R. § 125, which sets forth criteria for technology based permit requirements and criteria for Best Management Practices, may be applicable for any storm water discharge from any portion of the OW/EADA Operable Unit. Also, the substantive requirements of general permits for storm water discharges from construction are relevant and appropriate. See 57 Fed. Reg. 41236, September 9, 1992. More specific requirements will be identified at the time of the ROD. Montana has an EPA approved State program (MPDES) that is discussed in the State ARARs Section 4.3.1.4

3.1.3 Clean Air Act (Applicable)

Pursuant to Section 109 of the Clean Air Act (42 U.S.C. § 7409, 7410), EPA promulgated national ambient air quality standards (NAAQS) (see 40 C.F.R. Part 50). The attainment and maintenance of these primary and secondary standards are required to protect the public health and the public welfare. EPA has promulgated NAAQS for the following six pollutants (called "criteria pollutants"): particulate matter equal to or less than 10 microns particle size (PM-10), sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. Primary standards are set at levels to protect public health. Secondary standards are set at levels to protect public welfare.

According to Section 107 of the Clean Air Act, each State has the primary responsibility for assuring that NAAQS are attained and maintained. Section 110 requires each State to adopt and submit to EPA for approval a plan for the implementation, maintenance, and endorsement (State Implementation Plan (SIP)) of the NAAQS. Upon EPA approval, the SIP becomes Federally enforceable. The State of Montana Ambient Air Quality Standards in ARM § 16.8.801 et seq. are applicable to releases into the air from OW/EADA remedial activities.

Pursuant to Section 109 of the Clean Air Act (42 U.S.C. § 7409, 7410), and implementing regulations found at 40 C.F.R. Part 50, the following standards are identified as relevant and appropriate standards for releases into the air resulting from the OW/EADA remedial activities.

Particulate matter (PM_{10})

150 $\mu g/m^3$, 24 hour average; 50 $\mu g/m^3$, annual arithmetic mean for particulate matter of less than or equal to 10 micrometers in diameter (40 C.F.R. § 50.6, corresponding State regulation found at ARM § 16.8.821). These standards are applicable.

Lead

1.5 $\mu g/m^3$, maximum arithmetic mean over a calendar quarter (40 C.F.R. § 50.12, corresponding State regulation found at ARM § 16.8.815). These standards are applicable.

TABLE 1
FEDERAL AND STATE OF MONTANA WATER QUALITY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION

Requirement	Citation
FEDERAL	
SAFE DRINKING WATER ACT	40 U.S.C. § 300, *et seq.*
National Primary Drinking Water Standards	40 U.S.C. Part 141
CLEAN WATER ACT	33 U.S.C. §§ 1251-1376
Water Quality Standards	40 C.F.R. Part 131
Storm Water Discharge	40. C.F.R. Part 122
Dredge and Fill Requirements	40 C.F.R. Part 230
STATE	
WATER QUALITY STATUTES	
Nondegradation Statute	MCA § 75-5-303
Anti-Pollution Statute	MCA § 75-5-605
SURFACE WATER QUALITY STANDARDS	
Surface Water Classification	ARM § 16.20.604(1) ARM § 16.20.618
Turbidity Levels	ARM § 16.20.205
Water Impoundments	ARM § 16.20.632
Nonpollution Requirements	ARM § 16.20.633
Nondegradation Requirements	ARM § 16.20.702 ARM § 16.20.703
GROUNDWATER QUALITY STANDARDS	
Well Standards	MCA § 85-2-505
Groundwater Standards	ARM § 16.20.1002 ARM § 16.20.1003
Nondegradation Standards	ARM § 16.20.1011

TABLE 2
FEDERAL AND STATE OF MONTANA AIR QUALITY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION

Requirement	Citation
FEDERAL	
CLEAN AIR ACT	42 U.S.C. § 7409, *et seq.*
Ambient Air Quality Standards	40 C.F.R. Part 50
Particulate Matter (PM-10) Concentrations	40 C.F.R. § 50.6
Lead Concentrations	40 C.F.R. § 50.12
STATE	
CLEAN AIR ACT OF MONTANA	MCA § 75-2-101, *et seq.*
Ambient Air Quality Standards	ARM § 16.8.801, *et seq.*
Ambient Air Monitoring	ARM § 16.8.807
Lead Concentrations	ARM § 16.8.815
Settled Particulate Matter	ARM § 16.8.818
Particulate Matter (PM-10)	ARM § 16.8.821
AIR EMISSIONS STANDARDS	
Particulate Matter, Airborne	ARM § 16.8.1401
Odors	ARM § 16.8.1427
Fugitive Dust	ARM § 26.4.761

3.2 FEDERAL ACTION-SPECIFIC ARARS

3.2.1 Surface Mining Control and Reclamation (Relevant and Appropriate)

This Act (30 U.S.C. §§ 1201-1326) and implementing regulations found at 30 C.F.R. Parts 816 and 784 establish provisions designed to protect the environment from the effects of surface coal mining operations, and to a lesser extent non-coal mining. The regulations require that revegetation be used to stabilize soil covers over reclaimed areas. These requirements are relevant and appropriate to the covering of discrete areas of contamination. They also require that revegetation be done according to a plan which specifies schedules, species which are diverse and effective, planting methods, mulching techniques, irrigation if appropriate, and appropriate soil testing. Reclamation performance standards are currently relevant and appropriate to mining waste sites.

3.2.2 Clean Air Act (Applicable)

Section 110 of the Clean Air Act (42 U.S.C. § 7409, 7410) specifies requirements which are applicable for releases into the air resulting from OW/EADA remedial activities. These standards must be met during the design, implementation, and at the conclusion of OW/EADA remedial activities. See Federal Ambient Air Quality Standards listed in section 3.1.3, chemical-specific ARARs in Table 2.

3.2.3 Clean Water Act (Relevant and Appropriate)

The Clean Water Act, Section 402, 404, 33 U.S.C. § 1342, et seq., authorizes EPA to issue permits for the "discharge" of "pollutants" from any "point source." This includes storm water discharges associated with "industrial activity." See, 40 C.F.R. § 122.1(b)(2)(iv). Facilities subject to these regulations include those listed at 40 C.F.R. § 122.26(b)(14). The OW/EADA and activities to be performed there are subject to these requirements.

40 C.F.R. Part 122 establishes the NPDES. Section 122.1 requires permits for the discharge of "pollutants" from any "point source" into "water of the United States." Section 122.26 provides that "storm water discharges associated with industrial activity" be permitted. The permitting procedures themselves are not substantive and are not considered ARARs. However, substantive requirements such as those at 40 C.F.R. § 122.4, which outlines situations in which permits for discharges are prohibited, 40 C.F.R. § 122.41-.51, which sets forth permit conditions, and 40 C.F.R. § 125, which sets forth criteria for technology based permit requirements and criteria for Best Management Practices, may be applicable or relevant and appropriate for storm water discharges from any portion of the OW/EADA Operable Unit. Also, the substantive requirements of general permits for storm water discharges from construction are relevant and appropriate. See 57 Fed. Reg. 41236, September 9, 1992. More specific requirements will be identified at the time of the ROD. Montana has an EPA approved State program (MPDES) that is discussed in the State ARARs Section 4.3.1.4

3.2.3.1 Clean Water Act - Dredged or Fill Material (Applicable)

40 C.F.R. Part 230 (Guidelines for Specification of Disposal Sites for Dredged or Fill Material) provides guidelines for the discharge of fill material into aquatic ecosystems and is therefore considered applicable. Specific requirements will be identified at a later date.

3.2.4 Resource, Conservation, and Recovery Act, Subtitle D (Relevant and Appropriate)

The criteria contained in 40 C.F.R. Part 257 (Subtitle D) are used in accordance with RCRA guidance in determining which practices pose a reasonable probability of having an adverse effect on human health or the environment. RCRA Subtitle D establishes criteria which are, for the most part, environmental performance standards that are used by states to identify unacceptable solid waste disposal practices or facilities.

40 C.F.R. Part 257.3-1(a) states that facilities or practices in the floodplain shall not result in the washout of solid waste so as to pose a hazard to human life, wildlife, or land or water resources.

40 C.F.R. Part 257.3-2 provides for the protection of threatened or endangered species.

40 C.F.R. Part 257.3-3 provides that a facility shall not cause the discharge of pollutants into waters of the United States; this includes dredged or fill materials.

40 C.F.R. Part 257.3-4 states that a facility or practice shall not contaminate underground drinking water beyond the solid waste boundary.

3.3 FEDERAL LOCATION-SPECIFIC ARARS

Federal ARARS identified for OW/EADA remedial action are discussed below.

3.3.1 National Historic Preservation Act (NHPA) (Applicable)

This statute and implementing regulations (16 U.S.C. § 470, 40 C.F.R. § 6.301(b), and 36 C.F.R. Part 800), require Federal agencies or Federal projects to take into account the effect of any federally assisted undertaking or licensing, or any district, site, building, structure or object that is included in, or is eligible for, the Register of Historic Places. Compliance with the substantive portions of this ARAR requires EPA to consult with the State Historic Preservation Officer (SHPO) and the Anaconda/Deer Lodge Historic Preservation Officer (A/DLHPO) to identify any cultural resources which are on or near the OW/EADA Operable Unit. If any cultural resources exist, the SHPO and A/DLHPO assess whether the proposed cleanup actions will have possible effects on the resources. If the activity is likely to have an effect, EPA should examine whether feasible alternatives to the proposed actions would avoid

such effects. If effects cannot reasonably be avoided, measures should be implemented to minimize or mitigate the potential effect.

NHPA regulations reserve formal determination of eligibility for the National Register of Historic Places and "no adverse effects" determinations for Federal agencies. EPA is using the Upper Clark Fork River Basin Regional Historic Preservation Plan and supplementing this with site-specific historical inventory and adverse effects determinations. EPA will continue to consult with the SHPO and A/DLHPO to identify specific mitigative measures, if necessary.

3.3.2 Archaeological and Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 469, 40 C.F.R. § 6.301(c)) establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a Federal construction project or a federally licensed activity or program. This requires EPA or the PRP to survey the site for covered scientific, prehistorical or archaeological artifacts. The results of this survey will be reflected in the Administrative Record. Preservation of appropriate data concerning the artifacts is hereby identified as an ARAR requirement, to be completed during the implementation of the remedial action.

3.3.3 Historic Sites, Buildings and Antiquities Act (Applicable)

This Act (16 U.S.C. §§ 461 et seq.; 40 C.F.R. § 6.301(a)) states that "[i]n conducting an environmental review of a proposed EPA action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 C.F.R. § 62.6(d) to avoid undesirable impacts upon such landmarks." "National natural landmarks" are defined under 36 C.F.R. § 62.2 as:

> [A]rea(s) of national significance located within [the U.S.] that contain(s) an outstanding representative example(s) of the nation's natural heritage, including terrestrial communities, aquatic communities, landforms, geological features, habitats of natural plant and animal species, or fossil evidence of development of life on earth.

Under the Historic Sites Act of 1935, the Secretary of the Interior is authorized to designate areas as National Natural Landmarks for listing on the National Registry of Natural Landmarks. To date no such landmarks are identified in the area.

3.3.4 Fish and Wildlife Coordination Act (Applicable)

This standard (16 U.S.C. §§ 1531-1566, 40 C.F.R. § 6.302(g)) requires that Federal agencies or federally funded projects ensure that any modification of any stream or other water body affected by any action authorized or funded by the Federal agency provides for

adequate protection of fish and wildlife resources. Compliance with this ARAR requires EPA to consult with the U.S. Fish and Wildlife Service and the Wildlife Resources Agency of the affected State. Further consultation will occur during the public comment period on the RI/FS report, and specific mitigative measures may be identified, in consultation with the appropriate agencies. Specific mitigative measures may be specified in the ROD.

3.3.5 Floodplain Management (Applicable)

This requirement (40 C.F.R. Part 6, Appendix A, Executive Order No. 11988) mandates that federally funded or authorized actions within the 100 year floodplain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain.

Compliance with this requirement is detailed in EPA's August 6, 1985 *Policy of Floodplains and Wetland Assessments for CERCLA Actions*. A recommendation of activities which may minimize any anticipated adverse impacts will occur during the public comment period on the RI/FS report, and specific measures will be identified in the ROD.

If the remedial action is found to potentially affect the floodplain, the ROD will contain a Statement of Findings which will set forth the reasons why the proposed action must be located in or affect the floodplain; a description of significant facts considered in making the decisions to locate in or affect the floodplain or wetlands including alternative sites or actions; a statement indicating whether the selected action conforms to applicable state of local floodplain protection standards; a description of the steps to be taken to design or modify the proposed action to minimize potential harm to or within the floodplain; and a statement indicating how the proposed action affects the natural or beneficial values of the floodplain.

3.3.6 Protection of Wetlands (Applicable)

This ARAR (40 C.F.R. Part 6, Appendix A, Executive Order No. 11990) requires Federal agencies and the PRP to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. Wetlands are defined as those areas that are inundated or saturated by groundwater or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. EPA shall consult with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service to determine the extent of wetlands within the Warms Springs Creek floodplain.

3.3.7 Endangered Species Act (Applicable)

This statute and implementing regulations (16 U.S.C. §§ 1531-1543, 50 C.F.R. 402, and 40 C.F.R. § 6.302(h)) require that any Federal activity or authorized activity may not jeopardize

the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.

Compliance with this requirement involves consultation between EPA and the U.S. Fish and Wildlife Service, resulting in a determination as to whether there are listed or proposed species or critical habitats present, and, if so, whether any proposed activities will impact such wildlife or habitat.

3.4 TO BE CONSIDERED (TBC)

TBCs are advisories, criteria, and guidance documents which are identified by the lead and support agencies and considered, as appropriate, in selecting and developing cleanup actions. Often these documents are tied to the consideration of whether a particular cleanup action is protective of human health and the environment. See Table 4 for a list of TBCs.

TABLE 3
FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION

Section	Standard Requirements, Criteria or Limitation	Citation	Description	Applicable/ Relevant and Appropriate
	CHEMICAL-SPECIFIC			
3.1.1	SAFE DRINKING WATER ACT	40 U.S.C. § 300(g)		
	National Primary Drinking Water Standards	40 C.F.R. Part 141	Establishes health-based standards for public water systems (maximum contaminant levels).	-/Yes
3.1.2	CLEAN WATER ACT	33 U.S.C. §§ 1251-1376		
	Water Quality Standards	40 C.F.R. Part 131, Water Quality Criteria 1980, 1986	Sets standards for water quality based on toxicity to aquatic life.	-/Yes
	NPDES Permit Application Regulations for Stormwater Discharges	40 C.F.R. Part 122	Regulates stormwater discharges through required permits.	Yes/Yes
3.1.3	CLEAN AIR ACT	42 U.S.C. § 7409, 7410		
	National Primary and Secondary Ambient Quality Standards	40 C.F.R. Part 50	Standards for particulate and lead emissions to air.	Yes/-
	ACTION-SPECIFIC			
3.2.1	SURFACE MINING AND RECLAMATION ACT	30 U.S.C. §§ 1201-1326		
	Revegetation of All Areas Where Contamination is Removed or Left in Place	30 C.F.R. §§ 816, 784	Requires that revegetation be used to stabilize soil covers over reclaimed areas.	-/Yes
	Permanent Program Performance Standards	30 C.F.R. Part 816	Establishes provisions designed to protect the environment from the effects of surface coal mining operations and, to a lesser extent non-coal mining.	-/Yes
3.2.2	CLEAN AIR ACT	42 U.S.C. § 7409, 7410	Establishes standards for release into the air.	
3.2.3	CLEAN WATER ACT	33 U.S.C. §§ 1342, et seq.		Yes/-
	NPDES Permit Application Regulations for Stormwater Discharges	40 C.F.R. Part 122	Regulates stormwater discharges through required permits.	-/Yes
	Dredge and Fill Requirements	40 C.F.R. Part 230	Regulates disposal and handling of fill and dredge materials.	Yes/-
3.2.4	RESOURCE, CONSERVATION, AND RECOVERY ACT (RCRA)	42 U.S.C. § 6901, et seq.		
	Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 C.F.R. Part 257 Subtitle D	Establishes standards for determining if solid waste disposal facilities pose a reasonable risk of adverse effects on health and environment.	-/Yes

TABLE 3

FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE OW/EADA REMEDIAL ACTION

Section	Standard Requirements, Criteria or Limitation	Citation	Description	Applicable/ Relevant and Appropriate
	LOCATION-SPECIFIC			
3.3.1	NATIONAL HISTORIC PRESERVATION ACT	16 U.S.C. § 470 40 C.F.R. § 6.301(b) 36 C.F.R. Part 800	Requires federal agencies to take into account the effect of any federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.	Yes/-
3.3.2	ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT	16 U.S.C. § 469 40 C.F.R. § 6301(c)	Establishes procedures to provide for preservation of historical and archaeological data which might be destroyed through alteration of terrain as a result of a federal construction project for a federally licensed activity or program.	Yes/-
3.3.3	HISTORIC SITE, BUILDINGS AND ANTIQUITIES ACT	16 U.S.C. § 461, et seq. 40 C.F.R. § 6.301(a)	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural landmarks to avoid undesirable impacts on such landmarks.	Yes/-
3.3.4	FISH AND WILDLIFE COORDINATION ACT	16. U.S.C. §§ 1531-1566 40 C.F.R. § 6.302(g)	Requires consultation when federal department or agency proposes or authorizes any modification of any stream or other water body and adequate provision for protection of fish and wildlife resources.	Yes/-
3.3.5	FLOOD PLAIN MANAGEMENT	40 C.F.R. part 6, Appendix A, Executive Order No. 11, 988	Requires federal agencies to evaluate the potential effects of actions they may take in a flood plain, to avoid the adverse impacts associated with direct and indirect development of a flood plain. Regulates activities within the flood plain.	Yes/-
3.3.6	PROTECTION OF WETLANDS	40 C.F.R., Part 6, Appendix A, Executive Order No. 11,990	Requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the value of wetlands, and to prescribe procedures to implement these policies and procedures of the Executive Order.	Yes/-
3.3.7	ENDANGERED SPECIES ACT	16 U.S.C. §§ 1531-1543 50 C.F.R. Part 200 50 C.F.R. Part 402	Requires action to conserve endangered species within critical habitat upon which species depend. Includes consultation with Department of Interior.	Yes/-

TABLE 4
LIST OF FEDERAL POLICIES, CRITERIA, ADVISORIES OR GUIDANCE TO BE CONSIDERED IN SETTING REMEDIATION LEVELS OR OTHER REQUIREMENTS, STANDARDS OR LIMITATIONS TO BE MET FOR THE OW/EADA REMEDIAL ACTION

- Agency of Toxic Substances and Disease Registry (ATSDR). 1988. Draft, Toxicological Profile for Lead. U.S. Public Health Service, Atlanta, GA.
- EPA, 1986. Guidelines for the Health Risk Assessment of Chemical Mixtures. Federal Register 51(185):34014-34025.
- EPA, 1986. Superfund Public Health Evaluation Manual. EPA 540/1-86/060, Office of Emergency and Remedial Response, Washington, D.C.
- EPA, 1987. Final, Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Washington, D.C.
- EPA, 1988. Final, Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Washington, D.C.
- EPA, 1988. Final, Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Washington, D.C. (OSWER Dir. #9285.5-1)
- EPA, 1988. Integrated Risk Information System. Office of Research and Development, Cincinnati, OH.
- EPA, 1989. Second Quarter FY 89 Health Effects Assessment Summary Tables. Environmental Criteria and Assessment Office, OSWER 9200.6-303-(89-1). Cincinnati, OH.
- EPA, 1989. Regulating Lead: An Update. AWWAJ. 81(7):24.
- EPA, 1989. Evaluation of the Potential Carcinogenicity of Lead and Lead Compounds in Support of Reportable Quantity Adjustments Pursuant to CERCLA Section 102. EPA/600/8-89/045A, Office of Health and Environmental Assessment, Washington, D.C.
- EPA, September 1989. Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites. OSWER Dir. #9355.4-02.
- Recommended Agency Policy on the Carcinogenicity Risk Associated with the Ingestion of Inorganic Arsenic, June 21, 1988, Lee Thomas EPA Administrator.
- EPA, 1988. Special Report on Ingested Inorganic Arsenic-Skin Cancer; Nutritional Essentiality. EPA-625/3-89/0013, July 1988.
- EPA, 1989. Interim Final Guidance for Soil Ingestion Rates (OSWER Dir. #9850.4).
- EPA, 1990. Supplement to Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Dir. #9355.4-02A).
- EPA, 1990. Risk Assessment Guidance.

TABLE 4 (con't)
LIST OF FEDERAL POLICIES, CRITERIA, ADVISORIES OR GUIDANCE TO BE CONSIDERED IN SETTING REMEDIATION LEVELS OR OTHER REQUIREMENTS, STANDARDS OR LIMITATIONS TO BE MET FOR THE PRIORITY SOILS RI/FS

- EPA, 1990. Interim Final Environmental Evaluation Manual (OSWER Dir. #9285.7-01); otherwise known as the Risk Assessment Guidance for Superfund - Environmental Evaluation Manual.
- EPA, 1988. EPA's Proposed Drinking Water Standard for Maximum Concentration Limits for Copper and Lead, 53 Fed. Reg. 31516 (August 18, 1988).
- EPA, 1989. EPA's Proposed MCLG Levels for Cadmium, Mercury, and Selenium. 54 Fed. Reg. 22,062 (May 22, 1989.)
- EPA's RCRA Design Guidelines for Surface Impoundments.
- EPA's RCRA Permit Writer's Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
- EPA's RCRA Technical Resource Document for Closure of Hazardous Waste Surface Impoundments.
- EPA, 1981. EPA's NPDES Guidance Document on NPDES Best Management Practices (June 1981).
- EPA, 1990. Superfund Guide to RCRA Management Requirements of Mineral Processing Wastes (November 1990).
- EPA, 1988. EPA's Guidance on Remedial Action for Contaminated Groundwater at Superfund Sites. OSWER Dir. # 9283.1-2, December, 1988.
- EPA, 1989. EPA's Interim Final Guidance for Soil Ingestion Rates, OSWER Dir. # 9850.4, January, 1989.
- All Health Effects Assessments and Proposed Health Effects Assessments for contaminants of concern at the site.
- All Reference Doses for contaminants of concern at the site.
- All Carcinogenic Potency Factors for contaminants of concern at the site.
- Policy on Floodplains & Wetlands Assessments for CERCLA Actions, August 6, 1985.
- Superfund Guide to RCRA Management Requirements for Mineral Process Wastes. November 1990. 84473-12FS.

4.0 STATE OF MONTANA ARARS

4.1 OVERVIEW

Remedial actions undertaken pursuant to CERCLA must satisfy State and Federal ARARs. These ARARs, with few exceptions, serve as threshold criteria for site cleanup. CERCLA § 121 provides that for any hazardous substance, pollutant, or contaminant that will remain on site, remedial actions undertaken pursuant to CERCLA §§ 104, 106, 120, or 122 must satisfy any applicable or relevant and appropriate Federal requirement and any applicable or relevant and appropriate promulgated State standard, requirement, criterion, or limitation under State environmental or facility siting law that is more stringent than any Federal requirement if the State requirement is identified in a "timely" manner. Accordingly, this section is a list of State ARARs identified by the State of Montana.

4.2 MONTANA CHEMICAL-SPECIFIC ARARS

Though final remediation of air, groundwater, and surface water is not within the scope of the OW/EADA Operable Unit response action, this document does specify ARARs which prohibit degradation of existing air and water quality. Further, this document provides that remedial actions taken shall be consistent with the Regional Water and Waste Operable Unit, which will be the final response action. It is expected that consistency for the OW/EADA will be achieved through minimization of releases from surface sources to air and water media. Toward this end, state chemical specific air and water quality ARARs are identified below for the limited purpose of aiding in the identification of sources of contamination to air, groundwater, and surface water.

4.2.1 Water Quality

4.2.1.1 Water Quality Statutes (Applicable)

MCA § 75-5-303 of this Act establishes Montana's standard for nondegradation of water quality. It is applicable for all constituents for which Warm Springs Creek exceeds water quality standards, and is relevant and appropriate for all constituents for which Warm Springs Creek does not exceed water quality standards. This section will also be applicable if any remedial action constitutes a new source of pollution or an increased source of pollution to high-quality waters to require the degree of waste treatment necessary to maintain that existing high water quality.

MCA § 75-5-605 of Montana law makes it unlawful to cause pollution of any State waters, to place or cause to be placed any wastes in a location where they are likely to cause pollution of any State waters, to violate any permit provision, to violate any provision of the Montana water quality statutes, to construct, modify, or operate a system for disposing of waste (including sediment, solid waste and other substances that may pollute State waters)

which discharge into any State waters without a permit or discharge waste into any State waters.

4.2.1.2 Surface Water Quality Standards (Applicable)

ARM § 16.20.604(1) (Applicable) provides that Warm Springs Creek is classified as B-1.

ARM § 16.20.618 (Applicable) sets forth specific water quality standards. Waters classified B-1 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

ARM § 16.20.632 (Applicable) states that existing or new water impoundments must be operated in the best practicable manner to minimize harmful effects on State waters, and that new impoundments must be operated so that any temperature variations in receiving waters will maintain or enhance the existing propagating fishery and associated aquatic life. This section sets forth maximum and minimum temperature guidelines.

ARM § 16.20.633 (Applicable) requires that the State's surface waters be free from substances that will, *inter alia*, create concentrations or combination of materials that are toxic or harmful to human, animal, plant or aquatic life. Moreover, no waste may be discharged and no activities may be conducted such that the waste or activities, either alone or in combination with other waste or activities, will violate, or can reasonably be expected to violate, any of the standards. Leaching pads, tailings ponds, or water, waste, or product holding facilities must be located, constructed, operated and maintained to prevent any discharge, seepage, drainage, infiltration, or flow which may result in pollution of state waters, and a monitoring system may be required to ensure such compliance.

4.2.1.3 Nondegradation of Water Quality (Applicable)

ARM § 16.20.702 (Applicable) applies nondegradation requirements to any human activity which would cause a new or increased source of pollution to State waters. This section states when exceptions to nondegradation requirements apply, except that in no event may such degradation affect public health, recreation, safety, welfare, livestock, wild birds, fish and other wildlife or other beneficial uses, and strictly prohibits degradation in national resource waters.

ARM § 16.20.703 (Applicable) establishes substantive nondegradation standard (quality of receiving waters whose quality is higher than established water quality standards not to be degraded by the discharge of pollutants), although administrative (permit) requirements do not apply. Determination of degradation is to ensure that baseline quality of the receiving waters will not be degraded at any flow greater than the 7-day, 10 year low flow of the receiving waters.

4.2.1.4 Well Standards (Applicable)

MCA § 85-2-505 (Applicable) precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped and wells must be constructed and maintained so as to prevent waste, contamination, or pollution of groundwater.

4.2.1.5 Montana Ground Water Pollution Control System (Applicable)

ARM § 16.20.1002 (Applicable) classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater, and states that groundwater is to be classified to actual quality or actual use, whichever places the groundwater in a higher class.

ARM § 16.20.1003 (Applicable) establishes the groundwater quality standards applicable with respect to each groundwater classification. Concentrations of dissolved substances in certain classes of groundwater which is used for drinking water supplies may not exceed Montana MCL values for drinking water. Concentrations of other dissolved or suspended substances must not exceed levels that render the waters harmful, detrimental or injurious to public health. Maximum allowable concentration of these substances also must not exceed acute or chronic problem levels that would adversely affect existing or designated beneficial uses of groundwater of that classification.

Standards for groundwater quality are set forth below:

Arsenic	0.05 mg/L
Lead	0.05 mg/L
Cadmium	0.01 mg/L
Chromium	0.05 mg/L

ARM § 16.20.1011 (Applicable) provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless the board is satisfied that a change is justifiable for economic or social development and will not preclude present or anticipated use of such waters.

4.2.2 Air Quality

4.2.2.1 Clean Air Act of Montana (Applicable)

Montana Ambient Air Quality Regulations promulgated pursuant to the Clean Air Act of Montana (MCA § 75-2-102) are discussed below.

ARM § 16.8.807 (Applicable) Ambient Air Monitoring establishes standards for sampling, data collection, recording, and analysis to assure compliance with ambient air quality standards.

ARM § 16.8.815 (Applicable) specifies that no person shall cause or contribute to concentrations of lead in the ambient air which exceed the following: 90-day average--1.5 micrograms per cubic meter of air, 90-day average, not to be exceeded.

ARM § 16.8.818 (Applicable) specifies that no person shall cause or contribute to concentrations of particulate matter in the ambient air such that the mass of settled particulate matter exceeds the following 30-day average: 10 grams per square meter, 30-day average, not to be exceeded.

ARM § 16.8.821 (Applicable) specifies that no person may cause or contribute to concentrations of PM-10 in the ambient air which exceed the following standard:

- 24-hour average: 150 micrograms per cubic meter of air, 24-hour average, with no more than one expected exceedance per calendar year.
- Annual average: 50 micrograms per cubic meter of air, expected annual average, not to be exceeded.

4.2.2.2 Montana Air Quality Emissions Standards

ARM § 16.8.1401 (Applicable) establishes emission standards. Emissions shall not exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes.

ARM § 16.8.1427 (Applicable) establishes emission standards for vapors, gases and dust which create odors that constitute a public nuisance.

4.3 MONTANA ACTION-SPECIFIC ARARS

4.3.1 Water Quality

4.3.1.1 Water Quality Statutes (Applicable)

MCA § 75-5-303 (Applicable) see Section 4.2.1.1 on page 24 for discussion.

MCA § 75-5-605 (Applicable) see Section 4.2.1.1 on page 24 for discussion.

4.3.1.2 Surface Water Quality Regulations (Applicable)

ARM § 16.20.604(1) and 16.20.618 (Applicable) see Section 4.2.1.2 on page 25 for discussion.

ARM § 16.20.632 and 16.20.633 (Applicable) see Section 4.2.1.2 on page 25 for discussion.

4.3.1.3 Nondegradation of Water Quality (Applicable)

ARM § 16.20.702 (Applicable) see Section 4.2.1.2 on page 25 for discussion.

ARM § 16.20.703 (Applicable) see Section 4.2.1.2 on page 25 for discussion.

4.3.1.4 MPDES Permit Regulations (Relevant and Appropriate)

ARM § 16.20.925 (Relevant and Appropriate) adopts and incorporates language found in 40 C.F.R. Part 125 for criteria and standards for the imposition of technology-based treatment requirements in MPDES permits.

4.3.1.5 Well Standards (Applicable or Relevant and Appropriate)

MCA § 85-2-505 (Applicable) see Section 4.2.1.3 on page 26 for discussion.

4.3.1.6 Montana Ground Water Pollution Control System (Applicable)

ARM § 16.20.1002 (Applicable) see Section 4.2.1.3 on page 26 for discussion.

ARM § 16.20.1003 (Applicable) see Section 4.2.1.3 on page 26 for discussion.

ARM § 16.20.1011 (Applicable) see Section 4.2.1.3 on page 26 for discussion.

4.3.2 Air Quality

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions will be necessary to meet air quality requirements. Air quality regulations pursuant to the Clean Air Act (MCA § 75-2-102) are discussed below.

4.3.2.1 Air Quality Regulations (Applicable)

ARM § 16.8.807 (Applicable) see Section 4.2.2.1 on page 27 for discussion.

ARM § 16.8.815 (Applicable) see Section 4.2.2.1 on page 27 for discussion.

ARM § 16.8.818 (Applicable) see Section 4.2.2.1 on page 27 for discussion.

ARM § 16.8.821 (Applicable) see Section 4.2.2.1 on page 27 for discussion.

4.3.2.2 Montana Air Quality Emissions Standards

ARM § 16.8.1401 (Applicable) see Section 4.2.2.2 on page 27 for discussion.

ARM § 16.8.1427 (Applicable) see Section 4.2.2.2 on page 27 for discussion.

ARM § 26.4.761 (Applicable) requires a fugitive dust control program be implemented in reclamation operations, and lists specific but non-exclusive measures as necessary components of such a program.

4.3.3 Natural Streambed and Land Preservation Act (Applicable)

MCA § 75-7-102 and ARM §§ 36.2.404, .405 and .406 (Applicable), which place limitations on and specify criteria to be considered in approving projects affecting streambeds, would be applicable (substantive provisions only) if alternatives developed alter or affect a streambed or its immediate banks.

4.3.4 Solid Waste Management Act (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq., MCA, and the Hazardous Waste Management Act, §§ 75-10-401 et seq., MCA, place restrictions and requirements on the ultimate disposition of soils to be addressed during the OW/EADA remedial action.

4.3.4.1 Solid Waste Management Regulations (Applicable)

ARM § 16.14.504 (Applicable) restricts those various types of wastes that disposal sites may handle.

ARM § 16.14.505 (Applicable) sets forth standards that all solid waste disposal sites must meet.

ARM §§ 16.14.520 and 16.14.521 (Applicable) set forth the general and specific operation and maintenance requirements for solid waste management systems.

ARM § 16.14.523 (Applicable) specifies that solid waste must be transported in such a manner as to prevent its discharge, dumping, spilling or leaking from the transport vehicle.

4.3.5 Mining and Reclamation Requirements

The strip mining reclamation requirements provide guidelines that are relevant and appropriate for protecting and restoring areas impacted by significant earth moving operations, as may occur during remediation activities.

4.3.5.1 Strip Mining and Underground Mine Reclamation Act (Relevant and Appropriate)

MCA § 82-4-231 (Relevant and Appropriate) sets forth that each operator shall reclaim and revegetate the land affected by his operation as rapidly, completely, and effectively as the most modern technology and the most advanced state of the art will allow. The operator must grade, backfill, topsoil, reduce highwalls, stabilize subsidence, and control water. In so doing all measures must be taken to eliminate damage from soil erosion, subsidence, land slides, water pollution, and hazards dangerous to life and property.

In addition, this section directs the operator to employ various specific reclamation measures such as:

- to bury under adequate fill all toxic materials, shale, minerals, or any other material determined by Department of State Lands (DSL) to be acid producing, toxic, undesirable, or creating a hazard;
- to impound, drain, or treat all runoff waters so as to reduce soil erosion, damage to grazing and agricultural lands, and pollution of surface and subsurface waters;
- to stock pile and protect from erosion all mining and processing wastes until these wastes can be disposed of according to the provisions of this part;
- to deposit as much stockpile waste as possible back into the mine voids upon abandonment in such manner as to prevent or minimize land subsidence;
- to minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values and;
- to minimize disturbance to surface and groundwater systems by avoiding acid or other toxic mine drainage by such measures as, but not limited to, preventing or removing water from contact with toxic-producing deposits and treating drainage to reduce toxic content which adversely affects downstream water upon being released to water courses, and;
- to stabilize and protect all surface areas including spoil piles to effectively control air pollution.

MCA § 82-4-233 (Relevant and Appropriate) provides that after grading, the operator must plant vegetation that will yield a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area and capable of self-regeneration. The vegetative cover must be capable of:

- feeding and withstanding grazing pressure from a quantity and mixture of wildlife and livestock;
- regeneration under the natural conditions prevailing at the site; and
- preventing soil erosion to the extent achieved prior to the operation.

MCA § 82-4-336(7) (Relevant and Appropriate) requires the reclamation of all disturbed land.

Backfilling and Grading Requirements

ARM §§ 26.4.501 and 26.4.501a (Relevant and Appropriate) gives general backfilling and grading requirements.

ARM § 26.4.504 (Relevant and Appropriate) provides that permanent impoundments may be retained under certain circumstances.

ARM §§ 26.4.505 through 26.4.512 (Relevant and Appropriate) deal with disposition of waste material and subsequent protective measures to ensure wastes materials do not contribute to pollution problems.

ARM §§ 26.4.513 and 26.4.514 (Relevant and Appropriate) give final grading and contouring requirements.

ARM § 26.4.519 (Relevant and Appropriate) state that the operator may be required to monitor settling of regraded areas.

Hydrology Regulations

The hydrology regulations promulgated under the Strip and Underground Mine Reclamation Act, MCA §§ 82-4-201 et seq., provide detailed guidelines for addressing the hydrologic impacts of earth moving projects and are thus relevant and appropriate for addressing these impacts during OW/EADA remedial action.

ARM § 26.4.631 (Relevant and Appropriate) provides for long-term adverse changes in the hydrologic balance from reclamation activities, such as changes in water quality and quantity, depth to groundwater, and location of surface water drainage channels shall be minimized. Water pollution must be minimized and where necessary, treatment methods utilized. Other

pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.

ARM § 26.4.633 (Relevant and Appropriate) states that all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Treatment must continue until the area is stabilized.

ARM § 26.4.634 (Relevant and Appropriate) provides that drainage design shall emphasize channel and floodplain premining configuration that blends with the undisturbed drainage above and below, and provides specific requirements for designing the reclaimed drainage to:

- meander naturally,
- remain in dynamic equilibrium with the system,
- improve unstable premining conditions,
- provide for floods, and
- establish a premining diversity of aquatic habitats and riparian vegetation.

ARM §§ 26.4.635 through 26.4.637 (Relevant and Appropriate) set forth requirements for temporary and permanent diversions.

ARM § 26.4.638 (Relevant and Appropriate) specifies sediment control measures to be implemented during operations.

ARM § 26.4.639 (Relevant and Appropriate) gives requirements for construction and maintenance of sedimentation ponds.

ARM § 26.4.640 (Relevant and Appropriate) provides that discharge from sedimentation ponds, permanent and temporary impoundments, and diversions shall be controlled by energy dissipaters, riprap channels, and other devices, where necessary, to reduce erosion, prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance.

ARM § 26.4.641 (Relevant and Appropriate) sets forth methods for prevention of drainage from acid- and toxic-forming spoils into ground and surface waters.

ARM § 26.4.642 (Relevant and Appropriate) prohibits permanent impoundments with certain exceptions, and sets standards for temporary and permanent impoundments.

ARM §§ 26.4.643 through 26.4.646 (Relevant and Appropriate) provide for groundwater protection, groundwater recharge protection, and groundwater and surface water monitoring.

ARM § 26.4.649 (Relevant and Appropriate) prohibits the discharge, diversion, or infiltration of groundwater and surface water into existing underground mine workings.

ARM § 26.4.650 (Relevant and Appropriate) states that all permanent sedimentation ponds, diversions, impoundments, and treatment facilities must be renovated postmining, to meet criteria specified in the design plan. All such temporary structures shall be regraded to the approximate original contour.

Topsoil, Revegetation, and Protection of Wildlife and Air Resources Regulations

ARM §§ 26.4.701 and 26.4.702 (Relevant and Appropriate) require that during the removal, redistributing and stockpiling of soil (for reclamation):

- the operator shall limit the area from which soil is removed at any one time to minimize wind and water erosion, and the operator shall take other measures, as necessary, to control erosion;
- regraded areas must be deep-tilled, subsoiled, or otherwise treated to eliminate any possible slippage potential, to relieve compaction, and to promote root penetration and permeability of the underlying layer; this preparation must be done on the contour whenever possible and to a minimum depth of 12 inches;
- the operator shall, during and after redistribution, prevent, to the extent possible, spoil and soil compaction, protect against soil erosion, contamination, and degradation, and minimize the deterioration of biological properties of the soil;
- redistribution must be done in a manner that achieves approximate uniform thicknesses consistent with soil resource availability and appropriate for the postmining vegetation, land uses, contours, and surface water drainage systems; and
- reconditioned soil must be reconditioned by subsoiling or other appropriate methods.

ARM § 26.4.703 (Relevant and Appropriate) states that when using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM §§ 26.4.701 and 26.4.702.

ARM § 26.4.711 (Relevant and Appropriate) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected shall be established except on road surfaces and below the low-water line of permanent impoundments. Vegetative cover is considered of the same seasonal variety if it consists of a mixture of species of equal or superior utility when compared with the natural (or pre-existing) vegetation during each season of the year.

ARM § 26.4.713 (Relevant and Appropriate) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting period after final seedbed preparation but may not be more than 90 days after soil has been replaced.

ARM § 26.4.714 (Relevant and Appropriate) states that topsoiled areas must be seeded with a temporary cover until an adequate permanent cover can be established. Mulch shall be used on all regraded and topsoiled areas. Use of mulching and temporary cover may be suspended under certain conditions.

ARM § 26.4.715 (Relevant and Appropriate) states that after consultation with appropriate State and Federal wildlife and land management agencies, the permittee must select species that will fulfill the needs of wildlife including food, water, cover, and space.

ARM § 26.4.716 (Relevant and Appropriate) establishes the required method of revegetation, and provides that introduced species may be substituted for native species as part of an approved plan.

ARM § 26.4.717 (Relevant and Appropriate) gives requirements for tree planting if necessary to comply with MCA 82-4-233.

ARM § 26.4.718 (Relevant and Appropriate) requires the use of soil amendments and other means such as irrigation, management, fencing, or other measures if necessary to establish a diverse and permanent vegetative cover.

ARM § 26.4.719 (Relevant and Appropriate) prohibits livestock grazing on reclaimed land until the seedings are established and can sustain managed grazing.

ARM § 26.4.721 (Relevant and Appropriate) specifies that rills or gullies deeper than nine inches must be stabilized. In some instances shallower rills and gullies must be stabilized.

ARM § 26.4.722 (Relevant and Appropriate) states that stockpiled topsoil must be planted with quick growing plants that provide an effective cover.

ARM § 26.4.723 (Relevant and Appropriate) states that the operator shall conduct approved periodic measurements of vegetation, soils, water, and wildlife during the period of liability.

ARM § 26.4.724 (Relevant and Appropriate) specifies that revegetation success must be measured by approved unmined reference areas. There shall be at least one reference area for each plant community type. Required management for these reference areas is set forth.

ARM §§ 26.4.726 and 26.4.727 (Relevant and Appropriate) set the required methods for measuring productivity and canopy cover of revegetated areas.

ARM §§ 26.4.728 and 26.4.729 (Relevant and Appropriate) set requirements for measurements of the permanence and diversity of vegetation on reclaimed areas.

ARM §§ 26.4.730 and 26.4.731 (Relevant and Appropriate) provide that the revegetated area must furnish palatable forage in comparable quantity and quality during the same grazing period as the reference area. If toxicity to plants or animals is suspected, comparative chemical analyses may be required.

ARM §§ 26.4.733 and 26.4.735 (Relevant and Appropriate) provide additional requirements and measurement standards for trees, shrubs, half-shrubs, and other woody plants.

ARM § 26.4.751 (Relevant and Appropriate) mandates specific measures that must be undertaken or actions that must be refrained from to enhance or prevent harm to fish, wildlife and related environmental values.

Alluvial Valley Floors, Prime Farm Lands, and Auger Mining Regulations

ARM §§ 26.4.801 and 26.4.802 (Relevant and Appropriate) direct that the geologic, hydrologic, and biologic character of essential hydrologic functions on alluvial valley floors must be preserved and reestablished through reconstruction in the reclamation process. No reclamation should impair water quality or quantity of the surface or groundwater of an alluvial valley floor.

ARM § 26.4.804 (Relevant and Appropriate) states that the permittee must monitor alluvial valley floors to ensure preservation of hydrologic functions and beneficial uses.

ARM § 26.4.806 (Relevant and Appropriate) sets mandatory criteria for determining whether the quality and quantity of waters may be impaired by mining operations.

4.3.5.2 Rules and Regulations Governing the Opencut Mining Act (Relevant and Appropriate)

ARM § 26.4.204 states that:

> [N]o excavation will be allowed on any river or live stream channels or floodways at locations likely to cause detrimental erosion or offer a new canal to the river or stream at times of flooding except that such excavations may be

allowed when necessary to protect or promote the health and safety, or welfare of the people.

Further, if the site is "likely to contain critical fish and wildlife use areas the department may require a fish and wildlife survey covering all seasons of wildlife use."

4.4 MONTANA LOCATION-SPECIFIC ARARS

4.4.1 Natural Stream Bed and Land Preservation Act (Applicable or Relevant and Appropriate)

MCA § 75-7-102 (Applicable). See discussion in Section 4.3.3 on page 31.

ARM § 36.2.404 (Relevant and Appropriate) states that projects are to be evaluated by the appropriate conservation district based on the following criteria:

- the purpose of the project,
- the necessity and justification for the proposed project,
- whether the proposed project is a reasonable means of accomplishing the purpose,
- whether there are modifications or alternative solutions which are reasonably possible and which would reduce the disturbance to the stream channel and its environment and accomplish the purposes of the proposed project,
- whether the project will pass anticipated sediment loads without creating harmful flooding or erosion problems upstream or downstream,
- whether the project will minimize the amount of stream channel alteration,
- whether the project will be as permanent a solution as possible and whether the method used will create a reasonably permanent and stable situation,
- whether the project will minimize effects on fish and aquatic habitat,
- whether the project will minimize turbidity or other water pollution problems, and
- whether the project will minimize adverse effects on the natural beauty of the area.

These criteria are appropriate for consideration in the detailed analysis of alternatives and in the remedy selection and implementation pursuant to CERCLA. However, this provision is identified as relevant and appropriate because is would require the criteria to be evaluated in a permit context, whereas for a CERCLA site remedy that includes project activities addressed by this regulation, a permit to construct such project is not required.

4.4.2 Floodplain and Floodway Management Act (Applicable or Relevant and Appropriate)

MCA § 76-5-102 (Applicable) sets forth that it is policy of the State of Montana to restrict or prohibit uses that are dangerous to health or safety or property in times of flood or which cause increased flood height or velocities. This section establishes policy with respect to land uses and activities in floodplain and floodway areas.

MCA § 76-5-401 (Applicable) specifies the uses permissible in a floodway and generally prohibits permanent structures, fill, or permanent storage of materials or equipment.

MCA § 76-5-402 (Applicable) specifies uses allowed in the floodplain, excluding the floodway, and allows structures meeting certain minimum standards.

MCA § 76-5-403 (Applicable) lists certain uses which are prohibited in a designated floodway, including:

- any building for living purposes or place of assembly or permanent use by human beings,
- any structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway, or
- the construction or permanent storage of an object subject to flotation or movement during flood level periods.

MCA § 76-5-404 (Relevant and Appropriate) sets forth that an unpermitted nonconforming use in a floodplain is a public nuisance. Moreover, this section establishes that it is unlawful to alter an artificial obstruction or designated floodway without the express written approval of the Department of Natural Resources and Conservation (DNRC). This section is applicable to any action in the designated floodplain or designated floodway in the operable unit where such action requires more than maintenance.

4.4.3 Floodplain Management Regulations (Applicable or Relevant and Appropriate)

ARM § 36.15.216 (Applicable) specifies factors to consider in determining whether a permit should be issued to establish or alter an artificial obstruction or nonconforming use in the floodplain or floodway. While permit requirements are not directly applicable to activities

conducted entirely on site, the criteria used to determine whether to approve establishment or alteration of an artificial obstruction or nonconforming use should be applied by the decision-makers in evaluating proposed action in the floodplain or floodway. As such, the following criteria are relevant and appropriate:

- the danger to life and property from backwater or diverted flow caused by the obstruction,
- the danger that the obstruction will be swept downstream to the injury of others,
- the availability of alternative location,
- the construction or alteration of the obstruction in such a manner as to lessen the danger,
- the permanence of the obstruction, and
- the anticipated development in the foreseeable future of the area which may be affected by the obstruction.

In addition, if the remedial action does not meet the minimum standards in the floodplain management regulations, alterations of the floodplain or floodway can only be approved if:

- the proposed use would not increase flood hazard either upstream or downstream, in the area of insurable buildings;
- the refusal of a permit would, because of exceptional circumstances, cause a unique or undue hardship on the applicant or community involved;
- the proposed use is adequately flood-proofed; and
- reasonable alternative locations outside the designated floodplain are not available.

ARM § 36.15.603 (Applicable) provides that proposed diversions or changes in place of diversion must be evaluated by the DNRC to determine whether they may significantly affect flood flows and, therefore, require a permit. While permit requirements are not applicable for remedial actions conducted entirely on-site, the following criteria used to determine when a permit shall <u>not</u> be granted are applicable:

- the proposed diversion will increase the upstream elevation of the 100-year flood a significant amount (½ foot or as otherwise determined by the permit issuing authority);

- the proposed diversion is not designed and constructed to minimize potential erosion from a flood of 100-year frequency; and

- any permanent diversion structure crossing the full width of the stream channel is not designed and constructed to safely withstand up to a flood of 100-year frequency.

ARM § 36.15.604 (Applicable) precludes new artificial obstructions or nonconforming uses that will significantly increase the upstream elevation of the flood of 100-year frequency (½ foot or as otherwise determined by the permit issuing authority) or significantly increased flood velocities.

ARM § 36.15.605(1) (Applicable), and ARM § 36.15.605(2) (Applicable) enumerate artificial obstructions and nonconforming uses that are prohibited within the designated floodway except as allowed by permit and includes "a structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway ... ." Solid waste disposal and storage of highly toxic, flammable, or explosive materials are also prohibited.

ARM § 36.15.606(2) (Applicable) enumerates flood control works that are allowed with designated floodways pursuant to permit. Although the permit requirements are not applicable for activities conducted entirely on site, the following conditions are applicable:

- flood control levies and flood walls are allowed if they are designed and constructed to safely convey a flood of 100-year frequency and their cumulative effect combined with allowable flood fringe encroachments does not increase the unobstructed elevation of a flood of 100-year frequency more than ½ foot at any point;

- riprap, if not hand placed, is allowed if it is designed to withstand a flood of 100-year frequency, does not increase the elevation of the 100-year frequency flood, and will not increase erosion upstream, downstream, or across stream from the riprap site;

- channelization projects are allowed if they do not significantly increase the magnitude, velocity, or elevation of the flood of 100-year frequency downstream from such projects; and

- dams are allowed if they are designed and constructed in accordance with approved safety standards and they will not increase flood hazards downstream either through operational procedures or improper hydrologic design.

ARM § 36.15.703 (Applicable) is applicable in flood fringe areas (i.e., areas in the floodplain but outside of the designated floodway) of the site and prohibits, with limited

exceptions, solid waste disposal, soil absorption sewage systems and storage of highly toxic, flammable or explosive material.

4.4.4 Cultural Resources

4.4.4.1 Antiquities Act (Relevant and Appropriate)

MCA § 22-3-424 (Relevant and Appropriate) requires that the identification and protection of heritage properties and paleontological remains on lands owned by the state are given appropriate consideration in state agency decision-making. (Applicable only to state lands, but is relevant and appropriate in decision-making affecting other properties). Heritage property is defined in MCA §22-3-421, as any district, site, building, structure, or object located upon or beneath the earth or under water that is significant in American history, architecture, archaeology, or culture.

MCA § 22-3-433 (Relevant and Appropriate) requires that evaluation of environmental impacts include consultation with the historic preservation officer concerning the identification and location of heritage properties and paleontological remains on lands that may be adversely impacted by the proposed action. The responsible party, in consultation with the historic preservation officer and the preservation review board, shall include a plan for the avoidance or mitigation of damage to heritage properties and paleontological remains to the greatest extent practicable. (Applicable only to state lands, but is relevant and appropriate in decision-making affecting other properties).

MCA § 22-3-435 (Relevant and Appropriate) requires any person conducting activities, including survey, excavation, or construction, who discovers any heritage property or paleontological remains or who finds that an operation may damage heritage properties or paleontological remains shall promptly report to the historic preservation officer the discovery of such findings and shall take all reasonable steps to ensure preservation of the heritage property or paleontological remains. (Applicable only to state lands, but is relevant and appropriate in decision-making affecting other properties).

4.4.4.2 Cultural Resources Regulations (Relevant and Appropriate)

ARM § 12.8.503 and ARM §§ 12.8.505 through 12.8.508 (Relevant and Appropriate) prescribe specific procedures to be followed to ensure adequate consideration of cultural values in agency decision-making.

TABLE 5
MONTANA APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
OW/EADA REMEDIAL ACTION

Section	Standard Requirements Criteria or Limitation	Citation	Applicable/ Relevant and Appropriate
4.2	CHEMICAL-SPECIFIC		
4.2.1	WATER QUALITY		
4.2.1.1	WATER QUALITY STATUTES	MCA § 75-5-303	Yes/-
		MCA § 75-5-605	Yes/-
4.2.1.2	Surface Water Quality Standards	ARM § 16.20.604(1)	Yes/-
		ARM § 16.20.618	Yes/-
		ARM § 16.20.632	Yes/-
		ARM § 16.20.633	Yes/-
4.2.1.3	Nondegradation of Water Quality Regulations	ARM § 16.20.702	Yes/-
		ARM § 16.20.703	Yes/-
4.2.1.4	WELL STANDARDS	MCA § 85-2-505	Yes/-
4.2.1.5	Groundwater Pollution Control System	ARM § 16.20.1002	Yes/-
		ARM § 16.20.1003	Yes/-
		ARM § 16.20.1011	Yes/-
4.2.2	AIR QUALITY		
4.2.2.1	CLEAN AIR ACT OF MONTANA	MCA § 75-2-102	Yes/-
	Ambient Air Monitoring	ARM § 16.8.807	Yes/-
	Lead	ARM § 16.8.815	Yes/-
	Settled Particulate Matter	ARM § 16.8.818	Yes/-
	PM-10	ARM § 16.8.821	Yes/-
4.2.2.2	Montana Air Quality Emissions Standards		
	Airborne Particulate Matter	ARM § 16.8.1401	Yes/-
	Odors	ARM § 16.8.1427	Yes/-
4.3	ACTION-SPECIFIC		
4.3.1	WATER QUALITY		
4.3.1.1	WATER QUALITY STATUTES	MCA § 75-5-303	Yes/-
		MCA § 75-5-605	Yes/-
4.3.1.2	Surface Water Quality Regulations	ARM § 16.20.604(1), 16.20.618	Yes/-
		ARM § 16.20.632	Yes/-
		ARM § 16.20.633	Yes/-

TABLE 5 (con't)
MONTANA APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
OW/EADA REMEDIAL ACTION

Section	Standard Requirements Criteria or Limitation	Citation	Applicable/ Relevant and Appropriate
4.3.1.3	Nondegradation of Water Quality Regulations	ARM § 16.20.702	Yes/-
		ARM § 16.20.703	Yes/-
4.3.1.4	MPDES Permit Regulations	ARM § 16.20.925	-/Yes
4.3.1.5	WELL STANDARDS	MCA § 85-2-505	Yes/-
4.3.1.6	MGWPCS Regulations	ARM § 16.20.1002	Yes/-
		ARM § 16.20.1003	Yes/-
		ARM § 16.20.1011	Yes/-
4.3.2	AIR QUALITY		
	CLEAN AIR ACT OF MONTANA	MCA § 75-2-102	Yes/-
4.3.2.1	Air Quality Regulations	ARM § 16.8.807	Yes/-
		ARM § 16.8.815	Yes/-
		ARM § 16.6.818	Yes/-
4.3.2.2	Montana Air Quality Emission Standards		
		ARM § 16.8.821	Yes/-
		ARM § 16.8.1401	Yes/-
		ARM § 16.8.1427	Yes/-
	Fugitive Dust	ARM § 26.4.761	-/Yes
4.3.3	NATURAL STREAM BED AND LAND PRESERVATION ACT	MCA § 75-7-102	Yes/-
		ARM § 36.2.404, 405, 406	Yes/-
4.3.4	SOLID WASTE MANAGEMENT ACT	MCA § 75-10-201, et seq.	Yes/-
		MCA § 75-10-401, et seq.	Yes/-
4.3.4.1	Solid Waste Management Regulations	ARM § 16.14.504	Yes/-
		ARM § 16.14.505	Yes/-
		ARM §§ 16.14.520, 521	Yes/-
		ARM § 16.14.523	Yes/-
4.3.5	MINING AND RECLAMATION REQUIREMENTS		
4.3.5.1	STRIP MINING AND UNDERGROUND MINE RECLAMATION ACT	MCA § 82-4-231	-/Yes
		MCA § 82-4-233	-/Yes
		MCA § 84-4-336(7)	-/Yes
	Backfilling and Grading Requirements	ARM § 26.4.501, 501a	-/Yes
		ARM § 26.4.504	-/Yes

TABLE 5 (con't)
MONTANA APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
OW/EADA REMEDIAL ACTION

Section	Standard Requirements Criteria or Limitation	Citation	Applicable/ Relevant and Appropriate
		ARM §§ 26.4.505-512	-/Yes
		ARM §§ 26.4.513, 514	-/Yes
		ARM § 26.4.519	-/Yes
	Hydrology Regulations	ARM § 26.4.631	-/Yes
		ARM § 26.4.633	-/Yes
		ARM § 26.4.634	-/Yes
		ARM §§ 26.4.635-637	-/Yes
		ARM § 26.4.638	-/Yes
		ARM § 26.4.639	-/Yes
		ARM § 26.4.640	-/Yes
		ARM § 26.4.641	-/Yes
		ARM § 26.4.642	-/Yes
		ARM §§ 26.4.643-646	-/Yes
		ARM § 26.4.649	-/Yes
		ARM § 26.4.650	-/Yes
	Topsoil, Revegetation, and Protection of Wildlife and Air Resources Regulations	ARM §§ 26.4.701, 702	-/Yes
		ARM § 26.4.703	-/Yes
		ARM § 26.4.711	-/Yes
		ARM § 26.4.713	-/Yes
		ARM § 26.4.714	-/Yes
		ARM § 26.4.715	-/Yes
		ARM § 26.4.716	-/Yes
		ARM § 26.4.717	-/Yes
		ARM § 26.4.718	-/Yes
		ARM § 26.4.719	-/Yes
		ARM § 26.4.721	-/Yes
		ARM § 26.4.722	-/Yes
		ARM § 26.4.723	-/Yes
		ARM § 26.4.724	-/Yes
		ARM §§ 26.4.726, 727	-/Yes
		ARM §§ 26.4.728, 729	-/Yes
		ARM §§ 26.4.730, 731	-/Yes

TABLE 5 (con't)
MONTANA APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
OW/EADA REMEDIAL ACTION

Section	Standard Requirements Criteria or Limitation	Citation	Applicable/ Relevant and Appropriate
		ARM §§ 26.4.733, 735	-/Yes
		ARM § 26.4.751	-/Yes
	Alluvial Valley Floors, Prime Farm Lands, and Auger Mining Regulations	ARM §§ 26.4.801, 802	-/Yes
		ARM § 26.4.804	-/Yes
		ARM § 26.4.806	-/Yes
4.3.5.2	Rules and Regulations Governing the Opencut Mining Act	ARM § 26.4.204	-/Yes
4.4	LOCATION-SPECIFIC		
4.4.1	NATURAL STREAM BED AND LAND PRESERVATION ACT	MCA § 75-7-102	Yes/-
		ARM § 36.2.404	-/Yes
4.4.2	FLOODPLAIN AND FLOODWAY MANAGEMENT ACT	MCA § 76-5-102	Yes/-
		MCA § 76-5-401	Yes/-
		MCA § 76-5-402	Yes/-
		MCA § 76-5-403	Yes/-
		MCA § 76-5-404	-/Yes
4.4.3	Floodplain Management Regulations	ARM § 36.15.216	Yes/-
		ARM § 36.15.603	Yes/-
		ARM § 36.15.604	Yes/-
		ARM § 36.15.605(1)	Yes/-
		ARM § 36.15.605(2)	Yes/-
		ARM § 36.15.606(2)	Yes/-
		ARM § 36.15.703	Yes/-
4.4.4	CULTURAL RESOURCES REQUIREMENTS		
4.4.4.1	ANTIQUITIES ACT	MCA § 22-3-424	-/Yes
		MCA § 22-3-433	-/Yes
		MCA § 22-3-435	-/Yes
4.4.4.2	Cultural Resources Regulations	ARM §§ 12.8.503, 505-508	-/Yes

RESPONSIVENESS SUMMARY

TABLE OF CONTENTS

SECTION			PAGE
1.0	INTRODUCTION		RS-1
1.1	SITE BACKGROUND		RS-1
1.2	SUMMARY OF EPA ACTIONS AT THE ANACONDA SMELTER SITE		RS-2
1.3	SUMMARY OF EPA ACTIONS AT THE OW/EADA OU		RS-4
1.4	COMMUNITY INVOLVEMENT BACKGROUND		RS-4
1.4.1	PUBLIC MEETING PUBLICITY		RS-4
1.4.2	ADMINISTRATIVE RECORD		RS-5
1.4.3	DOCUMENT REPOSITORIES		RS-5
1.4.4	CITIZENS GROUPS		RS-5
1.4.5	PROGRESS REPORTS		RS-6
1.4.6	MAILING LIST		RS-6
1.5	CHRONOLOGY OF COMMUNITY RELATIONS ACTIVITIES		RS-6
1.6	EXPLANATION OF RESPONSIVENESS SUMMARY		RS-8
2.0	OVERVIEW OF COMMENTS		RS-10
3.0	RESPONSES TO COMMENTS		RS-11
3.1	PART I - NON-TECHNICAL COMMENTS		RS-11
3.1.1	COMMENTS AT THE FORMAL PUBLIC MEETING		RS-11
	3.1.1.1	Comments from Mr. Tom Hurlock	RS-11
	3.1.1.2	Comments from Mr. Jim Davison	RS-12
	3.1.1.3	Comment from Ms. Sandy Stash, ARCO	RS-13
	3.1.1.4	Comment from Mr. Bill Dee	RS-13
	3.1.1.5	Comment from Mr. Jim Yeoman	RS-13
	3.1.1.6	Comment from Ms. Natalie Fitzpatrick	RS-14
	3.1.1.7	Comment from Mr. Bill Crichton	RS-14
	3.1.1.8	Comments from Mr. Mel Stokke	RS-14
3.1.2	SUMMARY OF WRITTEN COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD		RS-15
	3.1.2.1	Comment from The Anaconda Chamber of Commerce	RS-15
	3.1.2.2	Comment from Anaconda Retired Teachers Association	RS-15
	3.1.2.3	Comment from The Anaconda Garden Club	RS-15
	3.1.2.4	Comment from Mr. Ray Lappin	RS-15
	3.1.2.5	Comment from Mr. Edward Sager	RS-16
	3.1.2.6	Comment from Anaconda-Deer Lodge Reclamation Advocates (ADRA)	RS-16

TABLE OF CONTENTS (continued)

SECTION			PAGE
	3.1.2.7	Comment from Ms. Bonnie Sturm	RS-16
	3.1.2.8	Comments from Mr. James Milo Manning	RS-16
	3.1.2.9	Comment from Ms. Rose Nyman	RS-17
	3.1.2.10	Comments from Mr. George Heath	RS-17
	3.1.2.11	Comments from Mr. Lee Bastian, Regional Park Manager, Montana Department of Fish, Wildlife and Parks	RS-17
	3.1.2.12	Comments from Ms. Nicki Leiss	RS-18
	3.1.2.13	Comments from Mr. and Mrs. Duane and Cindie Green	RS-18
	3.1.2.14	Comments from Ms. Mary Kay Craig, Clark Fork-Pend Oreille Coalition	RS-19
	3.1.2.15	Comments from Mr. Don Stoecker	RS-22
	3.1.2.16	Comments from One Anonymous Commenter	RS-22
	3.1.2.17	Comment from Mr. Mike Fitzgerald, Upper Clark Fork River Superfund Technical Specialist	RS-23
	3.1.2.18	Comments from ARCO	RS-23
3.2	PART II - TECHNICAL COMMENTS		RS-25
	3.2.1	COMMENTS FROM MR. MIKE FITZGERALD, UPPER CLARK FORK RIVER, SUPERFUND TECHNICAL SPECIALIST	RS-25
	3.2.2	COMMENTS FROM MR. DALE HARMS, STATE SUPERVISOR, MONTANA STATE OFFICE, U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE (USFWS)	RS-26
	3.2.3	COMMENTS FROM ARCO	RS-26
	3.2.3.1	Comments from ARCO Relating to ARARs	RS-27
	3.2.3.2	Comments from ARCO Relating to the Baseline Risk Assessment	RS-32
4.0	REFERENCES		RS-48
Attachment A	Transcript of Formal Public Meeting		
Attachment B	Written Comments Received During Public Comment Period		

LIST OF ABBREVIATIONS AND ACRONYMS

ADRA	Anaconda-Deer Lodge Reclamation Advocates
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
ARCO	Atlantic Richfield Company
ARWW	Anaconda Regional Water and Waste (operable unit)
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
C.F.R.	Code of Federal Regulations
CRAVE	Carcinogen Risk Assessment Verification Endeavor
DMA	dimethyl arsenic acid
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
MCA	Montana Code Annotated
MCLs	Maximum Contaminant Levels
MDHES	Montana Department of Health and Environmental Sciences
MMA	monomethyl arsenic acid
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NPL	National Priorities List
OW/EADA	Old Works East Anaconda Development Area
PDF	Probability Distribution Function
PM-10	10 micron particle size
ppm	parts per million
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RHPP	Regional Historic Preservation Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SEGH	Society for Environmental Geochemistry and Health
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act
TCRA	Time Critical Removal Action
UBK	Uptake/Biokinetic
USFWS	U.S. Department of the Interior, Fish and Wildlife Service

1.0 INTRODUCTION

The U. S. Environmental Protection Agency (EPA) and the Montana Department of Health and Environmental Sciences (MDHES) have prepared this Responsiveness Summary to document and respond to issues and comments raised by the public regarding the Remedial Investigation/Feasibility Study (RI/FS) and the Proposed Plan for the Old Works/East Anaconda Development Area (OW/EADA) operable unit (OU) of the Anaconda Smelter National Priorities List (NPL) site. Comments were received during the public comment period from September 23 through October 22, 1993. These comments, and responses to them, are outlined in this document. By law, the EPA and MDHES must consider public input before making a final decision on a cleanup remedy. Once public comment is reviewed and considered, the final decision on a cleanup remedy will be documented in the Record of Decision (ROD).

1.1 SITE BACKGROUND

The Anaconda Smelter site, located east of the town of Anaconda in southwest Montana, is the location of the former Anaconda Copper Mining Company ore processing facilities. These facilities were developed to remove copper from ore mined in nearby Butte during the period from 1884 through 1980. In 1977, the Atlantic Richfield Company (ARCO) purchased the assets of the Anaconda Copper Mining Company. In 1980, ARCO ceased smelting activities in Anaconda.

The OW/EADA OU is located immediately adjacent to the town of Anaconda. The OW/EADA OU encompasses approximately 1,300 acres and is bounded by Highway 1 and the East Anaconda Yard to the south, Highway 273 to the east, Stuckey Ridge to the north, and Cedar Street in Anaconda to the west. Warm Springs Creek, the area's principal drainage, flows east through the site. Also, since the anticipated land uses, site characteristics, and contaminants of concern are similar to areas in the OW/EADA OU, the Mill Creek OU was included in the selected remedy for the OW/EADA OU. The Mill Creek OU is approximately 140 acres in size and is located approximately two miles southeast of the OW/EADA OU, adjacent to the Anaconda Smelter (formerly known as the Washoe Reduction Works).

The OW/EADA OU contains large volumes of milling and smelting wastes, fallout from smelter emissions, and other debris that originated from the operation of smelters at the Upper and Lower Works from 1884 to 1902, and the Washoe Reduction Works from 1902 to 1980. Remnants of six brick flues on the hillside to the north of Warm Springs Creek and various deteriorated brick foundations, demolition debris, and railroad grades are all that remain of the original Old Works facilities. The Red Sands, a major Old Works site feature, consists of tailings and slag generated from the Lower Works smelter.

Several of the structures within the Old Works area are eligible for inclusion on the National Register of Historic Places. These structures include two former lumber company buildings, the various Old Works structures, the Heap Roast slag, and remnants of the Red Sands. The Anaconda Old Works Historic District is considered significant not only to Anaconda's past growth into an important turn-of-the-century Montana city, but also to the development of the Butte/Anaconda area as one of the largest copper producers in the world. Remnants of the original Old Works structures are historically significant for their relationship to the refinements in copper metallurgy developed at the site. The Red Sands and the Heap Roast slag piles are a significant part of the Old Works structures and are included in the Regional Historic Preservation Plan (RHPP). The RHPP was developed by a joint committee of citizens, EPA, MDHES, state and local historic preservation officers, and the local governments of Anaconda-Deer Lodge, Butte-Silver Bow, and Walkerville, Montana.

The Anaconda Smelter site covers a wide area and is currently organized into the following OUs:

- Anaconda Smelter Demolition (Smelter Hill)
- Mill Creek Children Relocation
- Anaconda Yards Time Critical Removal Action (TCRA)
- Arbiter/Beryllium & Repository Construction
- Old Works Stabilization
- Mill Creek Relocation
- Flue Dust
- Old Works/East Anaconda Development Area
- Community Soils
- Anaconda Regional Soils
- Anaconda Regional Water and Waste

The OUs were prioritized based on their potential risk to human health and the environment. Mill Creek was considered the highest priority because children in Mill Creek had elevated urinary arsenic levels indicating an excess exposure to arsenic in their environment. Based on this, EPA relocated Mill Creek residents in 1988. Since then, EPA has also taken action at several other OUs, including Flue Dust, Arbiter, Beryllium, Community Soils and Old Works. The OW/EADA OU is considered the next priority because of the potential exposure of the nearby population to elevated metal and arsenic concentrations and the potential for economic development within the area.

1.2 SUMMARY OF EPA ACTIONS AT THE ANACONDA SMELTER SITE

The history of pollution problems associated with heavy metal and arsenic releases at the Anaconda Smelter site resulted in placement of the site on the NPL in September 1983, under the authority of the Comprehensive Environmental Response, Compensation and

Liability Act (CERCLA). In October 1984, ARCO entered into an Administrative Order on Consent (AOC) to conduct a remedial investigation (RI) for the Anaconda Smelter site. The draft RI reports generally indicated wide-scale contamination and a need for more in-depth study.

In the initial stages of the Anaconda area investigations, it became apparent that the community of Mill Creek, located two miles east of Anaconda, was being severely impacted by contamination. Children in Mill Creek had elevated urinary arsenic levels indicating an excess exposure to arsenic in their environment. EPA redirected the sequencing of the RIs on the site to focus on Mill Creek. Young children, the population at greatest risk, were temporarily relocated from the community in May 1986. At this time, control measures were initiated on flue dust, the most concentrated arsenic and heavy metal contaminant source on the site.

In July 1986, EPA entered into an AOC with ARCO, the potentially responsible party (PRP), to conduct an expedited RI/FS for Mill Creek. The ROD for Mill Creek was completed in October 1987. The selected remedy was permanent relocation of Mill Creek residents. This remedy was selected in part because the area had the potential to become recontaminated from surrounding waste sources. EPA successfully negotiated a consent decree with ARCO concerning the implementation of the relocation remedy for Mill Creek residents on January 7, 1988. The permanent relocation of residents was completed in the fall of 1988.

In September 1988, EPA entered into an AOC with ARCO to conduct an RI/FS for the Flue Dust OU. The ROD was completed in September 1991. The remedy selected was treatment and disposal of all flue dust located on Smelter Hill. Also in September 1988, EPA entered into a consent order with ARCO to conduct an Engineering Evaluation/Cost Analysis (EE/CA) for the Old Works OU. The Final EE/CA Report addressing these areas was approved by EPA in July 1991. The actions taken as a result of the EE/CA have included stabilizing the Red Sands adjacent to Warm Springs Creek, repair of breaks in Warm Springs Creek levees, and the installation of fencing to limit access to certain areas of the Old Works site. Further cleanup actions relating to the Red Sands, as well as the remainder of the Old Works OU, are included in this OU.

A focused investigation of wastes within the ponds and bunkers at the Arbiter Plant site was conducted for the Accelerated Removals EE/CA in 1991. The waste materials within the Arbiter ponds and bunkers were removed as part of the Accelerated Removals response action in 1992.

1.3 SUMMARY OF EPA ACTIONS AT THE OW/EADA OU

A removal action was conducted at the OW/EADA OU between April and November 1992. The Old Works removal action consisted of temporary measures including the repair of the dikes along Warm Springs Creek to prevent flooding of the adjacent tailings, the construction of ditches and detention basins to prevent tailings from washing into the creek, site access control, and removal of some of the Red Sands from the banks of the creek. Three retention basins to intercept storm flow from the drainages above the Old Works area were constructed. The existing dike system adjacent to the creek was repaired, and riprap (a rock-lined erosion control) was placed along areas of erosion. The Red Sands were sloped and revegetated to prevent erosion and a portion of the Red Sands adjacent to the creek was removed. A gabion wall (stacked wire baskets filled with rock) was installed as a barrier between the creek and the Red Sands.

EPA released the RI/FS and the Proposed Plan for the OW/EADA OU on September 23, 1993. A public comment period was held from September 23 through October 22, 1993. On September 29, 1993, EPA held an informational meeting in Anaconda to explain the RI/FS process, outline the Proposed Plan and Preferred Alternative, and to answer questions regarding the alternatives. A formal public hearing was held in Anaconda on October 14, 1993, to allow the public to submit formal comments. Throughout the public comment period, EPA has received numerous comments, both oral and written, on the RI/FS and the Proposed Plan. EPA also received comments from ARCO on the supporting documents.

The Mill Creek OU was previously assessed under an RI/FS completed in September 1987 by ARCO. Volume VI (Mill Creek Addendum) of the OW/EADA RI/FS, released on September 23, 1993, summarizes the current status of the Mill Creek OU, including sample results from data collected in 1993. In the Proposed Plan, the Mill Creek OU was included in the Preferred Alternative for the OW/EADA OU since the anticipated land uses and site characteristics of this OU are similar to areas in the OW/EADA OU.

1.4 COMMUNITY INVOLVEMENT BACKGROUND

EPA has conducted community involvement activities for the OW/EADA OU in accordance with state and federal laws and EPA Superfund guidance documents. From the beginning of the RI/FS process for the OW/EADA OU, EPA has conducted community relations activities and sought the involvement of the public and the PRP.

1.4.1 PUBLIC MEETING PUBLICITY

Press releases were sent to the media mailing list to announce each public meeting and the public comment period. The media mailing list includes the Anaconda newspaper, *The Anaconda Leader*, and the Butte newspaper, *The Montana Standard*. The public meetings

were advertised in both newspapers. Print advertisements were display style, conspicuously large (at least two columns by five inches), and were placed in a widely-read sections of each local paper.

1.4.2 ADMINISTRATIVE RECORD

The Administrative Record is the set of documents identified for the OW/EADA OU upon which the selection of the remedy is based. The Administrative Record is required by CERCLA §113(k). The Administrative Record is available for public review at the EPA Record Center in Helena.

1.4.3 DOCUMENT REPOSITORIES

Documents relating to the OW/EADA OU are available at the County Courthouse in Anaconda, at the Hearst Free Public Library in Anaconda, and at the EPA Record Center in Helena.

1.4.4 CITIZENS GROUPS

The Anaconda-Deer Lodge Reclamation Advocates (ADRA) organization was formed in 1988 by members of the Citizens in Action and the Anaconda-Deer Lodge Environmental Advisory Council to work towards economic recovery. ADRA meets regularly with EPA and ARCO to discuss Superfund activities taking place in the Clark Fork Basin. ADRA has co-sponsored public Superfund meetings with EPA.

The Arrowhead Foundation is a non-profit community group focusing on the effort to establish a world-class, Jack Nicklaus-designed golf course in the OW/EADA OU.

In the spring of 1992, EPA, MDHES, the National Advisory Council for Historic Preservation, the Montana State Historic Preservation Office, and the local governments of Anaconda-Deer Lodge, Butte-Silver Bow, and Walkerville signed a Programmatic Agreement calling for a comprehensive approach to addressing the important historic resources throughout the upper Clark Fork Basin which potentially could be impacted by Superfund activities. This group developed an RHPP, which includes a comprehensive approach to historic preservation and specific suggestions for implementation, recommendation for funding sources, and management alternatives. A joint committee of citizens and representatives of various agencies and historic preservation groups in both Anaconda and Butte was formed to implement the concepts and plans for historic preservation as outlined in the RHPP.

The Clark Fork-Pend Oreille Coalition, an environmental advocacy organization headquartered in Missoula, Montana, has been actively involved in all aspects of Superfund

work throughout the Clark Fork Basin. In late 1992, the Coalition hired a staff member to work on upper Clark Fork issues and have an office located in Butte. The Coalition has been active in the public participation process for the OW/EADA OU.

1.4.5 PROGRESS REPORTS

Since the NPL listing of the Anaconda Smelter site in 1983, EPA and MDHES have produced a series of Progress Reports and Fact Sheets that discuss Superfund issues at the Anaconda Smelter NPL Site. Many of these printed materials have been site-specific and have discussed issues at specific OUs. Much of the early emphasis was placed on Mill Creek.

These Progress Reports and Fact Sheets contained information on released documents, meetings, site activities, completion of projects, sampling results, etc. They were sent to those people on the site mailing list and extra copies were distributed at public meetings. Copies of previous progress reports and fact sheets are contained in the Anaconda Smelter Administrative Record.

1.4.6 MAILING LIST

EPA maintains the OW/EADA OU mailing list on a computer database and updates this list periodically. EPA actively solicits additions to the mailing list in the Fact Sheets and at public meetings.

1.5 CHRONOLOGY OF COMMUNITY RELATIONS ACTIVITIES

1983-1993

Numerous site-wide community relations activities were conducted at the Anaconda Smelter site. These included the development of several Community Relations Plans and revisions to the Community Relations Plans in March 1984, October 1986, March 1989, and December 1992.

EPA and MDHES officials conducted extensive community relations activities in Anaconda and Opportunity, Montana, over the years. A part-time Community Relations Liaison worked in Anaconda for several years. In addition, the EPA Community Involvement Coordinator has conducted numerous small and large group meetings and extensive Community Relations activities in Anaconda and Opportunity.

EPA officials were readily available to local news media which resulted in frequent site coverage in local newspapers.

A site-wide *Progress Report* was prepared and mailed to those on the Anaconda mailing list in June 1990.

April 1991

An Accelerated Removal Engineering Evaluation/Cost Analysis *Progress Report* was prepared and mailed to those on the Anaconda mailing list. A public meeting was held on May 22, 1991, to discuss EPA's removal options for the Arbiter Plant waste, located in the OW/EADA OU.

August 1991

An Old Works Engineering Evaluation/Cost Analysis *Progress Report* was prepared and mailed to those on the Anaconda mailing list. A public meeting was held August 27, 1991, to discuss EPA's preferred removal option for areas in the OW/EADA OU.

Spring 1992

Several meetings were held to discuss the OW/EADA RI/FS schedule. The community was explicit in their urgency to accelerate the schedule as much as possible.

1992

Monthly meetings were held to discuss progress of the OW/EADA OU.

May 1993

A site-wide *Program Update* was prepared and mailed to every household in Anaconda and Opportunity. A special insert encouraged interested people to sign up for the mailing list, which resulted in a one-third increase of names to the list. A well-attended public meeting was held on May 24, 1993, which included extensive discussion on the OW/EADA OU.

September 1993

EPA sent out the Proposed Plan to the site mailing list. A display ad and legal ad for the Proposed Plan, public comment period, and meeting dates were published in *The Anaconda Leader* on September 22 and 24, 1993, and in *The Montana Standard* on September 23, 1993.

The Anaconda Leader ran press releases on September 23 and 29, 1993. *The Montana Standard* ran a press release on September 25, 1993.

An informational public meeting was held on September 23, 1993, to discuss the OW/EADA OU Proposed Plan.

October 1993

The Anaconda Leader ran press releases on October 1 and 15, 1993, and *The Montana Standard* ran a press release on October 15, 1993. A meeting notice ad was published by *The Anaconda Leader* on October 8 and 14, 1993.

A formal public hearing was held on October 14, 1993 to receive oral comments. The transcript of this meeting can be found in Attachment A.

1.6 EXPLANATION OF RESPONSIVENESS SUMMARY

Four types of comments were received on the Proposed Plan by EPA during the Public Comment Period. These were:

- **Comments presented at the public meetings** held on September 29 and October 14, 1993. The oral comments that were given at the formal public meeting were recorded and transcribed by a court reporter. A copy of the transcript of the formal public meeting, including formal comments, is provided in Attachment A.

- **Written comments received by EPA during the public comment period.** Copies of these comments can be found in Attachment B. Responses to these comments are in Section 3.1.2, page RS-14.

- **Written comments received by EPA from ARCO.** Copies of these comments are provided in Attachment B. Responses to these comments are in Section 3.1.2.18, page RS-23, and Section 3.2.3, page RS-26.

- **Written comments from State and Federal Government agencies.** Copies of these comments are provided in Attachment B. Responses to these comments are in Section 3.1.2.11, page RS-17, and Section 3.2.2, page RS-26.

Written comments were received from the following groups and individuals:

- Fifteen private citizens
- Anaconda-Deer Lodge Local Government
- ARCO
- Two Local Environmental Groups
- U.S. Department of the Interior, Fish and Wildlife Service (USFWS)
- Montana Department of Fish Wildlife and Parks
- Three Local Community Groups
- One Montana Environmental Group

It should be noted that while only the formal public comments are presented and responded to in this Responsiveness Summary, EPA has also considered other information in the remedy selection process. EPA has considered information from meetings held among EPA, MDHES, ARCO, Anaconda-Deer Lodge local government officials, and other parties during the RI/FS and during the public comment period. Also EPA, has considered ARCO's written submittals, including their applicable or relevant and appropriate requirements (ARARs) scoping documents, risk assessment documents, and other correspondence related to the RI/FS and remedy selection. Specific responses to ARCO's ARARs and risk assessment comments can be found in Part II, Section 3.2.3, page RS-26.

All comments received, including those provided to EPA outside the comment period, have been reviewed and considered by EPA in the decision-making process. These comments are addressed, either explicitly or implicitly, in this Responsiveness Summary and in the ROD.

The comments and responses have been organized into two Parts

Part I. **Non-technical comments** include summaries of most remarks made by citizens, local government, community groups, and local and state environmental organizations. Each comment is followed by EPA's response. Policy comments and responses are generally included with the non-technical comments.

Part II. **Technical comments** provide a comprehensive set of technical and legal comments and the EPA's detailed response. These comments include ARCO's comments on ARARs and the Risk Assessment and comments from the U.S. Department of the Interior.

2.0 OVERVIEW OF COMMENTS

The major concerns expressed during the RI/FS process focused on the permanence of the cleanup and the ultimate land use at the site. Most private citizens and local community groups expressed strong support for EPA's Preferred Alternative as outlined in the Proposed Plan.

The Preferred Alternative allows for the local community's desire to develop a golf course and historic trail. A significant number of comments are related to these proposals. Although some comments and responses are related to the golf course and historic trail and are in Section 3.0, many of the comments are related to issues beyond the scope of Superfund. There are two active community organizations, the Golf Course Authority Board and First Montana Heritage Park and Partners, Inc., currently working on these unrelated issues and EPA suggests that these concerns be brought before these groups.

The Golf Course Authority Board has recently been formed to develop and implement the proposed golf course. The Old Works Historic Interpretive Trail is an active project of the First Montana Heritage Park and Partners, Inc., a non-profit corporation, whose mission is to develop a historic and cultural corridor and park in and between both Anaconda and Butte.

3.0 RESPONSES TO COMMENTS

The following sections are divided into two parts. **Part I** lists the public comments that are non-technical in nature. These include general comments regarding the Preferred Alternative and the ability of Preferred Alternative to meet permanence criteria, concerns about specific areas of the OW/EADA OU, and concerns about the proposed golf course and historic trail. **Part II** discusses specific technical questions and concerns relating to ARARs, Wetlands, the RI, and the Risk Assessment.

3.1 PART I - NON-TECHNICAL COMMENTS

The following comments are divided into those received at the formal public meeting and written comments. Each commenter is identified and, in most instances, the comments are quoted directly. In some instances, the comments are paraphr sed. The EPA responses are stated after each comment.

3.1.1 COMMENTS AT THE FORMAL PUBLIC MEETING

The following are comments received at the formal public meeting. A transcript of the meeting is provided in Attachment A. Each individual commenter is identified and EPA's responses follow each comment. The comment is *italicized* and EPA's response is in regular type.

3.1.1.1 Comments from Mr. Tom Hurlock

Comment A: *"We read that there was a proposal for an automobile junkyard at Mill Creek and we think that's a poor idea."*

Response: Most areas of OW/EADA OU have been designated by Anaconda-Deer Lodge County for commercial/industrial or recreational uses. From a risk perspective, the use of the Mill Creek area for a junkyard-type activity would be acceptable under this land use designation. However, decisions to utilize property for specific uses rest with landowners or local government.

Comment B: *"I am afraid that the proposed golf course would cost us wildlife habitat and cost the taxpayers more money. I fear that the golf course would encourage land development and therefore provide less and less usable wildlife area."*

Response: Local government has designated the area around the proposed golf course for commercial/industrial and recreational use, with the exception of the Teressa Ann Terrace area that has been designated for residential use. The local government and local business community have advocated for the existence of

a golf course. EPA believes that as long as construction and maintenance of the golf course is compatible with the selected remedy, then the ultimate land use is a community decision. The selected remedy identifies revegetation of about 500 acres of currently barren waste and soil. Although not a specific goal of the remediation action, this should result in increased habitat and forage for wildlife.

EPA understands that it is the intention of Anaconda-Deer Lodge County and the Golf Course Authority Board to prevent any burden to the county taxpayers as a result of golf course construction.

Comment C: *"I would like to know the amount of chemicals that will be used on the proposed golf course."*

Response: This concern needs to be brought to the attention of the Golf Course Authority Board appointed to manage the proposed golf course. However, the potential use of chemicals (i.e., fertilizers and pesticides) will be evaluated in determining the appropriate design components (i.e., multi-media caps) for the golf course area. In addition, the effects of irrigation water will also be considered in the design.

Comment D: *"I hope that the Old Works ruins will be stabilized to prevent further deterioration."*

Response: Superfund remedies must avoid or prevent damage to historic resources, if possible, as part of a cleanup. However, stabilization or restoration of historic resources is generally not within the scope of Superfund. Stabilization or restoration of these historic resources would be the responsibility of local and state historic preservation interests. The Anaconda-Deer Lodge Historic Preservation Officer, Connie Ternes-Daniels, has been working extensively with various agencies to preserve this important historic resource.

3.1.1.2 Comments from Mr. Jim Davison

Comment A: *"I'm very supportive of the plan that has been presented and applaud the work that has gone into it."*

Response: EPA acknowledges this comment.

Comment B: *"The creation of action levels has long been requested in the community and the action level of 1,500 parts per million seemed very appropriate for long-term concerns."*

Response: Arsenic action levels have been, as Mr. Davison noted, determined for recreational (1,000 parts per million (ppm)) and industrial/commercial (500 ppm) land uses. An arsenic action level for residential land uses will be determined as part of the Community Soils RI/FS.

Comment C: *"We want to be assured that as Institutional Controls are developed and put into place that these covers stay intact and that the health and safety of the environment of the citizens are taken care of, but also that they be proactive to allow for future growth."*

Response: The Development Permit System is intended to do just that.

3.1.1.3 **Comment from Ms. Sandy Stash, ARCO**

Comment: *"ARCO is generally very in support of the Proposed Plan as outlined. We think this particular Proposed Plan meets a rather unique goal, not necessarily just Superfund, in that it does provide for cleanup, environmental cleanup, as well as economic development, and historic preservation."*

Response: EPA acknowledges this comment.

3.1.1.4 **Comment from Mr. Bill Dee**

Comment: *"I am very in favor of this Proposed Plan as it is with some reservations, but the majority of it, I think the people that have worked on it should be complimented and encouraged to continue in this proactive manner. I think that EPA has kept business in mind and the economic development of this area in mind when they have proposed this."*

Response: EPA acknowledges this comment.

3.1.1.5 **Comment from Mr. Jim Yeoman**

Comment: *"I am in approval and agree with the Preferred Alternative that you have chosen. I specifically like the idea that it will allow for some dedicated developments and potential developments because we are trying to all make a living here."*

Response: EPA acknowledges this comment.

3.1.1.6 **Comment from Ms. Natalie Fitzpatrick**

Comment: *"I am a member of ADRA and of the Arrowhead Foundation and am very much in favor of the preferred remedy. I think the work you have done is outstanding and I'm sure that the community appreciates not only the cleanup but the economic development that this will bring to the area."*

Response: EPA acknowledges this comment.

3.1.1.7 **Comment from Mr. Bill Crichton**

Comment: *"For those people that fear any waste or bad effects from chemicals used on golf courses, I think they can rest assured that golf courses don't waste chemicals ... I think that a new golf course in Anaconda would be the finest asset that could happen to southwestern Montana."*

Response: EPA acknowledges the comment. Also see response to Comment C, Section 3.1.1.1, page RS-11.

3.1.1.8 **Comments from Mr. Mel Stokke**

Comment A: *"I'm very much for the program that you have outlined."*

Response: EPA acknowledges this comment.

Comment B: *Mr. Stokke expressed both complimentary and critical comments as to EPA's past public participation efforts. Mr. Stokke stated that EPA did listen to comments and cited the Warm Springs Ponds OU as an example where public comment changed EPA's position. Mr. Stokke then discussed concerns he had about the decisions reached on the Flue Dust main flue. Mr. Stokke cited a letter sent by him to Ms. Carol Browner, which was not responded to by EPA.*

Response: The subject of this Responsiveness Summary is the OW/EADA OU. EPA values input from the public and makes every attempt to address comments either orally or in writing.

3.1.2 SUMMARY OF WRITTEN COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD

3.1.2.1 Comment from The Anaconda Chamber of Commerce

Comment: *"The Anaconda Chamber of Commerce supports the efforts of the Environmental Protection Agency and congratulates them along with ARCO and the Anaconda-Deer Lodge County Commission on their plan for the clean-up of the OW/EADA. It appears that the plan will not only restore vegetation to the area but will provide an opportunity for development."*

Response: EPA acknowledges this comment.

3.1.2.2 Comment from Anaconda Retired Teachers Association

Comment: *"We are happy to write to you in support of the Preferred Remedy indicated for the Old Works/East Anaconda Area OU. We are pleased with the attention paid to the historic smelter sites in the area as well as to the golf course."*

Response: EPA acknowledges this comment.

3.1.2.3 Comment from The Anaconda Garden Club

Comment: *"We of the Anaconda Garden Club support the Preferred Remedy for the Old Works/East Anaconda Development Area operable unit. We are particularly pleased with the plan to revegetate approximately 1500 acres over a 3-year period, establish the Jack Nicklaus golf course, and preserve historic resources with a controlled access trail system."*

Response: EPA acknowledges this comment.

3.1.2.4 Comment from Mr. Ray Lappin

Comment: *Mr. Lappin comments that he supports the Preferred Alternative. He states that "EPA, ARCO, and Deer Lodge County are to be commended for the cooperative effort shown in developing a solution to this problem."*

Response: EPA acknowledges this comment.

3.1.2.5 **Comment from Mr. Edward Sager**

Comment: *"I am in favor and support the Proposed Plan (Preferred Remedy) and recommend speedy action so as to get to the design stage as soon as possible."*

Response: EPA acknowledges this comment and indicates that ARCO has already started with preliminary design.

3.1.2.6 **Comment from Anaconda-Deer Lodge Reclamation Advocates (ADRA)**

Comment: *ADRA comments that EPA and the ADRA members have come to a "complete understanding" of the Proposed Plan and that it is their belief that the whole community will be in favor of the plan.*

Response: EPA acknowledges this comment.

3.1.2.7 **Comment from Ms. Bonnie Sturm**

Comment: *"I support the Proposed Plan for the Old Works/East Anaconda Development Area operable unit."*

Response: EPA acknowledges this comment.

3.1.2.8 **Comments from Mr. James Milo Manning**

Comment A: *"As Planning Director of Anaconda-Deer Lodge County, I support the Preferred Alternative as recommended by EPA. This alternative provides for the protection of human health and environment, and yet for the first time in CERCLA history, it takes into consideration the needs and desires of the community, both in regard to economic development and historic preservation."*

Response: EPA acknowledges this comment.

Comment B: *"I do believe there needs to be additional discussion on those areas with potential commercial and industrial development that have arsenic levels in excess of 500 ppm."*

Response: EPA and MDHES have modified the Preferred Alternative to address concerns that no remediation in potential commercial/industrial areas would occur until the time of development. The Selected Remedy will remediate all areas with waste sources and soils exceeding arsenic concentrations of 1,000 ppm in

potential commercial/industrial areas to below 1,000 ppm. Final remediation to the commercial/industrial level of 500 ppm would occur through the Development Permit System at the time of development.

3.1.2.9 **Comment from Ms. Rose Nyman**

Comment: *"Please consider allowing a tour of the Old Works by the Historic Resources Board ... I am hopeful that EPA and/or ARCO will prepare a documentary video of the Old Works as it is at this time."*

Response: Arrangements can be made through ARCO to obtain a guided tour of the Old Works area. A documentary video could be a negotiated mitigation measure as part of the Second Programmatic Agreement for implementation of the RHPP. EPA suggests that Ms. Nyman contact Connie Daniels, Local Historic Preservation Officer.

3.1.2.10 **Comments from Mr. George Heath**

Comment A: *"Your Proposed Plan looks to be acceptable in controlling further contamination of the ground water."*

Response: EPA acknowledges this comment.

Comment B: *"How does a construction firm obtain bid information on EPA funded work? Is Superfund private money or Federal? If Federal, why aren't the jobs advertised?"*

Response: EPA is a federal agency and consequently all procurement laws must be followed for any work that is done by EPA. However, to date, the work that has been done in Anaconda has been done by ARCO under EPA order. Consequently, ARCO does the actual hiring of all construction workers. EPA suggests that Mr. Heath contact ARCO to determine how he might be included on ARCO's bid list.

3.1.2.11 **Comments from Mr. Lee Bastian, Regional Park Manager, Montana Department of Fish, Wildlife and Parks**

Comment A: *"It appears that your plan has been thoroughly thought out and well organized. Your Preferred Alternative sounds logical and should address the problems."*

Response: EPA acknowledges this comment.

Comment B: *"I am writing to address the Stack and the 2.2 acre site the department manages. The department would like to suggest that if any development opportunities arise that will benefit or enhance these two areas or help solve some of the issues raised at that October 6 meeting, we would appreciate being involved."*

Response: The stack itself is outside the area of this selected remedy; however, the 2.2 acre site referenced is within the OW/EADA OU. Currently the site is paved and is presently utilized as a parking area. Remediation of this area will not only be protective of human health and the environment but will consider future land use by Fish, Wildlife, and Parks. Design plans for this and the surrounding area will be forwarded to Fish, Wildlife, and Parks.

3.1.2.12 **Comments from Ms. Nicki Leiss**

Comment A: *"I am in agreement with the EPA on the clean-up of the Old Works/East Anaconda Development Area."*

Response: EPA acknowledges this comment.

Comment B: *"The Proposed Plan calls for only a 75% cover or 'cap' of the Red Sands and in order to avoid future problems and costs which will likely happen due to potential drainage error - a complete 100% cover or 'cap' would be the solution of the Red Sands Area."*

Response: EPA believes that an engineered cover best prevents direct human contact to Red Sands material and reduces the rate of infiltration of water to the Red Sand material. The EPA believes the Red Sands are a potential source of metal loading to ground water. As noted, a portion of the Red Sands will remain uncovered in the interest of preserving the historic integrity of the Red Sands area. The extent of Red Sands material left uncovered will be determined by EPA during remedial design. However, EPA and MDHES agree that uncovered areas of the Red Sands will only include portions of the steep, well-consolidated walls, which do not readily promote infiltration of precipitation and wind erosion, while offering an excellent cross-sectional view of the Red Sands material.

3.1.2.13 **Comments from Mr. and Mrs. Duane and Cindie Green**

Comment: *Mr. and Mrs. Green raise several concerns regarding the proposed golf course. These relate to the weather often being unpredictable, the cost of the course, the possibility that some costs may fall to the taxpayers of Deer Lodge*

County, and suggest that ARCO buy back lands surrounding Anaconda from the timber companies and give those lands as a gift to Anaconda.

Response: EPA suggests that Mr. and Mrs. Green bring these suggestions to the recently appointed Golf Course Authority Board or to the Anaconda-Deer Lodge County Commission. EPA's role in the golf course development is limited to ensuring that the remedy is protective of human health and the environment. The use of this land for a proposed golf course, or anything else, rests with the community through the local government.

3.1.2.14 Comments from Ms. Mary Kay Craig, Clark Fork-Pend Oreille Coalition

Comment A: *"The Clark Fork-Pend Oreille Coalition is not in favor of perpetual 'management' of wastes in-situ rather than good permanent clean-up. The Preferred Alternative can set a precedent for leaving wastes in place. We do not believe that this is good public policy. The remedy alternatives considered for this site - engineered covers, revegetation, surface controls, stream channel controls, monitor, and Institutional Controls ... do not give Superfund's mandate for 'permanence' the weight we believe Congress intended. We note that some wastes will be left untreated. We are concerned what permanent controls will be put into place to assure citizens and tourists don't stray from proposed trails into areas seriously contaminated with arsenic."*

Response: EPA believes that the selected remedy which utilizes treatment and containment options meets the criteria for permanence. The selected remedy also balances other criteria, such as long and short-term effectiveness, reduction of toxicity, mobility, volume through treatment, cost, and state and community acceptance, to provide the most appropriate remedy for this site.

All alternatives considered in the feasibility study (FS) would have left waste in place. However, an alternative to excavate waste material was considered as a preliminary alternative. This excavation alternative, which would have still left waste in place, was screened out because it was not determined to be effective, in proportion to cost, in minimizing metal loading to ground water and would be difficult to implement.

EPA does not consider off-site disposal preferable to treatment or containment options. Remedy selection is site specific and does not necessarily set precedent for future remedial actions at other OUs.

Institutional controls are considered an element of the selected remedy and are not intended to be the primary cleanup measure. Institutional controls are expected to actively manage future land use and activities to protect engineering controls, facilitate future engineering controls, and restrict access at the site. These controls will be implemented by the local government and are considered to be long term. EPA will continue to review the effectiveness of these controls in protecting human health and the environment. EPA could require additional engineering measures to be taken if institutional controls are not deemed protective.

In areas where wastes will not receive engineering controls (along the historic trail), institutional controls (i.e., trail covers, barriers, fencing and/or security measures) are intended to restrict access to wastes. In the event that occasional trespassers contact these wastes, risk is not likely to be excessive.

Comment B: *Ms. Craig expresses concern that the addition of lime is not permanent because it "freezes heavy metal toxins in place." She asks that EPA respond to the issue of soil attenuation and its ability to provide a permanent solution.*

Response: Application of lime during implementation of the selected remedy is proposed in areas designated for revegetative treatment. Generally, areas designated for revegetative treatment demonstrate contamination by arsenic and metals from fallout of smelter emissions in surface (0-2") soil materials only. Information collected during the RI demonstrated that migration of contaminants deposited by smelter emissions into the subsurface was very limited. While these areas do not pose a significant threat to ground water at the site, they do present significant concerns related to direct human contact and migration of contaminants as a result of wind erosion and surface water runoff. Application of lime (to neutralize soil pH) and soil nutrients, followed by extensive deep tilling of near-surface soil material, will permanently reduce arsenic concentrations at the surface to acceptable levels, as well as promote a sustainable vegetation cover to minimize erosion. Since metals cannot be destroyed, changing the form or environment in which the metal exists can effectively stabilize the material for a very long time.

Conversely, other waste material at the site may pose a potential threat to ground and surface water. Waste material at the site will not be treated with lime but will be capped with a sufficiently thick soil cover to promote sustainable vegetation. The vegetated cap will prevent direct human contact with unacceptable arsenic concentrations, as well as minimize infiltration and the rate of deep percolation of metal-laden pore water. However, the ability of soil beneath waste to attenuate migrating solutes emanating from waste

material will continue to play a significant role in minimizing the rate of metal entering ground water beneath waste material at the site. Information presented in the OW/EADA RI Report suggests only limited contamination of ground and surface water from wastes at OW/EADA. EPA believes that the selected remedy will address these problems. To ensure the effectiveness of the remedy, however, long-term monitoring will be implemented.

Comment C: *"I would appreciate hearing how in-place management of contaminants -- the preferred remedy for 100% of this operable unit -- permanently protects ground water emanating from its sites."*

Response: Characterization of ground water at the site indicates exceedances of federal and state drinking water standards are observed on a local scale in the vicinity of the former Arbiter Plant. Removal of waste in the Arbiter Ponds and Old Works Tailings Ponds during the Arbiter/Beryllium ERA in 1992 was a source control measure that also addressed ground water exceedances in the vicinity of the Arbiter Plant. These wastes were considered primary sources of ground water contamination at the site because of their location relative to existing ground water high concentration plume locations and their ability to directly interact with ground water at the site.

Currently, waste material remaining at the site does not meet characteristic requirements to be defined as a hazardous waste and does not directly interact with ground water of the shallow alluvial aquifer. Although data indicate that some metal loading is occurring in ground water beneath remaining waste material (Heap Roast, Jig Tailings, and Red Sands) at the site, the current rate of loading does not result in exceedances of federal and state drinking water standards. Nevertheless, because ground water quality is impacted resulting in metal concentrations that might exceed ambient water quality criteria, EPA believes it necessary to limit leaching of metals to ground water. Since ground water does not recharge surface water in Warm Springs Creek, ground water at the site does not pose an immediate threat to water quality conditions of Warm Springs Creek.

A strategy to minimize the impact of waste material on ground water quality was adopted in the selected remedy. Implementation of a soil cap of sufficient thickness to sustain a good vegetation cover on waste remaining at the site is expected to reduce the rate of infiltration and deep percolation of metal-laden pore water through waste material, thus improving ground water quality at the site. A ground water monitoring program is included as part of the selected remedy. Also, a five-year review to evaluate the protectiveness of the remedy will be made by EPA.

3.1.2.15 Comments from Mr. Don Stoecker

Comment A: *Mr. Stoecker expresses concern that the metals and arsenic will leach into the creek from certain areas of the Old Works that were to be planted with grass, shrubs, or trees. He asks how this would prevent the metals and arsenic from leaching into the ground or into the creek. He also expresses concern about the proposed golf course and the irrigation that will occur.*

Response: The water quality of the Warm Springs Creek is generally good under the current conditions of the site. There have been no exceedances of maximum contaminant limits (MCLs) in surface water of Warm Springs Creek, with limited exceedances of Ambient Water Quality Criteria for aquatic organisms for copper and lead observed, usually in the spring. The selected remedy includes protection of the water quality of Warm Springs Creek through the stabilization of dikes, capping of waste material to prevent erosion, and routing of runoff from Stuckey Ridge and the Upper and Lower Works basins to remove sediment and minimize discharge to Warm Springs Creek.

The proposed golf course will use more natural substances for growth enhancement and will include a computerized state-of-the-art watering system to minimize water infiltration. In addition, drainage controls such as containment ponds, will be used at the site.

See also response to Comment C in Section 3.1.2.14, page RS-19, and Comments B and C in Section 3.1.2.16, page RS-22.

Comment B: *Mr. Stoecker expresses concern that "weeds and tules were being disrupted and were going over the dam" at Warm Springs Ponds.*

Response: As this Responsiveness Summary deals with concerns related to the OW/EADA OU, Mr. Stoecker's concerns regarding the Warm Springs Ponds were referred to Mr. Scott Brown, EPA Project Manager for the Warm Springs Ponds.

3.1.2.16 Comments from One Anonymous Commenter

Comment A: *"I was informed that there is a Superfund federal law that states that there can be no transfer of title to land that is officially Superfund property until that said land is reclaimed."*

Response: The transfer of land within a Superfund site is not prohibited. The commenter may be referring to Superfund liability which states that any owner, operator,

or transporter of hazardous materials may be held liable by EPA for the costs of any proposed cleanup activity.

Comment B: *The commenter states that it doesn't make any sense to pour hundreds of thousands of gallons of water on a golf course with contaminated ground under it.*

Response: The selected remedy will consolidate and grade waste sources to minimize the effects of water (precipitation and irrigation) by routing water away from the wastes, thus minimizing infiltration. In addition, waste sources that would receive irrigation water (greens and tee boxes) will be covered with multi-media caps designed to prevent water from reaching below the waste material. Impermeable or drainage layers will be incorporated into the cap design.

Irrigation water will be controlled to only provide water to wet the clean soil cover. This water will be utilized by the plant and/or evapotranspired to the atmosphere. Moisture-sensing devices will limit water during irrigation to prevent excess water from migrating below the clean soil zone. In addition, ground water quality will be monitored to detect any increase of contamination due to irrigation.

3.1.2.17 Comment from Mr. Mike Fitzgerald, Upper Clark Fork River Superfund Technical Specialist

Please note that Mr. Fitzgerald made comments of a technical nature. Mr. Fitzgerald's technical comments are answered in Section 3.2.2, page RS-26.

Comment: *The Proposed Plan has to be complimented on its display of good communications between all parties and, as concluded in the Feasibility Study, appears to be: "1.) An implementable and comprehensive plan that is capable to deal with the potential human health and environmental problems that exist at the site, 2.) In compliance with the ARARs, and 3.) A cost effective solution that is flexible in considering the short and long-term community planning needs."*

Response: EPA acknowledges this comment.

3.1.2.18 Comments from ARCO

Please note that ARCO also submitted extensive comments of a technical nature. These comments on ARARs and the Risk Assessment are answered in Section 3.2.3, page RS-26.

Comment A: *ARCO generally supports EPA's Preferred Alternative identified in the Proposed Plan to address conditions existing in the OW/EADA OU. ARCO believes that the Preferred Alternative satisfies the requirements of CERCLA and the NCP, and at the same time, will not hinder the commercial and recreational development contemplated for the OW/EADA OU by Anaconda-Deer Lodge County and the Town of Anaconda.*

Response: EPA acknowledges ARCO support for the Preferred Alternative and ARCO's recognition that the Preferred Alternative satisfies the requirements of CERCLA and the National Contingency Plan (NCP). EPA believes that the selected remedy best satisfies the criteria of CERCLA and the NCP.

Comment B: *ARCO requests that EPA reconsider and reject the portion of the Preferred Alternative which provides for the construction of an engineered cover over a portion of the Red Sands in Subarea 4. ARCO believes that the Red Sands do not pose a sufficient threat to human health and the environment to require construction of an engineered cover over any portion of the Red Sands. Rather, ARCO believes that the implementation of surface controls, drainage and dust controls will be sufficient to protect human health and the environment and will more effectively minimize impacts to the historical features of the Red Sands.*

Response: EPA believes that an engineered cover over portions of the Red Sands increases the protectiveness of the Preferred Alternative. The engineered cover will provide an adequate barrier to the majority of the Red Sands, which contain the highest average arsenic values of any waste in the OW/EADA OU. In conjunction with institutional controls, this will substantially reduce exposure to human receptors.

Also, an engineered cover best reduces infiltration of water to the Red Sands material, which is identified in the RI to be a potential source of metal loading to ground water.

Finally, EPA believes an engineered cover will provide better long-term effectiveness by best controlling fugitive dust. Water sprays and other dust control measures would be effective over the short term during construction, but long-term dust control, without an engineered cover, would continue to be a problem. Thus, the selected remedy provides the best balance of criteria.

3.2 PART II - TECHNICAL COMMENTS

This section contains the comments of a technical nature, along with the respective EPA responses. All comments received were in written format. Each commenter is identified and, in most instances, the comments are quoted directly. In some instances, the comments are summarized.

3.2.1 COMMENTS FROM MR. MIKE FITZGERALD, UPPER CLARK FORK RIVER, SUPERFUND TECHNICAL SPECIALIST

Comment A: *Mr. Fitzgerald expresses concern that the Remedial Investigation's usage of uniformly distributed sampling and mathematical averaging may be misleading and that this method might possibly result in an erroneous proposal of no-action for the southeast corner of Subarea 5. He suggests that "the elevated near-surface and subsurface arsenic values appear to warrant a capping and combined erosional control remedy at a minimum."*

Response: Although samples may be averaged over an area to characterize that area, individual sample points or hotspots are also evaluated. The selected remedy, acknowledging the selected action level, takes into account both average and individual sample data. This also results in some locations of the sites where individual samples are below the action level to be remediated.

The selected remedy does not provide for further engineering controls in the southeast portion of Subarea 5 as this area was previously covered. EPA evaluated this cover and believes it to be protective and consistent with the selected remedy. However, surface and institutional controls will be implemented to protect the existing cover. Additional areas will be covered as part of the Flue Dust remedial action to match those covers currently existing in this area.

Comment B: *Mr. Fitzgerald disagrees with the conclusion that the observed increase of in-stream metal loadings of Warm Springs Creek across the site are solely due to stream channel configuration. He suggests that there may be a potential data gap from the lack of overland and surface runoff data. He also suggests that a non-point source contribution and/or connection needs to be added to the conclusions for the observed gain in metal loadings across the reach. He suggests that this point should become an integral part of the monitoring program to test effectiveness of the Proposed Plan's surface treatments, engineering covers, and drainage controls.*

Response: EPA agrees with Mr. Fitzgerald's assessment of the lack of runoff data collected at the site during the RI. Several attempts over several years to collect runoff data were not successful due to the lack of precipitation and runoff. Although runoff data was limited, EPA believes runoff from the site to be a potential source of metals in Warm Springs Creek. The selected remedy will provide for surface controls to minimize runoff as well as preventing erosional effects due to flooding. Surface water monitoring will be included in the compliance monitoring program.

3.2.2 COMMENTS FROM MR. DALE HARMS, STATE SUPERVISOR, MONTANA STATE OFFICE, U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE (USFWS)

Comment: *The USFWS was unable to locate the Preliminary Analysis of Impacts to Wetlands, as described in ARCO's January 27, 1992, Wetland Issues letter to EPA cited in the RI/FS, and recommends that one be done prior to final remedy selection. Also, USFWS identifies two ARARS for inclusion to the ARARs section of the RI/FS. They believe that the remedial action must comply with these ARARs. These requirements are The Bald Eagle Protection Act of 1940, as amended, 16 U.S.C. 668, et seq., and The Migratory Bird Treaty Act of 1918, as amended, 16 U.S.C. 703, et seq.*

Response: The only "wetlands" that would be disturbed by any of the alternatives would be portions of the riparian habitat alongside Warm Springs Creek. The potential disturbance by all of the alternatives would be associated with the removal and replacement of bridge(s) across Warm Springs Creek. All of the alternatives included the same action in regard to this riparian habitat and all alternatives included the same mitigative measures, which would be the replacement of any damaged riparian habitat. Therefore, no greater detail or Preliminary Analysis of Impacts to Wetlands was believed necessary in the RI/FS.

Both of the above-identified ARARs were inadvertently omitted from the ARARs list and are considered ARARs for the OW/EADA OU. However, it is not anticipated that mitigative measures will be required for compliance with these ARARs.

3.2.3 COMMENTS FROM ARCO

The technical comments from ARCO are divided into two parts. The first section presents ARCO's comments regarding the ARARs associated with the OW/EADA OU, and the second section presents ARCO's comments on the Baseline Risk Assessment.

3.2.3.1 Comments from ARCO Relating to ARARs

ARCO's comments regarding potential ARARs are found in the following documents:

1. *Old Works/East Anaconda Development Area Operable Unit Remedial Investigation/Feasibility Study Supplemental Scoping Document Applicable or Relevant and Appropriate Requirements Under Section 121(d) of CERCLA (ARARs)* (March 1, 1993) DOCUMENT 1

2. *Anaconda Smelter Site Old Works Operable Unit Engineering Evaluation/Cost Analysis Scoping Document, Applicable or Relevant and Appropriate Requirements Under Section 121(d) of CERCLA* (February 1990) DOCUMENT 2

General Comment: EPA is responding only to those ARCO comments with which EPA is in disagreement or those that require clarification.

Comment A: *Document 1, Section I.A., Page 1, Paragraph 1 through Page 3, Paragraph 1, Scope of ARARs Analysis for OW/EADA OU. ARCO agrees with the statement in Section 2.4 of the Preliminary Draft Screening Document, dated March 25, 1993, that "[f]inal remediation of air and groundwater and surface water within the OW/EADA OU is not within the scope of the anticipated response action." Remediation of ground and surface water is not within the scope of the OW/EADA OU and will be addressed, as appropriate, under the Anaconda Regional Water and Waste (ARWW) OU.*

ARCO also agrees that no action will be taken under the remedial action for the OW/EADA OU that will adversely impact existing air and water quality. Furthermore, ARCO states that preliminary remedial action goals for ground and surface water will be developed under the ARWW OU, and that preliminary remedial action goals include ARARs.

It is ARCO's position then that because remediation of ground and surface water is outside the scope of the OW/EADA OU, and because preliminary remediation goals for ground and surface water will be developed under the ARWW OU, it is not necessary nor appropriate to identify ARARs for ground or surface water under the OW/EADA OU.

ARCO requests that Federal and State surface and ground water requirements be deleted from the ARARs identified in the Preliminary Draft Screening Document for the OW/EADA OU.

Response: EPA identified ground and surface water requirements in the March 25, 1993, ARARs document for the purposes of 1) prohibiting degradation of these media by this response action and 2) achieving consistency with the ARWW OU response action. Specifically, these ARARs are intended to aid in the identification of sources of contamination to ground and surface water and for developing remedial alternatives.

Since ground and surface water requirements have been scoped out of the ARARs for the OW/EADA OU, EPA will not further respond to comments regarding these requirements. However, it is still required that this response action not degrade existing water quality.

The ground and surface water requirements identified in the March 25, 1993, ARARs document were not intended to be performance standards or final ARARs for the OW/EADA OU. On this basis, ground and surface water requirements have not been identified as final ARARs or performance standards for the OW/EADA OU. Consistency between the ARWW OU and the OW/EADA OU will be achieved through identification of sources of releases and minimization of releases that would result in unacceptable adverse impacts to ground and surface water.

Comment B: *Document 2, Page 15, Paragraph E and Document 1, Page 3, Paragraph B. "Section 121(d)(2)(A) of CERCLA unambiguously provides that 'the remedial action selected under Section 9604 or secured under Section 9606 require, at the completion of the remedial action ... [attainment of ARARs].'" It is ARCO's position that EPA should not impose upon itself a requirement to invoke a waiver under Section 121(d)(4) of CERCLA if an ARAR cannot be attained during a removal action. If the Agency continues to take this position, the interim measures waiver under Section 121(d)(4)(A) of CERCLA may be appropriate for some activities conducted during the removal action for the OW/EADA OU.*

Response: Any reference or comments relating to attainment of ARARs during removal actions will not be addressed by EPA at this time since the removal actions associated with the OW/EADA OU have already been accomplished. Generally, it is EPA's position that ARARs must be attained for hazardous substances remaining on site at the completion of the remedial action. In addition, EPA intends that the implementation of remedial actions should also comply with ARARs to protect public health and the environment. All remedial actions should attain action- and location-specific requirements that have been identified as ARARs while the remedial action is be conducted, unless a waiver is justified. ARARs used to determine final remediation levels

need be met only at the completion of the remedial action. See, 55 Fed. Reg. 8755.

Comment C: *Document 1, Section II.A.1. and 2., Pages 4-7, Safe Drinking Water Act Requirements. ARCO states that National Primary and Secondary Drinking Water Regulations 40 C.F.R. Parts 141 and 143, should not be considered ARARs for the OW/EADA OU according to the reasons previously set out regarding Federal and State ground and surface water requirements being deleted from the ARARs identified in the Preliminary Draft Screening Document for the OW/EADA OU.*

Response: EPA will not respond specifically to this comment since EPA has agreed that ground and surface water requirements have been scoped out of the OW/EADA OU. However, EPA continues to stress that no implementation of the remedial action at the OW/EADA OU should adversely affect ground and surface water, nor be inconsistent with any remedial action conducted under the ARWW OU.

Comment D: *Document 1, Page 7, Paragraph No. 3, Air Quality Requirements. ARCO notes that the Clean Air Act requirements identified in Section 3.1.3 of the Preliminary Draft Screening Document should not be identified as "applicable" requirements, and would only be potentially "relevant and appropriate" to OW/EADA OU remedial activities if those activities qualify as a "major source."*

ARCO does not anticipate that any of the remedial action alternatives under consideration for the OW/EADA OU will create a "major stationary source" that results in an exceedence of a primary or secondary National Ambient Air Quality Standards (NAAQS).

Response: Clean Air Act regulations for particulate matter and dust control practices that achieve ambient air quality standards will be met for potential releases into the air resulting from remedial activities at the OW/EADA OU.

The attainment of NAAQS are required to protect the public health and the public welfare. EPA has promulgated NAAQS for the following six pollutants (called "criteria pollutants"): particulate matter equal to or less than 10 micron particle size (PM-10), sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. Primary standards are set at levels to protect public health. Secondary standards are set at levels to protect public welfare.

According to Section 107 of the Clean Air Act, each state has the primary responsibility for assuring that NAAQS are attained and maintained. Section 110 requires each state to adopt and submit to EPA for approval, a plan for the implementation, maintenance, and endorsement (known as State Implementation Plan (SIP)) of the NAAQS. Upon EPA approval, the SIP becomes federally enforceable. The State of Montana Ambient Air Quality Standards in ARM § 16.8.802, *et seq.*, are applicable to releases into the air from OW/EADA OU remedial activities, regardless of whether considered a "major source."

NAAQS provisions establishing standards for PM-10 and lead emissions to air are applicable to the remedial activities at OW/EADA OU. The corresponding state standards are found at ARM § 16.8.815 (lead) and ARM § 16.8.821 (PM-10).

Comment E: *Document 1, Page 8, Paragraph No.4. ARCO agrees with EPA that RCRA Subtitle C requirements are not applicable to the OW/EADA OU. ARCO strongly disagrees with the statement made by EPA that, "certain RCRA standards, and their State counterparts, are relevant and appropriate for the proposed remedial alternative for the OW/EADA remedial action.*

Response: EPA has stated in its *Clarification of Applicable or Relevant and Appropriate Requirements, Standards, Controls, Criteria, or Limitations for the Anaconda Smelter Superfund Site Old Works/East Anaconda Development Area Operable Unit Remedial Action* document dated September 16, 1993, that Resource Conservation and Recovery Act (RCRA) Subtitle D requirements are relevant and appropriate for the OW/EADA OU. Subtitle C requirements are neither applicable nor relevant and appropriate to the OW/EADA OU.

It is EPA's position that RCRA Subtitle C requirements, may in a proper case, be relevant and appropriate to Bevill excluded waste so long as the conditions at 40 C.F.R. § 300.400(g)(2) are met. See, 55 Fed. Reg. 8764.

Also ARCO cites to United States v. Iron Mountain Mines, Inc., Civ. No. S-92-768 MLS (E.D. Cal. 1993), however, in Louisiana Pacific Corporation, *et al.* v. ASARCO Incorporated, 1993 U.S. App. LEXIS 24404, (9th Cir. 1993), the Court ruled that a waste excluded from regulation under Subtitle C of RCRA by the so-called Bevill Amendment may nevertheless be a hazardous substance under CERCLA. See also, Report and Recommendation of United States Magistrate Judge, Re: ARCO Partial Motion to Dismiss, February 3, 1993, Magistrate Judge Robert Holter, in United States v. Atlantic Richfield

Company, Inc., and Cleveland Wrecking Company, Inc., No. CV-89-39-BU (D. Mont. 1994).

40 C.F.R. Part 257 establishes criteria under Subtitle D of RCRA for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on human health and the environment. This part is applicable whenever there is a "disposal" of any solid or hazardous waste from a "facility."

The activities to be performed for the OW/EADA OU remedial action are expected to comply with the federal requirements found in 40 C.F.R. Part 257 and State requirements found at ARM § 16.14.501, *et seq.*

Comment F: *Document 1, Page 12, Paragraph B.1. ARCO agrees that the Surface Mining Control and Reclamation Act (SMCRA) requirements are not applicable to any remedial action which may be undertaken at the OW/EADA OU. However, ARCO contests the assertion that SMCRA requirements may be relevant and appropriate to the remedial alternatives under consideration for the OW/EADA OU.*

Response: Although SMCRA is relevant and appropriate at this OU, it is not listed as an ARAR because state requirements found in Montana's Strip and Underground Mine Reclamation Act, MCA § 82-4-201, are deemed more appropriate.

Comment G: *Document 1, Page 35, Paragraph 3. ARCO states MCA §75-7-102 is not an ARAR because this statute does not in and of itself define a level or standard of control, or degree of cleanup.*

Response: EPA disagrees with ARCO's statement that MCA § 75-7-102 is not an ARAR. It is EPA's position that MCA § 75-7-102 is an ARAR; the statute prohibits sedimentation and erosion.

Comment H: *Document 1, Page 35, Paragraph 4. The Montana Solid Waste Management Act, MCA §§ 75-10-201 to 233, is neither applicable nor relevant and appropriate to the OW/EADA OU because the Act specifically excludes "mining wastes regulated under the mining and reclamation laws ... " from the definition of "solid waste." The remedial action alternatives considered for the OW/EADA OU do not involve the "disposal" of solid wastes.*

Response: Regulations found at 40 C.F.R. Part 257 and Montana Solid Waste Management Regulations provide criteria for classification of solid waste disposal facilities and practices. "Disposal" is defined under these regulations as "the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters." "Facility" means "any land and appurtenances thereto used for the disposal of solid wastes."

It is the position of EPA and the State of Montana that since the Anaconda Smelter site is not a permitted mining facility and accordingly, the mining wastes are not regulated under the mining and reclamation laws, the wastes located within the OW/EADA OU are not excluded from the definition of "solid waste." Furthermore, the definition of disposal includes the act of consolidation of wastes.

ARCO's comment pertains primarily to disposal in conjunction with Subtitle C requirements. Since EPA's position is that Subtitle D requirements are relevant and appropriate to the OW/EADA OU, the strict definition of disposal is irrelevant because Subtitle C requirements are not applicable here.

3.2.3.2 Comments from ARCO Relating to the Baseline Risk Assessment

The EPA has prepared a Baseline Risk Assessment for the OW/EADA OU of the Anaconda Superfund Site in Anaconda, Montana. This document was included as Appendix M of the OW/EADA RI/FS Report (ARCO, 1993). During the preparation of this document, the EPA received a number of suggestions and comments from ARCO. The following summarizes those comments and presents EPA's responses.

Scoping Document

In a scoping document prepared in 1990, ARCO provided comments on a number of issues related to the risk assessment process, including numerous comments related to the evaluation of exposure and risk of residents. Because the final Baseline Risk Assessment for the OW/EADA OU did not include an evaluation of residents, ARCO's comments regarding residential exposure and risk were not considered in this report. EPA will consider these comments when risks to residents are evaluated. Comments relating to other aspects of the risk assessment process are presented below.

Comment A: *There is an inconsistency between EPA's stated objective of calculating the reasonable maximum exposure (RME) as the upper 95th percentile of the exposure distribution curve and the actual means used to derive the RME value. This is because the product of several 95th percentile exposure parameters is not equal to the 95th percentile of the product. One way to solve this problem is to incorporate an estimate of the likelihood of occurrence of the assumed exposure conditions. The second way is to use Monte Carlo modeling. ARCO recommends that EPA not use the default RME approach.*

Response: The default method used by EPA to calculate RME values is not based on multiplying a series of 95th percentile exposure parameters together. Rather, a combination of 95th percentile values and average values are employed. Typically, the parameters entered as 95th percentile values are those with the widest variability, and the resulting product will generally be close to the true 95th percentile of the product. EPA recognizes that this is a rather simple way to estimate terms that could be estimated more precisely by Monte Carlo modeling, but does not feel that data presently available are adequate to define probability distribution functions (PDFs) for the worker or recreational visitor scenarios. (These are the only populations considered in the Baseline Risk Assessment). EPA will consider using Monte Carlo modeling when evaluating exposure of residents.

Comment B: *Metals in surface soils (top 2-3 inches) are the primary source of exposure, and the risk assessment should be limited to surface soils.*

Response: EPA agrees that surface soil is the chief medium of concern for current exposure scenarios. In general, if locations exist where subsurface soil are substantially more contaminated than surface soils, then it is often appropriate to evaluate possible future exposures to those buried wastes. At this site, no such locations were identified.

Comment C: *Contaminant concentrations in indoor dust should be based on site-specific measurements, if possible. If not, the concentrations in indoor dust should be estimated from algorithms based on data from other sites.*

Response: EPA has used site-specific data collected by ARCO to characterize the relation between arsenic levels in soil and indoor dust. Because no site-specific data exist on soil/dust relationships for other chemicals

(cadmium, lead), the EPA default assumption (dust = soil) was used for these chemicals.

Comment D: *The risk assessment should distinguish between three types of waste, including 1) flue dust in the remnants of flues, 2) tailings piles, and 3) slag piles.*

Response: EPA agrees that exposures to these different types of wastes may differ and has used different exposure assumptions for the different waste locations.

Comment E: *Evaluation of risk from airborne contaminants should be based on long-term (quarterly or yearly) average values measured at several on-site monitoring stations.*

Response: EPA agrees that inhalation risks should be based on long-term average concentration values in air. At this site, available monitoring data indicate that inhalation exposure to wind-eroded particles is not of significant concern, so this pathway was not evaluated quantitatively in the Baseline Risk Assessment. However, mechanical disturbances of soil or wastes piles (such as might be caused by dirt bike riding) could lead to much higher local concentrations, so this pathway was evaluated for the dirt bike rider scenario.

Comment F: *The concentration of contaminants in indoor air should be estimated using an algorithm that accounts for entry of dust particles from outside, the occurrence of respirable dust particles indoors, and the resuspension of indoor dust.*

Response: EPA has concluded that the inhalation pathway is likely to be of minor concern at this site, so estimation of contaminant concentration in indoor air was not required.

Comment G: *Because a municipal drinking water system exists, drinking water is not a significant route of exposure. If EPA does evaluate drinking water, a sampling protocol similar to that in Appendix B of ARCO's scoping document (ARCO, 1990) should be used.*

Response: EPA recognizes that it is fairly unlikely that ground water from beneath the OW/EADA OU will be used for drinking water, at least in the near future. Nevertheless, this does not mean that wells might not be installed in the future, and there are a number of locations not far from

the site where wells are currently in use. Thus, EPA believes that it is reasonable and appropriate to evaluate potential future risks from the drinking water pathway. Note that this does not necessarily oblige EPA to include the risks from ground water when considering soil remedial actions at the site. The protocol referred to in Appendix B is useful for evaluating current residential wells but is not useful for assessing exposure from hypothetical future wells. This can be done only by consideration of data from on-site monitoring wells.

Comment H: *For evaluation of human exposure to contaminants in surface water via swimming, average concentration values should be used.*

Response: The Baseline Risk Assessment evaluates risks to workers and dirt bike riders, and neither of these populations is assumed to be exposed to surface water by swimming. This comment will be considered when evaluating exposure of area residents who may occasionally swim or play in Warm Springs Creek.

Comment I: *Fish ingestion is not expected to be a significant route of exposure. If EPA does pursue a quantitative assessment of this pathway, the concentration of contaminants in edible tissue should be estimated using the bioconcentration factors for trout.*

Response: The Baseline Risk Assessment evaluates risks to workers and dirt bike riders, and neither of these populations is assumed to be exposed to fish from Warm Springs Creek. This comment will be considered when evaluating exposure of area residents who may occasionally fish in Warm Springs Creek.

Comment J: *Home-grown fruits and vegetables are not likely to be a source of exposure. If EPA chooses to quantify this pathway, contaminant concentrations should be measured rather than modeled, if possible. If not, calculation of vegetable concentrations should take site-specific data into consideration.*

Response: The Baseline Risk Assessment evaluates risks to workers and dirt bike riders, and neither of these populations is assumed to be exposed to home-grown garden vegetables. This comment will be considered when evaluating exposure of area residents who may consume fruits or vegetables from local gardens.

Comment K: *The primary populations with potential exposure in the Old Works are 1) current residents of Teressa Ann Terrace and Cedar Park Estates, 2) workers in on-site businesses, and 3) recreational visitors to Benny Goodman Park and publicly accessible lands.*

Response: The definition of the OU has been revised since the time this comment was written, and the OW/EADA OU no longer includes Teressa Ann Terrace or Cedar Park Estates. Thus, the EPA has included an evaluation of on-site workers and recreational visitors (dirt bike riders) as suggested, but has deferred an evaluation of future on-site residents.

Comment L: *Recreational use scenarios must be developed using site-specific data.*

Response: EPA agrees and has done so in this case.

Comment M: *The averaging time for lifetime exposure should be 75 years.*

Response: Current EPA guidance specifies that a value of 70 years should be used, and this was employed in the Baseline Risk Assessment.

Comment N: *For the recreational land use exposure scenario, the amount of soil and dust intake should be extrapolated from the residential scenario based on the assumption that one third of all outdoor activity is away from home.*

Response: EPA does not agree that simple time proration is an appropriate means for estimating soil intake rates during recreational activities because soil intake while at a location depends not only on time but also on activity pattern and intake rate per unit time. For example, Stanek and Calabrese (1993) found that children derive about 50% of their total intake from outdoor soil, even though the total time spent outdoors was only a small fraction of the total time awake. In the absence of data on actual soil intakes by recreational visitors, EPA believes that an assumed intake range of 50 (average) to 100 (RME) mg/day is reasonable and appropriate.

Comment O: *The dose-response curve for cancer following oral exposure to arsenic is nonlinear due to methylation of arsenic at low doses so the cancer slope factor is likely to overestimate cancer risk at low exposure levels. This is supported by the fact that no increase in skin cancer incidence has been observed in several epidemiological studies in the US, including a study in Deer Lodge and Silver Bow Counties. Available*

data on methylation and arsenic detoxification should be incorporated into procedures for quantifying arsenic toxicity and risk.

Response:

EPA is aware of and has evaluated available toxicokinetic data on the methylation of arsenic. While it is generally accepted that methylation represents a detoxification of arsenic, actual data on the chronic toxicity and carcinogenicity of methylated forms of arsenic are sparse. Assuming that the methylated forms are significantly less toxic after chronic exposure than the inorganic forms, then the key issue becomes the ability of the liver to methylate (detoxify) arsenic as a function of dose. Since this is an enzymic process, it is logical to expect that the process will be saturable.

The critical issue with respect to the validity of the EPA cancer slope factor is were the doses ingested by the populations studied by Tseng, *et al.* (1968) located to the right of the "saturation point" (in which case the slope estimate would be too high to describe risks at lower doses) or were the doses to the left of the "saturation point" (in which case the slope would be appropriate for low dose calculations, but would underestimate risk at higher doses). The average daily intakes by the exposed Taiwanese populations were estimated to be 595, 1,645, and 2,800 μg/day, assuming ingestion of 3.5 L/day of water. Thus, the question becomes this: is the "saturation point" for arsenic methylation above or below the 600 to 3,000 μg/day range?

Data regarding the "saturation point" in humans are extremely sparse. The only study that provides direct information was performed by Buchet, *et al.* (1981), and the results from this study have been interpreted somewhat differently by several different groups:

- The authors of the report (Buchet, *et al.*, 1981) concluded that the data "indicated that the arsenic methylating capacity of the human body was not yet saturated even with an oral dose of 1,000 μg As."
- Marcus and Rispin (1988) concluded that "saturation of methylating activity occurs just above 500 μg/day in healthy adult males."
- The Science Advisory Board (Loehr, *et al.*, 1989) concluded "daily doses of 250 to 1,000 μg As^{3+}/person/day or less may be largely detoxified."

- The EPA Risk Assessment Forum (EPA, 1988) concluded "the body's ability to form dimethyl arsenic acid (DMA) seems hampered at exposures in excess of about 500 μg/day, without affecting the excretion of inorganic arsenic or monomethyl arsenic acid (MMA) in the urine. If this is the case, then total urinary excretion of arsenic may be compromised at high doses leading to increased tissue levels."

As these varying interpretations indicate, the raw data are so limited that it is very difficult to draw a firm conclusion regarding the "saturation point" for arsenic methylation. In particular, it should be noted that each data point in the study by Buchet, *et al.* (1981) is based on only one analysis of the urine from one person exposed at each dose level. Consequently, even relatively small variations in analytical results or in individual metabolism could change the data dramatically.

After considering these data, along with other data on the genotoxicity of arsenic, the Risk Assessment Forum (EPA, 1988) concluded:

> While consideration of these data on the genotoxicity, metabolism, and pathology of arsenic has provided information on the possible mechanism by which arsenic may produce carcinogenic effects, a more complete understanding of these biological data in relation to carcinogenesis is needed before they can be factored with confidence into the risk assessment process.

Finally, it should be noted that the negative epidemiological studies (that is, those studies which did not detect an increased incidence of cancer in arsenic-exposed populations) do not constitute convincing evidence that the cancer slope factor is too high, since the incidence of cancer predicted by the slope factor is lower than would have been detectable in these studies.

Comment P: *It is important that the risk assessment present information on the non-lethal nature of arsenic-induced skin cancer so that the risk manager can consider this.*

Response: EPA agrees and this information is presented in the Baseline Risk Assessment. However, it is important to remember that simply because

most skin cancers are not lethal does not mean that a risk manager must treat arsenic differently than other carcinogens. It should also be remembered that arsenic appears to increase the risk of several types of internal cancers (these are often fatal) as well as the risk of skin cancer.

Comment Q: *Arsenic may be beneficial at low doses. This observation, along with the non-lethality of arsenic-induced skin cancer, suggests risk estimates derived ignoring these factors are likely to overestimate actual risks.*

Response: This comment confuses risk characterization with risk interpretation. The magnitude of the cancer risk does not depend on whether or not arsenic is beneficial and whether or not the cancers are fatal. However, EPA agrees that this information is relevant in the risk interpretation process and the Baseline Risk Assessment does include a discussion of the possible beneficial effects of arsenic.

Comment R: *The bioavailability of arsenic in soil is likely to be less than in other media. Available data suggest that a factor of 50% should be used to adjust for this.*

Response: The EPA believes it is appropriate to be cautious in extrapolating the results of bioavailability measurements across different media and across different locations, since the bioavailability of arsenic or metals may vary significantly as a function of waste characteristics. In this case, ARCO provided EPA with a supplemental report which compared the geophysical characteristics (including mass percentage by grain type) of the material that was tested in animals to the characteristics of several types of on-site waste. Based on this, the EPA has concluded that it is reasonable to include a quantitative adjustment factor of 0.5 (50%) in the amount of arsenic in soil that is available for absorption and has incorporated this into the Baseline Risk Assessment.

Comment S: *Data on the bioavailability of cadmium in soil should be used in estimating health risks from ingestion of cadmium in soil.*

Response: EPA is not aware of any biological tests or data on the bioavailability of cadmium in mine wastes or contaminated soils. If such data become available, they will be considered.

Comment T: *Soil lead cleanup standards must be derived using models such as the Society for Environmental Geochemistry and Health (SEGH) or the UBK that incorporate site-specific and generic data regarding*

environmental lead concentrations and their relationship to blood lead levels. In particular, data specific to mining and smelting sites must be used. In addition, determination of cleanup levels must specify the percentage of the population to be protected and the health endpoint of concern and must be developed using exposure scenarios that consistently relate the blood lead level, health endpoint, and population of concern.

Response: Derivation of cleanup goals is not a normal component of the baseline risk assessment process and no cleanup goal for lead has been derived for this site. Nevertheless, EPA agrees with the spirit and general concept of this comment, although it does not agree with a number of the specific recommendations provided in the comment. A more detailed response will be provided when EPA derives a cleanup goal for lead at this site.

Comment U: *For the recreational scenario, evaluation of risks should consider accessibility of various areas, the type of terrain, and the types of land uses that occur.*

Response: EPA agrees in concept and has attempted to do this. However, this is largely a subjective process, since reliable exposure data for various types of recreational visitors are sparse.

Comment V: *Unless risks associated with regional concentrations of arsenic are subtracted, risk estimates will be total rather than incremental.*

Response: EPA recognizes the distinction between total and incremental risk and believes that an estimate of total risk is the most appropriate endpoint for a baseline risk assessment. If total risk is judged to be unacceptably high, then an assessment of the fraction of the total that is due to natural sources and the fraction that is due to on-site wastes (the incremental risk) will be an important element in the risk management process.

Comment W: *The major sources of uncertainty in the risk results should be identified and quantified to the extent possible. The three critical areas of uncertainty are: 1) soil ingestion rates, 2) bioavailability of arsenic, and 3) the slope factor for arsenic.*

Response: EPA agrees each of these is an important source of uncertainty and has provided a discussion of each of these topics, along with other sources of uncertainty.

ARCO Comments on the Draft Baseline Risk Assessment

Comment A: *Future residential land use in the OW/EADA OU is highly unlikely, and inclusion of this scenario in the baseline risk assessment is not appropriate.*

Response: Evaluation of the residential scenario is reasonable and appropriate at a location where future residential land use is at least plausible. In view of the fact that the current community of Anaconda is immediately adjacent to the OW/EADA OU, and that two current housing subdivisions actually intrude into the area, at least limited future residential land development is considered possible. Nevertheless, EPA has not included the residential scenario in the final Baseline Risk Assessment for the following reasons:

- The likelihood of widespread residential development in the OW/EADA OU is relatively low, at least based on current land use plans.
- The University of Cincinnati is presently completing a study of human exposure to arsenic in current residential areas. Thus, the results of any residential risk estimates performed at present might need to be revised in the future based on the findings of this study.
- There will be a detailed evaluation of risks to current residents of Anaconda performed separately and the results of this Risk Assessment can be used to evaluate any potential concerns regarding future residents in the OW/EADA, as needed.

Comment B: *Data from the study performed by the University of Cincinnati indicate that the concentration of arsenic in indoor dust is less than in outdoor soil and this information should be used to improve the arsenic exposure assessment for on-site occupational workers.*

Response: EPA agrees that this is a reasonable approach and has estimated indoor dust concentrations in workplaces based on the observed relationship between arsenic in soil and dust in the current residential areas.

Comment C: *The weighting factor for the intake of soil by workers should be based on the amount of time spent outdoors by workers.*

Response: EPA does not believe that the weighting factor for soil intake should be based only on the time spent outside, since intake depends not only on time but on specific activity patterns and the associated intake rate per unit time. In the absence of data on actual indoor/outdoor soil/dust intakes by workers, EPA believes that an assumed 50% contribution for soil is reasonable and appropriate.

Comment D: *Ground water is unlikely to be a drinking water source because a municipal drinking water system is available and because a county management plan requires a permit before a new well can be drilled.*

Response: EPA recognizes that it is fairly unlikely that ground water from beneath the OW/EADA OU will be used for drinking water, at least in the near future. Nevertheless, this does not mean that wells might not be installed in the future, and the existence of an institutional control such as a permitting system does not alter this. Thus, EPA believes that it is reasonable and appropriate to evaluate potential future risks from the drinking water pathway. Note that this does not necessarily oblige EPA to include the risks from ground water when considering soil remedial actions at the site.

Comment E: *Documentation is needed on the dirt bike rider survey conducted by EPA.*

Response: Additional information and description of this survey was added as requested.

Comment F: *The risk assessment should distinguish between debris associated with the historic flues and flue dust.*

Response: EPA agrees and has distinguished between these two different types of waste.

Comment G: *The risk assessment should incorporate available data on the bioavailability of arsenic in residential soil taken at Teressa Ann*

Terrace into the arsenic exposure and risk calculations for workers and recreational visitors at the OW/EADA OU.

Response: As noted above, EPA has used these site-specific data as the basis for an adjustment factor of 0.5 in the absorption of arsenic from site soils.

Comment H: *Use of arsenic intake assumptions recently applied by EPA to the derivation of the reference dose for arsenic would result in a 60% decrease in the slope factor for arsenic.*

Response: EPA Region VIII recognizes the differences in the exposure assumptions used to derive the reference dose (RfD) and the slope factor for arsenic and has recommended to the headquarters Carcinogen Risk Assessment Verification Endeavor (CRAVE) committee that this issue be addressed. However, Region VIII does not believe it is appropriate to act unilaterally on this issue and to recalculate the slope factor as recommended in the comment. The Risk Assessment already discusses the uncertainty in the slope factor for arsenic.

Comment I: *The slope factor for arsenic does not account for the effect of detoxification of arsenic by methylation. An adjustment to account for this should be made to all cancer risk calculations for arsenic.*

Response: A response to this comment has been provided above.

Comment J: *There is significant uncertainty in the amount of arsenic ingested by the Taiwanese population upon whom the RfD calculation is based. If the ingested dose was higher than assumed, the RfD should be lower.*

Response: EPA agrees that there is uncertainty in the estimated arsenic exposure level of the Taiwanese population, both from water and from the diet. These uncertainties are discussed in the Baseline Risk Assessment so that the risk manager may consider this information as appropriate.

Comment K: *If EPA chooses to base deductions about the risk of lead on the calculated soil concentration that yields acceptable exposure levels in the UBK model, it must be stressed that the concentration is a geometric mean value and should not be confused with a "not-to-be - exceeded" value.*

Response: EPA agrees that the concentration value stemming from uptake biokinetic (UBK) model calculations is a mean value and should not be

interpreted as a not-to-be-exceeded value. Note, however, that current EPA thinking is that the value should be the arithmetic mean, not the geometric mean.

Comment L: *Because the OW/EADA OU is not likely to be developed for residential land use, the risks from lead in the OW/EADA OU should not be assessed using the residential default exposure assumptions employed by the UBK model.*

Response: EPA agrees that the residential UBK model should not be employed to assess the risks of lead to worker or recreational populations and has not done so in the final Baseline Risk Assessment.

Comment M: *Animal and geochemical studies of mine wastes demonstrate that lead bioavailability is significantly lower than is assumed in the UBK model. The results of tests on Butte soil bioavailability in rats should be used to modify the risk assessment at this site.*

Response: EPA recognizes the importance of bioavailability in evaluating exposure and risk from lead and other metals in mine wastes, and EPA is aware of both the animal data and the geochemical data on this topic. However, EPA feels it is not prudent to extrapolate toxicokinetic data on lead absorption from rats to children, since there are a number of important physiological differences that may cause the results in rats to underestimate the true rate of exposure in children. Likewise, EPA believes that extrapolation of bioavailability data across media and across sites should not be done without good geochemical data to demonstrate that materials are similar.

The EPA is presently performing studies of the bioavailability of lead in a variety of mine wastes, including the Anaconda site, and it is expected that data from these studies will help improve the reliability of risk assessments for lead at mining/smelting sites. Because a quantitative evaluation of lead risks to residents was not included in the Baseline Risk Assessment for the OW/EADA OU, these issues are largely moot for this OU. However, these issues will be of direct relevance in the risk assessment for residential soils and will be considered there.

Comment N: *The RfD for copper used in the risk assessment should be viewed as having low confidence, since it is derived by extrapolation from an MCL, and EPA has not derived a verified RfD. It should also be noted*

that the calculated RfD is only four times larger than the recognized beneficial dose of copper, and that the adverse effect caused by copper ingestion is only irritation of the gastrointestinal tract. Finally, the irritation produced by copper ingested in vegetables is likely less than from copper ingested in water, and the risk calculations should adjust for this.

Response: EPA is aware of and is in basic agreement with each of these observations, although it is not clear that sufficient data exist to permit a reliable quantitative adjustment in the risk estimate for copper ingested in vegetables. Because copper was not found to pose an unacceptable risk to either workers or dirt bike riders, these concerns are largely moot with respect to this OU. These concerns will be addressed in the risk assessment for residents.

Comment O: *Remedial actions are generally not required at sites where excess cancer risks are less than 1E-04, and the majority of the risks at this site fall within the range considered acceptable by government agencies.*

Response: The level of cancer risk that is and is not acceptable at a site is a risk management, not a risk assessment, issue. It is not the proper role of the risk assessment to make or recommend decisions on remedial actions.

Comment P: *The ecological risk assessment is incomplete and does not follow the basic format of EPA risk assessments.*

Response: A screening assessment based on effects data on broad groups of organisms was included in the Draft Baseline Risk Assessment. The Final Baseline Risk Assessment will also include a screening-level ecological assessment, but will focus on terrestrial organisms and will be structured in accordance with EPA guidance. Since the Warm Springs Creek is not part of the OW/EADA OU, it will be quantitatively evaluated in the ecological assessment for the ARWW OU. A full ecological risk assessment for terrestrial organisms will be developed under the Regional Soils OU. The latter two OU efforts may be combined into one ecological assessment for remaining portions of the site.

Comment Q: *The ecotoxicity values are undocumented and may greatly over estimate risk.*

Response: The limitations of the literature values used in the draft screening ecological assessment will be clarified in the final document. However, the literature values reported by CH2M-Hill (1987) may not be representative of species of plants which are ecologically important at the site but which have not been tested. Therefore, some degree of conservatism is warranted on the basis of the need to determine whether site conditions are hazardous to a wide variety of terrestrial plant species.

Comment R: *The baseline risk assessment fails to recognize physical habitat modifications as a factor that accounts for sparse plant growth in portions of the site.*

Response: The need to emphasize the physical impacts of human activities as one of the reasons for sparse vegetation at the site is important. The text in the Final Baseline Risk Assessment will be modified accordingly.

Comment S: *Risks to wildlife associated with inhalation of dust are greatly overestimated.*

Response: The assumption made in the comment that wildlife and humans receive the same exposure and experience similar adverse effects is speculative. The risks associated with this pathway will be clarified in the Final Baseline Risk Assessment.

Comment T: *The water quality criteria used in the ecological risk assessment are undocumented and may not account for site-specific conditions.*

Response: Impacts in Warm Springs Creek are being addressed in an ecological assessment prepared for the ARWW OU. A qualitative summary of potential impacts on aquatic resources in Warm Springs Creek will be provided in the Final Baseline Risk Assessment.

Comment U: *The discussion of potential ecological risks associated with episodic inputs of metals to Warm Springs Creek during high runoff events is speculative.*

Response: As previously stated, the ARWW OU ecological assessment will provide a more detailed analysis of risks associated with episodic inputs of metals to Warm Springs Creek. The discussion on potential for impacts will be retained in the Final Baseline Risk Assessment.

Comment V: *The conclusions of the ecological risk assessment are not supported by valid technical arguments.*

Response: The technical arguments in the Final Baseline Risk Assessment will be strengthened, up to the limits of the available site-specific data. Thus, the need for additional studies and assessments will be clearly identified. Possible impacts on plant communities from stresses other than metals toxicity (i.e., physical characteristics of the wastes and/or human activity) will also be discussed in the conclusions.

Comment W: *Available data demonstrate that arsenic concentrations in plants from several regions of the OW/EADA OU do not exceed background concentrations. This suggests that exposure by the garden vegetable pathway may not be higher than backgrou !.*

Response: The garden vegetable exposure pathway was not included in the final Baseline Risk Assessment because neither workers nor dirt bike riders are thought to be significantly exposed via ingestion of local vegetables. These comments will be considered when evaluating the risk to residents via the garden vegetable pathway.

Comment X: *Some of the arsenic that accumulates in garden vegetables is methylated, and the risk assessment should account for this by reducing the risk estimates for this pathway. [Several literature citations relating to this issue were also provided.]*

Response: As noted above, the garden vegetable exposure pathway was not included in the final Baseline Risk Assessment for this OU. These comments and the literature reports provided will be considered when evaluating the risk to residents via ingestion of arsenic in home-grown garden vegetables.

Comment Y: *The risk-specific concentration values shown in Table 5-2 are confusing and inaccurate because the values are not based on the risk levels shown but on risk levels that round to the values shown.*

Response: EPA addressed this concern by providing the full range of concentration values that round to the risk levels shown, and by providing additional explanation regarding the concentration values used to prepare the risk contour maps.

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Attachment A

Transcript of Formal Public Meeting

Anconda Smelter Superfund Site

CANDI NORDHAGEN
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NORDHAGEN COURT REPORTING

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BEFORE THE
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 8

ANACONDA SMELTER SUPERFUND SITE
OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT
PROPOSED PLAN

FORMAL PUBLIC COMMENT MEETING
Anaconda High School
October 14, 1993
7:00 p.m.
REMEDIAL PROJECT MANAGER CHARLES COLEMAN, presiding

INDEX

COMMENTORS: page:
TOM HURLOCK 4
JIM DAVISON 7
SANDY STASH 8
BILL DEE 9
JIM YEOMAN 11
NATALIE FITZPATRICK 12
BILL CRICHTON 12
MEL STOKKE 14

OCTOBER 14, 1993; ANACONDA, MONTANA

BE IT REMEMBERED THAT this matter came on for public hearing on October 14, 1993, Charles Coleman, presiding.

The following proceedings were had:

MR. COLEMAN: This is the formal public meeting. This formal public meeting is the second of two meetings held during the public comment period for the Remedial Investigation/Feasibility Study and Proposed Plan for the Old Works/East Anaconda Development Areas Operable Unit of the Anaconda Smelter Superfund Site.

This meeting is presided by the U.S. Environmental Protection Agency in consultation with the State of Montana. My name is Charlie Coleman. I am EPA's Remedial Project Manager for the Anaconda Smelter Site. This meeting is being conducted pursuant to requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, or CERCLA, as amended by Superfund Amendments and Reauthorization Act of 1986.

For the record, this public hearing is held on October 14, 1993, at the Anaconda High School in Anaconda,

Montana.

Attendees of the meeting will be included with the transcript of this meeting. Those wishing to comment have indicated so on the sign-up sheet in the back. Comments should be directed to the Remedial Investigation/ Feasibility Study and/or the Proposed Plan. Comments will not be limited, based on the number of intendees. Those with written comments are asked to please summarize. Your written comments will be included to the hearing transcript. EPA will respond to all comments in the Record of Decision. Written comments will be accepted by EPA if postmarked by midnight, October 22, 1993.

Please remember when you come up, please state your name, whom you represent for the reporter. We'll start off with Tom Herlock.

MR. HURLOCK: My name is Tom Hurlock. The wife and I have a place here in Anaconda which we're restoring and we're extremely concerned about historic Rick preservation here in this community. We should keep in mind that the glory of western Montana for a long time has been thought to be the wild mountain country and its wildlife. Our community here along with Butte has some wonderful extremely important unused historic resources. Many of us like to see, and some of the others like to hunt, the wildlife out there.

Briefly, regarding Mill Creek, we read that there was a proposal for an automobile junkyard and we think that's a poor idea. If that's truly a proposal, we think that the darn thing should be recycled.

Land developments in western Montana are chopping our area up into smaller and smaller chunks of land, less and less usable by wildlife such as elk. We fear that the golf course would encourage this, not just around the golf course but in the entire area. And I'm from Kalispell and you know what's happened up there as far as loss of natural values in the last quarter century.

The Denver newspaper recently said that a community leader somewhere in Colorado said that they wanted a golf course for the subdivisions which that would encourage, expensive subdivisions, not because they were so interested in golf. Some time this winter I read in the Denver paper, also, in another article, that most rural subdivisions lose money for the counties involved because of the high cost of such things as roads and other necessities.

And so what I'm saying that is that we fear that this golf course would cost us wildlife habitat and cost the taxpayers more money. Personally, I think that our nation's going to have a terribly difficult time some day paying the bill for all these rural roads and all the

manmade things we have. And understand that I'm a person who is actively trying to protect a hundred-year-old

resource and I find it very difficult. I find that the nation is a nation full, plumb full of 50-, 100-, 150-year-old manmade things and most of them are in poor condition.

The solution, as I said, to this pollution problem here - and dealing with the pollution I know is only part of it - uses a vast amount of chemicals to maintain the golf course. As I said before, that's a concern of ours. I would like to hear the amount of chemicals used on this proposed golf course per year.

The Old Works ruins has waited for stabilization for nearly a century and we would like to see something done to stabilize it. This was already addressed tonight, but I would hope that our U.S. Congressmen and others would be listening and the communities' leaders would be listening and start to stabilize the Old Works so that instead of crumbling with the freezing and thawing we get constantly and with the rain which we get which is simply crumbling this, I hope that we do something. I'm not saying that it's up to ARCO, I will emphasize that.

I will summarize. Sometimes, and this was also addressed, as up on Stucky Ridge above the golf course, sometimes what's not done - that is, the lack of

subdivisions up there - what is restricted and not done is just as important, for instance, in creating a historic district as what is done. And so the controls up there which are proposed I understand are very much needed.

The wife and I would prefer that the Old Works be stabilized and interpreted by the National Parks Service and the rest of the area, minus whatever little area we might someday use for whatever industry might someday come in here, the rest of the area we would like to see revegetated for wildlife. Thank you.

MR. COLEMAN: Thank you, Mr. Hurlock.

Next will be Jim Davison.

MR. DAVISON: For the record, my name is Jim Davison, Manager of Anaconda Local Development, P.O. Box 8242, Anaconda. Generally, I'm very supportive of the plan that has been presented and applaud the work that has gone into it. We're particularly supportive of the covers and the various approaches to look at the subareas and trying to look at an overall management of all the areas.

The creation of action levels has long been requested in the community and the action level of 1,500 seemed very appropriate for long-term concerns. We do look forward to action levels for residential areas, also. Also, I said we were broadly supportive of this. There are several concerns coming out, also, that we are assured

that the institutional controls are developed and put into place so that these covers stay intact and that the health and safety of the environment of the citizens are taken care of, but also that they be proactive to allow for future growth. The institutional controls that would allow for future growth we would also hope would include an area that if areas are to be gone in and caps broken through and soils must be removed, that a place, a repository be provided for those soils in the design phases. We will have written comment, but generally, we think this is a good plan.

MR. COLEMAN: Thank you, Mr. Davison.

Next, Sandy Stash.

MS. STASH: My name is Sandy Stash. I represent the Atlantic Richfield Company, potentially responsible party for this site. And I guess I'm happy to say this evening, for once, ARCO is generally very much in support of the proposed plan as outlined. We will provide some additional formal comments in writing by the October 22nd deadline.

This particular proposed plan we think meets a rather unique goal, not necessarily just Superfund, in that it does provide for cleanup, environmental cleanup, as well as economic development and historic preservation. In that regard, it's probably unique for Superfund.

Furthermore, it probably more than any other cleanup action that I viewed through the various sites around the country has taken into account local government concerns, local community concerns, as well as desires for future economic development.

This may very well stand as one of the very few Superfund sites in the country that actually sees redevelopment because there has been an extensive amount of -- or I should say "extensive lack of redevelopment". I think this is a very critical first step, one that we've all waited for for many, many years. I guess I'll do a little advertisement for the critical steps to come, and they involve our work with county government, with the newly appointed authority board, and this community in making sure that the golf course development as well as associated development comes to fruition.

I guess I would encourage EPA and the State of Montana as well as the local community to kind of hang with that over the next six months so that we'll see this thing actually come to fruition next year. Thanks.

MR. COLEMAN: Thank you, Sandy.

Next is Bill Dee.

MR. DEE: My name is Bill Dee. I'm a long time resident, born and raised here in Anaconda. I'm a local automobile dealer in town for General Motors and Chrysler

products. I'm married, I have four children, and have been raised and lived in Anaconda all my life, or the majority of it. I'm speaking as a father of four and also a businessman who has tried to invest most of their future in Anaconda.

I am very in favor of this proposed plan as it is with some reservations, but the majority of it, I think the people that have worked on it should be complimented and encouraged to continue in this proactive -- I think the EPA, I think they have kept business in mind and the

Anconda Smelter Superfund Site

economic development of this area in mind when they have proposed this. I think the original people who proposed this idea should be highly complimented for coming up with such a creative use of our land and also for economic development. I think with their help, EPA, ARCO, the proposed study group and all the individuals who have worked so hard and many hours to bring this to a worthwhile conclusion for everyone should be complimented and I encourage that they do that.

In a community as far as a business person here, many other areas throughout the country have developed, and for us to invest our savings, employ 25 people, and to have a reason to stay here, we have to have some future investment. I believe that our environment, our community cosmetically is very important for the future. And I

think with this plan, the entrance to our community will be helped tremendously. I think the economic impact is also very important due to that money that can be regenerated, can be placed back into the community to help our environment, to help our historic preservation, and our wildlife is important.

So as a business person, and we try to employ 25 people, we would like to keep them and their families here and our schools. It's important that we do this. Our dealership is 600 or 700 hundred yards from part of this proposed plan. And I'm sure it will help it cosmetically as also our business to grow. So I would like to compliment meant those, and thank you for this opportunity to speak.

MR. COLEMAN: Thank you, Mr. Dee.

Next we have Jim Yeoman.

MR. YEOMAN: My name is Jim Yeoman. I, like Bill Dee, have been born and raised in Anaconda. I have a business here and have followed the development of the remediation for this area for the last, what, five, six, ten years.

I just real quick would like to indicate that I am in approval and agree with the preferred alternative that you have chosen. I specifically like the idea that it will allow for some dedicated developments and

potential developments because we are trying to all make a living here in addition to the nice recreation that we have. Thank you.

MR. COLEMAN: Thank you. And last but not least on our list tonight, Natalie Fitzpatrick.

MS. FITZPATRICK: I'm glad not to be the least. I've Natalie Fitzpatrick of Anaconda, a member of the Anaconda - Lodge County Recreation Advocates and of the Arrowhead Foundation which proposed the original golf course. And I'm very much, of course, in favor of the preferred remedy. I think the work you have done is outstanding and I'm sure that the community appreciates not only the cleanup but the economic development that this will bring to the area. And I'm very much supportive of the entire concept. Thank you much. I'd like to also say that the Anaconda Garden Club and the Anaconda Retired Teachers will send in written comments about this in support of the project.

MR. COLEMAN: Thank you, Natalie.

I will open it up at this time to anybody else who would like to come forward and put a comment on the record, you have an opportunity at this time.

MR. CRICHTON: I'm Bill Crichton. I'm from Deer Lodge. I don't have any part of your community other than at one time I did belong and was a member of the Anaconda

Golf Club. For those people that fear any waste or bad effects from chemicals used on golf courses, I think can rest assured that golf courses don't waste chemicals. I'm thinking in particular of a beautiful golf course along the banks of the Flathead Lake, Polson Country Club, is right on the edge of the lake. If one drop of chemical is getting in the way there and getting into the water, I'm sure there would be plenty that you would have heard about it before now.

I think a new golf course in Anaconda would be the finest asset that could happen to southwestern Montana. I believe that any course designed by Jack Nicholas will bring people from many, many, many miles away to play it. I have played a lot of golf courses in my day over the last 60 years that I have been playing, and the last Nicholas designed golf course I played was Gironamo, Arizona; truly a fine golf course. And I'm sure that if Jack does this one, it too would be a fine golf course. I would certainly like to see you put one in.

MR. COLEMAN: Thank you for your comment.

Is there anybody else who would like to get up? Mel?

MR. STOKKE: I didn't say "yes" or "no," I just put a slash by my name. I wanted to see how long it was going to be.

MR. COLEMAN: You've got plenty of time.

MR. STOKKE: My name is Mel Stokke. I'm a member of, in fact vice chairman of ADRA. And Charlie Haeffner couldn't be here tonight so he asked me to represent ADRA. Also, I'm a member of the ALDC and a member of Arrowhead. I've got some compliments and I've got some derogatory remarks. I have worked basically behind the scene but we've participated a lot with ARCO and EPA on a lot of the things that have been done and accomplished and done in a good manner.

I'm very much for this program that you have laid out here tonight. Some of the things that we have had in the past on public meetings have been real good. We've had a lot bigger attendance and we've had a lot more people that were vocal.

At the time they proposed the tailings pond just over there by Fairmont, we had a lot of opposition from the Opportunity people in the public meetings, we had a

lot of opposition from the people in the community. And basically, we were listened to, we were heard, and they didn't go ahead with that plan. They changed it. There were a lot of proposals made on the tailings ponds and we had a lot of input into those and we were heard, especially the area below No. 1 Pond.

There were several proposals at that time and we

very strongly went for the proposal that they are now doing. And I'd like to say that ARCO and EPA have done a good job, except for one instance, and that's what I wanted to bring to your attention tonight. We had a public meeting, and this has been in my craw ever since. At that time they proposed that they were going to dig up the old flue, the 60-foot flue and 120-foot flue, and I opposed it. At that time I wrote a letter, and I wrote it to Ms. Browner who is the Environmental Protection Agency administrator. And I copied Charles Coleman, and I copied Sandy Stash, and I copied Max Baucus because he was bringing Ms. Browner in here for a visitation.

The meeting was called off because of the sickness and death of Max Baucus's father - but she's coming again this Saturday - so we were only allocated ten minutes at the airport to talk to her. So I knew that wouldn't be sufficient, so I decided to write a letter to her and give her the letter so she could read it on the plane. Whether she read it or not, I've never had an answer, I've never had a comment from Charles, I've never had a comment from Sandy, but I did get a letter from Max Baucus, so maybe I got to the top of the stack. But I'd like to read this letter to you.

"Dear Ms. Browner: On the Superfund project in the Anaconda Area, I feel that the cooperation between

EPA, State of Montana and ARCO has been excellent and to date the accomplishments are real assets to our communities.

"I worked for the Anaconda Company and ARCO for 34 years at the Smelter, and the last 8 years as General Manager. I believe that EPA has been misinformed when the decision was made to dig up the main flue and treat the material for deposit in a repository.

"The 60' and 120' flues were in an area where toxic dust was collected from the smelting process. This dust contains the following:

"Arsenic, cadmium, copper, zinc, bismuth, plus other elements.

"During the dismantlement of the flue in 1983 - 1984, because of the airborne particulates that were put into the atmosphere and the workplace, the decision was made to not remove the toxic dust but to collapse everything into the flue and then cover the flue with dirt and place a cap over the material. To date, this has been very successful. Now the decision has been made to remove the dirt, steel beams, bricks and dust. All of this material will have to be treated and placed in a repository.

"After the dirt cap is removed, the old problem will again exist; the dust and other material will be

removed by a clamshell and loaded into trucks, or onto the ground where it will eventually be treated with cement and lime. Even though hoses will be used to wet and spray the dust, there is going to be a lot of dust going into the atmosphere and around the working personnel.

"I have heard that no personnel will be put down into the flue but all the work will be done from above by the use of equipment. I would like to bring to your attention the fact that there are steel hoppers in the bottom of the flue that we used to remove the dust. Under the hoppers were railroad tracks for small rail cars to unload the hoppers.

"If the dust is removed by clamshells, then the dust cannot be removed from the hoppers, and if the process ends at that point, the contaminated dust is being left in place. So what has been accomplished? The saying goes, 'If it isn't broken don't fix it!'.

"I think ARCO has a plan to monitor the groundwater below the main flue for years to come, with the provision that if contamination does occur, that he would then dig up the material and treat it.

"Now as part of the concerned public, I appreciate your visiting our Superfund site and seeing the accomplishments to date. Hopefully, you will review my letter with the thought that this area should not be

disturbed."

I have never heard from her or anything, but there has been an agreement between EPA and ARCO that they would just go down to the hoppers and the dust then would be left in the hoppers and it would be covered over. This doesn't solve the problem because what arsenic was in the flue will be removed, but the arsenic in the hoppers and below will not be removed.

The thing about it is that if you look at the sheet over there, there are nine prerequisites that the EPA states that should be done. I would say that digging up that flue violates at least six of those nine, even including costs. I don't know what the final figure on the cost is, but it's probably in the realm of 15 million.

MS. STASH: It was on the high end.

MR. STOKKE: Anyway, the money has been spent for what? I can't see that it was spent for any good use at all. Now, I asked if the public could go up and visually see what's taking place on the digging up the flue and was turned down. So I guess they don't want us to see what's taking place.

Those comments were made at a public meeting, and I'm wondering: Do we really have any weight in a public meeting? Thank you.

MR. COLEMAN: Thank you for your comments.

Anconda Smelter Superfund Site

Is there anybody else that would care to comment tonight? Last chance.

(No response.)

MR. COLEMAN: I want to thank everybody for coming tonight and speaking here your comments and letting us know how you feel. I guess a lot of times we don't please everybody. We try to work within the Superfund law and strike the best balance between all the concerns of the community and meeting environmental concerns and the laws that are before us.

And hopefully, with the Old Works project, with your comments, and we will address every single one, that EPA's final decision for the Old Works area which will be in the Record of Decision by the end of the year, again, will be the right decision. I thank everybody for coming tonight.

*****

CERTIFICATE

STATE OF MONTANA)
: ss.
County of Silver Bow)

I, Candi Nordhagen, Registered Professional Reporter-Notary Public in and for the County of Silver Bow, State of Montana, do hereby certify:

That the hearing was taken before me at the time and place herein named; that the hearing was reported by me in machine shorthand and later transcribed by computer, and that the foregoing nineteen (19) pages contain a true record of the testimony of the witness, all done to the best of my skill and ability.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal this _____ day of _____, 1993.

_____
Notary Public for the State of Montana residing at Butte, Montana. My commission expires September 15, 1995.

(NOTARIAL SEAL)

-- 1 --

1,500 [1] 7:21
120-foot [1] 15:7
150-year-old [1] 6:5

-- 2 --

22nd [1] 8:19

-- 6 --

60-foot [1] 15:7

-- A --

ability [1] 20:15
accepted [1] 4:11
accomplished [2] 14:10, 17:16
accomplishments [2] 16:2, 17:24
account [1] 9:3
Act [2] 3:22, 3:23
action [4] 7:20, 7:21, 7:23, 9:2
actively [1] 6:2
actually [2] 9:7, 9:20
addition [1] 12:2
additional [1] 8:19
address [1] 19:12
addressed [2] 6:15, 6:24
administrator [1] 15:10
ADRA [2] 14:3, 14:5
advertisement [1] 9:12
Advocates [1] 12:8
affixed [1] 20:17
AGENCY [1] 1:2
Agency [2] 3:17, 15:9
agree [1] 11:23
agreement [1] 18:3
airborne [1] 16:15
airport [1] 15:16
ALDC [1] 14:5
allocated [1] 15:15
allow [3] 8:4, 8:6, 11:25
alternative [1] 11:23
amended [1] 3:22
Amendments [1] 3:23
amount [3] 6:9, 6:11, 9:8
ANACONDA [3] 1:5, 1:7, 3:1
Anaconda [21] 1:16, 3:14, 3:15, 3:19, 3:25, 3:25, 4:17, 7:14, 7:15, 9:24, 10:2, 10:5, 11:18, 12:7, 12:8, 12:16, 12:16, 12:25, 13:10, 15:25, 16:4
answer [1] 15:20
anybody [3] 12:20, 13:21, 19:1
applaud [1] 7:16
appointed [1] 9:14
appreciate [1] 17:23
appreciates [1] 12:12
approaches [1] 7:18
appropriate [1] 7:22
approval [1] 11:23
ARCO [9] 6:22, 8:17, 10:15, 14:8, 15:2, 16:1, 16:4, 17:18, 18:3
AREA [1] 1:8
Area [1] 15:25
area [13] 5:6, 5:9, 7:7, 7:8, 7:9, 8:7, 10:11, 11:20, 12:14, 14:24, 16:9, 17:25, 19:13
Areas [1] 3:14
areas [4] 7:19, 7:23, 8:7, 10:21
Arizona [1] 13:17
Arrowhead [2] 12:9, 14:6
Arsenic [1] 16:12
arsenic [2] 18:6, 18:7
article [1] 5:17
asked [3] 4:8, 14:4, 18:18
asset [1] 13:11
assets [1] 16:2
associated [1] 9:16
assured [2] 7:25, 13:3
Atlantic [1] 8:15
atmosphere [2] 16:16, 17:5
attendance [1] 14:14
Attendees [1] 4:2
attention [2] 15:4, 17:9
authority [1] 9:14
automobile [2] 5:2, 9:25

-- B --

back [2] 4:4, 11:4
bad [1] 13:1
balance [1] 19:8
banks [1] 13:5
based [1] 4:7
basically [2] 14:7, 14:20
Baucus [2] 15:11, 15:22
Baucus's [1] 15:14
beams [1] 16:21
beautiful [1] 13:4
behind [1] 14:8
believe [3] 10:24, 13:12, 16:6
belong [1] 12:25
best [2] 19:8, 20:15
bigger [1] 14:14
BILL [2] 2:6, 2:9
Bill [4] 9:22, 9:23, 11:18, 12:23
bill [1] 5:25
bismuth [1] 16:12
board [1] 9:14
born [2] 9:24, 11:18
bottom [1] 17:10
Bow [2] 20:4, 20:7
Box [1] 7:14
bricks [1] 16:21
Briefly [1] 5:1
bring [5] 10:17, 12:14, 13:13, 15:4, 17:8
bringing [1] 15:12
broadly [1] 7:24
broken [2] 8:7, 17:17
Browner [3] 15:9, 15:12, 15:24
business [5] 10:10, 10:20, 11:7, 11:12, 11:19
businessman [1] 10:4
Butte [2] 4:22, 20:20.5

-- C --

cadmium [1] 16:12
called [1] 15:13
Candi [1] 20:6
cap [2] 16:19, 16:24
caps [1] 8:7
care [2] 8:4, 19:1
cars [1] 17:11
cement [1] 17:2
century [2] 5:11, 6:14
CERCLA [1] 3:22
certainly [1] 13:19
certify [1] 20:8
chairman [1] 14:3
chance [1] 19:2
changed [1] 14:21
CHARLES [1] 1:19
Charles [3] 3:4, 15:10, 15:20
Charlie [2] 3:18, 14:3
chemical [1] 13:6
chemicals [4] 6:9, 6:12, 13:2, 13:3
children [1] 10:1
chopping [1] 5:6
chosen [1] 11:24
Chrysler [1] 9:25
chunks [1] 5:6
citizens [1] 8:3
clamshell [1] 17:1
clamshells [1] 17:13
cleanup [4] 8:23, 8:23, 9:1, 12:13
Club [3] 12:16, 13:1, 13:5
COLEMAN [12] 1:19, 3:10, 7:11, 8:12, 9:21, 11:15, 12:4, 12:19, 13:20, 14:1, 18:25, 19:4
Coleman [3] 3:4, 3:18, 15:10
collapse [1] 16:17
collected [1] 16:10
Colorado [1] 5:13
COMMENT [1] 1:14
comment [8] 3:12, 4:3, 8:10, 12:21, 13:20, 15:20, 15:21, 19:1
COMMENTORS [1] 2:2
Comments [2] 4:5, 4:6
comments [10] 4:8, 4:9, 4:10, 4:11, 8:19, 12:17, 18:22, 18:25, 19:5, 19:12
commission [1] 20:21
communities [2] 6:17, 16:3
community [15] 4:19, 4:22, 5:13, 7:21, 9:4, 9:14, 9:18, 10:20, 10:24, 11:1, 11:4, 12:12, 12:24, 14:19, 19:9
Company [2] 8:15, 16:4
Compensation [1] 3:21
compliment [1] 11:13
complimented [3] 10:8, 10:13, 10:18
compliments [1] 14:6
Comprehensive [1] 3:21
computer [1] 20:12
concept [1] 12:15
concern [1] 6:11
concerned [2] 4:18, 17:22
concerns [6] 7:22, 7:25, 9:3, 9:4, 19:8, 19:9
conclusion [1] 10:18
condition [1] 6:6
conducted [1] 3:20
Congressmen [1] 6:16
constantly [1] 6:20
consultation [1] 3:17
contain [1] 20:13
contains [1] 16:11
contaminated [1] 17:15
contamination [1] 17:20
continue [1] 10:9
controls [3] 7:3, 8:1, 8:5
cooperation [1] 15:25
copied [3] 15:10, 15:10, 15:11
copper [1] 16:12
cosmetically [2] 10:25, 11:11
cost [4] 5:19, 5:22, 5:22, 18:14
costs [1] 18:13
counties [1] 5:18
Country [1] 13:
country [4] 4:21, 9:3, 9:7, 10:21
County [3] 12:8, 20:4, 20:7
county [1] 9:13
course [16] 5:8, 5:9, 5:14, 5:22, 6:10, 6:12, 6:24, 9:15, 12:10, 12:10, 13:4, 13:10, 13:12, 13:16, 13:17, 13:19
courses [3] 13:2, 13:3, 13:14
cover [1] 16:18
covered [1] 18:5
covers [2] 7:17, 8:2
craw [1] 15:5
creating [1] 7:2
creation [1] 7:20
creative [1] 10:14
Creek [1] 5:1
CRICHTON [2] 2:9, 12:23
Crichton [1] 12:23
critical [2] 9:10, 9:12
crumbling [2] 6:19, 6:21

-- D --

darn [1] 5:4
date [3] 16:2, 16:19, 17:24
DAVISON [2] 2:4, 7:13
Davison [3] 7:12, 7:14, 8:12
day [3] 5:24, 13:15, 20:17
deadline [1] 8:20
dealer [1] 9:25
dealership [1] 11:10
dealing [1] 6:8
Dear [1] 15:24
death [1] 15:14
decided [1] 15:17
Decision [2] 4:11, 19:14
decision [5] 16:7, 16:16, 16:20, 19:13, 19:15
dedicated [1] 11:25
DEE [2] 2:6, 9:23
Dee [4] 9:22, 9:23, 11:15, 11:18
Deer [1] 12:23
Denver [2] 5:12, 5:17
deposit [1] 16:8
derogatory [1] 14:7

design [1] 8:9
designed [2] 13:12, 13:16
desires [1] 9:4
developed [2] 8:1, 10:21
DEVELOPMENT [1] 1:8
Development [2] 3:14, 7:14
development [8] 8:24, 9:5, 9:15, 9:16, 10:11, 10:15, 11:19, 12:13
developments [3] 5:5, 11:25, 12:1
difficult [2] 5:24, 6:3
dig [3] 15:6, 16:7, 17:21
digging [2] 18:11, 18:19
directed [1] 4:5
dirt [3] 16:18, 16:21, 16:24
dismantlement [1] 16:14
district [1] 7:3
disturbed [1] 18:1
doing [1] 15:2
drop [1] 13:6
due [1] 11:3
During [1] 16:14
during [1] 3:12
dust [12] 16:10, 16:11, 16:17, 16:21, 16:25, 17:4, 17:4, 17:10, 17:13, 17:14, 17:15, 18:4

-- E --

EAST [1] 1:7
East [1] 3:14
economic [6] 8:24, 9:5, 10:11, 10:14, 11:2, 12:13
edge [1] 13:6
effects [1] 13:2
elements [1] 16:13
elk [1] 5:7
emphasize [1] 6:22
employ [2] 10:22, 11:7
encourage [4] 5:8, 5:15, 9:17, 10:19
encouraged [1] 10:9
end [2] 18:15, 19:14
ends [1] 17:15
entire [2] 5:9, 12:15
entrance [1] 11:1
environment [3] 8:3, 10:24, 11:5
ENVIRONMENTAL [1] 1:2
Environmental [3] 3:17, 3:21, 15:9
environmental [2] 8:23, 19:9
EPA [11] 4:10, 4:12, 9:17, 10:10, 10:15, 14:9, 15:2, 16:1, 16:6, 18:3, 18:11
EPA's [2] 3:18, 19:13
equipment [1] 17:8
especially [1] 14:24
evening [1] 8:17
eventually [1] 17:2
everybody [3] 19:4, 19:7, 19:15
everyone [1] 10:18
everything [1] 16:18
excellent [1] 16:1
exist [1] 16:25
expensive [1] 5:15
expires [1] 20:21.5
extensive [2] 9:8, 9:9
extremely [2] 4:18, 4:23

-- F --

fact [2] 14:3, 17:9
Fairmont [1] 14:17
families [1] 11:8
far [2] 5:11, 10:20
father [2] 10:3, 15:14
favor [2] 10:6, 12:10
fear [3] 5:8, 5:21, 13:1
Feasibility [2] 3:13, 4:6
feel [2] 15:25, 19:6
few [1] 9:6
figure [1] 18:13
final [2] 18:13, 19:13
find [2] 6:3, 6:3
fine [2] 13:17, 13:18
finest [1] 13:11
first [1] 9:10
FITZPATRICK [2] 2:8, 12:6
Fitzpatrick [2] 12:5, 12:7
five [1] 11:20
fix [1] 17:17
Flathead [1] 13:5
flue [13] 15:7, 15:7, 15:7, 16:7, 16:14, 16:18, 16:18, 17:7, 17:10, 17:19, 18:7, 18:12, 18:20
flues [1] 16:9
followed [1] 11:19
following [2] 3:7, 16:11
foregoing [1] 20:13
FORMAL [1] 1:14
formal [3] 3:10, 3:11, 8:19
forward [2] 7:23, 12:21
Foundation [1] 12:9
four [2] 10:1, 10:3
freezing [1] 6:19
fruition [2] 9:16, 9:20
full [2] 6:4, 6:4
Furthermore [1] 9:1
future [6] 8:5, 8:6, 9:4, 10:4, 10:23, 10:25

-- G --

Garden [1] 12:16
General [2] 9:25, 16:5
Generally [1] 7:15
generally [2] 8:10, 8:17
getting [2] 13:7, 13:7
Gironamo [1] 13:17
give [1] 15:18
glad [1] 12:6
glory [1] 4:20
goal [1] 8:22
Golf [1] 13:1
golf [18] 5:8, 5:9, 5:14, 5:16, 5:22, 6:10, 6:12, 6:24, 9:15, 12:9, 13:2, 13:3, 13:4, 13:10, 13:14, 13:16, 13:17, 13:18
good [5] 8:11, 14:10, 14:13, 15:3, 18:17
government [2] 9:3, 9:13
ground [1] 17:2
groundwater [1] 17:19
group [1] 10:16
grow [1] 11:12
growth [2] 8:5, 8:6

-- H --

habitat [1] 5:22
Haeffner [1] 14:4
hand [1] 20:16
hang [1] 9:18
happened [1] 5:10
happy [1] 8:16
hard [1] 10:17
health [1] 8:2
hear [1] 6:11
heard [5] 13:8, 14:20, 14:23, 17:6, 18:2
hearing [5] 3:4, 3:24, 4:9, 20:10, 20:11
held [2] 3:12, 3:24
help [4] 10:15, 11:4, 11:5, 11:11
helped [1] 11:2
Herlock [1] 4:15
High [2] 1:16, 3:25
high [2] 5:19, 18:15
highly [1] 10:13
historic [5] 4:18, 4:23, 7:2, 8:24, 11:5
hope [3] 6:16, 6:21, 8:6
Hopefully [1] 17:24
hopefully [1] 19:11
hoppers [7] 17:9, 17:11, 17:12, 17:14, 18:4, 18:5, 18:7
hoses [1] 17:3
hours [1] 10:17
hundred [1] 11:10
hundred-year-old [1] 6:2
hunt [1] 4:25
HURLOCK [2] 2:3, 4:16
Hurlock [2] 4:16, 7:11

-- I --

idea [3] 5:3, 10:13, 11:24
impact [1] 11:2
important [6] 4:23, 7:2, 10:25, 11:3, 11:6, 11:9
include [1] 8:6
included [2] 1:2, 4:9
including [1] 18:13
indicate [1] 11:22
indicated [1] 4:4
individuals [1] 10:16
industry [1] 7:8
input [1] 14:23
instance [2] 7:2, 15:3
instead [1] 6:19
institutional [2] 8:1, 8:5
intact [1] 8:2
intendees [1] 4:7
interested [1] 5:16
interpreted [1] 7:6
invest [2] 10:4, 10:22
Investigation [2] 3:13, 4:5
investment [1] 10:24
involve [1] 9:13
involved [1] 5:18

-- J --

Jack [2] 13:12, 13:18
JIM [2] 2:4, 2:7
Jim [4] 7:12, 7:13, 11:16, 11:17
job [1] 15:3
junkyard [1] 5:2

-- K --

Kalispell [1] 5:10
keep [2] 4:19, 11:8
kept [1] 10:10
kind [1] 9:18

-- L --

lack [2] 6:25, 9:9
laid [1] 14:12
Lake [1] 13:5
lake [1] 13:6
Land [1] 5:5
land [2] 5:7, 10:14
Last [1] 19:2
last [6] 5:11, 11:20, 12:4, 13:15, 13:16, 16:5
later [1] 20:12
law [1] 19:7
laws [1] 19:10
leader [1] 5:13
leaders [1] 6:17
least [3] 12:4, 12:6, 18:12
left [2] 17:16, 18:5
less [2] 5:7, 5:7
letter [6] 15:8, 15:17, 15:18, 15:21, 15:23, 17:25
letting [1] 19:5
level [1] 7:21
levels [2] 7:20, 7:23
Liability [1] 3:22
life [1] 10:2
lime [1] 17:3
limited [1] 4:7
list [1] 12:5
listened [1] 14:20
listening [2] 6:17, 6:18
little [2] 7:7, 9:12
lived [1] 10:2
living [1] 12:2
loaded [1] 17:1
Local [1] 7:14
local [4] 9:3, 9:4, 9:18, 9:24
Lodge [2] 12:8, 12:24
long [4] 4:20, 7:20, 9:23, 13:24
long-term [1] 7:22
look [4] 7:18, 7:19, 7:23, 18:9
lose [1] 5:18
loss [1] 5:11
lot [11] 13:14, 14:8, 14:9, 14:14, 14:14, 14:17, 14:19, 14:22, 14:23, 17:4, 19:6

-- M --

machine [1] 20:12
made [5] 14:22, 16:7, 16:17, 16:20, 18:22

main [2] 16:7, 17:19
maintain [1] 6:10
majority [2] 10:3, 10:7
make [1] 12:1
making [1] 9:15
management [1] 7:19
MANAGER [1] 1:19
Manager [3] 3:19, 7:14, 16:6
manmade [2] 6:1, 6:5
manner [1] 14:10
married [1] 10:1
material [5] 16:8, 16:19, 16:22, 16:25, 17:21
matter [1] 3:3
Max [3] 15:11, 15:14, 15:21
may [1] 9:6
meant [1] 11:13
MEETING [1] 1:14
meeting [11] 3:10, 3:11, 3:16, 3:20, 4:2, 4:3, 15:5, 15:13, 18:22, 18:24, 19:9
meetings [3] 3:11, 14:13, 14:18
meets [1] 8:21
MEL [1] 2:10
Mel [2] 13:22, 14:2
member [5] 12:7, 12:25, 14:3, 14:5, 14:6
midnight [1] 4:12
might [2] 7:8, 7:8
miles [1] 13:13
Mill [1] 5:1
million [1] 18:14
mind [3] 4:20, 10:10, 10:11
minus [1] 7:7
minutes [1] 15:16
misinformed [1] 16:6
money [4] 5:18, 5:23, 11:3, 18:16
monitor [1] 17:18
MONTANA [2] 3:1, 20:3
Montana [10] 3:18, 4:1, 4:22, 5:5, 9:18, 13:12, 16:1, 20:8, 20:20.5, 20:21
months [1] 9:19
more [3] 5:23, 9:1, 14:14
Motors [1] 9:25
mountain [1] 4:21

-- N --

name [9] 3:18, 4:14, 4:16, 7:13, 8:14, 9:23, 11:17, 13:24, 14:2
named [1] 20:13
NATALIE [1] 2:8
Natalie [3] 12:5, 12:7, 12:19
nation [2] 6:4, 6:4
nation's [1] 5:24
National [1] 7:6
natural [1] 5:11
nearly [1] 6:14
necessarily [1] 8:22
necessities [1] 5:20
never [4] 15:19, 15:20, 15:20, 18:2
new [1] 13:10
newly [1] 9:14
newspaper [1] 5:12
nice [1] 12:2
Nicholas [2] 13:13, 13:16
nine [2] 18:10, 18:12
nineteen [1] 20:13
Nordhagen [1] 20:6
NOTARIAL [1] 20:21.5
notarial [1] 20:17
Notary [2] 20:7, 20:20
number [1] 4:7

-- O --

occur [1] 17:20
OCTOBER [1] 3:1
October [5] 1:16.5, 3:4, 3:25, 4:12, 8:19
OLD [1] 1:7
Old [6] 3:14, 6:13, 6:18, 7:5, 19:11, 19:13
old [2] 15:7, 16:24
once [1] 8:17
one [8] 9:6, 9:10, 12:25, 13:6, 13:18, 13:19, 15:3, 19:12
open [1] 12:20
OPERABLE [1] 1:8
Operable [1] 3:14
Opportunity [1] 14:18
opportunity [2] 11:13, 12:22
opposed [1] 15:8
opposition [2] 14:17, 14:19
original [2] 10:12, 12:9
outlined [1] 8:18
outstanding [1] 12:12
overall [1] 7:19

-- P --

page [1] 2:2
pages [1] 20:13
paper [1] 5:17
Parks [1] 7:6
part [4] 6:9, 11:10, 12:24, 17:22
participated [1] 14:8
particular [2] 8:21, 13:4
particularly [1] 7:17
particulates [1] 16:15
party [1] 8:16
past [1] 14:13
paying [1] 5:25
people [9] 10:8, 10:12, 10:22, 11:8, 13:1, 13:13, 14:15, 14:18, 14:19
period [1] 3:12
person [3] 6:1, 10:20, 11:7
Personally [1] 5:23
personnel [2] 17:5, 17:6
phases [1] 8:10
place [8] 4:17, 8:2, 8:8, 16:19, 17:16, 18:19, 18:21, 20:11
placed [2] 11:4, 16:22
Plan [2] 3:13, 4:6
plan [9] 7:16, 8:11, 8:18, 8:21, 10:6, 11:1, 11:11, 14:21, 17:18
plane [1] 15:19
play [1] 13:14
played [2] 13:14, 13:16
playing [1] 13:15
Please [1] 4:13
please [3] 4:8, 4:13, 19:7
plenty [2] 13:8, 14:1
plumb [1] 6:4
plus [1] 16:12
point [1] 17:15
pollution [2] 6:7, 6:8
Polson [1] 13:5
Pond [1] 14:24
pond [1] 14:16
ponds [1] 14:22
poor [2] 5:3, 6:5
postmarked [1] 4:12
potential [1] 12:1
potentially [1] 8:15
prefer [1] 7:5
preferred [2] 11:23, 12:11
prerequisites [1] 18:10
presented [1] 7:16
preservation [3] 4:19, 8:24, 11:5
presided [1] 3:16
presiding [2] 1:19, 3:5
proactive [2] 8:4, 10:9
problem [3] 6:8, 16:24, 18:6
proceedings [1] 3:7
process [2] 10:10, 17:15
products [1] 10:1
Professional [1] 20:6
program [1] 14:11
PROJECT [1] 1:19
Project [1] 3:19
project [3] 12:18, 15:24, 19:11
proposal [3] 5:2, 5:3, 15:1
proposals [2] 14:22, 14:25
Proposed [2] 3:13, 4:6
proposed [12] 6:12, 7:4, 8:18, 8:21, 10:6, 10:12, 10:12, 10:16, 11:11, 12:9, 14:16, 15:6
protect [1] 6:2
PROTECTION [1] 1:2
Protection [2] 3:17, 15:9
provide [2] 8:18, 8:23
provided [1] 8:9
provision [1] 17:20
PUBLIC [1] 1:14
Public [2] 20:7, 20:20
public [12] 3:4, 3:10, 3:11, 3:12, 3:24, 14:13, 14:18, 15:5, 17:22, 18:18, 18:22, 18:24
pursuant [1] 3:20

-- Q --

quarter [1] 5:11
quick [1] 11:22

-- R --

rail [1] 17:11
railroad [1] 17:11
rain [1] 6:20
raised [3] 9:24, 10:2, 11:18
rather [1] 8:22
read [5] 5:1, 5:16, 15:18, 15:19, 15:23
real [3] 11:22, 14:13, 16:2
really [1] 18:23
realm [1] 18:14
reason [1] 10:23
Reauthorization [1] 3:23
recently [1] 5:12
Record [2] 4:11, 19:14
record [4] 3:24, 7:13, 12:22, 20:14
Recreation [1] 12:8
recreation [1] 12:2
recycled [1] 5:4
redevelopment [2] 9:8, 9:9
regard [1] 8:25
regarding [1] 5:1
regenerated [1] 11:4
REGION [1] 1:2
Registered [1] 20:6
remarks [1] 14:7
REMEDIAL [1] 1:19
Remedial [3] 3:12, 3:19, 4:5
remediation [1] 11:20
remedy [1] 12:11
remember [1] 4:13
REMEMBERED [1] 3:3
remove [3] 16:17, 16:20, 17:10
removed [7] 8:8, 16:24, 17:1, 17:13, 17:14, 18:7, 18:8
reported [1] 20:11
Reporter [1] 20:6
reporter [1] 4:14
repository [3] 8:9, 16:8, 16:23
represent [3] 4:14, 8:14, 14:5
requested [1] 7:21
requirements [1] 3:20
reservations [1] 10:7
resident [1] 9:24
residential [1] 7:23
residing [1] 20:20.5
resource [1] 6:3
resources [1] 4:23
respond [1] 4:10
Response [1] 3:21
response [1] 19:3
responsible [1] 8:15
rest [3] 7:7, 7:9, 13:3
restoring [1] 4:17
restricted [1] 7:1
Retired [1] 12:16
revegetated [1] 7:10
review [1] 17:24
Richfield [1] 8:15
Rick [1] 4:18
Ridge [1] 6:24
right [2] 13:6, 19:15
roads [2] 5:19, 5:25
ruins [1] 6:13
rural [2] 5:18, 5:25

-- S --

safety [1] 8:3
SANDY [1] 2:5
Sandy [5] 8:13, 8:14, 9:21, 15:11, 15:21

Saturday [1] 15:15
savings [1] 10:22
scene [1] 14:8
School [2] 1:16, 3:25
schools [1] 11:9
SEAL [1] 20:21.5
seal [1] 20:17
second [1] 3:11
see [9] 4:24, 6:14, 7:10, 9:19, 13:19, 13:24, 18:17, 18:19, 18:21
seeing [1] 17:23
sees [1] 9:7
send [1] 12:17
September [1] 20:21.5
Service [1] 7:7
set [1] 20:16
several [2] 7:25, 14:25
sheet [2] 4:4, 18:10
shorthand [1] 20:12
sickness [1] 15:14
sign-up [1] 4:4
Silver [2] 20:4, 20:7
simply [1] 6:20
single [1] 19:12
SITE [1] 1:5
Site [2] 3:15, 3:19
site [2] 8:16, 17:23
sites [2] 9:2, 9:7
six [3] 9:19, 11:20, 18:12
skill [1] 20:15
slash [1] 13:24
small [1] 17:11
smaller [2] 5:6, 5:6
SMELTER [1] 1:5
Smelter [3] 3:15, 3:19, 16:5
smelting [1] 16:10
soils [2] 8:8, 8:9
solution [1] 6:7
solve [1] 18:6
someday [2] 7:8, 7:9
something [2] 6:14, 6:21
somewhere [1] 5:13
southwestern [1] 13:11
specifically [1] 11:24
spent [2] 18:16, 18:17
spray [1] 17:3
ss [1] 20:3.5
stabilization [1] 6:13
stabilize [2] 6:15, 6:18
stabilized [1] 7:6
stack [1] 15:22
stand [1] 9:6
start [2] 4:15, 6:18
STASH [3] 2:5, 8:14, 18:15
Stash [3] 8:13, 8:14, 15:11
STATE [1] 20:3
State [5] 3:18, 9:17, 16:1, 20:7, 20:20
state [1] 4:13
states [1] 18:11
stay [2] 8:2, 10:23
steel [2] 16:21, 17:9
step [1] 9:10
steps [1] 9:12
STOKKE [4] 3:10, 13:23, 14:2, 18:16
Stokke [1] 14:2
strike [1] 19:8
strongly [1] 15:1
Stucky [1] 6:24
Study [2] 3:13, 4:6
study [1] 10:16
subareas [1] 7:18
subdivisions [4] 5:14, 5:15, 5:18, 7:1
successful [1] 16:20
sufficient [1] 15:17
summarize [2] 4:8, 6:23
SUPERFUND [1] 1:5
Superfund [8] 3:15, 3:23, 8:22, 8:25, 9:7, 15:24, 17:23, 19:7
support [2] 8:17, 12:18
supportive [4] 7:15, 7:17, 7:24, 12:14
sure [5] 9:15, 11:11, 12:12, 13:8, 13:17

-- T --

tailings [2] 14:16, 14:22
taken [3] 8:3, 9:3, 20:10
taking [2] 18:19, 18:21
taxpayers [1] 5:23
Teachers [1] 12:17
ten [2] 11:21, 15:15
terribly [1] 5:24
testimony [1] 20:14
Thank [12] 7:10, 7:11, 8:12, 9:21, 11:15, 12:3, 12:4, 12:15, 12:19, 13:20, 18:24, 18:25
thank [3] 11:13, 19:4, 19:15
Thanks [1] 9:20
thawing [1] 6:19
thing [3] 5:4, 9:20, 18:9
things [5] 5:19, 6:1, 6:5, 14:9, 14:12
thought [2] 4:21, 17:25
time [13] 4:20, 5:16, 5:24, 9:23, 12:20, 12:22, 12:25, 14:1, 14:16, 14:25, 15:6, 15:8, 20:10
times [1] 19:6
TOM [1] 2:3
Tom [2] 4:15, 4:16
tonight [8] 6:15, 12:5, 14:4, 14:12, 15:4, 19:2, 19:5, 19:16
top [1] 15:22
town [1] 9:25
toxic [2] 16:10, 16:17
tracks [1] 17:11
transcribed [1] 20:12
transcript [2] 4:3, 4:10
treat [2] 16:7, 17:21
treated [2] 16:22, 17:2
tremendously [1] 11:2
tried [1] 10:4
trucks [1] 17:1
true [1] 20:13
truly [2] 5:3, 13:17
try [2] 11:7, 19:7
trying [3] 6:2, 7:19, 12:1
turned [1] 18:20
two [1] 3:11

-- U --

understand [2] 6:1, 7:4
unique [2] 8:22, 8:25
UNIT [1] 1:8
Unit [1] 3:14
unload [1] 17:12
unused [1] 4:23
usable [1] 5:7

-- V --

values [1] 5:11
various [2] 7:18, 9:2
vast [1] 6:9
vice [1] 14:3
viewed [1] 9:2
violates [1] 18:12
visitation [1] 15:12
visiting [1] 17:23
visually [1] 18:19
vocal [1] 14:15

-- W --

waited [2] 6:13, 9:11
wanted [3] 5:14, 13:24, 15:4
waste [2] 13:1, 13:3
water [1] 13:7
way [1] 13:7
weight [1] 18:23
well [5] 8:24, 9:4, 9:6, 9:15, 9:18
western [2] 4:20, 5:5
wet [1] 17:3
wife [2] 4:16, 7:5
wild [1] 4:21
wildlife [6] 4:22, 4:25, 5:7, 5:22, 7:10, 11:6
winter [1] 5:16
wishing [1] 4:3
WITNESS [1] 20:16
witness [1] 20:14
wonderful [1] 4:23
wondering [1] 18:23
work [5] 7:16, 9:13, 12:11, 17:7, 19:7
worked [4] 10:8, 10:17, 14:7, 16:4
working [1] 17:5
workplace [1] 16:16
WORKS [1] 1:7
Works [6] 3:14, 6:13, 6:18, 7:5, 19:11, 19:13
worthwhile [1] 10:18
write [1] 15:17
writing [1] 8:19
Written [1] 4:11
written [4] 4:8, 4:9, 8:10, 12:17
wrote [2] 15:8, 15:8

-- Y --

yards [1] 11:10
year [3] 6:12, 9:20, 19:14
years [6] 9:11, 11:21, 13:15, 16:5, 16:5, 17:19
YEOMAN [2] 2:7, 11:17
Yeoman [2] 11:16, 11:17
You've [1] 14:1

-- Z --

zinc [1] 16:12

Attachment B

Written Comments Received During Public Comment Period

Anaconda Chamber of Commerce
306 E. Park Anaconda, MT 59711 Phone (406) 563-2400

October 20, 1993

Charlie Coleman, EPA Project Manager
USEPA, Montana Office
301 South Park, Drawer 10096
Helena, MT 59626

Dear Mr. Coleman:

The Anaconda Chamber of Commerce supports the efforts of the Environmental Protection Agency and congratulates them along with ARCO and the Anaconda-Deer Lodge County Commission on their plan for the clean-up of the Old Work/East Anaconda Development Area. It appears that the plan will not only restore vegetation to the area but will provide an opportunity for development which will allow the Anaconda area to grow.

It is our hope that remediation will continue in a timely manner.

Sincerely,

Joan Vest.

Joan Vest, President
Anaconda Chamber of Commerce

1101 Heather Drive
Anaconda, MT 59711
October 19, 1993

Charles Coleman, EPA Project Manager
USEPA, Montana Office
301 South Park, Drawer 10096
Hele na, MT 59626

Dear Sirs:

We are happy to write you in support of the Preferred Remedy indicated for the Old Works/East Anaconda Area Operable Unit. During the past three years we have had several persons as program speakers who have outlined the many aspects of the clean-up alternatives and plans for our area, so we feel comfortable with the remedies included in your recommended program.

We are pleased with the attention paid to the historic smelter sites in the area as well as to the golf course. With the economic benefits of this revitalization, certainly our local government and schools will participate in the renewed vigor of our community.

We are interested in receiving some word in regard to the action levels of arsenic concentration, particularly for residential properties.

Yours very truly,

ANACONDA RETIRED TEACHERS' ASSOCIATION

Alice Balcombe

Alice Balcombe, President

1902 Tammany
Anaconda, MT 59711
October 19, 1993

Charles Coleman, EPA Project Manager
USEPA, Montana Office
301 South Park, Drawer 10096
Helena, MT 59626

Gentlemen:

We of the Anaconda Garden Club support the Preferred Remedy for the Old Works/East Anaconda Development Area Operable Unit. Since our organization's main purpose is civic beautification, we are particularly pleased that this alternative goes a long way toward improving our local area.

We are particularly pleased with the plan to revegetate approximately 1500 acres over a 3-year period, establish the Jack Nicklaus golf course, and preserve historic resources with a controlled access trail system. All of these elements will improve our community's physical environment as well as contribute to its economic well being.

We appreciate your department's including the community in its decision making process.

Yours very truly,

Lorraine Johnson

Lorraine Johnson, President
Anaconda Garden Club

Oct. 16, 1993

Charlie Coleman EPA Project Manager
USEPA Montana Office
301. S. Park. Drawer 10096
Helena, Mt. 59626

Dear Mr. Coleman:

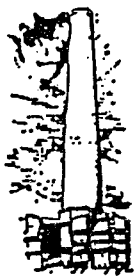
I would like to offer this letter in support of ~~the~~ Preferred Alternative 3. for the proposed clean up of the Old Works / East Anaconda Development Area.

EPA, ARCO, Deer Lodge Co. and the State of Montana are to be commended for the cooperative effort shown in developing a solution to this problem.

It will be great to have a beautified gateway into Anaconda instead of the desolate, polluted, moonscape that now exists.

I look forward for the Reclamation to begin, and the first signs of vegetative growth.

Sincerely,
Ray Lappin



ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

I am in favor + support the Proposed Plan, (Preferred Remedy) and ~~recommend~~ speedy action so as to get to the design stage as soon as possible.

Name: Edward L. Singer

Address: 1005 E. Park

Phone: 563-6543

ENVIRONMENTAL PROTECTION AGENCY
OCT 1 5 1993
MONTANA OFFIC

ANACONDA-DEER LODGE RECLAMATION ADVOCATES

218 EVERGREEN
ANACONDA, MT 59711

October 1, 1993

Charlie Coleman, EPA Project Manager
USEPA, Montana Office
301 South Park, Drawer 10095
Helena, MT 59626

Dear Sir:

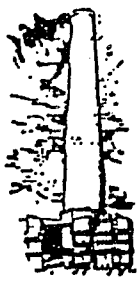
This is to inform you that ADRA has come to a complete understanding that your proposed plan offered to us at the September 29th meeting is accepted by all. We feel that if other changes come about while doing this project that we will be informed. The whole community we are sure will back you on this endeavor. We also know that there is some that are waiting for you and will ask for more studies. This community want to move forward and take a step into a new future.

Members of this organization will be at your October 14th meeting willing to help all take the next step in resolving our superfund dilemma. Myself will be out of town and would like to be present to back your proposal.

Sincerely,

Charles Haeffner

Charles Haeffner, Chairman
Anaconda-Deer Lodge reclamation
Advocates



ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

I support the proposed plan for the Old Works/East Anaconda development area operable unit.

Name: Bernie Sturm

Address: 1111 E. 4th St., Anaconda, MT 59711

Phone: 563-7806

ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

ENVIRONMENTAL PROTECTION AGENCY
OCT 19 1993
MONTANA OFFIC

As Planning Director of Anaconda-Deer Lodge County, I support the preferred alternative as recommended by EPA. This alternative provides for the protection of human health and environment, and yet for the first time in CERCLA history, it takes into consideration the needs and desires of the community, both in regard to economic development and historic preservation. There is a unique blend of both institutional controls and engineering controls. I do believe there needs to be additional discussion on those areas with potential commercial and industrial development that have arsenic levels in excess of 500 ppm.

These views do not necessarily reflect the views of the Anaconda-Deer Lodge County Commission nor the Anaconda-Deer Lodge Planning Board

Name: JAMES M. Jo MANNING

Address: 800 MAIN, ANACONDA MT 59711

Phone: 563-8921

ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

ENVIRONMENTAL PROTECTION AGENCY

OCT 14 1993

MONTANA OFFIC

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

Thank you for an interesting informative & professional presentation.

Please consider allowing a tour of the Old Works by the Historic Resources Board & other interested individuals before the changes take place.

I am hopeful that EPA and/or ARCO will prepare a documentary video of the Old Works as it is at this time. I feel it would be worthwhile to have this part of Anaconda's history preserved for future generations & for our current residents. The video could be placed at the Hearst Free Library and loaned to interested residents.

Thank you for your considerations.

Name: Rose Nyman

Address: 611 W. Third St., Anaconda, MT 59711

Phone: (406) 563-3288

ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

Your Proposed plan looks to be acceptable in controlling further contamination of the ground water.

My concerns are:

(1) How does a construction firm obtain bid information on ~~for~~ EPA funded work?

(2) Is Superfund private money or Federal?

(3) If Federal why aren't the jobs advertised?

I work for a reputable construction firm that is qualified for this type of work.

Name: George Heath - N.A. Degerstrom, Inc.

Address: Box 90 Ramsey, Mont.

Phone: 797-3284 work 797-7313 home

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
100 N PARK, SUITE 320
HELENA, MT 59601

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

10,143 C

October 21, 1993

Charles Coleman
Remedial Project Manager
U.S. Environmental Protection Agency
301 S. Park, Drawer 10096
Helena, MT 59626

Dear Charlie:

As part of Interagency Agreement No. 0-AA-60-01430 in which the U.S. Fish and Wildlife Service (Service) provides technical support to the Bureau of Reclamation, we have reviewed the Anaconda Smelter Superfund Site Old Works/East Anaconda Development Area Operable Unit (OW/EADA OU) Proposed Plan and Final Draft Remedial Investigation and Feasibility Study.

In the comparison of alternatives, we were unable to locate the "Preliminary Analysis of Impacts to Wetlands." As described in ARCO's January 27, 1992 letter to the EPA (attached, page 6), the purpose of this analysis is to forecast changes to wetland area and function related to response actions at a site. The analysis consists of two tasks including a comparison of quantitative and qualitative impacts to wetlands associated with each alternative.

The generic information presented in ARCO's Anaconda Smelter NPL Site Wetlands and Threatened/Endangered Species Inventory with Determination of Effective Wetland Area (February 1993) is insufficient for an adequate evaluation of alternatives. As discussed in ARCO's January 27, 1993 letter to EPA, this Inventory is to be only the first step in a four step wetlands assessment process.

We recommend that the information necessary for completion of the "Preliminary Analysis of Impacts" be collected and the analysis be completed prior to remedy selection. This information will also be necessary for completion of the wetlands assessment Step 3: Detailed Analysis of Impacts and Step 4: Confirmation of Response Action Impacts, following issuance of the Record of Decision and Certification of Completion, respectively.

Two applicable or relevant and appropriate requirements (ARARs) pertaining to the protection of the Service's trust resources were not included in the Federal ARARs section. We believe that the remedial action must comply with the substantitive requirements of The Bald Eagle Protection Act of 1940, as amended, 16 U.S.C. 668 et seq., and The Migratory Bird Treaty Act of 1918, as amended, 16 U.S.C. 703 et seq. This recommendation was previously made in our

June 28, 1993 letter to you, but the two Acts still have not been included in the ARARs listing.

These comments are provided as technical assistance only and do not constitute a position the Department may take in the future regarding possible injury to natural resources.

Thank you for the opportunity to comment on the Proposed Plan. We look forward to continued participation in the remediation of the OW/EADA OU.

Please contact Bill Olsen of my staff at 449-5225 if you have any questions concerning these comments.

Sincerely,

Robert M. Stoglewood

Dale Harms
for State Supervisor
Montana State Office

Attachment

cc: Hazardous Waste Coordinator, MT Projects Office, USBR, Billings, MT
w/o attach
Regional Environmental Officer, OEA, DOI, Denver, CO w/o attach

ARCO

Post Office Box 1491
Suite 301, First Security Bank Building
307 East Park Street
Anaconda, Montana 59711
Telephone 406 563 5211
Facsimile 406 563 8269

ATTACHMENT 2
10,085-(A)

January 27, 1992

Mr. Donald Pizzini
U. S. Environmental Protection Agency
Region VIII, Montana Office
Federal Building
301 South Park, Drawer 10096
Helena, Montana 59626-0096

Mr. Robert Fox
U.S. Environmental Protection Agency
Region VIII, Montana Office
Federal Building
301 South Park, Drawer 10096
Helena, Montana 59626-0096

Re: Clark Fork River Superfund Sites -- Wetlands Issues

Dear Don and Bob:

ARCO recently submitted a report captioned "Wetlands Delineation and Wildlife Habitat Evaluation of the Warm Springs Ponds Operable Unit" (the "WSP Study"). The WSP Study was prepared to provide baseline information related to wetlands at this site. ARARs for the WSP Operable Unit related to protection of wetlands include the substantive requirements of Executive Order 11990 and Section 404(b) of the Clean Water Act.[1]

As the WSP active and inactive area remedial actions move forward, issues related to wetland impacts will need to be factored into decisions made during RD/RA. Specific issues to be addressed include delineation and quantification of jurisdictional wetlands and wetland habitat, and mitigation measures which will be required. These same issues will arise during RI/FS or EE/CA studies as response actions are undertaken elsewhere

[1] Location-specific ARARs identified in the Record of Decision include 40 C.F.R. §6.302(a), and 40 C.F.R. Part 6, Appendix A. Action-specific ARARs related to Section 404(b) of the Clean Water Act include 40 C.F.R. Parts 230, 231 (substantive provisions only), 33 C.F.R. Parts 323 and 330 (substantive provisions only).

within the Clark Fork River Superfund Sites.[2] The purpose of this letter is to initiate a dialogue with the federal and state agencies involved in the review process and reach agreement on the procedures which will be adopted to resolve these issues as work progresses at each site.

In addition to the WSP Study, ARCO has previously submitted separate reports delineating wetlands covering the Rocker[3] and Streamside Tailings operable units,[4] limited areas within the Anaconda Smelter Hill Site[5], and the Montana Pole and Treating Plant Site.[6] Each of these reports will be reviewed and revised, as necessary, following the procedures outlined below. ARCO is presently preparing a report for the Lower Area One site which will delineate and assess existing wetlands, and include a proposed Mitigation Plan for response actions at that site.

At the outset, ARCO believes application of the federal no net loss policy, discussed in more detail below, does not mandate on-site mitigation, i.e., replacement within the same operable unit of high value wetlands which are eliminated by response actions. Rather, a net loss or gain in wetlands should be measured regionally across the contiguous Clark Fork River Superfund Sites. Furthermore, restoration or replacement of non-vegetated wetlands which presently provide little value or function as part of response action for a site, such as the barren tailings surfaces present at WSP, the Lower Area One and other sites within the Clark Fork River basin, should be credited against unavoidable

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[2] This would include the Silver Bow Creek/Butte Addition, Montana Pole and Treating Plant, the Anaconda Smelter, the Clark Fork River, and the Milltown Reservoir Sites.

[3] Wetlands Delineation and Threatened/Endangered Species Inventory for Rocker Timber Framing and Treatment Plant (EA, July 22, 1991).

[4] Identification and Delineation of Jurisdictional Wetlands: Inventory of Threatened, Endangered, and Sensitive Species, Streamside Tailings Operable Unit (EA, August 15, 1991).

[5] Smelter Hill RI/FS Wetland Inventory Report (PTI, March 1989).

[6] Wetland Delineation Montana Pole and Treating Site, Butte, Montana (Keystone, July 1990).

impacts to functioning wetlands arising through implementation of response actions at these and other sites.[7]

Identification and Delineation of Wetlands at WSP

Revisions to the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (USEPA 1989) were published as a Proposed Rule in the federal register on August 14, 1991. (56 Fed. Reg. 44046). More recently, EPA and the Corps of Engineers have proposed that the revised federal manual will be codified as part of the Code of Federal Regulations. (56 Fed. Reg. 65964) The proposed revisions, if adopted, will substantially modify the current federal criteria for identification and delineation of wetlands. Decisions arising from the identification and delineation of wetland areas must nevertheless proceed in the interim pending a final decision by EPA regarding the proposed revisions.

The WSP Study was completed using the methodology presented in the Federal Manual (USEPA 1989), and guidance on specific issues provided by the Corps of Engineers. In the preamble to the August 1991 Proposed Rule, EPA indicated that it would continue to use the Federal Manual until the revisions were adopted in final form. It is our understanding that EPA has since determined that it is appropriate to follow the lead of the Corps of Engineers, and utilize the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual).[8]

ARCO proposes that the 1987 Manual be utilized for identification and delineation of wetlands for those sites where field verification of technical criteria has not yet been initiated. At its option, ARCO may elect to undertake additional field verification necessary to apply the 1987 Manual criteria to complete the studies in

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[7] Under the Federal Manual and the 1987 Manual, non-vegetated surfaces such as tailings surfaces do not meet the prerequisite technical requirements for delineation of a jurisdictional wetland. However, based upon an informal opinion provided by the Corps of Engineers such areas were mapped as jurisdictional wetlands in the WSP Study.

[8] See attached October 7, 1991 Memorandum and Responses to Questions and Answers regarding the 1987 Manual, Response to question 6; distributed by the Department of the Army, U.S. Army Corps of Engineers, John F. Studt, Chief, Regulatory Branch.

progress (for example, LAO) using the Federal Manual. For sites such as the WSP operable unit, Smelter Hill, Rocker and others referenced above where the Federal Manual criteria has been applied in development of reports submitted to the agency, these studies will be revised, if necessary, for consistency with the definitions and procedures which will be made part of the final revised manual. We believe this approach is consistent with the preamble discussion in the Proposed Rule, 56 Fed. Reg. at 40457.

Neither the Federal Manual nor the 1987 Manual provide a satisfactory methodology by which wetland values and functions may be evaluated. Based upon our understanding of the federal no net loss policy, this quality assessment is an integral component of the delineation task.[9] In preparation of the WSP Study, ARCO utilized the Wetland Evaluation Technique (WET) 2.0 standard method for this quality assessment. While useful as a baseline assessment tool, our experience has shown that the generality of the input parameters and lack of regional/site specificity generates results which do not adequately describe or differentiate between the values and functions provided by wetlands within a limited geographic area.

In contrast to the WET 2.0 method, the delineation of wetland habitat area following the USFWS criteria (Cowardin et al. 1979) provides a more flexible approach which allows for consideration of local conditions in a comparative analysis of wetland quality. As described below in the sequence of tasks for each site, we propose that future studies at other sites utilize both the 1987 Manual and the USFWS criteria to develop a quantitative and qualitative assessment of wetlands.

Applying the experience gained in preparation of the WSP study, ARCO proposes the following process for delineation of wetlands, assessment of wetland habitat value and function, and analysis of impacts as work progresses at a site.

Step 1 - Wetland Identification and Delineation: The purpose of Step 1 is to

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[9] Compliance with Other Laws Manual, Part I (August 8, 1988); Section 3.4.4, p. 3-32.

quantify baseline (prior to response action) wetlands area, value and function.

Task No. 1: ARCO will delineate wetlands (using the 1987 Manual until the Federal Manual is published in final form) and other special aquatic sites at each site where work is performed under an administrative order or judicial decree. This task should occur early in the RI or EE/CA process as part of site characterization studies.

Task No. 2: In addition to delineation of jurisdictional wetlands using the 1987 Manual criteria, wetland habitat will be delineated, value and function assessed following the method adopted by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). As has been done for the WSP Study, wetlands data will be digitized into the Geographic Information System (GIS).

Task No. 3: For each area, maps and narrative discussion summarizing the results from the delineation task and quality assessment described in Tasks 1 and 2 will be prepared as a separate submittal for agency review. The assessment will both quantify and characterize wetland areas present prior to response actions, separately identifying those areas having value and function, and those which do not in their present condition provide the value and function normally associated with wetland habitat.

Step 2 - Preliminary Analysis of Impacts: The purpose of Step 2 is to forecast changes to wetland area and function related to response action at a site. The baseline data developed in Step 1 will be used in preparation of a

preliminary analysis of potential impact to wetlands from fill activities which may be part of response actions under consideration.

Task 1: As part of the development and analysis of response action alternatives, alternative actions under consideration will be assessed and potential impacts to physical, chemical, and biological components of wetlands and the associated aquatic environment described. Both quantitative and qualitative impacts to wetlands will be described. Where applicable to the actions under consideration, the factual determinations described at 40 C.F.R. 230.11[10] which are useful in understanding the effect upon the environment from a proposed discharge will be presented in development of this analysis.

Task 2: The analysis of alternatives conducted during the FS or EE/CA will include a comparative analysis of projected impacts and/or improvements to wetland acreage, value and function from implementation of the alternative actions under consideration and proposed mitigation measures.

Step 3 - Detailed Analysis of Impacts: Following publication of a Record of Decision or Action Memorandum at a site, a more detailed analysis of potential impacts from construction activity will be submitted during the design phase. In this document, a Mitigation Plan will be presented which addresses the substantive ARAR requirements for protection of wetlands and associated aquatic habitat. The Mitigation Plan will

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[10] The regulations describe factors to be considered such as changes to the physical substrate, water circulation and effects upon the structure and function of the aquatic ecosystem.

propose practicable mitigation measures to minimize potential adverse impacts following the guidelines set forth at 40 C.F.R. Par 230, Subpart H. Further discussion of replacement of wetland areas as a mitigation requirement is presented below. The Mitigation Plan will be submitted to the agency for review as part of the ARARs Report generally required during remedial design, or as part of a Design Report where work will be performed under the EPA's removal action authority.

Step 4 - Confirmation of Response Action Impacts: There is potential that a proposed final remedial or response action design may be modified as construction proceeds to accommodate site-specific conditions. For sites where such changes are made, ARCO suggests that it is appropriate to prepare a final analysis of impacts following construction. This final analysis would be submitted at the completion of remedial action prior to Certification of Completion.[11] In this submittal, a final accounting of acreage totals, and conclusions presented in the previous analyses regarding anticipated changes in wetland values and functions would be revised to conform with the as-built design of the selected remedy or response action.

Replacement of Wetland Areas

The foregoing discussion of mitigation focused upon Section 404(b)(1) requirements related to protection of downstream and adjacent wetland and other special aquatic sites which may be adversely impacted by response actions at a site. Practicable measures to protect such areas will be adopted to minimize impacts. The issue of mitigation also encompasses the manner in which EPA and ARCO will address the conversion of jurisdictional wetlands to non-wetland as a necessary consequence of response action implementation. The following discussion addresses restoration and replacement of wetlands as a mitigation requirement.

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[11] For the Warm Springs Ponds (active area), we propose that this submittal be made prior to the Certification of Completion of Initial Construction.

The Compliance with Other Laws Manual describes the framework for determining compliance with the substantive requirements of Section 404(b)(1) guidelines, promulgated as regulations in 40 C.F.R. Part 230. The Manual provides that "what constitutes necessary mitigation at a particular site is a case-specific determination depending upon such factors as the type of activity, the type of wetland, how well the wetland is presently functioning, etc., always keeping in mind the goal of preserving wetland values at a site."[12] In implementing the Section 404(b) guidelines for mitigation, the Memorandum of Agreement between EPA and the Corps of Engineers characterizes the goal of the no net loss policy as no overall net loss of wetland values and functions.[13]

Based upon the discussion of mitigation in the Compliance with Other Laws Manual and the Memorandum of Agreement, ARCO believes that implementation of the no net loss policy should not be viewed as an accounting exercise, requiring the one for one replacement of degraded wetland areas with higher value wetland.

> Where the functioning of the wetland has been significantly and irreparably degraded, mitigation would be oriented towards minimizing further adverse environmental impacts, rather than attempting to recreate the wetland's original value on-site or off-site. Compliance with Other Laws Manual, Part I; p. 3-32.

ARCO believes it is inconsistent with EPA policy to view the loss of wetland areas providing none of the environmental values normally associated with wetlands as contrary to the no net loss policy. When such areas are remediated as functional wetland habitat, EPA should allow an accounting of these acreages to be banked for use as offsets against future, unavoidable impacts to valuable wetland areas where mitigation, i.e., replacement, may otherwise be required to maintain a no

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[12] Compliance with Other Laws Manual, Part I, (August 8, 1988); Section 3.4.4, p. 3-32.

[13] Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines. February 7, 1990.

net loss of wetland value and functions. Thus, improvements made to wetlands within one operable unit (creation of new wetland habitat or enhancement of value and function through restoration of wetland areas present prior to response actions) may satisfy compensatory mitigation for response actions at another operable unit. This basin-wine approach is consistent with EPA policy which provides that compensatory mitigation may be implemented off-site, preferably within the same watershed.[14] We believe such an approach is workable and provides a better framework for evaluation of overall impact to existing wetlands from response actions in the Clark Fork River basin.

We look forward to a continuing, frank discussion of the issues we have framed and the procedures proposed in this letter.

Very truly yours,

Sandra M. Stash, P.E.
Montana Superfund Manager

cc: USFWS, Donald Palawski/Bill Olsen
Corps of Engineers
DNRC, Karen Barclay
MDHES, Karen Zackheim
MDFWP, Glen Phillips
W.R. Williams
Chuck Stilwell
Pamela S. Sbar, Esq.
William J. Duffy, Esq.
D. Henry Elsen, Esq.
Jim Madden, Esq.
Andrew Lensink, Esq.

---

[14] If on-site compensatory mitigation is not practicable, off-site compensatory mitigation should be undertaken in the same geographic area if practicable (i.e., in close physical proximity and, to the extent possible, the same watershed. In determining compensatory mitigation, the functional values lost by the resource to be impacted must be considered. Memorandum of Agreement, Section II.C.3, p.4.

Montana Department
of
Fish, Wildlife & Parks

3201 Spurgin Road
Missoula, Montana 59801
October 26, 1993

Charlie Coleman
USEPA, Montana Office
301 S Park, Drawer 10096
Helena, MT 59626

Dear Charlie:

Appreciated the opportunity to meet you during the October 6 meeting that Janet Corrish put together to identify interpretation and visitor access issues. I felt the meeting was very productive and will lead to solutions for the issues raised that day.

I have had a chance to read your proposed plan for the Old Works/East Anaconda Development Area Operable Unit. It appears that your plan has been thoroughly thought out and well organized. Your preferred alternative sounds logical and should address the problems.

The main reason I am writing is to address the Stack and the 2.2 acre site the department manages. I was not sure where or if those areas fit into your plan and preferred alternative. Without knowing exactly if this plan will affect these two areas, it's hard to give specific suggestions or recommendations. The department would like to suggest that if any development opportunities arise that will benefit or enhance these two areas or help solve some of the issues raised at that October 6 meeting, we would appreciate being involved.

I am looking forward to working with you as this project proceeds. Interpretation and access for the visitor will ultimately help to tell the story.

Thank you for your help and consideration.

Best Regards,

Lee Bastian

Lee Bastian
Regional Park Manager

LB/pm

ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office
Montana Department of Health and Environmental Sciences

September 1993

COMMENT SHEET Oct. 1, 1993

Please write any comments that you may have concerning the preferred alternative on this sheet.

While I am in agreement with the E.P.A. on the clean-up of the Old Works / East Anaconda Development Area, I would go a step further in the specific area of the "Red Sands." The "Proposed Plan" calls for only a 75% cover or "cap" of the Red Sands and in order to avoid future problems and costs which will be likely to happen due to a potential drainage error — a complete 100% cover or "cap" would be the solution of the "Red Sand Area"

ENVIRONMENTAL
PROTECTION AGENCY
OCT 4 1993
MONTANA OFFICE

Name: Mrs. Nicki Leirs

Address: 702 Hwy 1 West #5 Anaconda, Montana 59711

Phone: 1-406-563-7860

Duane and Cindie Green
211 Warren Street
Anaconda, Mt 59711
October 13, 1993

Charlie Coleman
Project Manager, US EPA
301 S. Park, Drawer 10096
Helena, Mt 59626

Dear Mr. Coleman;

We would like to comment on the development plans for the Old Works golf course. ARCO, the EPA, and Deer Lodge county can put all of the time, money and effort in the world into this golf course to make it a world class course , but nothing is going to change the fact that the weather in this little mountain valley is completely unpredictable. A PGA tournament cannot be planned six months in advance and only to be rained out or snowed out in the middle of July.

What happens to this course the eight months of the year that it is to cold to golf? When it is finally discovered that people from all over the country aren't coming to a place with cold weather to golf, the community of Anaconda is left holding the bag as usual.

As taxpayers, we are not interested in supporting an expensive golf course for the few people here that golf and the fewer who will be able to afford golfing there. We don't believe this golf course will be of benefit to the majority of Anacondans, nor does it reflect an interest of the majority Anacondans.

A suggestion was made in a letter to the editor in the Anaconda Leader, that instead of giving Anaconda this golf course, ARCO buy back the lands surrounding Anaconda from the timber companies and give the lands as a gift to Anaconda. We believe this would be of much greater benefit to the larger community as well as reflecting better the interests of the majority of the community.

Sincerely,

Duane and Cindie Green

THE
Clark Fork
Pend Oreille
COALITION

October 22, 1993

Mr. Charlie Coleman, Project Manager
U.S. Environmental Protection Agency
301 South Park, Drawer 10096
Helena, MT 59626

RE: Public Comment - Old Works/East Anaconda Development Area Operable Unit Proposed Plan, including Mill Creek

Dear Charlie:

The Clark Fork - Pend Oreille Coalition is not in favor of perpetual "management" of wastes in-situ rather than good permanent clean-up. The Preferred Alternative document of September, 1993 for the sizeable Old Works/East Anaconda O/U can set a precedent for leaving wastes in place -- wastes that depend on continual oversight, monitoring and maintenance in order to protect human health and the environment. We do not believe this is good public policy.

We believe Institutional Controls may play an interim role in protecting human health and the environment, but should not be considered a permanent remedy. In instances where technology does not yet exist for a permanent "hands off" remedy, it may be necessary to impose permitting systems and land use restrictions. These should be rare circumstances, and should never be called into play when other, more permanent, options exist. The remedy alternatives considered for this site -- engineered covers, revegetation, surface controls, stream channel controls, monitoring, and institutional controls involving land and water use restrictions and permitting -- do not give Superfund's mandate for "permanence" the weight we believe Congress intended. We do not believe it is fair for generations of the public to be burdened with responsibilities that are rightfully placed on polluters under Superfund.

We note that some wastes will be left untreated. We are concerned what permanent controls will be put into place to assure citizens and tourists don't stray from proposed trails into areas seriously contaminated with Arsenic. Others areas will receive the century-old "treatment" technology of the addition of lime or other organics to soils. Because lime merely "freezes" heavy metal toxins in place, these same contaminants may have to be dealt with again at some time in the future. At the public meeting in Anaconda September 29th, questions were asked concerning use of lime also causing release of lightweight metals such as Arsenic 5. These were answered

P.O. Box 7593
Missoula, MT 59807
406/542-0539

P.O. Box 4718
Butte, MT 59702
406/723-4061

P.O. Box 1096
Sandpoint, ID 83864
208/263-0347

by the PRP with statements that indicated soil "attenuation" handles the potential problem. As attenuation is simply another "holding action," and doesn't change the metal into a non-toxic form, we would appreciate your addressing this issue as it relates to permanence.

Groundwater issues at this site and others in the Clark Fork Superfund complex seem to be addressed last, only after final decisions are made for for soil and surface water issues. As groundwater in the Clark Fork Watershed is a main concern of our Coalition, I would appreciate hearing how in-place management of contaminants -- the preferred remedy for 100% of this operable unit -- permanently protects groundwater emanating from its sites.

Remedies that look good, compared to the current state of an area are not necessarily the best remedies when held against the permannence criteria.

Thank you for considering these matters.

Yours very truly,

Mary Kay

Mary Kay Craig
Upper River Field Representative

cc: Karen Zackheim, MDHES, Helena

ANACONDA SMELTER SUPERFUND SITE

OLD WORKS/EAST ANACONDA
DEVELOPMENT AREA OPERABLE UNIT

PROPOSED PLAN

U.S. Environmental Protection Agency, Region 8, Montana Office *September 1993*
Montana Department of Health and Environmental Sciences

COMMENT SHEET

Please write any comments that you may have concerning the preferred alternative on this sheet.

At the meeting in Anaconda on the 29th of Sept it was stated that certain of the old Smelter works tailing were to be planted with grasses, shrubs, trees whatever. The idea is this would help prevent leaching of heavy metals, arsenic, whatever into the creeks etc. From what I observe these old tailing etc are the source of Lost Box Creek. Any thing that may have been on top has already washed away. By leaving these areas bare of vegetation the water will keep run off at a rapid rate. If/when vegetation top soil etc is added this will act as a sponge. It will keep the water there more will seep into the ground. There will be less evaporation because of the ground cover. There for more will go into the ground and

Name: [illegible] Jane what heavy metals there are into the

Address: ground water or creek (rivers springs) the

Phone: root systems of shrubs trees etc will ge-

1 Sheet

down below what top soil is applied and make channels for water to seep deeper into the old holings etc. The shorter a lawn is cut the quicker it dries out. The longer the grass the longer it stays green with the same amount of water. Why do you think logging etc is not allowed on water shed areas for city water supplys. Sure the water to be used to water the golf course will or is supposed to drain into some ponds then re cycled ~~Then~~ heavy metals will leach out settle to the bottom and will eventually wind up into the ground water or creek This golf course is just a cover up. Out of site out of mind. To me this is just all plain common sence. No college schooling is needed.

Mrs Katherine Dimm was telling me one person fought against putting the Anaconda land fill where it is now because he knew contaminates would eventually pollute the ground water. He was right.

After the meeting in Anaconda on the 29th I learned that because of the Arco activities of the Warm Springs ponds and maybe from other sources that weeds and fishes were being disrupted and were going over the dam. These weeds are coated with heavy metal salts from the bottom of the ponds. They should not be allowed to go into the river and should be fenced because of this. This person said he contacted the EPA and was told that nothing could be done. There's a difference in can't and don't want to. This sounds like a don't want to to me.

MR. Coleman:

I am a lifelong resident of Anaconda, MT and I am concerned with our superfund problem in our area. I was informed that there is a superfund federal law that states there can be no transfer of title to land that is officially superfund property until that said land is reclaimed. If this is true wouldn't the transfer of land in our area be a dangerous precident with ominous liability.

Also if the EPA talked to any workers who were employed with the various contractors who dumped tons of metal and debris into the smeltra flume, you would probably find that Arco did not excavate the original flume site to remove flue dust but went alongside it instead.

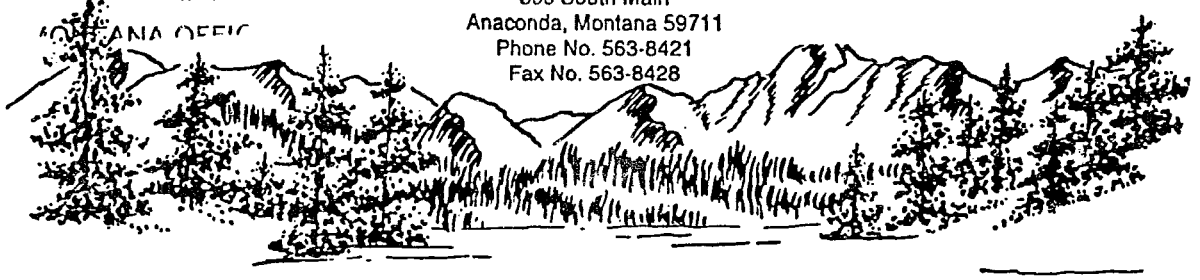
It just doesn't make any sense to pour hundreds of thousands of gallons of water on a golf course with contaminated ground under it no matter how good they say a cap will work.

Please file this letter in regards to our Superfund area Thank You Very Much

A concerned citizen of Anaconda Mont.

Charlie

ANACONDA-DEER LODGE COUNTY
PLANNING DEPT.
800 South Main
Anaconda, Montana 59711
Phone No. 563-8421
Fax No. 563-8428



This technical evaluation is in response to the Environmental Protection Agency (EPA) and the Montana Department of Health and Environmental Science (MDHES) requests for comments on the Old Works/East Anaconda Economic Development Area Operable Unit's (OW/EADAOU) Remedial Investigation (RI) which is inclusive of the Risk Assessment (RA), Feasibility Study (FS), and Proposed Plan (PP).

Criticism:

The RI's usage of uniformly distributed sampling and mathematical averaging (i.e. geometric means) appear to be quite adequate for characterizing smelter emission contaminants as found across most of the OW/EADAOU. However, this approach can yield misleading and/or erroneous conclusions. Typically, this occurs when non-smelter emission wastes are incorporated into a gridding and contouring routine as in the case of this data set. These results usually manifest themselves as one of the following problems:

1) Near-surface high "hotspots" could be smoothed over; and/or

2) Vertical aspect of contamination could be de-emphasized due to the lack of inclusion and/or wieghting in the final contours.

The best example this occurs in the south-east corner of Subarea 5. Sample D51 represents this local and has arsenic sample results of 2090, 1510, 1180, 1150, and 763 ppms for the depths of 0-2, 2-10, 10-24, 24-60, and 60-80 inches, respectively (RI Volume III: Appendix C, Table C-1). However, the near-surface arsenic contour interval reading is approximately 1500 ppm (RI Volume II, Plate 3).

This is misleading and possibly resulting to an erroneous proposal of no-action for this south-east corner of Subarea 5 (referencing the OW/EADAOU map handed out during the September 29, 1993 Informational Meeting). The elevated near-surface and subsurface arsenic values appear to warrant a capping and combined erosional control remedy at a minimum.

Potential Data Gap:

I disagreed with the RA's conclusion that the observed increase in in-stream metal loadings of Warm Springs Creek across the site are *solely* due to stream channel's configuration. The RA's discussion, that the narrowing of the stream channel causes an increase in velocity and erosion which there by accounts for the observed loadings across the site, is a plausible argument; but, it does not accurately describe the initial reason(s) for the loadings. Thus, it can be percieved that a potential data gap exists from the lack of overland and surface run-off data which can preclude and/or be included with the channel mechanic's discussion.

The fairly constant stream sediment metals data through out the reach of the site (RI Volume III: Appendix J, Table J-6), combined with the elevated overland samples collected from the Upper and Lower Old Work areas (RI Volume III: Appendix J, Table J-7 April 1985 samples OW20 and OW21), suggests that a non-point source contribution and/or connection needs to be added to the RA's plausible conclusions for the observed gain in metal loadings across

the reach (RI Volume III: Appendix J, Tables J-3 and 5, April 1985 samples WS-2 and WS-3).

It should be noted some perspective should be inserted here. This is a minor point to disagree upon because Warm Springs Creek has had only two near-chronic and one near-acute occurrences for metals; and, the overland water samples referred to only approach the chronic water standards for metals. However, it is suggested that this point becomes an integral part of the monitoring program to test effectiveness of the PP's surface treatments, engineering covers and drainage controls.

Compliments:

The PP has to be complimented on its display of good communications between all parties and as concluded in the FS, appears to be:

1.) An implementable and comprehensive plan that is capable to deal with the potential human health and environmental problems that exist at the site,

2.) In compliance with the ARAR's, and

3.) A cost effective solution that is flexible in considering the short and long-term community planning needs.

In conclusion, because many of the specifics on vegetation types, engineering covers and run-off controls are not included in the proposal, it is understood that the long-term effectiveness and permanence of the remedy will rely heavily on the design and implementation phases.

Thank you for allowing for comments and I look forward to working with both the EPA and the MDHES on the continuance of the OW/EADAOU project.

Sincerely,

Mike Fitzgerald
Upper Clark Fork River
Superfund Technical Specialist

ARCO

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October 22, 1993

Mr. Charlie Coleman
U.S. Environmental Protection
Agency ("EPA")
Montana Office
301 South Park, Drawer 10096
Helena, Montana 59626

Re: Atlantic Richfield Company's ("ARCO") Comments on Old Works/East Anaconda Development Area Operable Unit ("OW/EADA OU") Proposed Plan

Dear Mr. Coleman:

This letter presents ARCO's written comments on the OW/EADA OU Proposed Plan ("Proposed Plan") which EPA announced in September, 1993. It is our understanding that the public comment period on the Proposed Plan runs until October 22, 1993. ARCO requests that this letter be included in the OW/EADA OU administrative record and considered by EPA in selecting the final remedy for the OW/EADA OU. ARCO reserves its right to submit additional comments during the current public comment period and in any subsequent public comment periods provided by EPA.

ARCO has reviewed the Proposed Plan and generally supports the Preferred Alternative identified in the Proposed Plan to address conditions existing in the OW/EADA OU. ARCO believes that the Preferred Alternative satisfies the requirements of the Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended ("CERCLA") and the National Contingency Plan ("NCP"), 40 C.F.R. Part 300 and, at the same time, will not hinder the commercial and recreational development contemplated for the OW/EADA OU by Anaconda-Deer Lodge County and the Town of Anaconda.

During the OW/EADA OU Remedial Investigation/Feasibility Study ("RI/FS") ARCO prepared and submitted documents pursuant to the OW/EADA OU Administrative Order on Consent, Docket No. CERCLA VIII-88-16 and provided EPA with comments and other communications on studies, risk assessments, ARARs and other documents as part of the OW/EADA OU RI/FS. For the purpose of this comment letter, ARCO incorporates the comments identified in these documents by reference and requests that EPA include these

comments in the administrative record and consider its selection of the Preferred Alternative in light of these comments. In particular, ARCO incorporates its May, June and August comments that ARCO submitted on the 1993 Baseline Risk Assessment for the OW/EADA OU prepared by EPA and requests that EPA consider these comments in selecting the final remedy for the OW/EADA OU.

As noted above, ARCO generally supports the Preferred Alternative described in the OW/EADA OU Proposed Plan. However, ARCO requests that EPA reconsider the portion of the Preferred Alternative which provides for the construction of an engineered cover over a portion of the Red Sands in Subarea 4. As we have previously communicated in the draft OW/EADA Feasibility Study, ARCO believes that the Red Sands do not pose a sufficient threat to human health and the environment to require the construction of an engineered cover over any portion of the Red Sands. Rather, ARCO believes that the implementation of surface controls, e.g., erosion, drainage and dust controls, will be sufficient to protect human health and the environment at Red Sands. In addition, the use of surface controls, without the construction of an engineered cover, will more effectively minimize impacts to the historical features of the Red Sands, thereby supporting the historic preservation objectives for the OW/EADA OU. For these reasons, ARCO requests that EPA reconsider and reject construction of an engineered cover for a portion of the Red Sands in Subarea 4 as an element of the final remedy for the OW/EADA OU.

If you have any questions regarding this letter, please contact me.

Very truly yours,

Robin J. Bullock
Superfund Coordinator

RJB:lv