

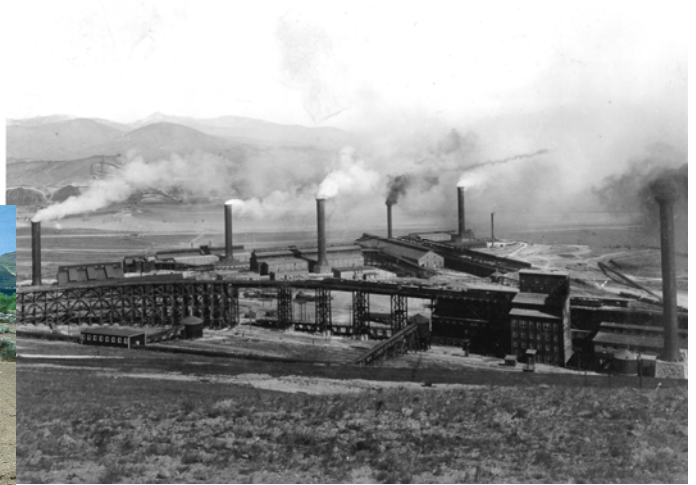
U.S. Environmental Protection Agency

Five-Year Review Report

Anaconda Smelter National Priority List Site

Deer Lodge County, Montana

September 2010



FINAL Report

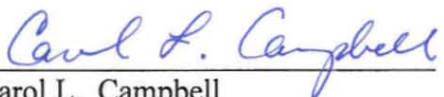
Fourth Five-Year Review Report
Anaconda Smelter Superfund Site
Anaconda, Montana

CERCLIS ID: MTD093291656

September 30, 2010

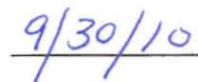
Prepared by:
U.S. Environmental Protection Agency
Region 8
10 West 15th Street, Suite 3200
Helena, Montana

Approved by:



Carol L. Campbell
Assistant Regional Administrator
U.S. EPA, Region 8

Date:



9/30/10

Executive Summary

This report documents the fourth, five-year review conducted by the U.S. Environmental Protection Agency (EPA), Region 8, for the Anaconda Smelter National Priorities List (NPL) site (the Site) in Deer Lodge County, Montana. The trigger for this review was the third five-year review completed in 2005. Consistent with federal guidance, this report evaluates and documents remedies or other response actions in place or under construction at the site and assesses whether or not those actions are protective of human health and the environment. The Site Five-Year Review Summary form is included at the end of this Executive Summary.

Large scale smelting and concentrating operations were conducted onsite for over 100 years. Smelter emissions dispersed contaminants elevated in arsenic and metals over more than 300 square miles. Large amounts of slag and tailings were also produced. Current estimated waste volumes on site include 230 million cubic yards (mcy) of tailings, 30 mcy of slag, and 500,000 cy of flue dust. Approximately 20,000 acres of soil were severely impacted by airborne emissions and millions of gallons of ground water were polluted. The milling and smelting contaminants pose well documented risks to human health and the environment.

The Site was placed on the NPL in 1983 and remedies were selected as documented by a Record of Decision (ROD) for the following five Operable Units (OU):

- OU 15 Mill Creek - 1987;
- OU 11 Flue Dust - 1991;
- OU 7 Old Works/East Anaconda Development Area (OW/EADA) - 1994;
- OU 16 Community Soils - 1996; and
- OU 4 Anaconda Regional Water, Waste & Soils (ARWW&S) - 1998

Construction is ongoing at OUs 7, 16 and 4. In addition, site-wide activities affecting all of the OU's (i.e., final IC's, O&M and ground and surface water remedies) are ongoing. Remedy protectiveness as determined during this five-year review is summarized below.

OU 15 Mill Creek

The remedy for the Mill Creek OU currently protects human health and the environment because Mill Creek residents exposed to contaminated soil and dust were permanently relocated from the site. Active monitoring and maintenance of the site is currently being conducted and interim controls such as the County's Development Permit System and fencing limit exposure to surface soils. However, for the remedy to be protective in the long term, final soil remediation and institutional controls must be completed under the OW/EADA and ARWW&S OUs.

OU 11 Flue Dust

The remedy for the Flue Dust OU currently protects human health and the environment because there is no current direct exposure to treated waste materials. Flue dust, a principal threat waste at the site, was treated to below TCLP standards for arsenic cadmium and lead and placed in an engineered repository. Active monitoring and maintenance of the site is currently conducted and site access is controlled by fencing, gates and security. However, unexpected leachate continues to be collected from the repository. In order for the remedy to remain protective in the long-term, the repository must meet the performance requirements. It is recommend that additional action be taken to determine if the repository liner and cap are functioning as designed and determine if additional remedial action is necessary.

OU 7 OW/EADA

A protectiveness statement for the OW/EADA OU is deferred because more information is needed to make a protectiveness determination. All waste material within the OW/EADA OU has been covered (with active monitoring, maintenance and interim IC's) with the exception of uncovered wastes left in place for historic preservation. Interim controls such as trails, barriers and signage limit exposure to these wastes. However, there is evidence that trespassers, hikers and dirt bike riders access these waste areas. It is recommended that additional action be taken to determine if these waste materials pose an unacceptable risk and to determine if additional remedial action is necessary. It is expected that this action will be completed next year, at which time a protectiveness determination will be made. Additionally, for the remedy to be protective in the long-term, final ICs must be completed.

OU 16 Community Soils

A protectiveness statement for the Community Soils OU is deferred because more information is needed to make a protectiveness determination. The remedial action completed to date has addressed the surficial arsenic in residential soils. Interim controls include the County's Community Protective Measures Program to communicate risk/protectiveness information related to remaining contaminants to residents. However, there is concern that the remaining contaminants especially lead, may pose an unacceptable risk. It is recommended that additional action be taken to determine if these remaining soil and dust contaminants pose an unacceptable risk to residents and to determine if additional remedial action is necessary. It is expected that this action will be completed next year, at which time a protectiveness determination will be made. Additionally, for the remedy to be protective in the long-term, final ICs must be completed.

OU 4 ARWW&S

The remedy for the ARWW&S OU is currently not protective of human health and the environment because controls preventing residents from drinking groundwater exceeding the new arsenic standard of 10 ug/L are not in place. It is recommended that additional

actions be taken to address this change in standards and to implement the appropriate controls. Additionally, for the remedy to be protective in the long-term, remedial design/action activities including the development the final IC Plan, development of a final vegetation cover design for the Milltown sediments, evaluation of long-term vegetation performance issues, removal of all Yellow Ditch material and resolution of the Georgetown railroad grade must be completed.

The 2010 five-year review identified nine issues regarding remediation and protectiveness. Table ES-1 presents the recommendations and follow-up actions for these issues and provides a milestone date for their resolution.

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**Table ES-1
Recommendations and Follow-up Actions for Issues Identified
2010 Anaconda Smelter NPL Site Five-Year Review**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future (if not addressed)
1. Long-term effectiveness of the County's IC program. OU16 Community Soils, OU7 OW/EADA, OU4 ARWW&S, OU 15 Mill Creek	Finalize County's IC Plan and implement program.	ADLC/Atlantic Richfield	EPA/DEQ	Dec 2011	No	Yes
2. Unexpected leachate production in the Flue dust repository OU11 Flue Dust	Evaluate Flue Dust repository performance to determine if the repository is functioning as designed.	Atlantic Richfield	EPA/DEQ	Dec 2011	No	Yes
3. Risk to trespassers on uncovered wastes left in place for historic preservation. OU7 OW/EADA	Determine if uncovered wastes pose an unacceptable risk to users and determine if additional action is necessary.	Atlantic Richfield	EPA/DEQ	Dec 2011	No	Yes
4. Buried waste and debris limiting redevelopment in the East Anaconda Yards. OU7 OW/EADA	Investigate nature and extent of buried waste/debris and develop an appropriate redevelopment plan for the East Anaconda Yards.	EPA/ADLC	EPA/DEQ	June 2011	No	No
5. Risk of remaining contaminants in residential settings (lead in soils; arsenic at depth in soil; arsenic and lead in interior dust). OU16 Community Soils	Determine if remaining contaminants pose an unacceptable risk to residents and determine if additional remedial action is necessary.	EPA/DEQ	EPA/DEQ	June 2011	No	Yes
6. Uncontrolled use of contaminated ground water. OU4 ARWW&S	Develop and implement appropriate controls to prevent exposure to groundwater exceeding the arsenic drinking water standard	Atlantic Richfield	EPA/DEQ	Dec 2011	Yes	Yes
7. Unsuccessful treatment of the Milltown Reservoir sediments in providing a vegetative cover for the Opportunity Tailings Ponds. OU4 ARWW&S	Complete investigations and determine if the Milltown sediments can be successfully treated and utilized in a cover design.	Atlantic Richfield	EPA/DEQ	Dec 2011	Yes	Yes
8. Concerns with phytotoxicity and the long-term permanence of vegetation in soil areas. OU4 ARWW&S	Determine why certain in-situ treated areas have poor plant establishment and determine if reclamation is functioning as designed.	Atlantic Richfield	EPA/DEQ	June 2012	No	Yes
9. Buried Yellow Ditch wastes northwest of Fairmont. OU4 ARWW&S	Remove waste materials in accordance with approved RAWP.	Atlantic Richfield	EPA/DEQ	June 2011	Yes	Yes
10. Railroad grade from Anaconda to Georgetown built of mine waste. OU4 ARWW&S	Evaluate nature and extent of contamination and determine if wastes pose an unacceptable risk. Determine if additional remedial action is necessary under the Anaconda Smelter Site.	Atlantic Richfield	EPA/DEQ	June 2012	No	Yes

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FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name	Anaconda Smelter NPL Site	
EPA ID:	MTD093291656	
Region:	8	State: MT City/County: Anaconda/Deer Lodge
SITE STATUS		
NPL Status:	<input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)	
Remediation Status (choose all that apply):	<input checked="" type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input type="checkbox"/> Complete	
Multiple OUs? *	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Construction Completion Date / /	
Has site been put into reuse?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
REVIEW STATUS		
Lead Agency:	<input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency	
Author Name:	Charles Coleman	
Author Title:	Remedial Project Manager	
Author Affiliations:	U.S. EPA, Region 8	
Review Period:	4/1/2010 & 9/30/2010	
Date(s) of site inspection:	6/7/2010 & 6/15/2010	
Type of Review:	<input checked="" type="checkbox"/> Statutory <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion	
Review number:	<input type="checkbox"/> 1(first) <input type="checkbox"/> 2(second) <input type="checkbox"/> 3(third) <input checked="" type="checkbox"/> Other (specify) Fourth	
Triggering Action:	<input type="checkbox"/> Actual RA on-site Construction at OU# <input type="checkbox"/> Actual RA Start at OU# <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)	
Triggering action date (from WasteLAN):	9/29/2009	
Due date (five years after triggering action date):	9/30/2010	

* "OU" refers to operable unit.

** Review period should correspond with actual start and end dates of the Five-Year Review in WasteLAN.

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Acronyms

ADLC	Anaconda-Deer Lodge County
ARAR	Applicable or Relevant and Appropriate Requirements
ARWW&S	Anaconda Regional Water, Waste & Soils
AMC	Anaconda Minerals Company
AOC	Administrative Order on Consent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
DPS	Development Permit System
DEQ	Montana Department of Environmental Quality
EAY	East Anaconda Yards
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
IC	Institutional Control
MCL	Maximum Contaminant Level
MHWA	Montana Hazardous Waste Act
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
OW/EADA	Old Works/East Anaconda Development Area
ppm	parts per million
POC	Point of Compliance
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Reclamation Act
RI/FS	Remedial Investigation/Feasibility Study
RD/RA	Remedial Design/Remedial Action
RDU	Remedial Design Unit
ROD	Record of Decision
TAG	Technical Assistance Group
TCLP	Toxicity Concentration Leachate Procedure
UAO	Unilateral Administrative Order
WMA	Waste Management Area

Section 1 Introduction

This report documents the fourth five-year review conducted by the U. S. Environmental Protection Agency (EPA) Region 8 for the Anaconda Smelter National Priorities List (NPL) site (the Site) in Deer Lodge County, Montana. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) ID for this Site is MTD093291656.

The purpose of the five-year review is to determine whether the remedies or other response actions in place or under construction at NPL sites are protective of human health and the environment. The methods, findings, and conclusions of these reviews are documented in five-year review reports. In addition, five-year review reports make recommendations to address any deficiencies found.

The comprehensive guidance (USEPA 2000) states that five-year reviews should be conducted either to meet a statutory mandate or as a matter of EPA policy. EPA must implement a statutory five-year review to be consistent with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 121(c), which states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

EPA interprets this requirement further in the National Contingency Plan (NCP) Section 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR), which states:

If a remedial action is selected that results in hazardous substances, pollutants or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Based on both CERCLA and NCP requirements, a statutory five-year review is required in 2010 for the Site. The Anaconda Smelter NPL Site consists of five separate remedial operable units (OUs). Remedial action (RA) for the Mill Creek OU 15 and Flue Dust OU 11 have been implemented. Remedial action work in the Old Works/East Anaconda Development Area (OW/EADA) OU 7, Community Soils OU 16, and Anaconda Regional Water, Waste & Soils (ARWW&S) OU 4 is ongoing. Monitoring, operation and maintenance (O&M) of all implemented actions at the Site are being conducted under the Flue Dust, OW/EADA, and ARWW&S OUs.

This is the fourth five-year review for the Anaconda Smelter NPL Site. The triggering action for this review is the completion of the third five year review on September 29,

Section 1
Introduction

2005. The five-year review is required due to hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use and unlimited exposure.

Section 2 Site Chronology

Table 2-1 summarizes the important events and relevant dates in the chronology of the Anaconda Smelter NPL Site.

**Table 2-1
Chronology of Site Events**

Event	Operable Unit	Date
Placer gold discovered in Silver Bow Creek	NA ¹	1864
Large scale underground mining in Butte and open pit mining at Berkeley Pit	NA	1875 - 1982
Smelting operations in Anaconda	NA	1890 - 1980
Smelter shutdown/demolition	NA	1980 - 1986
Anaconda Smelter Site listed on the NPL	NA	1983
Mill Creek Operable Unit OU 15 ROD	Mill Creek	October 1987
Mill Creek residents temporary and permanent relocation and site demolition	Mill Creek	1986 - 1988
Flue Dust OU 11 ROD	Flue Dust	September 1991
Anaconda Yards Time Critical Removal Action (TCRA) for residential soil removal	---	1191 – 1992
Flue dust treatment and disposal	Flue Dust	
Old Works TCRA soil stabilization	---	1992
Arbiter Non-Time Critical Removal Action (NTCRA)	---	1994
Beryllium NTCRA	---	1994
First Five-Year Review	All	1994
Old Works/East Anaconda Development Area (OW/EADA) OU 7 ROD	OW/EADA	March 1994
OW/EADA OU ESD	OW/EADA	April 1994
Golf course construction in the Old Works area	OW/EADA	1994 - 1997
Red Sands construction	OW/EADA	1996
Community Soils OU 16 ROD	Community Soils	September 1996
Aspen Hills and East Anaconda Yards construction	OW/EADA	1996
Anaconda Regional Water, Waste & Soils (ARWW&S) OU 4 ROD	ARWW&S	September 1998
Drag Strip construction	OW/EADA	1998
Second Five-Year Review	All	1999
Mill Creek final construction	OW/EADA	1998
Implementation of RA-related storm water controls	ARWW&S	2000
Anaconda Ponds construction	ARWW&S	2001
Stucky Ridge construction begins	ARWW&S	2002
Aspen Hills/Loop Track Construction	OW/EADA	2002
Triangle Waste construction	ARWW&S	2002
Removal of contaminated residential soil begins	Community Soils	2002

Section 2
Site Chronology

Opportunity Ponds construction begins	ARWW&S	2002
Cashman Concentrate construction	ARWW&S	2003
West Galen construction begins	ARWW&S	2005
Third Five-Year Review	All	2005
Adjacent to railroad construction begins	ARWW&S	2006
South Opportunity construction begins	ARWW&S	2007
Arbiter construction begins	OW/EADA	2007
North Opportunity construction begins	ARWW&S	2008
West Valley railroad removal begins	ARWW&S	2008
ARWW&S OU ROD Amendment	ARWW&S	2010 (in progress)

¹NA = Not Applicable

Section 3 Background

3.1 Location and Setting

The Anaconda Smelter NPL Site is located at the southern end of the Deer Lodge Valley, at and near the location of the former Anaconda Minerals Company (AMC) ore processing facilities in southwest Montana. Figure 3-1 shows the Site location, plus key features. The Site covers an area of approximately 300 square miles. It has a temperate climate and includes a variety of terrain - from steep slope uplands to gently sloping valley floors. There are also a variety of creeks and drainages. The towns of Anaconda and Opportunity lie within the Site footprint. The Site is divided into a number of OUs, two of which (Anaconda Regional Waste Water & Soil (ARWW&S) and the Old Works/East Anaconda Development Area) are further divided into smaller units to facilitate remedial design and actions.

3.2 History of Contamination

In 1884, the Anaconda Copper Mining Company (ACM) and its predecessors commenced large copper concentrating and smelting operations at the area presently known as the Old Works. The Old Works was located on the north side of Warm Springs Creek adjacent to the town of Anaconda and operated until about 1901. In about 1902, ore processing and smelting operations began at the Washoe Reduction Works (also called the Anaconda Smelter, the Washoe Smelter, the New Works, and the Anaconda Reduction Works) on Smelter Hill, south of the Old Works and east of Anaconda. In 1977, Atlantic Richfield Company (Atlantic Richfield) purchased ACM and expressly assumed its liabilities. Operations at the Anaconda Smelter ceased in 1980, and the smelter facilities were dismantled soon thereafter. The only substantial feature remaining from the smelter facility is the large, 585-foot tall brick smelter stack on Smelter Hill.

One hundred years of milling and smelting operations, including discharges into the air and streams, have scattered wastes that are high in arsenic and other metals over a wide area. In fact, more than 300 square miles of land surrounding the smelter have been affected by operations at the Anaconda smelters. Estimated waste volumes at the Site include approximately 230 million cubic yards of concentrated mill tailings, 30 million cubic yards of furnace slag, and 500,000 cubic yards of flue dust. In addition to the millions of cubic yards of these waste products, approximately 20,000 acres of soil have been severely contaminated by airborne emissions and millions of gallons of ground water have been polluted from wastes and contaminated soils. The milling and smelting contaminants pose potential risks to human health, to life in nearby streams, and to plants and animals on adjacent lands.

3.3 Regulatory History Summary

The Anaconda Smelter Site was placed on the NPL in September 1983, under the authority of CERCLA. Atlantic Richfield was identified as the principal Potentially

Section 3
Background

Responsible Party (PRP). EPA issued both general and special notice letters to Atlantic Richfield on several occasions and Atlantic Richfield has been actively involved in conducting investigations and response actions at the Site since that time. EPA is the lead agency and DEQ is the support agency for remedial actions being conducted at the Site.

Because of the size of the former facilities, the hundred-years of industrial operation, the large volume of wastes, and the wide area contaminated, the site has been divided into smaller, more manageable OUs for purposes of remedial design and action.

Section 4 Five-Year Review Process

4.1 Five-Year Review Administration and Schedule

The Anaconda Smelter NPL Site five-year review team was lead by Charlie Coleman, the EPA remedial project manager with support from John Brown, the State of Montana project manager. The interview team also included Wendy Thomi, EPA community involvement coordinator, and Kris Larson, CDM community involvement specialist. Technical expertise in areas of hydrogeology, civil and environmental engineering, land reclamation, and community involvement was provided by EPA's contractor CDM. Assistance was also provided by the Reclamation Research Group.

The review was initiated in April 2010 and included the following components:

1. Community notification
2. Identification and interviews with key persons and general public
3. Document review
4. Data review
5. Issues identification
6. Site Inspection
7. ARARs review
8. Risk evaluations
9. Five year review report development and review

4.2 Community Involvement/Notification

EPA's goals in conducting community interviews for the Anaconda 2010 Five-Year Review were to obtain the communities' perspective on the implemented remedy and to identify issues that directly relate to the protectiveness of completed and/or to be completed remedies. Appendix B provides a summary of comments and concerns expressed by the interviewees. Those comments/concerns cover a wide array of subjects. EPA and DEQ have carefully considered all issues brought forth; however, not all are germane to the protectiveness of remedial actions implemented at the Anaconda Smelter NPL Site. Issues raised by interviewees that may have a direct affect on the protectiveness of the Selected Remedy have been carried forward into the Issues and Recommendations sections of this five-year to ensure that they are tracked and addressed within the next review period.

The community was notified of the five-year review with an advertisement that ran in the Anaconda Leader on April 16, 2010. A second advertisement will announce the completion of the five-year review process and will run in the paper in October 2010. Individuals listed in Table 4-1 were called and asked to participate in the interviews.

All of the interviews were conducted in groups. Interviewees were contacted several weeks in advance. Individuals known to be interested or actively involved in the site were encouraged to invite other participants to the meeting. Contacts included the Arrowhead TAG, Anaconda Project Facilitators, Anaconda Local Development Corporation (ADLC), Anaconda Chamber of Commerce, Anaconda Main Street Program, realtors, bankers, title companies, builders association, Opportunity Citizens Protective Association (OCPA), sportsmen groups, Ducks Unlimited, Golf Course Authority Board, Clark Fork Watershed Education Program (CFWEP), Natural Resource Damage (NRD), Garden Club, Tree Committee, Planning Board, Greenway, high school students, and Anaconda Deer Lodge County staff and commission.

In addition to conducting interviews with the public, the Anaconda Smelter NPL Site 2010 five-year review includes an assessment of applicable and relevant or appropriate requirements (ARARs) and an evaluation of risk to human health and the environment.

4.3 ARARs Evaluation

The ARWW&S OU, being the last OU to have a ROD signed at the Anaconda NPL Site, has the most comprehensive list of applicable or relevant and appropriate requirements (ARARs) identified for the ARWW&S OU remedial action. These ARARs include all other ARARs identified for the other for OUs.

An analysis of the ARWW&S OU ARARs analysis is included as Appendix A. Part 1 of this analysis lists the 1998 ARWW&S OU ARARs, while Part 2 provides updates to those 1998 requirements. As discussed in Appendix A, EPA and DEQ determined that, except for the contaminant specific ground water and surface water standards listed in Appendix A Table 1, there is no change to any ARAR set forth in the 1998 ARWW&S ROD that would call into question the protectiveness of the remedy. The most significant ARAR change was the lowering of the arsenic human health standard for surface water and ground water from 18 to 10 µg/L.

4.4 Risk Evaluation

Potential human health and environmental risks at the Site were re-evaluated for this five-year review. Results are summarized in the technical sections for each OU and the complete risk evaluation is provided in Appendix C. The evaluation determined that although changes to assessing risks and physical changes at the Site have occurred, the assumptions used in the original risk assessments and the conclusions about risks to human health and the environment remain valid.

4.5 Previous Issues and Recommendations

Issues and recommendations identified during the last five-year review were:

- Address lack of vegetation at the Drag Strip Subarea;
- Investigate the potential for additional beryllium and/or hazardous waste at the East Anaconda Yards;
- Develop program to address concerns with attic dust, and;
- Coordinate with ADLC regarding the implementation and long-term funding of Institutional Controls.

These issues have been addressed as described below.

Drag Strip Subarea

In 2007, several previously reclaimed areas having low vegetation cover were covered with 6-inches of soil and reseeded. The test plot work was used to guide this additional reclamation. Based on Atlantic Richfield's monitoring data and the field inspections held on June 7 and 15, 2010, the Selected Remedy for the Drag Strip Subarea is protective of human health and the environment.

East Anaconda Yards

Within the last five years, individual site work plans (ISWPs) were used to guide development on a number of properties. No additional beryllium or hazardous waste was uncovered. ISWPs will continue to be used to ensure waste materials are appropriately dealt with should they be discovered during redevelopment.

Attic Dust

Contaminated attic dust is currently being remediated by Atlantic Richfield on a voluntary basis. EPA is currently preparing a modification to the Community Soils ROD to establish a defined process for addressing both contaminated house living spaces and attics. To date, Atlantic Richfield has tested 52 living spaces and found that while the interior dust is generally below the arsenic action level, attic dust exceeds the action level in nearly 50 percent of all attics tested. Atlantic Richfield has conducted 3 attic dust remediations.

Funding of ICs

The interim ICs program is currently being implemented by ADLC and is funded by EPA. A settlement for long-term funding of ICs is expected under the forthcoming ROD amendment for the Community Soils OU.

**Table 4-1
Interviewees**

2010 Anaconda Smelter NPL Site Five-Year Review

Name	Affiliation
Barbara Andreozzi	Street Tree Project – Montana State University (MSU) Extension Services
Alan Badar	Citizen
Katherine Basirico	Anaconda Environmental Education Institute (AEEI)
Rosemary Carrigan	Anaconda Garden Club
Connie Ternes Daniels	Deer Lodge County Planning Director
Jim Davison	Arrowhead Foundation – Anaconda’s Technical Assistance Grant (TAG) Group
Terry Galle	Anaconda Local Development Corporation (ADLC) Planning Board
Debra Gorman-Badar	Chair Anaconda Deer Lodge County Planning Board
Becky Guay	Anaconda Deer Lodge County CEO
Jim Kuipers	ADLC, Kuipers & Assoc.
Pete Lorello	Anaconda Deer Lodge County Commissioners
Milo Manning	AEEI, Chairman of Greenway Service District, Arrowhead Superfund PR contract
Bob Meredith	Southwest Montana Community Federal Credit Union
Skip Meyer	Opportunity Citizens Protective Association (OCPA)
Joan Morris	Garden Club
Serge Myers	OCPA
George Niland	OCPA, Clark Fork River Technical Assistance Committee (CFRTAC)
Carl Nyman	County Consultant
Rose Nyman	Anaconda Deer Lodge County Commissioner
Robert Pierce	Anaconda Deer Lodge County Commissioner
Dr. John W. Ray	Montana Tech Professor (written comments)
Penny Ryan	Citizen (written comments)
Chuck Stokke	Citizen (written comments)
Mark Sweeney	Anaconda Deer Lodge County Commission, Arrowhead
Lorry Thomas	Anaconda Sportsmen
Neal Warner	Anaconda Deer Lodge County Commissioner
Jim Yeoman	Private Businessman, Arrowhead Member

Section 5 Mill Creek OU15

5.1 Selected Remedy

The Mill Creek OU is located 1.5 miles east of Anaconda, adjacent to the Smelter complex, and was formerly a community of 37 families. The remedial objectives for the Mill Creek OU were to immediately protect public human health through the relocation of families and complete the initial cleanup and stabilization of the area.

Beginning in May 1986, EPA and the Federal Emergency Management Agency (FEMA) temporarily relocated residents of Mill Creek to address the immediate public health concerns. This effort targeted families with young children and individuals with special health problems. That action was accompanied by the stabilization of flue dust on Smelter Hill above the community and the controlling of dust from unpaved roads in the community. All children who were temporarily relocated had urine arsenic levels that dropped to normal levels after leaving Mill Creek. At that time, Atlantic Richfield purchased several properties and relocated all but eight families.

The EPA selected remedy for Mill Creek in 1987 featured:

- 1) permanently relocating all Mill Creek residents;
- 2) temporarily stabilizing the area;
- 3) storing demolition debris and contaminated soils for later disposal;
- 4) regrading and replanting areas disturbed by relocation/demolition activities;
- 5) monitoring and maintaining the vegetation and the fence installed around the area, and;
- 6) imposing short-term controls on access and land use.

5.2 Remedial Action Implementation

EPA entered into a consent decree with Atlantic Richfield to implement the permanent relocation remedy for Mill Creek residents on January 7, 1988. Resident relocation occurred by the fall and home demolition and site stabilization was finished in late 1988. Demolition debris and contaminated soils were disposed of on Smelter Hill. Foundations were buried on-site and the area was regraded and vegetated. Fencing was installed along with signage to control access and maintain the vegetation.

5.2.1 Construction Status

Construction activities related to the 1987 ROD have been implemented. Adjacent contaminated soil areas were incorporated into the OW/EADA OU and further evaluated under that OU. The OW/EADA ROD, signed in March 1994, addressed soils exceeding 1,000 ppm arsenic utilizing engineered covers and/or revegetation

techniques. Water issues (ground and surface water) were deferred to the ARWW&S OU. Additionally, final revegetation of this site was deferred to the ARWW&S OU.

5.2.2 Operations and Maintenance Status

Remediated soils areas are actively monitored and maintained in accordance with the ARWW&S OU Vegetation Management Plan. In-place ICs include ADLC's Development Permit System (DPS).

5.2.3 Data Evaluation

Additional remediation of soils is currently anticipated under RDU 6 of the ARWW&S OU.

5.2.4 Site Inspection

All site inspection activities associated with the former Mill Creek townsite properties were conducted under the East Anaconda Yards/Aspen Hills Subarea 5 of the OW/EADA OU for this fourth five year review.

5.3 Progress Since the Last Five-Year Review

No additional issues/recommendations concerning the protectiveness of the Mill Creek OU remedy were identified under the last five-year review. Therefore, no additional actions concerning this remedy were implemented.

5.4 Technical Assessment

Question A - Is the remedy functioning as intended by the decision documents?

Yes. The remedy was relocation of the Mill Creek townsite residents, which has been completed. Vegetation covers completed under the ARWW&S OU work are also functioning as designed.

Question B - Are the assumptions used at the time of remedy selection still valid?

Yes. The assumptions used at the time of remedy selection was the risk to human health from high arsenic concentrations in soils and dust. As discussed further in Section 7 and Appendix C, the selection of human health risk-based cleanup levels for arsenic in soils and dust was reviewed independently by the Agency for Toxic Substance and Disease Control (ATSDR) in 2008, and was confirmed to be protective of human health. Since the arsenic concentrations in residential soils and dust at the Mill Creek townsite were much higher than the current cleanup level for residences set in Anaconda, the decision to relocate the residences remains valid.

Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

No. At this time, EPA is not aware of other information that would affect the protectiveness of the remedy.

5.5 Issues and Recommendations

The only issue identified for this OU that affects protectiveness is:

- the long-term effectiveness of the County's IC program to protect the remedy.

The recommendation is for the County to finalize and fully implement the IC program.

5.6 Protectiveness Statement

The remedy for the Mill Creek OU currently protects human health and the environment because Mill Creek residents exposed to contaminated soil and dust were permanently relocated from the site. Active monitoring and maintenance of the site is currently being conducted and interim controls such as the County's Development Permit System and fencing limit exposure to surface soils. However, for the remedy to be protective in the long term, final soil remediation and institutional controls must be completed under the OW/EADA and ARWW&S OUs.

Section 6 Flue Dust OU11

6.1 Selected Remedy

Flue dust is a by-product of copper smelting and contains an average copper concentration of 14.6 percent, 4.9 percent arsenic, and 0.14 percent cadmium. Flue dust also contains magnesium, mercury, zinc, and other metals and is a hazardous waste (RCRA characteristic) because it fails toxic leach tests for arsenic and cadmium. Most of the flue dust generated by smelter operations in Anaconda was reprocessed. However, approximately 316,500 cubic yards was stockpiled at nine locations on and around Smelter Hill.

EPA selected a remedy for Flue Dust in 1991 that featured 1) stabilizing approximately 316,500 cubic yards of flue dust using cement and lime and 2) placing the treated materials in an engineered repository. Excavation and treatment of flue dust would stabilize each of the nine piles and thereby meet RCRA regulations. Processed material would then be transported to an on-site repository for disposal. Design requirements for the repository would meet all Montana Solid Waste Management Act and RCRA Subtitle D provisions and some relevant and appropriate Montana Hazardous Waste Act (MHW) and RCRA Subtitle C provisions. At a minimum the repository was to include a liner, leak detection and collection system, groundwater monitoring wells upgradient and downgradient from the repository, and a cap. Long-term maintenance and monitoring, and limiting site access and use, was required.

6.2 Remedial Action Implementation

6.2.1 Construction Status

EPA entered into a consent decree with Atlantic Richfield to implement the flue dust remedy in December 1992 (Civil Action No. CV-92-76-BU-PGH (D.MT)). Treatment of over 500,000 cubic yards of flue dust, including flue dust from the main flue, was completed in December 1993. All treated flue dust passed the TCLP measure. The repository was constructed using a bentonite/high density polyethylene (HDPE) liner, leachate collection and detection system and a cap consisting of the same bentonite/HDPE liner, cover soil and vegetation. Closure of the repository was completed in November 1994.

6.2.2 Operation and Maintenance Status

EPA approved an Interim Post-Closure operation and maintenance (O&M) plan for the Smelter Hill Repository Complex, dated August 1996, to include ground water monitoring, leachate management, post-closure cover inspection and monitoring, surface water diversion system maintenance, and site security. A pre-final inspection of the remedial action was completed in March of 1995, with a final inspection

completed during the summer of 1996. EPA approved the Remedial Action Construction Completion Report (CCR) on September 30, 1996.

EPA receives annual monitoring and maintenance reports for the Smelter Hill Repository Complex which includes the Flue Dust repository

6.2.3 Data Evaluation

In addition to the collection and disposal of leachate, a key component of the Selected Remedy for this RDU is land reclamation of the repositories and other reclaimed areas. Annual monitoring for the repositories is provided in the *Smelter Hill Repository Complex (SHRC) Monitoring and Maintenance Report* (Atlantic Richfield 2010). Over the past 10 years, the vegetation on the Flue Dust, Original Beryllium, and Aspen Hills repositories has become well established (Atlantic Richfield 2010). Weed control programs have been successful in reducing the amounts of spotted knapweed, leafy spurge and Dalmatian toadflax. The sites are stable and erosion is not a problem. According to Atlantic Richfield, the qualitative observations made prior to 2009 indicated that these areas were meeting the performance standards for remediated sites in WMA. Atlantic Richfield's formal (quantitative) evaluations conducted in 2009 determined that the performance standards are being met (Atlantic Richfield 2010). The information for 2009 will be used as the first year of documented success that will be combined with 2010 data (assuming these areas again pass the criteria) to prepare a compliance determination request. Following that request, EPA will conduct a compliance verification of these areas as prescribed in the VMP.

6.2.4 Site Inspection

EPA conducted a site inspection on June 7, 2010. The inspection confirmed the results presented in Atlantic Richfield's repository complex report and the M&M report. For the capped repository areas, vegetation cover was generally very good and the erosion control BMPs were fully functional as intended by the design. However, the vegetation cover in some isolated areas was thin and could indicate the need for additional reclamation work in the future. Photograph 5757 shows an example of a deteriorated portion of the Flue Dust repository cap. These areas are relatively small and therefore easily addressable.

6.3 Progress Since the Last Five Year Review

No additional issues/recommendations concerning the protectiveness of the Flue Dust OU remedy were identified under the last (2005) five-year review. Therefore, no additional actions concerning this remedy were enacted.

6.4 Technical Assessment

Question A: Is The Remedy Functioning As Intended By The Decision Documents?

No. The Selected Remedies for the Flue Dust Repository and other repositories in the Smelter Hill Repository Complex may not be functioning, in their entirety, as intended by the decision documents. Unexpected leachate is being collected from the

repository area and disposed of in the Opportunity Ponds WMA. This is considered a temporary solution requiring an engineering evaluation and the implementation of a permanent solution.

Monitoring data indicate that the vegetation in some reclaimed areas has stagnated at less than the required 30% cover for WMAs. It is doubtful that the vegetation in these areas will meet the performance criteria without significant inputs such as interseeding or adding a higher quality coversoil.

In general, the sites are erosionally stable; however, low vegetation cover in certain areas has resulted in increased erosion. Atlantic Richfield continues to monitor these sites in a qualitative (i.e., non-compliance) manner.

Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used At The Time of Remedy Selection Still Valid?

Yes. For the 2010 Five-Year Review, EPA re-examined the ARARs and the assumptions used in the original human health risk assessment. In accordance with the preamble to the National Contingency Plan, ARARs are frozen at the time of the ROD unless "a new or modified requirement calls into question the protectiveness of the selected remedy" (55 FR 8757 [March 8, 1990]). Appendix A sets forth certain contaminant specific water quality ARARs that have changed since completion of the previous five-year review for the Site. No other new or modified requirement calls into question the protectiveness of the selected remedy for this operable unit.

Within the last five years, EPA established performance standards for reclaimed areas. Those standards, as described in the VMP (Atlantic Richfield 2008), were used to determine compliance for some areas and will be used in subsequent five-year reviews to evaluate reclamation success.

Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

No. There is no other information that has come to light that would call into question the protectiveness of the remedy. The site will continue to be monitored for any changes in this regard.

6.5 Issues and Recommendations

The only issue identified for the Flue Dust OU that affects protectiveness is:

- the unexpected generation of leachate from the Flue Dust repository.

The recommendation is for Atlantic Richfield to determine if the repository is functioning as designed and implement a long-term solution. A plan to determine appropriate corrective actions should be implemented and completed prior to the next five-year review.

6.6 Protectiveness Statement

The remedy for the Flue Dust OU currently protects human health and the environment because there is no current direct exposure to treated waste materials. Flue dust, a principal threat waste at the site, was treated to below TCLP standards for arsenic cadmium and lead and placed in an engineered repository. Active monitoring and maintenance of the site is currently conducted and site access is controlled by fencing, gates and security. However, unexpected leachate continues to be collected from the repository. In order for the remedy to remain protective in the long-term, the repository must meet the performance requirements. It is recommend that additional action be taken to determine if the repository liner and cap are functioning as designed and determine if additional remedial action is necessary.

Section 7 Old Works/East Anaconda Development Area OU7

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. The Upper Works structural area was constructed in 1883 and 1884. 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 factories. 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 discarded onto the floodplain. The Heap Roast Slag, composed of partially vitrified slag, was generated by an air cooling process. Jig tailings and slag was 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. There are approximately 440,000 cubic yards of floodplain wastes (including jig tailings), 300,000 cubic yards of Heap Roast slag, 600,000 cubic yards of Red Sands, and 32,000 cubic yards in the miscellaneous waste piles.

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.

In 1991, EPA addressed the immediate concern of releases of contaminants to Warm Springs Creek and to human health through 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, were included in the OW/EADA OU ROD in March 1994.

7.1 Selected Remedy

In 1994, EPA selected a combination of engineering and institutional controls (IC) as the remedy for the OW/EADA OU. The remedy also established action levels for arsenic within the OU. Major components of the remedy include requirements to:

- Construct engineered covers over waste materials in recreational and potential commercial/industrial area exceeding arsenic levels of 1,000 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 and 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 ADLC Development Permit System (DPS);
- Construct 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 ICs 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.

7.2 Remedial Action Implementation

The ROD divided the OU into six subareas based on similarities of waste characteristics and present/future land uses. The six areas are: 1) Historic Structures; 2) Golf Course, 3) Industrial Area (including the Arbiter Industrial Complex); 4) Red Sands; 5) East Anaconda Yards, and; 6) Drag Strip (Figure 7-1). Since the anticipated land uses, site characteristics, and contaminants of concern are similar to areas in the OW/EADA OU, the Mill Creek OU and areas associated with the loop track in the Aspen Hills area are included in the Selected Remedy for the OW/EADA OU. These areas are discussed herein under Subarea 5, which is now referred to as the East Anaconda Yards/Aspen Hills Subarea.

A great deal of land reclamation work has been accomplished to date within the OW/EADA OU. Areas where the remedy has been implemented are shown on Figure 7-1. Table 7-1 provides a summary of the monitoring data provided in the Atlantic Richfield report. For each subarea, the table shows the number of sites evaluated, the acreage, and the range of vegetation cover for sites with at least three growing seasons since they were reclaimed. The table also indicates the degree to which there are

erosion, weed, or barren area problems. Lastly, the table summarizes remedy performance.

The status of construction, O&M, and site evaluation are discussed by subarea below.

7.2.1 Historic Structures Subarea 1

This area, defined by sloped areas above the golf course, contains flues and oven foundations, which were remnants of the Upper and Lower Works. Drainage controls were completed with the golf course construction in the mid-1990s.

7.2.1.1 Construction Status

Construction of storm water controls are complete. Final reclamation of steep slope areas is differed to remedial actions under the ARWW&S OU.

7.2.1.2 Operations and Maintenance Status

Active monitoring and maintenance of storm water controls is currently being conducted. Site access controls through engineered trails, barriers, and signage are in place.

7.2.1.3 Data Review and Evaluation

Atlantic Richfield conducts annual vegetation, engineered controls, and site stability monitoring in the reclaimed portions of Subarea 1. In addition, Atlantic Richfield submitted a compliance determination request and EPA performed a compliance evaluation for this subarea in 2009.

The latest available Engineered Controls Inspection and Maintenance Report (Atlantic Richfield 2009) provides the results for inspection and maintenance activities for Subarea 1 that were conducted in 2006. The report listed several minor maintenance issues associated with the storm water conveyance system. These include sedimentation in ditches (primarily as the result of erosion occurring from the Stucky Ridge hillside), poor vegetation in some ditches, and the presence of noxious weeds. One area of concern is that some runoff was observed to have flowed on to the trail system near Channel 2A. However, no significant accumulation of sediment in the Subarea 1 sediment ponds was occurring.

The vegetation in this subarea is well established and continues to do well. Overall vegetation cover by perennial species ranged from 28 to 39% for the two areas evaluated within Subarea 1 (Table 7-1). The M&M report indicated that some small areas within Subarea 1 were sparsely vegetated and recommended possible reseeded of those specific areas (Atlantic Richfield 2010). There was no evidence of soil movement, rill, or gullies, and there were no management issues other than weed control, according to the report.

In 2009, Atlantic Richfield applied for a compliance determination on the two areas that are monitored annually (Atlantic Richfield 2009). For WMAs, the compliance attributes and criteria are listed below and discussed in the VMP (2008).

- Desirable, live vegetation cover: $\geq 30\%$
- Noxious weeds: infrequent, widely spaced, cover $< 5\%$ of vegetation
- Barren areas: $< 10\%$ of area and not $> 10,000$ ft²
- Site stability: modified BLM score of < 45 points

Atlantic Richfield's compliance request report (Atlantic Richfield 2009) contained the required information for each of the subject areas. This information included the final inspection application form, annual M&M reports, yearly field results, appropriate maps and aerial photographs, and management recommendations. On October 23, 2009, EPA conducted an in-field evaluation of the subject areas.

The initial reconnaissance of these areas indicated that erosion was not an issue, even for sloped areas. Also, the areas contained very few noxious weeds and only small, infrequently encountered barren areas so these criteria were also met. Since the trend in vegetation cover in some areas (based on Atlantic Richfield's report) was possibly declining or was close to the 30% cover criteria, particular attention in the field was focused on this critical site attribute. For each area, the EPA evaluator specifically checked whether it was meeting the cover performance standard $\geq 30\%$.

Based on the field evaluation conducted by EPA, all of the subject remediated areas within the Historic Structures met the vegetation cover standard. All areas were erosionally stable; however, slopes upgradient of Subarea 1 on Stucky Ridge continue to erode and provide some sediment buildup in the down gradient channels. Noxious weeds were not an issue. In summary, the compliance verification indicated that the remediated areas met the WMA performance standards established for the Site. EPA is awaiting a long-term O&M (i.e., land management) plan before making a final decision regarding letting these areas be administered under the long-term maintenance/5-year review process.

7.2.1.4 Results of Site Inspections

The field work conducted as part of the 2009 compliance evaluation was used as the site inspection for those specific areas. Site inspections were conducted in June 2010 for areas not included in the 2009 compliance evaluation and for the unreclaimed Miscellaneous Waste area. The latter is shown in Figure 7-2A. The site inspection confirmed the information provided in the M&M report.

7.2.2 Golf Course Subarea 2

The Golf Course Subarea consists of approximately 250 acres of tailings and contaminated soils and the adjacent uplands where remnants of the historic smelter

remain.

7.2.2.1 Construction Status

Construction of the golf course began in June 1994 with the grading of the site and included the movement of over 600,000 cy of material. Concurrent with the site grading was the construction of eight sedimentation ponds to control surface water run-on to the site from the adjacent uplands and placement of riprap along the banks of Warm Springs Creek to protect against erosion.

After the grading, an extensive under-drain piping system, totaling approximately 32,000 linear feet, was installed. The drainage system collects surface water from the site and routes it to two constructed lakes where the water is recycled for irrigation. A soil cover consisting of 18 inches of soil (approximately 600,000 cy) over 2 inches of lime rock (47,000 cy) was then placed over the graded site. That work was completed in 1995. Remaining work on the golf course (tee boxes, greens, irrigation, etc) was completed in 1996. After a one year grow-in period, the golf course was opened to the public in May of 1997. Photograph 5832 shows a portion of the golf course with the historic Washoe smelter stack in the background. Subarea 2 is construction complete.

7.2.2.2 Operations and Maintenance Status

The golf course has been operated and maintained by ADLC since it was opened. Atlantic Richfield has monitored and performed maintenance on one small area located west of the golf course and north of the bowling alley. Site access controls include fencing and are in place.

7.2.2.3 Data Review and Evaluation

The annual M&M Reports prepared by Atlantic Richfield include an evaluation of the area north of the bowling alley (the golf course is not part of the Atlantic Richfield evaluation). This area was included in the compliance determination conducted by EPA in 2009. The Golf Course currently operates under a separate Operations and Maintenance Plan under the responsibility of the Old Works Golf Course Authority Board. Presently, there are no M&M reports generated by the Golf Course Authority. Reporting requirements for golf course monitoring and maintenance is currently being reviewed by EPA.

Since 2007, vegetation cover has ranged from 30 to 44% throughout this area (Table 7-1). The Atlantic Richfield report stated that this area had well-established vegetation in excess of the WMA criteria of $\geq 30\%$, the coverage was uniform across the site, erosion was minimal even in sloping areas, and weeds were infrequent. EPA's 2009 compliance evaluation confirms these statements. As with the other candidate compliance areas, EPA is awaiting a long-term O&M (land management) plan from Atlantic Richfield before making a final decision regarding letting these areas be administered under the long-term inspection and maintenance/5-year review process.

7.2.2.4 Results of Site Inspections

The field work conducted as part of the 2009 compliance evaluation was used as the site inspection for the 2010 Five-Year Review. Based upon EPA's in-field evaluation, this area met all the WMA compliance criteria.

7.2.3 Industrial Area Subarea 3

The Industrial Area Subarea is defined by those properties in private ownership within the OW/EADA OU, including the Anaconda Industrial Park and the former Arbiter Industrial Complex (AIC).

7.2.3.1 Construction Status

Construction of engineered and drainage controls began in 2002 and have been completed for specific lots. Remediated areas within this subarea are shown in Figure 7-2A. Since the last five-year review, the Selected Remedy has been implemented on a portion of this subarea and further work is ongoing. Due to the complexity of land ownerships, individual site work plans (ISWP) are required by EPA and ADLC for development of commercial and industrial properties.

Since the last five-year review, ISWPs have been developed for a number of properties, including:

- National Guard Parcel (Atlantic Richfield 2008);
- Anaconda Local Development Corporation (ADLC) Parcels (Atlantic Richfield 2007, 2009);
- Hoscheid Parcel in the AIC (Atlantic Richfield 2007),
- Miller Mechanical Parcel in the AIC (Atlantic Richfield 2008), and;
- A1 Lumber Parcels (CDM 2009).

The scope of remedial work on these parcels includes soil and waste excavation and disposal, the application of backfill and coversoil in specified areas, and land reclamation. Work on some properties is ongoing while work on others has been completed. A construction completion report (CCR) was recently prepared for the A1 Lumber Parcels that documents that the work conducted on this site was done according to the ISWP and was consistent with ROD requirements (CDM 2010).

7.2.3.2 Operations and Maintenance Status

Parcels where construction has been completed are monitored under two different monitoring and maintenance plans, depending on the type of cover. Industrial covers are inspected under the Engineered Controls

7.2.3.3 Data Review and Evaluation

For Subarea 3, Atlantic Richfield prepared a construction completion report that included the Ball Field in the Industrial Park (Atlantic Richfield 2000). Atlantic Richfield has also conducted annual vegetation and site stability monitoring in the reclaimed portions of Subarea 3 (Atlantic Richfield 2010); those results are discussed below.

Atlantic Richfield conducts monitoring in two areas. Based on the available data (Table 7-1) and on the narrative in Atlantic Richfield's report (Atlantic Richfield 2010), the vegetation in these areas has been good to excellent for the past several growing seasons. Vegetation cover ranged from appropriately 20 to 40% during the last three years. According to the M&M report, these area had good vegetation cover but there were some sparsely vegetated areas. There were also impacts from off road vehicle trespass noted; these reportedly are being evaluated by Atlantic Richfield for possible supplemental maintenance activities designed to improve vegetation cover. Weeds were present but infrequently encountered and were reportedly being sprayed on a regular basis. Since there was no observed evidence of soil movement, rills, or gullies, these sites were considered stable.

7.2.3.4 Results of Site Inspections

EPA's site inspection conducted on June 7, 2010 verified Atlantic Richfield's monitoring results for the revegetated areas. These areas have good vegetation cover and are stable, and therefore considered operational and functional (O&F). Additionally, the industrial cover (gravel) used in open areas within the AIC was intact and functioning as intended. The A1 Lumber site was seeded in 2009 and the inspection indicated that seed germination was good and the vegetation was developing as expected (Photograph 5735).

7.2.4 Red Sands Subarea 4

The Red Sands Subarea 4 was defined by the waste materials (red sands and jig tailings) located adjacent to the golf course subarea (Figure 7-2A).

7.2.4.1 Construction Status

Construction of a soil cover and drainage controls on approximately 300 acres began in 1996 and was completed in 1998. A portion of the Red Sands material was left unreclaimed as an historic feature.

7.2.4.2 Operations and Maintenance Status

Atlantic Richfield has monitored and performed maintenance on the reclaimed areas within this subarea annually since construction was completed. In addition, ICs that apply to this subarea have been fully implemented.

7.2.4.3 Data Review and Evaluation

This subarea was determined by EPA to be O&F in the first few years following construction and, like other reclaimed areas within this OU, is currently in the interim

O&M phase. A construction completion report (CCR) was prepared that covered the Industrial Park and Red Sands areas within Subarea 4 (Atlantic Richfield 2000) and regular maintenance activities have been ongoing since then. EPA receives annual M&M Reports for the OW/EADA OU from Atlantic Richfield that include this subarea and uses those data to verify trends in site stability and vegetation development. The latest report indicated that Atlantic Richfield is monitoring nine individual areas within this OU either quantitatively (for compliance) or qualitatively.

Based on Atlantic Richfield's M&M report, vegetation cover across the nine areas evaluated ranged from 10 to 43% and some soil movement (Table 7-1) was observed in specific areas; however, as a whole the reclamation in Subarea 4 was functioning as designed. The M&M reports noted some minor instances of poor vegetation for grass-lined ditches, noxious weeds, and minor erosion. No major safety, stability, or erosion concerns were noted in the 2009 inspection.

Quantitatively-Evaluated Areas and Compliance

In the last two years (2008 and 2009), Atlantic Richfield conducted quantitative monitoring in five areas and requested EPA to make a compliance determination.

Atlantic Richfield's compliance request report (Atlantic Richfield 2009) was reviewed by EPA and found to contain the required information for each of the subject areas. That information included the final inspection application form, annual M&M reports, yearly field results, appropriate maps and aerial photographs, and management recommendations.

On October 23, 2009, EPA conducted an in-field evaluation of the subject remediated areas to determine if the areas met the compliance attributes/criteria for WMAs.

- Desirable, live vegetation cover: $\geq 30\%$
- Noxious weeds: infrequent, widely spaced, cover $< 5\%$ of vegetation
- Barren areas: $< 10\%$ of area and not $> 10,000$ ft²
- Site stability: modified BLM score of ≤ 45 points

Based upon EPA's evaluation, the subject areas met the WMA compliance criteria. Vegetation was well established, erosion was minimal even in sloped areas, and weeds were infrequently observed. EPA is awaiting a long-term land management plan from Atlantic Richfield before making a final decision regarding letting these areas be administered under the long-term maintenance/5-year review process.

Qualitatively-Evaluated Areas

In the last few years, Atlantic Richfield used qualitative monitoring in four specific areas presumably because these areas were not meeting one or more of the compliance criteria. These areas include Type B cap material, which is very coarse and is commonly described as "pit run", a term used in the gravel mining industry to describe coarse alluvium materials that is processed for gravel ("run of the pit"), and

which refers to a mixture of sand, gravel, cobbles and boulders in a loamy sand matrix. This material is referred to as a temporary cover and was used in places likely to be redeveloped. In contrast, Type A cap material has more fine soil particles and is more like a natural soil that meets Anaconda cover soil specifications that were provided in the ARWW&S OU ROD (USEPA and DEQ 1998). This material was used in areas not likely to be redeveloped.

Based upon Atlantic Richfield's report, EPA inspected the areas identified as having potential problems, which included low vegetation cover, soil movement and rill formation, bare areas and weed infestations. Conditions in these areas are discussed below.

7.2.4.4 Results of Site Inspections

EPA's site inspections conducted on June 15, 2010 verified Atlantic Richfield's monitoring results for the revegetated areas. Most areas have well-established vegetation with relatively high cover; however, one area is particular (Area 4 Type B cap) is struggling. Photograph 5782 shows a low cover area that was reclaimed with Type B material and a greener, more vegetated area in the background that was reclaimed using a Type A cap. Despite the low vegetation cover in this area, this and all other areas within Subarea 4 are stable. Weeds were observed in some areas and don't look as though they are being actively controlled in some locations. All areas in Subarea 4 are considered O&F. Photograph 5719 shows an example of the general vegetation cover within Subarea 6.

An ongoing concern of the Agencies has been the structural integrity of the gabion walls located along the Warm Springs Creek stream channel. These were inspected during the June site walk over and appeared intact and functioning as designed. Duane Logan, Atlantic Richfield oversight contractor, stated that the all stormwater BMPS, including gabions, are inspected annually and after significant runoff events and that no issues have been noted for the gabions in this or other areas of the Site.

7.2.5 East Anaconda Yards/Aspen Hills Subarea 5

This subarea is defined by the East Anaconda Yards an approximately one hundred acre portion of the historic Smelter Hill facility located adjacent to the community of Anaconda, areas previously included in the Mill Creek OU, and a portion (approximately one mile) of contaminated railroad track located within the Aspen Hills residential subdivision (Figures 7-1 and 7-2B).

7.2.5.1 Construction Status

Construction of drainage controls (new ditches, culverts and outlets) in the East Anaconda Yards began in 1997. Drainage controls and some soil cover placement was completed in 1998. Most of the East Anaconda Yards were previously covered during the smelter demolition in 1986. Construction of soil covers over waste materials and the in-situ treatment (lime addition) of contaminated soils also began in the Aspen Hills area in 1997. This work and the construction of drainage controls was completed

in 1998. The OW/EADA ROD, signed in March 1994, provided for the cleanup of soils exceeding 1,000 ppm arsenic utilizing engineered covers and/or revegetation techniques and these provisions were later applied to the old Mill Creek area.

During redevelopment activities in East Anaconda Yards in 2004, additional hazardous waste material and beryllium waste were discovered. These materials were excavated and the hazardous wastes were disposed of at an off-site hazardous waste facility and the beryllium wastes were disposed of in a new repository in the Smelter Hill Repository Complex (SHRC). The excavated area was backfilled with clean material and made ready for redevelopment.

Reclaimed areas within the East Anaconda Yards, the Mill Creek area, and the Aspen Hills Loop Track area are shown in Figures 7-2B. Within the last five years, ISWPs have been prepared to complete remedial actions consistent with development on a number of properties:

- ADLC East Anaconda Yard Parcels (Atlantic Richfield 2009);
- Guhlke Parcel (Atlantic Richfield 2009);
- Assembly of God Parcel (Atlantic Richfield 2009);
- Pucillelli Parcel (Atlantic Richfield 2009), and;
- GM Partnerships LLP Parcel (Atlantic Richfield 2009).

7.2.5.2 Operations and Maintenance Status

Vegetation, storm water engineered controls, and industrial covers within the East Anaconda Yards, the Mill Creek area, and the Aspen Hills Loop Track are monitored and maintained as reported under the annual M&M reports. An analysis of these reports is provided below.

7.2.5.3 Data Review and Evaluation

The most recent annual M&M Report (Atlantic Richfield 2010) indicates that Atlantic Richfield is continuing to monitor vegetation in nine separate areas and storm water engineered controls (4 grass-lined ditches with intermittent sections of riprap) within Subarea 5. A summary of the data for the vegetation areas is provided in Table 7-1.

Results reported in the M&M report indicate that the vegetation in these areas is generally well developed and cover values are typically in the 10 to 39% range. The evaluation by Atlantic Richfield indicates that most areas are meeting or close to meeting the RA criteria for either WMA ($\geq 30\%$) or Uplands (LRES score ≥ 115), depending on which criteria is applicable. However, vegetation cover in portions of the Aspen Hills Loop Track area were as low as 10% over the last several years. In general, weeds were present throughout the subarea, but were low in abundant and

widely dispersed and most areas were erosionally stable with little soil movement and few to no rills or gullies.

As part of the annual inspection of stormwater BMPs conducted by Atlantic Richfield, an erosion and sediment depositional area was noted below the railroad wood box culvert at the beginning of ditch EAY-4. This was also an area of concern mentioned by ADLC.

According to the vegetation monitoring report, the vegetation in the remaining portion of the Type D cap area in the Aspen Hills Loop Track area continues to develop slowly. Although there is less vegetation cover in the Type D cap area compared to other areas, some of this area has well-developed stands of Great Basin wildrye with more than 30% cover. Whitetop, Canada thistle and leafy spurge are present in the loop track area and spotted knapweed is common. Weed spraying is the responsibility of Atlantic Richfield and is ongoing. Atlantic Richfield's report stated that this area will be assessed for possible supplemental maintenance activities to improve vegetation cover. There was some evidence of soil movement and some sheet wash erosion in the bare areas on east-facing slopes in the loop track area; however, the majority of the site was stable during the 2008 and 2009 field work (Atlantic Richfield 2010).

7.2.5.4 Results of Site Inspections

EPA's site inspection conducted on June 7 and 22, 2010 verified Atlantic Richfield's monitoring results for the revegetated areas and all areas are O&F. Site conditions in the East Anaconda Yards and at the historic Mill Creek townsite (formerly part of the Mill Creek OU) have well-established vegetation with relatively high cover, little to no soil movement, no bare areas, and low weed cover (Photographs 5730 and 5762). In contrast, the vegetation in two Aspen Hills Loop Track areas is struggling. In these areas, some soil movement and weed infestations were noted. For these reasons, reclaimed areas within the Aspen Hills Loop Track may not meet the performance standards without substantial input such as re-reclamation.

The East Anaconda Yards were inspected with respect to ADLC concerns with stormwater drainage. The inspection took place after several days of rain and revealed that all surface water drainage channels were functioning as intended. Minimal ponding was observed in the channels and only localized ponding was observed on the surface of the reclaimed areas.

7.2.6 Drag Strip Subarea 6

The Drag Strip Subarea contains more than 350 acres of contaminated soils owned by a local drag racing organization and located north-east portion of the OW/EADA OU (Figure 7-2A).

7.2.6.1 Construction Status

Initial construction, consisting of deep tilling and in-situ lime treatment and drainage controls began in late 1998 and was completed in 1999. Due to slower than expected vegetation establishment, four test plots ranging in size from 1.3 to 3.1 acres were established in early 2004. Based on the results from these test plots, in 2007 several previously reclaimed areas were covered with 6-inches of soil and reseeded. Subarea 6 is construction complete.

7.2.6.2 Operations and Maintenance Status

Results from the annual M&M report and site inspections for the reclaimed areas within Subarea 6 are discussed below.

7.2.6.3 Data Review and Evaluation

As mentioned above, due to slower than expected vegetation establishment, test plots were established in early 2004. Three treatments including organic matter, phosphorus plus organic matter, and addition of a thin layer (minimum 2 inches) of seed bed material from the Stewart Street borrow area east of Opportunity were installed. Also, there was one plot with no amendments or cover soil added. The plots were drill seeded in April, 2004 and qualitatively evaluated on July 17, 2006.

In general, after three growing seasons, the only treatment that had been reasonably successful had the addition of 2 to 3 inches of cover soil material from the Stewart Street Borrow. The other treatments did result in increases in cover of perennial grasses; however, none of the treatments resulted in acceptable stands of perennial grasses. In 2007, during performance of maintenance activities at the Drag Strip, plots 1, 2 and 4 were covered with 6-inches of soil from the Stucky Ridge borrow area. The data show that vegetation cover on Plot 3 ranged from approximately 30 to 39%, indicating that the coversoil application was successful.

The annual vegetation M&M report (Atlantic Richfield 2010) indicates that Atlantic Richfield is continuing to monitor three separate areas (plus the test plots) within the Drag Strip Subarea. According to Atlantic Richfield, vegetation throughout Subarea 6 is well established and ranges from approximately 20 to 42% (Table 7-1). Areas having at least three growing seasons have cover in excess of 30%, bare areas constituting less than 5% of the total reclaimed area (very low), and no evidence of soil movement, rills or gullies. Weeds are scattered, have low cover, and are being actively controlled (Atlantic Richfield 2010).

First year observations (2008) on the coversoiled areas indicated good seedling establishment with more than 40 seedlings per square meter. Weed were scattered and minimal and there were no rills or gullies observed. In 2009, vegetation was well established in some areas and cover generally ranged from 20 to 42%. Atlantic Richfield stated that the area, as a whole, was close to meeting the 30% criteria for WMAs (Atlantic Richfield 2010).

7.2.6.4 Results of Site Inspections

EPA conducted site inspections for the Drag Strip subarea on June 7 and 15, 2010 to verify/refute Atlantic Richfield's monitoring results for the RA areas. The inspection indicated that the coversoiled areas have abundant perennial grass cover compared to other areas, such as the in-situ treated areas (Type D - 18" in-situ) and the reseeded borrow areas. Photograph 5801 shows the well vegetated perennial grass growth on 2007 coversoiled area and Photograph 5799 shows the poor perennial plant growth and abundant knapweed on the in-situ (Type D) treated area. Photograph 5719 shows a ground-level view of the abundant perennial grass cover in the 2007 coversoiled area south of Warm Springs Creek. Erosion was not observed in this generally level subarea. All areas of Subarea 6 are considered O&F.

A second concern is that storage of vehicles was initiated in a portion of the Drag Strip Parcel. This activity should have been permitted through ADLC's DPS; however, no permit application was received or processed.

7.3 Progress Since The Last Five Year Review

The previous Five-Year Review identified two issues concerning the OW/EADA OU:

- Address lack of vegetation at the Drag Strip Subarea; and
- Investigate the potential for additional beryllium and/or hazardous waste at the East Anaconda Yards.

As discussed above in Section 7.2.6, a soil cover was placed over a portion of the Drag Strip Subarea in 2007 and was re-seeded. The area receiving the soil cover now supports abundant perennial grasses. Additional monitoring will continue in this area and the treated area to ensure that vegetation performance standards set forth in the VMP is achieved.

The second issue, a recommendation to investigate the potential for additional beryllium and/or hazardous waste at the East Anaconda Yards, was not completely addressed. EPA continues to work with ADLC to fill data gaps and complete a development plan to address this and other similar issues.

7.4 Technical Assessment

Question A: Is The Remedy Functioning As Intended By The Decision Documents?

Yes. The remedial actions implemented to date are functioning as intended. Waste material and contaminated soil have been removed, and the revegetated areas and other areas covered by an approved industrial cover material are meeting the performance standards, indicating that the implemented remedy is successfully meeting the RAOs established for the OW/EADA. The establishment of a golf course has proven successful. There are no early indicators of potential issues with the implemented remedy in Historic Structures Subarea 1. The Miscellaneous Waste area

is currently being evaluated to determine if remedial action is necessary. That evaluation is expected to be completed before the next five-year review.

Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used At The Time of Remedy Selection Still Valid?

Yes. For the 2010 Five-Year Review, EPA re-examined the ARARs and the assumptions used in the 1996 original human health risk assessment. In accordance with the preamble to the National Contingency Plan, ARARs are frozen at the time of the ROD unless "a new or modified requirement calls into question the protectiveness of the selected remedy" (55 FR 8757 [March 8, 1990]). Appendix A sets forth certain contaminant specific water quality ARARs that have changed since completion of the previous five-year review for the Site. No other new or modified requirement calls into question the protectiveness of the selected remedy for this operable unit. Since completion of the previous five-year review for the Site, ARARs (Appendix A) have not changed in ways that would significantly affect the remedy implemented within this Subarea. Changes in land use since the last five-year review have not increased potential risks (exposure assumptions, exposure pathways, and COC toxicity). Within the last five years, EPA established performance standards for reclaimed areas. Those standards, as described in the VMP (Atlantic Richfield 2008), were used to determine compliance for some areas and will be used in subsequent five-year reviews to evaluate reclamation success.

Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

Yes. Evidence of trespass in the historic areas (e.g., Miscellaneous Waste area) indicates potential public exposure to contaminated material and thereby called into question the protectiveness of the remedy.

7.5 Issues and Recommendations

Issues identified for the OW/EADA OU that affect protectiveness are:

- the long-term effectiveness of the County's IC program to protect the remedy;
- risks to trespassers on uncovered wastes left in place for historic preservation, and;
- buried waste and debris limiting redevelopment in the East Anaconda Yards

It is anticipated that the IC program will be effective in protecting the remedy when it is finalized and fully implemented. EPA is in the process of determining if uncovered waste material pose an unacceptable risk to trespassers and to determine if additional action is necessary. The unreclaimed Miscellaneous Waste area (Figure 7-2A) was evaluated as part of the site inspection and determined to require additional characterization and possible future remedial action for that area to eventually meet the RAOs. A remedial action for the Miscellaneous Waste area is expected to be

designed and implemented before the next five-year review. EPA is currently working with ADLC to assess the nature and extent of buried waste and debris and to develop an appropriate redevelopment plan for the East Anaconda Yards that is protective.

Although they do not affect the protectiveness of the remedy, the following issues were identified for the Community Soils OU during this five-year review:

- Current data suggest that the uncovered Red Sands are contributing to ground water contamination;
- Golf Course protectiveness;
- Trespassing on the reclaimed areas impacts seedling development, can leave soil barren and assessable to erosion, and may create source-receptor pathway. Physical restrictions (e.g., fencing) are not always possible;
- Storage of junk vehicles in Drag Strip Subarea, and;
- Contaminated soil sediment discharging onto the historic trail adjacent to golf course. Also, possible instability of adjacent slopes.

The Red Sands area within a ground water TI zone and there have been no exceedances at the POC. EPA has determined that the plume is unlikely to expand beyond the POC. A CGWA is anticipated to be implemented and land use ICs are in-place so there are no risks to human health.

At the golf course there are no exposure pathways for workers or users. The course is within a ground water TI zone and will be within the CGWA. EPA expects the golf course to continue to protect human health and reduce contaminant flux to ground and surface water.

EPA anticipates that degradation to reclaimed areas will be addressed through application of Vegetation Management Plan protocol. This includes physical restrictions where possible and acceptable to ADLC, public education, and signage. It is anticipated that on-going monitoring and maintenance will be required in some areas to keep the remedy intact.

Junk vehicles in the Drag Strip Subarea are not compromising the remedy; however, it is recommended that these vehicles be removed.

In the short-term, sediment (Photograph 5834) needs to be cleared from the historic walk way and the adjacent drainages require engineered BMPs to prevent reoccurrences. EPA has determined that the slopes above the walk way are not unstable.

7.6 Protectiveness Statement

A protectiveness statement for the OW/EADA OU is deferred because more information is needed to make a protectiveness determination. All waste material within the OW/EADA OU has been covered (with active monitoring, maintenance and interim IC's) with the exception of uncovered wastes left in place for historic preservation. Interim controls such as trails, barriers and signage limit exposure to these wastes. However, there is evidence that trespassers, hikers and dirt bike riders access these waste areas. It is recommended that additional action be taken to determine if these waste materials pose an unacceptable risk and to determine if additional remedial action is necessary. It is expected that this action will be completed next year, at which time a protectiveness determination will be made. Additionally, for the remedy to be protective in the long-term, final IC's must be completed.

**Table 7-1
OW/EADA OU Subarea Monitoring Results and Performance/Protectiveness**

Subarea	Number of Areas Evaluated	Site Type ¹	Acreage Evaluated	Monitoring Results ² and Performance/Protectiveness				
				Vegetation Cover	Site Stability	Weeds	Bare Areas	Performance ³ /Protectiveness
1 - Historic Structures	2	WMA	51	28-39%	Erosion not significant	Few	Infrequent	Meets performance standards - RA functioning as intended and is protective.
2 - Golf Course	1	WMA	5.3	30-44%	Erosion not significant	Few	Infrequent	Meets performance standards - RA functioning as intended and is protective.
3 - Industrial Area	2	WMA	32	20-40%	No erosion	Few	Infrequent	Meets performance standards - RA functioning as intended and is protective.
4 - Red Sands	9	WMA	181	10-43%	Some rills and soil movement observed in specific area	Few	Infrequent	RA functioning as intended in most areas. Most area meet performance standards. Vegetation is struggling in one area (with Type B cap). Although additional work may be needed, the RA is protective.
5 - East Anaconda Yards/Aspen Hills	9	WMA	98	10-39%	Rills and gullies in the Aspen Hills Loop Track area	Weeds abundant in certain areas of the Aspen Hills Loop Track areas	Some bare areas in the Aspen Hills Loop Track area	RA functioning as intended for the East Anaconda Yards and the Mill Creek area and these area would likely pass the performance standards. Vegetation in some areas of the Aspen Hills/Loop Track area is struggling and specific areas are unstable - these areas would not pass the performance criteria. Although additional work may be needed, access restrictions and IC's are in-place for these Atlantic Richfield-owned areas so the RAs are considered protective.
6 - Drag Strip	4	WMA	346	20-42%	No erosion	Few in coversoiled areas; abundant in in-situ treated areas and the reclaimed borrow area.	Infrequent	Most monitored areas within this subarea have well-established vegetation with relatively high cover. All areas are O&F, but only the coversoiled areas are likely to meet the performance standards.

Notes:

¹WMA = waste management area.

²Data from the last three growing season (2007, 2008, and 2009). Source: *2009 Vegetation Monitoring Annual Report*. Prepared by Atlantic Richfield. June 2010

³ Performance standards for WMAs as identified in the Anaconda Vegetation Management Plan, prepared by Atlantic Richfield 2008.

Section 8 Community Soils OU16

8.1 Selected Remedy

The Community Soils OU ROD (USEPA and DEQ 1996) was issued by EPA and DEQ in October 1996. The ROD addressed all remaining residential and commercial/industrial soils of the Anaconda Smelter NPL Site, and brought closure to previous actions conducted at residential properties within the site (i.e., Community Soils TCRA and actions taken through the Anaconda-Deer Lodge County's (ADLC's) Development Permit System) as well as commercial/industrial properties. Major components of the remedy for residential soils as outlined in the Community Soils OU ROD are:

- Clean up current residential soils that exceed the residential action level of 250 parts per million (ppm) soil arsenic concentrations, through removal and replacement with clean soil and placement of a vegetative or other protective barrier.
- In areas where specific site conditions dictate that removal is not implementable, treatment or other measures (e.g., capping, tilling, Institutional Controls [ICs]) will be taken to reduce arsenic concentrations to below the 250 ppm action level or to prevent exposure.
- Clean up all future residential soils at the time of development that exceed the residential action level of 250 ppm soil arsenic concentration, through the ADLC Development Permit System (DPS).
- Implement ICs to provide educational information to all residents describing potential risks, and recommendations to reduce exposure to residual contaminants in soils, and to ensure the long-term viability of this remedy.

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

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

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

- Construct an engineered cover over all contaminated railroad bed material within the community of Anaconda to prevent direct contact with, and reduce potential for erosion and transport of, contaminated materials to residential and commercial/industrial areas.

- Separate the railbed from residential and commercial/industrial areas with a barrier to restrict access to the railbed and to control surface runoff from the railbed through the use of retaining walls and/or curbing.
- Maintain existing ICs to restrict access.

8.2 Remedial Action Implementation

The Community Soils OU was divided into three subareas:

- Anaconda and Regional Residential Soils Subarea
- Adjacent to Railroad Properties (Commercial/Industrial) Subarea
- Anaconda Railroads Subarea

8.2.1 Residential Soils Construction Status

Using data collected during the remedial design investigation (Atlantic Richfield 1996), the Residential Soils Remedial Action Work Plan/Final Design Report (RAWP/FDR) was finalized in 2002 (Pioneer 2002). Remedial work was initiated in 2003 and is expected to be completed in 2010.

Soil and/or aggregate covers are used over portions (components) of the residential yards where concentrations exceed 250 ppm to minimize the potential risk of human exposure. The treatment type selected for each residential yard is based on the Supplemental RA Data Collection Activities. Individual Site Work Plans (ISWPs) are developed for specific areas requiring remedial action. The extent of soil removal and soil cover or aggregate cover placement for residential yards is determined through the supplemental data collection activities.

To date Atlantic Richfield has a dataset that includes over 5,500 samples collected from more than 1,700 yards. Atlantic Richfield has cleaned up over 300 yards in Anaconda and 47 in the nearby communities.

8.2.1.1 Operations and Maintenance Status

Cleanup of residential properties is a removal action and consequently does not require an operations and maintenance. Future development of residential properties, including those remediated under this RA, are currently addressed through the ADLC's ICs program (e.g., development permit system).

8.2.1.2 Data Review and Evaluation

Since the last five-year review, several data sets have been reviewed and evaluated by EPA regarding the Residential Soils Subarea of the Community Soils OU. Some of

these data sets are from new investigations (within the last five years) and some data sets are from older investigations (see Section 8.3).

8.2.1.3 Site Inspections

Site inspections of remedial action areas within the Residential Soils Subarea consisted of interviewing oversight personnel and discussing this RA work with the public during the interview process. No protectiveness issues were identified during those discussions.

8.2.2 Adjacent to Railroad Properties (Commercial/Industrial) Construction Status

According to the *Historical Railroad Beds and Commercial/Industrial Areas RAWP/FDR* (Pioneer 2004), in most locations specified for waste excavation, the excavation limits are based on visual observation because the underlying native soil is easily distinguishable from the railroad bed materials (as determined during the field characterization activities). However, in some cases the underlying soils may be difficult to differentiate from the waste material due to intermixing of materials or similar geology. In such instances, the excavation depth will be limited to 18 inches, consistent with the maximum excavation depth applicable to residential soils RA within the Community Soils OU. Remedial action on the commercial/industrial areas adjacent to railroads began in 2005 and is anticipated to be completed in 2010.

8.2.2.1 Operations and Maintenance Status

Consistent with residential soils, future development of Adjacent to Railroad properties will also be addressed by the DPS.

8.2.2.2 Data Review and Evaluation

Data used to prepare the RAWP/FDR report and SAP for this subarea have been previously discussed. Remedial action continues and, therefore, data review and evaluation continues as needed.

8.2.2.3 Results of Site Inspections

Site inspections of remedial action areas within the Adjacent to Railroad Property Subarea conducted on June 7, 2010 showed that the RAs were intact and functioning as design. The rock caps over waste material was intact and the retaining walls were preventing contaminated water and waste from discharging onto the city streets.

8.2.3 Anaconda Railroad Bed Construction Status

8.2.3.1 Construction Status

Within the last review period, remedial action work has been conducted in two areas: the West Valley and the In Town railroad lines.

Along the West Valley line, work was completed from the west end to the Thriftway store in 2009 and will be completed from the Thriftway store to the edge of Anaconda in 2010. This work includes removing the railroad tracks and ties, capping the excavated areas with clean coversoil, and reseeding. The approaches for driveways and roads will also be completed in 2010.

Remedial action was completed in 2008 for the In Town portion of the active rail line and a CCR has been prepared (Atlantic Richfield 2010). This consisted of removing contaminated soil adjacent to portions of the active rail line active line within Anaconda and capping those areas with rock. It also include removing contaminated material and reclaiming some abandoned spurs within Anaconda. In late 2009, an additional area was reclaimed at the request of a landowner and for 2010 one additional retaining wall and a rock cap will be installed. Another area identified as needing to be addressed is a several acre piece of property on the north side of the rail yard adjacent to Washoe Park. The EPA oversight person (US. Bureau of Reclamation staff (USBR)) indicated that portions of this area have previously been reclaimed but have been a failure and the entire area needs to be re-evaluated and reclaimed. This is anticipated to occur in 2010 and 2011.

The Agency-approved and implemented remedial actions (for the West Valley and In Town areas) included other important components. These were the proper disposal of contaminated waste materials, re-contouring affected areas so that they drain properly, installing storm water ditches and using other erosion control BMPs, mitigating losses of wetlands, and conducting monitoring and maintenance of the remedial action areas.

8.2.3.2 Operations and Maintenance Status

EPA anticipates that a Railroad Operations and Maintenance Plan to address Superfund remedial components of the Active Railroad will be completed before the next five-year review.

8.2.3.3 Data Review and Evaluation

No data were available for review for this RDU.

8.2.3.4 Results of Site Inspections

The USBR and CDM have provided EPA with continual oversight of the remedial action work conducted for the West Valley and In Town railroad lines. For this 2010 Five-Year Review, site inspections for were conducted on June 7, 2010 and an interview was held with USBR staff. Based on the inspection and the interview, the remedial actions implemented along the West Valley and In Town railroad lines have been conducted according to the designs and are functioning as intended. The work along the West Valley line is ongoing but the In Town work has been completed and accepted by EPA. A portion of the reclamation work conducted within Anaconda using a rock cap and retaining wall to prevent contaminated water and sediment from

getting onto the city street can be seen in Photograph 5739. Identified issues are weeds and trespassing.

8.3 Progress Since the Last Five Year Review

Issues concerning the Community Soils OU remedy that were identified in the last five year review include lead, subsurface arsenic, the residential arsenic cleanup level, and attic dust. Significant progress was made in addressing these issues, as discussed below.

In 2006, at the request of the Agencies because of concerns about exposure to lead, Atlantic Richfield analyzed archived soil samples from Anaconda residential yards where weighted average concentrations were below 250 ppm arsenic. Atlantic Richfield selected 142 Anaconda yards (approximately 10% of the Anaconda yards evaluated in RA Phase 1) from which lead concentrations were determined in surface soils. The resulting data confirmed the presence of elevated surficial (0 to 2 inch) concentrations of lead in individual yard components. Atlantic Richfield provided the Agencies a lead data set and a memorandum titled *Analysis of Lead in Anaconda Community Soils (Schooff/Integral Consulting to Kay/Atlantic Richfield, (Atlantic Richfield 2007)*. Agency personnel evaluated the same lead data and drew the following conclusions in a report titled *Residential Soils Data Interpretation and Analysis Report; Community Soils Operable Unit, Anaconda Smelter NPL Site (CDM 2008)*:

- 95 of the 142 yards (67%) had area weighted average lead concentrations above 400 mg/kg.
- 125 of the 142 yards (88%) evaluated revealed surface soil lead concentrations in at least one yard component greater than 400 mg/kg.
- 33 of the 142 yards (23%) had surface soil lead concentrations in at least one yard component greater than 1,200 mg/kg.

In September and October of 2007, EPA conducted a subsurface soil characterization study. Sampling crews collected 221 subsurface soil samples from 107 residential yards in Anaconda under an EPA approved sampling and analysis plan (CDM 2007). For arsenic, the objective of the subsurface soil study focused on identifying residential properties that were previously tested and are not scheduled for further sampling or remediation, that can have elevated subsurface soil arsenic concentrations above 250 mg/kg. For lead, the objective was to quantify the lead concentrations in subsurface soils and evaluate any relationship between surface and subsurface soil levels, and between arsenic and lead in subsurface soils. The agency focused on building a new data set of subsurface soils from residential yards in which identified 1) the AWAA's for surface soils less than 250 mg/kg and 2) remediated properties with individual yard components with surface soil results less than 250 mg/kg. Data from this study were used to quantify the lead concentrations in subsurface soils and evaluate any relationship between surface and subsurface soil

levels, and between arsenic and lead in subsurface soils and are summarized in the Residential Soils Data Interpretation and Analysis Report (CDM 2008).

In 2007, Atlantic Richfield conducted a limited characterization of interior, exterior and attic dusts arsenic and lead concentrations in 52 homes in the Anaconda and Residential areas of concern. The dusts were collected from attics and interior and exterior floor surfaces. Houses were located in Anaconda (east and west of Main Street), Opportunity, and rural areas. Samples were also collected from “new” houses. The results of this study were provided in the Draft Final Community Soils Interior and Attic Dust Characterization Study Data Summary Report (DSR) (Pioneer 2008). EPA is currently conducting investigations to determine the appropriate action regarding contaminated attic dust in homes.

In 2006, the Agency for Toxic Substances and Disease Registry (ATSDR) received a request from an Anaconda resident to evaluate the cleanup level for arsenic in residential soil that had been determined in the 1998 ROD. In this health consultation, ATSDR evaluated the studies and decisions made to determine the cleanup level, responded to community questions about the decision made, and determined the public health impact of using the cleanup level in the community. On the basis of the available literature and evaluation, ATSDR made the following conclusions in their Public Comment Release titled Evaluation of Residential Soil Arsenic Action Level, Anaconda Co. Smelter NPL Site, Anaconda, Deer Lodge County, Montana and dated May 29, 2007 (ATSDR 2007):

- “ATSDR considers the exposure and bioavailability assumptions made in EPA’s 1996 Baseline Human Health Risk Assessment for Anaconda to be reasonable in estimating risk. However, ATSDR recognizes the potential for uncertainty in the bioavailability factors chosen for soil and dust in Anaconda.
- Chronic exposure to soil at the residential cleanup level of 250 milligrams of arsenic per kilogram of soil would not be expected to result in adverse health effects for resident children or adults. This conclusion would not change within anticipated uncertainties of bioavailability or other exposure assumptions from EPA’s 1996 Baseline Human Health Risk Assessment.
- Children who exhibit soil pica behavior could experience adverse health effects if they ingested gram quantities of soil containing arsenic. This conclusion would not change within anticipated uncertainties of bioavailability or other exposure assumptions from EPA’s 1996 Baseline Human Health Risk Assessment. Areas containing soil with arsenic at levels high enough to cause adverse health effects upon soil pica behavior could remain, even after cleanup.
- Changing conditions at the soil surface due to activities such as excavation could increase the risk and may require further evaluation.

ATSDR makes the following recommendations to prevent potentially harmful exposures:

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

Anaconda Deer Lodge County is developing a Community Protective Measures Program (CPMP) to inform and educate the public regarding risks to contaminated soils as well as provide a vehicle to continue to address concerns with contaminated materials.

8.4 Technical Assessment

Question A: Is The Remedy Functioning As Intended By The Decision Documents?

No. Although the remedies (yard and vacant lot removals) conducted under both the removal and remedial actions appear to be protective, it may not be functioning as designed. This remedial action results in the surface area weighted average arsenic concentration of a risk unit (residential yard) to be below 250 mg/kg. However, recent data indicate that arsenic greater than 250 mg/kg remain in the upper 18 inch soil profile in some areas. In the areas where remedial action is complete, the backfill areas appear to be functioning as designed (yards, driveways, etc.).

Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

Yes. For the 2010 Five-Year Review, EPA re-examined the assumptions used in the original human health risk assessment and also re-examined ARARs. Risk assessment efforts for the Site have been focused, since the early 1990s, on arsenic, cadmium, copper, lead and zinc. A re-examination of data for target analyte list metals indicates that none of the constituents are important contaminants from a human health perspective.

The residential exposure pathways used in the 1996 risk assessment remain valid. Changes in land use that require additional remediation are, and will continue to be, identified through the county’s IC program and mitigated or remediated as necessary. Further, no changes in toxicity criteria for arsenic have occurred since the 1996 risk assessment was developed. Thus, risk estimates for arsenic are still valid. Similarly, targets for blood lead levels for assessing lead risks for young children have not changed since 1996, and the evaluation of lead risks is still valid, with caveats discussed below.

Bioavailability studies of arsenic in soils and dust from Anaconda have not been repeated and are still the best information available to estimate bioavailability for the Site. More recent information on bioavailability of arsenic at other mining, milling and smelting sites have been reported and is consistent with the results from monkey studies.

The 1996 risk assessment indicated that lead exposures within Community Soils OU (and the ARWW&S OU) were acceptable. As previously indicated, EPA is currently re-examining the issue of lead risks within current residential areas of the site.

At this time, there are no changes to the ARARs for soils identified in the ROD that would affect protectiveness. The ATSDR confirmed that the 250 ppm action level set forth in the ROD should remain. EPA is currently evaluating additional sources of contamination (i.e., attic dust and yard lead levels) that may be contributing to overall exposure in the residential setting. These sources would be addressed by EPA under an amendment to the ROD. A further evaluation of the effectiveness of the remedy in reducing long-term exposure or exposure pathways via ICs is part of the Selected Remedy for the ARWWS OU.

Question C: Has Any Other Information Come to Light that Could Call Into Question the Protectiveness of the Remedy?

Yes. Concerns regarding the affect of attic dust and yard lead levels on the protectiveness of the remedy have been raised and EPA is evaluating these potential additional risks in an upcoming focused feasibility study and amendment to the Community Soils ROD.

8.5 Issues and Recommendations

Issues identified for the Community Soils OU that affect protectiveness are:

- the long-term effectiveness of the County's IC program to protect the remedy, and;
- the potential risks associated with exposure to contaminants remaining in residential settings, which includes lead in soils, arsenic at depth in soil, and arsenic and lead in interior dust.

It is anticipated that the IC program will be effective in protecting the remedy when it is finalized and fully implemented. EPA is currently conducting investigations into attic dust and lead as part of a focused feasibility study to determine if this contamination poses an unacceptable risk to residents. Results may be used in a future modification of the Community Soils OU remedy.

Although it does not affect the protectiveness of the remedy, the following issue was identified for the Community Soils OU during this five-year review:

- roads and parking lots that may have contaminated soil or waste beneath them.

Currently, the source/receptor pathway is incomplete because existing caps function as effective barriers. The IC program administered by ADLC is expected to address these waste and contaminated soil if and when it is encountered.

8.6 Protectiveness Statement

A protectiveness statement for the Community Soils OU is deferred because more information is needed to make a protectiveness determination. The remedial action completed to date has addressed the surficial arsenic in residential soils. Interim controls include ADLC's Community Protective Measures Program to communicate risk/protectiveness information related to remaining contaminants to residents. However, there is concern that the remaining contaminants especially lead, may pose an unacceptable risk. It is recommended that additional action be taken to determine if these remaining soil and dust contaminants pose an unacceptable risk to residents and to determine if additional remedial action is necessary. It is expected that this action will be completed next year, at which time a protectiveness determination will be made. Additionally, for the remedy to be protective in the long-term, final ICs must be completed.

Section 9 Anaconda Regional Water, Waste & Soil OU4

9.1 Selected Remedy

The final remedial actions at the Anaconda Smelter NPL Site are being completed under the ARWW&S OU. These actions address all remaining contamination and impacts to surface and ground water, waste source areas (e.g., slag and tailings) and non-residential soils not remediated under prior response actions, including those under the OW/EADA. The ARWW&S OU will also bring closure to all previous OUs and removal actions.

The Selected Remedy for the ARWW&S OU is described below; the 1998 ROD components are listed in plain text and proposed changes to the ROD are included in italics.

Ground Water

- For alluvial aquifers underlying portions of the Old Works and South Opportunity Subareas, clean up to applicable State of Montana water quality standards through the use of soil covers and removal of sources (surface water) to ground water contamination and natural attenuation. *EPA and DEQ have determined that the South Opportunity and North Opportunity surface water/ground water areas of concern to be technical impracticable to remediate to the 10 µg/L standard within a reasonable period of time.*
- For the bedrock aquifers and a portion of the alluvial aquifer in the Old Works/Stucky Ridge and Smelter Hill Subareas, waive the applicable ground water standard. The aquifers underlying these subareas are impractical to clean up through reclamation, soil cover, or removal of the sources (wastes, soils, and tailings) of the ground water contamination. Reclamation of soils and waste source areas with revegetation is required, which will contribute to minimizing arsenic movement into the aquifers. *Two bedrock aquifer TI zones have been re-delineated (Stucky Ridge and Mount Haggin) and merged into a single TI zone. The merger of the TI zones is based primarily on the lowering of the arsenic performance standard and additional data collection/analyses.*
- For portions of the valley alluvial aquifers underneath the Old Works/Stucky Ridge, Smelter Hill, and Opportunity Ponds Subareas where ground water is underlying waste-left-in-place, point-of-compliance (POC) monitoring to ensure contamination is contained at the perimeter boundary of the designated WMA. Should POC monitoring show a spread of contaminants beyond the boundary of a WMA, institute treatment options for the ground water where practicable. *Revisions to the WMA boundaries require new POCs. The Smelter Hill and Opportunity Ponds WMAs have been merged, negating the need for POCs at the toe of the Anaconda Ponds. A ground water/surface water management system being constructed at the toe of*

the Opportunity Ponds to passively treat ground water requires new POCs beyond the system. New POCs are also established for the Old Works WMA based on additional data collection/analyses.

Surface Water

- Reclamation of contaminated soils and engineered storm water management options to control overland runoff into surface waters.
- Selective source removal and stream bank stabilization to minimize transport of COCs from fluvially deposited tailings into surface waters. Removed material will be placed within a designated WMA.
- *Waiving the arsenic human health standard for all surface waters within the TI zones.*

Soils and Waste Materials

- Reduction of surficial arsenic concentrations to below the designated action levels of 250 ppm, 500 ppm, and 1,000 ppm through a combination of soil cover or in-situ treatment.
- Reclamation of the soils and waste area contamination by establishing vegetation capable of minimizing transport of COCs to ground water and windborne and surface water erosion of the contaminated soils and waste areas. This vegetation will also provide habitat consistent with surrounding and designated land uses.
- Partial removal of waste materials followed by soil cover and revegetation for areas adjacent to streams. Removed material will be placed within designated WMAs.

Institutional Controls and Operations and Maintenance

- The remedy will employ ICs and long-term operations and maintenance (O&M) for the OU to ensure monitoring and repair of implemented actions. These actions will be coordinated through development of an ICs Plan and O&M Plan and will allow for communication with local government and private citizens. The plans will function as a tracking system for the agencies and describe and plan for potential future land use changes.
- The remedy calls for a fully-funded ICs program at the local government level. It is anticipated that ADLC will be responsible for on-going oversight of O&M in the OW/EADA OU due to its Prospective Purchaser Agreement with the Agencies, implementation of a county-wide DPS, and provision of public information and outreach through a Community Protective Measures program.
- In addition, the remedy will bring closure to previous response actions within the site that are already implemented, such as the Flue Dust remedy or the Old Works remedy, primarily through long term O&M for some or all of those actions which are integrated into this remedy.

Remedial Design/Remedial Action Management

The ARWW&S OU encompasses a very large area and remedial action was slated for approximately 20,000 acres in the ROD. The size of the OU and the focus on land reclamation as the key remedy required management tools during remedial design and remedial action activities to help direct, prioritize, and sequence response actions and allow for changing community interests. As envisioned in the ROD, management of the OU can be accomplished with the following elements:

- Site Management Plan (SMP) - The SMP will provide a framework for future Remedial Design/Remedial Action (RD/RA) activities and will incorporate remedial unit designations and sequencing criteria for the RD/RA actions.
- Historic Preservation and Mitigation Plan - Final implementation of the Regional Historic Preservation Programmatic Agreement will be accomplished. Separate agreements to address tribal cultural resources will be included.
- Wetlands Mitigation - Assessment and mitigation of impacts to wetlands from implementation of the remedy and communications with U.S. Fish and Wildlife Service will be coordinated.

The Selected Remedy would achieve reduction of risk to human health and the environment through the following:

- Preventing human ingestion of, inhalation of dust from, or direct contact with, contaminated soil and/or waste media where such ingestion or contact would pose an unacceptable health risk for the designated land use.
- Stabilization of contaminated soil and waste material against wind and surface erosion.
- Minimizing transport of contaminants to ground water and surface water receptors.

9.2 Remedial Action Implementation

Substantial progress has been made in implementing the Selected Remedy for the ARWW&S OU since the last Five-Year Review was performed. Figure ES-1 shows the areas slated for remedial action (i.e., remedial design areas) and those areas where the remedial action has been implemented throughout the Site.

Because of the size of the ARWW&S OU, the OU has been subdivided into 16 remedial design units (RDUs). Additionally, ground water and surface water issues have been addressed separately, since these resources cross RDU boundaries. A summary of the status of site work completed for each RDU is provided below.

9.2.1 RDU 1 - Stucky Ridge Uplands

9.2.1.1 Construction Status

Due to the large size of this RDU (approximately 1,870 acres), RDU 1 Stucky Ridge Uplands was divided into four areas based primarily on topography, remedial action acreage, and drainage configuration to more effectively implement and manage the remedial action. Remedial action components have been implemented for portions of this RDU and construction is on-going based on the final RAWPs. This work includes in-situ soil reclamation and revegetation. Land reclamation work on Stucky Ridge was initiated in the 1990s at the Tillage Demonstration Plots and has since been conducted at the 1994-1996 Reclamation Areas, and the 2002/03 Moto Cross Demonstration (East End) Reclamation Areas. Remedial action work implemented within this RDU since the last five-year review consists of land reclamation work in:

- Stucky Ridge RFC 3 – 2005/06 Reclaimed Areas, and;
- Stucky Ridge RFC 4 – 2007 Engineered Controls Punchlist Areas.

Figure 9-1 shows the remedial design areas and where the remedial action has been implemented to date for the Stucky Ridge RDU. Beginning in 2010, the State of Montana Natural Resource Damage Program (NRDP) is implementing land reclamation and restoration for a portion of State-owned property within this RDU.

9.2.1.2 Operations and Maintenance Status

Remediated areas in RDU 1 Stucky Ridge are being monitored under the VMP. Storm water engineered controls are inspected and maintained under the Engineered Controls Inspection and Maintenance Plan.

9.2.1.3 Data Review and Evaluation

EPA receives annual M&M reports from Atlantic Richfield that cover the reclaimed areas within the ARWW&S OU. Monitoring is performed to evaluate vegetation development and identify areas requiring maintenance. The monitoring data and other information provided in the M&M report are useful in ascertaining vegetation trends, erosional stability, potential risks, and the protectiveness of the reclamation component of the remedy. The latest report (Atlantic Richfield 2010) contains results for the years since the last five-year review (i.e., from 2005 through 2009).

Areas reclaimed within RDU 1 - Stucky Ridge Uplands up through 2009 are delineated on Figure 9-1. Table 9-1 provides a summary of data from Atlantic Richfield's report related to the key performance evaluation parameters within this RDU.

Currently, there are nine separate remedial action areas within RDU 1 being evaluated by Atlantic Richfield. For Upland sites, the data summarized in Table 9-1 are the 2009 results for sites having at least three growing seasons. Experience has shown that by the third growing season, conditions in the plant community provide a good indicator of whether the site is trending toward meeting the performance standards. In 2009, Atlantic Richfield evaluated Upland sites either qualitatively, in

which case they provided a percent vegetation cover, or quantitatively by using the LRES scoring methodology described in the VMP. Vegetation cover of >30% or an LRES score of ≥ 115 LRES points is generally indicative of a site that is progressing toward meeting the performance standards.

In 2009, Atlantic Richfield evaluated some Steep Slope sites using the modified BLM scoring tool described in the VMP. Table 9-1 shows the range of BLM erosion scores for the areas evaluated in 2009. A score of ≤ 45 points is indicative of a site that is trending toward meeting the performance standards.

Remedial action areas within RDU 1 are discussed below for the Upland, Steep Slope, and Recently Remediated areas.

Upland Areas

The data summarized in Table 9-1 along with the site narrative provided in the 2010 M&M report indicate that the reclaimed Upland sites are, in general, on a trajectory to eventually meet the performance standards and therefore the long-term remedial action goals; however, some significant concerns were noted in the M&M report. In 2009, vegetation cover generally ranged from approximately 30 to nearly 60%, although areas within the 2002/03 Moto Cross Demonstration had cover as low as 10%, according to the narrative in the Atlantic Richfield report. The Upland reclaimed areas were generally stable with little or no erosion, although there was evidence of a minor amount of soil movement and some rills in a portion of the 2002/03 Moto Cross Demonstration area. Weeds were infrequently observed and scattered, according to Atlantic Richfield. The M&M report stated that older gullies were still present but appeared to be mostly inactive and partially revegetated. Noted issues were the need to assess and maintain check dams and erosion fences in a portion of the 2002/03 Moto Cross Demonstration area and the need to continue the active weed management program. According to the quantitative evaluations conducted by Atlantic Richfield, the Upland areas that scored greater than 115 LRES points, and would therefore meet the performance standard, are:

- Tillage Demonstration Areas 1 and 2
- 2002/03 Moto Cross Demonstration Evaluation Areas 1 and 2
- 1994-96 Remedial Action Area 2

Steep Slope Areas

The two Steep Slope areas evaluated quantitatively in 2009 had BLM scores of 35 and 40 points (Table 9-1). Although these areas, by definition, meet the performance standard of ≤ 45 points, Atlantic Richfield noted some significant issues.

The most substantial erosion issues were noted for the RFC 3 – 2005/06 Reclaimed Areas. The primary remediation components implemented in these areas were slope roughening, regrading, dozer basins, contour V-ditches, and rock and log grade

control structures. Trees and shrubs were planted and the areas were reseeded. After four growing seasons, remediation success at this site is limited (Atlantic Richfield 2010). Some grass is established but overall the vegetation cover is sparse. There are sediment deposits in the dozer basins and collection ditches, and some of the dozer basins have been breached. Atlantic Richfield indicated that the RFC 3 – 2005/06 Reclaimed Areas would be evaluated for supplemental maintenance. The other Steep Slope area where issues were noted was in the 2002/03 Moto Cross Demonstration Area. In one area, dozer basins had been breached and there were a few rills, but these were small and infrequent.

Recently Remediated Areas

In 2007, Atlantic Richfield completed work in the 41 acres of the 2007 Engineered Controls Punchlist Areas under RFC 4. In 2008, a general assessment was made regarding seedling establishment and erosion status. Very few seedlings were noted in any of the evaluation areas so Atlantic Richfield reseeded areas in the fall of 2008. In 2009, qualitative assessments were made of seedling establishment, weed abundance, and erosion.

Data from the five areas evaluated in 2009 indicate very limited success in the establishment of the seeded perennial plant species. Seedling densities were low and some weeds, particularly Kochia, were abundant and may have contributed to the poor seedling growth. Some erosion was also noted. Atlantic Richfield indicated that adequate plant establishment may occur in some areas in 2 to 3 years, but other areas will require re-disking and re-seeding (Atlantic Richfield 2010).

9.2.1.4 Results of Site Inspections

On June 16 and 22, 2010, EPA conducted site inspections of remedial action areas within RDU 1. This inspection confirmed the monitoring data reported by Atlantic Richfield. In general, the Upland reclaimed areas had well established perennial vegetation, were erosionally stable, and had limited weed growth. Photograph 5864 shows the abundant Great Basin wildrye growing in the Tillage Demonstration plots. Despite the fact that Upland portions of the 2002/03 Moto Cross Demonstration Areas met the performance standard (scoring >115 LRES points) large areas were frequently encountered that were by definition barren (having less than 10% perennial plant cover). Many of the perennial plants in these areas were a light yellow in color indicating that they were under considerable stress, despite the wet soil conditions. Photograph 5813 shows an example of a barren area with discoloured sheep fescue plants. An in-field test indicated that the soil pH was near neutral. It is recommended that soil samples be collected and submitted for metal, pH, and fertility analyses.

The site inspection confirmed that there was erosion and breached dozer basins in the steep slope areas, especially in the 2005/06 Reclaimed Areas. Additionally, some shrub and tree seedlings planted directly into the surface soils of were still alive but had not grown at all in the four years since they were planted. A few of these plants were exhumed and it was found that their roots had not grown out into the surrounding soil; the roots were all contained within the soil brought in with the

tubelings. In contrast, some tubelings planted in the subsoil within the dozer basins had put on additional growth since they were planted and appeared relatively healthy.

In summary, the site inspections indicated that there may not be complete pH or metals control in remedial action areas within RDU 1, despite the fact that vegetation is generally well established and may be meeting the performance standard, as reported by Atlantic Richfield.

9.2.2 RDU 2 - Lost Creek Uplands

Due to the large size of this RDU (approximately 1,480 acres) it was divided into three (3) areas based on, but not limited to, topography, remedial action acreage, and drainages to more effectively implement and manage the remedial action. Because of the similarities in contaminant conditions and landscape setting, remedy components for the Lost Creek Uplands (Atlantic Richfield 2005) are the same as those identified above for the Stucky Ridge Uplands.

9.2.2.1 Construction Status

Implementation of land reclamation work has not been started in this RDU, however, ground and surface water are being monitored and ICs are being utilized to limit potential exposures to contaminants.

9.2.2.2 Data Review and Evaluation

No data were reviewed for this RDU.

9.2.2.3 Results of Site Inspections

No site inspections were conducted for this RDU.

9.2.3 RDU 3 - Smelter Hill Uplands

Based primarily on land ownership, this large RDU (approximately 3,348 acres) was divided into three (3) areas (Atlantic Richfield 2005). This upland RDU has similar contaminant characteristics and landforms to the RDUs discussed thus far so the remedy components are similar: monitoring-well vegetated, steep slope reclamation, and tillage with seeding.

9.2.3.1 Construction Status

Land reclamation has been implemented in several small polygons within this RDU (Figure 9-3) as part of work for adjacent RDUs. For Nazer Gulch, this work was documented in the Nazer Gulch Debris Removal CCR (Atlantic Richfield 2002) and included removal of debris from Nazer Gulch, disposal of that material in RDU 4 (Atlantic Richfield Land Management Area WMA), reclamation of the Nazer Gulch removal area, creation of an engineered channel for proper drainage, vegetation improvement, and steep slope reclamation. That work was completed in November 2001.

The Aspen Hills Railroad Loop Track project was implemented in the summer of 2003 and spring of 2004 and covered approximately 167 acres of several different upland areas and a portion of the former railroad grade (a portion of this project area lies within RDU 14 while the remainder is within RDU 3). The remedial action work involved completing remediation of the loop track using coversoil capping (18"), remediation of the adjacent upland areas through in-situ soil treatment (i.e., tillage and lime addition), and planting of trees and shrubs on steep slopes. Engineered controls were implemented to convey surface water drainage to the Smelter Hill drainage system.

9.2.3.2 Operations and Maintenance Status

Ground and surface water have been monitored under the Short-Term Ground Water Monitoring Plan and ICs are being utilized to restrict access and thereby limit potential exposures to contaminants. Annual monitoring reports have been prepared and maintenance (weed spraying and erosion control BMPs) is ongoing. Monitoring data for the Nazer Gulch and Aspen Hills areas are discussed below.

9.2.3.3 Data Review and Evaluation

Nazer Gulch

The M&M report indicated that there was no major differences in vegetation conditions in Nazer Gulch over the past three years (Atlantic Richfield 2010). According to Atlantic Richfield, many of the trees and shrubs that were planted have become very well established. In some places the planted pine trees have developed into saplings and added 6- 12 inches of terminal growth over the past four years. Weed control efforts in 2007 greatly reduced the amount of spotted knapweed, which is a major ongoing problem in this area. The Nazer Gulch sites are mostly stable and the dozer basins are functioning as intended, according to the Atlantic Richfield's report. In a few instances the dozer basins have been breached and the report recommended immediate repair.

Based on data from the M&M report, the vegetation in Nazer Gulch is generally well established although there are sparse areas in specific locales. In 2009, the Upland areas scored 122, 125, and 148 LRES points and the Steep Slope areas had BLM erosion scores of 16 and 45 points BLM (Table 9-1). The data indicate that these areas meet, or are close to meeting, performance standards. Atlantic Richfield acknowledged in the M&M report that the revegetation efforts in some locations is struggling and has not yet met the performance criteria. Indeed, the area scoring 45 erosion points indicates that soil stability problems exist. Weeds are an especially difficult problem and constant monitoring and spraying is required in Nazer Gulch. The low cover by the seeded species and the high density of weeds are both symptomatic of the igneous soil parent material, which makes a poor growth medium.

Aspen Hills

The Aspen Hills remedial action areas consist of three separate evaluation areas. Evaluation Area 1 includes the areas within the WMA; these primarily received 18" cover soil. Evaluation Area 2 includes areas outside the WMA and primarily includes

the 12" tillage areas. Evaluation Area 3 is the small steep slope area located along the west side of the Upper Railroad grade. The following is a general summary of the monitoring conducted in these areas and is taken from the latest M&M report (Atlantic Richfield 2010).

The WMA has developed good stands of perennial species; cover ranged from approximately 20 to 30% in 2009 (Table 9-1). Some small, infrequent bare areas occur on the steep east-facing slope and rills were present, but these were inactive. These site is generally stable. The qualitative evaluation showed that this area would not pass the remedial action criteria of 30% vegetation cover for WMAs. The M&M report recommended this area for possible supplemental activities to improve perennial vegetation cover.

The Upland tillage areas have excellent vegetation cover (30 to 39%). Weeds were not common but continued control was recommended in the M&M report. There were no gullies observed; however, there were a few rills and some deposition from sediment washing down from adjacent slopes in the eastern part of the area. The quantitative evaluation in 2009 indicated an LRES score of 147 points, well in excess of the performance standard of 115 points.

The Steep Slope area that was re-worked in 2006 and fertilized early in 2007. The area has had three full growing seasons (2007, 2008, and 2009) before the 2009 evaluation. Vegetation on the slopes has continued to develop and, according to the M&M report, the potential for erosion has been greatly reduced. Rills and sheet wash erosion are still relatively common on the slope and gullies are present, but most were inactive. Water diversion ditches and terraces were installed on the slope and have functioned to collect sediment. In 2009, this area scored 36 BLM points, suggesting that the site is not as stable as desired. Monitoring is ongoing.

9.2.3.4 Results of Site Inspections

The site inspection of Nazer Gulch held on in June 7, 2010 confirmed the data provided in the M&M report. The area was, in general, well vegetated. There were some weeds, but there was evidence that control is actively being conducted. A minor amount of localized erosion was evident, but erosion control BMP structures such toe-slope ditches, rock channels, and gabion walls were intact and functioning. Photograph 5722 shows good vegetation cover, some open ground, and a gabion rock wall.

9.2.4 RDU 4 - Anaconda Ponds WMA

This RDU consists of the two large cells of the Anaconda tailings ponds that contain approximately 97 million cubic yards of material covering approximately 480 acres. Originally, these tailings ponds were part of what was called the Smelter Hill WMA. Since the ARWW&S OU ROD, the WMAs have been redefined and these historic tailings ponds currently constitute the Anaconda Ponds WMA.

9.2.4.1 Construction Status

Remedial action for this RDU has been completed and is documented in the construction completion report (Atlantic Richfield 2003).

9.2.4.2 Operations and Maintenance Status

Since the last five-year review, M&M activities have occurred for both the Surface Cells and Dike Faces. In addition to the annual M&M report, Atlantic Richfield submitted a compliance determination request for the Surface Cells during this review period (Atlantic Richfield 2009). That document was reviewed by EPA and then verification data were collected during a compliance inspection conducted in October 2009. The compliance request and the inspection by EPA only covered the Surface Cells of the ponds and not the Dike Faces.

Since the last review, the Surface Cells were fertilized; this occurred in 2006. In late 2005 and early 2006, portions of the East- and North-facing dikes were repaired by adding coversoil. These were areas that still had the original soil cover that had been placed more than 20 years previous to that work.

9.2.4.3 Data Review and Evaluation

The data discussed in this section were obtained from the annual M&M report and from the EPA compliance evaluation and five-year review site inspections. Table 9-1 provides a summary of the monitoring results and an assessment of performance and protectiveness. To date, all of the Surface Cells and the Dike Faces have had the remedial action implemented (Figure 9-4).

Surface Cells

The surface of the ponds was divided into 13 evaluation areas by Atlantic Richfield. The vegetation is very uniform throughout most of the area. The M&M data indicate that in 2009 vegetation cover was greater than the performance standard of 30% in all areas (Table 9-1). It should be noted that in 2008 cover in one area was measured at 26%, but conditions had improve by the 2009 growing season. The cover and biomass comes primarily from intermediate wheatgrass, smooth brome, big bluegrass, and Great Basin wildrye. Some cover variations exist, but there are no large bare areas. Only a few noxious weeds occur, primary along the western edge of the area where there is a tendency for seeds to blow in from adjacent areas. Ongoing weed control efforts have been successful. Collectively, all noxious weeds and undesirable weedy species account for <1% of the total vegetation cover. The surface of the ponds is essentially flat and the only source of water is precipitation. The combination of flat topography and well-developed vegetation result in essentially no erosion problems on the ponds. The erosion evaluation scores were determined to be "0" (Stable - no erosion) in all areas (Atlantic Richfield 2010). It is possible that some minor erosion may be occurring on localized sites, but no areas would exceed a score of 45 which is the passing score for acceptable erosion conditions in WMAs.

EPA conducted a compliance inspection in October 2009 and found that all areas, including the low cover area identified in the M&M report, had vegetation cover

greater than 30%. CDM's compliance determination report to EPA (CDM 2010) stated that:

The pre-compliance verification indicated that the subject remediated areas meet the WMA performance standards established in the ARWW&S OU vegetation management plan. The Final Inspection Summary Sheet/Application Forms provided in Atlantic Richfield's compliance request report indicate that long term monitoring and maintenance will be conducted by the property owner (ADLC or AR) and that the land management plans are to be attached to the compliance request. However, no long-term O&M (land management) plans were attached or otherwise provided to the Agency for review. Therefore, a final compliance determination cannot be made at this time.

In short, Atlantic Richfield provided all the necessary documentation in their compliance request for the Surface Cells of the Anaconda tailings pond and achievement of performance standards were verified by CDM; however, until a land management plan is approved by EPA, these areas cannot move into long-term O&M.

Dike Faces

The Dike Faces were reclaimed as much as 30 years ago. As mentioned, portions of the dikes have received additional coversoil and repairs. Atlantic Richfield currently evaluates site conditions in eight evaluation areas for the repaired dikes and four evaluation areas for the previously reclaimed dikes (Atlantic Richfield 2010).

The vegetation on the dikes is well-established in all of the older reclaimed areas. Most of the Dike Faces had perennial vegetation cover in the 30 to 40% range and area had cover as high as 78%. One area, however, had vegetation cover ranging from 20 to 29%, indicating the seeded plants species were struggling in portions of this area. Atlantic Richfield reported that few weeds occur throughout the area (Atlantic Richfield 2010). The most troublesome weed species is white top. Past control efforts appear to be effective and only a few small patches remain, according to Atlantic Richfield.

The M&M report indicates that Atlantic Richfield will request a compliance determination within the next five-year review period for areas it believes meet the performance standards. The evaluations conducted in 2009 constitute the first year of compliance determination for the dikes reclaimed areas. Atlantic Richfield stated in the M&M report that since some of the repair work areas on the dikes are very small, the intent is to combine them with adjacent areas for the purposes of compliance determination. This is feasible because the vegetation is similar and the small repaired areas meet the erosion criteria. In 2010, the second year of data for the compliance determination will be collected. The Dike Face areas that Atlantic Richfield believes meet the performance standard criteria include:

- Repaired Areas 1, 2 and 3 on the South-Facing Dike
- Previously Reclaimed South-Facing Dike
- Repaired Area 4 – South- and East-Facing Dikes

- Repaired Area 12 – East-Facing Dike
- Repaired Areas 5 and 6 - East -and North-Facing Dikes
- Repaired East End of the North-Facing Dike (Including Repaired Area 8)
- Previously Reclaimed West End – North-Facing Dike (Including Repaired Areas 9 and 10)

Results of EPA’s compliance evaluation for the Dike Faces will be provided in the next five-year review.

9.2.4.4 Results of Site Inspections

The 2009 compliance determination was used as the site inspection for the Surface Cells of the Anaconda tailings pond. That determination verified that site conditions in the Surface Cells meet the performance standards for WMAs. Photograph 5758 shows a typical view of the well vegetated surface of the ponds. EPA inspected the Dike Faces on June 7, 2010. That inspection verified that the Dike Faces have good vegetation cover, little soil movement on these steep slopes, and weeds are being effectively controlled. Photograph 5743 shows a typical view of the Dike Faces. All areas are close to or surpass the vegetation cover performance standard of $\leq 30\%$ for WMAs.

9.2.5 RDU 5 - Active Railroad/Blue Lagoon

The RDU 5 Active Railroad/Blue Lagoons boundary is located within the right-of-way and in certain locations adjacent to the Butte, Anaconda and Pacific Railroad line extending from the east end of the East Anaconda Yards to the Fairmont Road (Figure 9-5). The railroad line includes stream crossings on Mill Creek and Willow Creek and a portion of the Yellow Ditch on both sides of the Blue Lagoon. The remainder of the Yellow Ditch will be addressed, as necessary, under the RDU 9 Fluvial Tailings. This portion of RDU 5 is generally characterized by contaminated wastes/soils associated with the railroad grade, contaminated sediments on the floors of Blue Lagoon and Son of Blue Lagoon, interaction of contaminated materials with both surface water and ground water, and contaminated material in an outwash area located directly downgradient of the Blue Lagoon. The Mill Creek Flood Irrigation Area is characterized by an irrigation pond held back by the active railroad grade embankment.

The Selected Remedy for active railroad beds east of Anaconda are described in detail in the *Active Railroads/Blue Lagoon RAWP/FDR* (Atlantic Richfield 2003). Design elements include:

- Consolidating and disposing of waste materials such as those found at the Blue Lagoon, Son of Blue Lagoon, Mill Creek Flood Irrigation, and Willow Creek Trestle areas, and miscellaneous waste piles;
- Applications of coversoil and seeding;

- In-situ soil treatment and seeding;
- Preparing a storm water runoff control plan and implementing its components;
- Removal of waste and reconstruction of irrigation ditches to improve surface water quality;
- Removal of source material to allow the natural attenuation of ground water contamination;
- Conducting monitoring and maintenance to determine the effectiveness of the remedy (including natural attenuation of ground water contamination) and to properly manage the site in the future; and
- Mitigating the loss of wetlands from the remedial action work through the Anaconda Smelter sitewide wetlands mitigation process approved by the Agencies.

9.2.5.1 Construction Status

Remedy implementation has not been started in this RDU, but will occur in the next five-year review period.

9.2.5.2 Data Review and Evaluation

No data were reviewed for this RDU.

9.2.5.3 Results of Site Inspections

No site inspections were conducted for this RDU.

9.2.6 RDU 6 - South Opportunity Uplands

In contrast to other upland RDUs discussed, the South Opportunity Uplands is relatively level and as such does not have steep slope areas where substantial storm water BMPs and/or storm water engineered controls are required. Sediment and erosion control will be accomplished primarily through the establishment of vegetation using land reclamation practices. Therefore, storm water BMPs are being employed in this RDU on a limited basis. Due to the close proximity of this RDU to the historic Anaconda tailings ponds, the land surface in certain areas has been more contaminated than other upland RDUs. The FDR/RAWP (Atlantic Richfield 2006) identifies the following remedial action elements for this area:

- Stripping of highly contaminated soil (estimated at 93 acres) and placement of that material within a WMA;
- Removal of the railroad grade and placement of that material within a WMA;
- Placement of a soil cover and seeding in specific areas;

- In-situ soil treatment (approximately 583 acres) and seeding;
- Limited use of engineered storm water controls BMPs;
- Long-term ground water monitoring program of alluvial aquifer performance wells (PWs) and POC monitoring wells, bedrock aquifer PWs, and domestic wells consistent with the long-term Ground Water Monitoring Plan (GWMP);
- Monitoring and maintenance, and;
- ICs consistent with the Final Institutional Controls Management Plan (ICMP) (Atlantic Richfield 2005) until the final ICs plan is approved.

9.2.6.1 Construction Status

A portion of the Selected Remedy for this RDU has been implemented and is documented in the 2010 CCR (Atlantic Richfield 2010); reclaimed areas and the remaining tillage and seeding areas are shown on Figure 9-6. The actions taken to date within this RDU, like those taken for RDU 8 (Opportunity Tailings Pond), were expedited to control fugitive dust. Construction in the Mill Creek Road area commenced in April 2008 and was substantially completed by November 2008. Removal of the railroad grade adjacent to the rail spur into the Opportunity Ponds was performed in June and July 2009 in conjunction with the NorthWestern Energy gas turbine expansion project near the adjacent electrical substation. Land reclamation work has included soil stripping and disposal, in-situ soil treatment, and coversoil capping. Approximately 195 acres have been addressed to date.

9.2.6.2 Operations and Maintenance Status

Vegetation monitoring in this area began in 2009 but since that was the first growing season no data was reported in the M&M report (Atlantic Richfield 2010).

9.2.6.3 Data Review and Evaluation

No data were available for review for this RDU.

9.2.6.4 Results of Site Inspections

An O&F evaluation was conducted by EPA for this RDU on June 11, 2010 and indicated abundant perennial vegetation growth in the areas where contaminated surface soil was stripped off and seeded compared to areas reclaimed using the in-situ technique. Photograph 5775 shows the stripped area with abundant perennial plant growth and Photograph 5777 shows the in-situ treated area with virtually no plant growth. All areas were deemed functional except the in-situ treated plots where lime was not incorporated into the soil. In a June 24, 2010 discussion with the Atlantic Richfield project manager he stated that the in-situ areas would undergo additional testing this year and that the areas may require stripping and/or an application of lime to control soil pH before being reseeded.

9.2.7 RDU 7- North Opportunity Uplands

The RDU 7 North Opportunity Uplands FDR/RAWP (Atlantic Richfield 2006) identified the following remedial action elements for this area:

- Stripping soil exceeding the arsenic action level and placement of that material within a WMA;
- Placement of a soil cover and seeding in specific areas;
- In-situ soil treatment and seeding;
- Limited use of engineered storm water controls BMPs;
- Long-term ground water monitoring program of alluvial aquifer performance wells, POC monitoring wells, bedrock aquifer monitoring wells, and domestic wells consistent with the long-term Ground Water Monitoring Plan (GWMP);
- Monitoring and maintenance, and;
- ICs consistent with the Final Institutional Controls Management Plan (ICMP) (Atlantic Richfield 2005) until the final ICs plan is approved.

9.2.7.1 Construction Status

The Selected Remedy was been implemented in a substantial portion of this RDU during the 2009 construction season and most of the remaining land reclamation work is expected to be completed in 2010. Sediment and erosion control will be accomplished primarily through the establishment of vegetation using land reclamation tillage and seeding practices in the upland area; however, storm water BMPs associated with Warm Springs Creek are required. Reclaimed areas and the remaining tillage and seeding areas are shown on Figure 9-7. The actions taken to date within this RDU are being expedited because of past fugitive dust problems and because of the highly contaminated nature of the soils in this area.

9.2.7.2 Operations and Maintenance Status

Some seeding was accomplished in 2009. EPA plans to conduct an inspection of those areas in the latter part of the 2010 growing season and conduct an O&F evaluation for the entire RDU in 2011

9.2.7.3 Data Review and Evaluation

No data were available for review for this RDU.

9.2.7.4 Results of Site Inspections

A site inspection was not conducted for this RDU since work only started in 2009 and will be ongoing through the 2010 construction season.

9.2.8 RDU 8 - Opportunity Ponds WMA

This RDU includes the Opportunity Ponds WMA, borrow areas surrounding the WMA, miscellaneous wastes consolidated into the WMA (e.g., toe wastes), and Impacted Soils areas. The general layout of the RDU is shown in Figure 9-8. In total, the Opportunity Ponds RDU contain approximately 130 million cubic yards of tailings, covering approximately 3,000 acres and having a total thickness ranging from 5 to 50 feet. The Opportunity Ponds includes a series of cells designated as A, B, C and D, and the Triangle Waste Area (TWA), which is located immediately west of the A-Cells and covers an additional 531 acres.

9.2.8.1 Construction Status

Construction activities associated with the Triangle Waste Area and North Waste Left In Place (WLIP) remedial actions began in June 2002 and were completed May 29, 2004. Construction began for the A-Cells in April 2003 and was completed on October 24, 2005.

In January 2006, Atlantic Richfield completed a comprehensive RAWP/FDR for the final phase of remedial action work within this RDU (Atlantic Richfield 2006). To date, the work described in that FDR has been nearly completely and EPA anticipates receiving construction completion reports in the near future. The FDR presented a succinct and precise description of the remedial action work for the following remedy components:

- Waste/Impacted Soil Stripping and Consolidation;
- WMA Closure, consisting of;
 - Engineered Covers; and
 - In-Situ Treatment.
- On-Site Borrow and Borrow Reclamation (outside of superfund);
- Interior Storm Water Runoff Controls;
- Exterior Storm Water Runoff Controls;
- Ground Water and Surface Water Management System;
- Wetlands Creation, Enhancement, and Mitigation;
- Surface Water;
- Historical Features Preservation;
- Uplands Revegetation (LRES Impacted Soils Areas);
- Stability;
- Future Land Use;
- M&M; and
- ICs.

Controlling fugitive dust was recognized as an important activity during the preparation of the final RAWP/FDR in 2005. Because of this, a dust management plan for Opportunity Ponds RA constructions was developed (Atlantic Richfield 2007). Key components of this plan include construction BMPs, temporary polymer surfactant cover, and ongoing ambient air monitoring.

9.2.8.2 Operations and Maintenance Status

As several components of the vegetative covers have been constructed for several years, these areas are included in the annual vegetation monitoring evaluations. Other components of the remedy are still under construction. EPA will require a long-term land management plan for this area following the completion of construction, operation and functional evaluations/compliance, and shakedown of the ground water/surface water management system.

9.2.8.3 Data Review and Evaluation

The data discussed in this section were obtained from the annual M&M reports (Atlantic Richfield 2010), from EPA compliance evaluations, from quarterly ambient air monitoring reports, and from the 2010 Five-Year Review site inspections. Several remedial components, including the Ground Water/Surface Water Management System, have only recently been or are currently being constructed, so monitoring data are not yet available. The post reclamation areas currently being evaluated by Atlantic Richfield are:

- Highway Evaluation Area 1
- South Uplands
- North Uplands
- Dike Faces
- Surface Cells A1-9
- Surface Cells – South of A Cells, Evaluation Areas 1-4
- Surface Cells – B Cells
- Surface Cells – C Cells
- Triangle Waste Evaluation Areas 1-4

Table 9-1 shows the 2009 results for sites having at least three growing seasons. Experience has shown that by the third growing season conditions in the re-establishing plant communities are becoming more stable and can provide a good indication of whether the site is trending toward meeting the performance standards. Table 9-1 identifies the types of site (either Upland or WMA) and provides the percent vegetation cover or the LRES, whichever data was collected. The table also summarizes the soil stability (i.e., existing and potential for erosion), weeds, barren areas, performance, and protectiveness.

Opportunity Ponds Highway Evaluation Area 1

This area is located along the north side of Highway 1 between the Gun Club Road and the Railroad, a distance of approximately one mile. It was reclaimed by adding manure and tilling to less than 12 inches; no lime was added. Prior to reclamation there were hummocks of tailings that had accumulated around some of the shrubs. These tailings were mixed with the soil during tilling. Following the 2007 evaluation, the area between Country Club road and the railroad was remediated and is now reported (in the M&M report) with the data for the South Opportunity Uplands RDU.

The portion of the area between Gun Club road and Country Club road is the remaining area currently being evaluated by Atlantic Richfield. According to the evaluators, this section has much better vegetation development compared to the western part of the area that was redone (Atlantic Richfield 2010). In 2009 the area scored 136 LRES points (Table 9-1), indicating that it meets the remedial action criteria for Uplands of ≥ 115 . Atlantic Richfield reported some bare areas, but these comprised less than 5% of the site. Spotted knapweed was present, but infrequently scattered throughout the area. There was no evidence of soil movement, rills or gullies in this area.

Opportunity Ponds South Uplands

The Opportunity South Uplands consist of eight Atlantic Richfield evaluation areas located along the north side of Highway 1 south of the ponds. Work completed in 2007 covers approximately 380 acres. The majority of that area was in-situ treated by tilling to a depth of 6 or of 12 inches; however, approximately two acres adjacent to Highway 1 received 12-inches of cover soil. General observations were made by Atlantic Richfield in that area in 2007 and then data were collected in 2008 and 2009. Some areas were seeded in 2008 and those have less than three years of observations. Data provided in Table 9-1 are for Evaluation Area 3, which has been observed for three growing seasons.

Evaluation Area 3 is located north of Highway 1 and is a strip of land approximately 300 feet wide and 20 acres in size. It is the western section of the original Opportunity Highway Previously Reclaimed area that was re-done. According to Atlantic Richfield, the vegetation in 2009 was much improved from what was present before the area was reworked, Some bare areas remain, but were smaller in extent and comprised less than 1% of the site. Spotted knapweed was present in 2009 but infrequent. There was no evidence of soil movement, rills or gullies. The qualitative evaluation made in 2009 put the vegetation in the 30-30% cover class and suggests that the area already may exceed the remedial action performance criteria for Upland of 115 LRES points. As Atlantic Richfield pointed out, however, the vegetation is still developing and will probably be ready for compliance determination in 2~3 years.

Opportunity Ponds Dikes

There are approximately 10 miles of dikes surrounding the various exterior cells of the Opportunity Tailings Ponds. Since they tend to be different in terms of seeding times, substrates, cover soil thickness and aspect, the dikes have been divided into sub-areas, based primarily on aspect, for monitoring purposes. According to the M&M report, the current plan is for most of the dikes to be re-worked. The dike areas evaluated in 2009 that have had at least three growing seasons are the A Cells Dikes, the B Cells south-facing dike, the D Cells north-facing dike, and the south half of the D Cells east-facing dike. These areas are discussed below and the data are presented in Table 9-1.

Vegetation on the dike faces of the A Cells has been well established for the last two years. In 2009, the cover of perennial plant species was quantitatively measured at

38%, which meets the 30% cover criteria for WMAs. There was no observed evidence of soil movement, rills or gullies. Knapweed on the north part of the east-facing slope could be spot sprayed.

The B Cells South-Facing Dike slope is on the perimeter of the B1 Cell. In 2006, additional cover soil was added and the area was revegetated; 2009 was its fourth growing season. According to Atlantic Richfield, vegetation cover in this area is very uniform with no significant bare areas. The perennial grasses have established well and in 2009 the total vegetation cover by acceptable species was 44%. There were no obvious signs of erosion and no perennial weed species in the area. The 2009 quantitative evaluation indicated that this area meets the performance standard of 30% vegetation cover for WMAs.

The D-Cells North-Facing Dike slope is on the perimeter of the D2 Cells. Vegetation cover in this area was 20-39% in 2009 and there were some scattered bare areas, according to the M&M report. The 2009 evaluation showed that this area would not meet the 30% vegetation cover criteria for WMAs and the area was recommended for possible supplemental reclamation activities. Monitoring personnel observed some windblown tailings were observed in areas with bare tailings present in the adjacent D2 cell. There was some evidence of soil movement but no gullies present. Small depositional areas were present and there was evidence of sheet wash and slight rilling on the sites with deposits of windblown tailings.

The D-Cells East-Facing Dike slope (South Half) lies on the southeast end of the D1 Cell. Overall vegetation cover ranged from 20 to 29% in 2009. The soil substrate in this area is coarse and rocky and there was a small amount of windblown tailings on the north end of this part of the dike, according to the M&M report. Both small and large barren areas are present but these constituted less than 5% of the total dike area. Spotted knapweed was observed in the area and requires control. The evaluation stated that the site would benefit from fertilization and interseeding with a mixture including intermediate wheatgrass. The qualitative evaluation showed that this area would not meet the remedial action criteria of 30% vegetation cover for WMAs.

Opportunity Ponds Surface Cells A1-9

Remedial action in the A-Cells commenced in 2003 and included the final closure plan for these cells, adjacent upland areas, and approximately 5,000 linear feet of storm water run-off control ditches. Remediation included cover soil placement and in-situ reclamation treatments. Work was documented in the A-Cells CCR (Atlantic Richfield 2006).

The 2010 M&M report indicates that perennial grasses in the A-Cells of the Opportunity Tailings Ponds are well established (Atlantic Richfield 2010). With the exception of the A9 Cells, which are discussed below, the A-Cells had vegetation cover in 2009 ranging from 32 to 42% (Table 9-1). The A-Cells were erosionally stable and there were some scattered noxious weeds but control efforts are being effective. Kochia was a major component of the developing plant communities in the A-Cells but has been greatly reduced over the last several years and is now only an issue in

the A9 Cells. Sparsely vegetated areas were infrequently observed and actual bare areas were non-existent. Pocket gophers and a red fox were observed by monitoring personnel.

In 2009, the A9 Cells had variable perennial vegetation cover (10-39%) and significant amounts of the weed kochia. In many of the cells kochia was abundant and often the dominant species. The A9 Cells were covered with coversoil in 2005 with materials that came from the east and north borrow areas at the Opportunity Ponds and was amended with lime as necessary. According to the M&M report, vegetation development in the cells was better in 2009 than in prior years, however problems with seeding establishment and competition with kochia continues. Several locations are reported to have large bare areas (up to 40% of the total area) with an acidic soil pH. The M&M report recommended additional lime amendment with disking and reseeded to assist in seedling establishment in certain areas. Because the site is relatively flat, there are no signs of erosion in any of the A9 Cells. As of 2009, qualitative evaluation of the A9 Cells indicates they do not meet the performance criteria for waste management areas (Atlantic Richfield 2010).

Opportunity Ponds Surface Cells - South of A Cells, Evaluation Areas 1-4

The areas south of the A-Cells consist of two Upland areas and two areas within the WMA. These areas have well established perennial vegetation and, according to monitoring data, meet the performance standards. In 2009, the Upland areas had LRES scores of 143 and 145 and the tow areas within the WMA had vegetation covers of 42 and 46%. Overall, kochia has been much reduced in the Upland areas where it was prominent and stands of cheatgrass and perennial grasses have been established. Spotted knapweed was noted at several sites and continued weed management was recommended by monitoring personnel. There was no evidence of soil movement, rill, or gullies in these areas (Atlantic Richfield 2010).

Opportunity Ponds Surface Cells - B Cells

As described in the RDU 8 FDR, the B Cells are receiving contaminated soils and wastes from the streamside Tailings Operable Unit of the Silver Bow Creek/Butte Area NPL Site. These materials are being treated in-situ to establish a permanent vegetation cover.

The B Cells that have had at least three years of observation are the B2.12 Cell and the B2 Cells Seeded in 2006/07. The B2.12 Cell is a wetland area and the observations in the M&M report pertain to the upland areas surrounding the wetland. This area was re-seeded in the spring of 2004 and overall vegetation conditions in 2009 were somewhat better than what was observed in 2008 (Atlantic Richfield 2010). Much of the area has more than 30% vegetation cover and in 2009 the area scored 144 LRES points. There was no observed evidence of soil movement, rills or gullies. The north side of the wetland area and the adjacent northeast facing slope have the most kochia; weed management was recommended to help the area fill in with perennial grasses. Sparse areas were especially evident on the south-facing slope, but overall the area

was less than 5% bare. Spotted knapweed and white top were infrequently and some pocket gophers were evident in this area.

For the B2 Cells seeded in 2006/07, 2009 was the third year that site observations were made on this part of the Opportunity Pond surface cells. Seeding occurred in the fall of 2006 or spring of 2007. Seedling establishment was poor in all of those areas seeded with Seed Mix 4 and in the majority of those areas seeded with Seed Mix 7. Vegetation cover ranged from 0 to 19% (Table 9-1) so would not meet the performance standard. The B2 cells are essentially flat and had no obvious signs of erosion despite the lack of perennial vegetation cover in certain areas. A majority of the cells were dominated by kochia in 2009 and several areas display bare patches with exposed tailings-like material or orange stained soil. According to the M&M report, the majority of the area needs to be reevaluated and re-done with the exception of cell B2.5-3, which has the potential to meet the performance standards in the next 1-2 years. Several areas will need to be evaluated for additional maintenance needs including mowing to reduce kochia abundance.

Opportunity Ponds Surface Cells - C Cells

The C Cells have received several different final covers, including unimpacted soils, treated impacted soils, and SST OU material. The C Cells that have had at least three years of observation are the C1 and C2 Cells Seeded in 2006/07. This is a significant area at 354 acres. For the C1 and C2 Cells Seeded in 2006/07, seedling establishment in the cells was better than in the B2 Cells. Vegetation cover was approximately 20 to 39% and this was an increase over the cover in 2008 (Atlantic Richfield 2010). These cells are flat and vegetated therefore there was no wind or water erosion observed. Weeds were observed and are being controlled and bare areas were insignificant.

Opportunity Ponds Triangle Waste Evaluation Areas 1-4

Remediation Work in the Triangle Waste Area (TWA) commenced in 2001 and has included waste consolidation, cover soil placement, installation of storm water BMPs and engineered controls and revegetation (Atlantic Richfield 2010). A CCR has been prepared for this area (Atlantic Richfield 2005). The TWA was seeded in 2003. There are four areas currently being evaluated by Atlantic Richfield: the (1) Industrial Area, (2) View Shed Area, (3) East Side CI2/CI2, and (4) North Waste Left in Place. 2009 was the sixth year these areas had been monitored.

Vegetation transects were sampled in 2007 and 2008 in Evaluation Areas 2, 3 and 4. During those years the perennial vegetation cover data indicated that those areas were meeting the performance standard for WMAs. In 2009, Atlantic Richfield submitted the necessary documentation and requested a compliance determination in order to move these areas into the long-term maintenance/5-year review phase.

EPA conducted a compliance inspection in the field in October 2009 and found that vegetation cover was greater than 30% in areas 2, 3, and 4. The compliance determination report prepared for EPA (CDM 2010) stated that:

“the pre-compliance verification indicated that the subject remediated areas meet the WMA performance standards established in the ARWW&S OU vegetation management plan. The Final Inspection Summary Sheet/Application Forms provided in Atlantic Richfield’s compliance request report indicate that long term monitoring and maintenance will be conducted by the property owner (ADLC or AR) and that the land management plans are to be attached to the compliance request. However, no long-term O&M (land management) plans were attached or otherwise provided to the Agency for review. Therefore, a final compliance determination cannot be made at this time.”

In short, Atlantic Richfield provided all the necessary documentation in their compliance request for the View Shed Area (2), East Side C12/C12 (3), and North Waste Left in Place (4) areas of the TWA and achievement of performance standards were verified by CDM. A land management plan is needed before these areas can move into long-term O&M.

The Industrial Area (Evaluation Area 1) is the large central portion of the TWA and is approximately 284 acres in size. Twelve inches of "pit run" type rocky material was used as a temporary cover soil in this area because future development was anticipated when the remedial actions were designed for the TWA. Since Area 1 has a temporary cap, it is not required to conform to the performance standards for WMAs identified in the Vegetation Management Plan. However, Atlantic Richfield performs annual monitoring on this area to track its general performance and has shown good plant establishment.

Although the cover is very rocky, a good stand of sheep fescue and alfalfa has developed, according to the M&M report. Vegetation cover in 2009 ranged from 20 to 29% (Table 9-1) and there was greater than 30% cover in the channel bottoms and side slopes of the drainages. Overall, however, the 2009 qualitative evaluation showed that this area does not meet the remedial action criteria of 30% vegetation cover for WMAs. The area was erosionally stable and there were minimal bare areas (less than 5%). Weeds were noted but infrequent. The flat, rocky surface is not subject to water erosion and there is enough vegetation to reduce wind erosion.

Dust Control

Controlling fugitive dust has been an important activity throughout the implementation of the Selected Remedy in RDU 8. To date, dust control measure, as described in the dust control plan (Atlantic Richfield 2007), have been effective in controlling the dust generated during construction as well as dust from the surface of as yet unremediated areas. The success of the revegetation efforts implemented to date (described above) have effectively controlled potential fugitive dust in the reclaimed areas.

The dust control objectives were and continue to be met through the use of BMPs in active construction areas and the application of other dust control measures in inactive open tailings areas that have a potential to generate fugitive dust. Active construction areas primarily include haul roads, borrow areas, and cover installation areas. Each active construction area has been assigned 1) specific BMPs and dust control processes, 2) triggers that will be used to start or increase implementation of

BMPs, and 3) conditions for shutting down operations before dust migrates beyond the point of compliance. In the few instances when operations were suspended, the BMPs were re-evaluated for modification prior to resuming activities. Inactive areas, which can have a high potential to generate fugitive dust, have received final soil cover or temporary surfactant cover in order from highest to lowest dust generating potential. Many of the high potential dust generating areas within the Opportunity Ponds were addressed with final or partial covers or polymer surfactant cover in 2006. Ambient air quality around the perimeter of the RDU 8 site has been continually monitored throughout the construction process to measure fugitive dust levels, evaluate the effectiveness of BMPs, and allow for implementation of appropriate dust mitigation measures.

9.2.8.4 Results of Site Inspections

On June 15, 2010, EPA conducted an inspection of the Industrial Area at the TWA that was covered with the 12 inches of the temporary rocky cover. Photographs 5807 and 5808 show the coarse nature of the substrate and two examples of vegetation development. EPA confirmed the assessment from the M&M report that this area has less overall vegetation cover than other TWAs and that the site is erosionally stable.

The site inspection further confirmed that perennial plant growth in the A9 Cells is struggling and that those cells have significant amounts of the weed Kochia and it is the dominant plant species in many of the A9 Cells. Photograph 5812 shows the A9-4 Cell with barren and kochia-dominated areas. EPA agrees with the recommendation that soils in the A9 Cells undergo testing and then be treated, disked, and reseeded. During the inspection, EPA tested the soils with a dilute solution of hydrochloric acid (HCl) and got a strong fizz reaction, indicating that calcium carbonate (CaCO₃) was present. This suggests that the soils have neutralization capacity and that other soil parameters may be limiting the establishment of the seeded perennial plants.

EPA's site inspection included an evaluation of portions of the D2 Cells that Atlantic Richfield covered with Milltown Reservoir sediments. These areas have been seeded several times since 2007. Observations from the June 15, 2010 indicate that the latest seedling attempt resulted in very poor germination and are non-functional. Currently, Atlantic Richfield is conducting studies to determine if these sediments can be amended to support plant growth or be used as a subsurface growth media beneath a placed six inch soil cover meeting approved specifications. EPA will evaluate the results of these studies and determine a suitable maintenance action or alternative remedy.

9.2.9 RDU 9 - Fluvial Tailings

The RDU 9 - Fluvial Tailings is situated southeast of the town of Opportunity, Montana and is bordered by the Chicago-Milwaukee railroad grade to the east, RDU 6 - South Opportunity and Yellow Ditch to the west, and is subdivided by Interstate 90 and the SST OU (Figure 9-9). The SST OU, Warm Springs Ponds OU, and the town of Opportunity (part of the Community Soils OU) border RDU 9 and are specifically excluded from this RDU.

RDU 9 was impacted by smelter fallout from the Washoe and the Upper and Lower Works Smelters and also from the flooding of Silver Bow Creek from approximately 1884 and until September 1980. Portions of Yellow Ditch from Highway 1 to near Blue Lagoon are addressed within this RDU. (The remedial design for the reach near Blue Lagoon (approximately 3,000 feet northwest and 8,000 feet southeast of Blue Lagoon) is presented in the RAWP/FDR for RDU 5 (Atlantic Richfield 2007)).

The remedial design for RDU 9 – Fluvial Tailings covers approximately 4,798 acres (Atlantic Richfield 2007). The FDR shows that approximately 1,926 acres require implementation of a remedial action while the remaining approximately 2,872 acres do not require physical remediation, as they are facilities or are well vegetated and only require monitoring/weed spraying.

9.2.9.1 Construction Status

Implementation of land reclamation work has not been started in this RDU, however, ground and surface water are being monitored and ICs are being utilized to limit potential exposures to contaminants.

9.2.9.2 Data Review and Evaluation

No data were reviewed for this RDU.

9.2.9.3 Results of Site Inspections

No site inspections were conducted for this RDU.

9.2.10 RDU 10 - Warm Springs Creek

The Warm Springs Creek RDU 10 consists of portions of the Warm Springs Creek and Willow Creek areas where the EPA and DEQ (the Agencies) have identified remedial requirements under the 1998 ARWW&S OU ROD. These areas are located within portions of the OU where the State of Montana has proposed restoration activities under the Natural Resources Damage (NRD) Program. RDU 10 was specifically created to facilitate the remedial design of Superfund remedies of contaminated riparian and wetland areas where NRD has proposed restoration actions. One FDR is being prepared for two areas located along Warm Springs Creek and another FDR will address the remedial design for the Willow Creek portions of RDU 10.

9.2.10.1 Construction Status

Implementation of land reclamation work has not been started in this RDU.

9.2.10.2 Data Review and Evaluation

No data were reviewed for this RDU.

9.2.10.3 Results of Site Inspections

No site inspections were conducted for this RDU.

9.2.11 RDU 11- Cashman Concentrate

The Cashman Concentrates consisted of materials stored in two separate locations. These separate materials included the Smelter Hill Concentrates stockpile located south of BA&P (formerly Rarus) railway's East Anaconda Rail Yard (Figure 9-11). The Skykomish material was located at the Cashman (Apex) Mill site near Skykomish, Washington. The Cashman Concentrates were produced at the Anaconda Company Weed Concentrator plant in Butte, Montana, and made from Berkeley Pit ores using a flotation process common in the mining industry. The concentrates were transported to the Anaconda Smelter Hill site and stored in holding pits for several years until they were later relocated to their East Anaconda Yard location during demolition of the Smelter Hill facilities. Materials stockpiled in Skykomish, Washington, were shipped from the Smelter Hill site and were to be processed using a proprietary process to recover the precious and base metals. Processing of the Skykomish materials did not occur and the materials were relocated via rail to Anaconda, Montana. The Smelter Hill and Skykomish materials were then hauled to Montana Resources in Butte, Montana, for processing to recover the precious and base metals.

9.2.11.1 Construction Status

Construction activities associated with the relocation of the Smelter Hill Cashman Concentrates began on October 30, 2003 and were completed December 15, 2003. Revegetation efforts associated with the Smelter Hill Cashman Concentrates site were completed on December 16, 2003. The Cashman Concentrates material was placed within bermed cells in the Nellie Valley area (Butte, Montana) for processing by Montana Resources using the leach/precipitation process. Impacted materials from the Smelter Hill Cashman Concentrate stockpile were relocated to the B2.12 cell within the Opportunity Ponds WMA. This consisted of miscellaneous construction debris, railroad ties, impacted materials and old power poles and were placed with standard track dozers. A total of 2,740 cubic yards of impacted materials and debris were disposed of in the B2.12 cell.

Construction activities associated with the unloading and hauling of the Skykomish Cashman Concentrates began on November 12, 2003 and were completed December 9, 2004. RDU 11 Cashman Concentrates are construction complete.

9.2.11.2 Operations and Maintenance Status

No O&M requirements for RDU 11 are required, as this was a removal operation. Final reclamation of the former Cashman pile location will occur under East Anaconda Yards (Subarea 5 of the OW/EADA OU).

9.2.11.3 Data Review and Evaluation

No data are available for this area.

9.2.11.4 Results of Site Inspections

The Cashman removal area was inspected as part of the inspection for East Anaconda Yards (Subarea 5 of the OW/EADA OU). The area was vegetated and erosionally stable.

9.2.12 RDU 12 - Slag

This RDU consists of three areas lying just east of Anaconda containing slag: the Main Granulated Slag; West Stack Slag, and; Anaconda Landfill Slag piles (Figure 9-12). The Main Granulated Slag site is a 168-acre and contains an estimated volume of 25 million cubic yards, or approximately 41.3 million tons. The West Stack Slag site consists of an estimated 360,000 cubic yards (approximately 540,000 tons) of material in two piles occupying approximately 13 acres. The Anaconda Landfill Slag site is an approximately 16-acre site that contains an estimated 129,000 cubic yards of material. The land occupied by the Anaconda Landfill Slag is owned by ADLC and others. Land use in and adjacent to these areas are currently zoned industrial/commercial and open space.

The disposition of these slag piles is described in separate final operation and closure/relocation plans (Atlantic Richfield 2003 (three reports)). EPA and DEQ have determined that slag materials may be reused for beneficial uses. The use of the slag materials requires management of the slag that is consistent with the objectives outlined in the ROD (USEPA and DEQ 1998). After slag is removed, a final grading plan will be developed to close the area to be compatible with the existing and anticipated future land use with minimal maintenance activities. The approved remediation plan will be implemented upon completion of slag processing activities . The slag Operator(s) is to provide a Slag Processing/Operation Plan that follows applicable environmental regulations.

The final operation and closure/relocation documents contain three separate plans for managing and eventually reclaiming these areas:

- Property Management/Best Management Plan
- Processing/Operations Plan
- Closure/Reclamation Plan

Prior to 2005, RDM Enterprises processed some material from the main Granulated Slag pile. No other material has processed since then.

9.2.12.1 Construction Status

No construction has occurred at this RDU.

9.2.12.2 Operations and Maintenance Status

No slag reprocessing activities have occurred since the last five-year review. One firm looked at using the slag in the manufacture of roofing products, but due to the weak

economy did not proceed with those plans. Atlantic Richfield has constructed wind and water erosion control BMPs, and has been performing regular inspection and maintenance on those controls.

9.2.12.3 Data Review and Evaluation

No data were available for this area.

9.2.12.4 Results of Site Inspections

The slag areas were inspected as part of the inspection for OW/EADA OU. Erosional control BMPs were in place and functional.

9.2.13 RDU 13 - Old Works WMA

RDU 13 addresses surface water and ground water associated with the Old Works portion of the OW/EADA OU. The OW/EADA OU remedy did not address surface water and ground water areas of concern, but instead deferred the remedy for those media to the ARWW&S OU. The discussion of the source control components of the Selected Remedy for the Old Works area and the protectiveness of those measures was presented in Section 8.

9.2.13.1 Construction Status

Construction status of the various Old Works source control measures within RDU 13 was described in Section 8 of this Five-Year Report.

9.2.13.2 Data Review and Evaluation

The site conceptual model presented in the RDU 13 Old Works WMA Final Design Report (Atlantic Richfield 2010) was developed utilizing site characterization and remedial action activities performed at the Old Works RDU 13. The model identifies one principal source, the current dispersed widespread non-point source located in the subsurface underlying the area. In addition to the principal source, lesser sources have been identified that consist of: miscellaneous wastes, flue debris, Red Sands, heap roast piles, Former Old Works Tailings Pond, Former Arbiter Tailings Pond, floodplain wastes, Upper and Lower Works, landfill slag, groundwater inflows from upgradient of the Old Works RDU 13, Stucky Ridge bedrock aquifer, and losses from Warm Springs Creek (Atlantic Richfield 2010). In addition to the contaminant sources, the site conceptual model identifies the contaminant transport and release mechanisms associated with the elevated contaminants concentrations in the aquifer.

The current principal source of elevated copper, cadmium, and/or zinc concentrations in ground water in the Old Works area is the Red Sands. The Red Sands waste was consolidated and covered with a soil cap and a small portion of the waste was left exposed as an historic feature. Ground water monitoring has identified a plume of copper, cadmium and zinc in ground water downstream of the Red Sands with the highest concentrations occurring immediately downgradient of the waste. The highest concentrations have also occurred during years with high precipitation

and a high water table. Precipitation percolates through the soil cover and through the waste mobilizing the metals. As the wetting front moves downward through the waste, metals concentrations increase in the pore water. Beneath the waste, metals attenuate in the soil by adsorption and formation of oxyhydroxides. During high water table conditions, the contaminated soil beneath the waste becomes saturated and mobilizes the previously attenuated metals. The contaminated ground water distributes the metals in a downgradient direction where they are attenuated onto aquifer materials. Whenever high water table conditions occur, the metals are remobilized, transported, and attenuated. This has resulted in a seasonal widespread plume of contaminated ground water that is most prevalent during high water table conditions.

9.2.13.3 Results of Site Inspections

EPA conducted site inspections of remedial action areas within the Old Works RDU 13 WMA in October 2009 and in June 2010 and those results are discussed in Section 8. Ground water conditions associated with the Old Works RDU 13 WMA are discussed in Section 9.2.10.

9.2.14 RDU 14 - Smelter Hill Facilities Area

The Smelter Hill Facilities Area encompasses the former Washoe smelter facilities (Figure 9-14). It includes the Previously Reclaimed (PR) areas, Iron Pond Slope, and Railroad Triangle areas and the Smelter Hill Repository Complex (SHRC). The latter consists of the Flue Dust, Arbitrator, Original Beryllium, Aspen Hills, and the New Beryllium repositories. Construction of the first four repositories was completed in the 1990s and the New Beryllium repository was completed in 2004.

Design requirements for the repositories were that they meet all Montana Solid Waste Management Act and RCRA Subtitle D provisions and some relevant and appropriate MHWAs and RCRA Subtitle C provisions. As such, the repositories were constructed with a liner, leak detection and collection system, groundwater monitoring wells upgradient and downgradient, and a coversoil cap.

9.2.14.1 Construction Status

Although several construction activities have occurred over time within this RDU, they have been completed under other removal and remedial actions. No construction work associated with the RDU 14 Smelter Hill Facilities Area FDR/RAWP has been initiated.

9.2.14.2 Operations and Maintenance Status

O&M activities within this RDU over the past five-years has consisted of monitoring vegetation of previously reclaimed areas and site stability, conducting reclamation maintenance, monitoring groundwater, and capturing and disposing of leachate from the SHRC in the Opportunity Ponds WMA. More specifically, maintenance work in the repository complex has included: maintenance and replacement of well equipment; maintenance of site ditches and roads; remediation of runoff/runoff controls ditches; reseeding; applying fertilizers and organic matter; remediation of

erosion rills; and spot spraying of weeds. EPA receives annual M&M reports for these areas (discussed below).

9.2.14.3 Data Review and Evaluation

In addition to the collection and disposal of leachate, a key component of the Selected Remedy for this RDU is land reclamation of the repositories and other reclaimed areas. Annual monitoring for the repositories is provided in the *Smelter Hill Repository Complex (SHRC) Monitoring and Maintenance Report* (Atlantic Richfield 2010). For the Previously Reclaimed, Iron Pond Slope, and Railroad Triangle areas the annual data are provide and discussed in the *Vegetation Monitoring Annual Report* (Atlantic Richfield 2010). The data evaluation of the repositories was conducted under Flue Dust OU11 (Section 6 of this report).

The Previously Reclaimed (PR), Iron Pond Slope, and Railroad Triangle areas within RDU 14 are associated with the closure of the smelter which was performed from approximately 1992 through 1994 (Figure 9-14). These areas have been monitored throughout their history and data for the last five years are presented and discussed in the most recent M&M report (Atlantic Richfield 2010). That report indicates that conditions in these reclaimed areas have not changed significantly over the past five-years.

The monitoring data collected by Atlantic Richfield demonstrate that some areas are meeting the vegetation cover criteria for WMAs while others are not. Perennial vegetation cover on these areas in 2009 ranged from 10 to 42% (Table 9-1). Areas meeting the 30% criteria are PR1, PR2, PR4, PR9, Iron Pond Slope, and the Railroad Triangle. The trend data over the past five years indicates that vegetation cover in PR5, PR6, and PR8 is stagnating at less than to WMA criteria and thus may not meet the standard in the future.

An important issue identified in the M&M report is weed control. Over the past five-years, spotted knapweed has been increasing in some areas. The lack of abundant growth by perennial species is likely contributing to the vigorous growth of the weeds. Other issues reported were relatively minor and included: active gully erosion in isolated areas; pocket gopher activity; sparse vegetation (barren areas) in specific areas, and; small barren areas. In general, most areas were generally erosionally stable.

9.2.14.4 Results of Site Inspections

Issues with vegetation cover, erosion, and weeds were more pronounced in the Previously Reclaimed, Iron Pond Slope, and Railroad Triangle areas than for the repositories. For some areas, these issues may be addressable through the established maintenance program; however, more aggressive actions, such as adding coversoil, will likely be required in some areas. Re-reclamation of these areas using current technology may be the only way to set them on a trajectory to meet WMA vegetation performance standards.

9.2.15 RDU 15 - Mount Haggin Uplands

RDU 15 lies entirely within the Mount Haggin Wildlife Management Area and is situated south of Anaconda, Montana and southeast of Mill Creek Road (Figure 9-15). This RDU is generally characterized by moderate to steep forested slopes. It is owned by the state of Montana, and the property is managed by the Montana Department of Fish Wildlife and Parks as a Wildlife Management Area. It has seasonal public access restrictions and designated road accessibility and continues to be used for recreation and open space/wildlife habitat. The area was impacted primarily by smelter fallout from the Washoe Smelter.

RDU 15 - Mt. Haggin Uplands contains approximately 776 acres. The remedial design calls for the implementation of remedial action on only about 137 acres. The remaining approximately 639 acres require only monitoring and weed spraying at this time.

Remedial action objectives for impacted soils are designed to be met through the reduction of arsenic to the applicable standards through in-situ treatment of soils (tilling with amendments), vegetation enhancement, and natural recovery (Atlantic Richfield 2006). The Selected Remedy also includes the implementation of surface water controls/BMPs in steep slope areas. Remediation technologies have been selected based on arsenic and other COC concentrations, land use, topography (slopes steeper than 3H:1V), soil pH, lime rate requirements and rock content.

The State of Montana is taking the lead in the remedial/restoration work in RDU 15 and is planning to begin remedial/restoration work in 2010 in this area under the Natural Resource Damage Program.

9.2.15.1 Construction Status

Implementation of land reclamation work has not been started in this RDU.

9.2.15.2 Operations and Maintenance Status

No O&M activities have been started in this RDU, as no work has been initiated.

9.2.15.3 Data Evaluation and Review

No data were reviewed for this RDU.

9.2.15.4 Results of Site Inspections

No site inspections were conducted for this RDU.

9.2.16 West Galen Expansion Area

The West Galen Expansion Area covers approximately 6,164 acres north of the town of Anaconda (Figure 9-16) that were impacted primarily by aerial emissions from the smelting facilities. The area consists of relatively level to gently sloping open space used primarily for livestock grazing and hay production. Due to the size of the area

and land ownership, the West Galen Expansion Area was divided into two areas to more effectively implement remedial action and manage the area.

Lands within Area No. 1 are not owned by Ueland Ranches and total approximately 2,195 acres. The West Galen Area No.2 consists of Ueland property and covers 2,876 acres of the expansion area as well as 1,093 acres in RDU 2 - Lost Creek and RDU 7 - North Opportunity.

The Final RAWP/FDR provides the methods and procedures being used to implement the Selected Remedy components and conduct M&M for the expansion area (Atlantic Richfield 2005). That document sets forth the task-specific methods, approaches, and other provisions aimed at having the Selected Remedy comply with the performance standards and other criteria required by the ARWW&S OU ROD (USEPA and DEQ 1998), and the vegetation management plan and site-wide management plans prepared since the ROD was issued.

9.2.16.1 Construction Status

Significant areas within this RDU have been remediated since the last review period (Figure 9-16) from 2006 to the present, and each phase of this work has been documented in the following CCR:

- West Galen Expansion Area, Draft 2005 Area 2 Construction Completion Report, Atlantic Richfield Company, December 2007
- West Galen Expansion Area, Draft 2006 Area 2 Construction Completion Report, Atlantic Richfield Company, December 2007
- West Galen Expansion Area, 2007 Area 2 Construction Completion Report, Prepared by Atlantic Richfield, February 2009
- West Galen Expansion Area, 2008 Area 2 Construction Completion Report (CCR) Prepared by Atlantic Richfield, February 2010

9.2.16.2 Operations and Maintenance Status

EPA conducted inspections of all treated areas using the methodology described in the Anaconda Smelter NPL Site vegetation management plan (VMP) (Atlantic Richfield 2008). To date, all areas have been determined to be functional (i.e., O&F) with the exception of some polygons near the wastewater treatment lagoons. Based upon the September 2009 inspection, EPA informed Atlantic Richfield of the non-functional areas and made specific recommendations to improve conditions so these areas would be on a trajectory to meet the compliance determination goals.

EPA believes that, in some cases, the lack of vegetation establishment occurred because an area was simply not seeded (although it was stated seeded in the CCR). These areas looked as though they were plowed but no evidence of the seed mixture could be found. The lack of good initial growth of the seeded species (i.e., non-functionality) in other areas is probably related to inadequate lime rates or possible

phytotoxic soil metal levels. In these areas, seedling establishment was so low that canopy cover of the seeded species was less than 10% over very large areas. A review of the historic soil data by EPA revealed that soil metal concentrations in some areas hovers near phytotoxic limits. Furthermore, COC concentrations are highly variable over relatively short distances. This pattern of contamination is more consistent with historic flood irrigation practices than aerial emissions from smelters. Given that soil metal concentrations vary greatly over short distances and can be very high suggests that the original soil sampling used to determine liming rates was inadequate.

EPA recommended that the non-functional areas be evaluated for additional work. In some cases re-seeding may be all that is required. For other polygons, additional soil samples/data are required to refined the reclamation approach. Additional lime application coupled with deeper plowing may be adequate for some areas; however, other areas may require soil removal or coversoil to achieve adequate seedling densities and set areas on a trajectory to eventually pass the ROD-mandated compliance requirements.

9.2.16.3 Data Review and Evaluation

Vegetation monitoring of reclaimed areas within the West Galen Expansion Area began in 2006 and now includes 21 sites (Atlantic Richfield 2010). Data for the seven sites having at least three growing seasons are presented in Table 9-1.

The M&M report indicted that the vegetation was well established in the two areas where work was completed in 2005. Both areas scored in excess of the 115 point performance standard for Uplands. It should be noted, however, that for Evaluation Area 1, one of the two transects had an LRES score of only 108 points. However, the weighted average for this area as a whole was 132 LRES points, well in excess of 115. There were some infrequently encountered bare areas that the assessor believed would fill in over time. Weeds, particularly whitetop, spotted knapweed, Canada thistle, and field bindweed were present but scattered.

The LRES score for the areas reclaimed in 2006 ranged from 133 to 142, indicating that these areas are well vegetated and on track for eventually passing a compliance determination. These sites had some small bare areas that would probably fill in over time. Weeds were scattered and not an issue although the assessor recommended mowing to reduce kochia in some areas. These sites were stable with no signs of erosion.

The M&M report indicated that some areas completed in 2007 and 2008 were struggling. These had very low cover of the seeded species and large bare areas. Weeds were abundant in some areas and dominant in others. Both water and wind erosion were noted. The site assessor acknowledged that reclamation efforts in some areas have failed and those areas need to be re-assessed and re-reclaimed.

9.2.16.4 Results of Site Inspections

An inspection of the West Galen reclaimed areas was conducted by EPA in June 2010 and indicated that the seeded vegetation was well established on most sites and probably would meet the performance standard of 115 LRES points. The inspection also indicated that no additional work by Atlantic Richfield had occurred for the non-O&F areas. Discussions with Atlantic Richfield subcontract personnel indicated that these areas were being evaluated and that additional reclamation was scheduled for 2010.

9.2.17 Ground Water and Surface Water

9.2.17.1 Operations and Maintenance Status

Ground water monitoring has been conducted under a short-term ground water monitoring plan. The Short Term Ground Water Monitoring Sampling and Analysis Plan consists of measuring water levels and collecting water quality samples twice per year, during the high water table period and low water table period (AERL 2000). The monitoring well network is designed to characterize ground water throughout ARWW&S OU. The ground water quality samples are analyzed for subarea specific COCs, common ions and field parameters.

Surface water monitoring is conducted by the U.S. Geological Survey (USGS) in the four major streams within the ARWW&S OU: Lost Creek, Warm Springs Creek, Mill Creek, and Willow Creek. A long-term surface water monitoring plan is currently being developed as part of the ARWW&S OU remedial action. The overall approach to long-term surface water monitoring at the site under this proposed plan is to continue monitoring at four core monitoring stations where surface waters exit the Operable Units (OU) for water quality, discharge, and annual benthic macroinvertebrate monitoring. This monitoring is consistent with the Upper Clark Fork Basin Long-Term Monitoring Plan, currently being implemented by the USGS. In addition to these stations, eight additional stations (two per stream) are monitored eight times a year for water quality and gauged flow. Unlike the four core stations, it is intended that monitoring will cease at these locations once the Agencies certify that compliance with surface water performance standards have been achieved. These stations also differ from the four core stations in that the Agencies may move their locations if conditions warrant.

Water quality includes contaminants of concern (COCs), dissolved organic carbon, instantaneous discharge measurements, and common ions. The specific list of analytes is consistent with monitoring currently performed at the eight USGS stations within the ARWW&S OU. Water quality sampling is conducted eight times per year. Sampling for each stream is conducted on the same day and as close together time wise as possible.

Discharge includes stage and calculated discharge measured at 15-minute intervals. Field discharge measurements are conducted during each water quality sampling

event plus additional measurements as needed to maintain the stage-discharge relation curve.

Stations including 15-minute discharge measurements include a permanently-established gaging station to house instruments and telemetry equipment. Telemetry is used to transmit data offsite for regular updates to the NWIS database.

Macroinvertebrate community surveys will be conducted annually at the four core stations in accordance with DEQ's Rapid Bioassessment Protocols, Standard Operating Procedure 12.1.3.1 or as specified in the Streamside Tailings monitoring plan.

As the USGS is implementing the long-term surface water monitoring program, all quality assurance/quality control procedures follow established USGS procedures. All data including provisional data is published to NWISWeb and is publicly accessible.

9.2.17.2 Data Review and Evaluation

Atlantic Richfield has prepared Data Summary Reports for low-water and high water short-term ground water monitoring events each year through 2008. Atlantic Richfield is required by EPA to continue this monitoring and to prepare reports. Additionally, they have prepared Data Analysis Reports for short-term ground water monitoring through 2005.

In 2009, Montana Bureau of Mines and Geology (MBMG) assumed responsibility for ground water monitoring. The data collected by MBMG is available on MBMG's Ground Water Information Center (GWIC) website.

Surface water monitoring is performed by USGS and is ongoing. The data they collect is published on USGS's National Water Information System website (NWISWeb). USGS publishes an annual report which presents data for each monitoring site, but does not offer any data interpretation. As with ground water, these data were thoroughly evaluated during the TI evaluations discussed above.

9.3 Progress Since The Last Five Year Review

No issues/recommendations were identified for the ARWW&S OU in the last five year review.

9.4 Technical Assessment

Question A - Is the remedy functioning as intended by the decision documents?

Yes. The remedial actions implemented to date within the OU are functioning as designed in most areas. Soil conditions appear to be adversely affecting plant development in limited areas within RDUs 1, 6, and 14. Treated wastes in RDU 8 have failed to establish vegetation in specific areas (e.g., D cells where Milltown sediments were placed). Surface water runoff controls are preventing off-site migration of contaminated soils and water although vegetation covers and erosion control BMPs

are functioning less than optimally in some areas. Access restrictions and ICs are in place and therefore functioning as intended. The remedial action work, including monitoring and maintenance, is ongoing and is consistent with the approved design documents.

Question B - Are the exposure, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. For the 2010 Five-Year Review, EPA re-examined the ARARs and the assumptions used in the original human health risk assessment. In accordance with the preamble to the National Contingency Plan, ARARs are frozen at the time of the ROD unless "a new or modified requirement calls into question the protectiveness of the selected remedy" (55 FR 8757 [March 8, 1990]). Appendix A sets forth certain contaminant specific water quality ARARs that have changed since completion of the previous five-year review for the Site. No other new or modified requirement calls into question the protectiveness of the selected remedy. Land use has changed in some areas, but those changes have not increased potential risks; exposure assumptions, exposure pathways, and COC toxicity used previously remain valid for human receptors. Lowering of the arsenic drinking water standard has resulted in a larger area of concern and a greater chance of exposure to contaminated drinking water.

In terms of ecological health, several changes have occurred in the derivation and use of media- and chemical-specific ecological screening levels (ESLs) since the ERA was completed. EPA has modified and in general lowered the chronic water quality criteria for several inorganic chemicals. Of major concern is the substantial reduction in the criterion continuous concentration (CCC) for cadmium in surface water. Sediment ESLs are now available to allow for a more certain assessment of risks for sediment-associated biota. Specifically, consensus-based toxicity effects concentrations discussed in the evaluation (Appendix C) can be used to verify the results of the screening and preliminary risk estimation as presented in the ERA. It is noted that the regional phytotoxicity values used in the ERA for screening surface soil contaminant concentrations are valid and relevant. The ecological soil screening levels (Eco-SSLs) derived by EPA since the ERA was completed can provide another source of soil screening values to ensure that risks to other soil associated organisms (i.e., other than terrestrial plants) are adequately evaluated.

Within the last five years, EPA established performance standards for reclaimed areas. Those standards, as described in the VMP (Atlantic Richfield 2008), were used to determine compliance for some areas and will be used in subsequent five-year reviews to evaluate reclamation success.

Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

No. At this time, EPA is not aware of other information that would affect the protectiveness of the remedy.

9.5 Issues and Recommendations

Issues identified for the ARWW&S OU that affect protectiveness are:

- the long-term effectiveness of the County's IC program to protect the remedy;
- uncontrolled use of contaminated ground water;
- unsuccessful treatment of the Milltown Reservoir sediments in providing a vegetative cover for the Opportunity Tailings Ponds;
- concerns with phytotoxicity and the long-term permanence of vegetation in soil areas;
- buried Yellow Ditch wastes northwest of Fairmont, and;
- railroad grade from Anaconda to Georgetown built of mine waste.

The Agencies are working with ADLC and Atlantic Richfield to fully implement the IC program. It is anticipated that the IC program will be effective in protecting the remedy when it is finalized and fully implemented.

The use of contaminated groundwater (and surface water) is currently not completely controlled in the rural areas of the Site. The full implementation of the well drilling provisions of ADLC's development permit system and designation of a CGWA by the Department of Natural Resources and Conservation are expected to significantly strengthen the ability of the County and State to prevent the use of contaminated water.

EPA continues to evaluate the reclamation studies Atlantic Richfield is conducting on the Milltown Reservoir sediments in the D2 Cells of the Opportunity Ponds and will determine an appropriate corrective action. It is anticipated that this issue will be resolved before the next five-year review.

A primary issue for the remedial action areas for RDU1, RDU6, and West Galen are the barren areas and stressed vegetation in certain locales. It appears that the soil pH may not have been adequately controlled or some other soil-related problem, such as high metal concentrations, is present. The soils will be tested in these areas to determine cause and then addressed.

Buried waste material is present in a portion of the Yellow Ditch northwest of Fairmont. This material needs to be characterized and then addressed as part of the remedial action for RDU 9, Fluvial Tailings.

The nature and extent of mining milling contamination within the Georgetown Lake railroad grade will be evaluated. Although currently outside the boundary of the Anaconda Smelter Site, it is anticipated that any required remedial work will be conducted under the ARWW&S OU.

The general public, ADLC, and others voiced a wide range of concerns during the community interviews. These are discussed in detail in Appendix B. Although many of these do not directly affect the protectiveness of the remedy, some are important to the Superfund process and the long-term well being of the affected communities. Those key concerns are addressed below.

Issue/Concern	Response/Recommendation
Closeout of Slag areas.	The slag is not hazardous to human health. BMPs limit off-site migration of slag. A permanent closure of the slag or a long-term agreement for processing will be completed before the next five-year review.
The ground surface in some in-situ treated areas these areas is barren and unprotected; exposed to wind and water erosion. These areas have signs of phytotoxicity and are unlikely to pass the established performance standards.	The effects of any phytotoxicity are being addressed through the protocol of the Vegetation Management Plan.
Trespassing on the reclaimed areas impacts seedling development, leaves soil barren and assessable to erosion, and may create source-receptor pathway. Physical restrictions (e.g., fencing) is not always possible.	These impacts are being addressed through M&M and application of Vegetation Management Plan protocol.
Vegetation development and slope stability on the Anaconda tailings pond dike faces.	Vegetation monitoring data and site inspection indicate that the vegetation is well established on these areas and erosion is slight. M&M activities are on-going.
Remedial action is needed along the Butte, Anaconda and Pacific railroad line east of Anaconda to protect health.	This area is isolated and not an imminent health issue. Remedial action is scheduled for this area within the next review period.
Surface and groundwater monitoring reports are not being prepared as required by the draft management plan.	These data are directly available from the Montana Bureau of Mines and Geology. EPA and DEQ will request that regular monitoring reports be made available.
Comprehensive (long-term) land management plans required for upland reclaimed areas are required to allow these areas to move into the 5-year monitoring and maintenance program. This is a compliance requirement.	Remediated lands that pass the compliance determination will remain in the short-term monitoring program until long-term land management plans are approved. All lands are monitored regularly regardless of whether they are in the short- or long-term program.
Financial assurance that Atlantic Richfield will complete the implementation of the Selected Remedy.	Atlantic Richfield is currently implementing the remedy according to the established schedule and no disruption is anticipated.
More trees are needed on the hills surrounding Anaconda.	Additional trees are being planted by the Montana Natural Resource Damage Program.
Maintenance of the Opportunity drain tiles.	The drain tiles are currently functioning. Long-term ground water monitoring will ensure protection and will trigger remedial actions if exceedances occur.
Potential risk to piscivorous predators from the ingestion of contaminated pray.	This is a data gap, but not anticipated to affect remedy protectiveness. Nonetheless, EPA will assess this receptor/pathway and address any potential risk within the next five-year review period.

9.6 Protectiveness Statement

The remedy for the ARWW&S OU is currently not protective of human health and the environment because controls preventing residents from drinking groundwater exceeding the new arsenic standard of 10 ug/L are not in place. It is recommended that additional actions be taken to address this change in standards and to implement the appropriate controls. Additionally, for the remedy to be protective in the long-term, remedial design/action activities including the development the final IC Plan, development of a final vegetation cover design for the Milltown sediments, evaluation of long-term vegetation performance issues, removal of all Yellow Ditch material and resolution of the Georgetown railroad grade must be completed.

**Table 9-1
ARWW&S OU RDU Monitoring Results and Performance/Protectiveness**

RDU	Site Type ¹	Areas	Acreage Evaluated	Monitoring Results ² and Performance/Protectiveness				
				Vegetation Cover/Score	Site Stability	Weeds	Bare Areas	Performance ³ /Protectiveness
RDU 1 - Stucky Ridge								
Stucky Ridge	Uplands	6	321	30-59%; LRES 126 and 149	Generally stable with infrequently observed small rills and some soil movement.	Generally scattered; being monitored and controlled.	Bare areas were frequently observed in some reclaimed areas.	The RA components are generally functioning as intended and most areas appear to be meeting or are on a trajectory to meet the performance standards. Vegetation cover and erosion issues are identified for specific areas and recommendation are noted in the text. Based on the level of function of the land reclamation components implemented to date, together with access controls and ICs, indicates that the Selected Remedy is currently protective of human health and the environment. It is anticipated that the Selected Remedy will be protective when fully implemented.
	Steep Slope	3	69	BLM 35-40	Soil movement and rills noted in specific areas. Dozer basins and ditches have been breached in some areas.	Generally scattered; being monitored and controlled.	Bare areas are small and scattered.	Despite the erosion and breached BMPs in some areas, the Steep Slope areas evaluated appear to meet the performance standard and are considered generally protective. Contaminated surface runoff is captured on-site, access restrictions are in-place, and ICs have been implemented.
RDU 3 - Smelter Hill Uplands								
Nazer Gulch	Uplands	3	9	LRES 122, 125, and 148	Generally stable with some small rills and some soil movement.	Significant	Bare areas are small and scattered.	The RA components are functioning as intended and the areas appear to be meeting performance standards. Weeds are a major issue. Although site access is not completely controlled, the Selected Remedy is currently protective of human health and the environment.
	Steep Slope	2	11	BLM 16 and 45	Some areas have substantial instability.	Significant	Bare areas are small and scattered.	The RA components are not functioning as intended due to significant slope instability in some areas. Because of ditches at the toe of slopes and the isolated locale, sediment is not discharging from this site or impacting surface water. Weeds are a significant concern. Despite these shortcomings and the fact that access is not completely controlled, the Selected Remedy is currently protective of human health and the environment.
Aspen Hills	WMA	1	54	20-39%	Stability adequate; some small rills.	On-going control adequate.	Some small, infrequent bare areas.	The RA components are not functioning as intended due to significant slope instability in some areas. Because of ditches at the toe of slopes and the isolated locale, sediment is not discharging from this site or impacting surface water. Weeds are a significant concern. Despite these shortcomings and the fact that access is not completely controlled,
	Uplands	1	30	LRES 147	Some rills and sediment movement in a few, isolated places.	Not common, but on-going control recommended.	None	The RA components are functioning as intended and the area is meeting the performance standard. Neither erosion nor weeds are an issue. Site access is controlled and other ICs are in-place. The Selected Remedy is currently protective of human health and the environment.
	Steep Slope	1	2.4	BLM 36	Rill and sheet erosion common; ditches collect sediment.	Some; control is on-going.	Some.	The RA components are functioning as intended, although the erosion score suggest some instability. Sediment is being collected by ditches so storm water is not discharging from this site. Despite these shortcomings, vegetation is developing and access restrictions and ICs are in-place so the Selected Remedy is viewed as protective of human health and the environment at this time.
RDU 4 - Anaconda Ponds WMA								
Surface Cells	WMA	13	503	30-39%	Stable; no erosion.	Very minor.	None.	EPA's compliance determination confirmed that the surface cells meet the performance standards for WMAs and are therefore protective of human health and the environment.
Dike Faces	WMA			20-78%	Little soil movement.	Minor; controlled.	None.	Based on the site inspection, the Dike Faces area currently protective of human health and the environment.
RDU 8 - Opportunity Tailings Ponds								
Highway Eval. Area 1	Uplands	1	15	LRES 136	Stable; no erosion.	Minor; controlled.	Minor.	The RA is functioning as intended and the area is meeting the performance standard. Neither erosion nor weeds are an issue. The Selected Remedy is currently protective of human health and the environment.
South Uplands Eval. Area 3	Uplands	1	20	30-30%	Stable; no erosion.	Minor; controlled.	None.	The RA is functioning as intended and the observations suggest that the area is meeting the performance standard and neither erosion nor weeds are an issue. The Selected Remedy is currently protective of human health and the environment.
Dike: A Cells (various aspects)	WMA	1	6	38%	Stable; no erosion.	Minor; needs controlled.	None.	The RA is functioning as intended and the observations suggest that the area is meeting the performance standard for WMAs. The Selected Remedy is currently protective of human health and the environment.

Dike: B Cells South-Facing	WMA	1	27	44%	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the observations suggest that the area is meeting the performance standard for WMAs. The Selected Remedy is currently protective of human health and the environment.
Dike: D-Cells North-Facing	WMA	1	21	20-39%	Some soil deposition, sheet erosion, and rills. No gullies.	Minor; controlled.	Some.	Observations in 2009 indicate that the area is not meeting the performance standard for WMAs. Due to access restrictions, human health is not at risk.
Dike: D-Cells East-Facing	WMA	1	11	20-29%	Some; not significant.	Some; control needed.	Small to large but <5% of area.	Observations in 2009 indicate that the area is not meeting the performance standard for WMAs. Due to access restrictions, human health is not at risk.
Surface A Cells	WMA	9	240	32-42% (except A9; see text)	Stable; no erosion.	Noxious weeds are minor and controlled. Kochia is issue in A9 Cells	Only significant in the A9 Cells.	The RA is functioning as intended and the observations suggest that the areas are meeting the performance standard, except in the A9 Cells. The Selected Remedy is currently protective of human health and the environment.
South of A Cells, Eval. Areas 1-4	Uplands and WMA	4	63	LRES 143, 145 (Uplands) and 42, 46% (WMA).	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the observations suggest that the areas are meeting the performance standard for WMAs. The Selected Remedy is currently protective of human health and the environment.
Surface B2 Cells	Upland and WMA	2	56	LRES 144 (Uplands) and 0-19% (WMA).	Stable; no erosion.	Minor; controlled.	Not significant.	The RA for the Upland B2.12 Cell is functioning as intended and the observations suggest that the area is meeting the performance standard and is currently protective of human health and the environment. For the B2 Cells Seeded in 2006/07, the actions to date are not functioning as intended and do not meet the performance standard.
Surface C Cells	WMA	2	354	20-39%	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the observations suggest that the areas will meet the performance standard for WMAs in the next few years. The Selected Remedy is currently protective of human health and the environment.
Triangle Waste Eval. Areas 2-4	WMA	3	237	30-39%	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the compliance determination by EPA declared that these areas meet the performance standard. The Selected Remedy is currently protective of human health and the environment in these areas.
Triangle Waste Eval. Area 1	WMA	1	284	20-29%	Stable; no erosion.	Minor; controlled.	Not significant.	The rocky, temporary cap is functioning as intended and is currently protective of human health and the environment in the Industrial Area.
RDU 14 - Smelter Hill Facility Area WMA								
PR1-9, Iron Pond Slope, and Railroad Triangle	WMA	11	227	10-42%	Mostly stable; some erosion.	Minor issue for repositories; noxious weeds in other areas.	Small to large but <5% of area.	The RA is functioning as intended for some areas. Vegetation and site stability trends indicate that some areas probably will not meet performance standards without re-reclamation using current methods and specifications. All reclaimed areas are within a WMA and access and runoff are strictly controlled, so the Selected Remedy is currently protective of human health and the environment.
West Galen Expansion Area								
2005 Eval Areas 1 and 2	Uplands	2	128	LRES 128 and 132	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the observations suggest that the area is meeting the performance standard for Uplands. Selected Remedy is currently protective of human health and the environment.
2006 Eval Areas 3 - 7	Uplands	5	227	LRES 130 to 142	Stable; no erosion.	Minor; controlled.	Not significant.	The RA is functioning as intended and the observations suggest that the area is meeting the performance standard for Uplands. Selected Remedy is currently protective of human health and the environment.

¹WMA = waste management area.

²Data from 2009 field season. Source: *2009 Vegetation Monitoring Annual Report*. Prepared by Atlantic Richfield. June 2010

³Performance standards for WMAs and Upland areas as identified in the Anaconda Vegetation Management Plan, prepared by Atlantic Richfield 2008.

Vegetation cover percentage or LRES score for Upland areas (depending on how the site was evaluated), or BLM erosion score for Steep Slope areas.

Perennial plant cover > 30% or LRES > 115 or BLM erosion score <45 generally indicate a site trending toward meeting performance standards.

Section 10 Next Review

The next five-year review for the Anaconda Smelter NPL Site is scheduled for 2015.

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