Unilateral Administrative Order for the Butte Priority Soils Operable Unit /Butte Site Partial Remedy Implementation - CERCLA Section 106

Henry Elsen to: leo, bullorj, RCBYLSMA, rcurley, ddennehy, William.Duffy, shannon.dunlap, gordonhart, glhoneym, ejoyce, ricklarson, mmaffei, Dawn Sara Sparks, Joe Vranka, Julie DalSoglio, Matthew Cohn, Cc: james.freeman2, john.sither, Jared Hautamaki, jgriffin, lscusa, lidewitt, solsen, ropper, mcapdeville, bkirley, rcollins, PCunneen,

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Responsible Party Representatives,

Attached is a Unilateral Administrative Order (UAO) for Partial Remedial Design, Remedial Action and Certain Operation and Maintenance activities for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area NPL Site. The UAO is being issued to the Atlantic Richfield Company, Butte Silver Bow County, RARUS Railroad Company, and Inland Properties Inc.,(Group 1); and BNSF Railway Company, and Union Pacific Railroad Company (Group 2). The liability schemes for each group are as described in the UAO.

The Effective Date of the UAO is September 6, 2011. Certain dates for deliverables under the UAO and PRI Work Plan are prior to the Effective Date and should be followed despite the later Effective Date.

You were previously provided the 2011 Explanation of Significant Differences for the BPSOU ROD. The UAO and PRI Work Plan are consistent with the 2011 ESD.

An important attachment to the UAO is the Partial Remedy Implementation Work Plan (PRI Work Plan). The PRI Work Plan text is contained in the attachment to this email. In a separate emails that I will send shortly, I will include the Appendices and a Figure to the PRI Work Plan.

Although I will send by mail hard copies to the main attorney contact for each Respondent, please consider the email transmission of these documents as service of the UAO and its Exhibits and Attachments on the named Respondents.

Opportunity to Confer

Please pay particular note to section XXVI of the UAO. It describes the ability of Respondents to request, either individually or in groups, an opportunity to confer conference with EPA. This request is not mandatory but is available if the Respondent(s) choose to have it. The conferences are limited to those issues described in section XXVI.

Given travel time and money constraints, I believe such conferences, if requested, are best held by telephone. We can discuss that when counsel for the requesting Respondent(s) contacts me.

A request for such a conference must be made within 10 days of today (the 10 day mark is August 1, 2011) by telephone to me, Henry Elsen. The conference itself must be held between August 4 and August, 30, 2011 on a mutually agreeable date.

I have surveyed the government participants for these conferences, and the best available dates during this time period for all of the government participants are:

August 10 - 12
August 17 - 18
August 22 - 24
August 29.

If these dates can be accommodated in your request, if a request is made, that would be helpful and

appreciated.

Notice of Intent to Comply

Please note that each Respondent is required to provide a Notice of Intent to Comply under Section VII of the UAO. That notice is due within 10 days of the Effective Date of the UAO, or by September 16, 2011.

Continued Consent Decree negotiations for the full implementation of the BPSOU ROD and any amendments

As we discussed previously, the issuance of this UAO for partial remedy implementation by EPA is not intended to stop comprehensive Butte Site Consent Decree negotiations or interfere with the completion of the Consent Decree negotiations. We understand that allocation agreements among and between the named Respondents are not yet complete, and we have not received a revised draft Consent Decree (CD) jointly from the Respondents as has long been promised. The US believes that the best time to re-start active CD negotiations may be when we receive notice of completion of the allocations agreement (s) and a revised joint CD from the Respondents. In the meantime, the US hopes to work with the State of Montana on work plan issues so that we can develop a final RD/RA Work Plan for the CD.

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BPSOUUAOandExhibitspartial_FINAL_07212011.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

IN THE MATTER OF: BUTTE PRIORITY SOILS OPERABLE UNIT OF THE SILVER BOW CREEK/BUTTE AREA (BUTTE PORTION) SITE ATLANTIC RICHFIELD COMPANY,) BUTTE SILVER BOW COUNTY,) INLAND PROPERTIES) INCORPORATED,) BNSF RAILWAY COMPANY,) UNION PACIFIC RAILROAD) COMPANY, and) RARUS RAILWAY COMPANY,) RESPONDENTS. PROCEEDING UNDER SECTION 106(a) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, AS AMENDED, 42 U.S.C. § 9606(a).	EPA Docket No. CERCLA-08-2011-0011

ADMINISTRATIVE ORDER
FOR PARTIAL REMEDIAL DESIGN/REMEDIAL ACTION IMPLEMENTATION AND CERTAIN OPERATION AND MAINTENANCE
AT THE BUTTE PRIORITY SOILS OPERABLE UNIT/BUTTE SITE

ATTACHMENTS

I. INTRODUCTION AND JURISDICTION

1. This Order directs Respondents to perform partial remedial design and remedial action activities, as well as certain Operation and Maintenance Activities, for the Butte Priority Soils Operable Unit of the Silver Bow Creek/Butte Area (Butte Portion) Superfund Site and adjacent properties. This Order is issued to Respondents by the United States Environmental Protection Agency (EPA) under the authority vested in the President of the United States by section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9606(a), as amended (CERCLA). This authority was delegated to the Administrator of EPA on January 23, 1987, by Executive Order 12,580, 52 Fed. Reg. 2,923, and was further delegated to EPA Regional Administrators on September 13, 1987, by EPA Delegation No. 14-14-B. This authority has been further delegated to the Assistant Regional Administrator, Office of Ecosystems Protection and Remediation and further delegated to the Director, Montana Office.

II. FINDINGS OF FACT

2. Respondents the Atlantic Richfield Company (AR), Inland Properties Incorporated (Inland), Burlington Northern Santa Fe Railway Company (BNSF), Union Pacific Railroad Company (UP), and Rarus Railway Company (Rarus), are duly authorized corporations doing business in the State of Montana. Respondent AR is an affiliate of BP Corporation North America, Inc. and a wholly owned subsidiary of BP America Inc., both of which are affiliates of BP, LLC. Respondent Butte Silver Bow County (BSBC) is a designated government entity under the laws of the State of Montana governing the city of Butte and the county of Butte Silver Bow in Montana.

a. Respondent AR is now, and has been since on or about 1977, the past and, in some cases, current owner and/or operator of a major portion of the "facilities" within and adjacent to the Butte Site, as those terms are defined below. AR is also the current and past owner/operator of the Anaconda Smelter facility in Anaconda, Montana, which distributed hazardous substances such as arsenic and lead via aerial emissions to a large area including the Butte Site.

b. As a result of a merger with the Anaconda Company (also known as the Anaconda Copper Mining Company) in 1977, Respondent AR is also the successor-in-interest to, and assumed the liabilities incurred by the Anaconda Company and/or its subsidiaries and related corporations or businesses, which were owners and operators of "facilities" within and adjacent to the Butte Site and the Anaconda Smelter facility. As a result of one or more mergers, restructurings, transfers of assets, continuations of business activities, or other corporate action, Respondent AR is also the successor-in-interest to, and has assumed the liabilities incurred by

predecessors to the Anaconda Company, the Anaconda Copper Mining Company and/or either companies' subsidiaries and related corporations or businesses which were also owners and operators of "facilities" within and adjacent to the Butte Site and the Anaconda Smelter facility.

c. Respondent BSBC is the past and current owner and operator of several "facilities", within the Butte Site, as those terms are defined below.

d. Respondent Inland was the former owner and/or operator of "facilities" within the Butte Site at the time of disposal, as those terms are defined below.

e. Respondents BNSF, UP, and Rarus are past and current owners and operators of certain "facilities" (railbeds and related properties) within the Butte Site, as those terms are defined below.

f. The Respondents also contributed to Butte Site contamination through the arrangement for disposal, transportation for disposal, and/or generation of hazardous substances through the transportation of hazardous substances and related spillage, the management of stormwater, and other activities at the Butte Site.

3. The Butte Priority Soils Operable Unit (BPSOU) is an area within and adjacent to the cities of Butte, Montana and Walkerville, Montana which consists of former mining areas, and contains several waste piles, former mining smelter and milling facilities, contaminated railroad beds, and other similar areas and source areas. These areas are each facilities within the meaning of sections 101(9) and 107 of CERCLA, 42 U.S.C. §§ 9601(9) and 9607. It also includes the alluvial aquifer beneath the cities of Butte and Walkerville, as well as a portion of Silver Bow Creek and a portion of Blacktail Creek which run through the Butte Priority Soils Operable Unit. A map of the Butte Priority Soils Operable Unit surface area is found as part of the map contained as Exhibit B to the Partial Remedy Implementation Work Plan which is Exhibit 3 to this Order. The Butte Priority Soils is an operable unit, designated by EPA, within the Silver Bow Creek/Butte Area Superfund Site, which was listed on the National Priority List pursuant to CERCLA as described below.

4. Butte, Montana and the surrounding area was the site of mining, milling and smelting activities from the 1860s to the present. In response to the release and threatened release of hazardous substances from facilities in and around Butte and Anaconda, Montana, into Silver Bow Creek, pursuant to section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Silver Bow Creek Site on the National Priorities List set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658. The original listing of the Silver Bow Creek Superfund Site focused on contamination within and along Silver

Bow Creek from its headwaters in Butte through the Warm Springs Ponds, approximately 28 miles downstream from the headwaters. The original Silver Bow Creek Superfund Site was amended on July 22, 1987, 52 Fed. Reg. 27627, to include large areas in and around Butte, and is now known as the Silver Bow Creek / Butte Area Superfund Site. This addition is known as the Butte Portion of the Silver Bow Creek / Butte Area Site ("SBCB"), and includes the area later designated as the BPSOU (OU#8).

5. The extensive mining, milling, and smelting activities that occurred within the BPSOU included over 300 mines (which produced contaminated overburden and other wastes), at least 19 mills and smelters (which produced tailings, fines, and other contaminated wastes), and an extensive network of railroad beds and lines (some of which were created with contaminated materials in some areas and which received spills of contaminated concentrate and waste in some areas). At least 197 contaminated source areas, or "facilities", were created from these operations within the BPSOU. Aerial emissions from the mills and smelters, contributed to the spread of contamination throughout the BPSOU, including residences, yards, and business locations within and adjacent to the BPSOU. Contaminated source areas and railroad properties also leached contamination into the alluvial groundwater underneath BPSOU. Stormwater run-off from the source areas and railroad properties also contributed to the spread of hazardous substances throughout the BPSOU, including the alluvial groundwater aquifer and nearby Silver Bow Creek and Blacktail Creek. The storm water conveyance system within the BPSOU also became contaminated and is a source of continuing contaminated storm water discharges to Silver Bow Creek.

6. After conducting other data collection and liability searches, and in response to the release or substantial threat of release of hazardous substances in and from the BPSOU, EPA, in consultation with the Montana Department of Environmental Quality (DEQ), initiated a series of removal actions at the BPSOU beginning in 1988. The list of those removal actions is as follows, with EPA administrative order numbers indicated where potentially responsible parties performed all or part of the work:

A. Walkerville Time Critical Removal Action (TCRA) I (1988) (Order No. CERCLA-VIII-88-05);

B. Timber Butte TCRA (1989) (Order No. CERCLA-VIII-89-21);

C. BPSOU TCRAs (1990 and 1991) (Orders No. CERCLA-VIII-90-11 and CERCLA-VIII-90-12);

D. BPSOU Engineering Evaluation/Cost Analysis (EE/CA) Administrative Order on Consent (Order No. CERCLA-VIII-91-13);

E. Colorado Smelter TCRA (1992) (Order No. CERCLA-VIII-92-04);

F. Anselmo Mine Yard and Late Acquisition / Silver Hill TCRA (1992) (Order No. CERCLA-VIII-92-23);

G. Walkerville TCRA II (1994) (EPA performed);

H. Railroad Beds TCRA (2000 to the present) (Order No. CERCLA-VIII-2000-02);

I. Stormwater TCRA (1995 to the present) (Order No. CERCLA-VIII-95-58);

J. Walkerville TCRA III (2000) (EPA performed);

K. Lower Area One EE/CA Administrative Order on Consent (Order No. CERCLA-VIII-90-14);

L. Lower Area One Non-Time Critical Removal Action (NTCRA) (1992 to the present) (Order No. CERCLA-VIII-92-17);

M. Manganese TCRA (1992) (EPA performed); and

N. BPSOU Residential Soils / Waste Dumps NTCRA (1994 to the present) (Order No. CERCLA-VIII-94-21).

In addition, EPA and AR participated in the following associated actions: Clark Tailings RCRA action (1998) and Mine Flooding Operable Unit-related pump vault interceptor (2002).

7. In 1992, certain potentially responsible parties conducted a Remedial Investigation and Feasibility Study ("RI/FS") for the BPSOU in accordance with 40 C.F.R. § 300.430 and Administrative Order on Consent Docket No. CERCLA-VIII-92-18. The RI/FS was completed in 2004. The BPSOU RI/FS, as well as a subsequent supplemental Focused Feasibility Report for the metro storm drain area of the BPSOU, examined alternatives for final remedial actions at the BPSOU.

8. In December of 2004, EPA, in consultation with DEQ, analyzed the various remedial action alternatives and proposed what it deemed to be the most appropriate remedy for the BPSOU and adjacent homes containing attic dust in a Proposed Plan (the BPSOU and the adjacent area are now known as the "Butte Site"). Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the Butte Site Proposed Plan in a major local newspaper of general circulation. It then provided an opportunity for written and oral comments from the public on the Butte Site Proposed Plan. A copy of the transcript of public meetings on the Butte Site Proposed Plan is available to the public as part of the administrative record upon which the EPA Region 8 Regional Administrator's delegate based the selection of the response actions for the Butte Site.

9. In September of 2006, EPA, in consultation with DEQ, made its final decision regarding a remedy for the Butte Site in accordance with CERCLA, and in a manner not inconsistent with CERCLA's governing regulations in the National Contingency Plan (the NCP), 40 C.F.R. Part 300. EPA issued a Record of Decision (ROD), Exhibit1, regarding its selection in September of 2006 and published notice of the 2006 Record of Decision in a major local newspaper of general circulation on September 25, 2006. After the receipt of new information and other considerations, EPA issued an Explanation of Significant Differences (ESD) in June 2011 (Exhibit2), which, among other things, amended the 2006 Record of Decision.

10. EPA's remedial action decision for the Butte Site is embodied in a ROD, executed on September 21, 2006 with partial concurrence by DEQ, Exhibit1. The ROD is supported by an administrative record that contains the documents and information upon which EPA based the selection of the response action.

11. Studies performed under the removal actions and the RI/FS for the Butte Site, have documented the presence, release, and threat of release of arsenic, cadmium, copper, lead, mercury, zinc and other mining related substances at and from the facilities within and adjacent to the BPSOU and the Butte Site. Arsenic, cadmium, copper, lead, mercury and zinc, as well as other substances from mining waste found in and around the Butte Site, are hazardous substances as defined in section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

12. Humans and wildlife are at risk from exposure to the contaminated soils in the BPSOU and Butte Site. In particular, current and future residential, commercial/industrial, and recreational users at BPSOU and the Butte Site may be exposed to contaminated soils and dust containing arsenic, lead and mercury via inhalation and ingestion pathways at levels which are harmful. Run-off and ground water contributions from arsenic, copper, lead, mercury, and zinc in the BPSOU facilities may enter nearby streams and cause damage to the recreational fisheries and related organisms in streams in the area. The BPSOU facilities are also a source of releases or threat of releases of hazardous substances or pollutants or contaminants into groundwater beneath and surrounding the area which, if uncontrolled by institutional controls, could be used for domestic or other purposes at harmful levels. Additional information on the human health and environmental risks at the BPSOU and Butte Site is presented in the several human health risk assessments and the Baseline Ecological Risk Assessment for the BPSOU, all of which are identified in the ROD and contained in the administrative record.

13. From about 2006 to the present time, the Respondents, with EPA oversight, conducted remedial design activities and studies required by the ROD. Respondents have also implemented certain remedial actions and operation and maintenance actions required by the ROD and resulting from the remedial design activities. Remedial design and remedial action is not yet complete and further remedial design and remedial action work, along with associated operation and maintenance activities, remains to be done. The current status of remedial design, remedial action, and operation and maintenance activities is described in the Partial Remedial Implementation Work Plan, Exhibit 3 to this Order.

III. CONCLUSIONS OF LAW AND DETERMINATIONS

14. Based on the preceding Findings of Fact and the administrative record for the Butte Site, EPA has made the following conclusions of law and determinations:

a. The Butte Site and the BPSOU contain "facilities" as defined in section 101(9) of CERCLA, 42 U.S.C. § 9601(9);

b. Each Respondent is a "person" as defined in section 101(21) of CERCLA, 42 U.S.C. § 9601(21);

c. Each Respondent is a liable party under sections 104 and 107 of CERCLA, 42 U.S.C. §§ 9604 and 9607, and is subject to this Order under section 106(a) of CERCLA, 42 U.S.C. § 9606(a) in the manner described below;

d. Each Group 1 Respondent is jointly and severally liable, as among Group 1 Respondents, for all actions required by the Order for those obligations and responsibilities designated as applicable to Group 1 Respondents or Group 1 Responsible Parties;

f. Group 2 Respondents are jointly and severally liable for actions required by the Order for the Lower Butte Site, and each Group 2 Respondent is responsible for actions required by the Order for those obligations and responsibilities designated as applicable to Group 2 Respondents or Group 2 Responsible Parties, and for its own railroad property;

g. Each Respondent is jointly and severally liable for all actions required of this Order for those obligations and responsibilities not designated as applicable to Group 1 Respondents or Group 1 Responsible Parties or Group 2 Respondents or Group 2 Responsible Parties.

h Substances such as arsenic, copper, mercury, lead and zinc found at the Butte Site and the BPSOU are "hazardous substances" as defined in section 101(14) of CERCLA, 42 U.S.C. § 9601(14) and these hazardous substances have been, are being, and threaten to be released at or from the BPSOU and Butte Site into the soils, groundwater, surface water, air, sediments, and dust;

i. The presence of hazardous substances at the Butte Site and the BPSOU, and the past, present, or potential future migration of hazardous substances described in Section II of this Order constitute an actual or threatened "release" as defined in section 101(22) of CERCLA, 42 U.S.C. § 9601(22);

j. The actual or threatened release of one or more hazardous substances from the facilities may present an imminent and substantial endangerment to public health or welfare or the environment; and

k. The actions required by this Order are necessary to protect the public health and welfare and the environment.

IV. NOTICE TO THE STATE

15. EPA has notified the State of Montana (State), through DEQ, of this action pursuant to section 106(a) of CERCLA, 42 U.S.C. § 9606(a), and provided for State involvement in the initiation, development, and selection of the remedial action, and will continue to provide for State involvement in design and implementation of the remedy, in accordance with section 121(f) of CERCLA, 42 U.S.C. § 9621(f). All EPA decisions under this Order will be made in consultation with DEQ. EPA is the lead agency for coordinating, overseeing, and enforcing the response action required by this Order.

V. ORDER

16. Respondents are hereby ordered to comply with all requirements of this Order, including but not limited to, all attachments to this Order and all documents incorporated by reference into this Order or its attachments, as described above and below and as indicated in the Partial Remedy Implementation Work Plan, Exhibit3. All listed Exhibits are attachments to this Order.

17. The Group 1 Respondents are jointly and severally responsible, as among Group 1 Respondents, for those obligations and responsibilities designated as Group 1 Responsible Party obligations in the Partial Remedy Implementation Work Plan, Exhibit 4. Group 2 Respondents shall be jointly and severally responsible, as among Group 2 Respondents, for those obligations and responsibilities designated as Group 2 Responsible Party obligations in the Partial Remedy Implementation Work Plan, Exhibit 4. Certain activities are site wide obligations and requirements applicable to both Group 1 and Group 2 Respondents, and those obligations and requirements - designated as Responsible Party obligations in the Partial Remedy Implementation Work Plan, Exhibit 4 - are joint and several. In the event of the insolvency or other failure of one of the Group 1 Respondents to implement a Group 1 obligation or requirement of this Order, the remaining Group 1 Respondents shall complete all such obligations or requirements. In the event of the insolvency or other failure of one of the Group 2 Respondents to implement a Group 2 obligation or requirement of this Order, the remaining Group 2 Respondents shall complete all such obligations or requirements. In the event of the insolvency or other failure of one of the Respondents to implement a Responsible Party

obligation or requirement of this Order, the remaining Respondents shall complete all such obligations or requirements.

VI. DEFINITIONS

18. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or such regulations. Whenever terms listed below are used in this Order or in the documents attached to this Order or incorporated by reference into this Order, the following definitions shall apply:

"AR" shall mean the Respondent, Atlantic Richfield Company, its divisions and subsidiaries, including ARCO Environmental Remediation L.L.C. (AERL), and any predecessors in interest. It shall also mean any successor in interest to the extent that any such successor's liability at the Butte Site derives from the liability of the Atlantic Richfield Company, its divisions and subsidiaries, including AERL, and any predecessor in interest.

"BNSF" shall mean the Respondent, BNSF Railway Company, and any predecessor in interest. It shall also mean any successor in interest to the extent that any such successor's liability at the Butte Site derives from the liability of the BNSF Railway Company, and any predecessors in interest.

"BSBC" shall mean Butte Silver Bow County, including its agencies and divisions.

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"CFRSSI LAP" shall mean the Clark Fork River Superfund Site Investigations Laboratory Analytical Protocol (AR/PTI, April 1992), as subsequently amended as of the Effective Date.

"CFRSSI QAPP" shall mean the Clark Fork River Superfund Site Investigations Quality Assurance Project Plan (AR/PTI and EPA, May 1992), as subsequently amended as of the Effective Date.

"**Contractor**" means any person, including the contractors, subcontractors, consultants, or agents retained or hired by any Respondent to undertake any Work under this Order.

"**Day**" means calendar day. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or federal holiday, the period

shall run until the end of the next working day. Time will be computed in accordance with Rule 6 of the Federal Rules of Civil Procedure, unless otherwise specified.

"**Deliverable**" means any written product, including but not limited to, plans, reports, memoranda, data, and other documents that any Respondent or group of Respondents must submit to EPA under this Order.

"DEQ" shall mean the Montana Department of Environmental Quality and any predecessor or successor departments or agencies of the State.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies.

"Group 1 Respondents" or **"Group 1"** shall be AR, BSBC, Inland, and RARUS.

"Group 2 Respondents" or "**Group 2"** shall be BNSF and UP.

"Inland" shall mean the Respondent, Inland Properties Incorporated, its divisions and subsidiaries, and any predecessor in interest. It shall also mean any successor in interest to the extent that any such successor's liability at the Butte Site derives from the liability of Inland Properties Incorporated and its divisions or subsidiaries, and any predecessor in interest.

"Lower Butte Site" shall be that portion of the Butte Site identified in the map attached as Exhibit4. The Lower Butte Site includes the portion of Silver Bow Creek which runs through the area shown in the maps attached as Exhibit 4 including its sediments and floodplain. The Lower Butte Site also includes the alluvial groundwater beneath and near the surface area shown on Exhibit 5 which contains hazardous substances from the various facilities and sources within the BPSOU.

"National Contingency Plan" or "**NCP**" means the National Oil and Hazardous Substances Pollution Contingency Plan promulgated under Section 105 of CERCLA, 42 U.S.C. § 9605, and codified at 40 C.F.R. Part 300, including any amendments thereto.

"**Operation and Maintenance**" or "**O&M**" means all activities required under any approved short term or long term Operation and Maintenance Plan or under the Butte Reclamation Evaluation System document. Any approved Operation and Maintenance Plan is incorporated into this Order.

"**Order**" means this Order, the exhibits attached to this Order, the EPA-approved work plan, and all documents incorporated into this Order by reference or according to the procedures set forth herein.

"Partial Remedy Implementation Work Plan" shall mean the plan attached as Exhibit 3 to this Order, which is incorporated by reference into this Order and is fully enforceable hereunder.

"**Performance Standards**" means those cleanup standards, standards of control, and other substantive requirements, criteria or limitations, identified in the BPSOU ROD (including but not limited to applicable and relevant and appropriate requirements identified in Appendix A to the BPSOU ROD and Appendix A to the Partial Remedial Action Implementation Work Plan, Exhibit3) and the BPSOU ESD, and/or described in the Partial Remedy Implementation Work Plan, Exhibit 4, that the remedial action and other Work performed under this Order must comply with, attain and maintain.

"RARUS" shall mean the Respondent, Rarus Railway Company, its divisions and subsidiaries, and any predecessor in interest. It shall also mean any successor in interest to the extent that any such successor's liability at the Butte Site derives from the liability of the Rarus Railway Company and its divisions or subsidiaries, and any predecessor in interest.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"**Record of Decision**" or "**ROD**" means the EPA Record of Decision for the BPSOU and Butte Site, executed by EPA on September 21, 2006, and all attachments thereto, attached hereto as Exhibit1, and incorporated herein by reference.

"**Remedial Action**" or "**RA**" means those activities, except for operation and maintenance, to be undertaken by Respondents to implement the final plans and specifications embodied any approved remedial design work plan or remedial action work plan or similar plans as required by the Partial Remedy Implementation Work Plan, Exhibit3, and including any additional activities required under Sections X, XI, XII, XIII, and XIV of this Order.

"**Remedial Design**" or "**RD**" means any actions or studies required to develop any final remedial design plan or remedial action work plan or similar plans as required by the Partial Remedy Implementation Work Plan, Exhibit3, and including any additional activities required to design actions required under Section X, XI, XII, XIII, and XIV of this Order.

"Respondents" shall mean AR, Inland, BNSF, RARUS, UP, and BSBC.

"Site" or **"Butte Site"** means the Butte Priority Soils Operable Unit (BPSOU) and other areas shown on the map attached as Appendix B to the Partial Remedy Implementation Work Plan, Exhibit3. In addition to the surface area identified as the BPSOU in this map, the Butte Site includes homes in areas that are adjacent to the BPSOU that have lead, arsenic, or mercury in homes and associated yards, gardens and play areas that will be addressed in the manner described in the Residential Metals Abatement Plan (April 2010) and this adjacent area is also shown on this map. The Butte Site includes the portion of Silver Bow Creek and the portion of Blacktail Creek which run through the BPSOU area shown in the map attached as Appendix B to the Partial Remedy Implementation Work Plan, Exhibit3, including any sediments and floodplain material, and the Granite Mountain Memorial Interpretive Areas. The Butte Site also includes the alluvial groundwater beneath the BPSOU surface area shown on the map attached as Appendix B to the Partial Remedy Implementation Work Plan, Exhibit3, which contains hazardous substances from the various facilities and sources within the BPSOU.

"State" shall mean the State of Montana, including all of its departments, agencies, and instrumentalities.

"UP" shall mean the Respondent, Union Pacific Railroad Company, and any predecessor in interest. It shall also mean any successor in interest to the extent that any such successor's liability at the Butte Site derives from the liability of the Union Pacific Railroad Company, and any predecessor in interest.

"United States" shall mean the United States of America, including all of its departments, agencies, and instrumentalities.

"**Work**" means all activities Respondent is required to perform under this Order, including remedial design, remedial action, operation and maintenance, and any other activities necessary to fulfill the requirements of this Order.

VII. NOTICE OF INTENT TO COMPLY

19. Respondents shall each provide, not later than 7 days after the effective date of this Order, written notice to the EPA Remedial Project Manager stating whether it will unconditionally and unequivocally comply with this Order. If Respondent does not unconditionally and unequivocally commit to perform the Work as provided by this Order, it shall be deemed to have violated this Order and to have failed or refused to comply with this Order. Respondent's written notice shall describe, based on facts that exist on or prior to the effective date of this Order, any "sufficient cause" defenses asserted by Respondent under sections 106(b) and 107(c)(3) of CERCLA, 42 U.S.C. §§ 9606(b) and 9607(c)(3). The absence of a response by EPA to the notice required by this Paragraph shall not be deemed to be acceptance of any of Respondent's assertions.

VIII. PARTIES BOUND

20. This Order shall apply to and be binding upon Respondents as described above and each corporate Respondent's directors, officers, employees, agents, successors, and assigns. No change in the ownership, corporate status, or other control of any Respondent, nor any transfer of assets or real or personal property by any Respondent, shall alter any of the Respondent's responsibilities under this Order.

21. During the period in which this Order is in effect, each Respondent shall provide a copy of this Order to any prospective owners or successors before a controlling interest in Respondent's assets within the Butte Site, property rights within the Butte Site, or stock is transferred to the prospective owner or successor. Respondents shall each provide a copy of this Order to each Contractor and laboratory retained to perform any Work under this Order, within 5 days after the effective date of this Order or on the date such services are retained, whichever date occurs later. Respondents shall also each provide a copy of this Order to each person representing Respondent with respect to the Work and shall condition all contracts and subcontracts entered into hereunder upon performance of the Work in conformity with this Order. Each contractor retained to perform Work shall be deemed to be related by contract to Respondent within the meaning of section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3). Notwithstanding the terms of any contract, Respondents are responsible for compliance with this Order as described above and for ensuring that contractors employed by the Respondent comply with this Order, and perform any Work in accordance with this Order.

22. Not later than 30 days prior to any transfer of any real property interest in any property included within the Site, each Respondent who so transfers shall submit a true and correct copy of the transfer document(s) to EPA, and shall identify the transferee by name and principal business address and effective date of the transfer.

IX. WORK TO BE PERFORMED

23. Respondents shall prepare, implement, perform, and complete all actions required by this Order (in the manner described above), including all actions required under approved plans, in accordance with the standards, criteria, specifications, requirements, and schedule set forth herein and in the Partial Remedy Implementation Work Plan, Exhibit3. All Work under this Order is subject to oversight by and the prior approval of EPA. Undertaking any on-Site physical Work activity without prior approval of EPA is a violation of this Order.

24. All Work shall be conducted and completed in accordance with CERCLA, the NCP, pertinent EPA guidance, and any amendments thereto which become effective prior to the date of completion of Work under this Order. Respondents shall be responsible for identifying and using other guidelines, policies, procedures, and information that may be appropriate for performing Work.

25. All Work shall be consistent with the ROD and ESD and the Performance Standards set forth in the ROD, ESD and the Partial Remedy Implementation Work Plan, Exhibit3, including all applicable or relevant and appropriate requirements. Notwithstanding any action by EPA, Respondents remain fully responsible for achievement of the Performance Standards as described above. Nothing in this Order, or in EPA's approval of any document prepared by EPA under this Order, shall be deemed to constitute a warranty or representation of any kind by EPA that full performance of the action will achieve Performance Standards. Respondents' individual or group compliance with such approved documents does not foreclose EPA from seeking additional Work to achieve Performance Standards.

26. Respondents shall employ sound scientific, engineering, and construction practices in performing Work under this Order. All tasks shall be under the direction and supervision of qualified personnel with experience in the types of tasks required for implementation of the Work.

27. All Work shall be under the direction and supervision of a qualified project manager. Within 10 days after the effective date of this Order, Respondents shall each notify EPA in writing of the name, address, telephone number, and qualifications of the respective Respondent's project manager and the identity and qualifications of the primary support entities, staff, and contractors proposed to be used in carrying out Work under this Order. With respect to any proposed project manager, Respondent shall demonstrate that the proposed project manager

is sufficiently qualified. If at any time any Respondent proposes to use a different project manager, support entities, staff, or contractors, that Respondent shall notify EPA and provide similar information at least 14 days before such persons perform any Work under this Order.

28. EPA will review each Respondent's selection of and changes in project managers, support entities, staff, or contractors according to the terms of this Section and Section XIV of this Order. If EPA disapproves of the selection of project managers, support entities, staff, or Contractors by a Respondent, that Respondent shall submit to EPA within 14 days after receipt of EPA's disapproval, a list of project managers, support entities, staff, or contractors that would be acceptable to Respondent. EPA will thereafter provide written notice to that Respondent of the names that are acceptable to EPA. That Respondent may then select any approved name or names from that list and shall notify EPA of its selection(s) within 14 days of receipt of EPA's written notice.

29. Respondents shall, as appropriate and in accordance with the responsibilities described above, no later than 10 days prior to any off-Site shipment of hazardous substances from the Site to an out-of-State waste management facility, provide written notification of such shipment of hazardous substances to the appropriate state environmental official in the receiving state, to EPA, and to DEQ. However, the notification of shipments shall not apply to any off-Site shipments when the total volume of all shipments from the Site to the state will not exceed 10 cubic yards.

a. The notification shall be in writing, and shall include the following information: (1) the name and location of the facility to which hazardous substances are to be shipped; (2) the type and quantity of hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method and route of transportation. Respondents shall notify EPA, DEQ, and the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state or to a facility in another state.

b. The identity of the receiving facility will be determined by Respondents at the earliest possible time. Respondents shall provide all relevant information, including the information noted above, as soon as practicable after a decision is reached, but in no event later than the time specified in this Paragraph.

30. Respondents shall cooperate with EPA in providing information regarding the Work to the public. If requested by EPA, Respondents shall participate in the preparation of such information for distribution to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to the Site.

X. FAILURE TO ATTAIN PERFORMANCE STANDARDS

31. In the event that EPA determines that response activities in addition to those set forth in the Partial Remedy Implementation Work Plan, Exhibit 4, are necessary to attain Performance Standards or accomplish the selected remedy for the Butte Site, EPA may notify Respondents, as EPA determines appropriate, that additional response actions are necessary.

32. Unless otherwise stated by EPA, within 30 days of receipt of notice from EPA that additional response activities are necessary to meet Performance Standards, Respondents so notified shall submit for approval by EPA a work plan for the additional response activities. The plan shall conform to the applicable requirements of Sections IX, XVI, and XVII of this Order. Upon EPA's approval of the plan pursuant to Section XIV, Respondents so notified shall implement the plan for additional response activities in accordance with the provisions and schedule contained therein.

XI. EPA PERIODIC REVIEW

33. Under section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations, EPA may review the RA and Work to assure that the Work performed pursuant to this Order adequately protects human health and the environment. Respondents shall conduct the studies, investigations, or other response actions determined necessary by EPA for EPA to conduct its review. As a result of any review performed under this Paragraph, Respondents may be required to perform additional Work or to modify Work previously performed.

XII. ADDITIONAL RESPONSE ACTIONS

34. EPA may determine that work, in addition to that identified in this Order or in the Partial Remedy Implementation Work Plan, Exhibit3, may be necessary to protect human health and the environment. If EPA determines that additional response activities are necessary, EPA may require Respondents, as determined by EPA, to submit a work plan for additional response activities. EPA may also require Respondents to modify any plan, design, or other deliverable required by this Order, including any approved deliverable.

35. Not later than 30 days after receiving EPA's notice that additional response activities are required pursuant to this Section, Respondents so notified shall submit a work plan for the response activities to EPA for review and approval. Upon approval by EPA, the work plan is incorporated into this Order as a requirement of this Order and shall be an enforceable part of this Order. Upon approval of the work plan by EPA, Respondents so notified shall implement the work plan according to the standards, specifications, and schedule in this Order and the approved work plan. Respondents so notified shall notify EPA of its intent to perform such additional response activities within 7 days after receipt of EPA's request for additional response activities.

XIII. ENDANGERMENT AND EMERGENCY RESPONSE

36. In the event of any action or occurrence during the performance of the Work which causes or threatens to cause a release of a hazardous substance or which may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action to prevent, abate, or minimize the threat, and shall immediately notify EPA and DEQ. If neither the EPA Remedial Project Manager nor the Alternate Project Manager are available, Respondents shall notify the EPA Emergency Response Branch, EPA Region 8. Respondents shall take such action in consultation with the EPA Remedial Project Manager and in accordance with all applicable provisions of law and of this Order. In the event that Respondents fail to take appropriate response action as required by this Section, and EPA takes action instead, Respondents shall reimburse the United States for all costs of the response action not inconsistent with the NCP.

37. Nothing in the preceding Paragraph shall be deemed to limit any authority of the United States to take, direct, or order any action to protect human health and the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the Site or at or from SBCB.

XIV. EPA REVIEW OF DELIVERABLES

38. After review of any Deliverable which must be submitted for review and approval pursuant to this Order, EPA may: (a) approve the submission, (b) approve the submission with its own modifications, (c) disapprove the submission and direct Respondent(s) to re-submit the document after incorporating EPA's comments, or (d) disapprove the submission and perform all or any part of the response action. As used in this Order, the terms "approval by EPA," "EPA approval," or similar term means the action described in phrases (a) or (b) of this Paragraph.

39. In the event of approval or approval with modifications by EPA, Respondents, as described above, shall proceed to take any action required by the Deliverable, as approved or modified by EPA.

40. Upon receipt of a notice of disapproval or a request for a modification, Respondents shall, as described above, within 7 days or such time as specified by EPA in its notice of disapproval or request for modification, correct the deficiencies and resubmit the deliverable for approval. Notwithstanding the notice of disapproval, or approval with modification, Respondents shall proceed, as described above and at the direction of EPA, to take any action required by any non-deficient portion of the deliverable.

41. Any failure of Respondents to obtain full approval of a Deliverable when required is a violation of this Order.

XV. REPORTING REQUIREMENTS

42. Group 1 and Group 2 Respondents shall separately submit to EPA and DEQ monthly progress reports containing, at a minimum, the following information:

a. A description of actions taken to comply with this Order, including plans and actions completed, during the previous month;

b. A description of problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to mitigate any problems or delays;

c. Any change orders, nonconformance reports, claims made, and actions taken to rectify problems;

d. Work planned for the next month with schedules relating such Work to the overall project schedule as described in the Partial Remedy Implementation Work Plan, Exhibit 4, and

e. Except for information previously submitted, copies of inspection logs and results of all sampling, tests, and other data (including validated analytical data with supporting documentation on Contract Laboratory Program Form I's or in a similar format) received or produced by Respondents during the course of Work during the previous month.

These reports shall be submitted on or before the 10th day of each month from the effective date of the Order and each month thereafter until EPA determines that reports are no longer required.

43. During construction, Group 1 and Group 2 Respondents shall each record information each day on construction activities discussing, at a minimum, the daily activities, field adjustments, change orders, summaries of problems and actions to rectify problems, and such information as is customary in the industry. Information recorded on a given day shall be available to EPA for inspection the following day. The daily records shall be compiled and delivered to EPA and DEQ monthly with the progress reports required under the preceding Paragraph, if requested by EPA or DEQ.

44. Respondents (in the manner described above) shall prepare and submit to EPA and DEQ O&M reports as required under any approved short term or long term O&M Plan (if no specific requirements for reporting is contained in any approved O&M Work Plan, then quarterly) that include, at a minimum, the following elements:

a. A description of O&M activities performed during the reporting period;

b. A description of the performance of each component of the remedial action requiring O&M, including a summary of any monitoring data demonstrating the performance of the remedy and its effectiveness in meeting Performance Standards;

c. A description and summary of the results of all monitoring performed in connection with the remedy;

d. A statistical evaluation of the monitoring data and a conclusion as to whether the results exceed appropriate criteria, and whether any exceedances necessitate the implementation of contingency measures;

e. Identification of any problems or potential problems and a description of all steps taken or to be taken to rectify the problems;

f. An appendix containing all validated data and supporting documentation on Contract Laboratory Program Form I's or in a similar format collected during the reporting period and not previously submitted; and

g. Copies of any O&M training materials and a record of employee attendance at training sessions.

O&M reports shall be submitted on or before the 10th day of January, April, July, and October for quarterly reporting or as specifically described in any approved short term or long term O&M Plan commencing in July 2011, and continuing until EPA notifies Respondents that the frequency of reporting may be reduced.

XVI. QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS

45. Respondents shall ensure that Work performed, samples taken, and analyses conducted conform to the requirements of this Order and the EPA-approved sampling and analysis plan. Each Respondent will ensure that its field personnel are properly trained in the use of field equipment and chain-of-custody procedures.

46. To provide quality assurance and maintain quality control, Respondents shall use the approved quality assurance, quality control, and chain of custody procedures for all samples for which it or they are responsible in accordance with the Clark Fork River Superfund Site Investigations Quality Assurance Project Plan (CFRSSI QAPP) and any amendments made thereto during the course of the implementation of this Order for sampling required of any

Respondent or group of Respondents. Respondents shall ensure that EPA and DEQ personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by Respondents in implementing this Order. In addition, Respondents shall ensure that such laboratories shall analyze all samples submitted by EPA and DEQ pursuant to the CFRSSI QAPP for quality assurance monitoring. Respondents shall ensure that the laboratories they use for the analysis of samples taken pursuant to the Order perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the CFRSSI Laboratory Analytical Protocol, and any amendments made thereto during the course of the implementation of this Order. Respondents shall ensure that all laboratories it uses for analysis of samples taken pursuant to this Order participate in an EPA or EPA-equivalent QA/QC program. Respondents shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Order will be conducted in accordance with the procedures set forth in the QAPP.

47. Upon request, Respondents shall allow split or duplicate samples to be taken by EPA and DEQ or their authorized representatives. Respondents shall give EPA and DEQ reasonable notice of any sample collection activity. In addition, EPA and DEQ shall have the right to take any additional samples that EPA or DEQ deem necessary. Upon request, EPA and DEQ shall allow Respondents to take split or duplicate samples of any samples they take as part of EPA's oversight of Respondents' implementation of the Work.

48. Respondents as described above shall submit to EPA and DEQ copies of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Respondents with respect to the RA and/or the implementation of this Order within thirty days of obtaining verified results of any such sampling, or upon request (for verified or unverified sampling) by EPA.

49. Notwithstanding any provision of this Order, EPA and DEQ retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, CECRA, and any other applicable federal and State statutes or regulations.

XVII. COMPLIANCE WITH APPLICABLE LAWS

50. All Work shall be performed in accordance with the requirements of all federal and State laws and regulations. Except as provided in section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and the NCP, no permit shall be required for any portion of the Work conducted entirely on-Site or within the contiguous Clark Fork Basin Superfund Sites. Where any portion of the Work requires a federal or State permit or approval, Respondents as described above shall submit timely and complete applications and take all other actions necessary to obtain and to comply with all such permits or approvals.

51. This Order is not, and shall not be construed to be, a permit issued pursuant to any federal or State statute or regulation.

52. All materials removed from the Clark Fork Basin collection of listed Superfund Sites shall be disposed of or treated at a facility approved by EPA and in accordance with section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3); with off-site policy regulations at 40 C.F.R. 300.440; and with all other applicable federal, State, and local requirements.

XVIII. REMEDIAL PROJECT MANAGER

53. The Butte Site EPA Remedial Project Manager is:

Sara Sparks, Remedial Project Manager
EPA Region 8 Butte Office
Federal Building
400 North Main St., Room 339
Butte, MT 59701
(406) 782-3264

The Alternate Remedial Project Manager is:

Joe Vranka, 8MO
EPA Region 8 Montana Office
Baucus Federal Building
10 West 15th Street, Suite 3200
Helena, MT 59624
(406) 457-5001

EPA's Butte Site Attorney is:

D. Henry Elsen, Attorney, 8ENF-L/MO
EPA Region 8 Montana Office
Baucus Federal Building
10 West 15th Street, Suite 3200
Helena, MT 59624
(406) 457-5030

DEQ's Butte Site Project Officer is:

Joe Griffin, State Project Officer
Montana Department of Environmental Quality

Remediation Division
P.O. Box 200901
Helena, MT 59620
(406) 841-5042

DEQ's Butte Site Attorney is:

Mary Capdeville, Attorney
c/o Montana Department of Environmental Quality
Remediation Division
P.O. Box 200901
Helena, MT 59620
(406) 444-0225

EPA may change its Remedial Project Manager or Alternate Project Manager or Site Attorney at any time and will inform Respondents of such changes. DEQ may change its Project Officer or Site Attorney at any time and will inform Respondents of such changes.

54. The EPA Remedial Project Manager and Alternate Project Manager shall have the authority lawfully vested in a Remedial Project Manager and On-Scene Coordinator by the NCP. The EPA Remedial Project Manager and Alternate Project Manager shall have authority, consistent with the NCP, to halt any Work required by this Order, and to take any necessary response action.

55. All communications, whether written or oral, from Respondents to EPA shall be directed from Respondent's project manager(s) or other authorized representative or personnel to the EPA Remedial Project Manager or Alternate Project Manager. All communications, whether written or oral, from Respondents to DEQ shall be directed from Respondent's project manager(s) or authorized representative or personnel to the DEQ Project Officer. Respondents shall as described above submit to EPA's Remedial Project Manager two copies, to EPA's Site Attorney one copy, and to DEQ's Project Manager one copy and DEQ's Site Attorney one copy of all documents, including plans, reports, and other correspondence, which are developed pursuant to this Order, and shall hand-deliver or send these documents by regular or overnight mail. A copy of all written notices under this Order sent to EPA shall be sent simultaneously to DEQ.

XIX. ACCESS AND DATA/DOCUMENT AVAILABILITY

56. Respondent shall allow EPA, the State, and their authorized representatives to enter and move freely about any and all property owned or controlled by Respondents at the Site and off-Site areas subject to or affected by the Work under this Order or where documents required to be prepared or maintained by this Order are located, for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Site or Respondents and their representatives or contractors pursuant to this Order; reviewing the progress of Respondents in carrying out the terms of this Order; conducting such tests as EPA or its authorized representatives deem necessary; using a camera, sound recording device or other documentary type equipment; and verifying the data submitted to EPA and the State by Respondents. Respondents shall allow EPA, the State, and their authorized representatives to enter the Site, to inspect and copy all records, files, photographs, documents, sampling and monitoring data, and other writings related to Work undertaken in carrying out this Order. Nothing herein shall be interpreted as limiting or affecting EPA's right of entry or inspection authority under federal law. Nothing herein shall be interpreted as limiting or affecting the State's right of entry or inspection authority under State or federal law.

57. If the Site, any off-Site area that is to be used for access, property where documents required to be prepared or maintained by this Order are located, or other property subject to or affected by the Work, is owned in whole or in part by parties other than those bound by this Order, Respondents will obtain, or use best efforts to obtain, Site access agreements from the present owner(s) within 30 days of the effective date of this Order, unless such access has already been secured.

a. Respondents' collective or individual best efforts shall include providing reasonable compensation to any on or off-Site property owner.

b. Access agreements shall provide access for EPA, the State, and their authorized representatives, and Respondents and their contractors and shall specify that Respondent(s) are not EPA's or DEQ's representative with respect to the Site or Site activities.

c. If not already obtained, copies of such agreements shall be provided to EPA prior to Respondents' initiation of field activities. If access agreements are not obtained within the time referenced above, Respondents as described above shall immediately notify EPA of its failure to obtain access.

58. Subject to the United States' non-reviewable discretion, EPA may use its legal authorities to obtain access for Respondents, may perform response actions with EPA contractors, or may terminate the Order if Respondents cannot obtain access agreements. Respondents shall

reimburse EPA for all response costs (including attorney fees) incurred by the United States to obtain access for Respondents. If EPA performs tasks or activities with contractors and does not terminate the Order, Respondents shall perform all other activities not requiring access to that property, and shall reimburse EPA for all costs incurred in performing such activities. Respondents shall integrate the results of any such tasks undertaken by EPA into the Work it performs under this Order.

59. Respondents shall provide to EPA and DEQ upon request, copies of all documents and information within each Respondent's possession and/or control or that of its contractors relating to activities at the Site or to the implementation of this Order, including but not limited to, sampling, analysis, chain-of-custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to EPA and DEQ for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

60. Respondents may assert a claim of business confidentiality covering part or all of the information submitted to EPA pursuant to the terms of this Order under 40 C.F.R. § 2.203, provided such claim is not inconsistent with section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), or other provisions of law. This claim shall be asserted in the manner described by 40 C.F.R. § 2.203(b) and substantiated by Respondents at the time the claim is made. Information determined to be confidential by EPA will be given the protection specified in 40 C.F.R. Part 2. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to Respondents.

XX. RECORD PRESERVATION

61. For a period of 10 years after Work is completed under this order, Respondents shall preserve and retain all records and documents in its possession or control and in the possession or control of its contractors, on and after the date of signature of this Order, that relate in any manner to the Site, Respondents' potential liability under CERCLA, or performance of Work under this Order. At the conclusion of this document-retention period, Respondents shall notify the United States at least 90 days prior to the destruction of any such records or documents, and upon request by the United States, Respondents shall deliver any such records or documents to EPA at no cost to EPA.

XXI. DELAY IN PERFORMANCE

62. Any delay in performance of this Order that, in EPA's judgment, is not properly justified by the Respondent or Respondents (in the manner described above) under the terms of this Section shall be considered a violation of this Order. Any delay in performance of this Order

shall not affect any Respondent's or group of Respondents' obligations to full perform all obligations under the terms and conditions of this Order.

63. Each Respondent shall notify EPA of any delay or anticipated delay in performing any requirement of this Order for which the Respondent is responsible in the manner described above. Such notification shall be made by telephone to EPA's Remedial Project Manager or Alternate Project Manager within forty eight (48) hours after the Respondent first knew or should have known that a delay might occur. Each Respondent shall adopt all reasonable measures to avoid or minimize any such delay. Within five (5) business days after notifying EPA by telephone, the Respondent shall provide written notification fully describing the nature of the delay, any justification for delay, any reason why the Respondent should be he be held strictly accountable for failing to comply with any relevant requirement of this Order, the measures planned and taken to minimize the delay, and a schedule for implementing the measures that will be taken to mitigate the effect of the delay. Increased costs or expenses associated with implementation of the activities called for in this Order is not a justification for any delay in performance.

XXII. ASSURANCE OF ABILITY TO COMPLETE WORK

64. Group 1 and Group 2 Respondents separately shall establish and maintain financial assurance sufficient to complete all Work covered under this Order. At a minimum, Group 1 and Group 2 Respondents shall demonstrate financial assurance in an amount no less than the estimate of the cost for the Work designated for each group as determined by each group and approved by EPA. Specific requirements are set forth below.

a. Not later than thirty (30) days after the effective date of this Order, Group 1 and Group 2 Respondents separately shall submit to EPA for approval an estimate of the cost of the Work each group is required to perform and a draft instrument for financial assurance in accordance with the options described in paragraph 63 below, in accordance with EPA model documents for each option. Such financial assurance must be sufficient to fund the performance of all Work the relevant group is required to perform, including all Operation and Maintenance activities, as specified in the Partial Remedial Action Work Plan, Exhibit3. Not later than thirty (30) days after EPA approval of the amount and form, Group 1 and Group 2 Respondents shall establish and maintain the approved financial assurance instrument(s). The amount of the financial assurance established and maintained shall be an amount as approved by EPA.

b. Each financial instrument obtained pursuant to this Section must be established and used solely for the purpose of conducting the remediation activities required by this Order at and for this Site. Each financial assurance instrument established

and maintained by the Group 1 and Group 2 Respondents in accordance with this Section must allow the funds provided in the financial assurance to be available in the event that the Group 1 or Group 2 Respondents collectively prove unable or unwilling to undertake any actions required of that group while it is in effect so that the activities covered by the instrument may be completed by EPA.

c. Group 1 and Group 2 Respondents shall review their respective financial assurance mechanisms annually to ensure they are still in effect and funded sufficiently to cover the performance of the remaining Work and other obligations under this Order required of each group. If at any time the amount of funds secured in the financial instrument is insufficient to perform the remaining Work and other obligations under this Order, Group 1 and/or Group 2 Respondents shall provide written notice to EPA within thirty (30) days after the amount of financial instrument becomes insufficient. The written notice shall describe what actions have been or will be taken to fund the instrument adequately.

d. In the event that EPA determines at any time that the financial assurance pursuant to this Section is inadequate, Group 1 and/or Group 2 Respondents, as appropriate, shall, within thirty (30) days of receipt of notice of EPA's determination, obtain and present to EPA for EPA's approval one of the other forms of financial assurance authorized in paragraph 63.

e. If Group 1 or Group 2 Respondents can show that the estimated cost to complete the remaining Work has diminished below the amount established as described above, Group 1 or Group 2 Respondents may, on any anniversary date of entry of this Order, or at any other time agreed to by the parties, request the amount of the financial assurance provided under this Section be reduced to the estimated cost of the remaining work to be performed. Group 1 and/or Group 2 Respondents shall submit a proposal for such reduction to EPA in accordance with the requirements of this Section. Upon approval, Group 1 and/or Group 2 Respondents will initiate steps to reduce the amount of assurance secured in the financial document.

f. Group 1 and Group 2 Respondents shall each submit initial and annual re-certifications or renewed financial assurance, from the Effective Date of this Order, financial assurance documents pursuant to this Section to the EPA attorney and to EPA Region 8 for review at the following address:

Daniela Golden, 8ENF-RC
EPA Region 8
1593 Wynkoop Street
Denver, CO 80202

g. Group 1 or Group 2 Respondent's inability to demonstrate financial ability to complete the Work shall not excuse performance of any Work required under this Order.

65. Group 1 and Group 2 Respondents shall demonstrate their ability to complete the Work this Order requires of their respective groups and to pay all claims that arise from the performance of the Work by obtaining and presenting to EPA, within 30 days from the effective date of this Order, one of the following: (1) a performance bond; (2) a letter of credit; or (3) a surety bond. The selected financial assurance mechanism will allow EPA to determine that Respondents have sufficient assets available to perform the Work required of their respective groups.

66. Not later than 10 days after the Effective Date, each Respondent shall submit to EPA a certification stating that each Respondent (or its Contractor(s)) has adequate insurance coverage or indemnification for injuries or damages to persons or property which may result from the activities that it has conducted or were conducted on its behalf pursuant to this Order. Each Respondent shall ensure that such insurance or indemnification is maintained for the duration of the Work required by this Order.

XXIII. UNITED STATES NOT LIABLE

67. The United States, by issuance of this Order, and the State assume no liability for any injuries or damages to persons or property resulting from acts or omissions by Respondents, or their directors, officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order. EPA, DEQ, the United States, and the State may not be deemed to be parties to any contract entered into by Respondents or their directors, officers, employees, agents, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order.

68. Respondents shall indemnify, save, and hold harmless the United States, the State, and their officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action or other costs incurred by the United States or the State, including but not limited to, attorneys fees and other expenses of litigation and settlement arising from or on account of acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Order, including any claims arising from any designation of Respondents as EPA's authorized representative(s) under section 104(e) of CERCLA, 42 U.S.C. § 9604(e).

XXIV. ENFORCEMENT AND RESERVATIONS

69. EPA reserves the right to bring an action against Respondents under section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States related to the Site and not reimbursed by Respondents. This reservation shall include but not be limited to past costs, direct costs, indirect costs, the costs of oversight, the costs of compiling the cost documentation to support the oversight cost demand, as well as accrued interest as provided in section 107(a) of CERCLA, 42 U.S.C. § 9607(a).

70. Notwithstanding any other provision of this Order, at any time during the response action, EPA may perform its own studies, complete the Work or any response action (or any portion of the Work or response action) as provided in CERCLA and the NCP, and seek reimbursement from Respondents for its costs, or seek any other appropriate relief.

71. Nothing in this Order shall preclude EPA or DEQ from taking any additional enforcement actions, including modification of this Order or issuance of additional Orders, and/or additional remedial or removal actions as EPA may deem necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

72. Notwithstanding any provision of this Order, the United States and the State hereby retain all of their information gathering, inspection, and enforcement authorities and rights under CERCLA, RCRA, and any other applicable statutes or regulations.

73. In the manner described above, Respondents shall be subject to civil penalties under section 106(b) of CERCLA, 42 U.S.C. § 9606(b), of not more than $32,500 for each day in which Respondents willfully violate, or fail or refuse to comply with this Order without sufficient cause. In addition, failure to provide response action properly under this Order, or any portion hereof, without sufficient cause, may result in liability under section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), for punitive damages in an amount at least equal to, and not more than three times the amount of any costs incurred by the Fund as a result of such failure to take proper action.

74. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person for any liability it may have arising out of or relating in any way to the Site.

75. If a court issues an order that invalidates any provision of this Order or finds that Respondents have sufficient cause not to comply with one or more provisions of this Order, Respondents shall remain bound to comply with all provisions of this Order as described above not invalidated by the court's order.

XXV. EFFECTIVE DATE AND COMPUTATION OF TIME

76. This Order shall be effective 45 days after signing. All times for performance of ordered activities shall be calculated from this effective date unless specifically noted otherwise.

XXVI. OPPORTUNITY TO CONFER

77. Respondents may, individually or collectively, within 10 days after the date this Order is signed, request a conference with EPA to discuss this Order. The conference must be held within 40 days after the date this Order is signed, between the dates of August 4 and August 30, 2011, on a date mutually agreeable between EPA and the requesting Respondent(s). The conference shall be limited to discussion of issues involving the implementation of the response actions required by this Order and the extent to which Respondent(s) intend to comply with this Order. This conference is not an evidentiary hearing, and does not constitute a proceeding to challenge this Order. It does not give any Respondent a right to seek review of this Order, or to seek resolution of potential liability, and no official stenographic record of the conference will be made. At any conference held pursuant to Respondent's or Respondents' request, Respondent(s) may appear in person or by an attorney or other representative. Such conference shall not delay the performance of any Work.

78. Requests for a conference must be by telephone followed by written confirmation mailed that day to:

D. Henry Elsen
Sr. Enforcement Attorney
EPA Region 8 Montana Office
10 West 15th Street
Suite 3200
Helena, MT 59624
(406) 457-5030

IT IS SO ORDERED

BY: Julie A. DalSoglio DATE: 7/21/11

Julie A. DalSoglio, Director
Montana Office
EPA Region 8

Exhibit 1 to the Unilateral Administrative Order for the Butte Priority Soils Operable Unit/Butte Site – Docket No. CERCLA-08-2011-0011

The 2006 Butte Priority Soils Operable Unit Record of Decision (EPA) is located in the BPSOU Administrative Record at SDMS # 1098577. Copies can be provided upon request.

Exhibit 2 to the Unilateral Administrative Order for the Butte Priority Soils Operable Unit/Butte Site – Docket No. CERCLA-08-2011-0011

The 2011 Butte Priority Soils Operable Unit Record of Decision Explanation of Significant Differences (EPA) is located in the BPSOU Administrative Record at SDMS # 1195656, and is available on the EPA website at http://www.epa.gov/region8/superfund/mt/sbcbutte/index.html. Copies can be provided upon request.

Exhibit 3

Partial Remedy Implementation Work Plan

For the Butte Priority Soils Operable Unit/Butte Site

EPA June 2011

1.0 Introduction to the Partial Remedy Implementation Work Plan for the Butte Site

This Partial Remedy Implementation Work Plan (PRI Work Plan) describes the status, as of June 2011, of remedial design and remedial implementation efforts for the 2006 Butte Priority Soils Operable Unit (BPSOU or Butte Site) Record of Decision (ROD) (EPA 2006) as modified by the 2011 BPSOU Explanation of Significant Differences (ESD) (EPA 2011). This PRI Work Plan also describes remedial design, remedial action, and operations and maintenance activities that are required for the 2011 and 2012 time period.

As noted below, the remediation required by the 2006 BPSOU ROD as modified by the 2011 BPSOU ESD has not been through complete remedial design for all components. Accordingly, this PRI Work Plan is not a comprehensive or final work plan for implementation of the 2006 BPSOU ROD. After the completion of further remedial design activities, a comprehensive work plan will be developed to describe the implementation of full remedial activities at the Butte Site.

All approvals described in this PRI Work Plan shall be done by EPA, the lead agency, in consultation with DEQ, the support agency. All references to "Responsible Party" or "Responsible Parties" can also be read as "Respondent" or "Respondents" as used in the Unilateral Order for Partial Remedy Implementation, to which this PRI Work Plan is attached.

2.0 Major BPSOU ROD Components

This section describes briefly the major components of the 2006 BPSOU ROD as modified by the 2011 BPSOU ESD. A more complete description of the components is found in the 2006 ROD and the 2011 BPSOU ESD themselves. Actions and requirements described in the 2006 BPSOU ROD, as modified by the 2011 BPSOU ESD, are defined as Remedy.

The 2006 BPSOU ROD states that the cleanup will address potential and actual threats to human health or welfare or the environment from heavy metals and arsenic in mine waste and contaminated soils in the BPSOU.

Performance standards are set forth in the 2006 BPSOU ROD. Performance standards are directly linked to the long-term protection of human health and the environment from contaminants of concern present at the BPSOU, and include the final ARARs for the site (Appendix A to the2006 BPSOU ROD) and the soil, ground water, and surface water action levels described in Tables 1, 2, and 3 (Appendix A to the PRI Work Plan). Other key performance standards are the vegetation, weed and erosion standards described in the Butte Reclamation Evaluation System (BRES), which is an attachment to the 2006 BPSOU ROD. Performance of the full Remedy must ultimately comply with performance standards, and performance standards will be monitored through comprehensive and interrelated monitoring programs for each media, respectively. These monitoring programs will be reviewed and approved by EPA in consultation with DEQ.

2.1 Residential Contamination

General Remedy Description:

EPA's action levels for residential, commercial/ industrial, and recreational soils and dust are described in Table 1, Appendix A.

The Remedy requires yards, recreational, and industrial/business areas be remediated if yard soils, interior dust in living spaces and/or attics, if an attic pathway exists, are above applicable action levels. The yard/recreational/business location and indoor dust cleanup apply throughout the BPSOU, and the attic dust portion applies throughout the BPSOU and to an area adjacent to the BPSOU. The Butte Site map, Appendix C to the UAO, describes the areas in which each of these elements will be applied.

Current 2011 Status: Remedial Design has produced a final remedial action plan for this component. The plan is known as the Residential Metals Abatement Program Plan (April 2010). This plan was approved by EPA and the State of Montana Department of Environmental Quality (DEQ) after informal public review and comment. The April 2010 Residential Metals Abatement Program Plan, including all schedules, is incorporated by reference into this PRI Work Plan.

2.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System

General Remedy Description:

As noted, action levels for contaminated solid media in residential and non-residential portions of the BPSOU are shown in Table 1, Appendix A. All contaminated solid media within the BPSOU containing concentrations of arsenic, lead, or mercury above the respective action levels shall be addressed. Also, source areas that do not exceed action levels shall be addressed if diagnostic monitoring performed as part of the surface water management and BMP program indicates that the source area contributes contaminant loads to receiving surface waters during wet weather runoff conditions.

The BRES (see 2006 BPSOU ROD Appendix E) establishes the vegetation, weed, and erosion performance standard for all completed solid media response actions under the Remedy except residential yards and playgrounds. The system is specifically designed for use in the upland environment of Butte. To accommodate the diverse land types and end land uses within the BPSOU, the BRES is designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings, excluding residential yards and playgrounds. The system also has components that allow it to be applied to areas reclaimed as open space within this urban setting. Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document. This system is a tool created for the BPSOU to evaluate the site-specific stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the Butte Site, as well as a tool to create and implement operation and maintenance plans and site-specific corrective action work plans for each area on a periodic basis.

The BRES is an evaluation tool for reclaimed and revegetated land, relying on routine inspections to assess the following:

- Condition and diversity of vegetative cover
- Presence of erosion
- Condition of site edges
- Presence of exposed waste material
- Presence of bulk soil failure or mass instability
- Presence of barren areas or gullies

The system also sets corrective action "triggers", coordinated with the conditions listed above. Based on the periodic monitoring and evaluation of response action sites, the triggers noted in the BRES require corrective action in a timely and appropriate manner in accordance with the scheduling requirements of the BRES. Vegetated cover soil caps must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the Remedy.

Current 2011 Status: The 2006 BRES, including all schedules and timetables described in BRES and including the need for written, approved work plans to address triggers and corrective actions, is incorporated into the PRI Work Plan by reference. Initial implementation efforts of BRES by the responsible parties have not produced timely or documented corrective actions (see the final Silver Bow Creek/Butte Area Five Year Review Report). Responsible parties shall implement BRES as written and provide any needed reports and work plans, including operation and maintenance plans and corrective actions plans documenting such compliance as directed by EPA in consultation with DEQ.

2.3 Groundwater

General Remedy Description:

The ground water component of the Remedy requires the continued use of the Hydraulic Control Channel (HCC) and the Metro Storm Drain (MSD) area capture and interception system to capture and pump contaminated ground water (and some surface water) into the Butte Treatment Lagoons facility for treatment prior to discharge. Both the HCC and the MSD area capture and interception system are to be thoroughly evaluated and improved as needed. Waste left in place in the Lower Area One (LAO) and MSD area will not be excavated. Additional ground water control measures, such as infiltration barriers, ground water diversion, or other measures, may also be needed and are to be evaluated. The ground water aquifer must be further evaluated and characterized to ensure the effectiveness of the interception and pumping systems. The area between the HCC and the MSD area capture and interception system must be further evaluated and controlled if necessary. Ground water monitoring and data reporting is required. The wetlands demonstration area near Kaw Avenue and George Street will be used for the construction of an emergency over flow pond (a minor modification to the 2006 BPSOU ROD – see page 12-34 of the ROD)). A five year shakedown period for operation of the MSD interception and pumping facility is required. Institutional controls to prevent the domestic use of the alluvial aquifer are required.

The Remedy requires the capture and treatment of contaminated groundwater. The 2006 BPSOU ROD contained a waiver of ARAR standards for the alluvial ground water within the defined TI Waiver Area described in the 2006 BPSOU ROD. The Remedy will not and is not intended to clean up groundwater to meet groundwater performance standards within the boundary of the waived standards. Therefore, there are no performance standards for groundwater in the area of the BPSOU alluvial aquifer that is covered by the TI waiver boundary. The TI boundary is shown in Figure 12-6 of the 2006 BPSOU ROD. Based on the data collected during the groundwater monitoring program, additional points of compliance may be determined necessary by EPA in consultation with DEQ in future remedial design (e.g., southern edge of the MSD).

Since the Remedy requires that contaminated plumes be prevented from migrating outside the established TI zone, the boundary for the TI zone represents the point of compliance boundary for groundwater, and groundwater performance standards must be met at these points of compliance and beyond. Groundwater quality standards (Appendix A, Table 2) will apply to groundwater at and beyond the edge of this boundary .

Groundwater contamination outside of the boundary of the TI zone in excess of groundwater performance standards identified in Appendix A, Table 2 shall constitute a violation.

Design of a groundwater treatment system at the Butte Treatment Lagoons facility and a sludge disposal plan must be approved by EPA, in consultation with DEQ, and the construction, operation, and maintenance of the facility will be monitored by EPA and DEQ in accordance with approved plans. The facility will be designed so that any discharge from the facility must meet water quality ARARs described previously and in Appendix A. Design, construction, maintenance, operation, and monitoring of the facility will be conducted according to the engineering standards established during remedial design and ARARs, and must be approved by EPA in consultation with the State. Treated water discharged to Silver Bow Creek shall meet all discharge requirements set forth in the ARARs. This discharge to surface water is discussed in greater detail in the following section.

Current 2011 Status: Remedial Design for this component is only partially completed with additional remedial design needed. A final remedial action plan for the ground water component of the Remedy has not been yet approved.

A well ban institutional control to prevent domestic ground water use was enacted and is in effect. A number of aquifer evaluations and related studies have been done under approved plans. Certain active measures for this component were done under the 2009 and 2010 Scopes of Work and order amendments (these two Scopes of Work are incorporated into this PRI Work Plan by reference). Additional remedial design actions and active measures that are ripe for implementation are described below in section 3.0. A Revised Interim Ground Water Monitoring Plan has been developed and shall be implemented as described below.

As noted, a final remedial action plan and a final Ground Water Monitoring Plan are not yet developed or approved and will be developed at a later date.

2.4 Surface Water

General Remedy Description:

In addition to the robust implementation of the ground water remedial component described above to prevent contamination from ground water and certain captured surface water from contributing to exceedances of surface water Performance Standards), the 2006 BPSOU ROD requires the removal of in-stream sediments and near stream contamination in the reach of Silver Bow Creek and certain areas of Blacktail Creek which were not addressed in the prior Lower Area One non-time critical removal action. It also requires that the discharge from the Butte Lagoon Treatment Lagoons facility meet Performance Standards for discharges (see section 2.6 below) in a permanent manner.

For wet weather conditions, the 2006 ROD requires the remediation of several specifically identified sites which are known to contribute to contaminated storm water runoff (this requirement is part of the solid media component of the remedy and also addresses surface water remediation). The evaluation and implementation of Best Management Practices (BMPs) on a yearly basis to control wet weather run-off under a variety of scenarios and flows such that surface water Performance Standards are met is also required. If BMPs do not meet surface water Performance Standards within a fifteen year time period, the 2006 BPSOU ROD provides for contingency measures such as the construction of a collection and treatment plant system for stormwater and/or flow augmentation in Silver Bow Creek.

The overall remedial goal for the ROD as applied to Silver Bow Creek is to achieve and maintain the in-stream concentrations of site-specific COCs (aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver and zinc) below the numeric surface water quality standards identified in the ARARs(Appendix A to the 2006 BPSOU ROD), for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek within and directly downstream of the BPSOU.

The Remedy requires an EPA approved comprehensive, long-term surface water monitoring program that will include collection of compliance and diagnostic flow and chemistry data for normal flow and wet weather conditions in receiving surface waters and within intermittent storm water conveyances at the BPSOU.

Current 2011 Status: Remedial Design for this component is only partially completed with additional remedial design needed. A final remedial action plan for the surface water component of the Remedy has not been developed or approved, and is not contained in this PRI Work Plan.

The specific sites identified in the 2006 BPSOU ROD for reclamation due to storm water contribution have been addressed. Certain sediments and near-stream contamination have been addressed but more remedial design and remedial action for this component of the Remedy are required. EPA's 2008 *Surface Water Characterization Report* (EPA October 2008) provided significant data and analysis regarding COCs and stormwater and other wet weather events. This provided a basis for identifying and requiring up-front BMPs of a significant nature. The first and second cycle of BMPS and other actions were implemented in 2009 and 2010, and included the beginning of additional storm water capture in existing catch basins, the beginning of a curb and gutter program in the BPSOU, and a program for routinely cleaning out contaminated sediments

from the BSB storm water conveyance system. A Third Cycle of up-front storm water control BMPs is identified below.

The BMP identification and implementation process will continue beyond the Third Cycle actions described below, along with surface water monitoring. Additional remedial design and remedial action measures will be required for a final surface water remedial action plan to be completed.

2.5 Groundwater Treatment Facility

General Remedy Description:

As previously described, the Butte Treatment Lagoons facility shall be evaluated and designed to ensure that contaminated groundwater captured from MSD and LAO (and certain captured surface water that is transported to the facility) is treated to ARAR standards, the plant can be operated efficiently and effectively in a variety of conditions, and sludge disposal can occur in accordance with the 2006 ROD and ARARs . The treatment plant will meet "end of pipe" discharge standards defined as the lesser of the chronic or human health surface water quality standards presented in Appendix A, Table 3.

Paired total recoverable and dissolved samples shall be collected and analyzed for COCs. Hardness-based standards will be calculated using the hardness of the sample collected from the treatment plant discharge, as directed by Circular DEQ-7. Two, 24-hour composite samples will be collected each week on random days to monitor compliance (for example, sampling will not be limited to Mondays and Thursdays).

Other analytes that shall be monitored include: dissolved calcium and magnesium (for hardness calculations), total alkalinity, total dissolved solids, total suspended solids, and sulfate. Temperature and pH will be monitored daily. Additional required field parameters will be determined based on the operational needs of the facility.

Current 2011 Status: Phase I of the comprehensive evaluation and re-design of the Butte Treatment Lagoons facility and system is completed and implementation of those actions is addressed below. Phase II of the evaluation and re-design of the lagoon treatment system is also described below. Sludge disposal plans are not yet complete.

2.6 Surface Water Monitoring and Compliance Requirements

General Remedy Description for In-Stream Monitoring and Compliance during Normal Flow Conditions:

In-stream surface water quality must meet surface water ARARs during normal flow conditions. Surface water flow and chemistry will be collected at least monthly from compliance monitoring stations GG-01 (Grove Gulch), SS-04 (Blacktail Creek), and stations SS-05, SS-05A, SS-06A, SS-06G, and SS-07 in Silver Bow Creek (Figure 12-7). All in-stream water quality samples shall be collected using the channel width integrated composite technique specified in the Clark Fork River Superfund Site Investigations Standard Operating Procedure (CFRSSI SOP) SW-1 – Collection of Surface Water Samples. Because of poor mixing at station SS-07, and the critical nature of this station, samples at SS-07 shall be collected using the depth and width integrating technique (used by the USGS), breaking the stream into 20 to 25

sections from bank to bank, and a churn splitter. Annual data summary reports shall be submitted to EPA showing the location, frequency and duration, and magnitude of exceedances for all COCs and shall include the data in an easily accessible electronic format such as a spreadsheet or database. The annual report will also present an interpretation for the source and significance of exceedances that occurred during the monitoring year.

Current 2011 Status: Because the ground water and surface water remedial components have not yet been fully developed or implemented, in-stream surface water quality has been improved significantly but ARARs has not yet been attained, especially for copper. A final surface water monitoring plan has not been developed. The interim surface water monitoring report - Interim Surface Water Monitoring Plan (EPA, April 2007) – is in effect. Annual reports are required under this plan and will be used to develop final remedial work plans and monitoring plans. In addition, additional monitoring requirements to be implemented at this time are described below.

General Remedy Description for Monitoring and Compliance during Wet Weather Flow Conditions

Wet weather flow conditions are defined as flow greater than 50 cfs at monitoring station SS-07 in Silver Bow Creek or greater than 35 cfs at station SS-04 in Blacktail Creek. These threshold flows are substantially above normal base flows at the respective monitoring stations and were chosen as general guidelines to help ensure that data are collected during true wet weather conditions.

Compliance during wet weather conditions means consistently measuring concentrations of COCs at in-stream compliance monitoring locations that are below the Montana DEQ-7 acute aquatic life standards (Appendix A, Table 3). Water quality in Silver Bow Creek within the Butte Site is affected by water flowing into the Butte Site (i.e., upstream in Blacktail Creek).

Compliance with standards is expected to be achieved over the 15 year period described below. Once compliance is achieved over a period of time, then compliance with acute standards during wet weather conditions will continue to be required consistently going forward. A final surface water monitoring plan is required.

A minimum of one automated sampler will be installed at each compliance monitoring station and at the upstream monitoring station to obtain data during wet weather conditions. Additional samplers may be required as deemed necessary during design, at some or all locations to obtain data for different portions of the storm hydrograph.

Current 2011 Status: Because the ground water and surface water remedial components have not yet been fully developed or implemented, in-stream surface water quality in wet weather conditions has been improved significantly but standards have not yet been attained. A final surface water monitoring plan, has not yet been developed. The interim surface water monitoring report - Interim Surface Water Monitoring Plan (EPA, April 2007) – is in effect. Annual reports are required under this plan and will be used to develop final remedial work plans and monitoring plans. In addition, additional monitoring requirements to be implemented at this time are described below.

2.7 Other Remedial Components – Syndicate Pit, Granite Mountain Memorial Interpretative Area, and Butte Mine Waste Repository

General Remedy Description:

The Syndicate Pit within the BPSOU shall be reclaimed, to the extent practicable, for use as a mine training center if feasible. Shallow to moderate slopes will be reclaimed using soils caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The pit base will continue to be used as a sediment basin. The Granite Mountain Memorial Area shall be subject to various reclamation, use restrictions, and enhancements in keeping with its historical character. These include reclaiming source areas in publicly used areas, restricting access to certain areas of historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions shall be consistent with the preservation requirements and other standards and the county's historical park plan. A Butte Mine Waste Repository was previously established and shall be used for the disposal of removed waste and contamination associated with BPSOU response actions. When the existing structure is full, it shall be closed in compliance with ARARs. A new repository will be sited next to the existing repository if that capacity is needed. It, too, would be closed using the same methods.

Current 2011 Status: The Syndicate Pit was reclaimed pursuant to an approved remedial action work plan. A construction completion report for the Syndicate Pit remediation component was prepared by the responsible parties (December 10, 2010) and approved by EPA and DEQ on May 10, 2011. Operation and maintenance actions are required at the Syndicate Pit. The Granite Mountain Memorial Interpretive Area (GMMIA) was remediated pursuant to two approved remedial action work plans (Phase I and Phase II). A construction completion report for the GMMIA remedy component has not yet been prepared by the responsible parties because the work is not complete for the GMMIA. 90 days after construction completion of the GMMIA, the PRPs will submit a draft CCR for review by EPA and DEQ and approval by EPA. Operation and Maintenance activities are required at the GMMIA. The initial Butte Waste Repository is in use and is nearly full. Requirements for development of a second repository adjacent to the first repository are described below. Closure and monitoring activities are required for all waste repositories.

2.8 Institutional Controls

General Remedy Description:

The 2006 BPSOU ROD requires the development, implementation, funding and enforcement and implementation of the following institutional controls (ICs) at a minimum: A. a controlled ground water area for the alluvial aquifer Technicality Impracticability zone to prevent domestic use of the contaminated ground water there as well as other controls for ground water use; B. Butte Silver Bow enacted zoning and ordinance/permit requirements for storm water controls, protection of capped and waste in place areas, removal and disposal of contaminated dirt, as well as other possible requirements: C. Deed notices under Montana state law for capped and waste in place areas; and D. fencing and signs where appropriate.

Current 2011 Status: ICs have not been fully implemented. The ground water control area IC was enacted by the State of Montana Department of Natural Resources on October 13, 2009. Butte-Silver Bow County enacted a storm water control ordinance in early 2011. The Group 1 responsible parties prepared a draft IC plan to address certain other IC requirements, which was submitted for informal public review on April 23, 2010. Approval of this plan by EPA is discussed below. The Group 2 responsible parties prepared a draft IC plan which is undergoing agency review and is subject to EPA approval at a later date. Fencing and signing are implemented upon request by EPA.

2.9 Operation and Maintenance

General Remedy Description:

Many aspects of the Remedy require long term operation and maintenance. This work must be done under approved and detailed operation and maintenance plans.

Current 2011 Status: There are several short term operation and maintenance plans in existence. Long term plans for the various aspects are not yet complete.

3.0 Specific Work Requirements for 2011 and 2012 for Partial Remedy Implementation

This section describes briefly the major components of the remedial design, remedial action, and operation and maintenance work required for 2011 and 2012. As noted, the 2009 and 2010 Scopes of Work issued by EPA under other orders remain in effect and actions under those documents is required, in addition to the actions described below.

3.1 Residential Contamination

As noted above, the final Multi-Pathway Residential Metals Abatement Program Plan (RMAP) (Responsible Parties April 2010), which is the remedial action work plan for this component of the Remedy, was approved by EPA and DEQ. This work plan is incorporated by reference into the PRIWP and shall be implemented by the Group 1 Responsible Parties. Soils action levels are described in Attachment A, Table 1.

For years 2011 and 2012, the Group 1 responsible parties shall sample and remediate the number of residential areas described for such years in the RMAP. Other required actions under the RMAP, such as medical monitoring, community outreach and education efforts, and long term database upkeep and tracking, shall also be implemented as described in the RMAP. The Butte Site map, Attachment C to the UAO, describes the areas in which each of these elements will be applied.

In summary, the RMAP requires that all residential properties within the BPSOU and the attics in the adjacent area noted on the map, Attachment B, be sampled, assessed, and abated within 20 years as described in the RMAP. A complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, attic dust, lead-based paint, drinking water, and mercury vapor) of all residential properties

that are known to be occupied or expected to be occupied must be completed within the first 10 years of the initiation of the expanded program (initiation occurred in 2009). During this 10-year period, the clean-up of residential properties that exceed the action levels will occur in concert with the assessment program. In addition, the program uses community awareness and education, long term database upkeep and tracking, and medical monitoring to ensure its effectiveness.

The Group 1 responsible parties developed and submitted as part of the RMAP to EPA and DEQ for review and approval by EPA, in consultation with DEQ, a long-term tracking method and database to ensure that all data and residential activities are tracked. Properties that were not or are not occupied or the owner refused access during the assessment period will be tracked and abated in the future if necessary. In addition, the tracking program will follow changes in ownership and remodeling of homes that were found to have contaminated attic dust but no current pathway. The long-term BSB RMAP Data Base tracking program will be continued for at least 99 years.

The RMAP implementation shall include community awareness and education and medical monitoring conducted by the Group 1 Responsible Parties. Participation in the medical monitoring will be encouraged through community awareness and education. Medical monitoring shall use blood lead, blood mercury, and urinary arsenic data to identify individuals who have concentrations of those elements above risk-based thresholds. When individuals are found to have elevated blood lead, blood mercury, or urinary arsenic, the home where the affected person or persons live shall be scheduled for immediate sampling and evaluation. Residential remediation shall be performed if sampling determines that yard soil, interior living-space dust, or mercury vapor action levels are exceeded. The Group 1 Responsible Parties shall submit a draft Medical Monitoring Program Remedial Design Workplan deliverable as part of the RMAP. EPA and ATSDR, in consultation with DEQ will review and comment on the workplan deliverable. The final Medical Monitoring Program Remedial Design work plan deliverable shall be submitted for EPA review and approval, in consultation with DEQ, and completed by November 30, 2012 and, until then, medical monitoring shall continue under existing protocols and plans.

Annual reports describing all activities under the RMAP shall be prepared by the Group 1 Responsible Parties by December31, 2011 and December31, 2012, in conjunction with the reports required in Section 15 of the RMAP.

3.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES)

Contaminated solid media located in non-residential areas within the BPSOU site include waste rock piles, smelter wastes, milling wastes, and contaminated soils. Solid media in non-residential areas including but not limited to commercial areas, open areas, and non-active mining areas may exceed action levels (see Attachment B). These areas may also pose a threat to the environment as a result of storm water runoff. For example, runoff from these areas is a source of copper and zinc loading to receiving waters.

Contaminated solid media shall be addressed through a combination of source removal, capping, and land reclamation. If a contaminated non-residential area is discovered, the PRPs will develop a draft site

specific work plan for the area within 45 days of discovery of the site and submit it to EPA for review and approval in consultation with DEQ.

Butte Reclamation Evaluation System

As noted above, The Butte Reclamation Evaluation System (BRES) (see 2006 ROD Appendix E) establishes the vegetation, weed, and erosion performance standard for all completed solid media response actions under the Remedy except for residential areas and playgrounds. The BRES is incorporated by reference into this PRIWP and shall be implemented by the Group 1 and Group 2 responsible parties in the manner described in the Unilateral Administrative Order. This includes the schedules and timetables for inspection, evaluation, and corrective action contained therein, as well as the requirement for specific work plans to address deficiencies found during the inspections and evaluations. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the Butte Site. Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document.

By July14, 2011, work plans shall be developed for the sites that were evaluated during the 2007 and 2008 inspections and evaluations conducted by the responsible parties under BRES. The work plans will be submitted to EPA and DEQ for review and comment and approval by EPA. O&M and corrective action construction activities for these sites will be conducted during the 2011 field season; however, some projects may be completed in 2012 if necessary. By April 30, 2012, the remaining BRES work plans (for inspections and evaluations conducted in 2009 and 2010) shall be submitted to EPA and DEQ for review and comment and approval by EPA. These sites will be approved by EPA in 2012 and construction activities will be completed by the end of field season 2012, however some projects may be completed in 2013 if necessary (see Appendix C, Schedule).

Long Term Tracking and Database

The Group 1 and Group 2 responsible parties shall develop daily Construction Activity Reports and submit them to the EPA and DEQ by close of business each Friday for the past week's BRES activities. All data concerning the BRES inspections, evaluations, and corrective actions shall be added to the BRES O&M Data Base. In addition, the BRES O&M data base will be updated weekly and submitted to EPA and DEQ for review. The data base shall be updated with all of the approved reports and other information created to date by December 31, 2011, and shall be maintained as described above thereafter.

3.3 Ground Water

MSD Subdrain

The Metro Storm Drain (MSD) subdrain extends from the BSB City/County Shops approximately 4,000 feet through lower MSD. It has been improved and upgraded over the last several years under initial remedial design and remedial action efforts. Contaminated alluvial groundwater in the MSD shall continue to be captured by the MSD subdrain ground water interception and pumping system under the MSD channel and/or another appropriate groundwater collection system by the Group 1 and Group 2 Responsible Parties. The captured groundwater shall continue to be pumped from the terminal vault in the

MSD to the Butte Treatment Lagoons facility at LAO by the Group 1 and Group 2 Responsible Parties. The captured and pumped water will be treated by lime precipitation technology as described below by the Group 1 and Group 2 Responsible Parties before being discharged to Silver Bow Creek. All necessary operation and maintenance activities for the MSD subdrain groundwater interception and pumping system shall be implemented by the Group 1 and Group 2 Responsible Parties.

Wetland Demonstration Area/Contingency Overflow Pond

The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall be used as a contingency overflow pond for the operation and maintenance of the MSD subdrain groundwater interception and pumping system. The Group 1 and Group 2 Responsible Parties shall submit a draft contingency overflow pond remedial action workplan to EPA and DEQ for review in consultation with DEQ by July 31, 2011. A final deliverable shall be submitted within thirty days of receipt of comment for approval by EPA in consultation with DEQ. Remedial Action activities shall begin under this plan shall begin in 2011 and be completed in 2012.

Irrigation Control

Current land use practices in the MSD area, particularly in some areas overlying portions of the Parrott Tailings, do not minimize recharge of groundwater through areas containing waste. Irrigated ball fields and unpaved portions of the City County Shops overlie a portion of the Parrott Tailings. Recharge of the groundwater is significantly increased by irrigation of the ball fields and melting of plowed snow that is frequently piled on the County Shop property. The Group 1 and Group 2 Responsible Parties shall immediately cease irrigation of the ball fields overlying the Parrot Tailings and discontinue the use of the unpaved County Shop area to pile snow removed from city streets and pavements. See Appendix D, the EPA direction letter of November 18, 2008 on this matter. The Group 1 and Group 2 Responsible Parties may complete a study to determine if there is a method to water the turf on the ball fields which would prevent the irrigation water from migrating into the tailings. If such a study is completed, that deliverable will be submitted to EPA for review and approval by EPA in consultation with DEQ.

Localized Groundwater Study

The Group 1 and Group 2 Responsible Parties shall develop a groundwater study work plan to characterize groundwater flow properties and quality in the area between the MSD vault and the groundwater collection features at the Butte Reduction Works. The draft groundwater study work plan shall be submitted to EPA and DEQ by the Group 1 and Group 2 Responsible Parties for review and comment. The final deliverable shall be submitted within thirty days of receipt of EPA comments for approval by EPA in consultation with DEQ by October 20, 2011. Additional groundwater monitoring wells may be necessary to conduct the study and, if so, shall be described in the work plan or ordered by letter from EPA. The assessment of the groundwater for this area shall be completed by December of 2012.

Groundwater Flow Monitoring for the MSD

Load monitoring in the MSD Subdrain was completed once in 2009 and was presented by the Group 1 and Group 2 Responsible Parties in the Draft Final Metro Storm Drain (MSD) 2009 Tracer-Dilution Study Technical (Atlantic Richfield 2010). This investigation concluded that alternative methods of

measuring flows and loading would be equally effective and easier to implement than dye tracer methodology. As a result, the requirement for load monitoring using a dye tracer will be replaced by an alternate monitoring method as described in the 2011 ESD. Flumes shall be installed by the Group 1 and Group 2 Responsible Parties within manholes in the subdrain immediately and a load monitoring plan will be developed as a part of O&M of the MSD subdrain groundwater interception and pumping system to determine whether the subdrain continues to operate as expected and is not fouling or clogging. At a minimum, the load monitoring plan shall address the following elements:

- Determine a pumping level in the vault that ensures that the subdrain is not adding contaminated water back into the aquifer in the vicinity of the pump vault
- Establish flumes or weirs and totalizers within the subdrain to continuously monitor flow
- Identify monitoring wells adjacent to the subdrain to be monitored that will signify when subdrain cleanouts are needed
- Overall description of flow measurement and monitoring procedures
- Location and description of monitoring points
- Description of flow measurement techniques
- Developing an SOP for the flow measurement and water sampling within the subdrain
- Monitoring schedule based on two monitoring events per year to be conducted at high water table conditions (approximately June or July) and low water table conditions (approximately October or November) of each year.
- An annual data summary report shall be prepared no later than June 30 of the year following data collection that includes: all measurements, analytical results and field notes for monitoring events; all flow rate and pumping rate data for the year; water level data from pertinent monitoring wells for the year; all analytical data pertinent to the subdrain collected between monitoring events; calculation of loads and mass balance to determine if the pumping rate is matching the subdrain collection rates and to assure that the subdrain is not adding contaminated water back into the aquifer near the pump vault; recommendations for operations changes, if needed: and other elements typical of a data summary report..

BRW East End Grading and MSD/BRW Upgrades Work Plans

The Responsible Parties previously submitted, and EPA approved, an MSD/Butte Reduction Works Remedial Action Work Plan (2010). The tasks outlined in the MSD/BRW Upgrades work plan are primarily completed. A punchlist has been developed for the remaining work and includes various small maintenance tasks along the MSD channel. The tasks remaining to be completed under this punchlist include replacing the cleanout caps along the MSD, performing minor slope repair along the MSD storm water channel, and some miscellaneous fencing to be done along the MSD and in the BRW area. This work shall be implemented by the Group 1 and Group 2 Responsible Parties and be conducted throughout the summer and completed in the fall of 2011.

The Responsible Parties previously submitted, and EPA approved, a BRW East End Grading Plan. Per the BRW East End Grading Work Plan, Responsible Parties have completed all grading of the BRW-01 East, BRW-01 West, and BRW-00 ponds. This grading was completed to change the groundwater gradient to allow contaminated water to be collected in these ponds and reduce metals loading to Silver Bow Creek. The remaining task to be completed under this work plan includes completion of the access road through the site and re-seeding of disturbed areas within BRW. This work shall be completed by the Group 1 and Group 2 Responsible Parties in early summer of 2011.

Culvert Removal

In addition to this grading work, the Group 1 and Group 2 Responsible Parties shall remove both sets of culverts located in the LAO section. The upstream culverts and local sediments upstream of the culverts are anticipated to be permanently removed in the fall 2011. The Group 1 and Group 2 Responsible Parties shall develop a work plan to replace the downstream culverts with a more permanent vehicle crossing structure and submit this deliverable to EPA for review and approval by EPA in consultation with DEQ by January 31, 2012. This work will be completed in 2012.

BRW Groundwater and Surface Water Monitoring

During construction of the BRW ponds, the Responsible Parties have monitored both local wells and the Silver Bow Creek reach adjacent to the BRW. The Group 1 and Group 2 Responsible Parties shall continue to monitor both water levels and metals concentrations throughout the remainder of the year in the same manner to evaluate the effectiveness of the grading plan and report all monitoring results and data to EPA and DEQ upon collection. Based on this data, the Responsible Parties and EPA and DEQ shall meet in the fall of 2011 and EPA shall determine and order further remedial actions associated with the BRW area in 2012.

Abandoned Aquaduct

Group 1 and Group 2 Responsible Parties shall determine potential impacts from material in and under the abandoned aqueduct. The material located in the abandoned aqueduct could be mobilized and transported to the creek during elevated stream conditions and affect surface water quality. A report about this material shall be submitted by the Group 1 and Group 2 Responsible Parties by September 30, 2011. Alternatives to be considered in this study range from no further action to removal of the aqueduct itself, its contents, or installation of sheet piling below the structure. The study will be evaluated by EPA and DEQ and a determination made in writing by EPA about the necessary actions shall be made in the winter of 2011-2012. The Group 1 and Group 2 Settling Defendants shall implement all required work in 2012.

MSD Subdrain Groundwater Management Report

The Group 1 and Group 2 Responsible Parties shall develop an MSD Subdrain Groundwater Management Report under direction from EPA and DEQ. The report shall include information about the installation of infiltration barriers over tailings in the MSD corridor, diversion of groundwater from the MSD subdrain to the Berkeley Pit, and further MSD subdrain groundwater interception and pumping system upgrades and other measures to optimize the operation of the MSD subdrain. The report shall be submitted in draft form by the Group 1 and Group 2 Responsible Parties by October 15, 2011 to EPA for

comment by EPA in consultation with DEQ. The final deliverable shall be submitted within thirty days of receipt of comments to EPA for review and approval by EPA in consultation with DEQ.

Revised Groundwater Monitoring

An Interim Groundwater Monitoring Plan for the alluvial aquifer, dated November 14, 2007 was completed by the Agencies and implemented by the PRPs for the alluvial aquifer to ensure that groundwater controls are effective; to provide additional information as necessary on the movement, quality, and quantity of groundwater; and to provide data for ongoing oversight of the groundwater remedy. EPA, in conjunction with DEQ, has modified the Groundwater Monitoring Plan to reflect current conditions and concerns. The modified plan, known as the Interim Revised Ground Water Monitoring Plan (EPA 2011) is attached to this Work Plan as Appendix E. The Group 1 and Group 2 Responsible Parties, as described in the UAO, shall implement the plan as written, including the installation and development of additional wells as described in the plan. EPA may request and order changes to the monitoring system and the Interim Revised Groundwater Monitoring Plan as data are evaluated.

3.4 Surface Water

The existing catch basin structures within BPSOU shall continue to be operated and maintained to maximize effectiveness by the Group 1 Responsible Parties. EPA may direct upgrades or improvements to the existing facilities, and such directions shall be implemented by the Group 1 Responsible Parties.

Slag Canyon Sediment Removal

Substantial bank and near-stream contamination removal and associated reclamation by Responsible Parties has occurred under prior order amendments and EPA direction. In addition to the ongoing monitoring of loads entering SBC along the BRW described above and below, the Group 1 and Group 2 Responsible Parties shall evaluate the feasibility and effectiveness of removing sediments within SBC from its confluence with the Metro Storm Drain downstream through the BRW area. In this evaluation, the Responsible Parties will make a recommendation to EPA on an effective means of addressing these sediments. This evaluation will be conducted throughout the remainder of 2011, and a summary report that addresses these sediments will be submitted to the agencies by October 15, 2012. The Responsible Parties shall implement sediment removal or mitigation actions as a result of the evaluation of this report, as directed by EPA in consultation with DEQ.

Third Cycle Upfront Stormwater BMPs

Since 2009, the Responsible Parties have implemented two cycles of upfront stormwater control best management practices to mitigate contaminated storm water run-off. These actions included the reclamation and revegetation of areas identified as contamination contributors to storm water runoff, initiation of stormwater system sediment cleanout activities on a periodic basis, the expansion and improvement of existing catch basins, and the initiation of a curb and gutter program, among other things. These actions were conducted under order amendments and were consistent with the 2006 BPSOU ROD requirements for a yearly BMP program to address contaminated stormwater until in-stream ARARs are consistently met.

Since 2009, the Responsible Parties have also prepared a variety of preliminary evaluations that looked at how improvements or maintenance activities or other actions could enhance the overall performance of the existing storm water infrastructure and improve water quality within the BPSOU. The intent of these BMP evaluations is to improve water quality that discharges from the existing storm water infrastructure and other storm water sources into Silver Bow Creek. The BMP actions listed and required below (the Third Cycle Upfront Stormwater BMPs) are based on those evaluations and EPA's own determinations and experience, and describe the ongoing programs that shall be implemented by the Group 1 and Group 2 Responsible Parties, as well as any BMP actions that need to be further developed in order to control storm water runoff. The Group 1 and Group 2 Responsible Parties shall continue to evaluate the effectiveness of the storm water BMPs and determine if additional BMPs are necessary to meet the site ARARs as directed by EPA in consultation with DEQ.

A. Clean out of the BSB Stormwater System

This work includes the cleanout and/or repair of subsurface stormwater drain sections which are linked to hazardous substance releases or potential releases through stormwater events. The Group 1 and Group 2 Responsible Parties shall continue implementation of the sediment *Removal Plan for the Butte Silver Bow Municipal Stormwater System within the Butte Priority Soils Operable Unit* (May 2010), and complete the work for 2011and 2012 as soon as practicable. These practices need to continue into the future to prevent build up of sediment in the BSB infrastructure.

B. Illicit connections

An evaluation of the existing storm water structures in the uptown Butte area was conducted during the fall of 2008 in the Butte Silver Bow Municipal Storm Water System Improvement Plan. Numerous illicit sanitary sewer connections were located during the study. The Group 1 Responsible Parties shall continue to locate and repair all illicit sanitary sewer connections identified in the past or newly identified to the BSB stormwater system. All repaired illicit sanitary sewer connections shall be described in a report/deliverable and submitted to the EPA for review and approval in consultation with DEQ every three months during 2011 and 2012.

C. The implementation of a curb and gutter program in Butte

The Group 1 Responsible Parties shall continue full implementation of the *Curb and Gutter Priority Plan for the Butte Silver Bow Municipal Stormwater System within the Butte Priority Soils Operable Unit* (May 2010), and complete the work for 2011 and 2012 (and future years) as soon as practicable.

D. The construction of stormwater catch basins at the base of Buffalo Gulch

A catch basin or more than one catch basin shall be constructed by the Group 1 and Group 2 Responsible Parties at the base area of Buffalo Gulch. These may include the purchase and development of catch basins on Mc Donough (BG-01), Lisac (BG-01) and/or WL-12 properties. The Group 1 and Group 2 Responsible Parties shall use best efforts to obtain these properties to build the largest catch basins possible in the area. Atlantic Richfield Company owns the land that WL-12 is proposed to be built on and discussions are ongoing for the purchase of other areas. A draft Buffalo Gulch Catch Basin(s) draft remedial action work plan shall be submitted to EPA and DEQ for review and comment by EPA no later than September 30, 2011. A final deliverable shall be submitted to EPA and DEQ within thirty days of

receipt of comments for approval by EPA in consultation with DEQ. Catch basin work approved by EPA shall be installed in Buffalo Gulch in 2012.

E. Hydrodynamic Devices

The Group 1 and Group 2 Responsible Parties shall construct the following Hydrodynamic Devices described in the Draft Plan for Third Cycle Best Management Practices (April 2011) as modified by direction from EPA:

- Texas Avenue. This hydrodynamic device shall be installed in 2011. It will be a 10-year design flow device.
- Warren Avenue. This hydrodynamic device shall be installed in 2011. It will be a 10-year design flow device.
- Anaconda Road. This hydrodynamic device shall be installed in 2012. It will be a 10-year design flow device.
- Montana Street. This hydrodynamic device shall be installed in 2012. It will be a 10-year design flow device.
- Buffalo Gulch. Theses hydrodynamic devices are located at the bottom of Buffalo Gulch. One shall be located on the corner of Holland and Main Street and the other on the corner of Front and Dakota Street and will be 2-year design flow devices.
- These shall be installed with the catch basins in 2012.

F. BSB Street Maintenance and Snow Management Plan

The Group 1 Responsible Parties shall develop a comprehensive street maintenance and snow management plan for the BPSOU that will cover issues such as snow removal and storage, heavy metal sampling of sand before it is used on the streets, street cleaning and the use of water to prevent dust problems from potentially contaminated dirt on city streets. The workplan/deliverable shall be submitted to EPA for review and approval by EPA in consultation with DEQ by September 30, 2011. This plan shall be completed by the November 2011 and implemented thereafter.

EPA Oversight of BSB Municipal Activities

EPA and DEQ recognize that the curb and gutter and stormwater system improvement actions described above overlap with BSB's municipal functions. EPA and DEQ will cooperate with BSB in its oversight and approval of BSB actions in these situations to ensure that duplicate reporting or inconsistent obligations are avoided to the extent practicable. EPA and DEQ's oversight of these actions does not extend to municipal actions which do not address the release or potential release of hazardous substances, such as stormwater system improvement actions outside of the Butte Site boundaries.

G. Additional Source Controls

Under the Remedy, an unreclaimed, disturbed site that does not exceed lead or arsenic human health action levels shall still be addressed by the Group 1 Responsible Parties if data collection, including data

collection under the surface water monitoring and BMP program, demonstrates that surface water contaminants of concern (i.e., copper and zinc) from the site are migrating off-site and impacting surface water quality in Silver Bow Creek, Blacktail Creek, or Grove Gulch Creek. If such sites are discovered by the Group 1 Responsible Parties, remedial actions for these sites shall be designed in a workplan/deliverable submitted to EPA and DEQ and implemented as approved by EPA. The action to be implemented will be determined during review of a proposed workplan, but is anticipated to be consistent with previous source area actions completed in BPSOU. These sites shall also be evaluated and maintained over the long-term in accordance with the BRES, the Butte Hill Revegetation Specifications, and site-specific design plans.

Specifically, EPA, in consultation with DEQ, has determined that the following list of sites along with their current status shall be part of the Third Cycle stormwater BMP action under the Remedy.

- New and Mahoney Street. The property owner is in the process of developing a portion of this site. The Group 1 Responsible Parties shall oversee the development of the property and ensure the contamination up gradient of the site is addressed. A CCR for the site shall be submitted to EPA and DEQ 3 months after completion of these activities.

- 800 North Main. The Group 1 Responsible Parties shall develop a workplan for this site in 2011. EPA, in consultation with DEQ, shall review and approve the workplan/deliverable. Remediation activities shall be completed by the end of 2012. A CCR for the site shall be submitted 3 months after completion of these activities.

- The Group 1 Responsible Parties prepared a draft technical memorandum on Additional Source Control and Engineering Sediment Control BMPs in May 2010. This evaluation presented a number of additional source control erosional areas that could benefit from mitigation. Twenty sites were identified and shall be addressed under a work plan/deliverable to be submitted to EPA for review and approval in consultation with DEQ as soon as practicable. Figure 1 shows the location of the source control areas to be addressed under this work. Potential mitigation for these sites include soil caps, rip-rap lined ditches, rock check dams, vegetated swales, concrete chutes, sediment traps, traffic barriers, silt fences, tailings removal, membrane lined ditches, and protection under the BSB storm water ordinance. Three of the source control sites are located on railroad property, and shall be addressed under the O&M Plan or other specifically approved plans for those properties by the Group 2 Responsible Parties. Construction activities for these twenty sites shall begin in 2011 and shall be completed in 2012. Construction Completion Reports (CCRs) shall be submitted 3 months after completion of these activities.

3.5 Groundwater Treatment Facility and Related Facilities

As noted above, the 2006 BPSOU ROD requires the continued operation of West Camp capture and pumping structures, the Butte Treatment Lagoons facility and the hydraulic control channel (HCC) for the treatment of captured ground and surface water in accordance with ARARs and any approved or applicable plans. The West Camp facilities, the Butte Treatment Lagoons facility and the HCC shall continue to be operated and maintained in as effective and efficient manner as possible by Responsible Parties such that Performance Standards are obtained under a variety of conditions for end of pipe

discharges. Monitoring and data reporting under existing plans and understandings for the discharge shall continue.

In addition, the 2006 BPSOU ROD requires the re-design and upgrade of the Butte Treatment Lagoons facility. That remedial design action has been ongoing. The following actions are required of the Group 1 and Group 2 Responsible Parties for the 2011 and 2012 seasons.

Phase I—2011 Construction

- The existing West Camp Pump Station shall be upgraded. Work will include a new, larger precast concrete pump station building with new interior piping, valves and control system. A permanent diesel fired generator shall be installed to provide electrical power during outages, and a new electrical panel shall be installed. The existing well shall be retrofitted with a pitless adaptor and the existing above ground piping between the well and the control building shall be replaced with below grade piping. A new submersible pump shall be installed controlled by a new variable frequency drive.

- Eight treatment lagoon outlet structures shall be upgraded. All metal wing walls, handrails and exposed piping shall be repainted. Any metal wing walls requiring substantial repair due to corrosion shall be replaced with concrete structures. Existing screw operated slide gates shall be replaced with corrosion resistant guide channels and stop logs. Existing metal stop logs shall be replaced with synthetic stop logs. All deteriorated concrete structures shall be repaired or replaced. Existing silt curtains shall be replaced and new silt curtains will be installed to optimize flow within the treatment lagoons. Permanent silt curtain anchors shall be installed and a means of measuring water elevation differential across each curtain shall be provided. Instrumentation will be upgraded for monitoring.

- The existing Automatic Sampling Building and Effluent Station shall be replaced. A new precast concrete sampling building will be constructed and a below grade effluent metering vault shall be installed. New sampling equipment shall be installed and the instrumentation and control system shall be upgraded.

- A new Influent Pump Station shall be constructed and include a heated building to house the new pumps, piping, valves, flow meters, instrumentation and controls. A new inlet structure shall be constructed and the existing inlet structure and pump station left in place for backup. Two new influent pipelines shall be constructed between the pump station and the CAS building. A dedicated diesel generator shall be installed to provide backup power during outages.

All of this Phase 1 work is described and addressed in *the Final Butte Treatment Lagoons (BTL) and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan(, May 12, 2011)*, which was approved by EPA and DEQ and which is incorporated herein by reference.

Phase II—2012 Construction

The Phase 2 work described below shall be addressed under a remedial action work plan submitted by the Responsible Parties. The draft work plan shall be submitted to EPA and DEQ for comment by the October 30, 2011. A final workplan/deliverable shall be submitted for review and approval by EPA in consultation with DEQ within thirty days of receipt of comments or as otherwise approved by EPA. A

Final Phase II LAO Butte Treatment Lagoons facility and related facilities Remedial Action Plan shall be completed and approved by March 30, 2012.

- At the Butte Treatment Lagoons (BTL) facility, site utility improvements shall include a new potable water line, fire hydrants and sewage force main to service the planned Operation Building. Capacity of the existing effluent pump station electrical service will be increased to serve the new Influent Pump Station.

- The existing Chemical Addition System (CAS) shall be upgraded. Design information for all equipment will be provided, including specific capacities for all tanks, mixers, and lime handling equipment. An addition to the existing building shall be constructed. Improvements to the interior shall improve service life and ease maintenance. Lime feed equipment will be upgraded to provide redundancy and reliability. Either a portable lime tank or a second lime silo shall be provided. Compressed air shall be piped in from the new Operations Building when it is built, and the existing compressor removed. New influent piping shall be constructed and the existing interior piping replaced. A connection to the new potable water line shall be made. The existing sluice box shall be replaced and a new distribution tank constructed. All three distribution channels between the CAS building and the treatment lagoons shall be replaced with precast concrete channels. Instrumentation and controls shall be upgraded.

- Access roads serving the BTL area shall be generally improved. Gravel roads along the dikes shall be graded, and resurfaced with gravel. The Operations Building and CAS road and parking lot shall be paved. Signage and traffic control shall be updated.

- A new Operations Building shall be constructed to provide operator office and lab space, as well as heated maintenance and storage space. A new control center shall be installed and be connected to an extensive network of monitoring points. A dedicated diesel generator shall be installed to provide electrical power during outages.

The following long term plans shall be prepared as part of the Final Phase II LAO Butte Treatment Lagoons Facility Remedial Action Plan:

- Water Management Plan will address the treatment system design basis with a breakdown of incoming flows, detailed treatment capacity, detailed online storage volumes, off-line storage capacity, off spec water management, and alternate modes of operation.

- Sludge Management Plan will address sludge removal, sludge handling, dewatering and disposal. The plan will include specific design information on all structures and equipment.

- Instrumentation, Controls and Monitoring Plan will provide complete design information for all existing and new systems.

- Construction Report for the recent MSD Pump Vault upgrades and will include specific information for all installed equipment and control.

3.6 Surface Water Monitoring

The Responsible Parties shall continue to implement the Interim Surface Water Monitoring Interim Monitoring Plan (EPA, April 2007). In addition, the following actions shall be taken in addition to those described in the April 2007 monitoring plan:

EPA or DEQ may require opportunistic wet weather sampling and monitoring upon notice and such sampling and monitoring shall be implemented as requested;

Automated wet weather sampling for station SS-06A shall be set up to collect individual samples every hour for 24 hours; and

SS-01 is added to this list of required sampling stations.

All data results shall be reported as directed by EPA and as stated in the 2007 Interim Surface Water Monitoring Plan. EPA and DEQ will develop a final Surface Water Monitoring Plan for implementation at a later date.

3.7 Other Remedial Requirements

Butte Mine Waste Repository

The Group 1 Responsible Parties shall ensure that remediation waste management activities at the Butte Mine Waste Repository are implemented in compliance with the approved Butte-Silver Bow County BPSOU Mine Waste Repository Operations and Maintenance Plan, June 2009.

In addition, the Group 1 Responsible Parties shall construct a new repository cell within the GMMIA boundary. The draft remedial design/draft remedial action report describing this construction shall be submitted to EPA and DEQ for comment by March 31, 2012. A final workplan/deliverable shall be submitted within thirty days of receipt of comment for approval by EPA in consultation with DEQ. The repository shall be constructed in 2012. All future repository cells used to contain mine wastes from the BPSOU shall be closed in a manner consistent with the initial repository closure, according to site-specific design plans, and shall comply with all pertinent ARARs. Closed repositories shall be evaluated and maintained over the long-term in accordance with the BRES, the Butte Hill Revegetation Specifications, and project-specific O&M plans. The Butte Mine Waste Repository O&M plan shall be submitted to EPA and DEQ for review and approval by EPA in consultation with DEQ no later than 30 days prior to the completion of any closure activities at the repository.

If it is determined by EPA, in consultation with DEQ, that Superfund waste cannot be disposed of in the Butte Mine Waste Repository because it is waste regulated under RCRA or the State equivalent of RCRA, or is otherwise not appropriate for disposal at the Butte Mine Waste Repository, the Group 1 Responsible Parties shall identify the names and locations of facilities where the waste materials will be shipped, the type and quantity of waste that will be generated and the method of transportation that will be used; and submit this information to EPA for review and approval, in consultation with DEQ.

3.8 Institutional Controls

The Group 1 and Group 2 Responsible Parties shall monitor and enforce, with adequate funding and planning, the ground water control area rule enacted by DNRC and any amendments thereto. The Group 1 and Group 2 Settling Defendants shall monitor and enforce, with adequate funding and planning, the 2011 BSB Storm Water Ordinance and any amendments thereto.

EPA will submit final comments, based on the public input received on the draft plan, to the draft Group 1 Institutional Control Plan in the summer of 2011. The Group 1 Responsible Parties shall revise the plan accordingly and submit a final Group 1 Institutional Control Plan within 60 days of receipt of the comments for final EPA approval. EPA and DEQ will submit comments on the Group 2 draft institutional control plan in 2011, and the plan shall be revised by the Group 2 responsible Parties accordingly.

EPA and DEQ will work with the county and others to ensure that workable and adequate zoning controls and permit requirements are enacted and enforced. EPA and DEQ will continue to work with the Responsible Parties for the installation of appropriate signage and fencing as needs arise and after input from affected landowners.

3.9 Operations and Maintenance (O and M)

There are several short-term, EPA-approved O&M plans in existence for various actions within the BPSOU site. These plans shall continue to be implemented by the appropriate Responsible Parties until final O&M plans are approved by EPA in consultation with DEQ. The Remedy requires the development of long-term and integrated comprehensive monitoring and O&M plans for all aspects of the Remedy, and these shall be addressed as full remedial action is implemented. Interim O&M plans, as described below, shall be developed for review and approval by EPA in consultation with DEQ as described below. All approved O&M activities shall be implemented by the Responsible Parties as appropriate.

The Residential Metals Abatement Program Plan and the IC Plans have or will have long term implementation elements included within those plans and do not require separate O&M plans.

During the O&M period, Responsible Parties as appropriate shall submit quarterly O&M data reports and an annual O&M report to document and evaluate the operation and performance of the system(s), including performance monitoring results, unless otherwise noted in this UAO.

Railroad O&M

This plan by the Group 2 Responsible Parties shall address the areas remediated or capped on railroad property and shall include any catch basins or waste repositories on such land. The draft Interim Group 2 Railroad O&M plan shall be submitted to EPA and DEQ for review and comment within 30 days of the effective date of the UAO. A final Interim Group 2 O and

M Plan/deliverable shall be submitted to EPA and DEQ by the Group 2 Responsible Parties within 30 days of receipt of comments for approval by EPA in consultation with DEQ. The plan shall include the date certain for transfer of certain waste repository land previously identified to BNSF to Butte Silver Bow County (which was a condition of the original waste repository approval construction) or for the removal of such wastes from the repository to a new, approved repository.

BTL, West Camp, and MSD Groundwater Capture System O&M

The draft Interim BTL System, West Camp,and MSD Groundwater Capture System O&M plan was submitted by Group 1 and Group 2 Responsible Parties to EPA and DEQ for review and comment . A final Interim BTL System and MSD Ground Water Capture system O&M Plan/deliverable shall be submitted to EPA and DEQ for approval by EPA in consultation with DEQ within thirty days of receipt of comments by EPA or as otherwise indicated by EPA.

Interim Stormwater Ponds and Engineering Controls O&M

This plan shall address all stormwater ponds and stormwater engineered structures within the Butte Site. The plan shall also address any other stormwater BMP components if those components are not addressed under other O&M plans (such as source area plans) or municipal operation plans. The draft Stormwater Ponds and Engineering Controls O& M plan shall be developed and submitted to EPA and DEQ for review and comment by EPA in consultation with DEQ by December 15, 2011. A final such plan/deliverable shall be submitted within thirty days of receipt of comments by Group 1 and Group 2 Responsible Parties for approval by EPA in consultation with DEQ.

Appendix A– Soil, Groundwater, and Surface Water Performance Standards

Appendix B– Butte Site and BPSOU Map

Appendix C–Schedule

Appendix D– EPA November 8, 2008 letter on snow disposal

Appendix E– Revised Interim Ground Water Monitoring Plan, 2011

Figure 1 – Source Control Area Map

Appendix A

Table 1
Soil, Dust, and Vapor Action Levels in Residential Areas

Contaminant of Concern (COC)	Exposure Scenario	Concentration
Lead	Residential	1,200 milligrams per kilogram (mg/kg)
	Non-residential	2,300 mg/kg
Arsenic	Residential	250 mg/kg
	Commercial	500 mg/kg
	Recreational	1,000 mg/kg
Mercury	Residential	147 mg/kg
	Residential (vapor)	0.43 micrograms per cubic meter ($\mu g/m^3$)

Table 2
Action Levels for Contaminated Solid Media in Non-Residential Areas

Contaminant	Commercial/Industrial	Recreational
Lead	2,300 mg/kg	2,300 mg/kg
Arsenic	500 mg/kg	1,000 mg/kg

Table 3
Standards for Ground Water

COC	Standard (Dissolved)[1]
Arsenic	10 µg/L
Cadmium	5 µg/L
Copper	1,300 µg/L
Lead	15 µg/L
Mercury	2 µg/L
Zinc	2,000 µg/L

1 As presented in the BPRSOU ROD, these are the DEQ-7 standards published in February 2006.

Table 3
Numeric Water Quality Standards

Contaminant	Human Health Standard (µg/L)	Chronic Aquatic Standard (µg/L)	Acute Aquatic Standard (µg/L)	Notes
Aluminum	--	87	750	Dissolved fraction
Arsenic	10	150	340	
Cadmium	5	0.097	0.52	Hardness-dependent
Copper	1,300	2.85	3.79	Hardness-dependent
Iron	--	1,000	--	
Lead	15	0.545	13.98	Hardness-dependent
Mercury	0.05	0.91	1.7	
Silver	100	--	0.374	Hardness-dependent
Zinc	2,000	37	37	Hardness-dependent

Note: All standards are based on total recoverable analysis except for aluminum.
µg/L = micrograms per liter

Appendix B

Residential Metals Expanded Area Attic Only

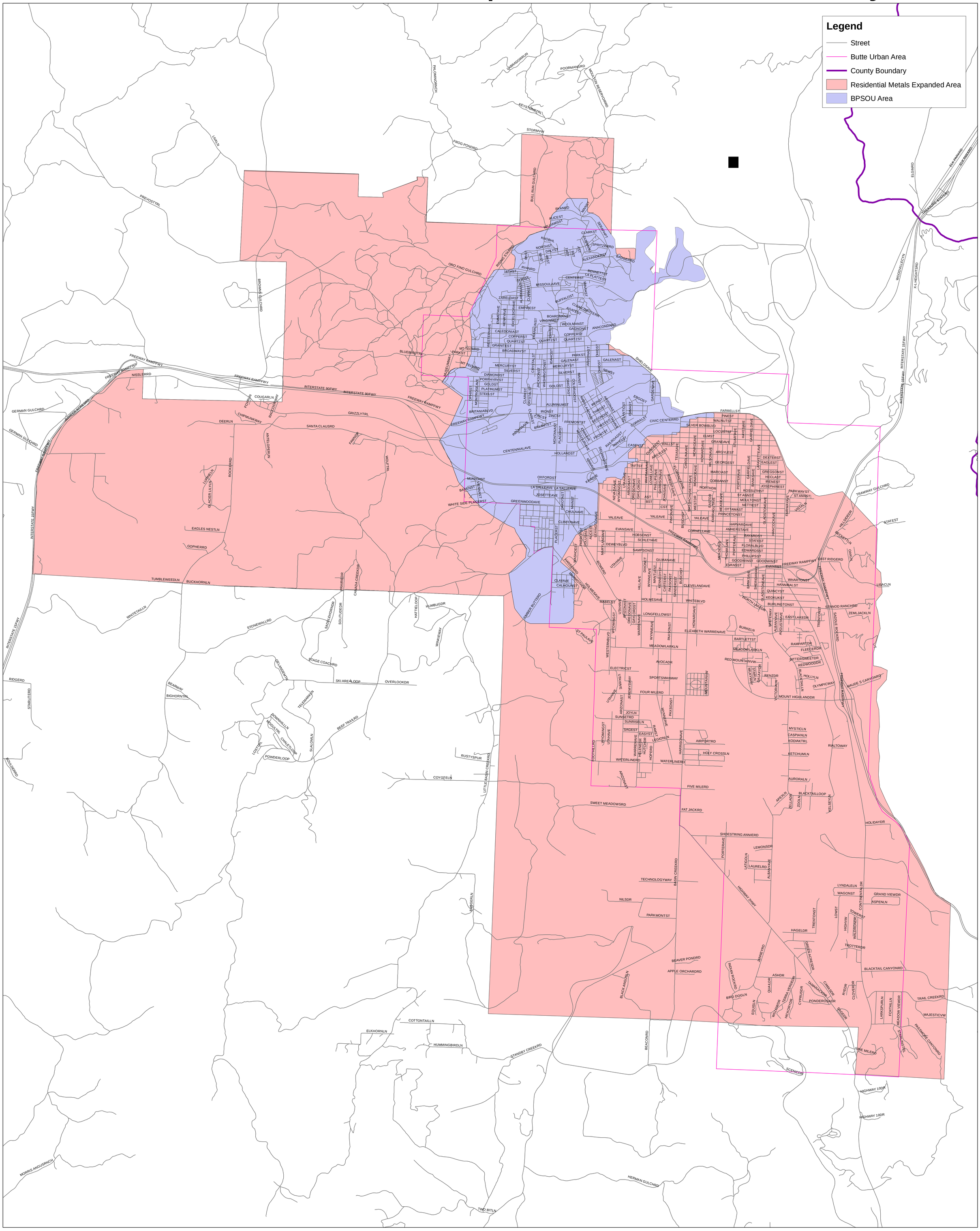

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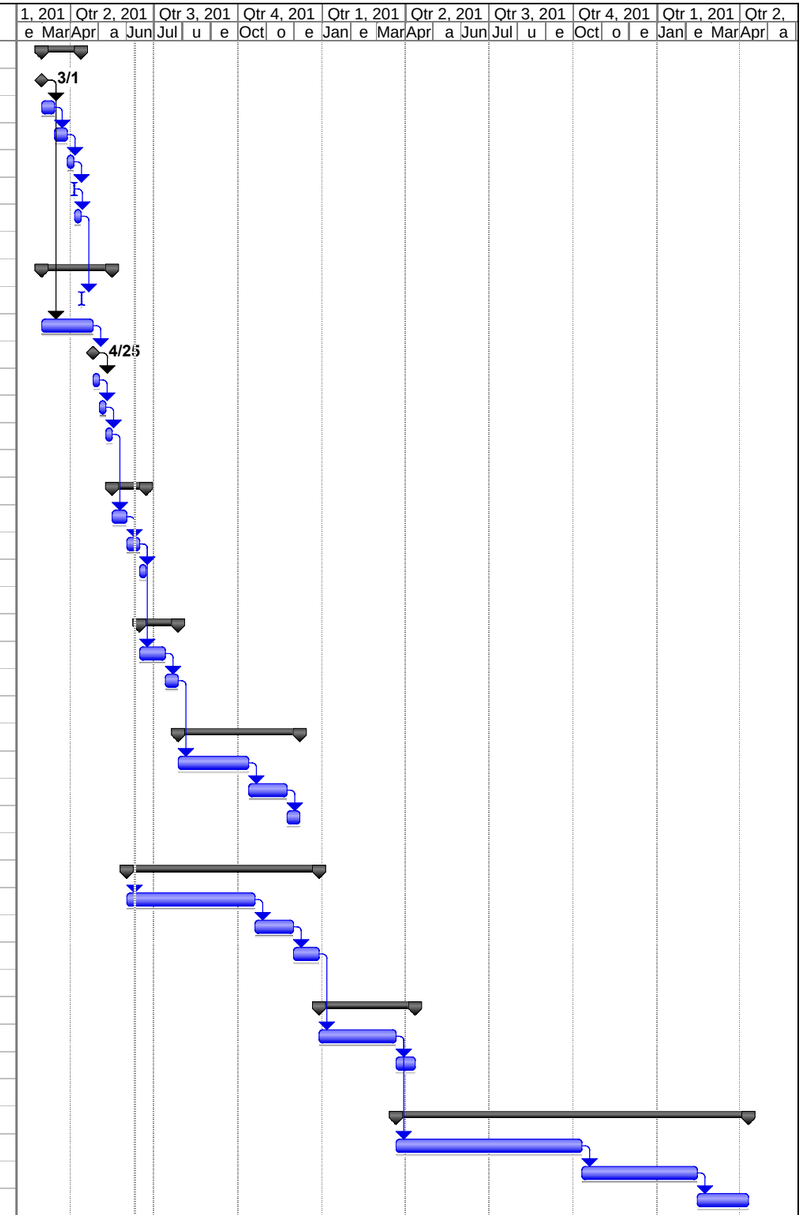
Exhibit C-1

BRES SCHEDULE

ID	Task Name	Duration	Start	Finish	Predecessors
1	**BRES Technical Evaluation Recommendation Report**	**31 days**	**Tue 3/1/11**	**Tue 4/12/11**	
2	BSB submit the 2007 thru 2010 Draft BRES Technical Evaluation Recommendation Report	0 days	Tue 3/1/11	Tue 3/1/11	
3	Agency review of the 2007 thru 2010 Draft BRES Technical Evaluation Recommendation Report	10 days	Tue 3/1/11	Mon 3/14/11	2
4	BSB revises the draft 2007 thru 2010 Draft BRES Technical Evaluation Recommendation Report	10 days	Tue 3/15/11	Mon 3/28/11	3
5	Agency review of the Final 2007 thru 2010 BRES Technical Evaluation Recommendation Report	5 days	Tue 3/29/11	Mon 4/4/11	4
6	Management Group reviews Technical Evaluation Recommendation Report and incorporates in modifying criteria	1 day	Tue 4/5/11	Tue 4/5/11	5
7	EPA prepares technical memorandum with BRES management directives for O&M work	5 days	Wed 4/6/11	Tue 4/12/11	6
8					
9	**Sampling and Analysis Plan Addendum**	**55 days**	**Tue 3/1/11**	**Mon 5/16/11**	
10	PRP Management review of EPA's technical memorandum of BRES directives for O&M work	1 day	Wed 4/13/11	Wed 4/13/11	7
11	BSB prepares the Draft Sampling and Analysis Plan Addendum for the 2007 to 2010 BRES Sites	40 days	Tue 3/1/11	Mon 4/25/11	2
12	BSB submits the Draft Sampling and Analysis Plan Addendum	0 days	Mon 4/25/11	Mon 4/25/11	11
13	Agency review of the Draft Sampling and Analysis Plan Addendum	5 days	Tue 4/26/11	Mon 5/2/11	12
14	BSB revises the Draft Sampling and Analysis Plan Addendum	5 days	Tue 5/3/11	Mon 5/9/11	13
15	Agency review of the Final Sampling and Analysis Plan Addendum	5 days	Tue 5/10/11	Mon 5/16/11	14
16					
17	**Field Work (for the 2007 and 2008 sites with BRES trigger items)**	**27 days**	**Tue 5/17/11**	**Wed 6/22/11**	
18	Site visit and detailed site investigation at the 2007 and 2008 BRES site with identified trigger items	12 days	Tue 5/17/11	Wed 6/1/11	15
19	BSB prepare the BRES Data Summary Report for the 2007 and 2008 BRES site with identified trigger items	10 days	Thu 6/2/11	Wed 6/15/11	18
20	EPA review of the BRES Data Summary Report for the 2007 and 2008 BRES site with identified trigger items	5 days	Thu 6/16/11	Wed 6/22/11	19
21					
22	**O&M Plan and Site Specific Corrective Action Plan Report (for the 2007 and 2008 sites with BRES trigger items)**	**30 days**	**Thu 6/16/11**	**Wed 7/27/11**	
23	BSB prepares O&M Plan and Site Specific Corrective Action Plan Report for the 2007 and 2008 BRES site with identified trigger items	20 days	Thu 6/16/11	Wed 7/13/11	19
24	EPA reviews O&M Plan and Site Specific Corrective Action Plan Report for the 2007 and 2008 BRES site with identified trigger items	10 days	Thu 7/14/11	Wed 7/27/11	23
25					
26	**Corrective Action (for the 2007 and 2008 sites with BRES trigger items)**	**95 days**	**Thu 7/28/11**	**Wed 12/7/11**	
27	BSB implements corrective action at the 2007 and 2008 BRES site with identified trigger items	55 days	Thu 7/28/11	Wed 10/12/11	24
28	BSB prepares Annual O&M Completion Report for the 2007 and 2008 BRES site with identified trigger items	30 days	Thu 10/13/11	Wed 11/23/11	27
29	EPA reviews Annual O&M Completion Report for the 2007 and 2008 BRES site with identified trigger items	10 days	Thu 11/24/11	Wed 12/7/11	28
30					
31	**Field Work (for 2009 and 2010 sites with BRES trigger items)**	**150 days**	**Thu 6/2/11**	**Wed 12/28/11**	
32	Site visit and detailed site investigation for the 2009 and 2010 BRES site with identified trigger items	100 days	Thu 6/2/11	Wed 10/19/11	18
33	BSB prepare the BRES Data Summary Report for the 2009 and 2010 BRES site with identified trigger items	30 days	Thu 10/20/11	Wed 11/30/11	32
34	EPA review of the BRES Data Summary Report for the 2009 and 2010 BRES site with identified trigger items	20 days	Thu 12/1/11	Wed 12/28/11	33
35					
36	**O&M Plan and Site Specific Corrective Action Plan Report (for 2009 and 2010 sites with BRES trigger items)**	**75 days**	**Thu 12/29/11**	**Wed 4/11/12**	
37	BSB prepares O&M Plan and Site Specific Corrective Action Plan Report for 2009 and 2010 BRES site with identified trigger items	60 days	Thu 12/29/11	Wed 3/21/12	34
38	EPA reviews O&M Plan and Site Specific Corrective Action Plan Report for 2009 and 2010 BRES site with identified trigger items	15 days	Thu 3/22/12	Wed 4/11/12	37
39					
40	**Corrective Action (for the 2009 and 2010 sites with BRES trigger items)**	**275 days**	**Thu 3/22/12**	**Wed 4/10/13**	
41	BSB implements corrective action at the 2009 and 2010 BRES site with identified trigger items	145 days	Thu 3/22/12	Wed 10/10/12	37
42	BSB prepares Annual O&M Completion Report for the 2009 and 2010 BRES site with identified trigger items	90 days	Thu 10/11/12	Wed 2/13/13	41
43	EPA reviews Annual O&M Completion Report for the 2009 and 2010 BRES site with identified trigger items	40 days	Thu 2/14/13	Wed 4/10/13	42



Project: BRES Schedule for 2011 to 2013

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

1 BRES Technical Evaluation Recommendation Report

The Evaluation Recommendations Report will document and summarize the results of the annual BRES evaluations. Specifically the document will identify trigger items that were observed during the present years upland and engineered BRES evaluations. This report will provide recommendations and justifications for conducting sampling and further data collection. This report will be a precursor to the sampling and analysis plan addendum and will be submitted to the agencies for review and comment.

9 Sampling and Analysis Plan Addendum

A Site-Wide BRES Sampling and Analysis Plan (SAP) will be prepared prior to conducting the initial BRES evaluation. The Site-Wide SAP will specify BRES-specific sampling protocols and standard operating procedures (SOPs). An addendum to the Site-Wide SAP will be prepared annually to provide justification for sampling and/or other data collection based on the results of the annual BRES evaluation. The addendum will include:

- Type of samples to be collected (i.e., soil nutrients, soil composition, waste material)
- Number of samples to be collected
- Location of the sample to be collected
- Number of test pits and type of data collected from test pits, and
- Any nontraditional data collection that is not specified in the site-wide BRES SAP

18 Site visit and detailed site investigation at the 2007 and 2008 BRES site with identified trigger items

Sites with problem areas identified by trigger items during the BRES evaluation will require additional data collection. Data will be used to determine the appropriate level of site improvements required (e.g., vegetation improvement [VI] or reclamation improvements [RI]). Data collection may include chemical and physical soil characterization and/or coversoil profile descriptions.

19 BSB prepare the BRES Data Summary Report for the 2007 and 2008 BRES site with identified trigger items

The BRES Summary Report (also known as summary report) will include recommendations that will be presented to Agency and stakeholder management based upon the results from the historic and recent BRES evaluations and BRES sampling events. The summary report will include items such as;

- Aerial photographs with site and polygon delineation
- Trigger items identified
- Analytical results from samples collected at problem areas
- Results from testing coversoil thickness
- Historic BRES evaluation summaries and recent trend analysis
- Recommendations of either vegetation improvement, reclamation improvement, or BRES evaluation in 4-years
- Deviations from the sampling and analysis plan

32 Site visit and detailed site investigation for the 2009 and 2010 BRES site with identified trigger items

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- Trigger items identified
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- Recommendations of either vegetation improvement, reclamation improvement, or BRES evaluation in 4-years
- Deviations from the sampling and analysis plan

SCHEDULE C-2

Part of Exhibit C to the July 2011 Unilateral Administrative Order
for the Butte Priority Soils Operable Unit/Butte Site

ACTION	SCHEDULED DATE	NOTE
Residential Metals Abatement Plan (RMAP) – yearly goals for residential assessment	Yearly goals for residential assessments as stated on Page 11 of the final RMAP (April 2010) apply yearly	
RMAP residential cleanups	Yearly goals for residential cleanup actions as stated on Page 11 of the final RMAP (April 2010) apply yearly	
RMAP Yearly Reporting	Due December 31, 2011 and yearly thereafter	
RMAP Assessment Completion for Butte Site	December 31, 2019	
RMAP Cleanup Completion	December 31, 2029	
RMAP Database Upkeep	Ongoing and Continuous	
RMAP Medical Monitoring Program Remedial Design Work Plan	Draft due July 30, 2010	Final due within thirty days of comments, and no later than November 30, 2012
BRES work	See attached schedule C-1	Note the requirements for daily BRES construction activity reports, and the need to ensure that the BRES database is fully updated by December 31, 2011 and is maintained thereafter on a continual basis
MSD Area Operation of Systems	Continuous in full compliance with all plans and directions	
MSD Area Operation and Maintenance	Continuous and in full compliance with all plans and directions	
Wetland Demonstration Area Contingency Overflow Work Plan	Draft due July 31, 2011	Final due within thirty days of receipt of comments. Final must be approved and work must begin in 2011. Work must be complete in 2012.
Cease Irrigation of baseball fields over the Parrott	Immediately upon Effective Date of Order	

Tailings Area		
Cease Use of unpaved County Shop Property Area for pile snow	Immediately upon Effective Date of Order	
Study on Irrigation of Baseball Fields over the Parrott Tailings Area	Optional – submit draft when done for agency comments and/or approval	
Localized Groundwater Study Work Plan for area between MSD and Butte Reduction Works Ground Water Collection	Draft due on October 20, 2011	Final due thirty days after receipt of comments. Assessment completed by December 31, 2012.
Ground Water Flow Monitoring Flume Installation	Upon Effective Date of Order and with Specific EPA Approval	
Load Monitoring Work Plan	As part of MSD Subdrain Interim O and M Plan (see below)	
Annual Load Monitoring Report	Annually, as provided in O and M plan	
Tasks and punchlist items for MSD/BRW Remedial Ation Work Plan completion	As described in approved Work Plan – completed by December 31, 2011	
Task described in BRW East End Grading Plan	As described in approved Work Plan – completed by December 31, 2011	
Culvert Removal	Draft work plan due January 31, 2012	Final within thirty days of receipt of comments – work must be done by December 31, 2012
Continued BRW area ground water and surface water monitoring	Ongoing – data must be reported as collected	
Further actions after evaluation of BRW area monitoring data	Upon notice by EPA after fall 2011 meeting on data.	Work must be completed by December 31, 2012
Report on Abandoned Aquaduct	September 30, 2011	
Actions to address Abandoned Aquaduct	Upon EPA notice in 2011 or 2012.	Work must be completed by December 31, 2012
MSD Subdrain Ground Water Management Report	Draft report due October 15, 2011	Final due thirty days after receipt of comments
Catch Basins Operation and Maintenance	Ongoing and continuous – maximum effectiveness	

	must be achieved	
Silver Bow Creek and Blacktail Creek Bank and Near Stream Removal and Associated Reclamation	Per Existing Approved Work Plans - ongoing	
Feasibility and Effectiveness Evaluation of Sediment Removal for In-Stream Sediments	Draft due October 15, 2012	Final due within thirty days of receipt of EPA comments
Actions Resulting from Feasibility and Effectiveness Evaluation of Sediment Removal for In-Stream Sediments	Upon Direction by EPA in accordance with Schedule Directed by EPA	
Stormwater Control BMPS – First and Second Upfront BMP Actions	Ongoing per prior Scopes of Work and approved plans	
Cleanout of sediments in BSB Stormwater System (Third Cycle Upfront BMP Action)	Ongoing per "Removal Plan for BSB Municipal Stormwater System within the BPSOU" for 2011, 2012, and beyond	
Illicit Connection Actions (Third Cycle Upfront BMP Action)	Ongoing per plan	
Curb and Gutter Construction (Third Cycle Upfront BMP Action)	Ongoing per "Curb and Gutter Priority Plan for the BSB Municipal Stormwater System within BPSOU (May 2010) for 2011, 2012 and beyond	
Buffalo Gulch Catch Basin Construction	Draft plan due September 30, 2011	Final plan due within thirty days of receipt of comments. Construction to follow per schedule in approved plan. Operation for maximum effectiveness to continue after construction.
Construction of Hydrodynamic Devices Described in PRI Work Plan	Upon Direction by EPA – work to be completed by December 31, 2012	
Street Maintenance and Snow Management Plan	Draft due September 30, 2011	Final due thirty days after receipt of comments. Final plan must be approved by November 30, 2011.
New and Mahoney Street Construction Oversight and	Construction and oversight ongoing. CCR due 3 months	

Construction Completion Report	after completion of work.	
800 North Main Reclamation/Capping Plan and Construction Completion Report	Draft work plan due by October 30, 2011.	Final plan due within thirty days of comments. Work Plan must be approved by December 31, 2011. Activities completed no later than December 31, 2012. CCR due within 3 months of action completion.
17 Group 1 Additional Source Control Sites Plan(s), Reclamation/Capping/Other Measures, and Construction Completion Report	Plans must be submitted as soon as possible.	Work to commence upon approval of plan(s). Work must begin by December 31, 2011 and be completed by December 31, 2012. CCR(s) due within 3 months after work is completed.
3 Group 2 Additional Source Control Sites Plan, Reclamation/Capping/Other Measures, and Construction Completion Report(s)	Plans can be submitted as part of Railroad Interim O and M plan (see below) or separately as soon as possible.	Work to commence upon approval of plan(s). Work must begin by December 31, 2011 and be completed by December 31, 2012. CCR(s) due within 3 months after work is completed.
Other Source Control Plans, Reclamation/Capping/Other Measures, and Construction Completion Report(s)	Plans to be submitted upon discovery. Work to be done and completed according to schedule contained in plan(s).	
Continued Operation of Butte Treatment Lagoon System, West Camp System, and HCC	Ongoing to achieve maximum effectiveness	
Phase I Butte Treatment Lagoons and related facilities Upgrades	Per Final May 12, 2011 approved plans and related plans	
Phase II Butte Treatment Lagoons and related facilities Work Plan	Drafts due on October 30, 2011	Final within thirty days of receipt of comments or longer is approved by EPA. Final must be done and approved by March 30, 2012
Surface Water Monitoring	Ongoing per the interim surface water monitoring plan described in the PRI Work Plan	
Butte Mine Waste Repository Operation	Ongoing per June 2009 Operation and Maintenance	

	plan	
Work Plan for construction of 2nd Mine Waste Repository	Draft due by March 31, 2012	Final due within thirty days of receipt of comments. Construction per schedule contained in approved work plan. Operation and Maintenance ongoing.
Granite Mountain Memorial Interpretive Area (GMIIA) Construction and Construction Completion Plan	Work is ongoing per approved plan. Construction Completion Report due thereafter as described in approved plan	
GMIIA and Syndicate Pit O and M	Per approved O and M plans	
Implementation of Revised Interim Ground Water Monitoring Plan including new well construction	Immediately Effective and schedule is contained in the plan. Monitoring and reporting ongoing.	
Ground Water Ordinance funding, enforcement and monitoring	Ongoing	
Butte Silver Bow County Stormwater Ordinance funding, enforcement and monitoring	Ongoing	
Final Group 1 Institutional Control Plan	Within 30 days of receipt of comments	
Public Comment Draft Group 2 Institutional Control Plan	Within 30 days of receipt of comments	Final plan due after informal public comment, and receipt of comments as a result – within thirty days of receipt of comments
Operation and Maintenance	As directed by EPA or in accordance with all approved short term O and M plans	
Interim Railroad O and M Plan	Draft due within 30 days of the Effective Date	Final due within 30 days of receipt of comments
BTL, West Camp, and MSD Interim Operation and Maintenance Plan	Draft(s) due by December 31, 2012	Final due within thirty days of receipt of EPA comments
Stormwater Ponds and Storm Water Engineering Interim Operation and Maintenance Plan(s)	Draft(s) due by December 15, 2011	Final within 30 days of receipt of comments

Nothing in this schedule (or in schedule C-1) alters any work plan requirements or directions or alters the Unilateral Administrative Order Docket No. CERCLA-08-2011-0011 (UAO). Any omission of actions described in any work plan is inadvertent.

The UAO requires other activities not described here. See the UAO for requirements and schedules.

Appendix D

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING, 10 W. 15th STREET, SUITE 3200
HELENA, MONTANA 59626

Ref: 8MO

November 18, 2008

Mr. Jon Sesso, Director
BSB Planning Department
BSB Courthouse
155 W. Granite Street
Butte, MT 59701

Mr. Rick Larson, Director
BSB Health Department
25 W. Front Street
Butte, MT 59701

Mr. Dan Dennehy
BSB Public Works
BSB Courthouse
155 W. Granite Street
Butte, MT 59701

Mr. Shannon Dunlap
Atlantic Richfield Company
317 Anaconda Road
Butte, MT 59701

Re: Water Infiltration Management at the Parrott Tailings

Dear Sirs:

The Agencies are concerned that Butte-Silver Bow Public Works Department is irrigating the baseball fields that overly the Parrott Tailings. In addition, Public Works stores snow, which it removes from city streets, at an unlined area of the BSB County Shops that also overlies the Parrott Tailings. Both of these practices add to water infiltrating through the Parrott Tailings and increase the volume of contaminated ground water that must be captured and treated.

As you know, the Butte Site Record of Decision (EPA, 2006) mandates that such practices cease. Effective immediately, the Agencies require that BSB cease irrigating the baseball fields and cease storing snow at the BSB County Shops. In addition, the BPSOU Record of Decision (12.1.2 (1.)) requires that infiltration barriers be considered during remedial design to reduce the metal loading to ground water. We request a plan to place infiltration barriers such as asphalt or concrete over these areas or a plan to evaluate the need for barriers.

If you have questions, please contact Sara Sparks at (406) 782-7415 or Joe Griffin at (406) 560-6060.

Sincerely,

Sara Weinstock Sparks
Remedial Project Manager

Joe Griffin
Project Officer

cc: John Wardell; 8MO (e-mail only)
Henry Elsen; 8MO (e-mail only)
Brad Smith; DEQ (e-mail only)
Robin Bullock; ARCO (e-mail only)
Bob Rennick; CDM (e-mail only)
Angela Frandsen; CDM (e-mail only)
Tom Malloy; BSB (e-mail only)
Bernard Harrington; Walkerville (e-mail only)
Dave Smith; BNSF (e-mail only)
Gary Honeyman; UP (e-mail only)
Bill McCarthy; RARUS (e-mail only)

Butte Priority Soils Operable Unit
Revised Interim Ground Water Monitoring Plan
Silver Bow Creek/Butte Area NPL Site
Butte-Silver Bow County, Montana

July 1, 2011

Prepared by:

U.S. Environmental Protection Agency
Federal Building
10 West 15th Street, Suite 3200
Helena, MT 59626

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Contents

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List of Acronyms and Abbreviations

µg/L	micrograms per Liter
AR	Atlantic Richfield
ARARs	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
BLTS	Butte Lagoons Treatment System
BMFOU	Butte Mine Flooding Operable Unit
BPSOU	Butte Priority Soils Operable Unit
BSB	Butte-Silver Bow County
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as amended
CFRSSI	Clark Fork River Superfund Site Investigations
CGWA	Controlled Ground Water Area
CLP	Contract Laboratory Program
COCs	Contaminants of Concern
COV	Coefficient of Variation
DEQ-7	Montana Numeric Water Quality Standards Circular DEQ-7
DNRC	Department of Natural Resources & Conservation
DO	dissolved oxygen
DQOs	Data Quality Objectives
DSR	Data Summary Report
Eh	redox potential
EPA	Environmental Protection Agency
ERA	Expedited Response Action
FS	feasibility study
GWMP	Ground Water Monitoring Plan
HCC	Hydraulic Control Channel
ICs	institutional controls
LAO	Lower Area One
LAO ERA	Lower Area One Environmental Remediation Area
MAROS	Monitoring and Remediation Optimization Software
MCLs	Maximum Contaminant Level
MSD	Metro Storm Drain
NPL	National Priorities List
OU	Operable Unit
POC	Point of Compliance
PRP Group	Potentially Responsible Parties
QAPP	Quality Assurance Project Plan
RAOs	Remedial Action Objectives
RD/RA	remedial design/remedial action
RGs	remedial goals
RI	remedial investigation
ROD	Record of Decision
RP	responsible parties
SAP	Sampling and Analysis Plan
SBC	Silver Bow Creek
SC	Specific Conductance
SOP	Standard Operating Procedures
TI	Technical Impracticability

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Section 1 Introduction and Background

This revised, interim ground water monitoring plan (GWMP) has been prepared for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek (SBC)/Butte Area National Priorities List (NPL) Site to address the ground water monitoring requirements specified in the September 2006 Record of Decision (ROD) for the BPSOU (the U.S. Environmental Protection Agency [EPA] with partial concurrence by Montana Department of Environmental Quality [DEQ] 2006). In brief, the ROD specifies the following ground water monitoring requirements for the BPSOU:

> *A comprehensive groundwater monitoring plan shall be prepared and implemented for the entire alluvial aquifer to ensure that groundwater capture systems are effective; to determine that contaminated groundwater is not leaving the TI [Technical Impracticability] Zone or discharging to surface water; to provide additional information as necessary on the movement, quality, and quantity of groundwater; and to provide data for review of the groundwater remedy. The groundwater monitoring program will include installing additional monitoring wells, regular measurement of water quality and water levels in a monitoring network, and shall provide thorough monitoring that includes, but is not limited to, groundwater in upper and lower MSD, groundwater near the southern extent of the TI zone, between the MSD and LAO ground water capture systems, and in the area adjacent to, and downgradient of the lagoon treatment system.*

This GWMP provides a description of an effective ground water monitoring program for the BPSOU. Because the full ground water component of the BPSOU ROD has not been fully designed, it is an interim plan, meant to update ground water monitoring requirements to meet current conditions but not meant to be the final ground water monitoring plan.

The GWMP provides an overview of history and features of the BPSOU, provides a brief site characterization, reviews the ROD requirements and standards and status of implementation, and outlines the tasks to be completed to comply with certain ROD requirements. Periodically, the ground water monitoring program should be examined to assess its overall effectiveness in achieving the objectives of the BSPOU ROD, to identify new monitoring needs as they arise, and to take advantage of opportunities to reduce or modify monitoring requirements as justified by data analysis or site conditions.

1.1 Overview

The BPS OU is one of seven remedial operable units (OUs) within the Silver Bow Creek/Butte Area Superfund Site (Figure 1-1). The BPSOU is centered on "Butte Hill", which is the location of the historic Butte Mining District. Silver Bow Creek is a small stream that flows along the base of Butte Hill. The BPSOU is situated in a predominantly urban setting and includes residential neighborhoods, schools and

parks, as well as commercial and industrial areas. The BPSOU also includes the alluvial aquifer underneath the BPSOU surface area.

EPA designated the original Silver Bow Creek Site as a Superfund site in September 1983. The Silver Bow Creek Site was expanded by EPA to include the Butte Area in 1987. Since then, the alluvial aquifer in the BPSOU has been the subject of multiple, extensive detailed investigations and evaluations. Fourteen separate investigations have focused on characterizing the BPSOU alluvial aquifer and limited portions of the bedrock aquifer. The majority of the bedrock aquifer has been characterized under the Butte Mine Flooding Operable Unit (BMFOU).

Ground water contaminants of concern (COCs) within the BPSOU include arsenic, cadmium, copper, lead, mercury and zinc. Ground water has been contaminated by both past release of mine process water and by precipitation infiltrating through mine wastes.

As a result of the extensive ground water contamination found in these investigations, EPA completed a Technical Impracticability (TI) evaluation for the alluvial aquifer within the BPSOU in April 2006 (EPA 2006). The purpose of this TI evaluation was to determine if it is technically impracticable to remediate the BPSOU alluvial aquifer to applicable and relevant and appropriate (ARAR) standards in a reasonable time frame. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended (CERCLA), Section 121(d)(4)(C), EPA may waive ARARs if compliance with these ARARs is technically impracticable from an engineering perspective.

After reviewing the TI evaluation and all relevant data and reports, EPA determined that a TI ARAR waiver for the BPSOU alluvial aquifer was required for the following general reasons:

- A large volume of widely distributed mine wastes (i.e., primary sources) exists and impacts ground water quality in the BPSOU. Given the totality of circumstances and the conditions at the BPSOU site, the ability to completely remove these primary sources of contaminants is not feasible.

- In addition, secondary sources of contaminants to ground water (adsorbed and precipitated metal phases within the alluvial aquifer) exist over a widely distributed area within the aquifer and cannot be completely removed from the aquifer.

- The BPSOU alluvial aquifer is heterogeneous both in terms of physical (grain size and chemical makeup of alluvial soils) and hydraulic properties, making it difficult to precisely predict the aquifer's response to source removal. The substantial weight of evidence from numerous aquifer evaluations and the scientific understanding of contaminant migration principles in heterogeneous aquifers lead to the conclusion that meeting ARARs within the BPSOU alluvial aquifer will not be possible in a reasonable time frame.

- The BPSOU alluvial aquifer is located in an urban area covered with municipal infrastructure, historic mining features, and commercial and residential structures that limit options to remove or remediate sources of metals and arsenic to ground water.

The TI Zone boundary is shown on Figure 1-2. Based on conclusions presented in the TI evaluation and other information, EPA determined that the water quality in the BPSOU alluvial aquifer could not be improved to the extent necessary to meet ARAR standards by remedial action within a reasonable time frame, even assuming implementation of the most extensive and costly mine waste removal alternatives. The evaluation demonstrated that regardless of the remedy selected by EPA and implemented at the BPSOU, ground water concentrations of COCs in the alluvial aquifer will remain above ARAR standards for the reasonably foreseeable future.

However, EPA's BPSOU remedy required the capture and treatment of contaminated ground water. The BPSOU ROD established remedial goals and ARARs for surface water base flow in Silver Bow Creek, the major area where contaminated ground water could be expressed.

While EPA made the determination that meeting ground water ARARs was technically impracticable, achieving surface water ARARs (i.e., meeting water quality standards in Silver Bow Creek) remains a remedial requirement. The remedy for surface water, during normal flow conditions (i.e., not during storm water runoff events) is directly linked to the ground water remedy. Among other things, ground water control, capture, and treatment must be implemented and maintained to protect surface water quality. In other words, contaminated BPSOU ground water must be prevented from discharging to Blacktail Creek and Silver Bow Creek in quantities or concentrations that cause exceedances of surface water ARARs.

A major objective of this GWMP is to provide the necessary information to ensure the ground water remedy is protective of surface water in Blacktail Creek and Silver Bow Creek and will remain protective for the long-term, as described in the BPSOU ROD.

In September 2006, EPA, with partial concurrence by the DEQ, issued the ROD for the BPSOU. The Selected Remedy, described in the BPSOU ROD fully, includes components to address contaminated solid media (mine waste, soil, and residential soil and dust), surface water contamination (base flow and storm water runoff), and ground water. The Selected Remedy formally waived ARAR standards for the alluvial ground water at the BPSOU. A description of the Selected Remedy for ground water is presented in summary below[1].

[1] The 2006 BPSOU ROD should be consulted for a complete description of the remedial requirements for ground water and all other components.

1.2 Description of the Selected Remedy for Ground Water

The Selected Remedy for ground water includes the following components:

1. ***Waste Left in Place***. Many areas of contamination at BPSOU were removed or capped in pre-ROD actions and the ROD describes other required cleanup actions addressing contaminated areas. Certain areas of remaining waste and contaminated, saturated soils will be left in place in Lower Area One (LAO) and MSD. To reduce the loading of metals to ground water in the area overlying the Parrott Tailings (e.g., the ball fields and BSB County Shops), the Diggings East and Northside Tailings, infiltration barriers shall be considered during remedial design and implemented if determined to be appropriate by EPA, in consultation with DEQ.

2. ***Wetland Demonstration Area Remediation.*** The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall also be reclaimed according to the intended future land use and may be used as a potential storm water retention/detention basin under the Surface Water Management Program.

3. ***Ground Water Capture and Treatment – MSD Area.*** Contaminated ground water in the MSD shall be captured with the subdrain under the MSD channel and/or another appropriate ground water collection system as determined under remedial design. The captured ground water shall continue to be pumped from the terminal vault in the MSD to the treatment facility at LAO. The captured and pumped water will be treated by lime precipitation technology as described below in subparagraph 4 before being discharged to Silver Bow Creek. However, because issues regarding long-term performance of the subdrain have not been fully addressed to date, the Selected Remedy also includes a 5-year shakedown period to evaluate the reliability of the MSD subdrain collection system. During this shakedown period, an approved operation and maintenance plan shall be developed for the collection system. If, during the shakedown period, monitoring data demonstrate that the subdrain is not effectively collecting contaminated ground water, or is spreading contamination downgradient, a new or modified ground water collection system will be designed and built.

4. ***Ground Water Capture and Treatment – LAO.*** Contaminated ground water at LAO and base flow from Missoula Gulch shall be intercepted in an hydraulic control channel, which runs parallel to Silver Bow Creek, and routed to the treatment lagoon facility described below. If ground water inflow between the MSD and LAO capture systems (i.e., between the end of the MSD subdrain and the start of the hydraulic control channel) is found to adversely affect surface water quality, additional ground water capture and hydraulic control systems

shall be implemented. In addition, water from the BMFOU West Camp System will be routed to the hydraulic control channel at Lower Area One for treatment through the treatment facility described below.

5. ***Ground Water Treatment Facility.*** As part of the RI/FS and the LAO removal action, Atlantic Richfield (AR) constructed a lagoon treatment system at Lower Area One. Treatment discharge data suggest that the system has been meeting state water quality standards for copper, cadmium, and zinc at the point of discharge. Arsenic standards have been met on all but a few occasions. These data are especially encouraging for cadmium discharges – conventional treatment systems have had problems meeting the cadmium standard because of reduced holding times in such facilities. The lagoon treatment system's longer holding times appear to be effective in the treatment of cadmium. Accordingly, the Selected Remedy includes retention and continued operation of the lagoon system for treating captured and routed ground water, and certain captured surface water, prior to discharge to Silver Bow Creek. However, because issues regarding long-term performance and sludge removal and disposal have not been fully addressed to date, the Selected Remedy also includes the following:

    a. A 5-year shakedown period will be in place for the lagoon treatment system. The captured ground water will be treated to DEQ-7 standards (Table 1-1) prior to discharge. The lagoon treatment system must demonstrate successful water treatment and full compliance with the standards when operating at designed capacity and when operating under a wide range of conditions. Also, it must be demonstrated that sludge removal and sludge management can be performed effectively without causing system upsets. Responsible parties made modifications to expand the capacity of the treatment lagoons that did not go through the formal EPA design, review, and approval process. Therefore, those modifications and any additional design of the expanded treatment lagoon system will need to go through the formal EPA review and approval process. The lagoon treatment system shall be designed to prevent the release of untreated contaminated waters into Silver Bow Creek as a result of upset periods due to flooding, equipment malfunction or failure, or extended periods of cold, etc. ARAR compliant sludge removal, management, and disposal plans must be developed and approved.

    b. Using the Butte Reduction Works area near the lagoon treatment system for sludge drying and sludge management is not allowed, since it is a dedicated open space area more suitable for public use.

    c. If at any time during the shakedown period, or thereafter, the system fails to meet discharge standards and cannot be adjusted or modified to meet standards, or if sludge removal, management, and disposal cannot be done in

compliance with ARARs and in a protective manner, a conventional lime treatment system shall be designed and built at Lower Area One. The conventional system shall use lime treatment technology to treat the captured contaminated water and meet all discharge standards.

d. To prevent the discharge of untreated water into Silver Bow Creek, the design will be required to include contingencies for how to manage and store collected ground water during extended periods of upset (e.g., flooding, equipment malfunction or failure, extended periods of freezing, etc.)

6. ***Ground Water Monitoring.*** A comprehensive ground water monitoring plan shall be prepared and implemented to ensure that ground water capture systems are effective; to determine that contaminated ground water is not leaving the TI Zone or discharging to surface water; to provide additional information as necessary on the movement, quality, and quantity of ground water; and to provide data for review of the ground water remedy. The ground water monitoring program will include installing additional monitoring wells, regular measurement of water quality and water levels in a monitoring network, and shall provide thorough monitoring that includes, but is not limited to, ground water in upper and lower MSD, ground water near the southern extent of the TI zone, between the MSD and LAO ground water capture systems, and in the area adjacent to and downgradient of the lagoon treatment system. An initial outline of ground water monitoring requirements was included in the ROD.

7. ***6.Controlled Ground Water Area.*** A Controlled Ground Water Area (CGWA) shall be established ground water in the area, may also be required.

The Selected Remedy for ground water will be implemented primarily in the MSD and LAO areas. Under the Selected Remedy, buried and partially saturated wastes that currently exist in these areas will be left in place with appropriate ground water monitoring and institutional controls. This will provide a continued understanding of the extent of ground water contamination and long-term protection of human health and surface water resources.

Although previous response actions have removed a substantial quantity of waste material from LAO, wastes remain beneath the Municipal Sewage Treatment Plant, structures such as the aqueduct and slag walls being retained for their historic value, and below the vertical excavation limits established during the design of LAO ERA. Existing hydraulic controls constructed during the LAO removal action to capture, control, and extract contaminated ground water and to prevent ground water discharge to Silver Bow Creek are incorporated into the Selected Remedy.

As more fully described in the BPSOU ROD and summarized above, under the Selected Remedy, ground water captured in the interception and collection systems at

LAO and MSD will be combined with contaminated base flow from Missoula Gulch and the ground water from the West Camp bedrock system of the Mine Flooding OU for combined treatment in the treatment lagoon facility. If monitoring data demonstrate that the current subdrain is not capturing the contaminated ground water, or contaminated ground water is leaving the site, or the system is not otherwise effective, additional ground water capture systems and/or extraction wells will be implemented to ensure full effectiveness of the system. The treated water shall be subsequently discharged to Silver Bow Creek or used for other beneficial purposes. Treatment capacity for the treatment lagoon system will be evaluated and finalized during remedial design.

1.3 Overall Remedial Action Objectives, Remedial Goals, and Performance Standards for Ground Water

Ground water COCs are arsenic, cadmium, copper, lead, mercury, and zinc.

1.3.1 Remedial Action Objectives

The remedial action objectives established by the BPSOU ROD for contaminated ground water are:

- Prevent ingestion of or direct contact with contaminated ground water that would result in unacceptable risk to human health.
- Prevent ground water discharge that would lead to violations of surface water ARARs and RGs for the BPSOU.
- Prevent degradation of ground water that exceeds current standards.

1.3.2 Remedial Goals/Performance Standards

RGs/Performance Standards for contaminants in ground water and protection of ground water resources within the BPSOU were established in the BPSOU ROD based on the applicable State of Montana numeric water quality standards for human health. Montana classifies ground water into Classes I through IV based upon its specific conductance and establishes the ground water quality standards applicable with respect to ground water classification under these standards. Concentration of dissolved substances in Class I or Class II ground water may not exceed the human health standards listed in the current Montana Numeric Water Quality Standards Circular DEQ-7 (DEQ-7) and shown in Table 1-1. The federally promulgated Maximum Contaminant Levels (MCLs) or non-zero Maximum Contaminant Level Goals (MCLGs) for these contaminants are identical, so those standards are the ARARs for ground water.

Table 1-1
Standards for Ground Water

COC	Standard (Dissolved)[1]
Arsenic	10 µg/L
Cadmium	5 µg/L
Copper	1,300 µg/L
Lead	15 µg/L
Mercury	2 µg/L
Zinc	2,000 µg/L

1 As presented in the BPRSOU ROD, these are equal to the DEQ-7 standards published in February 2006.

For concentrations of parameters for which human health standards are not listed in DEQ-7, ARM 17.30.1006 allows no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I or Class II water. RGs for ground water may be revised downward, in order to achieve surface water quality standards and RGs. For arsenic, the current Federal MCL of 10 µg/L is the appropriate RG for arsenic in ground water, along with the recently promulgated State standard of 10 µg/L.

As noted earlier, the BPSOU ROD waived the contaminant-specific ARARs for ground water within the designated TI Zone. The ground water ARARs identified in Table 1-1 therefore apply only to ground water outside of the designated TI Zone, which will be further defined during remedial design.

The Selected Remedy requires capturing and treating ground water to prevent the spread of contaminant plumes and to prevent the discharge of contaminated ground water into Blacktail and Silver Bow Creeks. The treated ground water must meet water quality standards prior to discharging it into surface water. As noted above, ground water standards have been waived within the designated TI Zone. The TI zone boundary is shown in Figure 1-2. Since the Selected Remedy requires that contaminated plumes be prevented from migrating outside the established TI zone, the boundary for the TI zone represents the Point of Compliance (POC) boundary for ground water. The RGs discussed earlier have been adopted as performance standards for the BPSOU. Thus, ground water quality standards in Table 1-1 will apply to ground water at and beyond the edge of this boundary. An exception lies at the downgradient edge of the OU where contaminated ground water is hydraulically prevented from moving off-site, but ground water is contaminated in the adjacent Streamside Tailings OU.

Based on the data collected during this ground water monitoring program, additional points of compliance may be determined necessary by EPA during remedial design (e.g., southern edge of the MSD). Additionally, ground water quality within the TI Zone will be evaluated using the statistical analysis described in Section 4.0. If select

wells (Early Warning Wells) within the TI zone are shown to have a definite increasing trend in COC concentration, indicating that a contamination plume is expanding, it will require a re-assessment of the ground water collection component of the Selected Remedy (e.g., use of additional subdrains, hydraulic control channels, or extraction wells), and will require additional remedy measures to protect the future surface water.

Ground water contamination outside the boundary of the TI zone in excess of ground water performance standards identified in Table 1-1 shall constitute a violation of Performance Standards triggering one or more of the following actions by EPA: 1) re-assess ground water collection and treatment effectiveness components of the Selected Remedy (e.g., use of additional subdrains, hydraulic control channels, or extraction wells); or 2) complete a TI evaluation for the aquifer in areas of ground water contamination located outside the compliance boundary. An exception applies at the downgradient OU boundary as described above.

1.3.3 Ground Water Use

BPSOU site ground water is not currently a municipal source of drinking water. The City of Butte obtains drinking water from sources outside of the immediate area. Current drinking water sources for residents within the BPSOU are Moulton Reservoir, Basin Creek Reservoir, the Big Hole River, and two bottled water companies. These water sources are located outside of the BPSOU and are not impacted by site contamination.

There are private wells located in the BPSOU, but these are used primarily for irrigation. Local ordinance requires residents to be connected to the municipal domestic water supply system if they are within 300 feet of the supply system. Properties connected to the water system are prohibited from using ground water for any purpose other than sprinkling or irrigation. Butte-Silver Bow County has an ordinance that states it "...is required at the owner's expense to install suitable water service facilities therein, and to connect such facilities directly to the water main within sixty days after date of official notice to do so, provided that a water main is located within a distance of three hundred feet from the owner's property line." The ordinance goes on to state that "... the occupants of property connected to the water system may not use water provided by wells for any purpose other than sprinkling or irrigation." If irrigation return flow poses a threat to surface water, those practices will be reassessed.

As further response to ongoing COC impacts, two control ground water areas (CGWA) exist in BPSOU: the Old Butte Landfill/Clark Tailings CGWA (established in 1999) and the Butte Alluvial and Bedrock CGWA (established in 2009). The CGWA boundaries are shown on Figure 1-3.

Under the Butte Alluvial and Bedrock CGWA, existing wells that exceed numeric water quality standards may not be used as a drinking water source and a replacement water source will be provided. The aquifer is closed to domestic use, and the installation of new domestic wells is prohibited. Environmental monitoring and

treatment wells are allowed in the CGWA provided the wells conform to applicable statutes. New or replacement industrial/irrigation wells may be allowed, providing the owner of the proposed well provides data to demonstrate that use of the well will not be detrimental to human health or the environment. The Butte/Silver Bow Water Quality district, in conjunction with the USEPA and MDEQ, will review proposals for new well installation (DNRC 2009).

The Old Butte Landfill/Clark Tailings CGWA is located south of and adjacent to the Butte Alluvial and Bedrock CGWA. Similar to the Butte Alluvial and Bedrock CGWA, the Old Butte Landfill CGWA does not allow the use of contaminated wells for drinking water purposes, and does allow for properly installed environmental monitoring wells. The CGWA is subdivided into four zones (Zone 1 through Zone 4), with no new well installation allowed in Zones 1 and 2. New drinking water and industrial wells may be installed in Zone 3 (up 10 to gallons per minute pumping rate) and Zone 4 (up to 200 gallons per minute) subject to DNRC approval and the following criteria (DNRC 2003):

- All wells must be tested for VOCs, chlorinated acid herbicides, phthalate esters, and Table 1 constituents from the Landfill Groundwater Monitoring Analysis List.

- Based on the analyses, drinking water wells must meet current human health standards (i.e. DEQ-7).

1.3.4 Ground Water Remedial Component Implementation

Since issuance of the 2006 BPSOU ROD, EPA has ordered and overseen remedial design of the ground water component of the ROD. That component is partially designed, and some elements (such as the controlled ground water area institutional control) have been implemented. But the full ground water remedy components have not been fully implemented.

Nevertheless, EPA has determined that the monitoring component must be implemented now. This will enable EPA to complete remedial design and remedy implementation, as well as ensure the protectiveness of the remedy in general. This interim ground water plan may be revised into a final ground water monitoring plan although still subject to ongoing assessment and changes) as remedial design and remedy implementation are more fully implemented.

Section 2 Comprehensive Ground Water Monitoring Plan

This section of the GWMP describes the overall implementation of the ground water monitoring program. The elements discussed in this section are as follows:

- Monitoring Objectives and Requirements
- Program Roles and Responsibilities
- Ground Water Monitoring Areas of Interest
- Ground Water Monitoring Network
- Program Reporting
- Data Management
- Quality Assessment

The GWMP requires planning and implementing the following major tasks:

1. Sampling and Analysis
2. Well Installation
3. Upper MSD Pumping Test
4. Data Management
5. MSD Subdrain Load Monitoring

2.1 Ground Water Monitoring Program Objectives and Requirements

2.1.1 Monitoring Objectives

The GWMP will address the following general concerns:

- Ensure that existing ground water capture and treatment systems are effective.
- Determine that contaminated ground water is not leaving the TI Zone or discharging to surface water.
- Provide additional information as necessary on the movement, quality, and quantity of ground water to assure that ground water contamination plumes are not spreading and ground water quality is not degrading and that surface water is not threatened.

- Provide data for review of the ground water remedy.

As stated in the ROD, this monitoring system shall "include expanded wells and measurements from the existing system and shall provide for the careful and thorough monitoring that includes, but is not limited to, ground water near Blacktail Creek, the ground water between the MSD and LAO ground water capture systems, ground water adjacent to the lagoon treatment system, and ground water downgradient (west) of the BPSOU." Additionally, "the monitoring plan will also include wells downgradient of BPSOU to gather information on the characteristics of the ground water and to assure that downstream waters are not being affected by ground water leaving BPSOU."

The specific objective of this GWMP is to provide a detailed description of the components of the comprehensive ground water monitoring program, including new well installation, for the BPSOU. These specific components are as follows:

1. Identify existing and new wells, and contain an initial list of wells within and adjacent to the BPSOU that will be monitored.

2. Describe the data to be collected and the frequency with which each well will be monitored.

3. Describe how the wells meet the ROD-mandated objectives.

4. Describe reporting and data management requirements.

5. Identify and scope the tasks related to ground water monitoring that must be completed.

If the statistical analysis (presented in Section 4) demonstrates that the contaminant plume(s) are a threat to surface water or clean ground water, the remedy will be enhanced to address the threat. The selection of engineering improvements to enhance the Selected Remedy shall be based on thorough evaluation and interpretation of the data collected under this ground water monitoring plan and any other additional data or information (e.g., data collected during operations and maintenance of the capture and treatment systems).

2.1.2 ROD Ground Water Monitoring Requirements

An initial outline of the minimum requirements of the ground water monitoring program was provided in the ROD. These minimum monitoring components are described below. Following each component is text in *italics* describing how these requirements will be met.

1. All monitoring wells in the BPSOU aquifer (MSD, LAO, and between) will be sampled every 5 years. Additionally, EPA in consultation with DEQ will identify a network of wells for annual water quality sampling.

A ground water monitoring network is presented in Table 2-1 and shown on Plate 1. The monitoring schedule is presented in Table 4-1.

2. Water levels will be measured in all wells and certain surface water locations twice per year. Water levels will be measured in a select network on a monthly basis, or more frequently if necessary for operation of the capture and treatment system.

Water levels will be monitored according to the schedule presented in Table 2-1. Water levels were required to be monitored on a monthly basis for one year (2008). Water levels are currently required to be measured annually for all wells and more often for certain wells associated with the capture systems. Some of the critical wells will be monitored continuously using dataloggers.

3. Ground water monitoring will be coordinated with the BMFOU monitoring program managed by the Montana Bureau of Mines and Geology as there is overlap in the monitoring well networks.

Table 2-1 and Plate 1 identify wells that shall be monitored under both BMFOU and BPSOU ground water monitoring programs. The Montana Bureau of Mines and Geology will review and comment on the monitoring well list before the monitoring SAP is finalized. Responsibility for monitoring wells in both programs and for coordinating the data will be determined at that time.

4. Additional monitoring wells will be installed throughout the MSD as needed to determine flow direction, gradients, and ground water quality. Additional monitoring wells will be installed in areas where the extent(s) of ground water plumes are uncertain. These will also include additional nested well sets in key areas of the floodplain, additional mid-level and deep wells, and possibly bedrock wells.

As presented in Table 2-1 and shown on Plate 1, several new wells were installed between 2007 and 2010 in the MSD and are now incorporated into the BPSOU monitoring network.

5. Wells will also be installed, as necessary, to monitor the subdrain performance.

As presented in Table 2-2 and shown on Plate 1, additional monitoring wells shall be installed in the MSD and incorporated into the BPSOU monitoring network. Based on ongoing work in the vicinity of the MSD pump vault, additional new monitoring wells will be installed to supplement the existing network.

6. One pumping test will be conducted on a mid-level well (AMW-1B) in upper MSD to determine if the subdrain will influence flow in the mid-level portion of the aquifer.

The aquifer test was conducted from January to February 2010. Pumping test results are summarized in the Draft Final 2010 Metro Storm Drain (MSD) Mid-Level Aquifer Pumping Test Technical Memorandum *(ARCO 2010).*

7. The ground water loads entering the MSD subdrain will be monitored annually in the fall (base flow) using dye tracer methods to determine flow and standard sampling to measure metals and arsenic concentrations. Load monitoring will assure that the subdrain continues to operate as expected and is not fouling or clogging. In addition, the mass balance will be used to determine if the pumping rate is matching the ground water collection rate and assure that the subdrain is not adding contaminated ground water back into the aquifer in the vicinity of the pump vault. In addition, two monitoring wells will be installed adjacent to MSD just downgradient of the pump vault to assure that captured ground water is not leaving the capture system.

Ground water loading evaluations for MSD are discussed in Section 3, Task 5 - MSD Subdrain Load Monitoring Plan. The additional wells adjacent to the MSD are discussed in Section 3 Task 2 - Well Installation.

8. A network of nested wells will be installed between the MSD and Blacktail Creek.

The network of nested wells is identified in Table 2-1 and shown on Plate 1 and shall be installed.

9. At least two nested well groupings (three wells each grouping) will be installed at the very west end of the BPSOU as POC wells. Each well group will consist of a shallow well, a deeper weathered bedrock well, and a deep solid bedrock well.

The POC wells at the west end of BPSOU are identified in Table 2-1 and shown on Plate 1.

10. There is no ground water capture system between the end of the MSD subdrain and the start of the hydraulic control channel. If ground water inflow between the MSD and LAO capture systems is found to adversely affect surface water quality, additional ground water capture and hydraulic control shall be developed and implemented in this area.

RD investigations identified a source of ground water inflow to surface water containing high concentrations of metals between the capture systems. A design for partially extending the HCC has been submitted and approved. Construction was initiated in November 2010. Following completion of the HCC extension, the extent of uncaptured ground water will be slightly smaller. The wells needed to monitor this are identified in Table 2-1 and shown on Plate 1. The wells are co-located with existing surface water monitoring stations. The stage

data will be obtained from the surface water monitoring program to delineate three-dimensional flow directions. The flow directions and water quality data will be used to evaluate interaction between surface and ground waters.

2.2 Monitoring Program Roles and Responsibilities

The primary entities of the BPSOU ground water monitoring team consist of EPA (the lead agency for the site), the Montana Department of Environmental Quality (DEQ, support agency for the site), and the PRP Group. Other stakeholders or program participants include the Montana Bureau of Mines and Geology (BMFOU monitoring program). The roles and responsibilities of the primary team members follow.

2.2.1 EPA and DEQ

The agencies' responsibilities include:

- Providing overall direction for the ground water monitoring activities.
- Reviewing, providing comments on, and EPA, in consultation with DEQ, approving plans, data summary reports, and other submittals, and implementing and documenting the monitoring work.
- Preparing, evaluating and interpreting data for annual assessments and the five-year review process (EPA, in consultation with DEQ).
- Providing oversight of field efforts.
- Providing community relations and other public information resources.
- Facilitating and coordinating activities with local, state, responsible parties (RPs), and other federal entities as needed.
- Maintaining records of site activities.

2.2.2 PRP Group

The PRP Group is responsible for implementing all remedial action and monitoring activities at the BPSOU. Under the GWMP, these responsibilities include:

- Organizing and arranging field planning meetings and scheduling, conducting, and documenting field work.
- Procuring technical services support and implementing activities for well drilling, sampling, laboratory analysis, drilling contractor oversight, surveying, and other similar activities.
- Preparing data summary reports and submitting to EPA/DEQ for review.
- Identifying and acquiring necessary permits (e.g., drilling) and utility clearances.

- Maintaining communication with EPA/DEQ regarding the status of this project.
- Coordinating with EPA/DEQ and the laboratory regarding the analytical, data validation, and QA issues related to sample analysis.
- Notifying EPA/DEQ immediately of significant problems affecting the quality of data or the ability to meet project objectives.
- Ensuring that sampling is conducted in accordance with procedures detailed in the governing field documents and that the quantity and location of all samples meet the requirements of the governing field documents.
- All other activities described in this document, unless specifically noted for other parties.

2.3 Monitoring Well Network

The required, current monitoring well network is presented in Table 2-1 and shown on Plate 1. The network will be reviewed and may be revised based on the annual BPSOU GWMP Data Summary Reports (DSR). A SAP for expanding the network was approved in 2007 and implemented in 2007-2010. Further expansion of the network will be conducted using this SAP as part of Task 1 (see Section 3.1 below).

2.3.1 Water Quality and Water Level Monitoring

As specified in the ROD, the ground water COCs are arsenic, cadmium, copper, lead, mercury, and zinc. These are the primary analytes that will be monitored under the ground water monitoring program. The wells to be sampled and the frequency of sample collection are specified in Table 2-1. Additionally, all new monitoring wells will be sampled quarterly for the first two years and then will be sampled semi-annually or every five years. Ground water field parameters include pH, temperature, redox potential (Eh), specific conductance (SC), dissolved oxygen (DO), and water levels. A number of wells are slated to have only water level information collected and will not be sampled.

As part of any Five-Year Review for BPSOU or any other comprehensive review as determined by EPA, general chemistry analysis shall be conducted for all wells sampled and include, at a minimum, the following analytes: potassium, sodium, calcium, magnesium, manganese, iron, sulfate, chloride, bicarbonate, carbonate, pH, SC, hardness, and total dissolved solids.

2.4 Ground Water Monitoring Areas of Interest

The monitor wells identified in Table 2-1 have been divided into separate areas of interest to aid in the evaluation and interpretation of site data and to ensure that the needs and objectives of each area of interest are being met. The following areas of interest have been established for this purpose:

- Technical Impracticability Zone
- MSD Capture System
- Lower Area One Capture System
- Ground water area between MSD and LAO capture systems
- Private Wells

Each of these areas of interest has been developed with a specific purpose, as discussed below.

2.4.1 Technical Impracticability Zone Monitoring

The boundary of the TI Zone is shown on Figure 1-2. This boundary was derived in the *Final Technical Memorandum, Technical Impracticability Evaluation for Alluvial Ground Water, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site, Butte, Montana,* April 2006 (EPA 2006) and adopted in the BPSOU ROD. This evaluation addressed the alluvial aquifer within the BPSOU and a small section southeast of the eastern BPSOU boundary extending south to the area of Clark Park. Ground water contamination in the bedrock aquifer, which lies beneath and north of the alluvial aquifer, has been addressed by EPA as part of the BMFOU. A TI determination for the bedrock aquifer was made and, as a result, an ARARs waiver for the bedrock aquifer was invoked in the Mine Flooding operable unit ROD.

Much of the TI Zone is located in an urban area covered with municipal infrastructure, historic mining features, railroad lines, and commercial and residential structures that limit options to remove or remediate sources of metals and arsenic to ground water. Purpose

The purpose of TI Zone ground water monitoring includes the following objectives:

- Determine if contaminated ground water is leaving the TI Zone. Coordinate Controlled Ground Water Area monitoring among other sites or OUs particularly Butte Mine Flooding Operable Unit and Montana Pole and Treating Plant NPL Site

2.4.1.1 Sampling Locations and Frequency

The wells included in the TI Zone monitoring network are listed in Table 2-1 and shown on Plate 1. This network includes the point of compliance wells located along the south boundary between the MSD and Blacktail Creek and the west boundary of BPSOU. In addition, this network includes wells within the TI Zone boundary, and a limited number of wells adjacent to the TI Zone boundary. The sampling and water level frequencies for TI Zone wells are shown on Table 2-1.

2.4.1.2 Point of Compliance Monitoring

The implementation of contingency remedy measures may occur with consecutive exceedances in the point of compliance wells above the arsenic, copper, cadmium,

lead, mercury, or zinc performance standards outlined in Section 1.3. Upon exceedance of a performance standard in any of the point of compliance wells, the EPA /DEQ shall be specifically notified and the well or wells in question will be resampled. Should resampling confirm the results, a draft contingency plan shall be prepared. Upon the confirmed exceedance in the same point of compliance well, this shall constitute a violation triggering one or more of the following contingency measures as determined by EPA in consultation with DEQ. Ground water within the interior of the TI zone will be monitored for trends to evaluate if conditions are changing which may lead to a point of compliance violation.

2.4.2 MSD Ground Water Capture System Monitoring

Ground water capture by the subdrain is intended to prevent contaminated ground water from entering Silver Bow or Blacktail Creeks. This component of the Selected Remedy removes a significant source of contaminant loading to Silver Bow Creek during base flow conditions.

2.4.2.1 Purpose

The MSD ground water capture system will be monitored to determine its effectiveness. The capture system monitoring includes analysis of the following:

- Water levels, including nested well pairs, to determine whether contaminated ground water in the shallow and deeper portions of the aquifer is flowing toward, or being captured by, the subdrain.
- Water levels in the MSD hydraulic control channel.
- Subdrain load monitoring to determine the effectiveness of the subdrain and changes in the effectiveness.

2.4.2.2 Sampling Locations and Frequency

The wells included in the MSD capture system monitoring network are listed in Table 2-1. This network includes wells following the MSD corridor and extends to Blacktail Creek in the area of the pump vault. The monitoring wells will be sampled and water level information collected on various schedules as presented in Table 2-1.

2.4.2.3 MSD Subdrain Load Monitoring

The ROD states that flows in the MSD subdrain will be measured in the fall, during base flow, using dye tracer methods to determine flows and metals loading entering the subdrain. Load monitoring in the MSD Subdrain was completed once in 2009 and was presented in the Draft Final Metro Storm Drain (MSD) 2009 Tracer-Dilution Study Technical (Atlantic Richfield 2010). This investigation concluded that alternative methods of measuring flows and loading would be equally effective and easier to implement than dye tracer methodology. As a result, the requirement for load monitoring using a dye tracer will be waived and replaced by an alternate monitoring method. Flumes shall be installed within manholes in the subdrain and a load monitoring plan will be developed as a part of O&M of the subdrain to

determine whether the subdrain continues to operate as expected and is not fouling or clogging. This plan is further discussed as *Task 5 - MSD Subdrain Monitoring Procedures*.

2.4.3 Lower Area One Capture System Monitoring

Hydraulic controls constructed during the Lower Area One Expedited Response Action (ERA) capture contaminated ground water and prevent it from discharging to Silver Bow Creek. Contaminated ground water is captured in the hydraulic control channel (HCC) and routed to the Butte Treatment Lagoon System.

2.4.3.1 Purpose

The purpose of LAO capture system monitoring is to determine the effectiveness of this capture system and ensure that contaminated ground water is not leaving BPSOU or discharging to Silver Bow Creek at levels causing performance standard violations. Actual operation and maintenance of the Butte Treatment System Lagoons, including operating water levels, will be provided in a separate operations and maintenance plan prepared by the PRP Group. The monitoring program shall include at a minimum:

- Water levels, including nested well pairs, to determine whether contaminated ground water in the shallow and deeper portions of the aquifer is flowing toward the capture system, and including staff gages in the HCC and D2, D3, D4 Cells and water level monitoring in several monitoring wells to determine whether ground water is leaving the capture system.`

- Water quality, including nested well pairs, to evaluate water quality in the vicinity of the ground water divide caused by the capture system.

2.4.3.2 Sampling Locations and Frequency

The wells and surface water staff gages included in the LAO capture system monitoring network are listed in Table 2-1. Well sampling and water level monitoring frequencies are presented in Table 2-1. Water-level measurements from wells in Montana Pole and Treating Plant Site may be used to expand the potentiometric surface map. Water levels from within the Montana Pole Site will be coordinated with their operations.

2.4.4 Monitoring Ground Water between LAO and MSD Capture Systems

Between the expanded LAO and MSD ground water capture systems, there are approximately two thousand feet of uncaptured ground water. Recent stream monitoring data indicate that contaminated ground water does not consistently impact Silver Bow Creek through this reach. Unlike the reconstructed stream channel and floodplain in LAO which is elevated above the water table, this reach is in hydraulic contact with the water table making it vulnerable to contaminated ground

water inflow. In order to evaluate the ground water quality trends in this area, surface water and ground water monitoring shall be coordinated in this area.

2.4.4.1 Purpose

Ground water shall be monitored in this area to determine ground water quality and hydraulic factors that control ground water-stream interaction. Monitoring shall consist of the following:

- Water level monitoring, including nested well pairs, to determine horizontal and vertical hydraulic gradients.
- Wells linked to surface water stations to determine hydraulic gradient between the stream and the aquifer.
- Ground water quality sampling, including nested well pairs, to determine ground water quality in the shallow and deeper portions of the aquifer.

2.4.4.2 Sampling Locations and Frequency

The wells and surface water staff gages included in the monitoring network for this area between capture systems are listed in Table 2-1. Well sampling and water level monitoring frequencies are presented in Table 2-1.

2.4.5 Private Well Monitoring

Private wells include those used for irrigation and industrial purposes. Private wells within the TI zone will be inventoried, sampled and monitored. There are no known publicly-owned production wells within the BPSOU.

2.4.5.1 Purpose

The purpose of monitoring domestic and irrigation wells is to ensure that the public and the environment are being protected from contaminated ground water underlying the TI Zone. Monitoring private wells will also help document changes in water quality within contaminant plumes. To the extent a Controlled Ground Water Area will not prevent the use of existing wells, the PRP Group will be implementing, after Agency review and approval, an education and well abandonment program. The program will persuade owners not to use contaminated water and to take existing wells out of service in exchange for public water service.

2.4.5.2 Sampling Locations and Frequency

An inventory of existing private wells and their current use will be completed as part of Task 6 detailed in Section 3.6. Access agreements to sample private wells will be obtained as needed. All private wells with access agreements will be sampled at a minimum of every five years. Wells used for drinking water will be sampled annually if water quality exceeds or approaches those drinking water quality standards specified in the ROD.

2.5 Reporting

2.5.1 Annual Reports

All data collected under this GWMP will be validated and reported in annual DSRs. The format of these reports shall follow the format provided in the *Clark Fork River Superfund Site Investigations, Pilot Data Report Addendum* (ARCO 2000), but may incorporate data analysis and interpretation as needed. Additionally, EPA may analyze data, as necessary, to assess current site conditions.

The annual DSR will compile the data and information collected during the course of the calendar year (January 1 through December 31). The purposes for preparing the annual report are as follows:

- Provide an annual summary of ground water data and information collected each year
- Summarize QA/QC issues
- Document deviations from the SAP
- Summarize the changes made to the ground water monitoring network.
- Note and highlight the wells that exceed performance standards
- Provide all data in a digital electronic format (e.g., electronic database or Microsoft Excel spreadsheet; pdf is not considered a digital electronic format)

The annual DSR will be submitted to EPA and DEQ by the end of the first quarter of the following calendar year (March 31). All data generated may be subject to Agency data validation.

2.5.2 Private Well Owner Reports

Reporting results to individual well owners is also required. The well owner, EPA, and DEQ should be notified immediately of any exceedance in a domestic or irrigation well. Reporting to the well owner shall include a cover letter that includes a discussion of the analytes exceeded (if any) and a copy of the analytical report with the laboratory results. Submission of this correspondence shall be in coordination with EPA and DEQ.

2.6 Data Management

Data collected during implementation of the BPSOU GWMP will be compiled in a long-term ground water monitoring database. The BPSOU ground water database will be updated with the monitoring data on an annual basis. All data generated will be managed according to the procedures developed in *Task 4 – Data Management Plan*.

2.7 Plan Revision

At least every five years, the EPA in consultation with the State, will review the ground water monitoring program's completeness. This Plan may be modified by EPA and the State, including, without limitation, contractors, monitoring locations, and analytical methods or parameters which may be added or deleted from the program, or adjustments to monitoring frequency. The five-year review will be used to analyze and if necessary adjust the requirements of the monitoring program as determined by EPA and the State.

Section 3 Ground Water Monitoring Program Tasks

This section of the GWMP describes the tasks that shall be completed by the PRP Group.

3.1 Task 1 - Ground Water Sampling and Analysis

A Sampling and Analysis Plan (SAP) for ground water monitoring shall be prepared. This section outlines the methods and procedures to be included in the SAP used to monitor ground water quality and flow within BPSOU. Ground water monitoring wells shall be monitored as described in this GWMP.

3.1.1 Monitoring Network

The monitoring well network and schedule of sampling and water level measurements, as presented in Table 2-1, will be incorporated into the SAP. The SAP should specify that the well network and monitoring program may be revised depending on the results of the monitoring.

3.1.2 Data Quality Objectives

The preparation of data quality objectives (DQOs) is required on Clark Fork River Superfund Site Investigation (CFRSSI) projects. The DQO process is a series of planning steps that is designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. Please refer to *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4,* February 2006 (United States Environmental Protection Agency, Office of Environmental Information Washington, DC 20460, EPA/240/B-06/001).

3.1.3 Standard Operating Procedures

Ground water sampling identified in this GWMP will be performed in accordance with the general *CFRSSI Standard Operating Procedures (SOPs)* (ARCO 1992a) and the *CFRSSI Quality Assurance Project Plan (QAPP)* (ARCO 1992b). The CFRSSI SOPs applicable to this monitoring program include, but may not be limited to, the following:

- Document Control (G-3)
- Field Logbook/Photographs (G-4)
- Sample Packaging and Shipping (G-5)
- Field Quality Control Samples (G-6)

- Sample Custody (G-7)
- Decontamination of Equipment used to Sample Soil and Water (G-8)
- Identification of Samples and Analytical Results (G-11)
- Data Security and Data Transfer (G-12)
- Measurement of Field Parameters (HG-6, HG-7, HG-8)
- Ground Water Sampling for Inorganics (GW-1)
- Field Procedure for Non-Steady State Aquifer Test Using Constant Discharge Rate and Multiple Wells (GW-2)
- Monitor Well Design and Construction (GW-3)
- Well Development (GW-4)
- Measurement of Water Elevation, Floating Product Thickness, and Determination of Well Casing Volume (GW-5)
- Continuous Ground Water Level Monitoring (GW-8)

Since the time the CFRSSI SOPs were developed in 1992, technological improvements have been made to monitoring equipment and procedures. For example, a variety of all-in-one instruments are now available for the collection of field parameters. Updated or amended SOPs will be included in the SAP prepared for BPSOU ground water monitoring.

3.1.4 Ground Water Sampling Procedures

Monitoring well sampling and sample handling, preservation, custody, and other associated activities will be performed according to the applicable *CFRSSI SOPs* (ARCO 1992a) for ground water sampling and sample water filtration. Ground water sampling is to be conducted with equipment consistent with *CFRSSI SOPs* (ARCO 1992a). Field parameters to be measured and documented at the time of sampling are included in Table 2-1. Ground water samples will be field-filtered and preserved at the time of sample collection to allow for laboratory analysis of the dissolved concentrations of selected parameters.

3.1.5 Ground Water Level Measurements

Ground water level measurements will be taken with a water level measuring device, consistent with CFRSSI SOP GW-5 (ARCO 1992a). The SOP for continuous ground water level monitoring (CFRSSI SOP GW-8) shall be followed, but the SOP will require updating to take into account the equipment that is actually used.

3.1.6 Laboratory Analysis

Table 2-1 presents the list of laboratory parameters that will be measured and documented under the BPSOU GWMP. Samples will be analyzed using methods consistent with the EPA *Contract Laboratory Program (CLP) Statement of Work ILM05.3* (EPA 2004). Analyses will be completed by a certified or EPA-approved laboratory. These analytical method and detection limit requirements will be updated as this CLP Statement of Work is updated by EPA. A table listing analytes, analytical methods, and detection limits will be included in the sampling and analysis plan.

3.2 Task 2 –Well Installation

As specified in the ROD, new monitoring wells shall be installed to supplement the existing ground water monitoring network. The locations of additional wells are specified in Table 2-1 and Plate 1. At a minimum, the new well installation plan will include the following elements:

- Contact person(s) for the new well installation
- A map showing the proposed new well locations
- A table showing proposed depths and screened intervals
- Proposed well construction diagrams and materials
- Well log form and well logging procedures
- Soil samples, if any, to be collected and analytes
- Well installation schedule
- Well installation completion report details
- Health and safety plan

3.3 Task 3 – Data Reporting and Management

Given the large amount of data that will be collected during monitoring, a data management program is required. It is anticipated that preparing a data management plan will be a collaborative effort among EPA, DEQ, and the PRP Group. The data management plan should address, at a minimum, the following elements:

- Electronic format of data packages
- Database management
- Data accessibility
- Quality control procedures

- Roles and responsibilities of system managers and data users
- The data manager must incorporate relevant Butte Mine Flooding data into the BPSOU data set
- The plan must specify that locations are to be recorded in NAD 83 State Plane Feet (FIPS 2500) for horizontal coordinates and NAVD 29 Feet for vertical elevations.

3.4 Task 4 – MSD Subdrain Load Monitoring

Although the ROD required load monitoring using dye tracer flow measurement and standard water sampling to determine whether the subdrain continues to operate as expected and is not fouling or clogging, the requirement for dye tracer methodology has been waived. A replacement method of load monitoring using flumes installed in manholes and conventional flow monitoring and sampling shall be developed. A plan for monitoring flow and loading in the MSD will be developed to ensure the subdrain is operating optimally. At a minimum, the load monitoring plan should address the following elements:

- Determine a pumping level in the vault that ensures that the subdrain is not adding contaminated water back into the aquifer in the vicinity of the pump vault
- Establish flumes or weirs and totalizers within the subdrain to continuously monitor flow
- Identify monitoring wells adjacent to the subdrain to be monitored that will signify when subdrain cleanouts are needed
- Overall description of flow measurement and monitoring procedures
- Location and description of monitoring points
- Description of flow measurement techniques
- Developing an SOP for the flow measurement and water sampling within the subdrain
- Monitoring schedule

Section 4 Performance Evaluation

Post-ROD monitoring of ground water at the BPSOU has been conducted since 2007. Many of the wells within the BPSOU have a longer monitoring history, with analytical results dating back to 1982. Additionally, remedial actions have altered conditions at the site with major changes in the vicinity of the capture systems.

The challenge in interpreting the analytical data is to determine if the monitoring objectives set forth in the ROD (refer to Section 2.1.1) are being met. Due to the variability in the data for a given well from quarter to quarter or year to year, it is not always evident if the increasing trend that would be expected to be associated with impacts to areas of interest is occurring. Therefore, analysis of the data using statistical methods is warranted. The trend of the onsite well concentrations will be the earliest indication of the water quality that will eventually appear in the contingency wells.

4.1 Overview

The software program *Monitoring and Remediation Optimization System* (MAROS) shall be used to perform statistical evaluation of the monitoring data. The MAROS program is a public domain program developed by the Air Force Center for Environmental Excellence (AFCEE). An explanation of the MAROS software and the calculations used by the software is included in **Appendix A**. The MAROS methodology pertinent to BPSOU includes the following tests:

Test	Purpose
Mann-Kendall Trend Test	To determine the trend of the data over time. Gives only the direction and probability of a trend, and not the magnitude.
Linear Regression Analysis	To verify and visually evaluate the magnitude of any trend predicted by the Mann-Kendall Test.

4.2 Mann-Kendall Trend Test

The first step in evaluating long-term ground water monitoring data will be to determine if the trend is increasing. The Mann-Kendall Test Statistic (S) is a value that when positive indicates an increasing trend and when negative a decreasing trend. The larger the S statistic and the greater the number of samples used in the calculation, the higher the statistical probability (confidence) that the trend is real and not due to chance. The Coefficient of Variation (COV) measures the degree of variation of individual data points from the mean. A low COV can be an indicator of

a stable concentration trend as opposed to an indefinable trend. The MAROS program designates the following general trend classifications with respect to COV and percent confidence:

Mann-Kendall Statistic	Confidence in Trend	Trend Designation
S > 0	> 95%	Increasing
S > 0	90 - 95%	Probably Increasing
S > 0	< 90%	No Trend
S ≤ 0	< 90% and COV ≥ 1	No Trend
S ≤ 0	< 90% and COV < 1	Stable
S < 0	90 - 95%	Probably Decreasing
S < 0	95%	Decreasing

4.3 Linear Regression

The linear regression method is used by MAROS to provide an alternate method of determining trends. Based on the slope of the linear regression, the magnitude of the trend can be evaluated as well. Linear regression is an evaluation of the log slope of concentration versus time. Confidence limits and COV are measured in a similar manner to the Mann-Kendall analysis. The MAROS program designates the following general trend classifications for regression analyses with respect to COV and percent confidence:

Confidence in Ln Slope	Trend	
	Positive	Negative
<90%	No Trend	COV < 1 Stable COV > 1 No Trend
90% – 95%	Probably Increasing	Probably Decreasing
> 95%	Increasing	Decreasing

If an increasing trend is identified but concentrations of the evaluated constituent remain below RGs, the magnitude of the linear regression slope will be considered when determining the need for further action.

4.4 Response to Increasing Trends

Increasing statistical trends are defined for the purposes of this GWMP as a positive Mann-Kendall S value or a positive linear regression slope. If an increasing trend in a COC is indentified with 90 percent or greater confidence (i.e. designated as "increasing" or "probably increasing" by the MAROS program), in an Early Warning Well, it will require a re-assessment of the ground water collection component of the Selected Remedy (e.g., use of additional subdrains, hydraulic control channels, or extraction wells), and may require additional remedy measures to protect the future surface water. Examples of causes of increasing statistical trends include, but are not limited to, incomplete system capture or an expanding plume (i.e., ground water leaving the TI zone). Monitoring objectives and appropriate measures to ensure those objectives are achieved are set forth in the ROD and summarized in Section 2.1.1. Further information on contingencies required to ensure the objectives are being met will be included in the final Remedial Design/ Remedial Action Work Plan for the Silver Bow Creek/ Butte Area.

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Section 5 Schedule

Sampling of monitoring wells will be completed such that the seasonal fluctuation of the water table is captured by the low and high water sampling events. The BPSOU high-water sampling event will be completed in July, and the low-water event will be completed in January. Timing of sampling may be altered based on additional data collection.

Each ground water sampling event will start by collecting synoptic water levels. The water level at each monitoring well in the network will be collected during the first two days of each monitoring event prior to the collection of any ground water samples. The water level at each well will also be measured just prior to purging and sampling the well.

The ground water monitoring program schedule is shown in Table 5-1. This schedule is provided only as a planning tool and as a basis for subsequent, more refined schedules.

Table 5-1
BPSOU Ground Water Monitoring Program Schedule

Task	Description	Responsibility	Schedule
---	Community Relations	EPA/DEQ	Ongoing
GWMP	GWMP	EPA/DEQ	March 31, 2011
1	Ground Water Sampling and Analysis Plan	PRP Group	May 31, 2011
2(a)	Well Installation Plan	PRP Group	Plan – May 31, 2011
2(b)	Install Monitoring Wells	PRP Group	July 15, 2011
3	Data Management Plan	EPA/DEQ PRP Group	January 15, 2012
~~4~~	MSD Subdrain Load Monitoring	EPA/DEQ PRP Group	December 21, 2011
Annual Report	Annual Data Summary Report	PRP Group	By March 31 of the following year
Private Well Owner Reports	Provide sample results to private owners of domestic or irrigation wells	PRP Group	Within 45 days of receipt of data

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Section 6 References

ARCO 1992a. Clark Fork River Superfund Site Investigations, Standard Operating Procedures. Compiled by Canonie Environmental Services, Inc. for the Atlantic Richfield Company. September.

ARCO 1992b. Clark Fork River Superfund Site Investigations, Quality Assurance Project Plan. Prepared by PTI Environmental Services for the Atlantic Richfield Company. May.

ARCO 2000. Clark Fork River Superfund Site Investigations, Pilot Data Report Addendum. Prepared by Exponent for the Atlantic Richfield Company. July.

ARCO 2010. Draft Final 2010 Metro Storm Drain (MSD) Mid-Level Aquifer Pumping Test Technical Memorandum. Prepared by PTI Environmental Services for the Atlantic Richfield Company. December

CDM 2001. Final Technical Memorandum: Addendum to the Baseline Human Health Risk Assessment, Evaluation of Human Health Risks Associated With Exposure to Alluvial Ground Water, Silver Bow Creek/Butte Area NPL Site, Butte-Silver Bow County, Montana, Butte Priority Soils Operable Unit. Prepared by CDM for EPA. September 4.

DNRC 2003. Montana's Basin Closures and Controlled Groundwater Areas. Prepared by DNRC Water Resources Division, Water Rights Bureau. December.

DNRC 2009. Final Order: Petition for Butte Alluvial and Bedrock Controlled Ground Water Area No. 76G-30043832. Administrative Order. October 30.

EPA 2004. Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, ILM05.3. March.

EPA 2006. Final Technical Memorandum, Technical Impracticability Evaluation for Alluvial Ground Water, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site, Butte, Montana. Finalized for EPA by CDM after the first two drafts of the document were prepared by Atlantic Richfield Company. April.

EPA and DEQ 2006. Record of Decision, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area Superfund Site, Butte, Montana. Prepared by EPA in consultation with and partial concurrence from DEQ. September.

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Figures

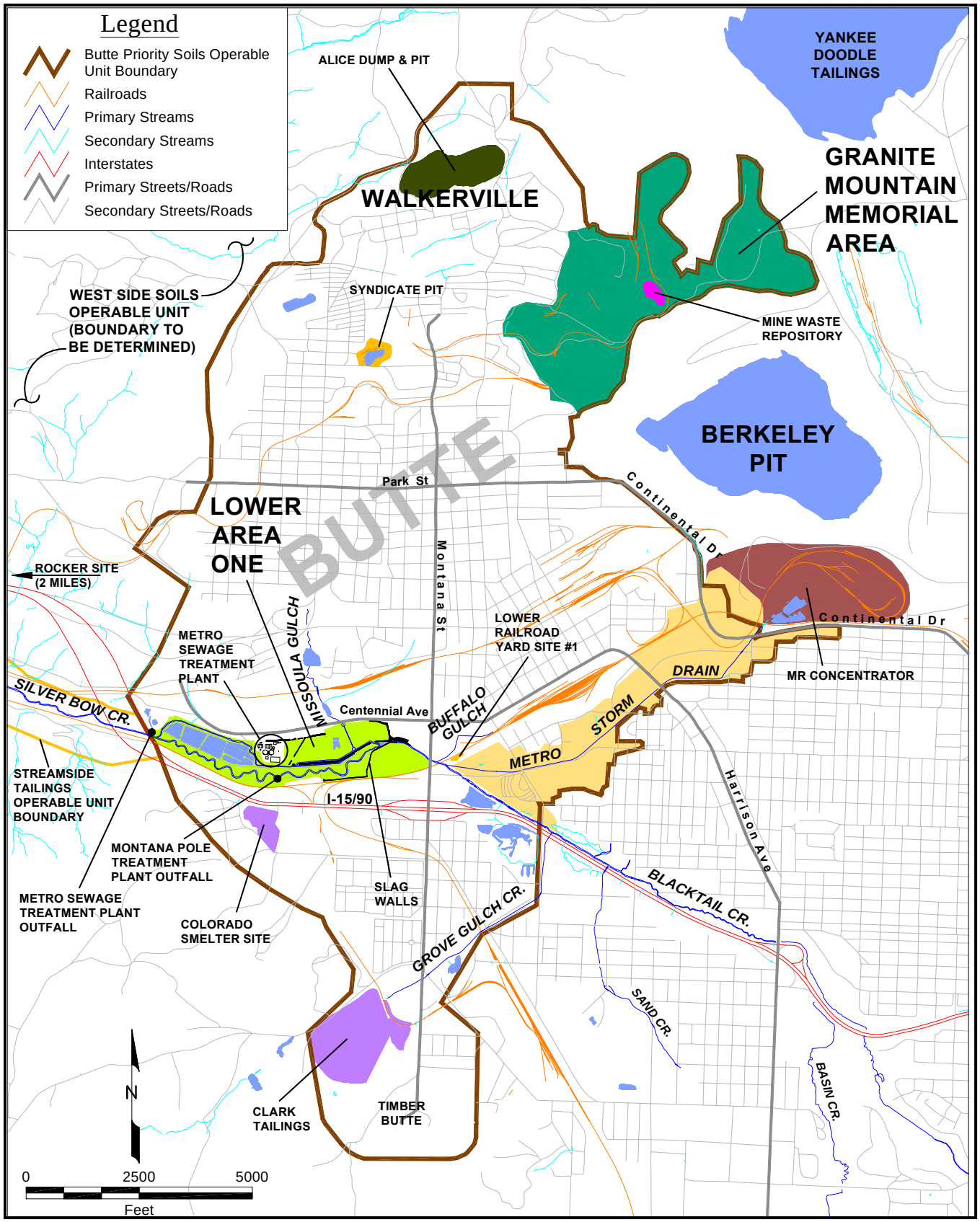

Figure 1-1
Site Map
Interim Ground Water Monitoring Plan
Butte Priority Soils Operable Unit
Silver Bow Creek/Butte Area NPL Site

Montana Department of Environmental Quality

United States Environmental Protection Agency

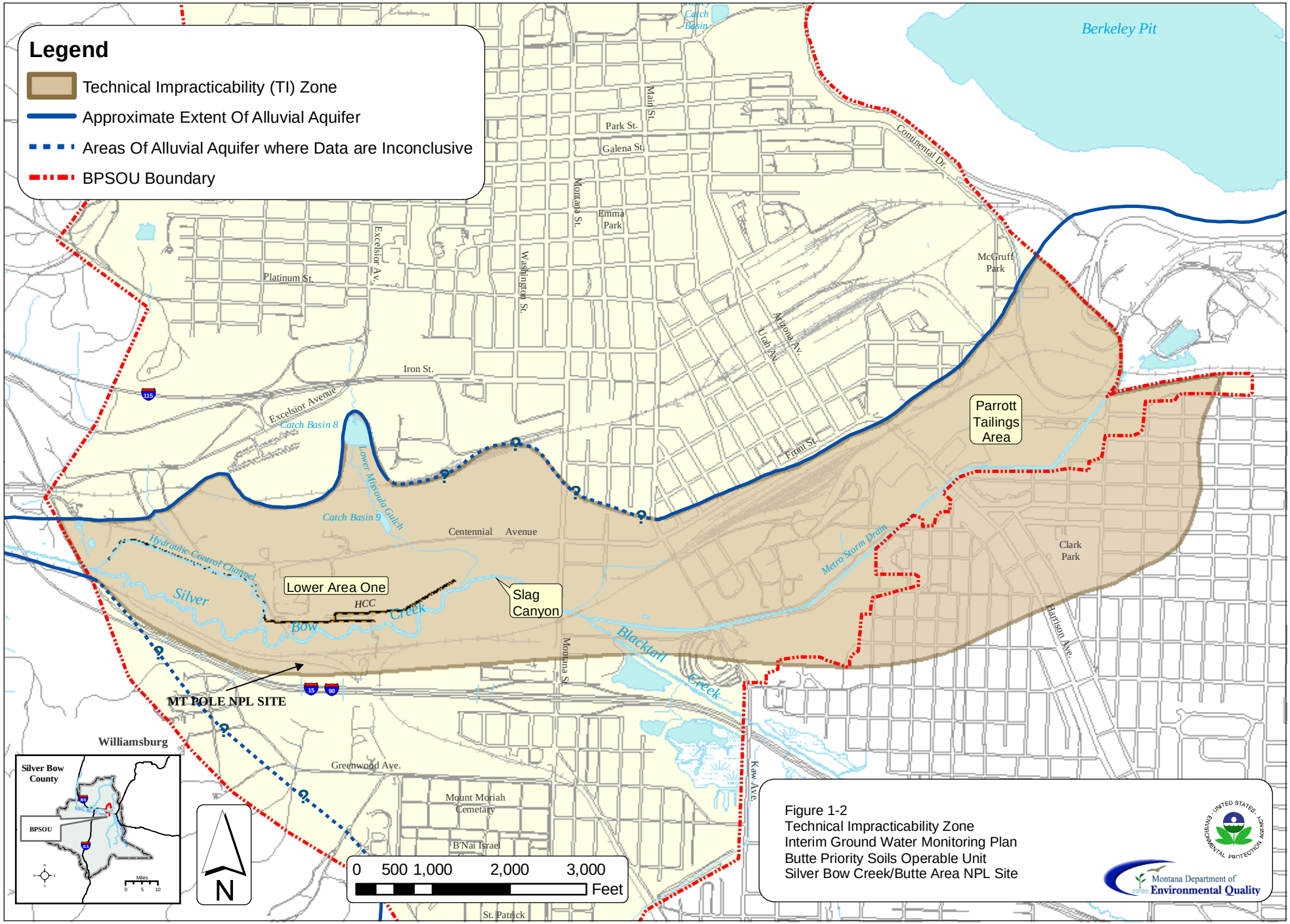

Figure 1-2
Technical Impracticability Zone
Interim Ground Water Monitoring Plan
Butte Priority Soils Operable Unit
Silver Bow Creek/Butte Area NPL Site

Montana Department of Environmental Quality

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Legend

- Surface Water Levels
- Required New Well
- Manhole

Monitoring Well and Purpose

- Colorado Smelter
- MSD Capture
- LAO Capture System
- POC
- TI Zone to SW
- Water Levels

- MSD Sub Drain
- Hydraulic Control Channel
- Area Between Capture Systems
- LAO
- MSD Capture System Area
- TI Boundary 2006 ROD
- Colorado Smelter

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Plate 1
Ground Water Monitoring Wells

Butte Priority Soils Operable Unit
Revised Interim Ground Water Monitoring Plan
Silver Bow Creek / Butte Area NPL Site
Butte / Silver Bow County, Montana

0 500 1,000 2,000 3,000 4,000 Feet

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Tables

TABLE 2-1. BUTTE PRIORITY SOILS GROUND WATER MONITORING NETWORK

Well ID		Multi/Single Depth	Purpose	Water Level	Chemistry	Location	Screened Interval (feet)	Aquifer
Alluvial Aquifer Technical Impracticability Zone Network								
AMW-13A		Multiple Depth	POC	Continuous	Semi-annual	South of Visitor Center	5-15	UAU
AMW-13B		Multiple Depth	POC	Continuous	Semi-annual	South of Visitor Center	33-43	MAU
AMW-13C		Multiple Depth	POC	Continuous	Semi-annual	South of Visitor Center	70.5-80.5	LAU
BPS07-01A		Multiple Depth	POC	Monthly	Semi-annual	Clark Park	12.5-22.5	UAU
BPS07-01B		Multiple Depth	POC	Monthly	Semi-annual	Clark Park	29-39	MAU
BPS07-05A		Multiple Depth	POC	Monthly	Semi-annual	Southwest of Clarks Park	25-35	UAU
BPS07-05B		Multiple Depth	POC	Monthly	Semi-annual	Southwest of Clarks Park	69-79	MAU
BPS07-16A		Multiple Depth	POC	Monthly	Semi-annual	SW Corner Nevada and Majors	10-20	UAU
BPS07-16B		Multiple Depth	POC	Monthly	Semi-annual	SW Corner Nevada and Majors	30-40	MAU
BPS07-28A	New Required Well	Multiple Depth	POC	Monthly	Semi-annual	Corner of Kaw and Cobben	Shallow	UAU
BPS07-28B	New Required Well	Multiple Depth	POC	Monthly	Semi-annual	Corner of Kaw and Cobben	Mid-Level	MAU
BPS07-28C	New Required Well	Multiple Depth	POC	Monthly	Semi-annual	Corner of Kaw and Cobben	Deep	LAU
Metro Storm Drain Capture System Monitoring Network								
AMC-12		Multiple Depth	MSD Capture	Monthly	Qrtrly then semi-Annual	East of Parrot	water table	UAU
AMC-13		Single Depth	MSD Capture	Monthly	BMFOU	Clark Park	47-55	MAU
AMC-23B	New Required Well	Multiple Depth	MSD Capture	Monthly	Semi-annual	East of Kaw Ave.	Mid-Level	MAU
AMC-24		Multiple Depth	MSD Capture	Continuous	Semi-annual	KOA	13-23	UAU
AMC-24B		Multiple Depth	MSD Capture	Monthly	Semi-annual	KOA	40.5-50.5	MAU
AMC-24C		Multiple Depth	MSD Capture	Monthly	Semi-annual	KOA	69.5-79.5	LAU
AMW-01A		Multiple Depth	MSD Capture	Continuous	Semi-annual	Civic Center	3-13	UAU
AMW-01B		Multiple Depth	MSD Capture	Continuous	Semi-annual	Civic Center	33-43	MAU
AMW-01C		Multiple Depth	MSD Capture	Monthly	Semi-annual	Civic Center	87-97	LAU
AMW-12		Single Depth	MSD Capture	Monthly	Semi-annual	Utah St	7-22	UAU
AMW-20		Single Depth	MSD Capture/GW Divide	Monthly	Semi-annual	Ecology Ponds	23-38	UAU
AMW-8		Multiple Depth	MSD Capture/GW Divide	Monthly	Semi-annual	North of Texas and Continental	water table	UAU?
BPS07-03A		Multiple Depth	MSD Capture	Monthly	Semi-annual	South of Pump Vault	9-19	UAU
BPS07-07		Single Depth	MSD Capture	Continuous	Semi-annual	West of MSD Pump Vault	5-15	UAU
BPS07-11A		Multiple Depth	MSD Capture	Monthly	Semi-annual	Between Parrott Tailings - Clark Park	12-24	UAU
BPS07-11B		Multiple Depth	MSD Capture	Monthly	Semi-annual	Between Parrott Tailings - Clark Park	34-44	MAU
BPS07-20		Single Depth	MSD Capture	Monthly	Semi-annual	N of MSD Vault	5-8	UAU
BPS07-21A		Multiple Depth	MSD Capture	Continuous	Semi-annual	S of MSD Vault	13-23	UAU
BPS07-21B		Multiple Depth	MSD Capture	Continuous	Semi-annual	S of MSD Vault	36-46	MAU
BPS07-21C		Multiple Depth	MSD Capture	Continuous	Semi-annual	S of MSD Vault	60.5-70.5	LAU
BPS07-22		Single Depth	MSD Capture	Continuous	Semi-annual	S of MSD Vault	5-15	UAU
BPS07-22B	New Required Well	Multiple Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	N of MSD Vault	Mid-Level	MAU
BPS07-22C	New Required Well	Multiple Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	N of MSD Vault	Deep	LAU
BPS07-23		Single Depth	MSD Capture	Continuous	Semi-annual	N of MSD Vault	5-15	UAU
BPS07-24		Single Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	S of George St / East of KOA	58.5-68.5	MAU
BPS07-26A	New Required Well	Multiple Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	E of KOA/ S of MSD-3A	Shallow	UAU
BPS07-26B	New Required Well	Multiple Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	E of KOA/ S of MSD-3A	Mid-Level	MAU
BPS07-26C	New Required Well	Multiple Depth	MSD Capture	Continuous	Qrtrly then semi-Annual	E of KOA/ S of MSD-3A	Deep	LAU
BPS07-27A	New Required Well	Multiple Depth	MSD Capture	Monthly	Qrtrly then semi-Annual	KOA	Shallow	UAU
BPS07-27B	New Required Well	Multiple Depth	MSD Capture	Monthly	Qrtrly then semi-Annual	KOA	Mid-Level	MAU
BPS07-27C	New Required Well	Multiple Depth	MSD Capture	Monthly	Qrtrly then semi-Annual	KOA	Deep	LAU
BT98-02A		Multiple Depth	MSD Capture	Monthly	Semi-annual	South of Diggings East	14-19	UAU

TABLE 2-1. BUTTE PRIORITY SOILS GROUND WATER MONITORING NETWORK

Well ID	Multi/Single Depth	Purpose	Water Level	Chemistry	Location	Screened Interval (feet)	Aquifer
BT98-02B	Multiple Depth	MSD Capture	Monthly	Semi-annual	South of Diggings East	32-42	MAU
GS-09-01	Single Depth	MSD Capture	Monthly	Semi-annual	Parrott Tailings	30.6-40.6	UAU
GS-09-02	Single Depth	MSD Capture	Monthly	Semi-annual	Parrott Tailings	26-36	UAU
GS-09-03	Single Depth	MSD Capture	Monthly	Semi-annual	Parrott Tailings	34-44	UAU
GS-11	Multiple Depth	MSD Capture	Continuous	Semi-annual	Diggings East	8-18	UAU
GS-30D	Multiple Depth	MSD Capture	Monthly	Semi-annual	Northside Tailings	28.5 - 30.5	UAU
GS-30S	Multiple Depth	MSD Capture	Continuous	Semi-annual	Northside Tailings	14-20	UAU
GS-31D	Multiple Depth	MSD Capture	Monthly	Semi-annual	Diggings East	29-39	UAU
GS-31S	Multiple Depth	MSD Capture	Continuous	Semi-annual	Diggings East	15-20	UAU
GS-32D	Multiple Depth	MSD Capture	Monthly	Semi-annual	Northside Tailings	27-37	UAU
GS-32S	Multiple Depth	MSD Capture	Monthly	Semi-annual	Northside Tailings	27-37	UAU
GS-40	Multiple Depth	MSD Capture/GW Divide	Monthly	Semi-annual	Continental and Texas		MAU
GS-41d	Multiple Depth	MSD Capture	Monthly	5-year (2013)	Parrott Tailings	51 - 61	MAU
GS-41s	Multiple Depth	MSD Capture	Monthly	5-year (2013)	Parrott Tailings	34 - 39	UAU
GS-44D	Multiple Depth	MSD Capture	Monthly	Semi-annual	Clark Park	50 - 60	MAU
GS-44S	Multiple Depth	MSD Capture	Monthly	Semi-annual	Clark Park	20 - 25	UAU
GS-45	Multiple Depth	MSD Capture	Monthly	Semi-annual	Parrot Tailings	49-59	UAU
GS-46d	Multiple Depth	MSD Capture	Monthly	Semi-annual	East of Clark Park	51 - 61	MAU
GS-46s	Multiple Depth	MSD Capture	Monthly	Semi-annual	East of Clark Park	25 - 30	UAU
GS-8	Multiple Depth	MSD Capture	Continuous	Semi-annual	Diggings East	127-145	LAU
GS-9	Multiple Depth	MSD Capture	Continuous	Semi-annual	Diggings East	60-75	MAU
MF-07	Single Depth	MSD Capture	Continuous	Semi-annual	Casey St at MSD	13-18	UAU
MF-08	Single Depth	MSD Capture	Continuous	Semi-annual	End of Delaware St.	9-14	UAU
MF-09	Single Depth	MSD Capture	Monthly	Semi-annual	Diggings East	11-16	MAU
MF-10	Single Depth	MSD Capture	Continuous	Semi-annual	Diggings East	12-17	UAU
MF-11	Multiple Depth	MSD Capture	Monthly	Semi-annual	Oregon and George	10-15	UAU
MSD01A	Multiple Depth	MSD Capture	Monthly	5-year (2013)	SW of Harrison Ave	6-16	UAU
MSD01B	Multiple Depth	MSD Capture	Monthly	Semi-annual	SW of Harrison Ave	40-45	MAU
MSD01C	Multiple Depth	MSD Capture	Monthly	Semi-annual	SW of Harrison Ave	110-115	LAU
MSD-02A	Multiple Depth	MSD Capture	Continuous	Semi-annual	Casey St at MSD	Shallow	UAU
MSD-02B	Multiple Depth	MSD Capture	Continuous	Semi-annual	Casey St at MSD	35-45	MAU
MSD-03	Single Depth	MSD Capture	Continuous	Semi-annual	NE of Diggings	40-50	MAU
MSD-04	Multiple Depth	MSD Capture	Monthly	Semi-annual	Oregon and George	45-55	MAU
MSD-05	Multiple Depth	MSD Capture	Continuous	Semi-annual	Northside Tailings	50-55	MAU
MSD-HCC			Flow Continuous	Monthly			
Subdrain Flumes	Single Depth	MSD Capture	Flow Continuous	Annually	MSD		Drain Rock

TABLE 2-1. BUTTE PRIORITY SOILS GROUND WATER MONITORING NETWORK

Well ID		Multi/Single Depth	Purpose	Water Level	Chemistry	Location	Screened Interval (feet)	Aquifer
Monitor Area Between Ground Water Capture Zones								
AMW-2			Uncaptured	Monthly	Semi-annual	Buffalo Gulch - Mouth	10-20	UAU
BPS07-08A		Single Depth	Uncaptured	Monthly	Semi-annual	Next to SS-05	9-19	UAU
BPS07-13A		Single Depth	Uncaptured	Monthly	Semi-annual	S of Blacktail Creek- concrete yard	23-33	UAU
BPS07-13B	New Required Well	Multiple Depth	Uncaptured	Monthly	Semi-annual	S of Blacktail Creek- concrete yard	Mid-Level	
BPS07-14A		Single Depth	Uncaptured	Monthly	Semi-annual	S of Blacktail Creek- concrete yard	16-26	UAU
BPS07-15A		Single Depth	Uncaptured	Monthly	Semi-annual	S of Blacktail Creek- concrete yard	25-35	UAU
BPS07-25A		Single Depth	Uncaptured	Continuous	Semi-annual	Next to SS-05a	10.5-20.5	UAU
FP98-1			Uncaptured	Monthly	Semi-annual	LAO	4 - 6	UAU
FP98-1B	New Required Well	Multiple Depth	Uncaptured	Monthly	Qrtrly then semi-Annual	LAO	Mid-Level tag BR	MAU
FP98-2			Uncaptured	Monthly	Semi-annual	LAO	3 - 18	UAU
FP98-3			Uncaptured	Monthly	Semi-annual	LAO	3 - 5	UAU
GS-13A		Single Depth	Uncaptured	Continuous	Semi-annual	West end of Slag Canyon	8 - 18	UAU
Lower Area One Capture System Monitoring Network								
BMW-3A		Multiple Depth	LAO Capture	Continuous	Semi-annual	Near SS07	14-19	Weathered Bedrock ?
BMW-3B		Multiple Depth	LAO Capture	Continuous	Semi-annual	Near SS07	36-50	Bedrock
BMW-6B		Single Depth	LAO Capture	Continuous	5-year (2013)	West End HCC	59-79	Bedrock
BPS07-17A		Single Depth	LAO Capture	Continuous	Semi-annual	West End LAO	10-20	UAU
BPS07-18A		Multiple Depth	LAO Capture	Continuous	Semi-annual	West End LAO	30-40	UAU
BPS07-18B		Multiple Depth	LAO Capture	Continuous	Semi-annual	West End LAO	8-18	UAU
FP98-6		Single Depth	LAO Capture	Continuous	Semi-annual	New SBC Floodplain	5-15	UAU
FP98-7		Single Depth	LAO Capture	Continuous	5-year (2013)	New SBC Floodplain	5-15	UAU
GS-26		Multiple Depth	LAO Capture	Continuous	5-year (2013)	West End HCC	9-14	UAU
HCAB-01		Multiple Depth	LAO Capture	Continuous	Semi-annual	West End HCC	40-50	Bedrock
HCAB-02		Single Depth	LAO Capture	Continuous	Semi-annual	West End HCC	25-35	Bedrock
NW-03		Single Depth	LAO Capture	Continuous	5-year (2013)	West End HCC	No Log	No Log
Colorado Smelter Repository Monitoring Network								
MW-G-96		Single Depth	Colorado Smelter Repository	Monthly		East of repository	19-29	
MW-H-96		Single Depth	Colorado Smelter Repository	Monthly		Northeast of repository	16-26	

TABLE 2-1. BUTTE PRIORITY SOILS GROUND WATER MONITORING NETWORK

Well ID	Multi/Single Depth	Purpose	Water Level	Chemistry	Location	Screened Interval (feet)	Aquifer
Water Levels Only - Site Wide							
BMF96-02			Monthly		Community Health Center	149-169	Bedrock
BMF96-03			Monthly		BSB Health Department	145-165	Bedrock
BMF96-04			Monthly		Charlie Judd Park	167-187	Bedrock
Staff gages along Silver Bow Creek			Monthly	None			
Staff gages in the Hydraulic Control Channel			Monthly	None			
Staff gages Treatment Lagoons A2 and A3			Monthly	None			
Staff gages Treatment System D2, D3 and D4 Cells			Monthly	None			
AMC-23			Continuous	BMFOU	East of Kaw Ave.	19-29	UAU
BMW-1A			Quarterly		LAO	22-32	UAU
BMW-2A			Quarterly		LAO	13-19	UAU
BMW-2B			Quarterly		LAO	45-55	Bedrock
BMW-2D			Quarterly		LAO	186-196	Bedrock
BMW-4B			Quarterly		LAO	27-37	Bedrock
BMW-5A			Quarterly		LAO	5-8	UAU
BMW-5B			Quarterly		LAO	37-57	Bedrock
BMW-8A			Quarterly		LAO	5-11	UAU
BMW-9A			Quarterly		LAO	15-25	UAU
BMW-9B			Quarterly		LAO	44-54	Weathered Bedrock
CT-84-1			Quarterly		LAO	11-16	UAU
CT-94-1			Quarterly		LAO	11-24	UAU
FP98-4			Quarterly		LAO	5-15	UAU
FP98-5			Quarterly		LAO	5-15	UAU
FP98-8			Quarterly		LAO	2.25-4.25	UAU
FP98-9			Quarterly		LAO	5-15	UAU
GS-12			Quarterly		LAO	19-29	UAU
GS-16			Quarterly		LAO	11-16	UAU
GS-17D			Quarterly		LAO	18-28	UAU
GS-18			Quarterly		LAO	11-16	UAU
GS-19			Quarterly		LAO	13-18	UAU
GS-20			Quarterly		LAO	18-23	UAU
GS-22			Quarterly		LAO	5-15	UAU
GS-23			Quarterly		LAO	14-19	UAU
GS-25			Quarterly		LAO	4-9	UAU
GS-25C			Quarterly		LAO	84-94	Weathered Bedrock
GS-25D			Quarterly		LAO	166-176	Bedrock
GS-29S			Quarterly		Visitor's Center	8-13	UAU
GS-34S			Quarterly		LAO	12-17	UAU
GW-6			Quarterly		LAO	10-20	UAU
HCA-MG1 (ALT FOR HCA-MG3)			Quarterly		LAO	17-27	UAU
M-1			Quarterly		LAO	5-8	UAU
MF-01			Continuous		George St. and Montana Ave.		UAU

TABLE 2-1. BUTTE PRIORITY SOILS GROUND WATER MONITORING NETWORK

Well ID	Multi/Single Depth	Purpose	Water Level	Chemistry	Location	Screened Interval (feet)	Aquifer
Water Levels Only - Site Wide (continued)							
MF-05			Quarterly		Northside Tailings	12-17	UAU
MW-3 (MPC)			Quarterly		West of Kaw Ave. at RR	3-13	UAU
MW-3			Quarterly		North of Montana Pole		
MW-3 (CGSB-4)			Quarterly		East of Kaw Ave. N. of MSD	T.D. 24.4	UAU
NE-2			Quarterly		LAO	15-20	Weathered Bedrock
NW-4			Quarterly		LAO	10-20	UAU
S-2			Quarterly		LAO	25-28	UAU
S-5			Quarterly		LAO	16-23	Weathered Bedrock
AMC-12			Continuous		East of Parrott Tailings	35-45	UAU
AMC-6			Continuous	BMFOU	East of Parrott Tailings	53-63	MAU
AMW-11			Quarterly		Visitor's Center	4-14	UAU
GS-28			Monthly		South of KOA	6-11	UAU
GS-10A(D)			Quarterly		South of Parrot Tailings	100-110	LAU
GS-42S			Continuous	BMFOU	East of Parrott Tailings	13-18	UAU
GS-42D			Continuous	BMFOU	East of Parrott Tailings	47-57	MAU
GS-30D			Quarterly		Diggings East	28-38	UAU
BPS07-30	New Required Well		Continuous		West End HCC	Shallow	UAU

Notes:

MSD Capture System Wells	These wells evaluate the effectiveness of the MSD ground water capture system at controlling the movement of contaminated ground water in the MSD area.
GW Divide	These wells evaluate the location of the groudn water divid in the vicinity of the Parrot Tailings.
TI Zone POC Wells	POC wells are uncontaminated and will remain uncontminated as long as the remedy is effective. Increases in COC concentrations will trigger an action.
Uncaptured	Thes wells evaluate condition in the area between the capture systems.
LAO Capture System Wells	These wells evaluate the effectiveness of the LAO ground water capture system at controlling the movement of contaminated ground water in the LAO area.
Colorado Smelter Repository	These wells evaluate the hydrologic and water quality conditions at the Colorado Smelter repository.
Butte Mine Flooding Well	These wells are currently monitored by the BMFOU. Monitoring data should be included as an appendix in the BPSOU ground water moinitoring DSRs.
New Required Well	Wells designated as new wells to be installed after 2010.

TABLE 2-2. BPSOU NEW MONITORING WELLS

Required New Monitoring Wells

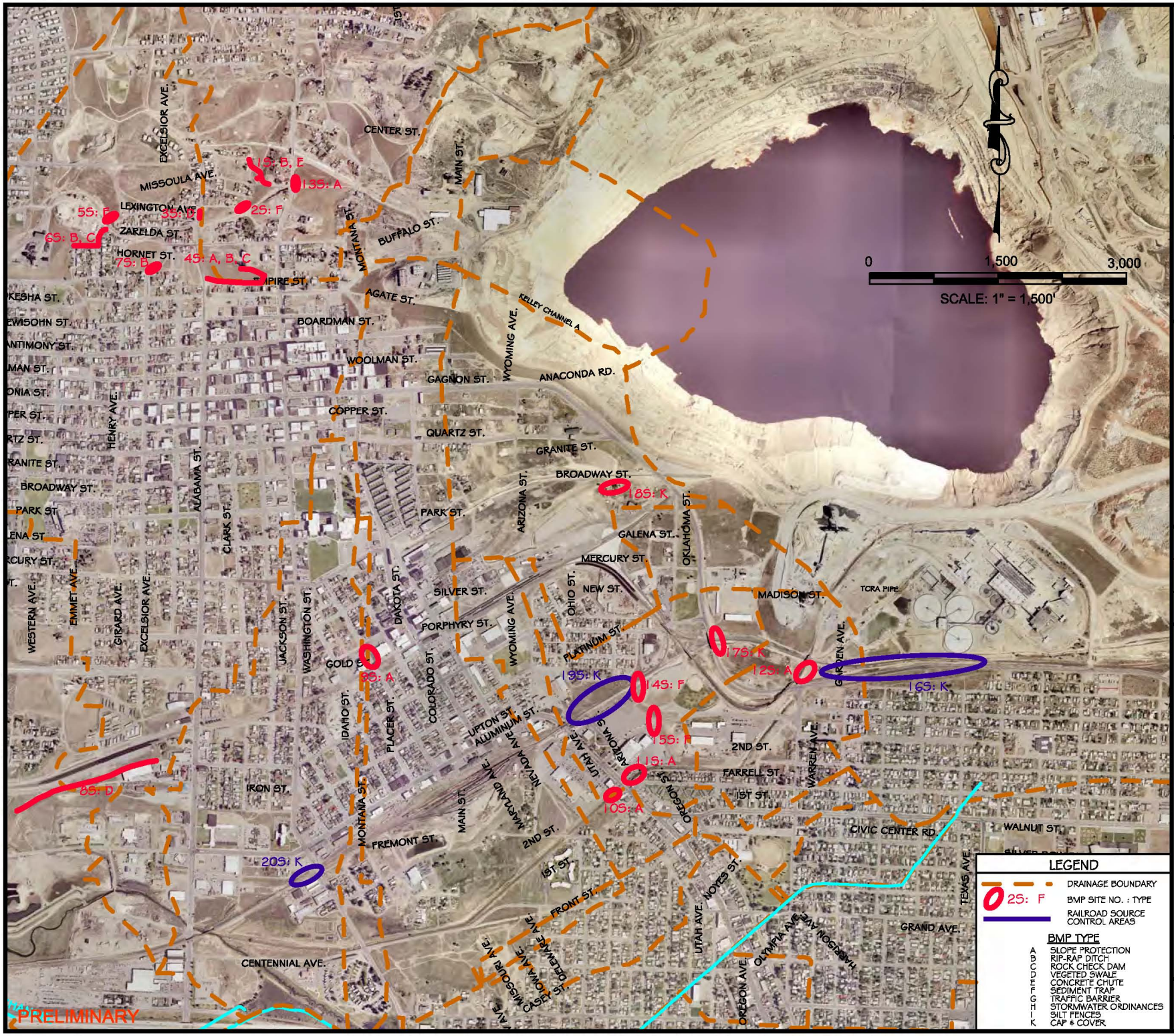
Well ID	Purpose	Location	Aquifer
BPS07-22B	MSD Capture	N of MSD Vault	MAU
BPS07-22C	MSD Capture	N of MSD Vault	LAU
BPS07-26A	MSD Capture	E of KOA/ S of MSD-3A	UAU
BPS07-26B	MSD Capture	E of KOA/ S of MSD-3A	MAU
BPS07-26C	MSD Capture	E of KOA/ S of MSD-3A	LAU
AMC-23B	MSD Capture	East of Kaw Ave.	MAU
BPS07-13B	Area Between Capture Systems	S of Blacktail Creek- concrete yard	MAU
BPS07-30	Compliance West End	Old SBC Channel beyond HCC	UAU
FP98-1B	Area Between Capture Systems	LAO	MAU
BPS07-28A	POC Boundary	Corner of Kaw and Cobben	UAU
BPS07-28B	POC Boundary	Corner of Kaw and Cobben	MAU
BPS07-28C	POC Boundary	Corner of Kaw and Cobben	LAU

Appendix A
MAROS Software User Manual

The MAROS software manual is available for download at the following link:

http://www.gsi-net.com/software/free-software/maros.html#MAROS_Download

Figure 1



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DSGN	DATE	CKD
KJG	04/10	STH
REV	DATE	CKD
CPD	03/11	STH

JOB # 2009-225

PDF: T:\ALE PWMP\1.0\MCP\MXD\PSOU_MAP.PDF
5/22/2011 FILE PATH: K:\CAD\2009\225\DGN\BPSOU_SOURCE_CONTROL.dgn

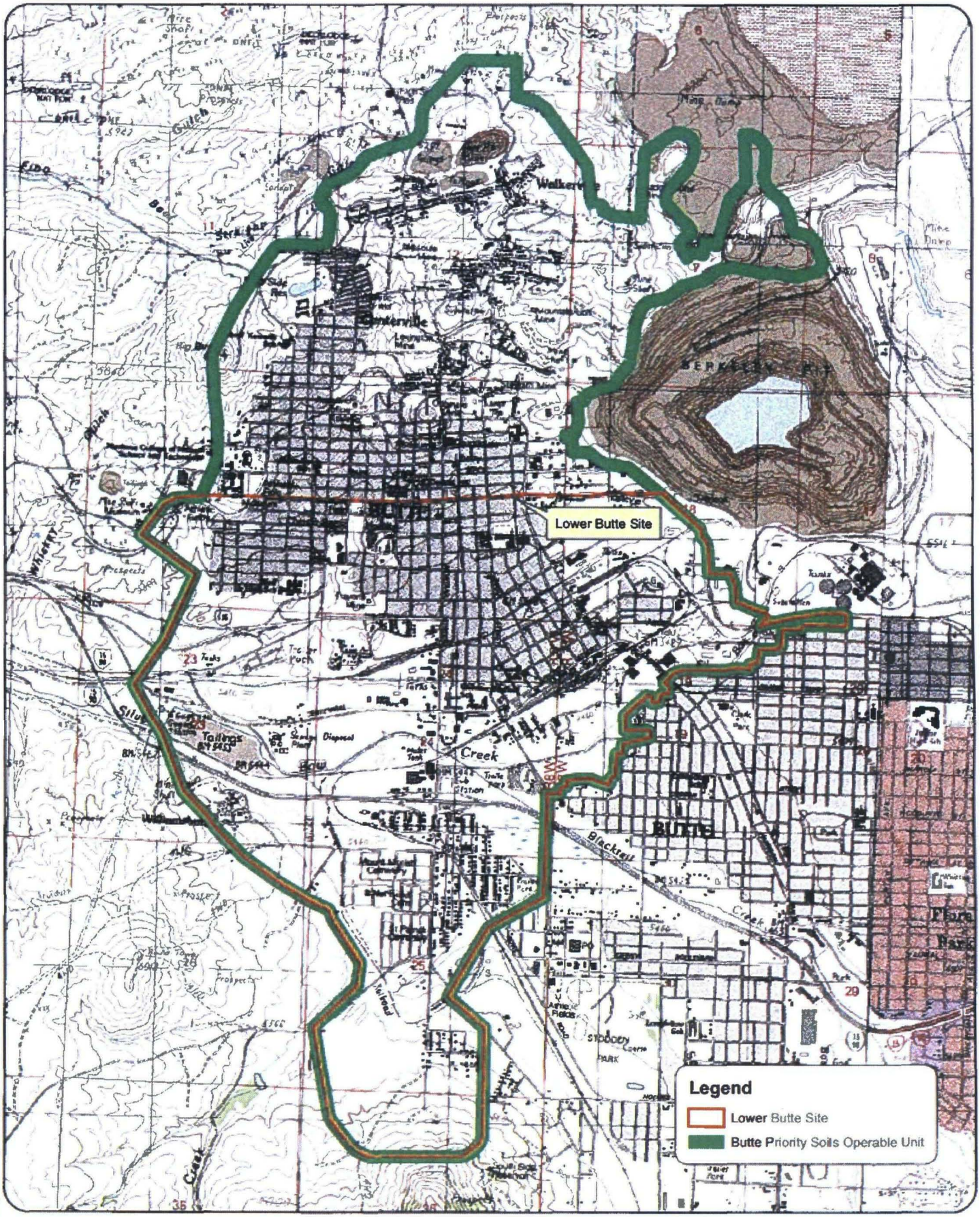
SUPERFUND RELATED SOURCE CONTROL BMP POTENTIAL LOCATIONS

Site Location Map

FIGURE 5

EXHIBIT 4

UNILATERAL ADMINISTRATIVE ORDER FOR THE BUTTE SITE



Lower Butte Site
Butte Priority Soils Operable Unit