

FINAL MULTI-PATHWAY RESIDENTIAL METALS ABATEMENT PROGRAM PLAN

PRIORITY SOILS OPERABLE UNIT
SILVER BOW CREEK/BUTTE AREA
NATIONAL PRIORITIES LIST SITE
BUTTE, MONTANA

April 19, 2010

Prepared by:

Butte Silver Bow County

and

Atlantic Richfield Company



TABLE OF CONTENTS

| | |
|--|-----------|
| Purpose Statement..... | 1 |
| Section 1 Introduction | 1 |
| 1.1 Program Components | |
| 1.2 Cleanup Action Levels..... | 3 |
| Section 2 Long-Term Tracking and Data Base Management | 4 |
| Section 3 Community Awareness and Education | 6 |
| Section 4 Medical Monitoring | 7 |
| 4.1 Health Studies | 7 |
| Section 5 Property Prioritization | 8 |
| Section 6 Property Sampling | 10 |
| 6.1 Schedule | 10 |
| 6.2 Access | 11 |
| 6.3 Procedures..... | 12 |
| 6.3.1 Residential Yards | 12 |
| 6.3.2 Indoor Dust..... | 14 |
| 6.3.3 Earthen Basements | 14 |

| | |
|---|-----------|
| 6.3.4 Attic/Crawl Spaces | 15 |
| 6.3.5 Paint..... | 16 |
| 6.3.6 Lead Pipes..... | 17 |
| 6.4 Sample Logging, Tracking, and Custody | 17 |
| 6.5 Sample Preparation | 18 |
| Section 7 Backfill Sampling and Selection | 18 |
| Section 8 Residential Yard Remediation..... | 19 |
| 8.1 Yard-Specific Removal Plans..... | 20 |
| 8.2 Soil Removal and Disposal..... | 20 |
| 8.3 Yard Reclamation..... | 20 |
| 8.3.1 Backfill Material..... | 20 |
| 8.3.2 Sod..... | 20 |
| 8.3.3 Seeding | 20 |
| Section 9 Other Media Abatement..... | 21 |
| 9.1 Indoor dust..... | 22 |
| 9.2 Earthen Basements..... | 22 |
| 9.3 Attic/Crawl Spaces..... | 22 |
| 9.4 Paint..... | 23 |
| 9.5 Lead Pipes..... | 23 |
| Section 10 Attic Abatement Area..... | 23 |
| Section 11 Air Monitoring for Mercury..... | 23 |
| Section 12 Health and Safety | 24 |
| Section 13 Dust Monitoring and Suppression | 24 |
| 13.1 Monitoring Particulate Dust Levels | 24 |

| | |
|--|-----------|
| 13.2 Dust Suppression Techniques..... | 24 |
| Section 14 Data Quality Objectives: Quality Assurance/Quality Control | 25 |
| 14.1 General Requirements..... | 25 |
| 14.2 Laboratory Quality Control..... | 26 |
| 14.3 Data Quality and Reporting..... | 26 |
| Section 15 Annual Construction Completion Report..... | 26 |
| Section 16 References..... | 27 |

Tables

- 1 Soil, Dust, Backfill, and Vapor Action Levels in Residential Areas
- 2 Testing Method References for Soil, Dust, Backfill, Gravel Material, and Vapor

Appendices

- A. BPSOU and Adjacent Area Map
- B. Property Specific Example of the Data Base and Tracking System
- C. US EPA Remedial Project Manager’s Memo – Commercial Properties
- D. Educational Materials
- E. Medical Monitoring
- F. Questionnaires and Consent Forms – Medical Monitoring
- G. Project Prioritization
- H. Access Agreement

Acronyms

| | |
|--------|--|
| ASA | American Society of Agronomy |
| ARCO | Atlantic Richfield Company |
| BSB | Butte-Silver Bow County |
| BPSOU | Butte Priority Soils Operable Unit |
| CFRSSI | Clark Fork River Superfund Site Investigation |
| CV-AAS | cold vapor-atomic absorption spectrophotometer |
| DQOs | data quality objectives |
| DEQ | (Montana) Department of Environmental Quality |
| EPA | (U.S.) Environmental Protection Agency |
| GIS | Geographic Information System |
| HVS3 | High Volume Small Surface Sampler |
| HEPA | High Efficiency Particulate Air |
| HUD | (U.S. department of) housing and urban development |
| LBP | lead-based paint |
| LAP | laboratory analytical protocol |
| MDLs | method detection limits |
| mg/kg | milligrams per kilogram |
| NPL | National Priority List |
| NIST | national institute of standards and testing |
| ROD | Record of Decision |

| | |
|-------|------------------------------|
| RPD | relative percent difference |
| RSD | relative standard deviation |
| SOP | standard operating procedure |
| WIC | Women, Infants, and Children |
| XRF | X-Ray Florescence |
| µg/dL | micrograms per deciliter |

PURPOSE STATEMENT

To ensure public and environmental health of the residents of the Butte Priority Soils Operable Unit and the adjacent areas by effectively identifying and mitigating potentially harmful exposures to sources of lead, arsenic and mercury.

1.0 INTRODUCTION

1.1 Program Components

The Multi-Pathway Residential Metals Abatement Program (hereafter referred to as the Program) is designed to mitigate potentially harmful exposure of residents of the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site and identified Adjacent Area to sources of lead, arsenic, and mercury contamination. The boundary of the BPSOU and the boundary of the Adjacent Area are shown on the map attached as Appendix A to this document. The contamination may originate from both mining-related (waste rock, tailings, aerial emissions) and non-mining-related sources (lead-based paint and lead solder). The potential sources of lead, arsenic, and/or mercury exposure addressed include yard soil, interior living space dust, interior and/or exterior lead based paint, lead in drinking water from pipe solder, and attic dust when exposure pathways are identified. In addition, the program uses community awareness and education in conjunction with medical monitoring to ensure its effectiveness. Included as well is an Attic Abatement Area, which is in addition to and outside of the BPSOU and Adjacent Area boundaries. The boundary of the separate Attic Abatement Area is also shown on the map in Appendix B. This identified area, though not historically associated with mining or smelting waste dumps, may have an exposure pathway associated with attic dust. The Attic Abatement Area and the attic abatement implementation is further discussed in Section 9.0 of this Program plan.

The Program uses a multi-pathway approach to address both mining and non-mining-related lead, arsenic and mercury contamination at all residential properties which exceed action levels within the BPSOU site and the Adjacent Area. The Program, to be implemented by Butte-Silver Bow (BSB) Program staff, utilizes a prioritized approach to address affected and sensitive populations¹ expeditiously, yet also requires that every property within the BPSOU and the Adjacent Area be

¹ Affected populations are those determined through medical monitoring to have elevated levels of lead or mercury in blood samples or elevated arsenic in urine samples. Sensitive populations include young children and pregnant or nursing mothers.

systematically sampled within 10 years following the Effective Date of the Consent Decree. Cleanup of residential areas shown to need such cleanup will occur within the BPSOU and the Adjacent Areas within 20 years following the Effective Date of the Consent Decree².

The Program requires sampling residential yard soil, interior living space dust, attic dust, and lead-based paint within the BPSOU and the Adjacent Area. Such properties with yard soil or interior living space dust exceeding solid media action levels, or indoor air exceeding the mercury vapor action level, will be remediated. If attic dust exceeds the action level and a pathway exists between the attic and living space, the attic will be remediated. If both living space and attic dust exceed the action levels, a pathway will be assumed and the attic will be remediated. Also, the Program has a process for determining when water samples will be collected and analyzed to determine if a home has lead pipes and/or lead solder that may be contributing to an unacceptable exposure.

The only Program sampling requirements applicable to the Attic Abatement Area is attic sampling, and systematic sampling of residential property attics in the Attic Abatement Area is not required. Within the Attic Abatement Area, Program staff will sample the attic of a residential property upon receiving a request for sampling from a residential property occupant or upon receipt of a development proposal which may result in development of an attic exposure pathway in a residential property.

Components of the Multi-Pathway Residential Metals and Abatement Program include a long-term tracking and data management program, an education and outreach plan, and a medical monitoring program. The long-term tracking and data management program ensures that properties that were not occupied or the owner refused access during the assessment period will be sampled, evaluated and abated in the future, if necessary. In addition, the tracking program will follow changes in ownership and note permits issued by BSB government for remodeling of homes where attic dust sampling found contamination above action levels, but a pathway did not exist when the assessment was completed. The long-term tracking and data management program will be continued for 99 years.

An extensive community awareness and education program to manage exposure to lead, arsenic, and/or mercury exposure within the BPSOU is an integral part of the Program. The focus of the community awareness component will be to raise general public awareness of potential risks from

² The 10 year sampling and 20 year cleanup deadline may not be met if there are problems with owner access or other implementation issues. BSB, the lead SD for this effort, shall notify EPA and DEQ on periodic basis if such problems occur. If EPA, in consultation with DEQ, determines the reasons present represent a good faith effort by the SDs towards achieving these timeframes for sampling and cleanup, the failure to meet these time frames is not a violation of this Plan or the Consent Decree.

these metals, especially risks to young children from lead exposure, and to encourage participation in this effort.

The Program will include medical monitoring. Participation in medical monitoring will be encouraged through community awareness and education. Medical monitoring will use blood lead, blood mercury, and urinary arsenic data to identify individuals who have concentrations of those elements above risk-based thresholds. Blood mercury and urinary arsenic testing will be offered to the residents if elevated concentrations of mercury or arsenic are discovered during the environmental assessment process.

These aspects of the Multi-Pathway Residential Metals and Abatement Program are described in more detail in the remainder of this Program plan.

The U.S. Environmental Protection Agency's (EPA's) Record of Decision (ROD) for the BPSOU, as modified by the Explanation of Significant Differences (ESD), requires that all residential properties within the BPSOU and the Adjacent Area be sampled and assessed within 10 years following the Effective Date of the Consent Decree. The goal of this requirement is to use best efforts to obtain access to all residential properties within the BPSOU and the Adjacent Area that have not previously been sampled to complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, attic dust, lead-based paint, drinking water, and mercury vapor).. During this 10-year period, the prioritized clean-up of residential properties that exceed the action levels will occur in concert with the assessment program. The ROD, as modified by the ESD, also requires that the Program address operation and maintenance issues and administer the attic dust component of the program. Since attic dust is not cleaned-up unless there is an established pathway of exposure, there is the requirement to track these properties over the long-term and to assess and abate attic dust problems when a potential exposure exists.

1.2 Cleanup Action Levels

Action levels for residential, commercial/ industrial, and recreational soils and dust are listed in Table 1. These action levels apply to all properties within the BPSOU and Adjacent Area and also to attics in the Attic Abatement Area, as described herein.

2.0 LONG-TERM TRACKING AND DATABASE MANAGEMENT

Sampling data gathered during environmental assessments and abatements shall be recorded in the Program database/tracking system. The database shall include, at a minimum, the following information:

- Property address, Geo code, short legal description, current roll and card numbers for the date of assessment and assessor code;
- Date of environmental assessment and/or abatement;
- Reason for assessment (i.e. agency request, owner request, EBL investigation and permitting requirements);
- Assessment/Abatement access refusal flag (if applicable) for long-term tracking and follow-up;
- Sample data – sample number, sample date, sample location, sample media, sample results;
- XRF results (paint);
- Abatement description/completion dates/final inspection;
- Flag for long-term tracking if contaminated attic dust is present but was not abated;
- Property owner recommendations/acceptance signature post-abatement; and
- Deed restrictions recorded at Roll/Card.

See Appendix B - Property specific example of the data base and tracking system.

The data record shall be used to track sampling/abatement data and other pertinent information for each property. The information shall be used to identify and prioritize abatement projects (see Section 5).

A key component of the tracking system is that it will ensure that non-occupied properties or properties where the owner refused access during the assessment period will be abated in the future if necessary. The tracking program will also document changes in ownership and remodeling of homes that were found to have contaminated attic dust but no current pathway. The long-term tracking program will be continued for 99 years.

The tracking program will be utilized by the Residential Metals Abatement Program in conjunction with the Butte-Silver Bow Planning /Permitting Department and the Butte-Silver Bow Land Records Office. The data base/tracking system will be linked to the Planning/Permitting Department's permitting system. When a property owner applies for a specific permit for a residential property or commercial building permitted to become a residential property within the BPSOU that property will be identified as having an environmental assessment completed or is required to have an environmental assessment completed. The data obtained from the environmental assessment and the specific permit requested will be used to determine if a potential for exposure exists. The permits that will require an environmental assessment as part of the permit application include; wiring permits, structural remodeling permits, building permits, roofing permits, demolition permits and water and sewer line replacement permits. When a potential exposure is identified, the property owner will be directed to the appropriate program. Permits that require excavating and/or soil transporting will be referred to the Planning Department and required to comply with the Excavation and Dirt-Moving protocols. Permits for projects with a potential exposure to contaminated attic dust will be referred to the Residential Metals Abatement Program. The program will abate the potential exposure prior to a residential property owner starting a project. Only those commercial properties that are permitted to become residential properties will be sampled and tracked. The program will coordinate with the developer to mitigate potential exposures and to ensure proper disposal of contaminated waste.

See Attachment C – EPA Remedial Project Manager Memo

The data base/tracking system will be linked to the Land Records office and available when ownership/deeds are transferred for properties within the BPSOU.

The long term tracking program will be continued for 99 years.

3.0 Community Awareness and Education

The Center for Disease Control states that education is critical to the success of any metals intervention and abatement program. This Residential Metals Abatement Program (RMAP) shall provide a range of education components to enhance and maintain the community's awareness of potential sources of and risks to lead, arsenic, and/or mercury in and around homes and commercial properties, as well as approaches residents can take to avoid exposures. The educational components include the distribution of educational materials to local contractors (e.g., electricians, roofers, carpenters), hardware/lumber suppliers, childcare facilities/programs (e.g., Head Start), and housing authorities (e.g., Human Resource Council – Section 8 and LIEAP). Informative presentations are available for real estate agents and landlords. Periodic mailings to property owners and public service announcements aired by the local television station are also designed to provide public awareness. Outreach will also rely on the medical community, particularly pediatricians and the Women, Infant, and Children (WIC) program to inform the public about risk, health monitoring, and the programs' activities. The RMAP also participates in Community Health fairs and Family fairs to provide outreach to the community.

The education and outreach program specifically addresses portions of homes and commercial buildings that pose a risk for potential exposure. (See attachment – EPA Remedial Project Manager memo) Such portions addressed are the attic space, interior living space, and exterior yard areas. The program shall rely on educational materials and face-to-face consultations to ensure that homeowners, remodeling contractors, developers, home inspectors, potential buyers, and weatherization workers are aware of:

- (1) (1) The potential presence of lead, arsenic, and/or mercury in attics or earthen basements;
- (2) (2) The importance of restricting access to those areas by sensitive populations and taking the appropriate measures to ensure that dust is not tracked into the interior living space when infrequent access occurs; and
- (3) (3) The proper contact information prior to implementing any remodeling project and/or landscaping project to ensure that dust and soil are appropriately handled and disposed of by a responsible entity and/or by approved contractors.

The educational materials shall be provided to all participants of the program at the time when an environmental assessment of the home is implemented (whether interior or exterior) as well as when applicable building permits are sought for remodeling projects. Recommendations made to each resident will be based on the results of environmental sampling at their homes and specific information collected by program staff about daily habits and activities.

See Appendix D (1-7) for examples of educational materials.

4.0 MEDICAL MONITORING

When individuals are found to have elevated blood lead, urinary mercury, or urinary arsenic, the home where the affected person or persons live shall be scheduled for immediate sampling and evaluation. Blood lead levels of 10 ug/dL will be considered as an elevated blood lead levels for children six years of age or less. Urinary mercury levels above the normal range of 0-10 ug/L will be considered as elevated mercury levels for all participants. Urinary arsenic levels above the normal range of 0-52.7 ug/L will be considered as elevated arsenic levels for all participants. (See Appendix E

Influencing factors such as food consumption (i.e. seafood) and dental amalgams will be taken into consideration in conjunction with the data collected during an environmental assessment to determine the source of exposure. Bio-monitoring participants will be required to complete a consent form for participation and an ATSDR approved individual questionnaire for urinary collection. (See Attachment F 1-3) Blood lead screening will be conducted by the Women, infants and children program and analysis will be conducted by an accredited laboratory. Urinary arsenic and mercury screenings will be contracted to a local physician and analysis will be conducted by a certified laboratory. Residential remediation shall then be performed if sampling determines that yard soil, interior living-space dust, or mercury vapor action levels are exceeded.

Participation in the medical monitoring program will be voluntary. However, participation will be encouraged through a variety of means, such as the existing Women, Infants, and Children (WIC) program and referrals from local physicians. Residents will also be encouraged to participate when they are contacted for sampling access.

4.1 HEALTH STUDIES

Butte-Silver Bow will perform public health studies every five years for a period of thirty years. The reports will respect the privacy of the participants and will be available to the public, the EPA, Montana Department of Environmental Quality (DEQ), and potentially responsible parties for the BPSOU. The health studies will include: Identifying chemicals that the residents may have been exposed to; Compiling and interpreting toxicology information on those chemicals; Routes of exposure; Compiling and interpreting the morbidity and mortality statistics as an epidemiology study; Compiling and interpreting health studies; and Compiling and interpreting influencing factors (environmental or cultural) for mortality rates. The public health studies will also include review of the latest epidemiological literature to determine if there are any newly established links between the contaminants of concern and specific diseases.

Data gathered through the Residential Metals Abatement Program's (RMAP) routine activities and the results of previous health studies will be utilized to determine the content of future health studies and potential improvements to RMAP routine activities.

5.0 PROPERTY PRIORITIZATION

Residential properties shall be remediated if sampling data indicate that action levels for yard soil or interior living space dust are exceeded or for indoor air when mercury concentrations exceed the mercury vapor action level. Residential remediation will involve removing and replacing the yard soil and a thorough, one-time house cleaning to mitigate the action level exceedances inside. If an attic to living space exposure pathway is identified during interior dust sampling or if the resident anticipates remodeling activities that could allow contaminated dust into the living space of the residence, the attic dust will be cleaned up by trained and certified professionals. This is discussed in detail in subsequent sections. Yard removal and replacement will only be performed if samples of yard soil exceed action levels. House cleaning will be performed if indoor dust vacuum samples exceed the stated action levels. Remediation of houses may include interior painting, exterior painting, and/or installation of siding if lead paint in poor condition is found. If lead exists in the home's plumbing system that results in elevated concentrations of lead in the drinking water, the plumbing system will be modified or replaced. The decision-making process for remediation of residential properties is summarized in Appendix G.

The Program utilizes a prioritized approach which addresses affected and sensitive populations as a priority; however, BSB will attempt to access every property within the BPSOU and Adjacent Area, and shall carry out abatement where required by the assessment results. If access is denied, the property will be flagged in the data base and reported to the Agencies on an annual basis for follow up. Affected populations are those determined through medical monitoring to have elevated levels of lead or mercury in blood samples or elevated arsenic in urine samples. Sensitive populations include young children and pregnant or nursing mothers. Residential properties shall be prioritized for remediation based on the following criteria, arranged from highest priority to lowest priority level:

- Homes occupied by one or more children with a blood lead equal to or greater than 10 µg/dL (which is considered to be an elevated blood lead);
- Homes occupied by an individual with elevated urinary arsenic;
- Homes occupied by an individual with elevated blood mercury;
- Secondary residences or subsequent homes occupied by children with elevated blood lead;
- Homes previously occupied by children with elevated blood lead, even if no child is currently living at the address;

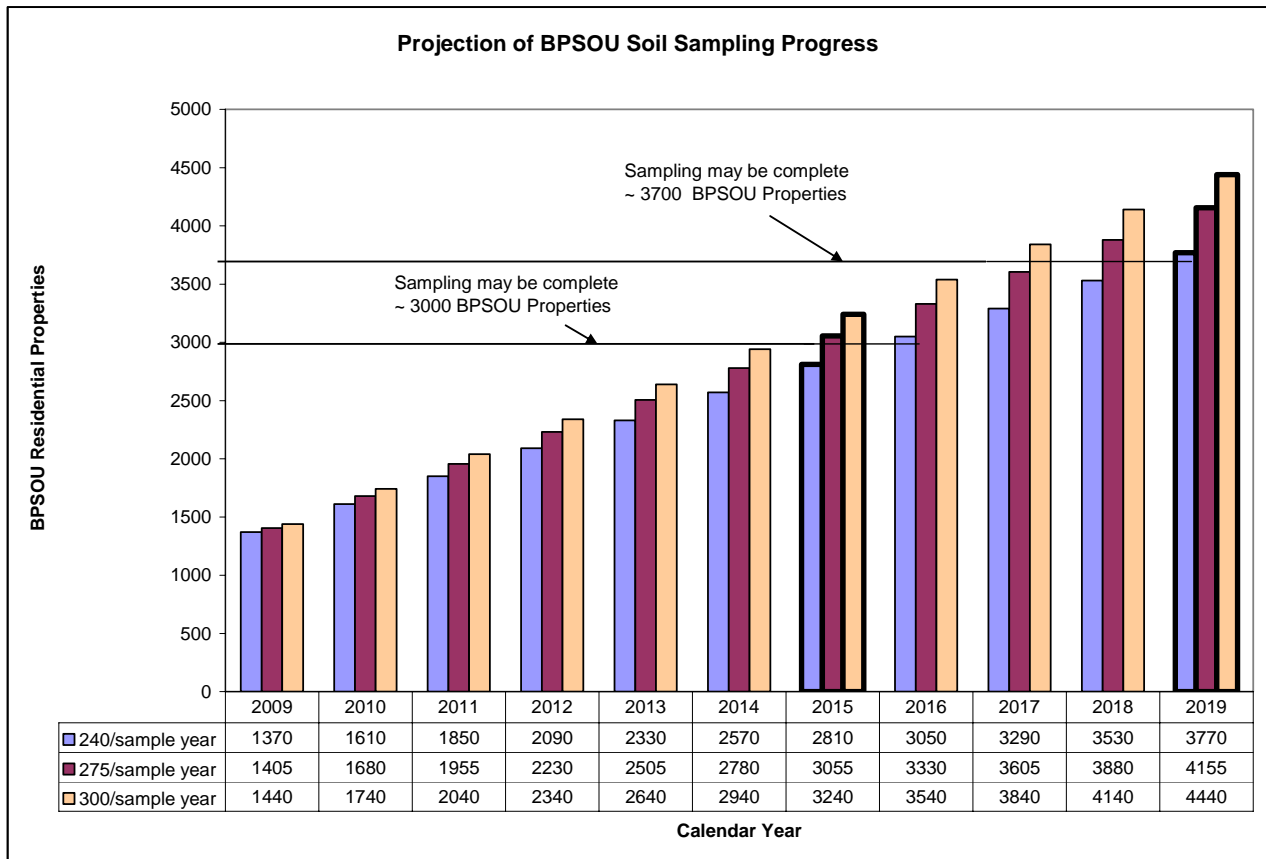
- Homes with very young children (e.g. <1 year) and blood lead of 5-9 micrograms per deciliter ($\mu\text{g}/\text{dL}$);
- Homes with no children, but with one or more sources (paint, water, soil, house dust) with a lead concentration that exceeds the 95th percentile as determined by the BSB. Particular attention should be given to homes built prior to 1940;
- Designated playgrounds;
- Informal play areas frequented by children with or without property owner's permission;
and
- All other actual or potential residential areas.

6.0 PROPERTY SAMPLING

6.1 SCHEDULE

The BPSOU ROD, as modified by the ESD, states that all properties in the BPSOU and the Adjacent Area be assessed within 10 years, and that all properties requiring remediation be addressed within 20 years, following the Effective Date of the Consent Decree. The soil and dust sampling schedule is based upon three main variables. The first factor is the estimated number of residential properties within the BPSOU. According to the data provided by the BSB Geographic Information System (GIS) office, there are no more than 3,700 residential properties and possibly as few as 3,000 residential properties within the BPSOU. The second factor affecting the schedule is that some residents will not sign an access agreement to allow sampling. For those that authorize sampling, some residents will not sign an access agreement for abatement that includes the imposition of covenants to provide notice and protect response actions on the property via the access agreement. Third, the city of Butte has a very short sampling season. Past experience indicates that there are only about 20 weeks each year during which to complete residential soil sampling. The chart below (Projection of BPSOU Soil Sampling Progress) takes these factors into account and estimates when sampling may be completed.

Using best efforts to obtain access to and complete assessments for all residential properties in the BPSOU and the Adjacent Area within 10 years following the Effective Date of the Consent Decree allows BSB to prioritize sampling, as explained in Section 5.0, and also provides a reasonable period of time to work with landowners and EPA to access to those residential properties where residents do not sign access agreements. EPA will review BSB's progress toward completing sampling of the remaining residential properties in BPSOU and the Adjacent Area as part of a 5-year review of the Program. While EPA requires that BSB attempt to obtain access and complete the assessment of such residential properties within 10 years, BSB's inability to gain access to and complete the Program assessment and subsequent remediation activities, where necessary, within 20 years as required by this Plan is not a violation of the Consent Decree.



6.2 ACCESS

Prior to conducting any sampling or clean-up activities at a residential property, access must be obtained from the property owner. A written Sample Request form must be obtained from the property owner before sampling and a written Access Agreement must be obtained before abatement begins. Any dispute concerning access should be brought to the attention of the Agencies. It is essential to begin access procurement as early as possible in the remedial process to avoid potentially lengthy delays. It is recommended that access be obtained by going door-to-door. If residents are not home, a blank Sample Request Form with instructions for signature and submission to BSB, along with relevant contact information will be left at the residence (but not in the mailbox). Experience has shown that one must use all means (mail, email, phone calls, and knocking on doors) to get access to some properties. An example of the access agreement is presented in Appendix A. Additionally, at the same time, access must be obtained for any interior dust sampling and/or remediation that will be performed at the property. The status of property access will be tracked in the Program's database tracking system (see also Section 2).

6.3 SAMPLING PROCEDURES

6.3.1 Residential Yards

This section summarizes the procedure for sampling residential yards. The complete standard operating procedure (SOP) for sampling residential yards must be followed and can be found in the *Clark Fork River Superfund Site Investigation (CFRSSI) SOP* document (ARCO 1992a).

- A. Visually inspect the property and determine the number of sections needed for composite sampling. A photographic record will be made to document the pre-removal condition of the specific areas (e.g., east, west, south or north yards) of each park, play area or residential yard identified by BSB for soils removal, and a copy of such record will be provided to the owner (and occupant). Copies will be made available for review by EPA. Such record will: 1) note the areas from which soils will be removed; and 2) document any physical structures or features (e.g., fences, trees, shrubs) that may be impacted by the removal work and that will be repaired or replaced as appropriate and necessary. The owner (and occupant) will be invited to provide input into the creation of this record to ensure that any particular concerns he/she may have are documented. The owner will have to sign an access agreement (Appendix H) before work can begin. The owner (and occupant) will be given written information noting the following.
 1. The date on which the removal is expected to begin and the expected duration of the work.
 2. The names and telephone numbers of the BSB and EPA contacts as well as the contact for the contractor(s) who will conduct the removal work. Any delays or changes in contact personnel or their telephone numbers will be promptly communicated to the owner (and occupant).
- B. B.) Draw a scaled map of each yard or lot that shows property boundaries, house, garage, structures, driveways, contaminant source material, gardens, lawns and patios. Using measuring tapes and drawing yard features on graph paper shall yield an accuracy of approximately ± 2.0 feet. Each yard shall be divided into polygons (e.g., east yard, west) for sampling, and these areas shall be identified on the map. Composite samples of each polygon shall be produced from subsamples. The location of each subsample shall also be shown on the map.
- C. Label a bag for each composite sample with the address and the location of the sample.
- D. Take five sub-samples in an X pattern (if possible) for each composite sample sections. Samples will be collected at depths of 0-2 inches, 2-6 inches, and 6-12 inches.

E. Decontaminate the shovel and other sampling equipment after each polygon is sampled and use a new scoop for each section.

For each yard or lot the following will be recorded:

- Legal address;
- Location of polygon (north, south, east, west yard, garden, earthen driveway, source area, north, south, east, west perimeter);
- Sample number (1, 2, 3, etc.) composite from location;
- Sample Date;
- Codes: NY – North Yard
SY – South Yard
EY – East Yard
WY – West Yard
G – Garden Area
ED – Earthen Driveway
EB – Earthen Basement
S – Source Area
PRT – Pre-Removal Testing
Example: 412EGOLD – NY1-PRT represents the pre-removal test composite sample from the first 625 square-foot area in the north yard of a residence at 412 East Gold Street.

Chain-of-custody procedures will follow CFRSSI SOP G-7 (ARCO 1992a). All sampling identification information shall be input to the Program’s database tracking system.

F. Large Lot Sampling. Either the property boundary or a smaller natural boundary within the yard/lot will be used to establish the extent of the sample area. The yard area shall be defined as a maximum of 125 feet from the center of the residence, unless a property boundary or natural barrier (e.g., fence, hedge, tree line, abrupt change in grade, etc.) is encountered at a distance less than 125 feet. It is generally anticipated that the property lot within the BPSOU represents the sample area. The 125-ft definition, therefore, will be applied predominantly to residential yards located in the Adjacent Area of the Butte Site.

6.3.2 Indoor Dust

This section summarizes the procedure for sampling indoor residential dust using a High Volume Small Surface Sampler (HVS3). The complete SOP must be followed and can be found in *High Volume Small Surface Sampler (HVS3) Operation Manual* (CS3 Inc. 1998). A composite HVS3 vacuum sample shall be collected consisting of subsamples using the following procedure.

- A. Label a bottle/bag for the sample with the address and the location of the sample.
- B. Collect samples from:
 - the floor area directly inside the main entries;
 - the floor areas in the most frequently occupied rooms (Normally living room and/or kitchen);
 - the floors in the children's bedrooms; and
 - the floor areas adjacent to or under attic pathways.
- C. Empty dust sample into the labeled bottle/bag.
- D. Clean vacuum parts.

Samples shall be collected in certified clean sample bottles. A number system for tracking each sample will be established. At the time of sampling, the sample number shall be recorded in the sample log and the chain-of-custody record completed. The HVS3 vacuum shall be decontaminated before each use. The log, sample label, and chain-of-custody record shall be checked for identical entries. Chain-of-custody procedures will follow CFRSSI SOP G-7 (ARCO 1992a). All sampling identification information shall be input to the Program's database tracking system.

6.3.3 Earthen Basements

This section summarizes the procedure for sampling earthen basements. Although a SOP does not exist specifically for earthen basements, samplers shall adhere to the CFRSSI SOP for residential yards, to the extent practicable (ARCO 1992a).

- A. Visually inspect the basement for any hazards.
- B. Draw a map of the basement, including each area
- C. Label a bag for each composite sample with the address and the location of the sample.
- D. Collect five subsamples for each composite sample throughout the basement and put them in a properly labeled bag.

- E. Mark the locations of the subsamples taken on the map.
- F. Take photographs of the areas in the basement that were sampled.

Chain-of-custody procedures will follow CFRSSI SOP G-7 (ARCO 1992a). All sampling identification information shall be input to the Program's database tracking system.

6.3.4 Attic/Crawl spaces

This section summarizes the procedure for sampling attics and crawl spaces. Dust in these areas shall be sampled as part of the Program assessment within BPSOU and the Adjacent Area, whether or not an exposure pathway exists. The sampler(s) must follow the complete SOP, which can be found in the *Interior and Attic Dust Sampling and Analysis Plan* (ARCO 2007).

- A. Label a bottle/bag for the sample with the address and the location of the sample.
- B. Visually inspect the attic/crawl space for any hazards.
- C. Move insulation and/or debris to find the dust.
- D. Collect enough dust to meet laboratory specifications for a sample.
- E. Take photographs of the attic/crawl space.
- F. Replace any disturbed insulation and close access.
- G. Clean sample bottle and hose for the next sample location.

Attic dust composite sampling will be conducted using the Quick Take 30 sampling pump, HVS3 dust sampler, or a scoop and brush. The amount of dust and insulation present in the attic space shall determine the sampling method used. Each sample shall consist of at least 100 grams of material. Samples shall be collected in certified clean sample bottles. A numbering system for tracking each sample will be established. At the time of sampling, the sample number shall be recorded in the sample log and the chain-of-custody record completed. The log, sample label, and chain-of-custody record shall be checked for identical entries. Chain-of-custody procedures will follow CFRSSI SOP G-7 (ARCO 1992a). All sampling identification information shall be input to the Program's database tracking system.

6.3.5 Paint

This section summarizes the procedure for sampling painted surfaces in the residential setting. The sampler(s) must follow the manufacturer's procedure for operating the X-Ray Florescence (XRF) instrument. Paint assessment shall begin with a visual inspection of the building following U.S. Housing and Urban Development (HUD) guidelines to determine if there are potential lead-based paint hazards. Interior and exterior components of the building, including outbuilding and fences shall be sampled with the portable XRF to determine the presence of lead-based paint. The information obtained during this assessment shall be recorded on a lead-based paint (LBP) data sheet.

- A. Calibrate the XRF in accordance with manufactures specifications using known standards, before and after each home is assessed.
- B. Visually inspect the property.
- C. Start on the interior of the house, in the room farthest from the entry point (if possible).
- D. Test all painted surfaces in each room, closets and hallways.
- E. After every shot write down the information required for every shot on the LBP testing data sheets.
- F. Move to the exterior of the house and shoot as many different surfaces as possible on each wall.
- G. After the house has been sampled, move to any outbuildings/fences and test all painted surfaces possible.
- H. Re-calibrate the XRF.
- I. Download the XRF data onto the computer and enter that data and all other sampling information into the Program's database tracking system.
- J. Generate the report using the information from the LBP testing data sheets.

The information recorded on the data sheet shall include:

- Date;
- Legal Address;
- XRF Serial Number;
- XRF calibration data and time;
- Property owners name and mailing address;

- Personnel conducting risk assessment;
- Sample location (room, wall, interior, exterior);
- Component sampled;
- Substrate (wood, metal, concrete);
- Paint condition;
- Paint color; and
- Sample result.

A report containing all the above-listed information shall be provided to the property owner. The report shall be recorded in the Program database and tracking system.

6.3.6 Lead Pipes

Drinking water shall be sampled for the presence of lead if elevated blood lead occur and no other potential source of lead is discovered during the residential investigation.

6.4 SAMPLE LOGGING, TRACKING, AND CUSTODY

Sample identification information for the yard soil, earthen basement material, indoor dust, and attic dust samples shall be recorded using the following procedures.

- A) Assign each sample a corresponding sample number.
- B) Log the identification information for each sample into the BSB sample logbook.
- C) Make sure that each sample is labeled with a sample number, address, and sample location.
- D) Fill out a chain-of-custody form and deliver it with the samples to the laboratory for testing.
- E) Ensure that all dust samples will be tested for lead, arsenic and mercury and all soil samples will be tested for lead and arsenic by the previously-used methods so the data will be representative and comparable to the historic data.
- F) After the lab delivers the results, log sample results into the BSB logbook and into the Program's database.

A sample chain-of-custody protocol will be initiated during the field collection and handling of samples for this Program. Chain-of-custody records ensure that samples are traceable from the time of collection until final disposition. A sample is in custody under any of the following circumstances:

- The sample is in the person's physical possession;
- The sample is in the person's view after being in possession;
- The sample has been locked in a secure area after it was in the person's possession; and
- The sample was in the person's possession and then was transferred to a designated secure area.

The chain-of-custody record will be initiated by the individual physically in charge of the sample collection. The chain-of-custody record may be completed concurrently with the field sampling or before shipping samples to the laboratory. The sampler is personally responsible for the care and custody of the samples until they are shipped. When transferring the sample possession, the individual relinquishing and receiving the sample will sign and record the date and time of day on the chain-of-custody record.

6.5 SAMPLE PREPARATION

Sample preparation will be consistent with the XRF analytical instrument manufacture's specification or with that of the laboratory method to be used (Table 3). As previously stated, all samples will be tested for lead, arsenic and mercury by the previously-used methods so that any newly-collected data will be representative and comparable to the historic data.

7.0 BACKFILL SAMPLING AND SELECTION

To determine if a potential backfill (i.e., replacement soil) source is uncontaminated, representative soil samples shall be collected and analyzed by either a laboratory- grade XRF or by standard wet chemistry methodology. Backfill material shall meet the cover soil requirements contained in the Butte Hill Re-vegetation Specification prior to its use. In addition, the maximum rock (course fragment) size must be <1 inch in diameter and constitute <10% (by volume) of the cover soil. If the backfill meets these specifications it will be deemed approved as the designated source for all soil replacement work. If another source of the backfill is needed, additional composite samples will be analyzed and the source approved by the EPA prior to its use. Sample logging, tracking, custody shall be the same as that used for yard soils (see Section 6.4).

8.0 RESIDENTIAL YARD REMEDIATIONS

The residential abatement program is described below. Once actions level exceedances are determined through sampling, abatement shall proceed as soon as possible. The abatement of residential soil will be conducted by appropriately trained Program staff or local contractors in accordance with all Federal and State rules and regulations and all procedures adopted by BSB. Training includes reading, understanding, and signing the site-specific health and safety plan. All abatement projects will be supervised by BSB Program staff. All BPSOU and Adjacent Area yards and other media (described in Section 9.0 below) shall be completed within 20 years following the Effective Date of the Butte Site Consent Decree.

8.1 Yard-specific Removal Plans

The removal action shall be preceded by an interview with the landowner and the renter if the property is rented, in order to understand their concerns. At least one week prior to initiating any removal action, a yard-specific removal plan must be developed for approval by the landowner (in writing). Each removal plan shall include the following:

- A description of the scope of the removal that includes a recognition of the landowner's concerns;
- Identification of the areas to be removed;
- An inventory of all the features (e.g., trees, shrubs, fences) of the yard including a map showing all the features that may be impacted by removal activities (the map made during the sampling of the yard can be used as a template);
- A list of the features that will be replaced, and steps that will be taken to minimize damage to features that will not be removed;
- Specific dates for the removal; and
- A list of the names and phone numbers of the BSB person responsible for the removal action and the BSB contractors.

The removal plan shall be made available for review and approval by oversight personnel, which include the MDEQ and EPA, at least one week prior to the initiation of removal activities. Sufficient time shall be allotted to address any potential concerns of the oversight personnel and property owners.

8.2 SOIL REMOVAL AND DISPOSAL

Contaminated soil which exceeds action levels shall be removed from residential areas to a maximum depth of 12 inches or to the soil bedrock interface (if bedrock is encountered before the 12-inch depth), and to a depth of 24 inches in vegetable garden areas. Soil will be excavated using conventional equipment such as backhoes, small Bobcat-type loaders, and hand tools. Excavated soils shall be transported to the Butte Mine Waste Repository using dump trucks. Precautions shall be implemented to prevent fugitive dust emissions during excavation and from the dump trucks during transportation. This could include spraying water on the surface of the soil or covering the trucks with tarps. Street cleaning will be conducted on an as-needed basis. At each removal location, prior to backfilling, a layer of lightweight Geotextile fabric will be placed over the exposed surface as a marker of the extent of soil removal/replacement and as a visual indicator that the underlying soil may contain arsenic, lead, or mercury concentrations above action levels.

8.3 YARD RECLAMATION

8.3.1 Backfill Material

The excavated areas will be backfilled with soil that meets the requirements set forth in the Butte Hill Revegetation Specifications and stated in Section 7. Backfill material (i.e., replacement soil) shall not contain any trash, debris, or large roots from shrubs or trees. The backfill material shall be from the pre-approved source as described in Section 7. Backfill material for garden areas must be suitable for germination and cultivation of flowers and vegetables with ordinary amendments. Dust suppression measures such as spraying water on the surface of the soil in trucks or covering trucks with tarps will be implemented as necessary to prevent fugitive dust emissions during transportation of the soils material to the repository and during transport of the backfill material.

For driveways, a pit-run gravel base capped with six inches of $3/4$ inch road-mix gravel will be applied in most cases. Each source of gravel will be analyzed for metals in the same manner as other backfill material. Concrete or asphalt will be applied when determined necessary by BSB.

8.3.2 Sod

A weed-free sod, composed of Kentucky bluegrass and/or a sod-forming fescue species, will be placed over the replacement soil in the residential yards and BSB parks from which soils were removed. Sod is not required over the replacement soil of play areas and the perimeters of structures. The topsoil attached to the sod constitutes the topsoil layer.

8.3.3 Seeding

Seeding will be used for open spaces. Soil surface preparation and seeding methods will be in accordance with EPA-approved techniques for use in the Priority Soils OU, which are described in the Butte Hill Revegetation Specifications. For these areas, the seed density shall be at least 58

pure live seed per square foot using the following species and rates, as provided in the Butte Hill specifications:

- Slender Wheatgrass 3.0 pounds/acre
- Thickspike Wheatgrass 2.0 pounds/acre
- Intermediate Wheatgrass 4.0 pounds/acre
- Sheep Fescue 2 pound/acre
- Canada Bluegrass 1 pound/acre
- Basin Wildrye 3 pounds/acre
- Crested Wheatgrass 1 pound/acre
- Ladak Alfalfa 1 pound/acre
- Red Clover 2 pounds/acre
- Birdsfoot Trefoil 1 pound/acre

It is recognized that the seed mixture and rate may need to be adjusted over time as more reclamation experience is gained and new varieties of species are released for reclamation purposes. Before altering the seed mixture or rates, BSB shall obtain approval from the oversight agency and update the Butte Hill Re-vegetation Specifications to reflect those changes.

9.0 Other Media Abatement

The interior residential abatement program is described herein and summarized below. As required for the yard removals, interior residential abatements will be conducted as part of the Program within BPSOU and the Adjacent Area by appropriately trained Program staff or local contractors in accordance with all Federal and State rules and regulations and all procedures adopted by BSB. Trained Program staff or local contractors will also complete all attic abatements in the Attic Abatement Area, where required and in accordance with this Program plan. Training includes reading, understanding, and signing the site-specific health and safety plan. All abatement projects will be supervised by BSB Program staff.

For the media discussed below, BSB shall interview the landowner and the renter if the property is rented, to understand their concerns, and then prepare an abatement plan specific for that residence. Non-mine waste lead sources [e.g., Lead-based paint] that are determined to be in fair or poor condition in accordance with the HUD guidelines will be abated in the following circumstances: when determined necessary for cap protection, when determined to be a potential source of elevated interior dust levels and when determined to be a source of exposure during

Elevated Blood Lead investigations. For example, paint abatements for cap protection purposes will consist of painted areas adjacent to the soil replacement project only. Property owners will be responsible for maintaining their property, including paint after an abatement/risk assessment has been completed. At least one week prior to initiating any abatement, BSB will review the plan with the property owner, and renter if the property is rented; written approval must be obtained from the property owner (and tenant) before abatement begins. Any dispute concerning access should, after good faith efforts to resolve the dispute by the implementer of this plan, be brought to the attention of the Agencies. Each abatement plan must:

- Describe the scope of the abatement;
- Provide the specific dates for the abatement; and
- Provide a list of the names and phone numbers for the BSB oversight person and the BSB contractors.

The removal plan shall be made available for review by agency oversight personnel, which include the DEQ and EPA, at least one week prior to the initiation of removal activities. Sufficient time shall be allotted to address any potential concerns of the oversight personnel.

9.1 Indoor Dust

If living space dust exceed either the arsenic, lead, or mercury action level, living space floors will be thoroughly cleaned with a remediation grade/High Efficiency Particulate Air (HEPA) filter vacuum or carpets will be removed and replaced. Non-living spaces will also be cleaned if an action level in those areas is exceeded and there is either a pathway allowing dust into the living space or the property owner is planning a remodel that will disturb the non-living space dust.

9.2 Earthen Basements

If soils in earthen basements exceed action levels, the soil will be capped or encapsulated via surfactant as appropriate for the space as determined by EPA in consultation with DEQ and BSB.

9.3 Attic/Crawl Spaces

Attic insulation, excluding HVAC insulation and thermal system insulation, and debris will be removed in conjunction with the contaminated attic dust. The removal of the insulation and debris is necessary due to the fact that the insulation/debris cannot be segregated from the contaminated dust.

Containment shall be achieved using 6-mil thick polyethylene at the attic access before attic dust removal/abatement begins. Attic dust removal/abatement shall be conducted using HEPA equipped vacuums systems. The dust shall be collected in doubled 6-mil poly bags. The contained attic dust, insulation and debris shall be transported to the local repository.

9.4 Paint

Deteriorated and peeling lead paint will be abated by painting walls and other surfaces with non-lead-based paint.

9.5 Lead Within Pipes

If water testing indicates that lead within the plumbing system of a house (i.e., lead solder at pipe joints) exceeds the safe drinking water standards, piping will be replaced.

10.0 ATTIC ABATEMENT AREA

Within the Attic Abatement Area, outside the BPSOU, Program staff will sample the attic of a residential property upon receiving a request for sampling from a residential property occupant or upon receipt of a development proposal which may result in development of an attic exposure pathway in a residential property. Experience with attic sampling in BPSOU has shown that contamination above action levels is associated with older residential properties. Therefore, BSB staff will prioritize their resources to target sampling of older residential properties, and only sample properties constructed after issuance of the 2006 ROD under extraordinary circumstances. An attic will be cleaned if an action level, as determined by Program sampling results, is exceeded and there is either a pathway allowing dust from the attic to enter the living space or the property owner is planning a remodel that will disturb the attic (non-living space) dust. Since attic dust is not cleaned-up unless there is an established pathway of exposure, properties that are sampled in the Attic Abatement Area and do not have a current exposure pathway will be tracked over the long-term to abate attic dust above action levels if exposure pathways arise in the future.

11.0 AIR MONITORING FOR MERCURY

Air monitoring for mercury will be performed by BSB in the three areas of residences frequented by children (BSB 2006); these are 1) a floor area directly inside the main entry to the residence, 2) a floor area in the most frequently occupied room (normally living room or kitchen), and 3) a floor area in the child's bedroom or another frequently occupied room if no children are present in the home. This sampling will be done if dust in the residence exceeds the residential action level for mercury, which is 147 mg/kg. Furthermore, a basement air sample will be collected if the mercury action level is exceeded in samples collected from exposed earthen basement soils. Butte-Silver Bow will conduct the mercury vapor sampling by collection of airborne elemental mercury in a

passive dosimeter or active sampling device and subsequent analysis using a cold vapor-atomic absorption spectrophotometer (CV-AAS – see Table 2).

12.0 HEALTH AND SAFETY

A site-specific health and safety plan has been developed by BSB for work in the BPSOU, including work under the ROD, as modified by the ESD for this OU, the Adjacent Area and the Attic Abatement Area. Updates to the site-specific health and safety plan will be made as necessary and provided to the agencies for review. The plan describes the air monitoring and dust suppression methods that will be employed and when work will be temporarily stopped, if necessary, to prevent potentially unacceptable exposures of abatement workers or the public to contaminants of concern.

Prior to conducting any contaminant abatement, all workers are required to read, understand, and sign the site-specific health and safety plan. Butte-Silver Bow will provide the signature page of the plan to the agencies upon request.

13.0 DUST MONITORING AND SUPPRESSION

13.1 MONITORING PARTICULATE DUST LEVELS

Air monitoring for dust levels during open space reclamation was conducted as part of the remedial investigation and feasibility study. It was determined by EPA and ARCO that dust levels during land reclamation activities are not a human health concern. Consequently, air monitoring of particulate dust during reclamation activities in open spaces and residential yards is not required, providing dust suppression techniques are used.

Dust monitoring during the abatement of attics has not been conducted to date so it is unknown if a potential hazard to workers exists. Until it is demonstrated not to be necessary, BSB abatement contractors will use respiratory protection during attic dust abatement activities whenever particulate matter is visually observable in the ambient air.

13.2 DUST SUPPRESSION TECHNIQUES

Routine dust control, including wetting of soils or lawns with water, will be performed as necessary during all soil excavations and backfilling activities. Soils being transported to or from each excavation also will be watered or the trucks shall be covered with tarps, as necessary, to prevent fugitive dust emissions.

14.0 DATA QUALITY CONTROL

14.1 General Requirements

The EPA has issued guidelines to help Superfund data users develop site-specific data quality objectives (DQOs) (EPA 1987). In addition to those general guidelines, EPA has approved data quality control documents for use in the Clark Fork River Superfund Site Investigations (CFRSSI). For implementing the residential yard work, BSB will be consistent with both the general EPA DQO guidelines and the CFRSSI documents. The key CFRSSI documents are: the Standard Operating Procedures (1992a); the Quality Assurance Project Plan (1992b); and the Laboratory Analytical Protocol (1992c). The protocol provided in these documents will be used to ensure that the quality of data generated under the multi-pathway program are known and documented.

The overall quality assurance objective for measurement data is to ensure the collection of representative samples and to provide analytical data of sufficient quantity and quality for decision-making. Important aspects of data quality are precision, accuracy, representativeness, and detection limits for the analytes. Definitions of each of these and how they apply specifically to the multi-pathway program are discussed below.

Accuracy is the degree of agreement of a measured value with the true or expected value. Accuracy will be measured in two different ways during the multi-pathway program. For laboratory data, accuracy will be assessed by measuring recovery of laboratory control standards, specifically national institute of standards and testing (NIST) for the metals. Recovery is calculated and bias evaluated.

Precision is the degree of mutual agreement of independent measurements of the same sample. Precision will be measured in multi-pathway program by analyzing both laboratory duplicate and "blind" field duplicate samples. Precision can be expressed as relative percent difference (RPD) or relative standard deviation (RSD).

Representativeness is the degree to which sample data represent a characteristic of a population, parameter, or environmental condition. Representativeness is a qualitative parameter that is most concerned with proper design of the sampling and analytical schemes. Representativeness is achieved by determining the number and locations of samples and the appropriate sampling techniques needed to depict, as accurately and precisely as necessary, the conditions being measured. Representativeness deals with protocols for storage, preservation and transportation of samples; analyzing samples with appropriate methods, techniques, and instrumentation; and the use of methods to document these protocols.

Both in-place soils and backfill material will be analyzed by laboratory grade XRF using protocols from the CFRSSI documents, as amended. The standard reference material for metals analysis will

be NIST reference material No. 2711 or another reference material with similar matrix conditions if the 2711 material is not available.

Method detection limits (MDLs) for metals analysis will be determined quarterly by the XRF laboratory. The MDL is defined as three (3) times the standard deviation of a series of measurements near the detection limit. Approximate detection limits are as follows: arsenic 6 milligrams per kilogram (mg/kg); and lead 9 mg/kg. These detection limits will be reevaluated and may change on a quarterly basis, but will typically be within ± 5 mg/kg of the values provided above.

14.2 Laboratory Quality Control

Required elements of laboratory QC are found in CFRSSI guidance documents: the CFRSSI QAPP (ARCO 1992b), laboratory analytical protocol (LAP) for standard wet chemistry analyses (ARCO 1992c), and LAP for XRF analysis (Ashe Analytics and MKE 1992). Specific laboratory quality control samples, the frequency of analysis, control windows and corrective action to be taken when windows are exceeded are provided in these documents. Analytical instruments are initially calibrated using standards and blanks, and the calibration is routinely verified. The calibration is checked using an independent reference and instrument performance is monitored using method-specified QC check samples. Matrix spikes and laboratory duplicates measure method performance. All appropriate laboratory QC samples included in the XRF LAP are to be implemented in this response action.

14.3 Data Quality Reporting

Butte-Silver Bow will prepare annual data summary reports and make these available to the agencies upon request. These reports will document the procedures used in the field to collect and transport samples including chain of custody.

15.0 ANNUAL CONSTRUCTION COMPLETION REPORT

Construction Completion Reports will be compiled for the fiscal year and will be disseminated to ARCO and the agencies by the end of December of each year. The report will include a description of the year's activities and the costs associated with the work. The report will also include a summary of the clinical and educational intervention programs conducted by the BSB Health Department.

16.0 REFERENCES

ARCO 1992a. Clark Fork River Superfund Standard Operating Procedures. Anaconda, Montana. September.

ARCO 1992b. Clark Fork River Superfund Quality Assurance Project Plan. Anaconda, Montana.

ARCO 1992c. Clark Fork River Superfund Laboratory Analytical Protocol. Anaconda, Montana.

ARCO 2007. Interior and Attic Dust Sampling and Analysis Plan, June 19.

Ashe Analytics and MKE 1992. XRF Laboratory Analytical Protocol. Butte, Montana.

BSB/ARCO 2006. Allocation and Settlement Agreement and Mutual Release Claims By and Between the City and County of Butte-Silver Bow and Atlantic Richfield Company. Exhibit 20 – Multi-Pathway Program Protocol. November 15 (draft).

CS3 Inc. 1998. High Volume Small Surface Sampler (HVS3) Operation Manual.

EPA 2000. Guidance for Data Quality Objectives Process. EPA QA/G-4. August.

EPA 2006. Record of Decision, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site.

TABLE 1

**Soil, Dust, Backfill, and Vapor Action Levels in Residential Areas
Butte Priority Soils Operable Unit
Silver Bow Creek/Butte Area NPL Site**

| Contaminant of Concern | Exposure Scenario | Concentration |
|-------------------------------|----------------------------|----------------------|
| Lead | Residential | 1,200 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 ug/m3 |

TABLE 2

**Testing Method References for Soil, Dust, Backfill, Gravel Material, and Vapor¹
Butte Priority Soils Operable Unit
Silver Bow Creek/Butte Area NPL Site**

| Parameter | Application | Reference/Method | Comments ² |
|--|-----------------------------------|---|---|
| Lead, Arsenic, Cadmium, Copper, Zinc, and Mercury | Soil, Dust, and Backfill material | Ashe Analytics and MKE Services/XRF or EPA Methodology | By XRF: with EPA – approved modifications |
| Mercury (vapor) | Ambient interior air | Cold vapor-atomic absorption spectrophotometer (CV-AAS). OSHA ID- | |
| pH and Saturation Percent | Soil and Backfill material | ASA Monograph No.9 (most recent version)/Method 10-2.3.1 | Measured from a saturated paste extract |
| Electrical Conductivity | Soil and Backfill material | ASA Monograph No.9 (most recent version)/Method 10-3.3 | Measured from a saturated paste extract. |
| NO ₃ – Nitrogen, Phosphorus, Potassium | Soil | ASA Monograph No.9 (most recent version) | |
| Percent Organic Matter | Soil | Walkley-Black procedure; ASA Method Soil Analysis, Method 29-3.5.2. | |
| Texture and Percent Rock Fragment | Soil and Backfill material | ASA Monograph No.9 (most recent version)/Method 15.5 | Percent rock fragment is the > 2mm size fraction. |
| Gravel | Driveway Material | No reference/ standard sieving method | Pit run material capped with gravel consisting of 100% being < 3/4 inch |
| ¹ Except for mercury in ambient air, all parameters and testing methods follow the Butte Hill Revegetation Specifications (EPA 2006). ² Soil testing must be done for every 5,000 yd ³ of material used. | | | |

Appendices